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FINAL TECHNICAL MEMORANDUM SITE INSPECTION STEP 2 RESULTS AND PROPOSED PATH FORWARD FOR AREA OF CONCERN 9 (AOC 9) FISC WILLIAMSBURG VA

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CH2M HILL

Site Inspection – Step 2 Results and Proposed Path Forward for AOC 9 at Cheatham Annex, Williamsburg, Virginia

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1 Introduction

This Technical Memorandum (TM) presents the results of Step 2 of the Site Inspection (SI) and the path forward for AOC 9, Penniman Lake, located at Naval Weapons Station Yorktown Cheatham Annex (CAX) in Williamsburg, Virginia (**Figure 1**). An SI is being conducted to identify the potential source(s) of polychlorinated biphenyls (PCBs) as well as volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, explosives, and inorganic constituents (a.k.a. metals) identified within Penniman Lake, and to determine if additional investigation activities or remedial action are warranted. Penniman Lake is not a formal site, but is a 48-acre freshwater lake that receives stormwater runoff from adjacent areas within CAX.

A two-stepped SI was conducted, due to the size of the lake and complexity to identify the potential source of contamination. Step 1 field activities were conducted from July to August 2011 to evaluate soil within drainage areas leading to Penniman Lake and to confirm the presence of PCBs within lake sediment. Results of the Step 1 SI were presented in the document titled *Final Technical Memorandum, Results of the Step 1 Polychlorinated Biphenyls Site Inspection at Penniman Lake, Cheatham Annex, Williamsburg, Virginia* (CH2M HILL, 2012a) (referred to as the "Step 1 TM" and included as **Attachment A**). The Step 1 TM concluded that PCBs were distributed throughout Penniman Lake, but were found at the highest concentrations in the northwest cove area (referred to as the "northwest finger" of Penniman Lake), nearest the outfalls of the stormwater drainage channels in which the highest concentrations of Aroclor-1260 were detected in upstream surface soil samples (**Attachment A**). To continue examining the potential sources for the PCBs detected in surface soil and sediment, the Step 1 TM recommended additional investigation of the areas that appeared to be along potential migration pathways from a potential PCB source, including upland areas that are upstream of these northwest finger drainage channels.

The Step 2 field activities were conducted in October and November 2012, with the primary objective to further evaluate potential PCB source areas and concentrations within the lake based on the results of Step 1, and a secondary objective was to evaluate results for non-PCB constituents (namely, SVOCs, pesticides, explosives, and metals). In addition, a biological survey was conducted to evaluate the aquatic communities present and to assess the levels of bioaccumulative constituents in the aquatic community that were identified in the Pond Study (Baker, 2001) and resulted in a catch-and-release fishing restriction on Penniman Lake[1]. This TM provides a comprehensive summary of the soil, sediment, and biota analytical results, and human health and ecological risk screenings conducted during Step 2 of the SI. This TM has several attachments that provide supplemental information in support of the main body text and are referenced throughout – the aforementioned **Attachment A** (Step 1 TM), **Attachment B** (Analytical Results), **Attachment C** (Human Health Risk Screening), **Attachment D** (Ecological Risk Screening), and **Attachment E** (Exceedance Figures for Non-PCB constituents).

[1] The restriction was implemented in 2000 as a conservative measure based on the presence of bioaccumulative constituents; however, no biota sampling was conducted and no human health risk assessment (HHRA) was prepared at that time.

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2 Site Background

CAX is located in Williamsburg, Virginia, on the York-James Peninsula (**Figure 1**). The peninsula trends northwest-southeast and is roughly bordered to the southwest by the James River, to the northeast by the York River, and to the southeast by the confluence of the James River and the Chesapeake Bay. CAX was established in June 1943 as a satellite unit of the Navy Supply Depot to provide bulk storage facilities. The property that houses CAX had been the location of the Penniman Shell Loading Plant, a large powder and shell loading facility operated by the DuPont Company during World War I. Today, the mission of CAX is supplying Atlantic Fleet ships and providing recreational opportunities to military and civilian personnel.

Penniman Lake is a 48-acre freshwater lake located in the southeastern portion of CAX. The lake was created in 1943 when a portion of King Creek was dammed; it is not tidally influenced (**Figure 2**). Numerous drainage channels and stormwater outfalls discharge to the lake. Penniman Lake is the ultimate receptor for stormwater runoff originating from a vast acreage of impervious surfaces in upland industrialized and developed areas of CAX (particularly to the north and northwest) that drain to the lake, including parking lots, roadways, and building rooftops. Stormwater is directed to Penniman Lake via a substantial network of drainage features, including drainage ditches adjacent to roads, drop inlets located in paved parking lots and other surfaces, subsurface storm sewers leading to stormwater outfalls that ultimately discharge to Penniman Lake, and drainage ways or channels that directly intersect the lake. An overflow structure adjacent to the dam (**Figure 2**) discharges directly to King Creek; other major outflows are evaporation and recharge to groundwater. The historical use of the lake is unknown; however, the lake is currently used by the Department of Defense (DoD) for recreational activities. The lake is not open to the general public. Catch-and-release fishing restrictions were implemented for the lake in 2000, following identification of bioaccumulative constituents, in particular PCBs, within lake sediment[2].

Known CERCLA sites adjacent to Penniman Lake are Site 11, located to the northwestern portion of Penniman Lake, and the Area of Concern 6 (AOC 6) Ammonia Settling Pits subarea, Trinitrotoluene (TNT) Graining House Sump subarea, and TNT Catch Box Ruins subarea, which are adjacent to the southwestern portion of Penniman Lake (**Figure 2**).

Site 11, commonly referred to as the "Bone Yard" because of its use as a storage area for old cars, encompasses an area of approximately 2.7 acres and was reportedly used by the CAX Department of Public Works to store scrap materials (CH2M HILL, 2010). In 2002, an RI was conducted at Site 11 that included the collection of surface and subsurface soil, surface and subsurface sediment, surface water, and groundwater samples from within Site 11 and adjacent areas. The RI concluded that Site 11 was not the source of PCB contamination in Penniman Lake and recommended additional sampling from within the drainage channel upgradient of Outfall NR-029 (Figure 3 of **Attachment A**) and in the northwestern finger of Penniman Lake to determine the extent of PCB contamination and potentially identify the source(s) (Baker, 2007); Site 11 closed with a no further action for all media Record of Decision in 2010 (CH2M HILL, 2010).

The AOC 6 Ammonia Settling Pits, TNT Graining House Sump, and Catch Box Ruins are three of five subareas related to the former Penniman Shell Loading Plant. The AOC 6 Ammonia Settling Pits consist of earthen ammonia settling pits through which wastewater from an ammonia finishing building was discharged. The AOC 6 TNT Graining House Sump consists of a concrete-lined, open top pit believed to be the sump pit for the TNT graining house in the former shell loading area, while the AOC 6 TNT Catch Box Ruins consists of an earthen, brick-lined depression located immediately adjacent to the TNT Graining House and was used to separate TNT particles from wastewater. All three subareas were investigated during the CAX Multiple AOC SI, and explosives constituents

[2] Again, the restriction was a conservative measure and not based on biota sampling or an HHRA.

consistent with site historical activities were detected in soil (CH2M HILL, 2012b). Samples of Penniman Lake surface water and sediment were collected in October 2008 from two locations adjacent to these AOC 6 subareas (SD/SW01 and SD/SW02 – (Figure 4 of **Attachment A**) and analyzed for SVOCs, explosives, and inorganic constituents to determine if AOC 6 has had an impact on the lake (CH2M HILL, 2012b). Based on historical sampling results and known site activities, these samples were not analyzed for VOCs, pesticides, and PCBs since an earlier 1999 SI identified only inorganic constituents and explosives as constituents that exceeded risk-based concentrations (Weston, 1999). Therefore, with regard to PCBs (Aroclor-1260), the AOC 6 Ammonia Settling Pits and the TNT Graining House Sump and Catch Box Ruins subareas are not considered contributors to Penniman Lake. A remedial investigation (RI) is currently in progress for the Ammonia Settling Pits subarea; the TNT Graining House Sump and TNT Catch Box Ruins subareas were evaluated together under a recently completed RI (CH2M HILL, 2015). An RI addendum will be completed for all three subareas to address explosives constituents in Penniman Lake.

3 Investigation History

In January 2001, CAX was placed on the National Priorities List (NPL), which required all subsequent activities for Navy Environmental Restoration sites to be conducted under the procedures set forth in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Previously conducted evaluations and inspections that helped characterize potential contamination and contaminant sources at Penniman Lake include the Penniman Shell Loading Plant SI (Weston, 1999), Pond Study (Baker, 2001), Site 11 Remedial Investigation (Baker, 2007), AOC 6 SI (CH2M HILL, 2012b), and various site visits. The previous investigations relevant to this SI are presented in detail in the final TM for Step 1 of the current SI, provided as **Attachment A**. Previous sampling locations and PCB results that exceeded a human health and/or ecological screening value are presented in Figure 4 of **Attachment A**.

Site Inspection – Step 1

The SI's Step 1 field investigation activities were conducted in July and August 2011 (**Attachment A**). A field survey was initially conducted to verify all stormwater outfalls and identify all major drainage ways (man-made and natural) to the lake. Following identification of potential drainage ways, a total of 26 surface soil (0 to 6 inches below ground surface [bgs]) samples were collected from within the drainage ways and a total of 44 surface sediment (0 to 4 inches below sediment surface [bss]) samples were collected from Penniman Lake and analyzed for PCB Aroclors (**Table 1** and **Figure 3**).

Surface soil and surface sediment data were evaluated to identify or eliminate potential PCB migration pathways into Penniman Lake. Aroclor-1260 was the only PCB congener detected in surface soil and sediment, with maximum concentrations of 63,000 and 16,000 micrograms per kilogram (µg/kg), respectively. The highest Aroclor-1260 concentrations in surface soil were detected in the drainage ways leading to the northwest finger of Penniman Lake (Figure 5 of **Attachment A**). Similarly, the highest Aroclor-1260 concentrations in Penniman Lake surface sediment were observed in the northwestern (most upstream) end of Penniman Lake, in the northwest finger area (Figure 6 of **Attachment A**). Outside of the northwest finger area, the highest Aroclor-1260 concentration was 810 µg/kg, located in the northeast finger of Penniman Lake (Figure 6 of **Attachment A**).

The Step 1 TM concluded that PCBs were distributed throughout Penniman Lake, but were found at the highest concentrations in the northwest finger area, nearest the outfalls of the stormwater drainage ways in which the highest concentrations of Aroclor-1260 were detected in upstream surface soil samples (**Attachment A**). To continue examining the potential sources for the PCBs detected in surface soil and sediment, the TM recommended additional investigation of the areas that appeared to be along potential migration pathways from a potential PCB source, including upland areas that are upstream of these northwest finger drainage ways. In addition, it recommended a review of available historical records and information on building usage to potentially gather additional information regarding the use of PCBs at the base, specifically within four upland areas recommended for further investigation activities, and to review the historical non-PCB data to help identify any other constituents of potential concern that may need further evaluation (CH2M HILL, 2012a).

4 Step 2 Field Investigation Activities

The SI's Step 2 field activities were conducted from October through November 2012 and included a reconnaissance-level biological survey of fish, frogs, and benthic invertebrates throughout the Penniman Lake study area; collection of reference biota samples from Cheatham Pond; and collection of surface and subsurface soil, surface and subsurface sediment, surface water, and biota (tissue) samples from the Penniman Lake study area (**Tables 1** and **2**). The Step 2 samples were collected throughout the study area (**Figure 3**) at locations that were identified and based on the results of the samples collected during Step 1 and agreed upon by the CAX Partnering Team; in addition, reference sediment and surface water samples were collected from Cheatham Pond (**Figure 4**). All samples were collected in accordance with the Step 2 UFP-SAP (CH2M HILL, 2012c); any deviations from the UFP-SAP are discussed below.

4.1 Sediment Sampling

Twenty-five[3] co-located surface and subsurface sediment samples (Station IDs SD62 through SD82 and SD84 through SD87) were collected from Penniman Lake and upstream drainage ways and analyzed for VOCs, SVOCs, pesticides, Aroclor-1260, inorganic constituents, cyanide, explosives, total organic carbon (TOC), pH, acid-volatile sulfide and simultaneously extracted metals (AVS/SEM), and grain size. Surface sediment samples were collected from 0 to 4 inches bss (to be consistent with the historic surface sediment sampling interval at CAX and is generally the bioavailable zone) to evaluate the nature and extent of contamination and sediment characteristics in the lake and upstream drainage ways, and to assess potential risks to human health and the environment. Subsurface sediment (4 to 8 inches bss – the historic subsurface sediment sampling interval at CAX and is typically used for fate and transport [not exposure]) samples were collected to evaluate the nature and extent of possible deeper contamination within the drainage way and lake sediments and to evaluate sediment characteristics within the lake from historical deposition and subsequent burial of sediments.

One surface sediment sample was collected from the King Creek side of the dam, just south of the overflow pipe from Penniman Lake to King Creek (**Figure 3**). This sample was collected to evaluate any potential transport of contaminants from Penniman Lake into the adjacent King Creek and analyzed for the aforementioned sediment parameters.

In general, the surface and subsurface sediment samples were collected from Penniman Lake using a stainless steel Ponar dredge; however, when vegetation was found to obstruct the Ponar dredge grabs, the sediment samples were collected using a hand auger. Sediment samples from the drainage ways were collected using a hand auger. The sediments were transferred from the Ponar dredge or hand auger using Sterileware high-density polyethylene disposable 8-ounce scoops and placed inside disposable aluminum pans for homogenization, prior to placing them into the sample containers.

4.2 Surface Water Sampling

Eight surface water samples (Station IDS SW62 through SW69) were collected from Penniman Lake and upstream drainage ways and analyzed for VOCs, SVOCs, pesticides, Aroclor-1260, total and dissolved inorganic constituents, cyanide, explosives, and hardness. These samples were collected to evaluate the nature and extent of contamination in surface water.

The surface water samples were collected using a decontaminated collection sampler, such as an unpreserved laboratory jar, from just below the water surface and the collected surface water was then decanted into the sample containers. Water quality parameters (hardness, turbidity, temperature, pH, conductivity, salinity, dissolved oxygen, and oxidation reduction potential) were measured from the top, middle, and bottom of the water column above each surface water sample location, and the data are provided in Table D-2 of **Attachment D**.

[3] Initially, the UFP-SAP outlined the collection of 21 co-located surface and subsurface sediment samples; however, based on field observations and the saturation of the samples at the time of collection, several samples originally designated to be soil samples (CAPL-SO51 through CAPL-SO54) were renamed and analyzed as sediment samples (CAPL-SD84 through CAPL-SD87).

4.3 Soil Sampling

A total of 83 surface and subsurface soil samples were collected from potential upland source areas and from stormwater drainage features (**Figure 3**). The CAX Partnering Team also agreed to the collection of three-point composite, surface soil samples at the pole-mounted transformer and former transformer pad locations to address the USEPA's concerns about collecting only one sample at these areas; discrete soil samples were collected at all other locations.

In general, the surface and subsurface soil samples were collected using a stainless-steel hand auger. For the three-point composite soil samples, the subsamples were composited in the field using a stainless steel bowl.

At locations where a hand-auger could not be used (such as an impenetrable surface such as a parking lot or pavement), the samples were collected using direct-push technology (DPT) services provided by Parratt-Wolff, Inc., of Hillsborough, North Carolina.

The soil sampling rationale and analyses for each area are as follows:

Potential Source Areas

- **Pole-Mounted Transformers** - Seven three-point composite surface soil (0 to 6 inches bgs) samples (Station IDs SO27 through SO33) were collected around the base of utility pole-mounted transformers (within a 10-foot radius) and analyzed for Aroclor-1260 in order to identify any potential Aroclor-1260 contamination in the vicinity of the utility pole-mounted transformers (possible PCB sources). No documentation or information is available regarding the potential for PCBs to be present within these pole-mounted transformers. These soil samples were only analyzed for Aroclor-1260, since prior to 1974, PCBs were used for transformers (ATSDR, 2000), and Aroclor-1260 was the only PCB congener detected in surface soil and surface sediment during Step 1 of the SI (**Attachment A**).
- **Former Transformer Pad Areas** -Ten three-point composite surface and subsurface (6 to 24 inches bgs) soil samples (Station IDs SO34 through SO43; collected within a 10-foot radius of the central sample location) were collected in the vicinity of the reported locations of former pad-mounted transformers and analyzed for Aroclor-1260, in order to identify any potential Aroclor-1260 contamination from former pad-mounted transformers (possible PCB sources). These soil samples were only analyzed for Aroclor-1260, since prior to 1974, PCBs were used for transformers (ATSDR, 2000), and Aroclor-1260 was the only PCB congener detected in surface soil and surface sediment during Step 1 of the SI (**Attachment A**).
- **Other Upland Areas** - Six co-located surface and subsurface soil samples (Station IDs SO70 through SO75) were collected from upland areas potentially impacted by historical site activities such as spills or waste disposal[4]. These samples were analyzed for VOCs, SVOCs, pesticides, Aroclor-1260, inorganic constituents, cyanide, explosives, TOC, pH, and grain size (surface samples only). These samples were primarily collected in order to characterize contamination and to determine the spatial extent of Aroclor-1260 contamination in the upland industrial and developed area north and northwest of Penniman Lake.

Drainage Features

Upland areas that drain to the northwest finger of Penniman Lake and to Outfalls NR-026 through NR-029 (Figure 4 of **Attachment A**) were investigated by CH2M HILL personnel on June 10, 2008, in order to help evaluate potential contaminant source areas. Drainage patterns identified during the site visit indicate:

- Surface water runoff enters the northwest finger of Penniman Lake from the heavily wooded slopes along this portion of the lake, as well as through Outfalls NR-026 and -027

[4] There was no record or physical evidence of any spills or waste disposal activities at any of these sample locations. The locations were selected to obtain a spatially diverse set of sampling points across the upland area to provide the best chance of capturing evidence of a source of PCB contamination to Penniman Lake. For example, one hypothetical source for upland PCB impacts is the historical spraying of unpaved roadways for dust control with waste oil possibly contaminated with Aroclor-1260; however, there is no evidence that this practice ever took place at CAX.

- Stormwater runoff originating from areas south of Cheatham Annex Detachment (CAD) 10 is collected in drop inlets on the north and south sides of Sanda Avenue, and is channeled to Outfall NR-026
- Outfall NR-026 discharges to one of the northwest finger of Penniman Lake via a drainage way
- A ravine upgradient of Outfall NR-027, north of Antrim Road, channels stormwater runoff from areas south of Building 250
- Outfall NR-027 discharges to one of the northwest finger of Penniman Lake via a drainage way

In addition, Outfall NR-028 conveys stormwater runoff to Penniman Lake from an intermittent drainage way that originates south of Building 132 and north of Antrim Road. Outfall NR-029 conveys stormwater runoff from two intermittent drainage ways that originate north of Antrim Road; one flows east, parallel to Antrim road, and the other flows southeast, perpendicular to Antrim Road. Soil samples[5] were collected upgradient and downgradient of all of these outfalls.

All of the observed drainage ways were unlined (that is, there was no concrete), though the inlets to the drainage ways were often concrete culverts, with the exception of the corrugated steel outlet to King Creek located in the southeast portion of Penniman Lake. Drainage ways emptying into Penniman Lake along its northern border were found to have whole shell, shell fragments, brick debris, rounded coarse gravel, and coarse sands as substrate, and within all the drainage ways, the observed sediments were unconsolidated. The drainage ways were generally steep, especially in the northwestern areas of Penniman Lake, with densely vegetated slopes and edges, as well as sand bars at their openings to Penniman Lake. Sampling of these drainage features consisted of:

- **Drainage Ways** - Twelve co-located surface and subsurface soil samples (Station IDs SO44 through SO50, and SO55 through SO59) were collected from drainage features leading into Penniman Lake, and analyzed VOCs, SVOCs, pesticides, Aroclor-1260, inorganic constituents, cyanide, explosives, TOC, pH, and grain size. These samples were collected in order to further characterize contamination and delineate the vertical extent of Aroclor-1260 contamination in drainages leading to the fingers of Penniman Lake[6].
- **Upgradient to Drainage Ways -** Ten co-located surface and subsurface soil samples (Station IDs SO60 through SO69) were collected from areas upstream of the drainage ways leading into Penniman Lake and analyzed for VOCs, SVOCs, pesticides, Aroclor-1260, inorganic constituents, cyanide, explosives, TOC, pH, and grain size (grain size analysis was conducted for surface samples only). These samples were collected in order to characterize contamination in upland areas in the vicinity of Penniman Lake and to delineate the extent of Aroclor-1260 contamination upgradient of the drainage feature locations, in areas where PCBs may have been used, stored, or released.

4.4 Biota Sampling

Because of the catch-and-release fishing restriction on Penniman Lake, which was a conservative measure stemming from the Pond Study (Baker, 2001) sediment sample results and not based on any tissue sample collection or evaluation, biota samples were collected as part of the SI. A reconnaissance-level biological survey of fish, frogs, and benthic invertebrates was conducted at Penniman Lake as part of the first phase of Step 2 to study the composition of the aquatic communities present, to select fish and amphibian species for biota sample collection, and to characterize the basic physical characteristics of the lake prior to sample collection. This information was used to select a suitable reference pond and associated reference pond sample locations to allow

[5] Initially, the UFP-SAP outlined the collection of soil samples upgradient of the outfalls; however, based on field observations and the saturation of the samples at the time of collection, several samples originally designated to be soil samples upgradient of outfall NR-028 (CAPL-SO51 through CAPL-SO54) were collected from 0-4 inches bss and renamed and analyzed as sediment samples (CAPL-SD84 through CAPL-SD87).

[6] An additional four sample locations initially identified in the UFP-SAP (CAPL-SO51 through CAPL-SO54) as soil samples within the drainage ways were renamed, post-sampling, as sediment sample locations (CAPL-SD84 through CAPL-SD87), due to field observations and the water saturation of the samples at the time of collection. Since these four samples were originally planned as soil samples, and as such, did not include acid volatile sulfide/simultaneous extracted metals (AVS/SEM) analysis, an additional AVS/SEM fraction was collected for each sample, and are listed as separate samples in **Table 1**.

a comparison of site data to reference data for the purpose of discerning potential non-site-related contaminant impacts. Cheatham Pond was ultimately selected by the CAX Partnering Team as the approved reference pond.

During the biological survey, a variety of frogs and fish were collected from Penniman Lake for tissue analyses in order to further characterize contamination within Penniman Lake and to evaluate the associated potential human health and ecological risks from exposure to these biota. All fish and adult frogs/tadpoles trapped or collected during the Step 2 sampling were identified in the field during a reconnaissance-level biological survey of Penniman Lake and its major upstream drainage ways. Each fish/frog sample was weighed (to the nearest gram) and its total length measured (to the nearest centimeter). Areas where samples were collected are depicted on **Figure 3**. Frogs were collected from the drainage ways leading to the northwestern and southwestern fingers of Penniman Lake, and fish were collected from the northern, northwestern, and northeastern fingers of Penniman Lake.

After the biological survey was completed, the CAX Partnering Team held a call to discuss the amount and types of biota found. The specific species collected were American bullfrog (*Lithobates catesbeinanus*; adult and tadpoles), golden shiner (*Notemigonus crysoleucas*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), and American eel (*Anguilla rostrata*), as detailed in **Table 2**. **Table 2** identifies the CAX Partnering Team's agreement on the selected biota sample types and analyses. Almost all of the samples contained tissues from more than one specimen (individual organism), which were composited, but there was no compositing across species.

A total of seven composite whole-body adult bullfrog samples, one whole-body adult bullfrog sample, one composite whole-body bullfrog tadpole sample, five composite whole-body fish samples, and one composite whole-body eel sample, as well as three composite edible-sized fish samples, were collected in October 2012, frozen, and sent to the lab for later analysis[7]. Based on the results of the human health and ecological risk evaluations conducted using the October 2012 sediment and surface water samples, the biota samples were analyzed in October 2013 for the parameters listed in **Table 2.** These analyses included bioaccumulative metals, Aroclor-1260 (fillet samples only), 12 dioxin-like PCB congeners, PCB Homologues, TCL Pesticides, percent moisture, and percent lipids.

For the edible-sized fish samples, the tissue samples were filleted at the lab and the fillet results were used during the human health risk screening provided in **Section 6.1**. Additionally, the offal (all parts of the fish except the fillet, including the skin) from each of these three samples was analyzed. During the ecological risk screening, the fillet and offal pairs were mathematically reconstituted to whole-body samples and used to evaluate potential risks to piscivorous species (for example, osprey) that consume larger fish. The results were used in the ecological risk screening provided in **Section 6.2**.

Benthic invertebrate biological survey data and fish physical data were collected and are provided in Tables D-4 through D-7 of **Attachment D.**

4.5 Reference Samples

Surface sediment (0 to 4 inches bss), subsurface sediment (4 to 8 inches bss), surface water, and biota samples were collected from portions of Cheatham Pond to develop a reference data set for use in the SI. The reference data were used to provide background comparison concentrations for naturally-occurring and widely-occurring anthropogenic constituents from a multitude of non-CERCLA-regulated sources and to provide comparative data for biological surveys and toxicity testing. The sediment and surface water sample collection methods used were the same as those used for the Penniman Lake site samples. The constituents detected in the Cheatham Pond reference samples are summarized in **Tables 3** through **6**.

Based on a reconnaissance survey conducted in Cheatham Pond, five locations were selected to match habitat conditions at Penniman Lake. In addition, five locations were also selected to match habitat conditions at Site 4

[7] Whole-body samples within the size range consumed by piscivorous wildlife likely to use the lake were collected for ecological risk screening purposes; fillet (edible size) samples were collected for human health risk screening purposes.

(Upstream Pond) and three locations were selected to match habitat conditions at Youth Pond, since field activities for these sites were conducted at the same time as those for Penniman Lake. Based on a review of the preliminary (unvalidated) data, the CAX Partnering Team agreed not to use the three reference samples for Youth Pond due to elevated concentrations of PCBs and metals in sediment. Thus, only the 10 samples collected for Penniman Lake and Site 4 were used to develop background upper tolerance limits (UTLs).

Surface water and surface sediment data were also collected from eight locations in Cheatham Pond during the Pond Study (Baker, 2001). The surface water samples were not used due to their age. The surface sediment samples were used, because sediment concentrations tend to be much more temporally stable than surface water concentrations. However, only the inorganic data were used, because of elevated detection limits for most of the organic analytes.

To determine which groups (by medium) should be combined when calculating background UTLs, pair-wise Wilcoxon Rank Sum (WRS) comparisons and box and whisker plots were used to determine if significant differences exist between groups. Based on this analysis, the data for both surface water groups were combined, and the data for all three surface sediment groups were combined, when deriving the UTLs. For subsurface sediments, the two groups were not combined because they were significantly different from each other for most of the metals. Because the uncombined sample sizes for the two subsurface sediment groups were low (five in each group), the UTL was set at the maximum detected concentration for each group.

The methodology used to develop background 95 percent UTLs for surface water and sediment followed the same methodology used to derive the base background 95 percent UTLs for soil and groundwater (CH2M HILL, 2011b).

5 Step 2 Analytical Results

The Step 2 soil, sediment, surface water, and biota samples were analyzed by the following three laboratories: Empirical Laboratories, LLC, Nashville, Tennessee; Test America, Inc., South Burlington, Vermont; ALS-Fort Collins, Fort Collins, Vermont and Houston, Texas. The analytical results are discussed in the following subsections. All analytical data for the Step 2 samples are provided in **Attachment B**. **Tables 7** through **13** summarize the constituent detections in surface soil, subsurface soil, sediment, subsurface sediment, and surface water that exceeded screening criteria during Steps 1 and 2, and **Table 14** summarizes the constituents detected in the biota samples collected at Penniman Lake during Step 2. The spatial distribution of samples collected from Penniman Lake provides sufficient coverage of the environmental media at the site to assess the potential source and nature and extent of contamination.

Since the primary objective of this SI is to further evaluate potential PCB source areas and concentrations within the lake, the focus of this section, and corresponding figures, are the PCB results. Explosives results are included on the figures as well, because the nature of historical activities at CAX indicate that they may represent a potential CERCLA release.

5.1 Soil

The results of surface and subsurface soil samples collected during the Step 2 field activities have been evaluated in an attempt to identify a source for the Aroclor-1260 found in Penniman Lake drainage ways and lake sediments, as well as, to characterize contamination along potential migration pathways to Penniman Lake. **Tables 7** and **8** include the concentrations exceeding screening criteria in surface soil, while **Tables 9** and **10** include the concentrations exceeding screening criteria in subsurface soil. **Figure 5** shows soil sample results with Aroclor-1260 concentration exceedances of screening criteria in soil from both the Step 1 and Step 2 investigations, while **Figures 6** to **11** provide the detail of concentration exceedances of screening criteria per soil sample type, as listed below.

5.1.1 Results for Aroclor-1260

- **Pole-Mounted Transformer Locations** - Aroclor-1260 concentrations only exceeded the Residential regional screening levels in two surface soil samples collected beneath pole-mounted transformers (SS27 and SS31)

with the maximum Aroclor-1260 concentration of 4,350 J µg/kg detected at sample location SO27, west of Penniman Lake (**Figures 5** and **6**).

- **Former Transformer Pad Areas** - No detections of Aroclor-1260 in surface soil exceeded screening criteria, and Aroclor-1260 was not detected in any of the subsurface soil samples collected at the former transformer pad locations.
- **Other Upland Areas** - Aroclor-1260 exceeded the Residential RSL in two surface soil samples located adjacent to the Sanda Avenue roadway; Aroclor-1260 was detected below screening criteria in subsurface soil samples (**Figures 5** and **7**).
- **Drainage Ways -** Aroclor-1260 exceeded the Residential RSL in five surface soil samples. The highest Aroclor-1260 concentrations were detected in surface soil samples collected in the western most tributary of the northwest drainage area (CAPL-SS46 and CAPL-SS47), with the maximum PCB concentration of 16,500 µg/kg detected in sample CAPL-SS46 (**Figures 5** and **8**). Aroclor-1260 also exceeded the Residential RSL in three subsurface soil samples collected from drainage ways to the northwest finger of Penniman Lake (CAPL-SB46 through SBS48). These three subsurface soil samples were collected in the tributaries of the northwest drainage area (**Figures 5** and **9**). Aroclor-1260 was not detected above screening criteria in the subsurface soil samples from drainage ways leading to the northeast corner of Penniman Lake. Aroclor-1260 concentrations were lower in all of the co-located subsurface soil samples where PCB exceedances were observed in both the surface and subsurface soil.
- **Upgradient of Drainage Ways** - Aroclor-1260 exceeded the Residential RSL in four surface soil samples (**Figures 5** and **10**), and in one subsurface soil sample (**Figures 5** and **11**). The results of this set of samples, as well as the other upland soil samples, indicate that Aroclor-1260 is found at concentrations exceeding screening criteria at sporadic locations across a broad upland area upstream of the northwest finger of Penniman Lake rather than confined to a concentrated source area. The maximum Aroclor-1260 concentrations in this set of soil samples are also significantly lower than the maximum concentrations found in downstream drainage ways leading to the northwest finger of Penniman Lake. Aroclor-1260 concentrations were not always lower in the co-located subsurface soil samples where PCB was detected in both surface and subsurface soils at a particular location; specifically, the concentration of Aroclor-1260 in the subsurface soil sample was greater than the concentration in surface soils at locations CAPL-SO62 and CAPL-SO64.

5.1.2 Results for Other Constituents

In upland area soil samples, non-PCB constituents detected above screening criteria included five SVOCs, nine pesticides, and seven inorganics (Figures 1E and 2E of **Attachment E** for surface and subsurface soil, respectively).

In drainage ways leading to Penniman Lake, other constituents detected above screening criteria included two SVOCs (polycyclic aromatic hydrocarbons [PAHs] common in stormwater runoff from urban watersheds [Mahler, et al., 2012]), nine pesticides, one explosive, and nine inorganic constituents (Figures 3E and 4E of **Attachment E**). The SVOC, pesticide, and inorganic constituent exceedances were observed within the drainage ways leading to the northwest finger of Penniman Lake, downstream of the large acreage of impervious surfaces in upland industrialized and developed areas of CAX that drain to the lake. The explosive exceedance was located in a drainage way discharging to the northeast corner of Penniman Lake. Upgradient of the drainage ways, other constituents detected above screening criteria included seven SVOCs, nine pesticides, and ten inorganic constituents (Figures 5E and 6E in **Attachment E**).

5.2 Sediment

The results of surface and subsurface sediment samples collected during the Step 2 field activities have been evaluated primarily to further characterize and delineate concentrations of Aroclor-1260 found in drainage ways leading to Penniman Lake, as well as, lake bottom sediments. Aroclor-1260 is believed to have originated from an unknown upland source or sources, adsorbed to soil particles, and subsequently transported via stormwater runoff from upland areas through drainage ways discharging to Penniman Lake, where the particles settled on the lake bottom over many years.

5.2.1 Results for Aroclor-1260

Aroclor-1260 exceeded the Residential RSL in 5 surface sediment samples and 11 subsurface sediment samples. The maximum concentrations in surface (16,200 J μg/kg) and subsurface (34,200 J μg/kg) sediment (**Tables 11** and **12**, respectively and **Figures 12** and **13,** respectively) were detected at one location (SD84) near the upstream end of one of the drainage ways leading to the northwest finger of Penniman Lake. Aroclor-1260 concentrations were lower in the co-located subsurface sediment sample where the PCB was detected in both surface and subsurface sediment samples at a particular location, with the exception of locations SD78 and SD79, located in the northeast finger of Penniman Lake, and SD84, located in the northern tributary of the northwest drainage area. **Figure 14** shows Aroclor-1260 exceedances from both the Step 1 and Step 2 Investigations.

5.2.2 Results for Other Constituents

Additional analyses were conducted on drainage way and lake bottom sediment samples for VOCs, SVOCs, explosives, and inorganic constituents. Other constituents detected above screening criteria include 1 VOC (carbon disulfide), 14 SVOCs (PAHs), 14 pesticides, 3 explosives, and 12 inorganic constituents. Carbon disulfide is likely naturally occurring, as natural sources of carbon disulfide include wetlands, oceans, as well as microbial activity in soil (ATSDR, 1996) (Figures 7E and 8E in **Attachment E** for surface and subsurface sediment, respectively).

The detected SVOCs consisted of PAHs that are commonly found in urban freshwater sediments (Mahler, et al., 2012). The majority of the SVOC exceedances were observed in the northwest finger drainage area, with exceedances also observed at one location in the northeast drainage area, as well in the vicinity of the outfall pipe in the southern portion of Penniman Lake.

The highest concentrations of pesticides were observed in the northwest and northeast drainage ways, as well as, in the vicinity of the outfall pipe in the southern portion of Penniman Lake. Explosives constituents were observed in the northeast drainage area of Penniman Lake; however, one exceedance was detected in a sample collected in the northwest portion of the lake. Inorganic constituent concentrations were detected above screening criteria throughout Penniman Lake.

5.3 Surface Water

No PCBs were detected in surface water. Two SVOCs (benzo(a)anthracene and pyrene) exceeded ecological screening criteria in two of the surface water samples; one sampled in the western portion of Penniman Lake, and one sampled within the northeast area of Penniman Lake. Two inorganic constituents (arsenic and barium) each exceeded one screening criterion in each of the surface water samples (**Table 13** and Figure 9E in **Attachment E**).

5.4 Biota Samples

Biota samples were collected during the Step 2 field activities to assess bioaccumulative constituent concentrations in fish and frog tissue within Penniman Lake. Twenty-one PCB congeners were detected among the biota samples (**Table 14** and **Figure 15**). Sixteen pesticides and PCBs (4,4-DDD, 4,4'-DDE, 4,4'-DDT, Aroclor-1260, alpha-BHC, beta-BHC, delta-BHC, dieldrin, Endosulfan II, Endosulfan sulfate, Endrin, Endrin aldehyde, gamma-BHC, gamma-chlordane, heptachlor epoxide, and total PCBs) and nine total metals (arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, and zinc) were detected among the biota samples (**Figure 15**).

5.5 Step 2 Analytical Results Summary

Table 5A presents an overview of the soil, sediment, and surface water sample results exceeding screening criteria.

TABLE 5A
Regulatory Screening Criteria Exceedance Overview Table

	Aroclor 1260 Exceedance	Explosives Exceedance	VOC Exceedance	SVOC Exceedance	Pesticide Exceedance	Metals Exceedance	Relevance
Soil Samples (All samples include co-located surface (ss) and subsurface (sb) samples unless otherwise noted)							
Pole-Mounted Transformers (Surface Soil Only)	√						Possible Aroclor-1260 source. Exceedances of screening criteria were observed in samples from two of seven locations along the roadways and parking areas (**Figure 6**). It is not clear if these detections reflect leaks from the pole-mounted transformers themselves or potential impacts due to contaminant transport in stormwater runoff within the upland areas.
Former Transformer Pads							Not an Aroclor-1260 source. Aroclor-1260 did not exceed screening criteria in any of these samples (**Figure 6**).
Other Upland Areas	√ (SS)			√ (SS)	√ (SS)	√ (SS and SB)	Possible Aroclor-1260 source. Aroclor-1260 exceedances were observed in samples from two of six locations; no Aroclor-1260 exceedances occurred in subsurface soil samples. This indicates that Aroclor-1260 is not significantly migrating downward vertically in soil (**Figure 7**). Other constituents exceeded screening criteria at sporadic locations across broad portions of the upland areas.
Upgradient of Drainage Ways	√ (SS and SB)			√ (SS and SB)	√ (SS and SB)	√ (SS and SB)	Possible Aroclor-1260 source. Aroclor-1260 exceedances were observed in samples from four of ten locations; subsurface soil concentrations were higher in some locations than the corresponding surface soil locations, indicating that historical stormwater runoff from upland areas may have transported particles with higher concentrations of Aroclor-1260 than more recent runoff (**Figures 10** and **11**). Maximum Aroclor-1260 exceedances in these areas are significantly lower than in the drainage ways leading to the northwest finger of the lake.
Drainage Ways	√ (SS and SB)	√ (SS)		√ (SS and SB)	√ (SS and SB)	√ (SS and SB)	Possible Aroclor-1260 source. Aroclor-1260 exceedances were observed in samples from six of twelve locations (**Figures 8** and **9**); subsurface soil concentrations were generally lower. During Step 1 Investigation, the highest Aroclor-1260 exceedances were detected in surface soil samples in the northwest finger drainage way leading away from building 250 at locations SS09, SS10, and SS11 (**Figure 5**). Aroclor-1260 concentrations are much lower in upgradient soil samples than concentrations found in drainage way soil samples. Aroclor-1260 concentrations in the drainage ways have consistently been the highest found during the Penniman Lake investigation activities, providing strong evidence that either suspended solids have been transported via stormwater from upland areas and deposited in the drainage ways, or that possible PCB-contaminated material was potentially disposed of directly into the drainage ways during historical activities. One explosive constituent exceedance was in northeast the drainage way; all other constituent exceedances were in samples from the northwest drainage ways to Penniman Lake.

TABLE 5A
Regulatory Screening Criteria Exceedance Overview Table

	Aroclor 1260 Exceedance	Explosives Exceedance	VOC Exceedance	SVOC Exceedance	Pesticide Exceedance	Metals Exceedance	Relevance
Sediment Samples (All samples include co-located surface (ssd) and subsurface (sbsd) samples unless otherwise noted)							
Lake and Drainage Way Sediment	√ (SD and SSD)	√ (SD and SSD)	√ (SD and SSD)	√ (SD and SSD)	√ (SD and SSD)	√ (SD and SSD)	Aroclor-1260 exceedances were highest in surface sediment samples in the northernmost northwest drainage way leading to Penniman Lake. Overall, surface sediment Aroclor-1260 concentrations were greater than subsurface concentrations, with the exception of locations SD78 and SD79 in the northeast finger. Sediment concentrations in the northwest finger drainage ways were generally an order of magnitude or more greater than detections typically found within the lake itself, which is consistent with the hypothesis that Aroclor-1260 was transported to Penniman Lake primarily via suspended particles carried in stormwater runoff from the upland area north and northwest of Penniman Lake (**Figures 12** and **13**). The majority of explosive constituent exceedances in surface sediment were observed in the northeast drainages of the lake, and one in the northwest portion. The subsurface sediment exceedances were located in the northwest-northern tributary of the lake and in SD78 in the northeast finger of the lake. Other constituent exceedances were found within the lake and within the drainage ways.
King Creek Sediment Sample							No exceedances in this sample. This indicates that contamination within Penniman Lake sediments is not migrating significantly out of the lake.
Surface Water Samples							
Surface water within Penniman Lake				√		√	No Aroclor-1260 exceedances. Two PAH compounds exceeded screening criteria; one in the western portion of the lake and one in the northeast area of the lake. Two metals exceeded screening criteria at various locations within the lake.

Notes:

See **Attachment C** and **D** for details on human health and ecological risk screening exceedances for biota samples.

Tables 7 through **14** summarize constituent detections per medium and **Figures 6** through **17** identify Aroclor-1260 and explosive constituent exceedances. **Attachment E** provides figures showing exceedances for all detected constituents.

SS - surface soil; SB - subsurface soil; SD - surface sediment; SSD - subsurface sediment

5.5.1 Results for Aroclor-1260

The results of the upland soil samples indicate that Aroclor-1260 is found at concentrations exceeding screening criteria at sporadic locations across a broad upland area upstream of the northwest finger of Penniman Lake rather than confined to a concentrated source area. No isolated or spatially discrete upland source area for the Aroclor-1260 detected in Penniman Lake sediment has been identified based on the Step 2 results.

The concentrations of Aroclor-1260 detected in soil and sediment samples in the drainage ways leading to the northwest finger of Penniman Lake provide strong evidence that the Aroclor-1260 found in Penniman Lake sediment originates from contaminant transport via suspended particles carried via stormwater runoff from the upland area upstream of these drainage ways, and/or possibly from PCB-contaminated material directly applied to the drainage ways. Specifically, it is evident that the primary upland area contributing the majority of the Aroclor-1260 contaminant mass to Penniman Lake is the industrialized and developed area in the vicinity of Sanda and Antrim Roads, upstream of the several drainage ways that discharge stormwater to the northwest finger of Penniman Lake, where widespread and spatially sporadic concentrations of Aroclor-1260 in exceedance of screening criteria have been detected.

5.5.2 Results for Other Constituents

The small number of detected concentrations of several explosives constituents in Penniman Lake sediment appear to represent CERCLA-regulated contamination. Since the former Penniman Shell Loading Plant was an explosives manufacturing facility that operated during WW I on what is now CAX, as well as adjacent properties, and explosives constituents were detected in soil at the AOC 6 Ammonia Settling Pits and TNT Subareas during the Multiple AOC SI (CH2M HILL, 2012b), these detections are consistent with historical site use. Explosive constituents in Penniman Lake will be addressed in an RI addendum for AOC 6.

Concentrations of SVOCs, pesticides, and metals detected above screening criteria appear in all media. It is unclear whether or not these concentrations reflect a CERCLA source or the presence of non-CERCLA-regulated sources for these contaminants, including the normal use of pesticides around buildings, roads, and parking areas and the impacts to stormwater runoff that would be expected from contact with the asphalt-paved parking lots, roadways, and building rooftops in the upland industrialized and developed areas that drain to the lake. Penniman Lake is the ultimate receptor for stormwater runoff originating from a vast acreage of impervious surfaces in upland industrialized and developed areas that drain to the lake, including parking lots, roadways, and building rooftops. In addition, the detected concentrations of some metals (particularly arsenic, iron, and manganese) are likely naturally occurring in the local environment.

6 SI Risk Screenings

6.1 Human Health Risk Screening

A conservative human health risk screening (HHRS) was performed for Penniman Lake and is presented in **Attachment C.** Although the primary purpose of the Step 2 TM is to evaluate the potential sources of contamination to Penniman Lake, potential risks associated with exposure to all sampled media (surface water, sediment, fish tissue, and soil) during the Step 1 and Step 2 SIs were evaluated in the HHRS. The results of the HHRS provide a preliminary indication of potential risks from exposure to constituents of potential concern (COPCs) identified for each of the different exposure areas for each medium, and are used to help determine whether further evaluation (such as, further risk assessment or additional data collection) is necessary or future unrestricted use of the site is acceptable based on human health risks.

The human health risk screening consisted of three steps:

1) Comparison of the maximum detected concentrations to risk-based screening levels and background concentrations (if available) to identify COPCs in the sampled media for each exposure area that required further evaluation.

2) Calculation of a corresponding risk level using the maximum detected concentration for the COPCs identified in Step 1 and comparison against risk-ratio screening benchmarks.

3) For those COPCs carried forward from Step 2, calculation of a corresponding risk level using the 95 percent upper confidence limit on the mean as the exposure point concentration and comparison against risk-ratio screening benchmarks to determine which COPCs should be retained.

The risk screening evaluation for each medium and data grouping is presented in Tables 2.1 through 2.23 in **Attachment C**. An overview of the various potential receptors and exposure pathways addressed in the HHRS is presented in the human health CSM, Figure C-1 of **Attachment C**. The HHRS COPCs retained through Step 3 of the HHRS are presented in **Table 15** and are summarized below by medium.

The HHRS identified COPCs associated with exposure to the following media and exposure areas:

- Subsurface sediment
  - Northwest finger and associated drainage ways north of Site 11: six SVOCs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2-cd)pyrene], one PCB (Aroclor-1260), one pesticide (dieldrin), and one inorganic constituent (chromium[8])
- Fish (via ingestion) caught in Penniman Lake
  - One pesticide (4,4'-DDE), Aroclor-1260, total PCBs, and one inorganic constituent (arsenic)
- Surface soil
  - Drainage ways to Penniman Lake: two SVOCs [benzo(a)pyrene and benzo(b)fluoranthene], one PCB (Aroclor-1260), one pesticide (dieldrin), one explosive (nitroglycerin), and two inorganic constituents (arsenic and chromium[8])
  - Upgradient of drainage ways to Penniman Lake: seven SVOCs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2-cd) pyrene], one pesticide (4,4'-DDE), one PCB (Aroclor-1260), and four inorganic constituents (antimony, arsenic, chromium[8], and iron)
  - Other Upland Areas: five SVOCs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene], one PCB (Aroclor-1260), and two inorganic constituents (arsenic and chromium[8])
- Subsurface soil
  - Drainage ways to Penniman Lake: one SVOC [benzo(a)pyrene], one PCB (Aroclor-1260), and four inorganic constituents (arsenic, chromium[8], cobalt, and iron)
  - Upgradient of drainage ways to Penniman Lake: one SVOC [benzo(a)pyrene], one PCB (Aroclor-1260), and four inorganic constituents (arsenic, chromium[8], cobalt, and iron)
  - Other Upland Areas: three inorganic constituents (arsenic, chromium[8], and iron)

6.2 Ecological Risk Screening

An ecological risk screening was performed to determine the potential for ecological risks associated with exposure to surface (0 to 6 inches bgs) and shallow subsurface (6 to 24 inches bgs) soil in upland areas draining to Penniman Lake, surface water, surface (0 to 4 inches bss) and subsurface (4 to 8 inches bss) sediment, and fish/frog tissues from Penniman Lake itself, including small fingers where drainage ways enter the pond. The results of the ecological risk screening are presented in **Attachment D** and provide a preliminary indication of potential risks from exposure to the identified COPCs. They are also used to help determine whether the site

[8] Total chromium was identified during the HHRS as a COPC based on comparison to hexavalent chromium screening levels.

requires further evaluation (such as a baseline ecological risk assessment [BERA] or additional data collection) or if ecological risks are acceptable.

The ecological risk screening was performed for surface soil, shallow subsurface soil, surface water, surface sediment, subsurface sediment, fish tissue, and frog tissue. Food web exposures were evaluated for both terrestrial and aquatic habitats. The samples used in the ecological risk screening are listed in Table D-9 in **Attachment D** and their locations are shown on **Figure 3** of this TM; Table D-9 in **Attachment D** also shows the data groupings used in the area-specific evaluations.

In terrestrial habitats for direct exposures, the key COPCs in surface soil were PCBs (primarily Aroclor-1260) (**Table 16**), but only for Groups 1A and 1B (northwest drainage ways, northern and center tributaries). The key COPCs for terrestrial food web exposures for Groups 1A and 1B, as well as for Groups 2A (pole-mounted transformer locations) and 2D (other upland areas) also were PCBs (primarily Aroclor-1260). Pesticides (particularly dieldrin, Endrin, and DDE/DDT) in Groups 1B and 2C (areas upgradient of drainage ways) surface soils, and high molecular weight SVOCs in Group 2C surface soil, were also elevated relative to ecological screening values (ESVs). Shallow subsurface soil does not appear to be significantly impacted in areas where these samples were collected.

In aquatic habitats, no COPCs were identified for Penniman Lake surface water (**Table 16**). In both surface and subsurface sediment, four inorganics (copper, lead, nickel, and zinc) were elevated relative to ESVs in Group 1 (northwest finger and tributaries north of Site 11). Similarly, mercury was elevated in surface and subsurface sediments in Group 4A (northwest portion of Penniman Lake). However, all five of these are AVS metals, and SEM/AVS ratios, a measure of metal bioavailability in sediment, were almost always less than 1, indicating that bioavailability is limited.

In Group 1 surface and subsurface sediment samples (which are directly downstream of Group 1A and 1B drainage way soil samples), PCBs (primarily Aroclor-1260) were elevated, and were also key COPCs for aquatic food web exposures (along with total PCBs) in Group 1. Total PCBs were identified as tissue COPCs, but only for the large-sized largemouth bass; smaller whole-body fish and frogs did not exceed tissue-based PCB ESVs. Group 1 also had high concentrations of pesticides (particularly dieldrin) and SVOCs in subsurface sediment.

7 Conclusions

The results of the Penniman Lake investigations performed to date collectively indicate that:

PCBs:

- PCB (Aroclor-1260) concentrations in sediment in the northwest finger of Penniman Lake and associated upland drainage ways are of greatest concern. Concentrations of Aroclor-1260 in surface and subsurface sediment are substantially elevated in these areas. Drainage ways leading to the northeast finger of Penniman Lake also contribute Aroclor-1260 to Penniman Lake sediment, though to a more minor extent.
- Based on the HHRS, Aroclor-1260 is the primary risk contributor for the fish ingestion pathway.
- PCBs (Aroclor-1260 and total PCBs) are the key COPCs for ecological aquatic food web exposures.
- Total PCBs are also an ecological COPC for largemouth bass tissue based on a site-wide evaluation.
- The vertical extents of Aroclor-1260 contamination in the north*west* finger and drainage ways north of Site 11 are not fully defined, particularly the locations with surface sediment Aroclor-1260 concentrations greater than 1,000 µg/kg (the deeper sediment samples at these locations also had elevated Aroclor-1260 concentrations). Focused deeper sediment sampling would be necessary in this area to more fully define the vertical extent of contamination.
- The extent of the elevated Aroclor-1260 concentrations in the drainage way leading to the north*east* finger of Penniman Lake does not appear to be fully defined; however, the soil and sediment data from this area suggest a relatively minor input of Aroclor-1260 to Penniman Lake sediment from this area.

Other Constituents:

- The small number of detected concentrations of several explosives constituents in Penniman Lake sediment also appear to represent CERCLA-regulated contamination. Since the former Penniman Shell Loading Plant was an explosives manufacturing facility that operated during WW I on what is now CAX, as well as adjacent properties, and explosives constituents were detected in soil at the AOC 6 Ammonia Settling Pits and TNT subareas during the Multiple AOC SI (CH2M HILL, 2012b), these detections are consistent with historical site use. Explosive constituents in Penniman Lake will be addressed in an RI addendum for AOC 6.
- Concentrations of SVOCs, pesticides, and metals have been detected above screening criteria appear in all media. Further investigation is needed to determine whether or not these concentrations reflect a CERCLA source or the presence of non-CERCLA-regulated sources for these contaminants, including the normal use of pesticides around buildings, roads, and parking areas and the impacts to stormwater runoff that would be expected from contact with the asphalt-paved parking lots, roadways, and building rooftops in the upland industrialized and developed areas that drain to the lake. In addition, the detected concentrations of some metals (particularly arsenic, iron, and manganese) likely represent naturally occurring conditions.

8 Path Forward

The historical and current Step 2 SI analytical data collected to date did not provide any evidence of the existence of an isolated or spatially discrete upland source area. Since the Step 2 evaluation was initiated, recently discovered information (historic maps, as-built drawings) regarding the industrial area upgradient of the northwest finger (where the highest PCB concentrations were detected) has come to light. Therefore, a comprehensive desktop evaluation, bringing together the historic, SI, and recently uncovered information, will be conducted to determine if additional investigation of the industrial area is warranted to identify the source. The desktop evaluation will include a recommended path forward for AOC 9 for CAX Partnering Team review.

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Tables

TABLE 1
Soil, Sediment, and Surface Water Sample Summary
Penniman Lake Site Inspection – Step 1 and Step 2
Cheatham Annex
Williamsburg, Virginia

SI Phase	Matrix	Station ID	Sample ID	Sample Collection Depth (inches bgs)	Analytical Group	Sampling Rationale	Sample Area	Sample Subarea
Step 1	surface soil	CAPL-SO01	CAPL-SS01-0811	0-6"	PCBs	To assess the general extent of PCB contamination in areas draining into Penniman Lake	Drainage Areas	Northwest Drainage - Center Tributary
		CAPL-SO01	CAPL-SS01P-0811					
		CAPL-SO02	CAPL-SS02-0811					
		CAPL-SO03	CAPL-SS03-0811					
		CAPL-SO04	CAPL-SS04-0811					
		CAPL-SO05	CAPL-SS05-0811					
		CAPL-SO06	CAPL-SS06-0811					
		CAPL-SO07	CAPL-SS07-0811					
		CAPL-SO08	CAPL-SS08-0811					
		CAPL-SO09	CAPL-SS09-0811					Northwest Drainage - Northern Tributary
		CAPL-SO10	CAPL-SS10-0811					
		CAPL-SO10	CAPL-SS10P-0811					
		CAPL-SO11	CAPL-SS11-0811					
		CAPL-SO12	CAPL-SS12-0811					
		CAPL-SO13	CAPL-SS13-0811					
		CAPL-SO14	CAPL-SS14-0811					
		CAPL-SO15	CAPL-SS15-0811					Northwest Drainage - Other Tributary
		CAPL-SO16	CAPL-SS16-0811					
		CAPL-SO17	CAPL-SS17-0811					Center Drainage
		CAPL-SO18	CAPL-SS18-0811					
		CAPL-SO18	CAPL-SS18P-0811					
		CAPL-SO19	CAPL-SS19-0811					
		CAPL-SO21	CAPL-SS21-0811					
		CAPL-SO22	CAPL-SS22-0811					Eastern Drainage
		CAPL-SO23	CAPL-SS23-0811					
		CAPL-SO24	CAPL-SS24-0811					
		CAPL-SO25	CAPL-SS25-0811					
		CAPL-SO26	CAPL-SS26-0811					
Step 2	3-pt composite surface soil[3]	CAPL-SO27	CAPL-SS27-1012	0-6"	Aroclor 1260	To assess potential PCB contamination as a possible source area.	Transformer Pole	NA
		CAPL-SO28	CAPL-SS28-1012[1]					
		CAPL-SO29	CAPL-SS29-1012					
			CAPL-SS29P-1012[2]					
		CAPL-SO30	CAPL-SS30-1012					
		CAPL-SO31	CAPL-SS31-1012					
		CAPL-SO32	CAPL-SS32-1012					
		CAPL-SO33	CAPL-SS33-1012					
		CAPL-SO34	CAPL-SS34-1112			To assess potential PCB contamination as a possible source area. Historic figures were reviewed to identify locations of former pad mounted transformers.	Former Transformer Pad	NA
		CAPL-SO35	CAPL-SS35-1112					
		CAPL-SO36	CAPL-SS36-1112					
		CAPL-SO37	CAPL-SS37-1112					
		CAPL-SO38	CAPL-SS38-1012					
		CAPL-SO39	CAPL-SS39-1012					
			CAPL-SS39P-1012[2]					
		CAPL-SO40	CAPL-SS40-1112					
		CAPL-SO41	CAPL-SS41-1012					
		CAPL-SO42	CAPL-SS42-1012					
		CAPL-SO43	CAPL-SS43-1112					

TABLE 1
Soil, Sediment, and Surface Water Sample Summary
Penniman Lake Site Inspection – Step 1 and Step 2
Cheatham Annex
Williamsburg, Virginia

SI Phase	Matrix	Station ID	Sample ID	Sample Collection Depth (inches bgs)	Analytical Group	Sampling Rationale	Sample Area	Sample Subarea
Step 2	surface soil	CAPL-SO44	CAPL-SS44-1012	0-6"	full suite[4], pH, TOC, Grain-size	To assess potential PCB contamination as a possible source area. Step 1 of the SI identified the drainages as the most heavily PCB contaminated areas.	Drainage Areas	Northwest Drainage - Center Tributary
		CAPL-SO45	CAPL-SS45-1012					
			CAPL-SS45P-1012[2]		full suite[4]			
		CAPL-SO46	CAPL-SS46-1012		full suite[4], pH, TOC, Grain-size			
		CAPL-SO47	CAPL-SS47-1012					
		CAPL-SO48	CAPL-SS48-1012[1]					
		CAPL-SO49	CAPL-SS49-1012					
			CAPL-SS49P-1012[2]		full suite[4]			
		CAPL-SO50	CAPL-SS50-1012		full suite[4], pH, TOC, Grain-size		Drainage Areas	Northeast Drainage
		CAPL-SO55	CAPL-SS55-1012					
		CAPL-SO56	CAPL-SS56-1012					
		CAPL-SO57	CAPL-SS57-1012					
		CAPL-SO58	CAPL-SS58-1012					
		CAPL-SO59	CAPL-SS59-1012					
			CAPL-SS59P-1012[2]		full suite[4]			
		CAPL-SO60	CAPL-SS60-1112		full suite[4], pH, TOC, Grain-size	To assess if PCB contamination is present in upgradient areas to the drainages where possible dumping could have occurred.	Upgradient to Drainages	NA
		CAPL-SO61	CAPL-SS61-1112					
		CAPL-SO62	CAPL-SS62-1112					
		CAPL-SO63	CAPL-SS63-1112					
		CAPL-SO64	CAPL-SS64-1112					
		CAPL-SO65	CAPL-SS65-1112					
		CAPL-SO66	CAPL-SS66-1112					
		CAPL-SO67	CAPL-SS67-1112					
		CAPL-SO68	CAPL-SS68-1112[1]					
		CAPL-SO69	CAPL-SS69-1112					
			CAPL-SS69P-1112[2]		full suite[4]			
		CAPL-SO70	CAPL-SS70-1112		full suite[4], pH, TOC, Grain-size	These locations were chosen as possible areas where PCB contamination may have collected as a result of potential historic spraying activities.	Potential Sprayed Areas	NA
		CAPL-SO71	CAPL-SS71-1112					
		CAPL-SO72	CAPL-SS72-1112					
		CAPL-SO73	CAPL-SS73-1112					
		CAPL-SO74	CAPL-SS74-1112					
		CAPL-SO75	CAPL-SS75-1112					

TABLE 1
Soil, Sediment, and Surface Water Sample Summary
Penniman Lake Site Inspection – Step 1 and Step 2
Cheatham Annex
Williamsburg, Virginia

SI Phase	Matrix	Station ID	Sample ID	Sample Collection Depth (inches bgs)	Analytical Group	Sampling Rationale	Sample Area	Sample Subarea
Step 2	3-pt composite subsurface soil[3]	CAPL-SO34	CAPL-SB34-1112	6-24"	Aroclor 1260	To assess potential PCB contamination as a possible source area. Historic figures were reviewed to identify locations of former pad mounted transformers.	Former Transformer Pad	NA
		CAPL-SO35	CAPL-SB35-1112					
		CAPL-SO36	CAPL-SB36-1112					
		CAPL-SO37	CAPL-SB37-1112					
		CAPL-SO38	CAPL-SB38-1012[1]					
		CAPL-SO39	CAPL-SB39-1012					
		CAPL-SO40	CAPL-SB40-1112					
			CAPL-SB40P-1112[2]					
		CAPL-SO41	CAPL-SB41-1012					
		CAPL-SO42	CAPL-SB42-1012					
		CAPL-SO43	CAPL-SB43-1112					
Step 2	subsurface soil	CAPL-SO44	CAPL-SB44-1012	6-24"	full suite[4], pH, TOC	To assess potential PCB contamination as a possible source area. Step 1 of the SI identified the drainages as the most heavily PCB contaminated areas.	Drainage Areas	Northwest Drainage - Center Tributary
		CAPL-SO45	CAPL-SB45-1012					
		CAPL-SO46	CAPL-SB46-1012					
		CAPL-SO47	CAPL-SB47-1012					
		CAPL-SO48	CAPL-SB48-1012					
		CAPL-SO49	CAPL-SB49-1012					
		CAPL-SO50	CAPL-SB50-1012					
			CAPL-SB50P-1012[2]		full suite[4]			
		CAPL-SO55	CAPL-SB55-1012		full suite[4], pH, TOC		Drainage Areas	Northeast Drainage
		CAPL-SO56	CAPL-SB56-1012					
		CAPL-SO57	CAPL-SB57-1012					
		CAPL-SO58	CAPL-SB58-1012[1]					
		CAPL-SO59	CAPL-SB59-1012					
		CAPL-SO60	CAPL-SB60-1112		full suite[4], pH, TOC			
			CAPL-SB60P-1112[2]		full suite[4]			
		CAPL-SO61	CAPL-SB61-1112		full suite[4], pH, TOC	To assess if PCB contamination is present in upgradient areas to the drainages where possible dumping could have occurred.	Upgradient to Drainages	NA
		CAPL-SO62	CAPL-SB62-1112					
		CAPL-SO63	CAPL-SB63-1112					
		CAPL-SO64	CAPL-SB64-1112					
		CAPL-SO65	CAPL-SB65-1112					
		CAPL-SO66	CAPL-SB66-1112					
		CAPL-SO67	CAPL-SB67-1112					
		CAPL-SO68	CAPL-SB68-1112					
		CAPL-SO69	CAPL-SB69-1112					
		CAPL-SO70	CAPL-SB70-1112		full suite[4], pH, TOC	These locations were chosen as possible areas where PCB contamination may have collected as a result of potential historic spraying activities.	Potential Sprayed Areas	NA
		CAPL-SO71	CAPL-SB71-1112					
		CAPL-SO72	CAPL-SB72-1112					
		CAPL-SO73	CAPL-SB73-1112[1]					
		CAPL-SO74	CAPL-SB74-1112					
		CAPL-SO75	CAPL-SB75-1112					
			CAPL-SB75P-1112[2]		full suite[4]			

TABLE 1
Soil, Sediment, and Surface Water Sample Summary
Penniman Lake Site Inspection – Step 1 and Step 2
Cheatham Annex
Williamsburg, Virginia

SI Phase	Matrix	Station ID	Sample ID	Sample Collection Depth (inches bgs)	Analytical Group	Sampling Rationale	Sample Area	Sample Subarea
Step 1	surface sediment	CAPL-SWSD18	CAPL-SD18-0811	0-4"	PCBs, TOC, Grain-size	To assess the general extent of PCB contamination in areas draining into Penniman Lake	Drainage Areas	Northwest Drainage - Northern Tributary
		CAPL-SWSD19	CAPL-SD19-0811					
		CAPL-SWSD20	CAPL-SD20-0811					Northwest Drainage - Other Tributary
		CAPL-SWSD20	CAPL-SD20P-0811		PCBs			
		CAPL-SWSD21	CAPL-SD21-0811		PCBs, TOC, Grain-size		Penniman Lake	Northwest - Northern Tributary
		CAPL-SWSD22	CAPL-SD22-0711					
		CAPL-SWSD23	CAPL-SD23-0711					Northwest - Center Tributary
		CAPL-SWSD24	CAPL-SD24-0711					
		CAPL-SWSD25	CAPL-SD25-0711					Northwest - Southern Tributary
		CAPL-SWSD26	CAPL-SD26-0811				Drainage Areas	Northwest Drainage - Other Tributary
		CAPL-SWSD27	CAPL-SD27-0711				Penniman Lake	Northwest
		CAPL-SWSD28	CAPL-SD28-0711					
		CAPL-SWSD28	CAPL-SD28P-0711		PCBs			
		CAPL-SWSD29	CAPL-SD29-0711		PCBs, TOC, Grain-size			
		CAPL-SWSD30	CAPL-SD30-0711					
		CAPL-SWSD31	CAPL-SD31-0711					Center
		CAPL-SWSD32	CAPL-SD32-0711					
		CAPL-SWSD33	CAPL-SD33-0711					
		CAPL-SWSD33	CAPL-SD33P-0711		PCBs			
		CAPL-SWSD34	CAPL-SD34-0711		PCBs, TOC, Grain-size			
		CAPL-SWSD35	CAPL-SD35-0711					Northwest
		CAPL-SWSD36	CAPL-SD36-0711					
		CAPL-SWSD37	CAPL-SD37-0711					
		CAPL-SWSD38	CAPL-SD38-0711					Center
		CAPL-SWSD38	CAPL-SD38P-0711		PCBs			
		CAPL-SWSD39	CAPL-SD39-0711		PCBs, TOC, Grain-size			
		CAPL-SWSD40	CAPL-SD40-0711					
		CAPL-SWSD41	CAPL-SD41-0711					
		CAPL-SWSD42	CAPL-SD42-0711					
		CAPL-SWSD43	CAPL-SD43-0711				Drainage Areas	Center Drainage
		CAPL-SWSD44	CAPL-SD44-0711				Penniman Lake	Center
		CAPL-SWSD45	CAPL-SD45-0711					
		CAPL-SWSD46	CAPL-SD46-0711					
		CAPL-SWSD47	CAPL-SD47-0711					
		CAPL-SWSD48	CAPL-SD48-0711					East
		CAPL-SWSD49	CAPL-SD49-0711					
		CAPL-SWSD50	CAPL-SD50-0711					
		CAPL-SWSD50	CAPL-SD50P-0711		PCBs			
		CAPL-SWSD51	CAPL-SD51-0711		PCBs, TOC, Grain-size			
		CAPL-SWSD52	CAPL-SD52-0711					
		CAPL-SWSD53	CAPL-SD53-0711					
		CAPL-SWSD54	CAPL-SD54-0711					
		CAPL-SWSD55	CAPL-SD55-0711					
		CAPL-SWSD56	CAPL-SD56-0711					
		CAPL-SWSD57	CAPL-SD57-0711					
		CAPL-SWSD58	CAPL-SD58-0711					
		CAPL-SWSD58	CAPL-SD58P-0711		PCBs			
		CAPL-SWSD59	CAPL-SD59-0711		PCBs, TOC, Grain-size			Northeast
		CAPL-SWSD60	CAPL-SD60-0711					
		CAPL-SWSD61	CAPL-SD61-0811				Drainage Areas	Eastern Drainage

TABLE 1
Soil, Sediment, and Surface Water Sample Summary
Penniman Lake Site Inspection – Step 1 and Step 2
Cheatham Annex
Williamsburg, Virginia

SI Phase	Matrix	Station ID	Sample ID	Sample Collection Depth (inches bgs)	Analytical Group	Sampling Rationale	Sample Area	Sample Subarea
Step 2	surface sediment	CAPL-SWSD62	CAPL-SD62-1012	0-4"	full suite[4], pH, TOC, grain-size, AVS/SEM	These locations were chosen to obtain a broader coverage of Penniman Lake.	Penniman Lake	Northwest
			CAPL-SD62-1012-V[7]		VOCs			
		CAPL-SWSD63	CAPL-SD63-1012		full suite[4], pH, TOC, grain-size, AVS/SEM			
			CAPL-SD63-1012-V[7]		VOCs			
		CAPL-SWSD64	CAPL-SD64-1012		full suite[4], pH, TOC, grain-size, AVS/SEM			
			CAPL-SD64P-1012[2]		full suite[4]			
			CAPL-SD64-1012-V[7]		VOCs			
			CAPL-SD64P-1012-V[2,7]		VOCs			
		CAPL-SWSD65	CAPL-SD65-1012		full suite[4], pH, TOC, grain-size, AVS/SEM			East
		CAPL-SWSD66	CAPL-SD66-1012					Northeast
		CAPL-SWSD67	CAPL-SD67-1012					East
		CAPL-SWSD68	CAPL-SD68-1012[1]					
		CAPL-SWSD69	CAPL-SD69-1012					Center
		CAPL-SD70	CAPL-SD70-1012					Northwest - Northern Tributary
			CAPL-SD70-1012-V[7]		VOCs			
		CAPL-SD71	CAPL-SD71-1012		full suite[4], pH, TOC, grain-size, AVS/SEM			Center
			CAPL-SD71-1012-V[7]		VOCs			
		CAPL-SD72	CAPL-SD72-1012		full suite[4], pH, TOC, grain-size, AVS/SEM			
			CAPL-SD72-1012-V[7]					
		CAPL-SD73	CAPL-SD73-1012					
			CAPL-SD73P-1012[2]		full suite[4]			
			CAPL-SD73-1012-V[7]		VOCs			
			CAPL-SD73P-1012-V[2,7]		VOCs			
		CAPL-SD74	CAPL-SD74-1012		full suite[4], pH, TOC, grain-size, AVS/SEM			
		CAPL-SD75	CAPL-SD75-1012					Northeast
		CAPL-SD76	CAPL-SD76-1012					
		CAPL-SD77	CAPL-SD77-1012					
			CAPL-SD77-1012-V[7]		VOCs			
		CAPL-SD78	CAPL-SD78-1012[1]		full suite[4], pH, TOC, grain-size, AVS/SEM			
		CAPL-SD79	CAPL-SD79-1012					
			CAPL-SD79P-1012[2]		full suite[4]			
		CAPL-SD80	CAPL-SD80-1012		full suite[4], pH, TOC, grain-size, AVS/SEM			
		CAPL-SD81	CAPL-SD81-1012					East
		CAPL-SD82	CAPL-SD82-1012					
		CAPL-SD84	CAPL-SD84-1012[5]				Drainage Areas	Northwest Drainage
			CAPL-SD84-1012-A[5]		AVS/SEM			
		CAPL-SD85	CAPL-SD85-1012[5]		full suite[4], pH, TOC, grain-size, AVS/SEM			
			CAPL-SD85-1012-A[5]		AVS/SEM			
		CAPL-SD86	CAPL-SD86-1012[5]		full suite[4], pH, TOC, grain-size, AVS/SEM			
			CAPL-SD86-1012-A[5]		AVS/SEM			
		CAPL-SD87	CAPL-SD87-1012[5]		full suite[4], pH, TOC, grain-size, AVS/SEM			
			CAPL-SD87-1012-A[5]		AVS/SEM			
		CAPL-SD83	CAPL-SD83-1012[6]		full suite[4], pH, TOC, grain-size, AVS/SEM	To assess sediment on the King Creek side of the overflow pipe	King Creek	NA
			CAPL-SD83-1012-V[6,7]		VOCs			

TABLE 1
Soil, Sediment, and Surface Water Sample Summary
Penniman Lake Site Inspection – Step 1 and Step 2
Cheatham Annex
Williamsburg, Virginia

SI Phase	Matrix	Station ID	Sample ID	Sample Collection Depth (inches bgs)	Analytical Group	Sampling Rationale	Sample Area	Sample Subarea
Step 2	subsurface sediment	CAPL-SWSD62	CAPL-SSD62-1012	4-8"	full suite[4], pH, TOC	These locations were chosen to obtain a broader coverage of Penniman Lake.	Penniman Lake	Northwest
		CAPL-SWSD63	CAPL-SSD63-1012					
		CAPL-SWSD64	CAPL-SSD64-1012					
		CAPL-SWSD65	CAPL-SSD65-1012					East
		CAPL-SWSD66	CAPL-SSD66-1012					
			CAPL-SSD66P-1012[2]		full suite[4]			Northeast
		CAPL-SWSD67	CAPL-SSD67-1012		full suite[4], pH, TOC			East
			CAPL-SSD67-1012-V[7]		VOCs			
		CAPL-SWSD68	CAPL-SSD68-1012		full suite[4], pH, TOC			
		CAPL-SWSD69	CAPL-SSD69-1012[1]					Center
			CAPL-SSD69-1012-V[1,7]		VOCs			
		CAPL-SD70	CAPL-SSD70-1012		full suite[4], pH, TOC			Northwest - Northern Tributary
		CAPL-SD71	CAPL-SSD71-1012					Center
		CAPL-SD72	CAPL-SSD72-1012					
		CAPL-SD73	CAPL-SSD73-1012					
		CAPL-SD74	CAPL-SSD74-1012					
			CAPL-SSD74P-1012[2]		full suite[4]			
		CAPL-SD75	CAPL-SSD75-1012		full suite[4], pH, TOC			Northeast
		CAPL-SD76	CAPL-SSD76-1012[1]					
		CAPL-SD77	CAPL-SSD77-1012					
		CAPL-SD78	CAPL-SSD78-1012					
		CAPL-SD79	CAPL-SSD79-1012					
			CAPL-SSD79-1012-V[7]		VOCs			
		CAPL-SD80	CAPL-SSD80-1012		full suite[4], pH, TOC			
			CAPL-SSD80-1012-V[7]		VOCs			
		CAPL-SD81	CAPL-SSD81-1012		full suite[4], pH, TOC			East
		CAPL-SD82	CAPL-SSD82-1012					
		CAPL-SD84	CAPL-SSD84-1012					
		CAPL-SD85	CAPL-SSD85-1012				Drainage Areas	Northwest Drainage - Northern Tributary
		CAPL-SD86	CAPL-SSD86-1012					
		CAPL-SD87	CAPL-SSD87-1012					
Step 2	surface water	CAPL-SWSD62	CAPL-SW62-1012	NA	full suite[4] including total and dissolved metals, hardness	These locations were chosen to obtain a broader coverage of Penniman Lake.	Penniman Lake	Northwest
		CAPL-SWSD63	CAPL-SW63-1012					
			CAPL-SW63P-1012[2]		full suite[4] including total and dissolved metals			
		CAPL-SWSD64	CAPL-SW64-1012		full suite[4] including total and dissolved metals, hardness			
		CAPL-SWSD65	CAPL-SW65-1012					East
		CAPL-SWSD66	CAPL-SW66-1012					Northwest
		CAPL-SWSD67	CAPL-SW67-1012[1]					East
		CAPL-SWSD68	CAPL-SW68-1012					
		CAPL-SWSD69	CAPL-SW69-1012					Center

Notes:

NA - Not applicable

bgs – below ground surface

[1] MS/MSD sample collected

[2] Duplicate sample

[3] Composite samples were collected from 3-points within a 10 foot radius from the identified location

[4] Full suite for this investigation includes the following: VOCs, SVOCs, Pesticides, Aroclor 1260, Explosives, Nitroguanidine, Metals, Mercury, and Cyanide

[5] These locations were fomerly proposed as soil locations in the most heavily contaminated drainage; however, during the field event, this drainage had standing water, so these samples were identified as sediment

[6] This single surface sediment sample was collected off-site along the King Creek side of the dam, near the overflow pipe from Penniman Lake to King Creek

[7] Due to a sample collection error during the initial sediment sampling, the VOC portion of this sample had to be recollected and is listed as separate sample

Table 2
Tissue Sample Summary
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Sample ID	Date	Time	Species Name	Common Name	Specimen Number	Length (mm)	Weight (g)	Cohort	Sample Type*	Analytical Group	Sample Area
CAPL-TS01-1012	10/24/2012	13:05	*Lithobates catesbeinanus*	American bullfrog	1	190	54	adult	whole body	Bioaccumulative metals, 12 dioxin-like PCB congeners, PCB Homologues, TCL Pesticides, percent moisture, percent lipids	Drainage south of Site 11
					2	180	36	adult	whole body		
					3	200	51	adult	whole body		
						Total Weight:	**141**				
CAPL-TS02-1012	10/24/2012	13:10	*Lithobates catesbeinanus*	American bullfrog	1	170	26	adult	whole body		
					2	265	122	adult	whole body		
						Total Weight:	**148**				
CAPL-TS03-1012	10/24/2012	13:15	*Lithobates catesbeinanus*	American bullfrog	1	290	155	adult	whole body		
						Total Weight:	**155**				
CAPL-TS04-1012	10/24/2012	13:20	*Lithobates catesbeinanus*	American bullfrog	1	200	66	adult	whole body		
					2	200	45	adult	whole body		
					3	150	20	adult	whole body		
					4	110	8	adult	whole body		
					5	140	14	adult	whole body		
						Total Weight:	**153**				
CAPL-TS05-1012	10/24/2012	13:25	*Lithobates catesbeinanus*	American bullfrog	1	175	35	adult	whole body		
					2	180	44	adult	whole body		
					3	145	18	adult	whole body		
					4	140	16	adult	whole body		
					5	150	19	adult	whole body		
					6	145	16	adult	whole body		
						Total Weight:	**148**				
CAPL-TS06-1012	10/24/2012	15:30	*Lithobates catesbeinanus*	American bullfrog	1	255	110	adult	whole body		Drainage to NW Cove
					2	180	37	adult	whole body		
					3	105	6	adult	whole body		
						Total Weight:	**153**				
CAPL-TS07-1012	10/24/2012	15:35	*Lithobates catesbeinanus*	American bullfrog	1	170	47	adult	whole body		
					2	160	30	adult	whole body		
					3	180	38	adult	whole body		
					4	190	44	adult	whole body		
						Total Weight:	**159**				
CAPL-TS08-1012	10/24/2012	15:40	*Lithobates catesbeinanus*	American bullfrog	1	165	26	adult	whole body		
					2	180	35	adult	whole body		
					3	185	43	adult	whole body		
					4	160	25	adult	whole body		
					5	160	24	adult	whole body		
						Total Weight:	**153**				
CAPL-TS09-1012	10/24/2012	15:45	*Lithobates catesbeinanus*	American bullfrog	1	30-60	55	tadpole	whole body		
						Total Weight:	**55**				

Table 2
Tissue Sample Summary
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Sample ID	Date	Time	Species Name	Common Name	Specimen Number	Length (mm)	Weight (g)	Cohort	Sample Type*	Analytical Group	Sample Area
CAPL-TS10-WB-1012	10/10/2012	12:20	*Notemigonus crysoleucas*	golden shiner	1	90	7	medium	whole body	Bioaccumulative metals, 12 dioxin-like PCB congeners, PCB Homologues, TCL Pesticides, percent moisture, percent lipids	Penniman Lake - Near Site 11
					2	95	7	medium	whole body		
					3	100	8	medium	whole body		
					4	90	6	medium	whole body		
					5	85	7	medium	whole body		
					6	105	10	medium	whole body		
					7	80	4	medium	whole body		
					8	95	8	medium	whole body		
					9	105	9	medium	whole body		
					10	85	6	medium	whole body		
					11	90	6	medium	whole body		
					12	95	7	medium	whole body		
					13	120	15	medium	whole body		
					14	95	7	medium	whole body		
					15	85	4	medium	whole body		
					16	95	8	medium	whole body		
					17	105	10	medium	whole body		
					18	90	5	medium	whole body		
						Total Weight:	**134**				
CAPL-TS11-WB-1012	10/10/2012	12:25	*Micropterus salmoides*	largemouth bass	1	110	15	medium	whole body		Penniman Lake - Northwest
					2	145	34	medium	whole body		
					3	140	30	medium	whole body		
					4	135	27	medium	whole body		
					5	145	34	medium	whole body		
					6	145	35	medium	whole body		
					7	150	39	medium	whole body		
					8	160	49	medium	whole body		
					9	130	27	medium	whole body		
						Total Weight:	**290**				
CAPL-TS12-WB-1012	10/10/2012	12:30	*Lepomis macrochirus*	bluegill	1	40-75	202	small	whole body		Penniman Lake - Near Site 11
						Total Weight:	**202**				
CAPL-TS13-WB-1012	10/10/2012	12:15	*Lepomis macrochirus*	bluegill	1	160	88	medium	whole body		
					2	170	99	medium	whole body		
					3	185	137	medium	whole body		
						Total Weight:	**324**				
CAPL-TS14-WB-1012	10/10/2012	12:35	*Lepomis microlophus*	redear sunfish	1	130	42	medium	whole body		
					2	145	57	medium	whole body		
					3	150	66	medium	whole body		
					4	95	5	medium	whole body		
					5	80	6	medium	whole body		
						Total Weight:	**176**				

Table 2
Tissue Sample Summary
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Sample ID	Date	Time	Species Name	Common Name	Specimen Number	Length (mm)	Weight (g)	Cohort	Sample Type*	Analytical Group	Sample Area
CAPL-TS15-WB-1012	10/10/2012	12:40	*Anguilla rostrata*	American eel	1	300	47	small	whole body	Bioaccumulative metals, 12 dioxin-like PCB congeners, PCB Homologues, TCL Pesticides, percent moisture, percent lipids	Penniman Lake - Northwest
					2	285	38	small	whole body		
					3	310	53	small	whole body		
					4	245	20	small	whole body		
						Total Weight:	**158**				
CAPL-TS16-F-1012 & CAPL-TS16-O-1012	10/10/2012	12:05	*Micropterus salmoides*	largemouth bass	1	270	195	large	fillet (HHRA)	Bioaccumulative metals, Aroclor 1260, 12 dioxin-like PCB congeners, PCB Homologues, TCL Pesticides, percent moisture, percent lipids	
					2	265	203	large	fillet (HHRA)		
						Total Weight:	**398**				
CAPL-TS17-F-1012 & CAPL-TS17-O-1012	10/10/2012	11:45	*Micropterus salmoides*	largemouth bass	1	405	755	large	fillet (HHRA)		
					2	345	570	large	fillet (HHRA)		
						Total Weight:	**1325**				
CAPL-TS18-F-1012 & CAPL-TS18-O-1012	10/10/2012	11:50	*Micropterus salmoides*	largemouth bass	1	350	508	large	fillet (HHRA)		
					2	340	515	large	fillet (HHRA)		
						Total Weight:	**1023**				

Notes:

*Whole body samples were sent to the lab for analysis to be used in the ecological risk assessment, fillet samples were sent to the laboratory for analysis to be used in the human health risk assessment

Table 3
Reference Surface Sediment Sample Detections
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05
Sample ID	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Volatile Organic Compounds (µg/kg)						
2-Butanone	32.2	169	129	31	42.4	109
Acetone	114 J	563 J	424 J	99.8 J	148 J	629 J
Carbon disulfide	4.54 UJ	15 UJ	7.06 J	4.26 UJ	7.55 UJ	13.8 UJ
Methylene chloride	5.21 J	16.9 J	17.1 J	8.51 U	8.18 J	27.6 U
Semivolatile Organic Compounds (µg/kg)						
Chrysene	8.69 J	22.4 U	19.3 U	7.33 U	9.57 U	17.3 J
Fluoranthene	8.77 J	19.4 J	31.4 J	6.59 J	12.3 J	19 J
Phenanthrene	3.67 J	15.4 J	27.5 J	4.97 J	7.38 J	13.6 J
Pyrene	7.57 J	25.1 J	27.4 J	7.33 U	12.5 J	21.8 J
Pesticide/Polychlorinated Biphenyls (µg/kg)						
4,4'-DDD	0.571 J	2.32 L	7.97 L	4.51 L	2.3 L	154 L
4,4'-DDE	0.945 L	3.27 L	9.3 J	3.75 J	1.5 L	26.2 J
4,4'-DDT	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.45 L
alpha-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.813 L	1.62 UL
Dieldrin	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	0.948 J
Endrin	0.663 UL	2.25 UL	2.27 J	0.763 UL	0.933 UL	7.36 J
gamma-BHC (Lindane)	0.295 J	2.25 UL	2.03 UL	0.316 J	0.933 UL	2.22 J
gamma-Chlordane	0.663 UL	1.1 L	2.56 B	1.27 B	0.933 UL	1.32 B
Explosives (µg/kg)						
1,3-Dinitrobenzene	160 U	278 J	279 J	160 U	167 U	167 U
2,4,6-Trinitrotoluene	160 U	160 U	436 J	160 U	141 J	167 U
2-Nitrotoluene	160 U	101 J	167 U	160 U	167 U	167 U
4-Nitrotoluene	160 U	160 U	167 U	160 U	348	167 U
HMX	160 U	160 U	167 U	174 J	167 U	167 U
Nitroglycerin	400 U	384 J	417 U	400 U	417 U	417 U
RDX	160 U	160 U	297 J	160 U	167 U	167 U
Tetryl	160 U	160 U	106 J	160 U	167 U	167 U
Total Metals (mg/kg)						
Aluminum	2,880	5,320	4,460	6,450	1,730	24,200
Antimony	1.63 UL	5.45 U	4.98 U	4.82 U	0.726 J	10.6 U
Arsenic	11.1	147	140	16.3	43.1	43
Barium	23.5	31.7	25.7	34.3	9.62	75
Beryllium	0.45 J	1.36 U	1.24 U	0.74 J	0.287 U	1.39 J
Calcium	2,960	23,000	20,800	3,780	5,490	8,540
Chromium	7.19	18.9	16.8	13.7	5.67	46.2
Cobalt	1.5 J	6.82 U	6.22 U	6.02 U	1.44 U	13.2 U
Copper	2.18	10	9.16	2.57 J	3.38	8.72 J
Iron	5,420	13,500	11,400	16,100	5,730	38,900
Lead	4.46	19	16.6	8.33	6.09	22.2
Magnesium	482 J	716 J	1,870 U	1,100 J	255 J	3,470 J
Manganese	28	69	56.3	54.9	21.9	74.6
Mercury	0.0307 J	0.224 U	0.16 U	0.0327 J	0.0665 U	0.0811 J
Nickel	2.57	4.91 J	4.04 J	4.48 J	1.3 J	13.4
Potassium	530 J	2,040 U	1,870 U	1,180 J	248 J	3,740 J
Vanadium	7.47	18.4	16.8	16.3	8.64	58.3
Zinc	14	60.1	50.8	19.9	14.2	58.5

Table 3
Reference Surface Sediment Sample Detections
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05
Sample ID	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)						
Zinc, SEM	0.0881	0.505	NA	0.0653	0.0717	0.247
Acid volatile sulfide, SEM	1.98 J	12.1	NA	4.5	2.62 J	9.62
Cadmium, SEM	8.22E-04 J	0.00181 J	NA	9.87E-04 U	8.50E-04 U	0.00201 U
Copper, SEM	0.0112 J	0.0145 J	NA	0.0104 J	0.0114 J	0.0163 J
Lead, SEM	0.0138	0.0528	NA	0.0192	0.0103	0.0464
Nickel, SEM	0.00813 J	0.0167 J	NA	0.00989 J	0.00373 J	0.0145 J
Wet Chemistry						
pH (ph)	6.86 H3	6.54 H3	NA	6.91 H3	6.75 H3	6.72 H3
Total organic carbon (TOC) (mg/kg)	56,100 N	97,200 N	NA	37,600 N	51,700 N	57,100 N
Grain Size (pct)						
Coarse Sand (%)	1.8	7.8	NA	3.9	3.9	5.6
Fine Sand (%)	81.1	47	NA	61.8	69	65.3
Fines (%)	10.7	35.2	NA	26.2	16.2	20.6
Gravel (%)	0	0	NA	0	1.6	0
Medium Sand (%)	6.4	10	NA	8.1	9.3	8.5
Sand (%)	89.3	64.8	NA	73.8	82.2	79.4
GRAINSIZE (PCT/P)						
GS03 Sieve 3" (75 mm)	100	100	NA	100	100	100
GS05 Sieve 2" (50 mm)	100	100	NA	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	NA	100	100	100
GS07 Sieve 1" (25.0 mm)	100	100	NA	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	NA	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	100	NA	100	100	100
Sieve No. 004 (4.75 mm)	100	100	NA	100	98.4	100
Sieve No. 010 (2.00 mm)	98.2	92.2	NA	96.1	94.5	94.4
Sieve No. 020 (850 um)	96.3	88.6	NA	93.9	93.4	91.9
Sieve No. 040 (425 um)	91.8	82.2	NA	88	85.2	85.9
Sieve No. 060 (250 um)	66.2	69.4	NA	67.3	67.7	67
Sieve No. 080 (180 um)	40.1	56.2	NA	48.4	49.6	47.6
Sieve No. 100 (150 um)	26.3	47.6	NA	39.7	35.6	37.4
Sieve No. 200 (75 um)	10.7	35.2	NA	26.2	16.2	20.6

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\[Table 3_CAREF_AllData_SD_Detections_v2_jd.xlsx], Campbell, Clairette/VBO, 03/17/2014

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3 - Result estimated; sample received outside the recommended holding time for this analyte

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

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

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

N - Unvalidated data; one or more quality control criteria was not met.

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

PCT/P - Percent passed

ph - pH units

µg/kg - Micrograms per kilogram

µmol/g - Micromoles per gram

Table 4
Reference Subsurface Sediment Sample Detections
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	
Sample ID	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Volatile Organic Compounds (µg/kg)						
2-Butanone	19	40.9	11.8	43.9	13.3 J	17.5 J
Acetone	70.5 J	137 J	43.4 J	157 J	57.6 J	77.4 J
Methylene chloride	8.03 J	6.33 B	3.93 B	7.11 J	4.33 B	6.31 B
Semivolatile Organic Compounds (µg/kg)						
2-Methylnaphthalene	7.01 U	6.5 U	4.59 U	10.5 U	3.26 J	5.91 U
Benzo(a)pyrene	7.01 U	6.5 U	4.59 U	10.5 U	13.6	14.5
Benzo(b)fluoranthene	7.01 U	6.5 U	4.59 U	10.5 U	17.7	16.3
Benzo(k)fluoranthene	7.01 U	6.5 U	4.59 U	10.5 U	12.6	8.37 J
Chrysene	7.01 U	6.5 U	4.59 U	10.5 U	19.6	5.91 U
Fluoranthene	8.1 J	11.4 J	3.11 J	11 J	21.2	20
Fluorene	7.01 U	6.5 U	4.59 U	10.5 U	3.18 J	5.91 U
Naphthalene	7.01 U	6.5 U	4.59 U	10.5 U	4.78 J	5.91 U
Phenanthrene	8.42 J	7.31 J	3.59 J	10.5 J	16.7	15.4
Pyrene	9.75 J	9.86 J	4.59 U	11.1 J	21.5	20.7
Pesticide/Polychlorinated Biphenyls (µg/kg)						
4,4'-DDD	0.739 UL	1.13 J	1.37 L	18.4 J	13.4 L	11.6 L
4,4'-DDE	0.683 J	1.3 L	0.345 L	8.98 J	7.53 J	6.82 J
Aldrin	0.739 UL	0.668 UL	0.478 UL	0.91 J	0.568 UL	0.619 UL
alpha-BHC	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.322 J	0.318 L
Aroclor-1254	14.5 L	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL
beta-BHC	0.739 UL	0.668 UL	0.478 UL	2.21 J	0.465 J	0.364 L
delta-BHC	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.294 J	0.264 J
Endosulfan I	0.739 UL	0.668 UL	0.478 UL	0.805 J	0.568 UL	0.619 UL
Endrin	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.64 J	0.619 UL
gamma-BHC (Lindane)	0.739 UL	0.668 UL	0.218 J	1.04 U	0.285 J	0.48 J
Explosives (µg/kg)						
1,3-Dinitrobenzene	190 U	160 U	190 U	174 U	182 U	217 J
HMX	190 U	160 U	190 U	812 J	182 U	200 U
Nitroguanidine	90.9 U	105 U	95.2 U	95.2 U	110 J	105 J
Total Metals (mg/kg)						
Aluminum	3,110	1,510	3,500	2,570	7,950 J	10,200 J
Arsenic	8.08	16.5	3.39 J	57.2	7.85	6.96
Barium	27.7	10.5	17.6	13 J	28.2	36.5
Beryllium	0.492 J	0.386 U	0.448 J	1.65 U	0.914 U	0.599 J
Calcium	3,240	5,050	1,120 J	7,430	2,800	3,160
Chromium	7.29	4	8.9	6.22 J	11.9	15.9
Cobalt	1.69	1.93 U	3.53 U	8.23 U	4.57 U	2.47 J
Copper	2.64	2.09	2.83 U	3.67 J	2.31 J	2.78 J
Iron	5,310	2,840	8,940	6,300	8,740 J	11,300 J
Lead	4.05	3.77	3.58	8.98	9.5	12.1
Magnesium	479 J	197 J	802 J	2,470 U	861 J	1,130 J
Manganese	28.9	18.6	13.6	22.6	21.6	25.1
Mercury	0.0258 J	0.0541 U	0.043 U	0.0499 J	0.047 J	0.0519 J
Nickel	2.75	1.24 J	2.48 J	4.94 U	4.39 J	5.63
Potassium	558	578 U	1,120 J	2,470 U	777 J	1,010 J
Vanadium	7.65	5.09	10.3	8.57 J	15.8	20.4
Zinc	13.3	10.8	8.81	22.3	18.9	22.6
Wet Chemistry						
pH (ph)	6.87 H3	6.89 H3	6.77 H3	6.79 H3	6.94 H3	NA
Total organic carbon (TOC) (mg/kg)	26,500 N	42,500 N	19,600 N	67,800 N	43,400 N	NA

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\[Table 4_CAREF_AllData_SSD_Detections_v1_jd.xlsx], Campbell, Clairette/VBO, 03/17/2014

Notes:

Shading indicates detections
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H3 - Result estimated; sample received outside the recommended holding time for this analyte
J - Analyte present, value may or may not be accurate or precise
L - Analyte present, value may be biased low, actual value may be higher
N - Unvalidated data; one or more quality control criteria was not met.
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/kg - Milligrams per kilogram
ph - pH units
µg/kg - Micrograms per kilogram

Table 5
Reference Surface Water Sample Detections
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03
Sample ID	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFYP-SW01-1012	CAREFYP-SW02-1012	CAREFYP-SW02P-1012	CAREFYP-SW03-1012
Sample Date	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12
Chemical Name										
Volatile Organic Compounds (µg/l)										
Acetone	49.5 J	68.4	5 U	65.3	60.5	76.8	12 U	12 U	12 U	12 U
Semivolatile Organic Compounds (µg/l)										
4-Methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	NA	NA	NA	NA
Benzo(a)anthracene	0.0943 U	0.0515 L	0.0926 UL	0.0943 U	0.0962 U	0.0666 J	0.08 UL	0.08 U	0.08 U	0.08 U
Benzo(b)fluoranthene	0.0943 U	0.0627 J	0.0926 UL	0.0943 U	0.0962 U	0.0629 J	0.08 UL	0.08 U	0.08 U	0.08 U
Benzo(k)fluoranthene	0.0943 U	0.0575 J	0.0926 UL	0.0943 U	0.0962 U	0.0627 J	0.08 UL	0.08 U	0.08 U	0.08 U
Chrysene	0.0943 U	0.0542 J	0.0926 UL	0.0943 U	0.0962 U	0.0799 J	0.08 UL	0.08 U	0.08 U	0.08 U
Fluoranthene	0.0943 U	0.0901 J	0.0622 L	0.0855 J	0.0962 U	0.177 J	0.08 UL	0.08 U	0.08 U	0.08 U
Phenanthrene	0.189 U	0.192 U	0.185 UL	0.0988 J	0.192 U	0.124 J	0.08 UL	0.08 U	0.08 U	0.08 U
Pyrene	0.0943 U	0.0742 J	0.0926 UL	0.0591 J	0.0962 U	0.125 J	0.08 UL	0.08 U	0.08 U	0.08 U
Pesticide/Polychlorinated Biphenyls (µg/l)										
alpha-BHC	0.00432 J	0.00943 UL	0.00943 UL	0.0404 J	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U
alpha-Chlordane	0.00943 UL	0.00943 UL	0.00943 UL	0.0172 J	0.00943 U	0.0082 J	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (Lindane)	0.00401 J	0.00943 UL	0.00943 UL	0.0124 J	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-Chlordane	0.0119 B	0.0109 B	0.00612 B	0.0159 B	0.0213	0.00943 UL	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.00383 B	0.00943 UL	0.00943 UL	0.0055 B	0.00943 UL	0.00746 J	0.05 U	0.05 U	0.05 U	0.05 U
Explosives (µg/l)										
2-Nitrotoluene	0.15 U	0.148 U	0.154 UJ	0.814 J	0.152 U	0.148 U	0.168 UL	0.168 U	0.167 UL	0.166 UL
Total Metals (µg/l)										
Aluminum	61	61.3	52.1	49.8 J	55.6	55.2	614	116 J	92.7 J	112 K
Antimony	2 U	2 U	2 U	2 U	2 U	2 U	0.2 J	0.161 J	0.164 J	0.171 J
Arsenic	6.07	6.19	5.28	5.13	5.2	5.3	6.14 J	5.8 J	5.63 J	6.19 J
Barium	20.7	20	18.6	18.7	19	19.1	26.1	35	32.9	33.1
Cadmium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4 U	4 U	4 U	4 U
Calcium	35,300	36,000	32,300	31,800	32,800	32,400	67,100	89,700	85,600	77,100
Chromium	1 U	1 U	1 U	1 U	1 U	1 U	0.932 J	1.52 J	1.14 J	1.45 J
Copper	2 U	2 U	2 U	2 U	2 U	2 U	0.967 J	1.15	1.13	0.922 J
Iron	1,260	1,220	994	1,010	996	996	2,160	2,480	2,440	2,340
Lead	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.444 J	0.51 J	0.49 J	0.511 J
Magnesium	1,920	1,940	1,910	1,930	1,980	2,000	1,960 J	2,020 J	2,040 J	2,070 K
Manganese	142	133	98.5	99.2	102	100	108	133	144	153
Nickel	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.27 J	1.75 J	1.94 J	1.47 J
Potassium	2,600	2,690	2,580	2,590	2,650	2,700	2,310 J	2,010 J	1,990 J	2,100 K
Selenium	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	2.6 U	2.6 U	2.6 U	2.6 U
Sodium	13,200	13,200	13,300	13,400	13,700	14,000	12,200	12,200	12,000	12,000
Vanadium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.636 J	0.428 J	0.397 J	0.449 J
Zinc	1.38 J	1.31 J	2.5 U	2.5 U	1.64 J	1.29 J	12.9	25.2	17.7	15

Table 5
Reference Surface Water Sample Detections
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03
Sample ID	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFYP-SW01-1012	CAREFYP-SW02-1012	CAREFYP-SW02P-1012	CAREFYP-SW03-1012
Sample Date	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12
Chemical Name										
Dissolved Metals (µg/l)										
Aluminum, Dissolved	49.3 B	61.8 B	38.8 B	41.5 B	28.4 B	46.4 B	250 U	25 U	250 U	100 K
Arsenic, Dissolved	4.33 B	5.62 B	4.08 B	4.59 B	3.81 B	4.52 B	4.09 B	2.43 B	2.77 B	4.15 B
Barium, Dissolved	18.6 B	19.8 B	17.5 B	17.7 B	16.3 B	17.4 B	26.1 B	30.6 B	30.7 B	33 B
Cadmium, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4 U	4 U	0.186 J	0.226 J
Calcium, Dissolved	36,200 B	36,100 B	32,800 B	32,200 B	33,000 B	31,100 B	68,600 B	94,300 B	93,400 B	86,200 B
Chromium, Dissolved	1 U	1 U	1 U	1 U	1 U	1 U	0.966 J	3 U	3 U	1.26 J
Copper, Dissolved	2 U	2 U	2 U	2 U	2 U	2 U	0.82 J	0.88 U	0.374 J	0.934 J
Iron, Dissolved	613	1,030	634	688	364	707	979	97.2	362	1,550
Lead, Dissolved	0.75 U	0.75 U	0.523 J	0.75 U	0.75 U	0.75 U	0.29 J	0.6 U	0.6 U	0.489 J
Magnesium, Dissolved	1,940 B	1,970 B	1,960 B	1,960 B	1,990 B	1,960 B	1,800 B	2,100 B	2,080 B	1,950 B
Manganese, Dissolved	70.9	116	64.2	67.6	35.7 B	71.5	99.3	110 B	110 B	136 B
Mercury, Dissolved	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.069 U	0.069 U	0.069 U	0.069 U
Potassium, Dissolved	2,580 B	2,690 B	2,620 B	2,590 B	2,590 B	2,590 B	1,980 B	1,680 B	1,740 B	2,020 B
Selenium, Dissolved	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	2.6 U	2.6 U	2.6 U	2.6 U
Sodium, Dissolved	13,400 B	13,500 B	13,700 B	13,700 B	13,900 B	13,700 B	11,700	11,600 B	11,000 B	11,600 B
Thallium, Dissolved	1 U	1 U	1 U	1 U	1 U	1 U	0.23 U	0.23 U	0.23 U	0.23 U
Vanadium, Dissolved	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.308 B	0.8 U	0.8 U	0.326 B
Zinc, Dissolved	1.48 B	2.09 B	2.5 U	2.5 U	2.5 U	2.5 U	16.9	9.91 J	15	15.8
Wet Chemistry										
Hardness (mg/l)	107 N	98 N	85.5 N	NA	96.3	97.3	160	220	NA	210 Q

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\[Table 5_CAREF_AllData_SW_Detections_v1_jd.xls], ccampbe6, 03/20/2013

Notes:

Shading indicates detections

NA - Not analyzed
B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N - Laboratory qualifier. One or more quality control criteria was not met.
Q - Laboratory qualifier. One or more quality control criteria was not met.
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/l - Milligrams per liter
µg/l - Micrograms per liter

Table 5
Reference Surface Water Sample Detections
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAREFS04-SWSD01	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFS04-SW01-1012	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Sample Date	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12
Chemical Name						
Volatile Organic Compounds (µg/l)						
Acetone	4.3 B	4.3 B	4.6 B	2.7 B	5.4 B	5.8 B
Semivolatile Organic Compounds (µg/l)						
4-Methylphenol	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(b)fluoranthene	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Benzo(k)fluoranthene	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Chrysene	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Fluoranthene	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Phenanthrene	0.065 J	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Pyrene	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Pesticide/Polychlorinated Biphenyls (µg/l)						
alpha-BHC	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
alpha-Chlordane	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
gamma-BHC (Lindane)	0.024 U	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
gamma-Chlordane	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Heptachlor epoxide	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Explosives (µg/l)						
2-Nitrotoluene	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Total Metals (µg/l)						
Aluminum	286 J	97.5 J	141 J	77.9 J	149 J	90.8 J
Antimony	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic	7.9 J	5.3 J	7.3 J	6.6 J	6.3 J	6.4 J
Barium	23.1	20 J	21.3	19.5	24.6	22.3
Cadmium	3 U	3 U	3 U	3 U	3 U	0.08 J
Calcium	39,400	40,700 J	43,400	31,900	57,700	44,100
Chromium	0.96 J	4 U	0.57 J	0.37 J	0.53 J	0.47 J
Copper	1.7 B	1.3 B	1.2 B	1.3 B	1.7 B	2.1 B
Iron	2,030	1,080 J	1,630 J	1,410	2,050	1,710
Lead	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium	2,330	2,180	2,260	2,190	2,180	2,160
Manganese	120	79.2 J	98.8 J	86.3	114	115
Nickel	0.55 B	4 U	0.63 B	0.7 B	0.57 B	0.57 B
Potassium	2,960	2,860 J	2,990	2,750	2,480	2,630
Selenium	2.5 J	7 U	7 U	7 U	7 U	7 U
Sodium	13,900	13,200	13,500	14,100	12,300	12,600
Vanadium	1.1 J	0.44 J	0.88 J	0.47 J	0.57 J	0.4 J
Zinc	4.3 B	3.1 B	3.4 B	15.5 B	3.4 B	3.4 B

Table 5
Reference Surface Water Sample Detections
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAREFS04-SWSD01	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFS04-SW01-1012	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Sample Date	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12
Chemical Name						
Dissolved Metals (µg/l)						
Aluminum, Dissolved	158 J	295 J	106 J	69.1 J	113 J	138 J
Arsenic, Dissolved	5 J	6.1 J	4.2 J	5.2 J	5.9 J	5.6 J
Barium, Dissolved	16.8	23 J	20.1	17.5	24.5	22.9
Cadmium, Dissolved	3 U	3 U	0.05 J	3 U	3 U	3 U
Calcium, Dissolved	33,900	46,600 J	41,000	32,500	58,100	48,500
Chromium, Dissolved	0.65 J	1.2 B	0.7 B	0.74 B	0.58 B	0.53 B
Copper, Dissolved	1.2 B	2 B	1.3 B	0.83 B	1.1 B	1.1 B
Iron, Dissolved	544	1,660 J	954 J	934 K	1,800	1,420
Lead, Dissolved	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium, Dissolved	2,090	2,280	2,170	2,160	2,200	2,200
Manganese, Dissolved	34.8	81.4	72.8	65.4	104	107
Mercury, Dissolved	0.04 J	0.04 J	0.1 U	0.02 J	0.04 J	0.01 J
Potassium, Dissolved	2,630	3,200 J	2,810	2,620	2,540	2,710
Selenium, Dissolved	7 U	7 U	2.8 J	7 U	7 U	7 U
Sodium, Dissolved	13,300	13,200	13,300	13,500	12,600	13,400
Thallium, Dissolved	5 U	5 U	5 U	1.4 J	1.2 J	5 U
Vanadium, Dissolved	0.75 J	0.96 J	0.43 J	0.51 J	0.72 J	0.96 J
Zinc, Dissolved	2.9 B	5.5 B	3.4 B	3 B	3.2 B	3.3 B
Wet Chemistry						
Hardness (mg/l)	94	98	NA	76	160	120

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Notes:

Shading indicates detections
NA - Not analyzed
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J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N - Laboratory qualifier. One or more quality control criteria was not met.
Q - Laboratory qualifier. One or more quality control criteria was not met.
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/l - Milligrams per liter
µg/l - Micrograms per liter

Table 6
Reference Tissue Sample Detections
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAREFPL-TS01	CAREFPL-TS02	CAREFPL-TS03	CAREFPL-TS04	CAREFPL-TS05	CAREFPL-TS06	CAREFPL-TS07	CAREFPL-TS08	CAREFPL-TS10		CAREFPL-TS11	
Sample ID	CAREFPL-TS01-1012	CAREFPL-TS02-1012	CAREFPL-TS03-1012	CAREFPL-TS04-1012	CAREFPL-TS05-WB-1012	CAREFPL-TS06-WB-1012	CAREFPL-TS07-WB-1012	CAREFPL-TS08-WB-1012	CAREFPL-TS10-F-1012	CAREFPL-TS10-O-1012	CAREFPL-TS11-F-1012	CAREFPL-TS11-O-1012
Sample Date	10/24/12	10/24/12	10/24/12	10/24/12	10/23/12	10/22/12	10/23/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Chemical Name												
Pesticide/Polychlorinated Biphenyls (UG/KG)												
4,4'-DDD	1.8 U	1.9 U	1.9 U	12 U	2.3	1.6 J	0.72 J	0.89 J	1.9 U	1.1 J	1.8 U	5.8 J
4,4'-DDE	8.9 J	4.5	15 J	74 J	13 J	15 J	13	6.4	1.9 U	17 J	4.6	57
4,4'-DDT	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.8 J	1.8 U	1.8 U	1.9 U	1.1 J	1.8 U	3.7 J
Aldrin	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.3 J	1.9 U	1.8 U	1.8 U	10 U
alpha-Chlordane	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.5 J	1.8 U	1.8 U	10 U
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	18 U	80	25	240
beta-BHC	1.8 U	1.9 U	1 J	12 U	1.9 U	1.9 U	1.8 U	2.3 J	2.9 J	1.5 J	3.3 J	10 U
Endosulfan sulfate	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.2 J	1.8 U	3.7 J
Endrin	1.8 U	1.9 U	1.9 U	12 U	1.9 U	0.7 J	1.8 U	1.8 U	1.9 U	0.86 J	1.8 U	10 U
gamma-Chlordane	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	0.68 J	1.8 U	10 U
Heptachlor	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	2.5 J	1.8 U	10 U
Polychlorinated biphenyls (PCBs)	125	148	204	137	221	73.9	108	35.4	11.7	191	40.7	433
Polychlorinated Biphenyl Congeners (PG/G)												
3,3',4,4'-Tetrachlorobiphenyl (77)	7.79 J	8.15 J	17.4 J	12.6 J	24.9 J	20.7	22.4	12.3 J	3.24 J	33.4	6.62 J	80.1
3,4,4',5-Tetrachlorobiphenyl (81)	2.92 J	2.53 J	5.42 J	14.1 U	7.64 J	5.52 J	13.8 U	13.5 U	14.7 U	13.3 U	14.1 U	14.1 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	76.5 J	97.2	177	186	470	162	215	112	25.1	376	90.2	991
2,3,4,4',5-Pentachlorobiphenyl (114)	14.7 J	11.2 J	18 J	14.1 U	13 U	14.2 U	13.8 U	13.5 U	14.7 U	13.3 U	14.1 U	14.8 U
2,3',4,4',5-Pentachlorobiphenyl (118)	867	1,340	1,820	1,270	2,550	873	1,190	480	136	2,260	470	5,080
2,3',4,4',5'-Pentachlorobiphenyl (123)	22.4	18.3 J	29.1 J	20.7	35.3	13.7 J	13.8 U	14.1 U	14.7 U	37.7	12.9 J	57
3,3',4,4',5-Pentachlorobiphenyl (126)	70.1	73.7	105	74.5	13 U	14.2 U	13.8 U	15.1 U	14.7 U	13.3 U	14.1 U	14.8 U
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	1,280	1,540	1,750	969	496	246	266	137	41.5	746	159	1,920
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	14.3 U	28.6 J	13.5 U	14.1 U	13 U	14.2 U	13.8 U	13.5 U	14.7 U	18.9 U	14.1 U	14.8 U
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	522	712	780	376	130	82.9	58.3	48	14.6 J	243	51.8	743
Decachlorobiphenyl (209)	33.3 B	31.6	49.9	37.1	36.2 B	32.1 B	17.3 B	16.2 J	19.6 B	50.5	27.4 B	148
Congeners (156/157)	1,260	1,890	2,170	1,120	754	353	380	206	65.7	1,050	234	2,840
Total Dichlorobiphenyls	24.1	32.2	46	73.3	142	44.7	54.9	30.5	25	70	26.6	121
Total Heptachlorobiphenyls	49,200	61,200	74,900	44,500	43,500	18,800	21,200	9,320	2,990	53,800	10,200	130,000
Total Hexachlorobiphenyls	55,600	69,700	96,000	68,700	121,000	37,100	62,600	19,400	6,170	96,800	22,500	214,000
Total Nonachlorobiphenyls	901	1,150	1,360	687	401	290	169	146	40.3	622	148	2,040
Total Octachlorobiphenyls	11,500	12,800	19,400	10,200	7,200	4,150	3,490	2,260	674	11,100	2,370	34,900
Total Pentachlorobiphenyls	5,630	3,220	8,910	8,730	33,400	9,600	14,800	3,430	1,320	21,500	4,300	39,700
Total Tetrachlorobiphenyls	2,130	189	3,130	4,280	14,300	3,670	5,510	685	480	6,450	1,130	12,700
Total Trichlorobiphenyls	66.6	4.13	121	180	491	131	205	102	22.1	258	27.7	390
Toxic Equivalents (Total TEQ)	7.13	8.4	10.7	7.57	0.138	0.0557	0.0655	0.0307	0.00882	0.145	0.0312	0.361
Total Metals (MG/KG)												
Arsenic	0.095 J	0.13 J	0.13 J	0.13 J	0.067 J	0.17 J	0.38	0.15 J	0.19 U	0.19 U	0.19 U	0.19 U
Cadmium	0.068	0.084	0.046	0.049	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Copper	1.5	2.2	1	2.2	0.3 J	0.93 U	0.94 U	0.92 U	0.94 U	0.94 U	0.94 U	0.95 U
Mercury	0.0086 J	0.015 J	0.011 J	0.0052 J	0.014 J	0.0072 L	0.0077 J	0.014 J	0.13	0.064	0.27	0.19
Selenium	0.36	0.21	0.31	0.43	0.14	0.11	0.12	0.092 J	0.094 U	0.096	0.048 J	0.15
Silver	0.0046 J	0.0095 J	0.0039 J	0.003 J	0.0094 U	0.0093 U	0.0094 U	0.0092 U	0.0094 U	0.0094 U	0.0094 U	0.0095 U
Zinc	18	18	18	23	24	21	32	36	5	17	5.5	14
Wet Chemistry												
% Moisture (pct)	78	78	76	75	71	73	74	74	80	70	78	71
Lipids (%) (pct)	1.4	1.3	2	2.8	8.9	2.3	2.5	2.8	0.18	2.9	0.54	7.3

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\[Table 6_CAREFPL-TS_Detections_v1_jd.xlsx], Campbell, Clairette/VBO, 03/12/2014

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

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

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

U - The material was analyzed for, but not detected

MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

Table 7
Composite Surface Soil Data Exceedance Results - Transformer Pole and Former Transformer Pad - Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Transformer Pole Locations							
Station ID	**CAX 95% UTL SS Background**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO27	CAPL-SO28	CAPL-SO29		CAPL-SO30	CAPL-SO31	CAPL-SO32	CAPL-SO33
Sample ID				CAPL-SS27-1012	CAPL-SS28-1112	CAPL-SS29-1012	CAPL-SS29P-1012	CAPL-SS30-1012	CAPL-SS31-1012	CAPL-SS32-1012	CAPL-SS33-1012
Sample Date				10/31/12	11/02/12	10/31/12	10/31/12	10/31/12	10/31/12	10/31/12	10/31/12
Chemical Name											
Pesticide/Polychlorinated Biphenyls (µg/kg)											
Aroclor-1260	--	240	8,000	**4,350 J**	117 J	94.2	150	26.6	**627**	34.9	10.6 U

Notes:
Underline indicates exceedance of CAX 95% UTL Surface Soil (SS) Background value
Bold text indicates exceedance of Adjusted Residential Soil RSLs (May 2014)
Shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
U - The material was analyzed for, but not detected
UL - Analyte not detected, quantitation limit is probably higher
µg/kg - Micrograms per kilogram

Table 7
Composite Surface Soil Data Exceedance Results - Transformer Pole and Former Transformer Pad - Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Former Transformer Pad Locations										
Station ID	**CAX 95% UTL SS Background**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO34	CAPL-SO35	CAPL-SO36	CAPL-SO37	CAPL-SO38	CAPL-SO39		CAPL-SO40	CAPL-SO41	CAPL-SO42	CAPL-SO43
Sample ID				CAPL-SS34-1112	CAPL-SS35-1112	CAPL-SS36-1112	CAPL-SS37-1112	CAPL-SS38-1012	CAPL-SS39-1012	CAPL-SS39P-1012	CAPL-SS40-1112	CAPL-SS41-1012	CAPL-SS42-1012	CAPL-SS43-1112
Sample Date				11/05/12	11/06/12	11/06/12	11/06/12	10/31/12	10/31/12	10/31/12	11/01/12	10/31/12	10/31/12	11/01/12
Chemical Name														
Pesticide/Polychlorinated Biphenyls (µg/kg)														
Aroclor-1260	--	240	8,000	44.6 J	10.4 UL	30.4 K	21.9 K	9.71 U	10.8 U	8.76 UL	9.22 U	16.2 J	10.3 UL	9.52 UL

Notes:
Underline indicates exceedance of CAX 95% UTL Surface Soil (SS) Background value
Bold text indicates exceedance of Adjusted Residential Soil RSLs (May 2014)
Shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
U - The material was analyzed for, but not detected
UL - Analyte not detected, quantitation limit is probably higher
µg/kg - Micrograms per kilogram

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas													
Station ID		**RSLs Residential Soil**		CAPL-SO01		CAPL-SO02	CAPL-SO03	CAPL-SO04	CAPL-SO05	CAPL-SO06	CAPL-SO07	CAPL-SO08	CAPL-SO09	CAPL-SO10		CAPL-SO11	CAPL-SO12
Sample ID	**CAX 95% UTL BKG SS**	**Adjusted**	**CAX SS ECO SV**	CAPL-SS01-0811	CAPL-SS01P-0811	CAPL-SS02-0811	CAPL-SS03-0811	CAPL-SS04-0811	CAPL-SS05-0811	CAPL-SS06-0811	CAPL-SS07-0811	CAPL-SS08-0811	CAPL-SS09-0811	CAPL-SS10-0811	CAPL-SS10P-0811	CAPL-SS11-0811	CAPL-SS12-0811
Sample Date		**(May 2014)**		08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11
Chemical Name																	
Volatile Organic Compounds (µg/kg)																	
2-Butanone	--	2,700,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	6,100,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	--	7,800,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	--	600,000	64,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)																	
2-Methylnaphthalene	--	23,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	--	350,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	--	350,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	--	1,700,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	--	780,000	58,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	--	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	--	15	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	--	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	--	1,500	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	--	38,000	30,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	--	--	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	--	15,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	--	15	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	--	230,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	--	230,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	--	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	--	3,800	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	--	170,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)																	
4,4'-DDD	--	2,200	583	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	--	1,600	114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	--	1,900	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	--	31	3.63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	--	85	226	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	--	1,800	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	--	240	8,000	**5,600**	**4,300**	**23,000**	**590**	**17,000**	**4,400**	**2,000**	73	94	**63,000**	**13,000**	**17,000**	**38,000**	**1,000**
beta-BHC	--	300	342	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	--	300	226	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	--	33	10.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	--	37,000	6.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	--	37,000	6.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	--	37,000	6.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	--	1,800	1.95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	--	1,800	1.95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	--	1,800	1.95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	--	560	7.75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	--	1,800	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	--	120	52.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	--	59	52.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	--	31,000	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas													
Station ID		**RSLs Residential Soil**		CAPL-SO01		CAPL-SO02	CAPL-SO03	CAPL-SO04	CAPL-SO05	CAPL-SO06	CAPL-SO07	CAPL-SO08	CAPL-SO09	CAPL-SO10		CAPL-SO11	CAPL-SO12
Sample ID	**CAX 95% UTL BKG SS**	**Adjusted**	**CAX SS ECO SV**	CAPL-SS01-0811	CAPL-SS01P-0811	CAPL-SS02-0811	CAPL-SS03-0811	CAPL-SS04-0811	CAPL-SS05-0811	CAPL-SS06-0811	CAPL-SS07-0811	CAPL-SS08-0811	CAPL-SS09-0811	CAPL-SS10-0811	CAPL-SS10P-0811	CAPL-SS11-0811	CAPL-SS12-0811
Sample Date		**(May 2014)**		08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11
Chemical Name																	
Explosives (µg/kg)																	
1,3,5-Trinitrobenzene	--	220,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	--	620	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg)																	
Aluminum	12,200	7,700	pH < 5.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	--	3.1	78	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	6.36	0.67	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	52.9	1,500	330	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	0.587	16	40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	--	7	32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	2,290	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	18.2	0.3	64	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	9.93	2.3	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	4.25	310	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	--	2.1	15.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	19,900	5,500	5 < pH > 8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	17.4	400	120	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	1,070	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	324	180	220	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.111	2.3	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	9.52	150	38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	708	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	27.9	39	130	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	26.5	2,300	120	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry																	
pH (ph)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas													
Station ID				CAPL-SO01		CAPL-SO02	CAPL-SO03	CAPL-SO04	CAPL-SO05	CAPL-SO06	CAPL-SO07	CAPL-SO08	CAPL-SO09	CAPL-SO10		CAPL-SO11	CAPL-SO12
Sample ID	**CAX 95% UTL BKG SS**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SS01-0811	CAPL-SS01P-0811	CAPL-SS02-0811	CAPL-SS03-0811	CAPL-SS04-0811	CAPL-SS05-0811	CAPL-SS06-0811	CAPL-SS07-0811	CAPL-SS08-0811	CAPL-SS09-0811	CAPL-SS10-0811	CAPL-SS10P-0811	CAPL-SS11-0811	CAPL-SS12-0811
Sample Date				08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11	08/01/11
Chemical Name																	
Grain Size (pct)																	
Coarse Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gravel (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GRAINSIZE (PCT/P)																	
GS03 Sieve 3" (75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS05 Sieve 2" (50 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS07 Sieve 1" (25.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 004 (4.75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 080 (180 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\[Table 8_PennLake_SS_Exceedances_0514RSLs_bk_jd_ll_v5_jd.xlsx], Campbell, Clairette/VBO, 03/13/2014

Notes:

Underline indicates exceedance of CAX 95% UTL BKG SS

Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas													
Station ID		**RSLs Residential Soil**		CAPL-SO13	CAPL-SO14	CAPL-SO15	CAPL-SO16	CAPL-SO17	CAPL-SO18		CAPL-SO19	CAPL-SO21	CAPL-SO22	CAPL-SO23	CAPL-SO24	CAPL-SO25	CAPL-SO26
Sample ID	**CAX 95% UTL BKG SS**	**Adjusted**	**CAX SS ECO SV**	CAPL-SS13-0811	CAPL-SS14-0811	CAPL-SS15-0811	CAPL-SS16-0811	CAPL-SS17-0811	CAPL-SS18-0811	CAPL-SS18P-0811	CAPL-SS19-0811	CAPL-SS21-0811	CAPL-SS22-0811	CAPL-SS23-0811	CAPL-SS24-0811	CAPL-SS25-0811	CAPL-SS26-0811
Sample Date		**(May 2014)**		08/01/11	08/01/11	08/01/11	08/02/11	08/01/11	08/01/11	08/01/11	08/01/11	08/02/11	08/02/11	08/02/11	08/02/11	08/01/11	08/01/11
Chemical Name																	
Volatile Organic Compounds (µg/kg)																	
2-Butanone	--	2,700,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	6,100,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	--	7,800,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	--	600,000	64,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)																	
2-Methylnaphthalene	--	23,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	--	350,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	--	350,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	--	1,700,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	--	780,000	58,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	--	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	--	15	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	--	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	--	1,500	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	--	38,000	30,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	--	--	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	--	15,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	--	15	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	--	230,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	--	230,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	--	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	--	3,800	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	--	170,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)																	
4,4'-DDD	--	2,200	583	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	--	1,600	114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	--	1,900	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	--	31	3.63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	--	85	226	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	--	1,800	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	--	240	8,000	**560**	**340**	**290**	18 U	140	17 U	17 U	**450**	49	150	30	22	**390**	30
beta-BHC	--	300	342	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	--	300	226	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	--	33	10.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	--	37,000	6.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	--	37,000	6.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	--	37,000	6.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	--	1,800	1.95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	--	1,800	1.95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	--	1,800	1.95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	--	560	7.75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	--	1,800	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	--	120	52.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	--	59	52.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	--	31,000	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas													
Station ID	**CAX 95% UTL BKG SS**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO13	CAPL-SO14	CAPL-SO15	CAPL-SO16	CAPL-SO17	CAPL-SO18		CAPL-SO19	CAPL-SO21	CAPL-SO22	CAPL-SO23	CAPL-SO24	CAPL-SO25	CAPL-SO26
Sample ID				CAPL-SS13-0811	CAPL-SS14-0811	CAPL-SS15-0811	CAPL-SS16-0811	CAPL-SS17-0811	CAPL-SS18-0811	CAPL-SS18P-0811	CAPL-SS19-0811	CAPL-SS21-0811	CAPL-SS22-0811	CAPL-SS23-0811	CAPL-SS24-0811	CAPL-SS25-0811	CAPL-SS26-0811
Sample Date				08/01/11	08/01/11	08/01/11	08/02/11	08/01/11	08/01/11	08/01/11	08/01/11	08/02/11	08/02/11	08/02/11	08/02/11	08/01/11	08/01/11
Chemical Name																	
Explosives (µg/kg)																	
1,3,5-Trinitrobenzene	--	220,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	--	620	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg)																	
Aluminum	12,200	7,700	pH < 5.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	--	3.1	78	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	6.36	0.67	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	52.9	1,500	330	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	0.587	16	40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	--	7	32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	2,290	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	18.2	0.3	64	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	9.93	2.3	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	4.25	310	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	--	2.1	15.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	19,900	5,500	5 < pH > 8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	17.4	400	120	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	1,070	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	324	180	220	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.111	2.3	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	9.52	150	38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	708	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	27.9	39	130	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	26.5	2,300	120	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry																	
pH (ph)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas													
Station ID	**CAX 95% UTL BKG SS**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO13	CAPL-SO14	CAPL-SO15	CAPL-SO16	CAPL-SO17	CAPL-SO18		CAPL-SO19	CAPL-SO21	CAPL-SO22	CAPL-SO23	CAPL-SO24	CAPL-SO25	CAPL-SO26
Sample ID				CAPL-SS13-0811	CAPL-SS14-0811	CAPL-SS15-0811	CAPL-SS16-0811	CAPL-SS17-0811	CAPL-SS18-0811	CAPL-SS18P-0811	CAPL-SS19-0811	CAPL-SS21-0811	CAPL-SS22-0811	CAPL-SS23-0811	CAPL-SS24-0811	CAPL-SS25-0811	CAPL-SS26-0811
Sample Date				08/01/11	08/01/11	08/01/11	08/02/11	08/01/11	08/01/11	08/01/11	08/01/11	08/02/11	08/02/11	08/02/11	08/02/11	08/01/11	08/01/11
Chemical Name																	
Grain Size (pct)																	
Coarse Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gravel (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GRAINSIZE (PCT/P)																	
GS03 Sieve 3" (75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS05 Sieve 2" (50 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS07 Sieve 1" (25.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 004 (4.75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 080 (180 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\

Notes:

Underline indicates exceedance of CAX 95% UTL BKG SS

Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas											
Station ID	**CAX 95% UTL BKG SS**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO44	CAPL-SO45		CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49		CAPL-SO50	CAPL-SO55	CAPL-SO56	CAPL-SO57
Sample ID				CAPL-SS44-1012	CAPL-SS45-1012	CAPL-SS45P-1012	CAPL-SS46-1012	CAPL-SS47-1012	CAPL-SS48-1012	CAPL-SS49-1012	CAPL-SS49P-1012	CAPL-SS50-1012	CAPL-SS55-1012	CAPL-SS56-1012	CAPL-SS57-1012
Sample Date				10/26/12	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12
Chemical Name															
Volatile Organic Compounds (µg/kg)															
2-Butanone	--	2,700,000	--	6.35 UJ	6.8 UJ	6.82 UJ	7.34 UJ	5.35 UJ	14.7 J	6.52 U	6.39 U	8.07 U	3.06 J	7.16 U	8.91 U
Acetone	--	6,100,000	--	7.77 J	8.33 J	13.6 UJ	14.7 UJ	10.7 UJ	186 L	13 UJ	12.8 UJ	16.1 UJ	96.8 J	14.3 UJ	15.2 J
Methyl acetate	--	7,800,000	--	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U	8.91 U
Styrene	--	600,000	64,000	38.2	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U
Semivolatile Organic Compounds (µg/kg)															
2-Methylnaphthalene	--	23,000	--	9.42	3.96 U	4.1 U	69.7 J	71.6 J	59 K	46 K	91.3	45.9 K	3.61 U	4.53 U	5.33 U
Acenaphthene	--	350,000	--	3.83 U	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	4 U	20.4 U	3.61 U	4.53 U	5.33 U
Acenaphthylene	--	350,000	--	3.83 U	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	15	20.4 U	3.61 U	4.53 U	5.33 U
Anthracene	--	1,700,000	--	3.83 U	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	4 U	20.4 U	3.61 U	4.53 U	5.33 U
Benzaldehyde	--	780,000	58,400	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U
Benzo(a)anthracene	--	150	--	5.75 J	3.96 U	4.1 U	86.6	72.4 J	56.1 J	23.5	47.3	92.3	4.19 J	6.82 J	5.33 U
Benzo(a)pyrene	--	15	--	6.85 J	3.96 U	4.1 U	**122**	**78.4 J**	**86.6 K**	**23.6 K**	**51.5**	**90.9 K**	3.61 U	4.53 U	5.33 U
Benzo(b)fluoranthene	--	150	--	11.5	4.78 J	4.97 J	**197**	**187**	137 K	50.5 K	75.9	135 K	4.31 J	9.95	5.33 U
Benzo(g,h,i)perylene	--	--	--	7.69	3.96 U	4.1 U	133	125	40.9 U	31.3 K	58.8	76.1 K	3.98 J	4.53 U	5.33 U
Benzo(k)fluoranthene	--	1,500	--	7.66 J	3.96 U	4.1 U	139	83.9 J	40.9 U	33	48.7	90.7	3.61 U	7.61 J	5.33 U
bis(2-Ethylhexyl)phthalate	--	38,000	30,000	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U
Carbazole	--	--	7,000	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U
Chrysene	--	15,000	--	13.4	4.79 J	4.1 U	200	189	109 K	50.1 K	102	211 K	3.61 U	9.62	5.33 U
Dibenz(a,h)anthracene	--	15	--	1.98 J	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	9.61 K	4 U	20.4 U	3.61 U	4.53 U	5.33 U
Fluoranthene	--	230,000	--	10.3	3.57 J	2.84 J	246	211	145	63.8	107	298	5.6 J	4.77 J	6.21 J
Fluorene	--	230,000	--	3.83 U	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	4 U	20.4 U	3.61 U	4.53 U	5.33 U
Indeno(1,2,3-cd)pyrene	--	150	--	6.99 J	3.96 U	4.1 U	114	97.7	70 J	29.1	39.3	71.5	4.87 J	8.28 J	5.33 U
Naphthalene	--	3,800	--	13.5	3.96 U	4.1 U	62.3 J	49.3 J	40.9 U	30.3 K	51.3	20.4 U	3.61 U	4.53 U	5.33 U
Phenanthrene	--	--	--	5.93 J	3.96 U	4.1 U	108	143	92.8	55.7	106	69.5	3.61 U	4.53 U	4.25 J
Pyrene	--	170,000	--	10.9	3.25 J	2.44 J	213	183	134 K	58.5 K	97.2	263 K	5.68 J	4.95 J	4.37 J
Pesticide/Polychlorinated Biphenyls (µg/kg)															
4,4'-DDD	--	2,200	583	0.566 J	0.295 J	0.398 J	22.6 J	17 J	26.8 J	44 J	78.5 J	27.3 J	0.356 UL	1.5 J	1.26 J
4,4'-DDE	--	1,600	114	1.92 L	2.14 L	1.89 L	179	53.6 J	206	186 J	254 J	285 K	0.32 L	2.92 L	1.93
4,4'-DDT	--	1,900	100	2.15 J	1.76 J	1.6 J	194 J	70.4 J	214 J	30.8 J	40.8	132 K	0.363 L	0.264 J	0.331 J
Aldrin	--	31	3.63	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.424 UL	0.401 U	0.406 U	0.395 U	0.356 UL	0.452 UL	0.528 U
alpha-BHC	--	85	226	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.418 J	0.401 U	0.406 U	0.395 U	0.356 UL	0.496 J	0.211 J
alpha-Chlordane	--	1,800	11	0.394 UL	0.409 UL	0.407 UL	8.46 J	4.38 J	1.72 J	0.401 U	0.609 J	1.33 J	0.356 UL	0.452 UL	0.528 U
Aroclor-1260	--	240	8,000	177 J	134 L	103 L	**16,500 J**	**9,980 J**	**1,600 J**	**386**	**589 J**	**1,170 J**	8.72 UL	14.9 J	12.9 U
beta-BHC	--	300	342	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.211 J	0.401 U	0.406 U	0.395 U	0.356 UL	0.452 UL	0.528 U
delta-BHC	--	300	226	0.394 UL	0.409 UL	0.407 UL	0.209 J	0.438 UL	0.424 UL	0.401 UL	0.258 J	0.395 UL	0.356 UL	0.452 UL	0.528 U
Dieldrin	--	33	10.5	2.25 L	1.19 L	1.48 J	**253 J**	**140 L**	16.8 J	1.49 J	13.7 J	18.8 J	0.356 UL	0.452 UL	0.528 U
Endosulfan I	--	37,000	6.32	0.394 UL	0.409 UL	0.407 UL	0.385 L	0.438 UL	1.06 L	0.401 U	0.406 U	0.395 UJ	0.356 UL	0.452 UL	0.528 U
Endosulfan II	--	37,000	6.32	1.64 J	1.17 J	0.876 J	42.8 J	19.7 J	10.8 J	4.18 J	5.33 J	8.16 J	0.356 UL	0.452 UL	0.528 U
Endosulfan sulfate	--	37,000	6.32	4.63 J	2.99 J	2.32 J	694 J	365 L	4.23 J	0.401 U	20.5	0.395 U	0.356 UL	0.399 L	0.528 U
Endrin	--	1,800	1.95	0.432 J	0.279 J	0.205 J	77.7 J	43 J	3.25 J	4.55 J	1.65 J	3.09 J	0.356 UL	0.452 UL	0.528 U
Endrin aldehyde	--	1,800	1.95	0.394 UL	0.409 UL	0.407 UL	22.9 J	16.5 J	1.34 J	0.597 J	0.746 J	1.59 J	0.356 UL	0.452 UL	0.528 U
Endrin ketone	--	1,800	1.95	0.756 J	0.558 J	0.452 J	45.9 J	83.3 J	5.46 J	1.18 J	1.81 J	2.62 J	0.356 UL	0.452 UL	0.528 U
gamma-BHC (Lindane)	--	560	7.75	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.149 J	0.297 J	0.137 J	0.406 U	0.395 U	0.356 UL	0.452 UL	0.528 U
gamma-Chlordane	--	1,800	11	2.59 J	1.33 J	3.55 L	9.77 J	15.5 J	4.79 J	3.82 B	0.874 B	4.04 J	1.29 J	2.1 J	2.61 J
Heptachlor	--	120	52.9	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.424 UL	0.401 U	0.406 U	0.395 UL	0.356 UL	0.452 UL	0.528 U
Heptachlor epoxide	--	59	52.9	0.394 UL	0.409 UL	0.407 UL	0.176 J	0.164 J	0.528 J	0.401 UL	0.517 J	0.258 J	0.356 UL	0.452 UL	0.528 U
Methoxychlor	--	31,000	500	0.367 J	0.649 J	0.375 J	74.9 J	29.9 J	13.3 J	1.74 J	0.873 J	5.18 J	0.199 L	0.438 J	2.38 J

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas											
Station ID		**RSLs Residential Soil**		CAPL-SO44	CAPL-SO45		CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49		CAPL-SO50	CAPL-SO55	CAPL-SO56	CAPL-SO57
Sample ID	**CAX 95% UTL BKG SS**	**Adjusted**	**CAX SS ECO SV**	CAPL-SS44-1012	CAPL-SS45-1012	CAPL-SS45P-1012	CAPL-SS46-1012	CAPL-SS47-1012	CAPL-SS48-1012	CAPL-SS49-1012	CAPL-SS49P-1012	CAPL-SS50-1012	CAPL-SS55-1012	CAPL-SS56-1012	CAPL-SS57-1012
Sample Date		**(May 2014)**		10/26/12	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12
Chemical Name															
Explosives (µg/kg)															
1,3,5-Trinitrobenzene	--	220,000	--	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U
Nitroglycerin	--	620	--	435 U	455 U	476 U	500 U	459 U	455 U	455 U	455 U	476 U	495 U	467 U	391 U
Total Metals (mg/kg)															
Aluminum	12,200	7,700	pH < 5.5	**10,100**	**25,200**	**24,000**	**20,500**	**19,500**	**9,730**	**9,410**	**11,000**	**9,410**	4,920	2,100	2,480
Antimony	--	3.1	78	0.914 U	2.45 U	2.46 U	2.46 U	2.7 U	2.55 U	2.48 U	2.59 U	2.38 U	0.901 U	1.09 J	1.28 U
Arsenic	6.36	0.67	18	**2.54**	**7.03**	**6.21**	**6.07**	**6.69**	**6.35**	**5.54**	**5.69**	**5.48**	**1.64**	**1.55**	**1.17 J**
Barium	52.9	1,500	330	36.1	43.5	39	73.7	84.5	46.6	76.1	60.6	50.5	23.2	13.9	16.8
Beryllium	0.587	16	40	0.397 J	1.64	1.46 J	0.97 J	1.24 J	0.491 J	0.749 J	0.718 J	0.854 J	0.199 J	0.274 U	0.166 J
Cadmium	--	7	32	0.228 U	0.612 U	0.615 U	1.14 J	2.32	0.639 U	0.333 J	0.648 U	0.387 J	0.225 U	0.274 U	0.213 J
Calcium	2,290	--	--	1,370	2,220	2,040	3,610	4,590	4,810	9,650 J	5,640 J	7,710	368 J	567 J	2,260
Chromium	18.2	0.3	64	**14**	**45.9**	**46.3**	**41.4**	**35.3**	**17.2**	**16.1**	**17.7**	**19.9**	**5.46**	**3.54**	**4.76**
Cobalt	9.93	2.3	13	1.71	**4.96**	**4.78**	**3.76 J**	**4.71**	**2.38 J**	**3.09 J**	**3.02 J**	**2.94 J**	0.861 J	1.37 U	1.07 J
Copper	4.25	310	70	6.4	6.59	5.42	24.9	39.3	11.9	18.1 J	12.7 J	19.8	2.07	3.12	1.97
Cyanide	--	2.1	15.8	0.284 U	0.296 U	0.312 U	0.306 U	0.302 U	0.315 U	0.307 U	0.305 U	0.298 U	0.272 U	0.336 U	0.383 U
Iron	19,900	5,500	5 < pH > 8	**10,100**	**48,000**	**43,400**	**26,000**	**25,100**	**13,400**	**14,500 J**	**22,500 J**	**15,300**	**6,440**	2,780	2,310
Lead	17.4	400	120	17.6	16.5	14.4	141	211	65	61.6 J	40.7 J	81	12.5	9.1	29.3 J
Magnesium	1,070	--	--	856	2,650	2,740	2,450	3,130	1,240 J	1,360 J	1,300 J	2,060	400 J	232 J	327 J
Manganese	324	180	220	51.1	30.2	25.9	**213**	**308**	**212**	170	141	**297**	59	7.46	11.7
Mercury	0.111	2.3	0.1	0.0491 B	0.0603 B	0.0473 B	0.138	0.134	0.0712	0.061	0.0734	0.0472	0.0348 B	0.0421 B	0.0488 B
Nickel	9.52	150	38	3.72	13.2	11.3	9.03	11.1	5.96	6.9	6.44	7.18	2.47	1.35 J	2.31
Potassium	708	--	--	445 J	1,910	2,030	874 J	959 J	933 J	1,050 J	911 J	1,040 J	280 J	317 J	275 J
Vanadium	27.9	39	130	19.6	**67.3**	**64.5**	**45.8**	**43.9**	28.9	22.8	23.4	22	9.48	5.28	7.73
Zinc	26.5	2,300	120	36.7	41	33.7	315	428	139	71	55.4	85.2	10.9	31.7	16.1
Wet Chemistry															
pH (ph)	--	--	--	5.99 H3	5.25 H3	NA	5.79 H3	6.46 H3	6.25 H3	7.65 H3	NA	7.55 H3	5.48 H3	5.71 H3	5.99 H3
Total organic carbon (TOC) (mg/kg)	--	--	--	5,900	24,700	NA	24,400	36,000	42,600	44,200	NA	52,300	9,100	16,200	43,700

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas											
Station ID	**CAX 95% UTL BKG SS**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO44	CAPL-SO45		CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49		CAPL-SO50	CAPL-SO55	CAPL-SO56	CAPL-SO57
Sample ID				CAPL-SS44-1012	CAPL-SS45-1012	CAPL-SS45P-1012	CAPL-SS46-1012	CAPL-SS47-1012	CAPL-SS48-1012	CAPL-SS49-1012	CAPL-SS49P-1012	CAPL-SS50-1012	CAPL-SS55-1012	CAPL-SS56-1012	CAPL-SS57-1012
Sample Date				10/26/12	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12
Chemical Name															
Grain Size (pct)															
Coarse Sand (%)	--	--	--	0.6	0.2	NA	0.9	0.8	1	5.1	NA	3.9	0.9	0.5	0.8
Fine Sand (%)	--	--	--	45.6	46.6	NA	37.9	29.2	43.3	37.7	NA	37	71.6	85.3	76.2
Fines (%)	--	--	--	42.6	46	NA	53.4	65.9	40.2	39.3	NA	36.4	16.9	6.6	16.9
Gravel (%)	--	--	--	0.7	2.8	NA	1.3	0	3.6	10.1	NA	13.3	0.2	0.3	0.4
Medium Sand (%)	--	--	--	10.5	4.4	NA	6.5	4.1	11.9	7.8	NA	9.4	10.4	7.4	5.7
Sand (%)	--	--	--	56.7	51.2	NA	45.3	34.1	56.2	50.6	NA	50.3	82.9	93.2	82.7
GRAINSIZE (PCT/P)															
GS03 Sieve 3" (75 mm)	--	--	--	100	100	NA	100	100	100	100	NA	100	100	100	100
GS05 Sieve 2" (50 mm)	--	--	--	100	100	NA	100	100	100	100	NA	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	100	100	NA	100	100	100	100	NA	100	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	100	100	NA	100	100	100	100	NA	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	100	100	NA	100	100	100	100	NA	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	--	100	98	NA	100	100	97.4	97.3	NA	92.8	100	100	100
Sieve No. 004 (4.75 mm)	--	--	--	99.3	97.2	NA	98.7	100	96.4	89.9	NA	86.7	99.8	99.7	99.6
Sieve No. 010 (2.00 mm)	--	--	--	98.7	97	NA	97.8	99.2	95.4	84.8	NA	82.8	98.9	99.2	98.8
Sieve No. 020 (850 um)	--	--	--	96.3	96.3	NA	96.1	98.2	94.1	81.6	NA	78.9	97.3	98.6	98
Sieve No. 040 (425 um)	--	--	--	88.2	92.6	NA	91.3	95.1	83.5	77	NA	73.4	88.5	91.8	93.1
Sieve No. 060 (250 um)	--	--	--	66.6	70.8	NA	75.5	83.9	70.8	63.3	NA	59.9	55.5	53.2	63.8
Sieve No. 080 (180 um)	--	--	--	53.8	56.5	NA	64.8	76.2	61.2	52.8	NA	49.7	33.2	22.6	38.3
Sieve No. 100 (150 um)	--	--	--	49	52	NA	60.2	72.8	54.1	47.7	NA	44.6	25.3	12.1	27.8
Sieve No. 200 (75 um)	--	--	--	42.6	46	NA	53.4	65.9	40.2	39.3	NA	36.4	16.9	6.6	16.9

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Notes:

Underline indicates exceedance of CAX 95% UTL BKG SS

Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas			Upland Areas Upstream to Drainage Areas									
Station ID	**CAX 95% UTL BKG SS**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO58	CAPL-SO59		CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	
Sample ID				CAPL-SS58-1012	CAPL-SS59-1012	CAPL-SS59P-1012	CAPL-SS60-1112	CAPL-SS61-1112	CAPL-SS62-1112	CAPL-SS63-1112	CAPL-SS64-1112	CAPL-SS65-1112	CAPL-SS66-1112	CAPL-SS67-1112	CAPL-SS68-1112	CAPL-SS69-1112	CAPL-SS69P-1112
Sample Date				10/26/12	10/26/12	10/26/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12
Chemical Name																	
Volatile Organic Compounds (µg/kg)																	
2-Butanone	--	2,700,000	--	15.4 U	8.44 J	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	23.5	5.38 J	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
Acetone	--	6,100,000	--	30.2 J	149 J	20.5 J	10.4 UJ	13.1 UJ	17.2 J	10.4 UJ	24.3 J	210 J	10.7 UJ	34.9 J	10.1 UJ	9.22 UJ	8.88 UJ
Methyl acetate	--	7,800,000	--	15.4 U	24	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UL	4.61 U	4.44 U
Styrene	--	600,000	64,000	7.68 U	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	15.2	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Semivolatile Organic Compounds (µg/kg)																	
2-Methylnaphthalene	--	23,000	--	4.84 J	4.25 U	4.85 U	3.51 J	190 U	3.9 U	23.2 J	12.4	117	45.9 J	69.5 J	4.49 U	37.9 U	37 U
Acenaphthene	--	350,000	--	5.34 U	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	4.18 U	4.72 U	42.7 U	75.6 J	4.49 U	37.9 U	37 U
Acenaphthylene	--	350,000	--	5.34 U	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	4.18 U	4.72 U	42.7 U	144	4.49 U	37.9 U	37 U
Anthracene	--	1,700,000	--	5.34 U	4.25 U	4.85 U	4.43 U	271 J	3.9 U	19.5 U	4.18 U	4.72 U	42.7 U	1,690	4.49 U	37.9 U	37 U
Benzaldehyde	--	780,000	58,400	268 U	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	517	1,070 U	1,010 U	225 U	951 U	1,850 U
Benzo(a)anthracene	--	150	--	5.34 U	4.25 U	4.85 U	4.43 U	**3,570**	30.5	34.1 J	9.99	142	**182**	**14,400**	55.8	37.9 U	37 U
Benzo(a)pyrene	--	15	--	6.2 J	5.61 J	4.85 U	4.43 U	**4,780**	**54.6**	**23.9 J**	11.8	**195**	**192**	**8,120**	**54.3**	37.9 U	37 U
Benzo(b)fluoranthene	--	150	--	8.22 J	9.68	8.38 J	5.97 J	**8,910**	150	40.4	15.9	**242**	**335**	**11,300**	116	37.9 U	78.9
Benzo(g,h,i)perylene	--	--	--	7.84 J	5.93 J	4.85 U	4.43 U	4,730	73.4	47.8	11	153	172	3,320	45.5	37.9 U	37 U
Benzo(k)fluoranthene	--	1,500	--	9.57 J	6.64 J	8.49 J	4.52 J	**7,950**	85.2	40	7.92 J	289	330	**8,830**	70.6	40.3 J	37 U
bis(2-Ethylhexyl)phthalate	--	38,000	30,000	268 U	186 J	131 J	141 J	1,910 U	195 U	205 J	210 U	137 J	1,070 U	1,010 U	1,000 J	951 U	1,850 U
Carbazole	--	--	7,000	268 U	213 U	243 U	222 U	968 J	195 U	195 U	210 U	237 U	1,070 U	1,450 J	225 U	951 U	1,850 U
Chrysene	--	15,000	--	13.9	4.25 U	4.85 U	4.43 U	8,790	143	67	18.5	373	386	**19,200**	104	91.7	52.7 J
Dibenz(a,h)anthracene	--	15	--	5.34 U	4.25 U	4.85 U	4.43 U	**1,260**	**17.6**	19.5 U	4.18 U	**62.6**	42.7 U	**2,080**	**15.8**	37.9 U	37 U
Fluoranthene	--	230,000	--	11.3	16.2 B	17.4 B	5.38 J	12,200	118	62.9	17.1	115	384	72,300	112	64.4 J	43.7 J
Fluorene	--	230,000	--	5.34 U	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	4.18 U	4.72 U	42.7 U	40.4 U	4.49 U	37.9 U	37 U
Indeno(1,2,3-cd)pyrene	--	150	--	7.83 J	5.82 J	4.85 U	4.43 U	**4,200**	65.6	19.5 U	9.11	134	**175**	**3,800**	44.5	37.9 U	37 U
Naphthalene	--	3,800	--	5.34 U	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	7.72 J	423	31.4 J	104	4.49 U	37.9 U	37 U
Phenanthrene	--	--	--	5.95 J	6.9 B	5.98 B	10.2	3,190	17.4	33.9 J	19.7	213	121	6,370	17.1	42.1 J	37 U
Pyrene	--	170,000	--	10.3 J	13.8 B	16.6 B	6.11 J	13,300	119	67.7	17	135	374	54,600	118	60.8 J	38.9 J
Pesticide/Polychlorinated Biphenyls (µg/kg)																	
4,4'-DDD	--	2,200	583	0.813 J	0.747 J	0.36 J	0.442 U	10.9 J	0.386 UL	353	0.519 J	0.381 J	6.28 J	1.89 J	0.68 J	2 J	1.08 J
4,4'-DDE	--	1,600	114	3.76 L	2.44 J	4.52 J	0.442 UJ	127 K	1.28 L	**2,640**	1.68 L	4.44 J	91.1 K	4.92 J	0.459 UJ	4.22 J	3.34 J
4,4'-DDT	--	1,900	100	7.79 J	0.324 J	0.491 U	0.442 UJ	122 K	1 J	808	0.433 UJ	0.605 J	31.9 J	7.1 J	0.595 J	17.6 J	3.97 J
Aldrin	--	31	3.63	2.56 L	0.432 UL	0.397 J	0.442 U	0.397 U	0.386 U	0.415 U	0.433 U	0.467 U	0.441 U	0.399 UL	0.459 U	0.392 U	0.37 U
alpha-BHC	--	85	226	0.722 J	0.514 J	1.05 J	0.442 U	0.397 U	0.386 U	0.415 U	0.433 U	0.467 U	0.441 U	0.399 U	0.459 U	0.392 U	0.37 U
alpha-Chlordane	--	1,800	11	0.929 J	0.432 UL	0.491 UL	0.442 U	0.518 J	0.386 UL	8.88 L	0.433 UL	0.467 UL	0.441 UL	0.259 J	0.459 U	1.78 J	1.52 J
Aroclor-1260	--	240	8,000	39.8 J	13.5 L	12 U	10.8 U	**627 J**	42.3	**397**	10.6 U	11.4 U	**2,770 J**	9.77 U	36.9 J	**266 J**	**283 J**
beta-BHC	--	300	342	0.536 UL	0.432 UL	0.491 U	0.442 U	0.397 U	0.386 U	0.415 U	0.433 U	0.467 U	0.441 U	0.305 J	0.459 U	0.392 U	0.37 U
delta-BHC	--	300	226	0.213 J	0.432 UL	0.907 J	0.442 U	1.07 J	0.386 U	0.156 L	0.424 J	0.455 J	0.377 J	0.681 J	0.459 U	0.392 UL	0.37 UL
Dieldrin	--	33	10.5	0.565 J	0.432 UL	0.491 U	0.442 U	13.3 J	0.462 J	7.09 L	0.433 U	0.344 J	26.5 K	0.399 U	0.264 J	5.69 L	5.53
Endosulfan I	--	37,000	6.32	0.536 UL	0.432 UL	0.275 J	0.442 U	0.397 U	0.386 U	0.263 J	0.433 U	0.467 U	0.441 U	1.14 J	0.459 U	0.392 UL	0.37 U
Endosulfan II	--	37,000	6.32	0.536 UL	0.432 UL	0.491 UL	0.442 U	4.69 J	0.386 UL	9.2 L	0.231 J	0.467 U	6.04 J	2.5 J	0.387 J	2.99 J	3.26 J
Endosulfan sulfate	--	37,000	6.32	0.648 J	0.432 UL	1.48 J	0.442 U	4.08 J	0.303 J	12.4 J	1.68 J	0.467 UL	64.2 L	0.347 J	0.459 U	9.13 L	10.1 L
Endrin	--	1,800	1.95	0.536 UL	0.432 UL	0.491 UL	0.442 U	1.75 J	0.492 J	13.3 J	0.433 U	0.467 UL	13.6 J	0.399 U	0.459 U	2.62 J	2.5 J
Endrin aldehyde	--	1,800	1.95	0.536 UL	0.432 UL	0.953 J	0.442 U	0.397 U	0.386 U	0.9 J	5.31 J	3.16 J	2.19 J	1.73 J	0.459 U	0.518 J	0.397 J
Endrin ketone	--	1,800	1.95	0.273 J	0.432 UL	0.491 U	0.442 UJ	4.97 J	0.359 L	4.05 L	0.433 UL	1.65 K	26.5 J	0.399 UL	0.459 U	3.04 J	0.834 J
gamma-BHC (Lindane)	--	560	7.75	1.47 J	0.523 J	1.84 J	0.442 U	4.76 J	0.386 U	0.415 U	0.433 U	0.467 U	0.159 J	0.399 UL	0.205 J	0.392 U	0.37 U
gamma-Chlordane	--	1,800	11	3.76 L	2.51 L	0.491 U	0.484 J	1.62 K	0.428 J	14.5	0.251 J	0.253 J	1.81 J	0.399 UL	0.402 J	1.55 J	1.24 J
Heptachlor	--	120	52.9	3.53 J	1.16 J	0.372 J	0.442 U	0.397 U	0.386 UL	0.417 L	0.433 UL	0.467 UL	0.148 J	0.399 UL	0.459 U	0.392 UL	0.37 U
Heptachlor epoxide	--	59	52.9	0.536 UL	0.363 L	0.491 UL	0.442 U	0.397 UL	0.386 U	9.28 J	0.433 UL	0.467 U	0.272 J	0.399 UL	0.459 U	0.392 UL	0.37 UL
Methoxychlor	--	31,000	500	5.53 J	0.392 J	6.65 J	0.442 UJ	3.55 J	0.316 J	2.8 J	0.433 UL	2.72 K	10 J	1.91 J	0.459 UJ	0.712 J	0.206 J

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas			Upland Areas Upstream to Drainage Areas									
Station ID		**RSLs Residential Soil**		CAPL-SO58	CAPL-SO59		CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	
Sample ID	**CAX 95% UTL BKG SS**	**Adjusted**	**CAX SS ECO SV**	CAPL-SS58-1012	CAPL-SS59-1012	CAPL-SS59P-1012	CAPL-SS60-1112	CAPL-SS61-1112	CAPL-SS62-1112	CAPL-SS63-1112	CAPL-SS64-1112	CAPL-SS65-1112	CAPL-SS66-1112	CAPL-SS67-1112	CAPL-SS68-1112	CAPL-SS69-1112	CAPL-SS69P-1112
Sample Date		**(May 2014)**		10/26/12	10/26/12	10/26/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12
Chemical Name																	
Explosives (µg/kg)																	
1,3,5-Trinitrobenzene	--	220,000	--	182 U	192 U	181 U	162 U	110 J	160 U	193 U	183 U	194 U	176 U	161 J	173 U	160 U	175 U
Nitroglycerin	--	620	--	**866 J**	481 U	452 U	405 U	446 U	400 U	483 U	457 U	485 U	441 U	478 U	433 U	400 U	439 U
Total Metals (mg/kg)																	
Aluminum	12,200	7,700	pH < 5.5	2,910	4,720	4,380	**14,800**	**11,100**	5,400	6,090	**13,700**	6,660	**8,330**	4,340	**25,800**	**10,300**	**10,000**
Antimony	--	3.1	78	1.34 U	1.03 U	1.16 U	2.73 U	2.33 U	0.942 U	2.51 U	2.69 U	**11.6**	2.53 U	2.42 U	2.67 UL	2.46 U	2.28 U
Arsenic	6.36	0.67	18	**1.12 J**	**1.45**	**1.73**	**19.3**	**8.12**	**3.47**	**8.93**	**10**	**2.44 J**	**6.5**	**2.69 J**	**14.4**	**5.74 J**	**7.9 J**
Barium	52.9	1,500	330	17	16.4	14.9	80.8	50.2	44.8	27.4	48.2	175	66.3	39.9	81.8	52.6 J	37.1 J
Beryllium	0.587	16	40	0.335 U	0.257 J	0.238 J	1.4 J	0.838 J	0.571 J	1.3 J	0.866 J	0.887 J	0.677 J	0.441 J	1.44	0.537 J	0.418 J
Cadmium	--	7	32	1.89	0.724	0.538 J	0.412 J	1.94	0.413 J	1.21 J	0.674 U	0.989 J	0.613 J	0.606 U	0.668 U	0.615 U	0.57 U
Calcium	2,290	--	--	1,840	1,600	1,600	15,000	11,200	539 J	19,000	5,740	3,910	4,370	1,170 J	6,660	5,630 J	3,740 J
Chromium	18.2	0.3	64	**4.26**	**6.91**	**6.69**	**40.3**	**69.7**	**10.9**	**66.7**	**29.9**	**8.21**	**18.5**	**8.3**	**56.1**	**19.4**	**21.1**
Cobalt	9.93	2.3	13	0.938 J	1.23 J	1.24 J	**6.04**	**4.6**	**2.53**	**2.73 J**	**3.28 J**	**2.91 J**	**3.75 J**	3.03 U	**5.81**	2.12 J	1.61 J
Copper	4.25	310	70	4.16	7.11	5.67	5.81	26.1	6.24	12	8.2	10.7	20.1	5.05	9.67	12.4 J	7.95 J
Cyanide	--	2.1	15.8	0.383 U	0.314 U	0.358 U	0.322 U	0.279 U	0.286 U	0.291 U	0.317 U	0.354 U	0.323 U	0.289 U	0.334 U	0.281 U	0.261 U
Iron	19,900	5,500	5 < pH > 8	3,990	**7,050**	**7,610**	**53,300**	**22,300**	**8,330**	**32,800**	**33,300**	**8,680**	**17,500**	**9,300**	**49,100**	**18,400**	**16,800**
Lead	17.4	400	120	13.1 J	12 J	11.7 J	14.5	107	25.3	46.8	21.3	42.5	77.7	28.8	14.7	29.9	22.7
Magnesium	1,070	--	--	732 J	1,290	1,320	3,950	2,050	654	1,960	2,110	1,590 J	2,080	580 J	4,380	1,290 J	1,230 J
Manganese	324	180	220	58.8	78.4	90.4	**259**	151	**256**	140	77.7	**264**	**216**	86.5	133 L	123 J	90.1 J
Mercury	0.111	2.3	0.1	0.064 B	0.0204 B	0.0291 B	0.0327 J	0.0835	0.11	0.145	0.0672	0.0499	0.247	0.034 J	0.0784	0.0476	0.0465
Nickel	9.52	150	38	2.43	2.87	3	15.8	11.4	4.59	8.33	8.8	5.9	7.21	2.99 J	18.5	4.96 J	3.4 J
Potassium	708	--	--	299 J	517 J	540 J	4,240	1,600	401 J	1,840	1,800	451 J	807 J	437 J	3,420	795 J	821 J
Vanadium	27.9	39	130	7.3	11.4	11.1	**40.3**	29.1	10.6	26.7	33.3	10.9	24.1	11.1	**55.6**	24.7	26.5
Zinc	26.5	2,300	120	74.4	60.2	56.4	63.4	235	45.5	83.9	59.6	190	142	35.2	73.9 K	58.6 J	40.2 J
Wet Chemistry																	
pH (ph)	--	--	--	6.38 H3	6.5 H3	NA	7.66 H3	7.74 H3	6.06 H3	8.25 H3	7.96 H3	6.25 H3	7.5 H3	6.7 H3	7.77 H3	8.19 H3	NA
Total organic carbon (TOC) (mg/kg)	--	--	--	41,500	15,000	NA	18,400	33,500 N	12,300 N	16,000 N	29,800	128,000	60,800	39,400	21,100 N	20,900 N	NA

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas			Upland Areas Upstream to Drainage Areas										
Station ID		**RSLs Residential Soil**		CAPL-SO58	CAPL-SO59		CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	
Sample ID	**CAX 95% UTL BKG SS**	**Adjusted**	**CAX SS ECO SV**	CAPL-SS58-1012	CAPL-SS59-1012	CAPL-SS59P-1012	CAPL-SS60-1112	CAPL-SS61-1112	CAPL-SS62-1112	CAPL-SS63-1112	CAPL-SS64-1112	CAPL-SS65-1112	CAPL-SS66-1112	CAPL-SS67-1112	CAPL-SS68-1112	CAPL-SS69-1112	CAPL-SS69P-1112
Sample Date		**(May 2014)**		10/26/12	10/26/12	10/26/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12
Chemical Name																	
Grain Size (pct)																	
Coarse Sand (%)	--	--	--	1	4.9	NA	0.3	3.8	1.2	5.3	1	7.2	6	2.7	0.7	5.5	NA
Fine Sand (%)	--	--	--	58.8	40.6	NA	46.7	51.4	67.1	52.7	38.8	41.6	33.1	55.6	27.7	36.4	NA
Fines (%)	--	--	--	28.1	0.5	NA	49.1	31.3	24.8	22.3	43.9	21.8	32.4	31.3	67.2	28.7	NA
Gravel (%)	--	--	--	2.5	45.1	NA	0.4	3.5	0.3	12.9	11	14.7	15.7	3.7	2.1	18.2	NA
Medium Sand (%)	--	--	--	9.6	8.9	NA	3.5	10	6.6	6.8	5.3	14.7	12.8	6.7	2.3	11.2	NA
Sand (%)	--	--	--	69.4	54.4	NA	50.5	65.2	74.9	64.8	45.1	63.5	51.9	65	30.7	53.1	NA
GRAINSIZE (PCT/P)																	
GS03 Sieve 3" (75 mm)	--	--	--	100	100	NA	100	100	100	100	100	100	100	100	100	100	NA
GS05 Sieve 2" (50 mm)	--	--	--	100	100	NA	100	100	100	100	100	100	100	100	100	100	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	--	100	100	NA	100	100	100	100	100	100	100	100	100	100	NA
GS07 Sieve 1" (25.0 mm)	--	--	--	100	100	NA	100	100	100	100	100	100	100	100	100	100	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	--	100	80.3	NA	100	100	100	100	100	100	100	100	100	100	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	98.4	58	NA	100	100	100	95.4	91.4	94.2	89.2	98.4	100	89.5	NA
Sieve No. 004 (4.75 mm)	--	--	--	97.5	54.9	NA	99.6	96.5	99.7	87.1	89	85.3	84.3	96.3	97.9	81.8	NA
Sieve No. 010 (2.00 mm)	--	--	--	96.5	50	NA	99.3	92.7	98.5	81.8	88	78.1	78.3	93.6	97.2	76.3	NA
Sieve No. 020 (850 um)	--	--	--	94.5	46.7	NA	98.5	88.4	97.5	78.7	86.5	72.3	73.2	91.7	96.4	71.8	NA
Sieve No. 040 (425 um)	--	--	--	86.9	41.1	NA	95.8	82.7	91.9	75	82.7	63.4	65.5	86.9	94.9	65.1	NA
Sieve No. 060 (250 um)	--	--	--	63.6	27.3	NA	73.8	64.4	63.2	59	65.8	44.5	49.5	62.8	85	50.6	NA
Sieve No. 080 (180 um)	--	--	--	45.6	15.7	NA	57.3	49.9	44.3	39.8	53.4	32.3	40.6	43.5	76.1	40.7	NA
Sieve No. 100 (150 um)	--	--	--	37.2	8.7	NA	53.5	42.4	35.3	30.2	49.3	27.8	37	37.7	73.5	36.2	NA
Sieve No. 200 (75 um)	--	--	--	28.1	0.5	NA	49.1	31.3	24.8	22.3	43.9	21.8	32.4	31.3	67.2	28.7	NA

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Notes:

Underline indicates exceedance of CAX 95% UTL BKG SS

Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Other Upland Areas					
Station ID	**CAX 95% UTL BKG SS**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75
Sample ID				CAPL-SS70-1112	CAPL-SS71-1112	CAPL-SS72-1112	CAPL-SS73-1112	CAPL-SS74-1112	CAPL-SS75-1112
Sample Date				11/02/12	11/02/12	11/02/12	11/05/12	11/05/12	11/05/12
Chemical Name									
Volatile Organic Compounds (µg/kg)									
2-Butanone	--	2,700,000	--	7.37 J	4.4 J	7.92	4.61 U	5.79 U	7.06 U
Acetone	--	6,100,000	--	25.3 J	58.1 J	40.7 J	9.23 UJ	10.6 J	14.1 UJ
Methyl acetate	--	7,800,000	--	4.14 UJ	4.09 UJ	3.95 UJ	4.61 U	5.79 U	7.06 U
Styrene	--	600,000	64,000	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Semivolatile Organic Compounds (µg/kg)									
2-Methylnaphthalene	--	23,000	--	37.7 J	39.2 U	26.6 J	37.7 J	28.7 J	41.8 U
Acenaphthene	--	350,000	--	33.6 U	39.2 U	34.5 U	39.8 U	166	41.8 U
Acenaphthylene	--	350,000	--	33.6 U	39.2 U	34.5 U	39.8 U	35.5 U	41.8 U
Anthracene	--	1,700,000	--	33.6 U	39.2 U	34.5 U	39.8 U	512	41.8 U
Benzaldehyde	--	780,000	58,400	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Benzo(a)anthracene	--	150	--	33.6 U	39.2 U	34.5 U	128	**797**	41.8 U
Benzo(a)pyrene	--	15	--	33.6 U	39.2 U	34.5 U	**119**	**722**	41.8 U
Benzo(b)fluoranthene	--	150	--	33.6 U	39.2 U	34.5 U	**157**	**418**	46.3 J
Benzo(g,h,i)perylene	--	--	--	33.6 U	39.2 U	34.5 U	114	399	41.8 U
Benzo(k)fluoranthene	--	1,500	--	33.6 U	39.2 U	34.5 U	128	506	41.8 U
bis(2-Ethylhexyl)phthalate	--	38,000	30,000	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Carbazole	--	--	7,000	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Chrysene	--	15,000	--	46.5 J	39.2 U	65.7 J	192	906	82.8 J
Dibenz(a,h)anthracene	--	15	--	33.6 U	39.2 U	34.5 U	39.8 U	**137**	41.8 U
Fluoranthene	--	230,000	--	36.7 J	40.5 J	30.6 J	260	1,510	69.7 J
Fluorene	--	230,000	--	33.6 U	39.2 U	34.5 U	39.8 U	169	41.8 U
Indeno(1,2,3-cd)pyrene	--	150	--	33.6 U	39.2 U	34.5 U	102	**321**	41.8 U
Naphthalene	--	3,800	--	33.6 U	39.2 U	34.5 U	39.8 U	35.5 U	41.8 U
Phenanthrene	--	--	--	44.2 J	39.2 U	73.8	172	1,910	53.3 J
Pyrene	--	170,000	--	51.6 J	46.1 J	47.8 J	231	2,080	54 J
Pesticide/Polychlorinated Biphenyls (µg/kg)									
4,4'-DDD	--	2,200	583	0.351 UJ	0.394 UJ	0.718 J	19.3 J	0.565 J	1.84 J
4,4'-DDE	--	1,600	114	0.351 UJ	0.394 UJ	4.42 J	146 L	2.46 J	16.4 J
4,4'-DDT	--	1,900	100	0.337 J	0.525 J	4.85 J	334 L	0.373 UJ	5.95 J
Aldrin	--	31	3.63	0.351 U	0.394 UJ	0.358 L	0.398 UL	0.373 U	0.415 UL
alpha-BHC	--	85	226	0.351 U	0.394 U	0.362 UL	0.398 UL	0.373 U	0.415 UL
alpha-Chlordane	--	1,800	11	0.351 U	0.394 U	0.362 UJ	13.3 J	1.42 J	0.415 UJ
Aroclor-1260	--	240	8,000	8.59 U	12.1 J	34.9 L	**4,630 J**	9.13 U	**357 J**
beta-BHC	--	300	342	0.351 U	0.394 U	0.362 UL	0.398 UL	0.373 U	0.415 UL
delta-BHC	--	300	226	0.351 UJ	0.394 UJ	0.362 UL	0.398 UJ	0.373 U	0.415 UL
Dieldrin	--	33	10.5	0.351 U	0.394 U	0.453 J	19.1 J	0.306 J	0.704 J
Endosulfan I	--	37,000	6.32	0.351 U	0.394 U	0.362 UJ	0.398 UL	0.373 U	0.415 UL
Endosulfan II	--	37,000	6.32	0.351 U	0.394 U	0.273 L	39.2 L	0.373 U	0.415 UJ
Endosulfan sulfate	--	37,000	6.32	0.351 U	0.394 U	9.86 J	0.559 J	0.373 U	2.3 L
Endrin	--	1,800	1.95	0.351 UJ	0.394 UJ	0.362 UL	0.398 UJ	0.373 U	0.415 UJ
Endrin aldehyde	--	1,800	1.95	0.351 U	0.394 UJ	0.362 UL	7.81 J	0.373 U	0.759 J
Endrin ketone	--	1,800	1.95	0.351 U	0.394 U	0.362 UL	40.2 J	0.373 U	1.36 J
gamma-BHC (Lindane)	--	560	7.75	0.351 U	0.394 U	0.362 UL	0.398 UL	0.373 UJ	0.415 UL
gamma-Chlordane	--	1,800	11	0.642 J	0.916 L	0.53 J	12.7 L	3.31 J	0.765 L
Heptachlor	--	120	52.9	0.351 U	0.394 U	0.362 UL	0.398 UJ	0.373 UJ	0.415 UL
Heptachlor epoxide	--	59	52.9	0.351 UJ	0.394 UJ	0.362 UL	0.483 J	0.373 UJ	0.415 UJ
Methoxychlor	--	31,000	500	0.351 UJ	0.394 UJ	0.215 J	21.2 J	0.373 UJ	1.52 J

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Other Upland Areas					
Station ID	**CAX 95% UTL BKG SS**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75
Sample ID				CAPL-SS70-1112	CAPL-SS71-1112	CAPL-SS72-1112	CAPL-SS73-1112	CAPL-SS74-1112	CAPL-SS75-1112
Sample Date				11/02/12	11/02/12	11/02/12	11/05/12	11/05/12	11/05/12
Chemical Name									
Explosives (µg/kg)									
1,3,5-Trinitrobenzene	--	220,000	--	186 U	191 U	191 U	170 U	174 U	173 U
Nitroglycerin	--	620	--	465 U	478 U	478 U	426 U	435 U	433 U
Total Metals (mg/kg)									
Aluminum	12,200	7,700	pH < 5.5	6,070	**9,460**	3,260	5,380	7,640	**9,110**
Antimony	--	3.1	78	0.787 U	2.3 U	2.14 U	2.33 U	2.27 U	2.65 U
Arsenic	6.36	0.67	18	**1.19**	**2.1 J**	**0.941 J**	**2.6 J**	**5.29**	**7.22**
Barium	52.9	1,500	330	10.9	14	46	34.1	66.4	61.1
Beryllium	0.587	16	40	1.63	1.35 J	0.535 U	0.363 J	0.521 J	0.759 J
Cadmium	--	7	32	0.197 U	0.575 U	0.535 U	0.984 J	0.568 U	0.339 J
Calcium	2,290	--	--	15,900	11,000	40,800	2,070	58,200	2,170
Chromium	18.2	0.3	64	**5.78**	**10.5**	**7.84**	**16.7**	**23.3**	**19.3**
Cobalt	9.93	2.3	13	2.09	2.05 J	2.01 J	2.02 J	**3.8**	**3.66 J**
Copper	4.25	310	70	3.29	4.57	6.47	44.8	28.3	51.5
Cyanide	--	2.1	15.8	0.246 U	0.29 U	0.265 U	0.297 U	0.272 U	0.155 J
Iron	19,900	5,500	5 < pH > 8	**10,400**	**15,100**	**6,370**	**11,100**	**10,900**	**18,500**
Lead	17.4	400	120	12.9	10.3	15.1	127	14.7	159
Magnesium	1,070	--	--	2,530	2,620	22,800	1,480	2,520	1,680
Manganese	324	180	220	**405**	**331**	117	140	161	**351**
Mercury	0.111	2.3	0.1	0.031 U	0.0355 U	0.0242 J	0.0861	0.0188 J	0.0835
Nickel	9.52	150	38	2.28	2.64 J	3.24	6.27	11.8	6.5
Potassium	708	--	--	667	987 J	421 J	414 J	1,280 J	975 J
Vanadium	27.9	39	130	13.7	19.7	12.8	19.4	28.3	25.6
Zinc	26.5	2,300	120	44.6	33.3	21.7	175	47.5	196
Wet Chemistry									
pH (ph)	--	--	--	9.11 H3	9.12 H3	8.15 H3	7 H3	11.9 H3	5.85 H3
Total organic carbon (TOC) (mg/kg)	--	--	--	7,450	9,410	13,500	29,600	13,200	40,100

TABLE 8
Surface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 1 Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Other Upland Areas					
Station ID	**CAX 95% UTL BKG SS**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75
Sample ID				CAPL-SS70-1112	CAPL-SS71-1112	CAPL-SS72-1112	CAPL-SS73-1112	CAPL-SS74-1112	CAPL-SS75-1112
Sample Date				11/02/12	11/02/12	11/02/12	11/05/12	11/05/12	11/05/12
Chemical Name									
Grain Size (pct)									
Coarse Sand (%)	--	--	--	18.2	11.5	10.9	4.4	20.3	2.8
Fine Sand (%)	--	--	--	17.8	20.6	20.1	44.6	15.9	44.6
Fines (%)	--	--	--	16	14.7	18.1	25.9	6.2	38.5
Gravel (%)	--	--	--	25.6	36.3	32.3	1.3	38.6	2.1
Medium Sand (%)	--	--	--	22.4	16.9	18.6	23.8	19	12
Sand (%)	--	--	--	58.4	49	49.6	72.8	55.2	59.4
GRAINSIZE (PCT/P)									
GS03 Sieve 3" (75 mm)	--	--	--	100	100	100	100	100	100
GS05 Sieve 2" (50 mm)	--	--	--	100	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	100	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	100	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	--	92.5	76.7	79.3	100	82.8	99.1
Sieve No. 004 (4.75 mm)	--	--	--	74.4	63.7	67.7	98.7	61.4	97.9
Sieve No. 010 (2.00 mm)	--	--	--	56.2	52.2	56.8	94.3	41.1	95.1
Sieve No. 020 (850 um)	--	--	--	43.3	42.6	48.6	83.4	31.5	89.7
Sieve No. 040 (425 um)	--	--	--	33.8	35.3	38.2	70.5	22.1	83.1
Sieve No. 060 (250 um)	--	--	--	27.1	27	28.7	51.6	14.9	63
Sieve No. 080 (180 um)	--	--	--	23.2	21.7	23.5	39.6	11.2	49.5
Sieve No. 100 (150 um)	--	--	--	20.8	19.1	21.5	34	9.4	44.6
Sieve No. 200 (75 um)	--	--	--	16	14.7	18.1	25.9	6.2	38.5

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Notes:

Underline indicates exceedance of CAX 95% UTL BKG SS

Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

ph - pH units

µg/kg - Micrograms per kilogram

Table 9
Composite Subsurface Soil Detection Results - Former Transformer Pad Locations - Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAPL-SO34	CAPL-SO35	CAPL-SO36	CAPL-SO37	CAPL-SO38	CAPL-SO39	CAPL-SO40		CAPL-SO41	CAPL-SO42	CAPL-SO43
Sample ID	CAPL-SB34-1112	CAPL-SB35-1112	CAPL-SB36-1112	CAPL-SB37-1112	CAPL-SB38-1012	CAPL-SB39-1012	CAPL-SB40-1112	CAPL-SB40P-1112	CAPL-SB41-1012	CAPL-SB42-1012	CAPL-SB43-1112
Sample Date	11/05/12	11/06/12	11/06/12	11/06/12	10/31/12	10/31/12	11/01/12	11/01/12	10/31/12	10/31/12	11/01/12
Chemical Name											
Pesticide/Polychlorinated Biphenyls (µg/kg)											
No Detections	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
Shading indicates detections
ND - Not detected
µg/kg - Micrograms per kilogram

Table 10
Subsurface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas												
Station ID	**CAX 95% UTL BKG SB**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO44	CAPL-SO45	CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49	CAPL-SO50		CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58	CAPL-SO59
Sample ID				CAPL-SB44-1012	CAPL-SB45-1012	CAPL-SB46-1012	CAPL-SB47-1012	CAPL-SB48-1012	CAPL-SB49-1012	CAPL-SB50-1012	CAPL-SB50P-1012	CAPL-SB55-1012	CAPL-SB56-1012	CAPL-SB57-1012	CAPL-SB58-1012	CAPL-SB59-1012
Sample Date				10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name																
Volatile Organic Compounds (µg/kg)																
2-Butanone	--	2,700,000	--	5.16 UJ	6.99 UJ	7.61 UJ	5.95 UJ	6.28 U	5.28 U	7.55 U	6.9 U	5.05 UJ	93.1	6.83 U	6.44 UJ	3.88 J
Acetone	--	6,100,000	--	10.3 UJ	14 UJ	15.2 UJ	6.84 J	61 J	10.6 UJ	15.1 UJ	13.8 UJ	7.89 J	261 J	13.7 UJ	9.05 J	14.8 J
Carbon disulfide	--	77,000	--	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	2.89 J	3.42 U	3.22 U	1.93 J
Semivolatile Organic Compounds (µg/kg)																
2-Methylnaphthalene	--	23,000	--	3.66 U	4.36 U	3.04 J	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.56 J	4.5 U	4.23 U	4.1 U
Anthracene	--	1,700,000	--	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Benzo(a)anthracene	--	150	--	3.66 U	4.36 U	3.94 U	3.93 U	23.8 J	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Benzo(a)pyrene	--	15	--	3.66 U	4.36 U	5.81 J	3.93 U	**23.2 K**	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Benzo(b)fluoranthene	--	150	--	3.66 U	4.36 U	22.4	3.93 U	57 K	4 U	4.26 U	5.56 K	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Benzo(g,h,i)perylene	--	--	--	3.66 U	4.36 U	11.9	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Benzo(k)fluoranthene	--	1,500	--	3.66 U	4.36 U	9.43	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	6.87 J	4.5 U	4.23 U	4.1 U
bis(2-Ethylhexyl)phthalate	--	38,000	30,000	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Chrysene	--	15,000	--	3.66 U	4.36 U	17.3	3.93 U	31.6 K	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Dibenz(a,h)anthracene	--	15	--	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Fluoranthene	--	230,000	--	3.66 U	4.36 U	17.5	3.93 U	49	4 U	4.26 U	5.42 J	4.57 J	10.7	3.62 J	3.52 J	4.1 U
Fluorene	--	230,000	--	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Indeno(1,2,3-cd)pyrene	--	150	--	3.66 U	4.36 U	9.69	3.93 U	23.3 J	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Naphthalene	--	3,800	--	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Phenanthrene	--	--	--	3.66 U	4.36 U	6.01 J	3.93 U	30.2 J	4 U	4.26 U	7.26 J	4.03 U	8.77 J	4.5 U	4.23 U	4.1 U
Pyrene	--	170,000	--	3.66 U	4.36 U	16.5	3.93 U	43.5 K	4 U	4.26 U	6.22 K	4.22 J	10.7	3.46 J	3.17 J	4.1 U
Pesticide/Polychlorinated Biphenyls (µg/kg)																
4,4'-DDD	--	2,200	583	0.23 J	0.47 UL	0.851 J	3.08 J	13 J	1.69 J	2.68 J	0.675 J	0.396 UL	11.3 J	19.7 J	0.243 J	2.7 J
4,4'-DDE	--	1,600	114	0.456 L	0.47 UL	7.49 J	3.01 J	143 J	9.02	7.1	4.78	0.346 J	9.67	11.5 L	3.53 L	14.3 L
4,4'-DDT	--	1,900	100	0.353 J	0.47 UL	2.96 J	2.11 J	60 J	0.467 J	3.71 J	2.88 J	0.396 U	0.663 J	2.53 J	1.28 J	1.54 L
Aldrin	--	31	3.63	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.451 UL	0.333 J	0.429 UL
alpha-BHC	--	85	226	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.307 J	0.444 UL	0.594 J
alpha-Chlordane	--	1,800	11	0.367 UL	0.47 UL	0.768 J	0.394 UL	0.656 J	0.412 U	0.441 U	0.398 U	0.396 U	0.449 UL	0.451 UL	0.444 UL	0.429 UL
Aroclor-1260	--	240	8,000	35.6 J	23.2 L	**414 L**	**284 J**	**428 L**	13.9 J	39.7	31.7	9.7 U	54.3 J	19.9 L	35.2 L	9.07 L
beta-BHC	--	300	342	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.252 J	0.444 UL	0.429 UL
Dieldrin	--	33	10.5	0.602 L	0.47 UL	6.49 L	3.65 L	8.16 J	0.412 U	0.613 J	0.449 J	0.396 U	1.66 J	0.451 UL	0.444 UL	0.429 UL
Endosulfan II	--	37,000	6.32	0.367 UL	0.47 UL	4.18 J	0.81 J	4.07 J	0.412 U	0.441 U	0.398 UL	0.396 U	0.449 UL	0.451 UL	0.444 UL	0.429 UL
Endosulfan sulfate	--	37,000	6.32	0.937 J	0.484 J	29.3 J	9.05 L	0.367 UL	0.412 U	0.441 U	1.45 J	0.396 U	0.449 U	0.681 J	0.444 UL	0.227 J
Endrin	--	1,800	1.95	0.367 UL	0.47 UL	1.1 J	1.54 J	1.25 J	0.412 U	0.441 U	0.398 U	0.396 U	0.905 J	0.403 L	0.519 J	0.429 UL
Endrin aldehyde	--	1,800	1.95	0.367 UL	0.47 UL	0.452 J	0.441 J	0.646 J	0.412 U	0.441 U	0.398 U	0.396 U	1.15 J	0.429 J	0.444 UL	0.429 UL
Endrin ketone	--	1,800	1.95	0.367 UL	0.47 UL	1.84 J	0.81 J	1.73 J	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.451 UL	0.444 UL	0.429 UL
gamma-BHC (Lindane)	--	560	7.75	0.367 UL	0.47 UL	0.411 U	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.451 UL	0.444 UL	0.429 UL
gamma-Chlordane	--	1,800	11	2.17 J	1.76 J	2.1 J	1.88 L	3.66 B	0.412 UJ	0.366 B	0.411 B	1.45 J	0.296 J	0.303 J	3.23 L	2.5 L
Heptachlor	--	120	52.9	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.185 J	0.246 J	1.97 J
Heptachlor epoxide	--	59	52.9	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.451 UL	0.201 L	0.437 J
Methoxychlor	--	31,000	500	0.367 UL	0.47 UL	3.49 J	0.85 J	4.95 J	0.412 UJ	0.441 U	0.398 U	0.396 U	1.63 J	3.61 J	0.52 J	1.28 J
Explosives (µg/kg)																
Nitroglycerin	--	620	--	455 U	493 U	498 U	478 U	455 U	500 U	500 U	455 U	478 U	465 U	469 U	493 U	452 U

Table 10
Subsurface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Drainage Areas												
Station ID	**CAX 95% UTL BKG SB**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO44	CAPL-SO45	CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49	CAPL-SO50		CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58	CAPL-SO59
Sample ID				CAPL-SB44-1012	CAPL-SB45-1012	CAPL-SB46-1012	CAPL-SB47-1012	CAPL-SB48-1012	CAPL-SB49-1012	CAPL-SB50-1012	CAPL-SB50P-1012	CAPL-SB55-1012	CAPL-SB56-1012	CAPL-SB57-1012	CAPL-SB58-1012	CAPL-SB59-1012
Sample Date				10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name																
Total Metals (mg/kg)																
Aluminum	13,000	7,700	pH < 5.5	**11,600**	**27,600**	**22,400**	**24,000**	**11,500**	**10,900**	**23,400**	**24,500**	6,480	3,590	2,580	4,220	1,600
Arsenic	5.54	0.67	18	**2.12**	**16.3**	**4.87**	**4.01**	**4.51**	**2.91**	**11.5 J**	**7.98 J**	**1.9**	**2.76**	**1.44 J**	**1.5**	**1.11 J**
Barium	84.5	1,500	330	33.4	52.8	39.6	46.8	26.2	47.3	55.7 J	87.3 J	29.4	18.4	12.2	24.3	7.04
Beryllium	--	16	40	0.421 J	1.89	0.786 J	0.552 J	0.323 J	0.52 J	1.1 J	1.07 J	0.263 J	0.21 J	0.228 J	0.25 J	0.254 U
Cadmium	--	7	32	0.218 U	0.697 U	0.61 U	0.627 U	0.57 U	0.246 U	0.626 U	0.622 U	0.252 U	0.268 U	0.204 J	1.64 K	0.254 U
Calcium	2,380	--	--	1,160	2,690	3,920	3,190	1,800	1,570	3,360	3,320	283 J	681	1,660	760 L	695
Chromium	33.7	0.3	64	**15.1**	**58.5**	**44.9**	**42.6**	**19.1 K**	**15.2**	**41.8**	**37.7**	**6.74**	**5.6**	**5.41**	**5.56**	**3.67**
Cobalt	5.18	2.3	13	**2.54**	**6.45**	**2.62 J**	1.97 J	1.51 J	**2.69**	**4.1**	**4.62**	1.27 J	1.07 J	2.16	0.947	1.27 U
Copper	3.17	310	70	3.59	8.05	4.26	8.85	5.1	3.71	5.35	4.65	3.02	3.17	2.37	3.54	1.26 J
Iron	32,000	5,500	5 < pH < 8	**10,300**	**63,500**	**33,600**	**27,100**	**14,200**	**13,400**	**52,600**	**38,700**	5,460	**5,560**	2,570	4,220	2,470
Lead	8.79	400	120	7.96	16	11.9	9.33	23.6	9.17	15	12.4	13.3	8.58	22 J	16.8 K	4.59 J
Magnesium	1,120	--	--	844	4,280	2,740	1,750	957 J	969	2,440	2,080	489 J	341 J	312 J	601 K	268 J
Manganese	176	180	220	35.2	65.1	28.3	16.2	59.4	50.6	78.7 J	45 J	22.8	11.3	7.37	34.4 K	7.12
Mercury	--	2.3	0.1	0.0354 J	0.0947	0.0344 J	0.0446 J	0.0462	0.0298 J	0.0671	0.0642	0.0354 J	0.0226 J	0.0437	0.0454 L	0.036 U
Nickel	17.6	150	38	3.96	16.1	7.25	5.86	4.06	4.37	9.19	8.36	3.06 B	2.19 B	3.17 B	2.63 B	1.15 B
Potassium	901	--	--	483 J	4,420	1,920	863 J	744 J	593 J	1,510 J	887 J	362 J	412 J	351 J	315 K	364 J
Selenium	--	39	0.52	0.546 U	1.74 U	1.52 U	1.57 U	1.42 U	0.616 U	1.56 U	1.55 U	0.631 U	0.669 U	0.54 J	0.349 U	0.636 U
Vanadium	48.3	39	130	20.2	**66.7**	**51.4**	**54.3**	27.9 K	17.7	**47.7**	**43.8**	11.3	8.95	6.94	8.78 K	4.81
Zinc	28	2,300	120	14.1	48.8	43	20.2	42.3	16.8	29.5	25.7	11.7	48.2	13.2	72.7 K	52.7
Wet Chemistry																
pH (ph)	--	--	--	5.82 H3	5.06 H3	6.6 H3	5.52 H3	5.88 H3	7.86 H3	8.08 H3	NA	5.7 H3	6.02 H3	6.96 H3	5.82 H3	5.87 H3
Total organic carbon (TOC) (mg/kg)	--	--	--	4,100	1,770	3,180	5,670	20,300	3,740	5,900	NA	5,480	13,300	26,000	11,900	8,970

\\VBOFPP01\Proj\CLEAN\IR\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\[Table 10_PennLake_SB_Exceedances_0514RSLs_v2_jd.xlsx], Campbell, Clairette/VBO, 03/13/2014

Notes:

Underline indicates exceedance of CAX 95% UTL BKG SB

Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

*- Exceeding quality control criteria are associated with the reported results (unvalidated data)

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

Table 10
Subsurface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Upland Areas Upstream to Drainage Areas											
Station ID	**CAX 95% UTL BKG SB**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO60		CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69
Sample ID				CAPL-SB60-1112	CAPL-SB60P-1112	CAPL-SB61-1112	CAPL-SB62-1112	CAPL-SB63-1112	CAPL-SB64-1112	CAPL-SB65-1112	CAPL-SB66-1112	CAPL-SB67-1112	CAPL-SB68-1112	CAPL-SB69-1112
Sample Date				11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12
Chemical Name														
Volatile Organic Compounds (µg/kg)														
2-Butanone	--	2,700,000	--	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U
Acetone	--	6,100,000	--	11.6 UJ	12.7 UJ	8.57 UJ	5.13 J	9.44 UJ	9.53 UJ	9.24 UJ	11.7 UJ	5.86 J	12.3 UJ	9.1 UJ
Carbon disulfide	--	77,000	--	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U
Semivolatile Organic Compounds (µg/kg)														
2-Methylnaphthalene	--	23,000	--	4.2 U	4.4 U	3.85 U	39.2 U	35.5	9.96	3.89 U	16.4	3.7 U	4.21 U	23.1 J
Anthracene	--	1,700,000	--	4.2 U	4.4 U	3.85 U	83.6	65.4	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	40.1 U
Benzo(a)anthracene	--	150	--	4.2 U	4.4 U	3.85 U	**610**	3.99 U	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	122
Benzo(a)pyrene	--	15	--	4.2 U	4.4 U	3.85 U	**859**	3.99 U	4.99 J	3.89 U	3.93 U	3.7 U	4.21 U	**213**
Benzo(b)fluoranthene	--	150	--	4.2 U	4.4 U	3.85 U	**2,100**	7.82 J	9.11	3.89 U	8	3.7 U	4.21 U	**292**
Benzo(g,h,i)perylene	--	--	--	4.2 U	4.4 U	3.85 U	1,140	3.99 U	6.09 J	3.89 U	5.27 J	3.7 U	4.21 U	186
Benzo(k)fluoranthene	--	1,500	--	4.2 U	4.4 U	3.85 U	**2,210**	3.99 U	5.51 J	3.89 U	3.93 U	3.7 U	4.21 U	274
bis(2-Ethylhexyl)phthalate	--	38,000	30,000	211 U	221 U	167 J	512 J	200 U	196 U	130 J	197 U	186 U	553	1,000 U
Chrysene	--	15,000	--	4.2 U	4.4 U	3.85 U	3,070	14.8	22.8	3.89 U	16.4	3.7 U	4.21 U	346
Dibenz(a,h)anthracene	--	15	--	4.2 U	4.4 U	3.85 U	**250**	3.99 U	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	**56.2 J**
Fluoranthene	--	230,000	--	4.2 U	4.4 U	3.85 U	3,360	6.05 J	6.26 J	3.89 U	5.35 J	2.31 J	4.21 U	343
Fluorene	--	230,000	--	4.2 U	4.4 U	3.85 U	39.2 U	8.88	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	40.1 U
Indeno(1,2,3-cd)pyrene	--	150	--	4.2 U	4.4 U	3.85 U	**1,000**	3.99 U	4.3 J	3.89 U	3.93 U	3.7 U	4.21 U	**161**
Naphthalene	--	3,800	--	4.2 U	4.4 U	3.85 U	39.2 U	53	7.17 J	3.89 U	16.7	3.7 U	4.21 U	40.1 U
Phenanthrene	--	--	--	4.2 U	4.4 U	3.85 U	405	46.7	17.7	3.89 U	17.5	3.7 U	4.21 U	88
Pyrene	--	170,000	--	4.2 U	4.4 U	3.85 U	2,980	10.2	7.48 J	3.89 U	7.02 J	2.21 J	4.21 U	361
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	--	2,200	583	0.43 U	0.442 U	0.399 U	3.36 L	0.837	0.957 J	0.387 U	0.811 J	0.392 U	0.425 UL	5.6 J
4,4'-DDE	--	1,600	114	0.43 UJ	0.442 UJ	0.399 UJ	23.1 K	8.29 J	3.66	0.387 UJ	0.347 J	0.392 UJ	0.217 J	5.45 J
4,4'-DDT	--	1,900	100	0.43 U	0.442 U	0.399 U	32.1 L	1.13 J	0.801 J	0.387 UJ	0.401 U	0.392 UJ	1.41 J	19.6 L
Aldrin	--	31	3.63	0.43 U	0.442 U	0.399 U	0.929 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.594 J	0.409 U
alpha-BHC	--	85	226	0.43 U	0.442 U	0.399 U	0.352 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.251 J	0.409 U
alpha-Chlordane	--	1,800	11	0.43 U	0.442 U	0.399 U	0.512 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 U	1.9 J
Aroclor-1260	--	240	8,000	10.5 U	7.83 J	9.77 U	**704 J**	9.88 U	75.9 J	9.49 U	13.5 J	9.61 U	141	211 J
beta-BHC	--	300	342	0.43 U	0.442 U	0.399 U	0.403 U	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U
Dieldrin	--	33	10.5	0.43 U	0.442 U	0.399 U	2.91 L	0.403 U	1.02 J	0.387 U	0.401 U	0.392 U	4.4 L	4.36
Endosulfan II	--	37,000	6.32	0.43 U	0.442 U	0.399 U	2.32 L	0.403 U	0.757 J	0.387 U	0.401 U	0.392 U	2.31 J	2.29 J
Endosulfan sulfate	--	37,000	6.32	0.43 U	0.442 U	0.399 U	19.7 K	0.403 U	0.401 U	0.387 U	0.54 J	0.392 U	4.43 L	7.5 L
Endrin	--	1,800	1.95	0.43 U	0.442 U	0.399 U	6.12 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	4.14 J	0.529 J
Endrin aldehyde	--	1,800	1.95	0.43 U	0.442 U	0.399 U	1.27 K	0.403 U	0.523 J	0.387 U	0.401 U	0.392 U	0.276 J	0.409 U
Endrin ketone	--	1,800	1.95	0.43 U	0.442 U	0.399 UL	7.34 L	0.403 U	0.401 U	0.387 U	0.401 UJ	0.392 U	1.36 L	2.52 J
gamma-BHC (Lindane)	--	560	7.75	0.43 U	0.442 U	0.399 U	1.17 K	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U
gamma-Chlordane	--	1,800	11	0.301 J	0.538 J	0.399 U	3.76 L	0.403 U	0.394 J	0.252 J	0.283 J	0.392 U	1.86	1.79
Heptachlor	--	120	52.9	0.43 U	0.442 U	0.399 U	0.27 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U
Heptachlor epoxide	--	59	52.9	0.43 U	0.442 U	0.399 U	1.44 K	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.187 J	0.409 UL
Methoxychlor	--	31,000	500	0.43 U	0.442 U	0.399 UJ	4.71 K	0.403 UJ	0.545 J	0.387 UJ	0.401 UJ	0.392 UJ	0.327 J	0.257 J
Explosives (µg/kg)														
Nitroglycerin	--	620	--	446 U	500 U	435 U	566 J	441 U	448 U	467 U	485 U	457 U	488 U	493 U

Table 10
Subsurface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Upland Areas Upstream to Drainage Areas										
Station ID	**CAX 95% UTL BKG SB**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO60	CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69
Sample ID				CAPL-SB60-1112	CAPL-SB60P-1112	CAPL-SB61-1112	CAPL-SB62-1112	CAPL-SB63-1112	CAPL-SB64-1112	CAPL-SB65-1112	CAPL-SB66-1112	CAPL-SB67-1112	CAPL-SB68-1112	CAPL-SB69-1112
Sample Date				11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12
Chemical Name														
Total Metals (mg/kg)														
Aluminum	13,000	7,700	pH < 5.5	**12,100**	**15,800**	**16,400**	**8,930**	**11,600**	**13,600**	**16,800**	**8,500**	**18,100**	**15,300**	**10,300**
Arsenic	5.54	0.67	18	**14.2 J**	**22.4 J**	**1.9 J**	**2.64 J**	**3.41**	**10.7**	**6.91**	**6.85**	**11.9**	**17.1**	**7.05**
Barium	84.5	1,500	330	49.2 J	77.2 J	38.2	48.8	40.5	49	71	89.3	64.7	61.8	37.7
Beryllium	--	16	40	0.95 J	1.32 J	0.45 J	0.495 J	0.431 J	0.821 J	0.908 J	0.737 J	1.21 J	1.14 J	0.555 J
Cadmium	--	7	32	0.668 U	0.365 J	0.609 U	1.02 J	0.613 U	0.628 U	0.566 U	0.574 U	0.592 U	0.647 U	0.61 U
Calcium	2,380	--	--	116,000 J	16,800 J	3,160	1,780	6,460	16,900	2,890	3,150	3,020	79,700	5,690
Chromium	33.7	0.3	64	**30.9**	**41.8**	**34.6**	**20**	**19.7**	**31.7**	**33**	**19.2**	**39.6**	**39.4**	**22.2**
Cobalt	5.18	2.3	13	**4.52 J**	**9.11 J**	3.05 U	1.88 J	1.89 J	**3.4 J**	**3.27 J**	2.13 J	**3.67 J**	**5.26**	2.12 J
Copper	3.17	310	70	4.48	5.19	4.89	10.1	5.31	6.64	2.95	5.04	4.57	4.12	12.6
Iron	32,000	5,500	5 < pH < 8	**42,300**	**51,100**	**26,600**	**12,700**	**19,300**	**38,600**	**37,200**	**22,500**	**51,400**	**34,400**	**23,800**
Lead	8.79	400	120	9.66 J	14 J	14.4	66.5	11.2	190	8.99	14.8	10.7	10.8	23.2
Magnesium	1,120	--	--	3,300	3,790	1,490 J	983 J	1,100 J	8,710	1,770	1,670	2,180	3,870	2,280
Manganese	176	180	220	**208 J**	**520 J**	17.8	90.6	36.4	75.4	40.4	92.3	67.5	155	111
Mercury	--	2.3	0.1	0.0227 J	0.0316 J	0.0511	0.0674	0.0795	0.0789	0.0311 J	0.049	0.0358 J	0.0299 J	0.0432
Nickel	17.6	150	38	14	18.2	3.49	4.5	3.95	9.1	6.12	4.95	7.82	15.9	4.85
Potassium	901	--	--	2,730	3,170	665 J	547 J	532 J	2,000	769 J	1,470	1,690	3,620	1,270 J
Selenium	--	39	0.52	1.67 U	1.74 U	1.52 U	1.5 U	1.53 U	1.57 U	1.42 U	1.43 U	1.48 U	1.62 U	1.53 U
Vanadium	48.3	39	130	30.3	**40**	34	20.4	22.7	33.5	34.5	20.4	**45.1**	34.4	24.5
Zinc	28	2,300	120	44.8	51.5	24.3	98.6	16.2	32.2	17.1	27.4	22.9	49.9	53.8
Wet Chemistry														
pH (ph)	--	--	--	8.14 H3	NA	7.93 H3	6.73 H3	8.12 H3	8.12 H3	7.42 H3	7.73 H3	7.2 H3	8.16 H3	8.32 H3
Total organic carbon (TOC) (mg/kg)	--	--	--	6,880	NA	2,690 N	27,500 N	10,900 N*	32,800	3,960	9,110	3,180	1,640 J	15,600 N

\\VBOFPP01\Proj\CLEAN\IR\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\[Table 10_PennLake_SB_Exceedances

Notes:

Underline indicates exceedance of CAX 95% UTL BKG SB

Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

*- Exceeding quality control criteria are associated with the reported results (unvalidated data)

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

Table 10
Subsurface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Other Upland Areas						
Station ID	**CAX 95% UTL BKG SB**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75	
Sample ID				CAPL-SB70-1112	CAPL-SB71-1112	CAPL-SB72-1112	CAPL-SB73-1112	CAPL-SB74-1112	CAPL-SB75-1112	CAPL-SB75P-1112
Sample Date				11/02/12	11/02/12	11/02/12	11/05/12	11/05/12	11/05/12	11/05/12
Chemical Name										
Volatile Organic Compounds (µg/kg)										
2-Butanone	--	2,700,000	--	5.54 U	4.84 U	4.75 J	4.16 U	4.24 J	4.76 U	4.9 U
Acetone	--	6,100,000	--	11.1 UJ	6.84 J	25.8 J	8.32 UJ	28.8 J	9.51 UJ	9.8 UJ
Carbon disulfide	--	77,000	--	2.77 U	2.42 U	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
Semivolatile Organic Compounds (µg/kg)										
2-Methylnaphthalene	--	23,000	--	3.86 U	4.28 U	17.6 U	4.41 J	3.52 U	8.87	7.32 J
Anthracene	--	1,700,000	--	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Benzo(a)anthracene	--	150	--	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Benzo(a)pyrene	--	15	--	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U	5.02 J	4.58 U
Benzo(b)fluoranthene	--	150	--	3.86 U	4.28 U	17.6 U	8.24	3.52 U	10.8	5.39 J
Benzo(g,h,i)perylene	--	--	--	3.86 U	4.28 U	17.6 U	3.96 J	3.52 U	5.46 J	4.58 U
Benzo(k)fluoranthene	--	1,500	--	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
bis(2-Ethylhexyl)phthalate	--	38,000	30,000	109 J	167 J	302 J	185 U	177 U	202 U	164 J
Chrysene	--	15,000	--	3.86 U	4.28 U	24.1 J	10.5	3.52 U	20.4	11.8
Dibenz(a,h)anthracene	--	15	--	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Fluoranthene	--	230,000	--	3.86 U	4.28 U	17.6 U	6.38 J	3.52 U	7.37 J	4.58 U
Fluorene	--	230,000	--	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Indeno(1,2,3-cd)pyrene	--	150	--	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U	4.28 J	4.58 U
Naphthalene	--	3,800	--	3.86 U	4.28 U	17.6 U	4.46 J	3.52 U	6.63 J	6.05 J
Phenanthrene	--	--	--	3.86 U	4.28 U	26.1 J	8.88	3.52 U	19.4	12.6
Pyrene	--	170,000	--	3.86 U	4.28 U	17.6 U	6.56 J	3.52 U	8.55	4.67 J
Pesticide/Polychlorinated Biphenyls (µg/kg)										
4,4'-DDD	--	2,200	583	0.407 U	0.421 U	0.356 UL	0.616 J	0.37 U	0.406 UJ	0.447 U
4,4'-DDE	--	1,600	114	0.407 U	0.421 U	0.356 UL	4.16 L	3.78 J	0.561 J	0.795 J
4,4'-DDT	--	1,900	100	0.407 UJ	0.421 UJ	0.356 UJ	3.63 J	0.37 UJ	0.406 U	0.447 U
Aldrin	--	31	3.63	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
alpha-BHC	--	85	226	0.407 UJ	0.421 U	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
alpha-Chlordane	--	1,800	11	0.407 U	0.421 U	0.356 UL	0.375 UJ	0.37 U	0.406 U	0.447 U
Aroclor-1260	--	240	8,000	9.97 U	10.3 U	8.72 UL	56.9	9.06 U	9.95 UL	11 UL
beta-BHC	--	300	342	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
Dieldrin	--	33	10.5	0.407 U	0.421 U	0.356 UL	1 J	0.37 U	0.406 U	0.447 U
Endosulfan II	--	37,000	6.32	0.407 U	0.421 U	0.356 UL	0.375 UJ	0.37 U	0.406 U	0.447 U
Endosulfan sulfate	--	37,000	6.32	0.407 U	0.421 U	0.356 UJ	0.375 U	0.37 U	0.406 U	0.447 UL
Endrin	--	1,800	1.95	0.407 UJ	0.421 U	0.356 UL	0.375 UJ	0.37 U	0.406 U	0.447 U
Endrin aldehyde	--	1,800	1.95	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
Endrin ketone	--	1,800	1.95	0.407 U	0.421 U	0.356 UL	0.375 UL	0.37 U	0.406 U	0.447 UL
gamma-BHC (Lindane)	--	560	7.75	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
gamma-Chlordane	--	1,800	11	0.332 J	0.219 J	0.356 UJ	0.565 J	0.316 J	0.312 J	0.364 J
Heptachlor	--	120	52.9	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
Heptachlor epoxide	--	59	52.9	0.407 UJ	0.421 U	0.356 UL	0.375 UL	0.37 UJ	0.406 U	0.447 U
Methoxychlor	--	31,000	500	0.407 UJ	0.421 UJ	0.356 UJ	0.456 J	0.37 UJ	0.406 UJ	0.447 UL
Explosives (µg/kg)										
Nitroglycerin	--	620	--	444 U	403 U	410 U	488 U	433 U	413 U	441 U

Table 10
Subsurface Soil Data Exceedance Results - Drainage, Upland to Drainage, Other Upland Areas - Step 2
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

				Other Upland Areas						
Station ID	**CAX 95% UTL BKG SB**	**RSLs Residential Soil Adjusted (May 2014)**	**CAX SS ECO SV**	CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75	
Sample ID				CAPL-SB70-1112	CAPL-SB71-1112	CAPL-SB72-1112	CAPL-SB73-1112	CAPL-SB74-1112	CAPL-SB75-1112	CAPL-SB75P-1112
Sample Date				11/02/12	11/02/12	11/02/12	11/05/12	11/05/12	11/05/12	11/05/12
Chemical Name										
Total Metals (mg/kg)										
Aluminum	13,000	7,700	pH < 5.5	**8,670**	**13,700**	5,140	**8,690**	**13,400**	**12,900**	**11,400**
Arsenic	5.54	0.67	18	**1.82**	**7.08**	**1.51 J**	**2.69**	**11.6**	**6.7**	**7.79**
Barium	84.5	1,500	330	26.9	70.6	44	62.8	31.7	212 J	99.8 J
Beryllium	--	16	40	0.251 J	0.965 J	0.573 U	0.454	0.88 J	1.24 J	0.858 J
Cadmium	--	7	32	0.242 U	0.642 U	0.573 U	0.196 J	0.535 U	0.616 U	0.703 U
Calcium	2,380	--	--	988	3,990	1,020 J	2,550	3,590	8,710 J	6,360 J
Chromium	33.7	0.3	64	**13.9**	**37.3**	**8.4**	**16.5 K**	**33.3**	**22.6**	**25.8**
Cobalt	5.18	2.3	13	1.28 J	**3 J**	2.87 U	1.52	**2.71 J**	**2.63 J**	**2.9 J**
Copper	3.17	310	70	3.48	2.57 U	2.77 J	10.9 L	3.96	11.5	11.7
Iron	32,000	5,500	5 < pH < 8	**10,200**	**37,600**	**8,050**	**14,700**	**64,700**	**25,900**	**34,200**
Lead	8.79	400	120	6.49	8.19	6.53	34.4 L	10.6	18.4	21.7
Magnesium	1,120	--	--	632	3,290	545 J	886 K	1,670	2,960 J	2,050 J
Manganese	176	180	220	15.8	32.5	33.2	82 L	100	**373 J**	126 J
Mercury	--	2.3	0.1	0.053	0.0261 J	0.0251 J	0.0578	0.0324 U	0.0661 J	0.0387 UJ
Nickel	17.6	150	38	2.46	6	1.69 J	3.11	7.28	6.42	7.29
Potassium	901	--	--	276 J	3,450	860 U	421 K	1,570	1,510 J	1,540 J
Selenium	--	39	0.52	0.606 U	1.61 U	1.43 U	0.301 U	1.34 U	1.54 U	1.76 U
Vanadium	48.3	39	130	18.9	34	10.7	20.4	**42.3**	26.4	31.1
Zinc	28	2,300	120	6.44	24.6	29.9	36.5 L	21.2	37.4	38.8
Wet Chemistry										
pH (ph)	--	--	--	7.35 H3	5.95 H3	8.03 H3	8.05 H3	7.8 H3	8.24 H3	NA
Total organic carbon (TOC) (mg/kg)	--	--	--	1,480	1,940	6,290	14,300	2,880	13,800	NA

\\VBOFPP01\Proj\CLEAN\IR\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\[Table 10_PennLake_SB_Exceedances

Notes:

Underline indicates exceedance of CAX 95% UTL BKG SB

Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

*- Exceeding quality control criteria are associated with the reported results (unvalidated data)

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAX Marine SD ESV[1]	CAPL-SD18	CAPL-SD19	CAPL-SD20		CAPL-SD21	CAPL-SD22	CAPL-SD23	CAPL-SD24	CAPL-SD25	CAPL-SD26	CAPL-SD27
Sample ID				CAPL-SD18-0811	CAPL-SD19-0811	CAPL-SD20-0811	CAPL-SD20P-0811	CAPL-SD21-0811	CAPL-SD22-0711	CAPL-SD23-0711	CAPL-SD24-0711	CAPL-SD25-0711	CAPL-SD26-0811	CAPL-SD27-0711
Sample Date				08/02/11	08/02/11	08/02/11	08/02/11	08/02/11	07/28/11	07/28/11	07/28/11	07/28/11	08/02/11	07/28/11
Chemical Name														
Volatile Organic Compounds (µg/kg)														
2-Butanone	27,000,000	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	61,000,000	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	740,000	0.85	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	29,000,000	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	820,000	670	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)														
2-Methylnaphthalene	230,000	--	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	3,500,000	290	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	3,500,000	160	44	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	17,000,000	57.2	85.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	1,200,000	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1,500	108	261	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	150	150	430	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	1,500	240	1,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	170	670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	15,000	240	1,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	150,000	166	384	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	150	33	63.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	72,000	5,100	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	2,300,000	423	600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	2,300,000	77.4	19.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1,500	200	600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	38,000	176	160	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	204	240	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	1,700,000	195	665	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	22,000	4.88	1.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	16,000	3.16	2.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	19,000	4.16	1.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	310	2	9.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	850	6	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	18,000	3.24	2.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	2,400	59.8	48.0	**4,100**	**2,600**	25 U	15 J	45	**16,000**	**6,200**	930	18 U	35	150
beta-BHC	3,000	5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	3,000	3	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	330	1.9	0.72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	370,000	2.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	370,000	14	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	370,000	5.4	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	18,000	2.22	2.67	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	18,000	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	18,000	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	5,600	2.37	0.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	18,000	3.24	2.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	1,200	68	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	590	2.47	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	310,000	19	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAX Marine SD ESV[1]	CAPL-SD18	CAPL-SD19	CAPL-SD20		CAPL-SD21	CAPL-SD22	CAPL-SD23	CAPL-SD24	CAPL-SD25	CAPL-SD26	CAPL-SD27
Sample ID				CAPL-SD18-0811	CAPL-SD19-0811	CAPL-SD20-0811	CAPL-SD20P-0811	CAPL-SD21-0811	CAPL-SD22-0711	CAPL-SD23-0711	CAPL-SD24-0711	CAPL-SD25-0711	CAPL-SD26-0811	CAPL-SD27-0711
Sample Date				08/02/11	08/02/11	08/02/11	08/02/11	08/02/11	07/28/11	07/28/11	07/28/11	07/28/11	08/02/11	07/28/11
Chemical Name														
Explosives (µg/kg)														
1,3-Dinitrobenzene	6,200	6.7	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	36,000	92	20,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	6,200	1,922	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	250,000	4,062	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	3,800,000	4.74	115,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	6,200	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	120,000	--	72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg)														
Aluminum	77,000	25,500	18,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	31	3	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	6.7	9.79	8.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	15,000	20	48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	160	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	70	0.99	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	3	43.4	81.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	23	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	3,100	31.6	34.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	21	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	55,000	20,000	220,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	4,000	35.8	35.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	1,800	460	260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	23	0.18	0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1,500	22.7	20.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	390	2	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	390	1	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	390	--	57	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	23,000	121	150	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)														
Zinc, SEM	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acid volatile sulfide, SEM	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, SEM	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, SEM	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, SEM	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, SEM	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry														
pH (ph)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	--	--	--	34,000	3,800	110,000	NS	1,300	180,000	79,000	110,000	12,000	15,000	98,000
Grain Size (pct)														
Coarse Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gravel (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAX Marine SD ESV[1]	CAPL-SD18	CAPL-SD19	CAPL-SD20		CAPL-SD21	CAPL-SD22	CAPL-SD23	CAPL-SD24	CAPL-SD25	CAPL-SD26	CAPL-SD27
Sample ID				CAPL-SD18-0811	CAPL-SD19-0811	CAPL-SD20-0811	CAPL-SD20P-0811	CAPL-SD21-0811	CAPL-SD22-0711	CAPL-SD23-0711	CAPL-SD24-0711	CAPL-SD25-0711	CAPL-SD26-0811	CAPL-SD27-0711
Sample Date				08/02/11	08/02/11	08/02/11	08/02/11	08/02/11	07/28/11	07/28/11	07/28/11	07/28/11	08/02/11	07/28/11
Chemical Name														
GRAINSIZE (PCT/P)														
GS03 Sieve 3" (75 mm)	--	--	--	100	100	100	NS	100	100	100	100	100	100	100
GS05 Sieve 2" (50 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	--	100	100	100	NS	100	100	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	--	96	100	96	NS	100	100	100	100	100	99	100
GS10 Sieve 0.375" (9.5 mm)	--	--	--	95	98	92	NS	100	98	100	100	99	95	98
Sieve No. 004 (4.75 mm)	--	--	--	91	95	86	NS	100	91	100	98	98	92	92
Sieve No. 008 (2.36 mm)				88	91	80	NS	100	73	98	74	94	89	72
Sieve No. 010 (2.00 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 016 (1.18 mm)				84	82	70	NS	100	49	92	46	89	86	47
Sieve No. 020 (850 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 030 (600 um)				79	65	55	NS	99	31	75	31	82	76	30
Sieve No. 040 (425 um)	--	--	--	72.0	53.0	47.0	NS	96.0	24.0	64.0	26.0	76.0	65.0	24.0
Sieve No. 050 (300 um)				48.0	30.0	34.0	NS	75.0	20.0	56.0	22.0	52.0	41.0	20.0
Sieve No. 060 (250 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 080 (180 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	--	8.2	3.3	10.0	NS	4.6	13.0	44.0	15.0	5.6	10.0	12.0
Sieve No. 200 (75 um)	--	--	--	3.5	1.6	4.0	NS	0.8	8.0	25.0	9.2	1.5	3.5	6.8

Notes:

Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted

Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek
[2]Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD28		CAPL-SD29	CAPL-SD30	CAPL-SD31	CAPL-SD32	CAPL-SD33		CAPL-SD34	CAPL-SD35	CAPL-SD36	CAPL-SD37
Sample ID			CAPL-SD28-0711	CAPL-SD28P-0711	CAPL-SD29-0711	CAPL-SD30-0711	CAPL-SD31-0711	CAPL-SD32-0711	CAPL-SD33-0711	CAPL-SD33P-0711	CAPL-SD34-0711	CAPL-SD35-0711	CAPL-SD36-0711	CAPL-SD37-0711
Sample Date			07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/27/11	07/28/11	07/28/11	07/27/11
Chemical Name														
Volatile Organic Compounds (µg/kg)														
2-Butanone	27,000,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	61,000,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	740,000	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	29,000,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	820,000	670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)														
2-Methylnaphthalene	230,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	3,500,000	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	3,500,000	160	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	17,000,000	57.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	1,200,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1,500	108	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	150	150	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	1,500	240	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	170	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	15,000	240	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	150,000	166	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	150	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	72,000	5,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	2,300,000	423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	2,300,000	77.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1,500	200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	38,000	176	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	204	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	1,700,000	195	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	22,000	4.88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	16,000	3.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	19,000	4.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	310	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	850	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	18,000	3.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	2,400	59.8	590	410	950	1,100	180	210	580	1,000	760	390	110	380
beta-BHC	3,000	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	3,000	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	330	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	370,000	2.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	370,000	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	370,000	5.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	18,000	2.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	18,000	2.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	18,000	2.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	5,600	2.37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	18,000	3.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	1,200	68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	590	2.47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	310,000	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD28		CAPL-SD29	CAPL-SD30	CAPL-SD31	CAPL-SD32	CAPL-SD33		CAPL-SD34	CAPL-SD35	CAPL-SD36	CAPL-SD37
Sample ID			CAPL-SD28-0711	CAPL-SD28P-0711	CAPL-SD29-0711	CAPL-SD30-0711	CAPL-SD31-0711	CAPL-SD32-0711	CAPL-SD33-0711	CAPL-SD33P-0711	CAPL-SD34-0711	CAPL-SD35-0711	CAPL-SD36-0711	CAPL-SD37-0711
Sample Date			07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/27/11	07/28/11	07/28/11	07/27/11
Chemical Name														
Explosives (µg/kg)														
1,3-Dinitrobenzene	6,200	6.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	36,000	92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	6,200	1,922	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	250,000	4,062	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	3,800,000	4.74	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	6,200	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	120,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg)														
Aluminum	77,000	25,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	31	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	6.7	9.79	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	15,000	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	160	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	70	0.99	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	3	43.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	23	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	3,100	31.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	21	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	55,000	20,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	4,000	35.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	1,800	460	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	23	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1,500	22.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	390	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	390	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	390	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	23,000	121	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)														
Zinc, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acid volatile sulfide, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
											NA	NA	NA	NA
Wet Chemistry														
pH (ph)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	--	--	87,000	NS	78,000	75,000	68,000	110,000	80,000	NS	78,000	110,000	64,000	72,000
Grain Size (pct)														
Coarse Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gravel (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD28		CAPL-SD29	CAPL-SD30	CAPL-SD31	CAPL-SD32	CAPL-SD33		CAPL-SD34	CAPL-SD35	CAPL-SD36	CAPL-SD37
Sample ID			CAPL-SD28-0711	CAPL-SD28P-0711	CAPL-SD29-0711	CAPL-SD30-0711	CAPL-SD31-0711	CAPL-SD32-0711	CAPL-SD33-0711	CAPL-SD33P-0711	CAPL-SD34-0711	CAPL-SD35-0711	CAPL-SD36-0711	CAPL-SD37-0711
Sample Date			07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/28/11	07/27/11	07/28/11	07/28/11	07/27/11
Chemical Name														
GRAINSIZE (PCT/P)														
GS03 Sieve 3" (75 mm)	--	--	100	NS	100	100	100	100	100	NS	100	100	100	100
GS05 Sieve 2" (50 mm)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	100	NS	100	100	100	100	100	NS	100	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	100	NS	100	100	100	100	100	NS	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	100	NS	100	100	100	99	100	NS	100	99	100	100
Sieve No. 004 (4.75 mm)	--	--	100	NS	100	100	100	96	100	NS	100	99	100	100
Sieve No. 008 (2.36 mm)			90	NS	94	89	92	87	92	NS	94	98	82	97
Sieve No. 010 (2.00 mm)	--	--	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Sieve No. 016 (1.18 mm)			58	NS	75	59	72	72	60	NS	66	88	50	75
Sieve No. 020 (850 um)	--	--	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Sieve No. 030 (600 um)			36	NS	52	38	54	57	35	NS	45	66	31	50
Sieve No. 040 (425 um)	--	--	30.0	NS	44.0	32.0	48.0	50.0	28.0	NS	38.0	57.0	26.0	42.0
Sieve No. 050 (300 um)			25.0	NS	36.0	27.0	43.0	41.0	22.0	NS	33.0	47.0	21.0	34.0
Sieve No. 060 (250 um)	--	--	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Sieve No. 080 (180 um)	--	--	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Sieve No. 100 (150 um)	--	--	18.0	NS	28.0	20.0	25.0	20.0	14.0	NS	24.0	29.0	14.0	26.0
Sieve No. 200 (75 um)	--	--	11.0	NS	18.0	12.0	14.0	7.0	8.5	NS	15.0	17.0	8.4	14.0

Notes:

Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted

Shading indicates exceedance of CAX Freshwater SD ESV

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

NA - Not analyzed

[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek

[2]Exceeding quality control criteria are associated with the reported result (unvalidated data)

B - Analyte not detected above the level reported in blanks

D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)

mg/kg - Milligrams per kilogram

pct - Percent

pct/p - Percent passed

ph - pH units

µg/kg - Micrograms per kilogram

µmol/g - Micromoles per gram

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD38		CAPL-SD39	CAPL-SD40	CAPL-SD41	CAPL-SD42	CAPL-SD43	CAPL-SD44	CAPL-SD45	CAPL-SD46	CAPL-SD47	CAPL-SD48
Sample ID			CAPL-SD38-0711	CAPL-SD38P-0711	CAPL-SD39-0711	CAPL-SD40-0711	CAPL-SD41-0711	CAPL-SD42-0711	CAPL-SD43-0711	CAPL-SD44-0711	CAPL-SD45-0711	CAPL-SD46-0711	CAPL-SD47-0711	CAPL-SD48-0711
Sample Date			07/27/11	07/27/11	07/27/11	07/27/11	07/28/11	07/27/11	07/28/11	07/28/11	07/28/11	07/27/11	07/27/11	07/29/11
Chemical Name														
Volatile Organic Compounds (µg/kg)														
2-Butanone	27,000,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	61,000,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	740,000	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	29,000,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	820,000	670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)														
2-Methylnaphthalene	230,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	3,500,000	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	3,500,000	160	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	17,000,000	57.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	1,200,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1,500	108	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	150	150	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	1,500	240	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	170	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	15,000	240	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	150,000	166	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	150	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	72,000	5,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	2,300,000	423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	2,300,000	77.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1,500	200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	38,000	176	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	204	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	1,700,000	195	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	22,000	4.88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	16,000	3.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	19,000	4.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	310	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	850	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	18,000	3.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	2,400	59.8	41 J	91 J	220	95	430	230	110	410	130	390	200	23 J
beta-BHC	3,000	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	3,000	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	330	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	370,000	2.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	370,000	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	370,000	5.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	18,000	2.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	18,000	2.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	18,000	2.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	5,600	2.37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	18,000	3.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	1,200	68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	590	2.47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	310,000	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD38		CAPL-SD39	CAPL-SD40	CAPL-SD41	CAPL-SD42	CAPL-SD43	CAPL-SD44	CAPL-SD45	CAPL-SD46	CAPL-SD47	CAPL-SD48
Sample ID			CAPL-SD38-0711	CAPL-SD38P-0711	CAPL-SD39-0711	CAPL-SD40-0711	CAPL-SD41-0711	CAPL-SD42-0711	CAPL-SD43-0711	CAPL-SD44-0711	CAPL-SD45-0711	CAPL-SD46-0711	CAPL-SD47-0711	CAPL-SD48-0711
Sample Date			07/27/11	07/27/11	07/27/11	07/27/11	07/28/11	07/27/11	07/28/11	07/28/11	07/28/11	07/27/11	07/27/11	07/29/11
Chemical Name														
Explosives (µg/kg)														
1,3-Dinitrobenzene	6,200	6.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	36,000	92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	6,200	1,922	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	250,000	4,062	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	3,800,000	4.74	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	6,200	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	120,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg)														
Aluminum	77,000	25,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	31	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	6.7	9.79	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	15,000	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	160	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	70	0.99	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	3	43.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	23	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	3,100	31.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	21	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	55,000	20,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	4,000	35.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	1,800	460	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	23	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1,500	22.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	390	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	390	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	390	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	23,000	121	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)														
Zinc, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acid volatile sulfide, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
			NA	NA	NA	NA	NA	NA	NA					
Wet Chemistry														
pH (ph)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	--	--	85,000	NS	68,000	47,000	81,000	80,000	150,000	130,000	5,500	80,000	100,000	8,200
Grain Size (pct)														
Coarse Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gravel (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD38		CAPL-SD39	CAPL-SD40	CAPL-SD41	CAPL-SD42	CAPL-SD43	CAPL-SD44	CAPL-SD45	CAPL-SD46	CAPL-SD47	CAPL-SD48
Sample ID			CAPL-SD38-0711	CAPL-SD38P-0711	CAPL-SD39-0711	CAPL-SD40-0711	CAPL-SD41-0711	CAPL-SD42-0711	CAPL-SD43-0711	CAPL-SD44-0711	CAPL-SD45-0711	CAPL-SD46-0711	CAPL-SD47-0711	CAPL-SD48-0711
Sample Date			07/27/11	07/27/11	07/27/11	07/27/11	07/28/11	07/27/11	07/28/11	07/28/11	07/28/11	07/27/11	07/27/11	07/29/11
Chemical Name														
GRAINSIZE (PCT/P)														
GS03 Sieve 3" (75 mm)	--	--	100	NS	100	100	100	100	100	100	100	100	100	100
GS05 Sieve 2" (50 mm)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	100	NS	100	100	100	100	100	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	99	NS	100	100	100	100	100	100	99	100	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	79	NS	100	100	100	100	97	100	99	100	100	100
Sieve No. 004 (4.75 mm)	--	--	69	NS	99	100	100	100	89	88	98	100	100	98
Sieve No. 008 (2.36 mm)			57	NS	96	96	87	84	72	40	97	86	96	95
Sieve No. 010 (2.00 mm)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 016 (1.18 mm)			47	NS	90	83	56	53	51	21	92	54	72	92
Sieve No. 020 (850 um)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 030 (600 um)			39	NS	84	70	35	34	34	11	75	35	49	72
Sieve No. 040 (425 um)	--	--	36.0	NS	79.0	65.0	29.0	28.0	29.0	8.4	58.0	29.0	42.0	50.0
Sieve No. 050 (300 um)			33.0	NS	70.0	60.0	24.0	24.0	23.0	6.2	39.0	24.0	36.0	29.0
Sieve No. 060 (250 um)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 080 (180 um)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	23.0	NS	62.0	44.0	17.0	18.0	13.0	3.3	19.0	18.0	28.0	12.0
Sieve No. 200 (75 um)	--	--	12.0	NS	46.0	23.0	11.0	9.4	5.8	1.4	6.4	11.0	18.0	4.5

Notes:

Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted

Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek
[2]Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD49	CAPL-SD50		CAPL-SD51	CAPL-SD52	CAPL-SD53	CAPL-SD54	CAPL-SD55	CAPL-SD56	CAPL-SD57	CAPL-SD58	
Sample ID			CAPL-SD49-0711	CAPL-SD50-0711	CAPL-SD50P-0711	CAPL-SD51-0711	CAPL-SD52-0711	CAPL-SD53-0711	CAPL-SD54-0711	CAPL-SD55-0711	CAPL-SD56-0711	CAPL-SD57-0711	CAPL-SD58-0711	CAPL-SD58P-0711
Sample Date			07/29/11	07/29/11	07/29/11	07/29/11	07/29/11	07/29/11	07/27/11	07/27/11	07/27/11	07/27/11	07/29/11	07/29/11
Chemical Name														
Volatile Organic Compounds (µg/kg)														
2-Butanone	27,000,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	61,000,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	740,000	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	29,000,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	820,000	670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)														
2-Methylnaphthalene	230,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	3,500,000	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	3,500,000	160	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	17,000,000	57.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	1,200,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1,500	108	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	150	150	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	1,500	240	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	170	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	15,000	240	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	150,000	166	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	150	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	72,000	5,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	2,300,000	423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	2,300,000	77.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1,500	200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	38,000	176	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	204	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	1,700,000	195	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	22,000	4.88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	16,000	3.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	19,000	4.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	310	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	850	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	18,000	3.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	2,400	59.8	270	540	440	250	400	180	230	39	280	48 J	170	240
beta-BHC	3,000	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	3,000	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	330	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	370,000	2.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	370,000	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	370,000	5.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	18,000	2.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	18,000	2.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	18,000	2.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	5,600	2.37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	18,000	3.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	1,200	68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	590	2.47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	310,000	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD49	CAPL-SD50		CAPL-SD51	CAPL-SD52	CAPL-SD53	CAPL-SD54	CAPL-SD55	CAPL-SD56	CAPL-SD57	CAPL-SD58	
Sample ID			CAPL-SD49-0711	CAPL-SD50-0711	CAPL-SD50P-0711	CAPL-SD51-0711	CAPL-SD52-0711	CAPL-SD53-0711	CAPL-SD54-0711	CAPL-SD55-0711	CAPL-SD56-0711	CAPL-SD57-0711	CAPL-SD58-0711	CAPL-SD58P-0711
Sample Date			07/29/11	07/29/11	07/29/11	07/29/11	07/29/11	07/29/11	07/27/11	07/27/11	07/27/11	07/27/11	07/29/11	07/29/11
Chemical Name														
Explosives (µg/kg)														
1,3-Dinitrobenzene	6,200	6.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	36,000	92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	6,200	1,922	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	250,000	4,062	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	3,800,000	4.74	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	6,200	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	120,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg)														
Aluminum	77,000	25,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	31	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	6.7	9.79	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	15,000	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	160	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	70	0.99	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	3	43.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	23	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	3,100	31.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	21	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	55,000	20,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	4,000	35.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	1,800	460	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	23	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1,500	22.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	390	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	390	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	390	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	23,000	121	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)														
Zinc, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acid volatile sulfide, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, SEM	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry														
pH (ph)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	--	--	130,000	66,000	NS	70,000	58,000	63,000	83,000	19,000	84,000	35,000	74,000	NS
Grain Size (pct)														
Coarse Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gravel (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand (%)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
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Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD49	CAPL-SD50		CAPL-SD51	CAPL-SD52	CAPL-SD53	CAPL-SD54	CAPL-SD55	CAPL-SD56	CAPL-SD57	CAPL-SD58	
Sample ID			CAPL-SD49-0711	CAPL-SD50-0711	CAPL-SD50P-0711	CAPL-SD51-0711	CAPL-SD52-0711	CAPL-SD53-0711	CAPL-SD54-0711	CAPL-SD55-0711	CAPL-SD56-0711	CAPL-SD57-0711	CAPL-SD58-0711	CAPL-SD58P-0711
Sample Date			07/29/11	07/29/11	07/29/11	07/29/11	07/29/11	07/29/11	07/27/11	07/27/11	07/27/11	07/27/11	07/29/11	07/29/11
Chemical Name														
GRAINSIZE (PCT/P)														
GS03 Sieve 3" (75 mm)	--	--	100	100	NS	100	100	100	100	100	100	100	100	NS
GS05 Sieve 2" (50 mm)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	100	100	NS	100	100	100	100	100	100	100	100	NS
GS07 Sieve 1" (25.0 mm)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	100	100	NS	100	100	100	100	100	100	100	100	NS
GS10 Sieve 0.375" (9.5 mm)	--	--	100	100	NS	100	100	100	100	100	100	100	100	NS
Sieve No. 004 (4.75 mm)	--	--	100	100	NS	100	100	100	99	100	100	99	100	NS
Sieve No. 008 (2.36 mm)			97	97	NS	98	96	98	95	99	96	97	93	NS
Sieve No. 010 (2.00 mm)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 016 (1.18 mm)			83	85	NS	82	75	85	81	96	82	93	67	NS
Sieve No. 020 (850 um)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 030 (600 um)			64	68	NS	55	54	67	59	88	62	82	49	NS
Sieve No. 040 (425 um)	--	--	55.0	60.0	NS	46.0	47.0	59.0	51.0	79.0	53.0	68	43	NS
Sieve No. 050 (300 um)			47.0	52.0	NS	38.0	40.0	52.0	43.0	59.0	46.0	46	38	NS
Sieve No. 060 (250 um)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 080 (180 um)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	34.0	41.0	NS	28.0	31.0	40.0	32.0	18.0	36.0	14	29	NS
Sieve No. 200 (75 um)	--	--	18.0	26.0	NS	18.0	20.0	22.0	20.0	5.5	22.0	4.6	18	NS

Notes:

Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted

Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek
[2]Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD59	CAPL-SD60	CAPL-SD61	CAPL-SD70		CAPL-SD71		CAPL-SD72	
Sample ID			CAPL-SD59-0711	CAPL-SD60-0711	CAPL-SD61-0811	CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V
Sample Date			07/27/11	07/29/11	08/02/11	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/25/12
Chemical Name											
Volatile Organic Compounds (µg/kg)											
2-Butanone	27,000,000	--	NA	NA	NA	NA	125	NA	131	NA	50.6 J
Acetone	61,000,000	--	NA	NA	NA	NA	330 J	NA	477 J	NA	181 J
Carbon disulfide	740,000	0.85	NA	NA	NA	NA	4.41 J	NA	13.6 J	NA	26.7 J
Methyl acetate	29,000,000	--	NA	NA	NA	NA	13.3 U	NA	30 U	NA	32.3 U
Methylcyclohexane	--	--	NA	NA	NA	NA	6.64 U	NA	15 U	NA	16.2 U
Toluene	820,000	670	NA	NA	NA	NA	6.64 U	NA	15 U	NA	16.2 U
Semivolatile Organic Compounds (µg/kg)											
2-Methylnaphthalene	230,000	--	NA	NA	NA	47.3 U	NA	15.4 U	NA	27.2 U	NA
Acenaphthene	3,500,000	290	NA	NA	NA	140	NA	15.4 U	NA	27.2 U	NA
Acenaphthylene	3,500,000	160	NA	NA	NA	47.3 U	NA	15.4 U	NA	27.2 U	NA
Anthracene	17,000,000	57.2	NA	NA	NA	47.3 U	NA	15.4 U	NA	27.2 U	NA
Benzaldehyde	1,200,000	--	NA	NA	NA	323 J	NA	771 U	NA	1,370 U	NA
Benzo(a)anthracene	1,500	108	NA	NA	NA	47.3 U	NA	15.4 U	NA	27.2 U	NA
Benzo(a)pyrene	150	150	NA	NA	NA	79.3 J	NA	15.4 U	NA	27.2 U	NA
Benzo(b)fluoranthene	1,500	240	NA	NA	NA	143	NA	20.5 J	NA	27.2 U	NA
Benzo(g,h,i)perylene	--	170	NA	NA	NA	47.3 U	NA	15.4 U	NA	27.2 U	NA
Benzo(k)fluoranthene	15,000	240	NA	NA	NA	94.6 J	NA	15.4 U	NA	27.2 U	NA
Chrysene	150,000	166	NA	NA	NA	173	NA	15.4 U	NA	27.2 U	NA
Dibenz(a,h)anthracene	150	33	NA	NA	NA	47.3 U	NA	15.4 U	NA	27.2 U	NA
Dibenzofuran	72,000	5,100	NA	NA	NA	474 U	NA	771 U	NA	1,370 U	NA
Fluoranthene	2,300,000	423	NA	NA	NA	227	NA	32.5	NA	27.2 U	NA
Fluorene	2,300,000	77.4	NA	NA	NA	70.7 J	NA	15.4 U	NA	27.2 U	NA
Indeno(1,2,3-cd)pyrene	1,500	200	NA	NA	NA	66 J	NA	15.4 U	NA	27.2 U	NA
Naphthalene	38,000	176	NA	NA	NA	47.3 U	NA	15.4 U	NA	27.2 U	NA
Phenanthrene	--	204	NA	NA	NA	138	NA	16.3 J	NA	27.2 U	NA
Pyrene	1,700,000	195	NA	NA	NA	216	NA	29.6 J	NA	27.2 U	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)											
4,4'-DDD	22,000	4.88	NA	NA	NA	43.9 J	NA	1.52 J	NA	2.79 U	NA
4,4'-DDE	16,000	3.16	NA	NA	NA	121 J	NA	7.95 J	NA	6.03 J	NA
4,4'-DDT	19,000	4.16	NA	NA	NA	21 J	NA	1.51 UL	NA	2.79 U	NA
Aldrin	310	2	NA	NA	NA	0.954 UL	NA	1.51 UL	NA	2.79 U	NA
alpha-BHC	850	6	NA	NA	NA	0.954 UL	NA	1.51 UL	NA	2.79 U	NA
alpha-Chlordane	18,000	3.24	NA	NA	NA	29.6 L	NA	1.51 UL	NA	2.79 U	NA
Aroclor-1260	2,400	59.8	410	810	40	**8,240**	NA	57.4 J	NA	68.2 U	NA
beta-BHC	3,000	5	NA	NA	NA	0.98 J	NA	1.51 UL	NA	2.79 U	NA
delta-BHC	3,000	3	NA	NA	NA	0.954 UL	NA	1.51 U	NA	2.79 U	NA
Dieldrin	330	1.9	NA	NA	NA	106 J	NA	1.68 J	NA	2.86 J	NA
Endosulfan I	370,000	2.9	NA	NA	NA	0.954 UL	NA	1.51 UL	NA	2.79 U	NA
Endosulfan II	370,000	14	NA	NA	NA	0.954 UL	NA	1.51 UL	NA	2.79 U	NA
Endosulfan sulfate	370,000	5.4	NA	NA	NA	0.954 UL	NA	2.36 J	NA	2.79 U	NA
Endrin	18,000	2.22	NA	NA	NA	0.954 UL	NA	1.51 UL	NA	2.79 U	NA
Endrin aldehyde	18,000	2.22	NA	NA	NA	16.4 J	NA	2.38 J	NA	3.95 J	NA
Endrin ketone	18,000	2.22	NA	NA	NA	34.7 J	NA	4.31 J	NA	4.6 J	NA
gamma-BHC (Lindane)	5,600	2.37	NA	NA	NA	0.954 UL	NA	1.51 UL	NA	2.79 U	NA
gamma-Chlordane	18,000	3.24	NA	NA	NA	94.2 J	NA	5.18 J	NA	17 J	NA
Heptachlor	1,200	68	NA	NA	NA	0.954 UL	NA	1.51 U	NA	2.79 U	NA
Heptachlor epoxide	590	2.47	NA	NA	NA	2.42 J	NA	1.51 U	NA	2.79 U	NA
Methoxychlor	310,000	19	NA	NA	NA	82.2 J	NA	1.51 UL	NA	2.79 U	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD59	CAPL-SD60	CAPL-SD61	CAPL-SD70		CAPL-SD71		CAPL-SD72	
Sample ID			CAPL-SD59-0711	CAPL-SD60-0711	CAPL-SD61-0811	CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V
Sample Date			07/27/11	07/29/11	08/02/11	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/25/12
Chemical Name											
Explosives (µg/kg)											
1,3-Dinitrobenzene	6,200	6.7	NA	NA	NA	189 U	NA	195 U	NA	196 U	NA
2,4,6-Trinitrotoluene	36,000	92	NA	NA	NA	189 U	NA	195 U	NA	196 U	NA
3-Nitrotoluene	6,200	1,922	NA	NA	NA	189 U	NA	195 U	NA	196 U	NA
4-Nitrotoluene	250,000	4,062	NA	NA	NA	189 U	NA	195 U	NA	196 U	NA
HMX	3,800,000	4.74	NA	NA	NA	189 U	NA	195 U	NA	196 U	NA
Nitroglycerin	6,200	--	NA	NA	NA	472 U	NA	1,210 J	NA	490 U	NA
Tetryl	120,000	--	NA	NA	NA	189 U	NA	195 U	NA	196 U	NA
Total Metals (mg/kg)											
Aluminum	77,000	25,500	NA	NA	NA	8,670	NA	18,300	NA	28,200	NA
Antimony	31	3	NA	NA	NA	6.01 U	NA	9.2 U	NA	17.2 U	NA
Arsenic	6.7	9.79	NA	NA	NA	**12.7**	NA	**33.9**	NA	**51.5**	NA
Barium	15,000	20	NA	NA	NA	43	NA	72.6	NA	107	NA
Beryllium	160	--	NA	NA	NA	1.5 U	NA	2.3 U	NA	4.3 U	NA
Cadmium	70	0.99	NA	NA	NA	1.5 U	NA	2.3 U	NA	4.3 U	NA
Calcium	--	--	NA	NA	NA	32,700	NA	102,000	NA	122,000	NA
Chromium	3	43.4	NA	NA	NA	**19.4**	NA	**36.6**	NA	**50.4**	NA
Cobalt	23	50	NA	NA	NA	7.51 U	NA	11.5 U	NA	21.5 U	NA
Copper	3,100	31.6	NA	NA	NA	33	NA	43.1	NA	40.2	NA
Cyanide	21	--	NA	NA	NA	0.682 U	NA	1.05 U	NA	2.26 U	NA
Iron	55,000	20,000	NA	NA	NA	21,900	NA	30,100	NA	41,300	NA
Lead	4,000	35.8	NA	NA	NA	66.8	NA	72.8	NA	69.2	NA
Magnesium	--	--	NA	NA	NA	2,100 J	NA	2,900 J	NA	4,320 J	NA
Manganese	1,800	460	NA	NA	NA	102	NA	119	NA	206	NA
Mercury	23	0.18	NA	NA	NA	0.11	NA	0.134 J	NA	0.198 J	NA
Nickel	1,500	22.7	NA	NA	NA	11.7	NA	11.9	NA	18.1 J	NA
Potassium	--	--	NA	NA	NA	1,480 J	NA	2,400 J	NA	3,570 J	NA
Selenium	390	2	NA	NA	NA	3.75 U	NA	5.75 U	NA	10.7 U	NA
Silver	390	1	NA	NA	NA	1.5 U	NA	2.3 U	NA	4.3 U	NA
Sodium	--	--	NA	NA	NA	2,250 U	NA	3,450 U	NA	6,450 U	NA
Vanadium	390	--	NA	NA	NA	25.4	NA	46.3	NA	69.9	NA
Zinc	23,000	121	NA	NA	NA	190	NA	173	NA	186	NA
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)											
Zinc, SEM	--	--	NA	NA	NA	2.64	NA	1.66 D	NA	1.22	NA
Acid volatile sulfide, SEM	--	--	NA	NA	NA	10.3	NA	13.7	NA	14.4	NA
Cadmium, SEM	--	--	NA	NA	NA	0.00566	NA	0.00245 J	NA	0.00191 J	NA
Copper, SEM	--	--	NA	NA	NA	0.112	NA	0.0751	NA	0.159	NA
Lead, SEM	--	--	NA	NA	NA	0.324	NA	0.246 D	NA	0.162	NA
Nickel, SEM	--	--	NA	NA	NA	0.103	NA	0.0307 J	NA	0.0266 J	NA
Wet Chemistry											
pH (ph)	--	--	NA	NA	NA	7.47 H3	NA	6.85 H3	NA	6.93 H3	NA
Total organic carbon (TOC) (mg/kg)	--	--	98,000	78,000	15,000	98,300	NA	51,800	NA	107,000	NA
Grain Size (pct)											
Coarse Sand (%)	--	--	NA	NA	NA	2.3	NA	0	NA	1.8	NA
Fine Sand (%)	--	--	NA	NA	NA	42.5	NA	7.4	NA	14.2	NA
Fines (%)	--	--	NA	NA	NA	46.7	NA	92.2	NA	79.7	NA
Gravel (%)	--	--	NA	NA	NA	1.9	NA	0	NA	1.1	NA
Medium Sand (%)	--	--	NA	NA	NA	6.6	NA	0.4	NA	3.2	NA
Sand (%)	--	--	NA	NA	NA	51.4	NA	7.8	NA	19.2	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD59	CAPL-SD60	CAPL-SD61	CAPL-SD70		CAPL-SD71		CAPL-SD72	
Sample ID			CAPL-SD59-0711	CAPL-SD60-0711	CAPL-SD61-0811	CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V
Sample Date			07/27/11	07/29/11	08/02/11	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/25/12
Chemical Name											
GRAINSIZE (PCT/P)											
GS03 Sieve 3" (75 mm)	--	--	100	100	100	100	NA	100	NA	100	NA
GS05 Sieve 2" (50 mm)	--	--	NA	NA	NA	100	NA	100	NA	100	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	100	100	100	100	NA	100	NA	100	NA
GS07 Sieve 1" (25.0 mm)	--	--	NA	NA	NA	100	NA	100	NA	100	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	100	100	100	100	NA	100	NA	100	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	100	100	100	100	NA	100	NA	100	NA
Sieve No. 004 (4.75 mm)	--	--	100	99	99	98.1	NA	100	NA	98.9	NA
Sieve No. 008 (2.36 mm)			94	85	98	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	NA	NA	NA	95.8	NA	100	NA	97.1	NA
Sieve No. 016 (1.18 mm)			69	60	96	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	NA	NA	NA	94.3	NA	99.9	NA	96.1	NA
Sieve No. 030 (600 um)			46	45	90	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	39	39	83	89.2	NA	99.6	NA	93.9	NA
Sieve No. 050 (300 um)			33	34	50	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	NA	NA	NA	66.2	NA	98.5	NA	90.6	NA
Sieve No. 080 (180 um)	--	--	NA	NA	NA	54.9	NA	97	NA	88.1	NA
Sieve No. 100 (150 um)	--	--	25	26	17	52.2	NA	95.9	NA	86.2	NA
Sieve No. 200 (75 um)	--	--	16	17	5.8	46.7	NA	92.2	NA	79.7	NA

Notes:

Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted

Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek
[2]Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD73				CAPL-SD74	CAPL-SD75	CAPL-SD76	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81
Sample ID			CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012	CAPL-SD75-1012	CAPL-SD76-1012	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012
Sample Date			10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12	10/16/12	10/25/12	10/16/12	10/16/12	10/16/12	10/16/12	10/18/12
Chemical Name																
Volatile Organic Compounds (µg/kg)																
2-Butanone	27,000,000	--	NA	NA	59.5 J	79.9	108	71.2	17.3 J	NA	42.7	23.1 J	23.8	39.7	42.7	42.2
Acetone	61,000,000	--	NA	NA	215 J	309 J	418 J	273 J	60.6	NA	137 J	77.5 J	85.3	121	150	229 J
Carbon disulfide	740,000	0.85	NA	NA	29.9 J	19 J	19.2 U	13.4 U	5.3 UJ	NA	6.19 U	5.21 UL	4.9 UJ	6.48 UJ	3.5 J	9.22 J
Methyl acetate	29,000,000	--	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 U	NA	12.4 U	10.4 UJ	5.12 J	8.47 J	10.1 U	19.8 U
Methylcyclohexane	--	--	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U	NA	26.4	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U
Toluene	820,000	670	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U
Semivolatile Organic Compounds (µg/kg)																
2-Methylnaphthalene	230,000	--	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U	34.2 J	NA	39.2 J	6.51 U	45.8 U	36.4 U	12.8 U
Acenaphthene	3,500,000	290	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U
Acenaphthylene	3,500,000	160	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U
Anthracene	17,000,000	57.2	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U
Benzaldehyde	1,200,000	--	811 U	852 U	NA	NA	1,070 U	833 U	184 J	421 U	NA	398 U	326 U	459 U	212 J	640 U
Benzo(a)anthracene	1,500	108	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U
Benzo(a)pyrene	150	150	16.2 U	17 U	NA	NA	21.2 U	16.6 U	36.9	42 U	NA	39.7 U	9.18 J	45.8 U	36.4 U	12.8 U
Benzo(b)fluoranthene	1,500	240	19.1 J	17 U	NA	NA	23.3 J	16.6 U	34.9	42 U	NA	39.7 U	10.5 J	45.8 U	36.4 U	17.9 J
Benzo(g,h,i)perylene	--	170	16.2 U	17 U	NA	NA	21.2 U	16.6 U	29.9	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U
Benzo(k)fluoranthene	15,000	240	16.2 U	17 U	NA	NA	21.2 U	16.6 U	28.3	42 U	NA	39.7 U	8.89 J	45.8 U	36.4 U	12.8 U
Chrysene	150,000	166	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U	42 U	NA	57.2 J	6.51 U	45.8 U	36.4 U	12.8 U
Dibenz(a,h)anthracene	150	33	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U
Dibenzofuran	72,000	5,100	811 U	852 U	NA	NA	1,070 U	833 U	337 U	421 U	NA	398 U	326 U	459 U	365 U	640 U
Fluoranthene	2,300,000	423	22.4 J	17 U	NA	NA	34.9 J	13.4 J	48.2	27 J	NA	36.8 J	22.4	36.4 J	33 J	18.5 J
Fluorene	2,300,000	77.4	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U
Indeno(1,2,3-cd)pyrene	1,500	200	16.2 U	17 U	NA	NA	21.2 U	16.6 U	23.2	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U
Naphthalene	38,000	176	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U	42 U	NA	24.4 J	6.51 U	34.5 J	36.4 U	12.8 U
Phenanthrene	--	204	16.2 U	17 U	NA	NA	22.5 J	16.6 U	30.5	53.1 J	NA	35.5 J	6.51 U	45.8 U	37 J	13.9 J
Pyrene	1,700,000	195	23.7 J	17 U	NA	NA	32.4 J	12.2 J	53.3	23.2 J	NA	41.4 J	22.2	34.5 J	44.3 J	14.6 J
Pesticide/Polychlorinated Biphenyls (µg/kg)																
4,4'-DDD	22,000	4.88	1.66 J	1.23 J	NA	NA	2.13 U	1.67 U	23.3 J	2.64 L	NA	10.3 J	1.69 L	3.47 J	1.39 L	1.31 U
4,4'-DDE	16,000	3.16	14 J	10.1 J	NA	NA	5.19 J	4.58 J	45.9 J	46.5 J	NA	12.6	13.6 J	23.6 J	21.5	1.22 J
4,4'-DDT	19,000	4.16	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.966 J	3.61 J	NA	0.932 J	1.14 J	1.12 J	0.696 J	1.31 U
Aldrin	310	2	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U	0.83 U	NA	0.8 UL	0.66 U	0.328 J	0.505 L	1.31 U
alpha-BHC	850	6	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U	1.54 J	NA	0.536 J	0.66 U	0.912 U	0.585 L	1.31 U
alpha-Chlordane	18,000	3.24	1.97 J	1.73 U	NA	NA	2.13 U	1.67 U	0.69 UL	9.57 L	NA	0.8 UL	0.914 J	0.302 J	0.715 U	1.31 U
Aroclor-1260	2,400	59.8	78.5 J	48.4 J	NA	NA	52.3 U	25.9 J	37.3 J	720 J	NA	66.1 L	212 J	354 J	156	32 U
beta-BHC	3,000	5	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U	0.287 L	NA	0.8 UL	0.66 U	0.912 U	0.744 L	1.31 U
delta-BHC	3,000	3	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 UL	1.14 J	NA	0.8 U	1.5 J	0.912 U	0.503 J	1.31 U
Dieldrin	330	1.9	2.64 J	1.48 J	NA	NA	2.13 U	1.67 U	0.377 L	15.1 J	NA	0.8 U	4.13 J	6.63 J	2.42 L	1.31 U
Endosulfan I	370,000	2.9	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U	0.83 U	NA	0.8 U	0.66 U	0.912 U	0.715 UL	1.31 U
Endosulfan II	370,000	14	1.64 U	1.73 U	NA	NA	2.13 U	23.8 J	0.69 UL	1.41 L	NA	0.8 U	2.25 J	3.37 J	1.36 J	1.31 U
Endosulfan sulfate	370,000	5.4	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U	12.8 J	NA	22.8 K	4.47 J	6.65 J	0.715 U	1.31 U
Endrin	18,000	2.22	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.576 L	13.7	NA	1.14 L	3.07 L	5.37 J	0.715 UL	1.31 U
Endrin aldehyde	18,000	2.22	3.53 J	2.58 J	NA	NA	2.14 J	2.49 J	0.368 L	0.637 J	NA	0.8 UL	0.79 J	0.683 J	3.05 L	1.31 U
Endrin ketone	18,000	2.22	5.62 J	3.4 J	NA	NA	2.88 J	1.67 U	0.69 U	0.83 UL	NA	0.8 U	0.66 U	0.912 U	0.715 U	1.31 U
gamma-BHC (Lindane)	5,600	2.37	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.485 J	0.364 J	NA	1 J	0.573 J	0.744 J	0.715 U	1.31 U
gamma-Chlordane	18,000	3.24	1.8 J	2.98 J	NA	NA	12.7 J	3.09 J	4.03 L	35.9 J	NA	2.58	3.78 J	6.3 J	2.71	0.735 J
Heptachlor	1,200	68	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U	1.97 J	NA	0.9 L	0.66 U	0.744 J	0.715 UL	1.31 U
Heptachlor epoxide	590	2.47	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 UL	0.708 L	NA	0.8 UL	0.66 UL	0.912 U	0.715 UL	1.31 U
Methoxychlor	310,000	19	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 UL	0.83 UL	NA	4.11 J	0.66 UL	0.912 U	4.73 J	1.31 U

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD73				CAPL-SD74	CAPL-SD75	CAPL-SD76	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81
Sample ID			CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012	CAPL-SD75-1012	CAPL-SD76-1012	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012
Sample Date			10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12	10/16/12	10/25/12	10/16/12	10/16/12	10/16/12	10/16/12	10/18/12
Chemical Name																
Explosives (µg/kg)																
1,3-Dinitrobenzene	6,200	6.7	198 U	195 U	NA	NA	192 U	197 U	469 J	303 J	NA	151 J	179 U	384 J	200 U	190 U
2,4,6-Trinitrotoluene	36,000	92	198 U	195 U	NA	NA	192 U	197 U	194 U	198 U	NA	195 U	179 U	197 U	200 U	190 U
3-Nitrotoluene	6,200	1,922	198 U	195 U	NA	NA	192 U	197 U	882	198 U	NA	195 U	179 U	197 U	200 U	190 U
4-Nitrotoluene	250,000	4,062	198 U	104 J	NA	NA	192 U	330 J	194 U	198 U	NA	195 U	179 U	197 U	200 U	190 U
HMX	3,800,000	4.74	198 U	195 U	NA	NA	192 U	197 U	194 U	198 U	NA	195 U	179 U	464 J	200 U	190 U
Nitroglycerin	6,200	--	1,250 J	1,250	NA	NA	486 J	1,230 J	485 U	495 U	NA	488 U	448 U	493 U	500 U	476 U
Tetryl	120,000	--	198 U	195 U	NA	NA	192 U	197 U	245 J	198 U	NA	195 U	179 U	197 U	200 U	190 U
Total Metals (mg/kg)																
Aluminum	77,000	25,500	25,200	22,700	NA	NA	17,200	20,500	6,530	2,430	NA	4,040	2,630	3,200	5,770	26,000
Antimony	31	3	9.92 U	10.3 U	NA	NA	5.35 U	4.27 U	1.65 U	1.03 U	NA	0.952 UL	0.778 U	1.14 U	1.78 U	7.78 U
Arsenic	6.7	9.79	**51.7**	**50.9**	NA	NA	**42.4**	**47.3**	5.56	**9.1**	NA	5.53	**7.87**	**7.53**	**16.8**	**27.9**
Barium	15,000	20	93.9	85.5	NA	NA	75.4	88.3	28.1	12.9	NA	22.3	15.6	18.6	26.8	63.5
Beryllium	160	--	2.48 U	2.57 U	NA	NA	0.949 J	1 J	0.283 J	0.171 J	NA	0.253 J	0.181 J	0.214 J	0.306 J	1.15 J
Cadmium	70	0.99	2.48 U	2.57 U	NA	NA	1.34 U	1.07 U	0.414 U	0.144 J	NA	0.242 J	0.136 J	0.157 J	0.456 J	1.95 U
Calcium	--	--	88,800	89,300	NA	NA	80,400	104,000	2,870	2,560	NA	4,310	3,380	3,720	23,100	18,700
Chromium	3	43.4	**46.3**	**43.1**	NA	NA	**36.1**	**38.7**	**9**	**5.73**	NA	**8.21**	**5.31**	**5.91**	**9.76**	**45.6 J**
Cobalt	23	50	12.4 U	12.8 U	NA	NA	4.99 J	5.77 J	1.46 J	1.71	NA	1.83	1.15 J	1.43 J	1.6 J	8.67 J
Copper	3,100	31.6	50.1	43.7	NA	NA	46	56.9	4.7	4.63	NA	6.98	3.81	4.54	14.1	25.8
Cyanide	21	--	1.27 U	1.24 U	NA	NA	1.66 U	1.18 U	0.522 U	0.641 U	NA	0.56 U	4.86	0.672 U	0.516 U	0.922 U
Iron	55,000	20,000	39,300	36,000	NA	NA	34,900	34,000	5,960	4,360	NA	7,870	4,300	4,900	7,790	36,600
Lead	4,000	35.8	81.6	74.7	NA	NA	56.2	69.3	16.3	15.2	NA	19.8	11.6	13.2	23	30.4
Magnesium	--	--	3,820 J	3,440 J	NA	NA	2,800 J	3,270	531 J	337 J	NA	556 J	328 J	377 J	803 J	4,270 J
Manganese	1,800	460	163	147	NA	NA	163	143	25.4	14.6	NA	14.9	13.4	15.5	40.2	199
Mercury	23	0.18	0.147 J	0.164 J	NA	NA	0.126 J	0.136 J	0.0408 J	0.0656 J	NA	0.0413 J	0.0476 J	0.0733 J	0.0641 J	0.103 J
Nickel	1,500	22.7	15.4	14.4	NA	NA	13	14.8	3.63	2.17	NA	3.06	1.99	2.31	3.72	18.4
Potassium	--	--	3,070 J	2,770 J	NA	NA	2,390 J	2,570 J	397 J	384 J	NA	724 L	343 J	409 J	663 J	3,220 J
Selenium	390	2	6.2 U	6.42 U	NA	NA	3.34 U	2.67 U	1.03 U	0.644 U	NA	0.53 J	0.486 U	0.71 U	1.11 U	4.86 U
Silver	390	1	2.48 U	2.57 U	NA	NA	1.34 U	1.07 U	0.414 U	0.258 U	NA	0.238 U	0.194 U	0.284 U	0.446 U	1.95 U
Sodium	--	--	3,720 U	3,850 U	NA	NA	2,010 U	755 J	621 U	386 U	NA	357 U	292 U	426 U	668 U	2,920 U
Vanadium	390	--	58.3	57.1	NA	NA	52.1	55.5	15	7.66	NA	12.2	7.34	7.96	13.7	58.5
Zinc	23,000	121	173	160	NA	NA	133	148	18.7	48.6	NA	83.1 L	33.5	37	70	89.5
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)																
Zinc, SEM	--	--	1.54 D	NA	NA	NA	1.08	0.377 D	0.0847	0.597	NA	0.859	0.385	NA	0.764	0.53
Acid volatile sulfide, SEM	--	--	12.8	NA	NA	NA	19.8	4.16	0.411	4.96	NA	0.484 J	3.42	NA	5.52	5.47
Cadmium, SEM	--	--	0.00176 J	NA	NA	NA	0.00246 J	4.06E-04 J	8.24E-04 U	0.00119 J	NA	0.00218 J	0.0013 J	NA	0.00383	0.00184 U
Copper, SEM	--	--	0.303	NA	NA	NA	0.246	0.103	0.0079 J	0.0193 J	NA	0.0618	0.0117 J	NA	0.0865	0.0261 J
Lead, SEM	--	--	0.279 D	NA	NA	NA	0.18	0.0722 D	0.0256	0.0832	NA	0.0796	0.0405	NA	0.0882	0.0617
Nickel, SEM	--	--	0.0361 J	NA	NA	NA	0.0364 J	0.00837 J	0.00343 J	0.0116 J	NA	0.015 J	0.0071 J	NA	0.00828 J	0.0142 J
Wet Chemistry																
pH (ph)	--	--	7.01 H3	NA	NA	NA	7.3 H3	7.34 H3	6.83 H3	6.71 H3	NA	6.9 H3	6.98 H3	NA	7.29 H3	7.19 H3
Total organic carbon (TOC) (mg/kg)	--	--	37,100	NA	NA	NA	79,300	84,300	51,400	91,100	NA	71,500	68,400	NA	69,200	108,000
Grain Size (pct)																
Coarse Sand (%)	--	--	0	NA	NA	NA	0	0	4	2.9	NA	5.1	2.2	NA	1	0
Fine Sand (%)	--	--	3.1	NA	NA	NA	5	4	75	56.3	NA	73.8	77.8	NA	51.2	3.7
Fines (%)	--	--	96.6	NA	NA	NA	94.6	95.8	12.4	26	NA	10.6	11.1	NA	40.6	95.9
Gravel (%)	--	--	0	NA	NA	NA	0	0	0.9	1.7	NA	2.3	0.3	NA	0.3	0
Medium Sand (%)	--	--	0.3	NA	NA	NA	0.4	0.2	7.7	13.1	NA	8.2	8.6	NA	6.9	0.4
Sand (%)	--	--	3.4	NA	NA	NA	5.4	4.2	86.7	72.3	NA	87.1	88.6	NA	59.1	4.1

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD73				CAPL-SD74	CAPL-SD75	CAPL-SD76	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81
Sample ID			CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012	CAPL-SD75-1012	CAPL-SD76-1012	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012
Sample Date			10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12	10/16/12	10/25/12	10/16/12	10/16/12	10/16/12	10/16/12	10/18/12
Chemical Name																
GRAINSIZE (PCT/P)																
GS03 Sieve 3" (75 mm)	--	--	100	NA	NA	NA	100	100	100	100	NA	100	100	NA	100	100
GS05 Sieve 2" (50 mm)	--	--	100	NA	NA	NA	100	100	100	100	NA	100	100	NA	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	100	NA	NA	NA	100	100	100	100	NA	100	100	NA	100	100
GS07 Sieve 1" (25.0 mm)	--	--	100	NA	NA	NA	100	100	100	100	NA	100	100	NA	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	100	NA	NA	NA	100	100	100	100	NA	100	100	NA	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	100	NA	NA	NA	100	100	100	100	NA	98.7	100	NA	100	100
Sieve No. 004 (4.75 mm)	--	--	100	NA	NA	NA	100	100	99.1	98.3	NA	97.7	99.7	NA	99.7	100
Sieve No. 008 (2.36 mm)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	100	NA	NA	NA	100	100	95.1	95.4	NA	92.6	97.5	NA	98.7	100
Sieve No. 016 (1.18 mm)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	99.9	NA	NA	NA	100	100	93.6	92.2	NA	91.2	96.4	NA	97.2	100
Sieve No. 030 (600 um)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	99.7	NA	NA	NA	99.6	99.8	87.4	82.3	NA	84.4	88.9	NA	91.8	99.6
Sieve No. 050 (300 um)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	99.3	NA	NA	NA	98.8	99.4	57.1	53.6	NA	57.8	57.1	NA	75	98.7
Sieve No. 080 (180 um)	--	--	98.9	NA	NA	NA	98.1	99	31.9	36.7	NA	35	31.4	NA	61.3	98
Sieve No. 100 (150 um)	--	--	98.4	NA	NA	NA	97.5	98.6	22.5	30.6	NA	21	20.6	NA	53.3	97.6
Sieve No. 200 (75 um)	--	--	96.6	NA	NA	NA	94.6	95.8	12.4	26	NA	10.6	11.1	NA	40.6	95.9

Notes:

Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted

Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek
[2]Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD82	CAPL-SD83[1]		CAPL-SD84		CAPL-SD85		CAPL-SD86	
Sample ID			CAPL-SD82-1012	CAPL-SD83-1012	CAPL-SD83-1012-V	CAPL-SD84-1012	CAPL-SD84-1012-A	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A
Sample Date			10/18/12	10/16/12	10/25/12	10/24/12	10/26/12	10/24/12	10/26/12	10/24/12	10/26/12
Chemical Name											
Volatile Organic Compounds (µg/kg)											
2-Butanone	27,000,000	--	90.7	NA	5.92 J	6.15 U	NA	3.93 J	NA	4.8 U	NA
Acetone	61,000,000	--	399 J	NA	22.6 J	12.3 UJ	NA	21.3 J	NA	9.6 UJ	NA
Carbon disulfide	740,000	0.85	11.7 J	NA	2.26 J	3.07 U	NA	3.04 U	NA	2.4 U	NA
Methyl acetate	29,000,000	--	32.3 U	NA	7.63 U	6.15 U	NA	6.08 U	NA	4.8 U	NA
Methylcyclohexane	--	--	16.1 U	NA	3.82 U	3.07 U	NA	3.04 U	NA	2.4 U	NA
Toluene	820,000	670	16.1 U	NA	6.87 J	3.07 U	NA	3.04 U	NA	2.4 U	NA
Semivolatile Organic Compounds (µg/kg)											
2-Methylnaphthalene	230,000	--	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Acenaphthene	3,500,000	290	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Acenaphthylene	3,500,000	160	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Anthracene	17,000,000	57.2	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Benzaldehyde	1,200,000	--	4,860 U	349 U	NA	196 U	NA	220 U	NA	204 U	NA
Benzo(a)anthracene	1,500	108	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Benzo(a)pyrene	150	150	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Benzo(b)fluoranthene	1,500	240	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Benzo(g,h,i)perylene	--	170	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Benzo(k)fluoranthene	15,000	240	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Chrysene	150,000	166	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Dibenz(a,h)anthracene	150	33	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Dibenzofuran	72,000	5,100	4,860 U	349 U	NA	196 U	NA	220 U	NA	204 U	NA
Fluoranthene	2,300,000	423	63.6 J	6.97 U	NA	19.6 U	NA	22.2 J	NA	20.3 U	NA
Fluorene	2,300,000	77.4	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Indeno(1,2,3-cd)pyrene	1,500	200	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Naphthalene	38,000	176	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Phenanthrene	--	204	96.9 U	6.97 U	NA	19.6 U	NA	22 U	NA	20.3 U	NA
Pyrene	1,700,000	195	67.2 J	6.97 U	NA	19.6 U	NA	20.1 J	NA	20.3 U	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)											
4,4'-DDD	22,000	4.88	1.91 U	2.88 L	NA	10.2 J	NA	12.8 K	NA	6.53 J	NA
4,4'-DDE	16,000	3.16	3.49 J	2.15 L	NA	50.8 J	NA	64.9 J	NA	18.5 L	NA
4,4'-DDT	19,000	4.16	1.91 U	0.694 UJ	NA	137 K	NA	71 J	NA	27.6 J	NA
Aldrin	310	2	1.91 U	0.468 L	NA	3.54 J	NA	1.2 J	NA	0.407 J	NA
alpha-BHC	850	6	1.91 U	0.49 L	NA	0.408 U	NA	0.443 U	NA	0.414 UL	NA
alpha-Chlordane	18,000	3.24	1.91 U	0.694 UL	NA	6.82 J	NA	13.1 K	NA	8.56 J	NA
Aroclor-1260	2,400	59.8	46.9 U	29.3 L	NA	**16,200 J**	NA	**8,300 J**	NA	**4,090 J**	NA
beta-BHC	3,000	5	1.91 U	0.694 UL	NA	0.408 UL	NA	2.09 K	NA	0.414 UL	NA
delta-BHC	3,000	3	1.91 U	0.694 UL	NA	0.208 J	NA	1.3 K	NA	0.505 J	NA
Dieldrin	330	1.9	1.91 U	0.694 UL	NA	**364 K**	NA	167 K	NA	66.6 J	NA
Endosulfan I	370,000	2.9	1.91 U	0.694 UL	NA	0.408 U	NA	0.615 J	NA	0.325 J	NA
Endosulfan II	370,000	14	1.91 U	0.694 UL	NA	56.1 J	NA	26.1 K	NA	43.9 J	NA
Endosulfan sulfate	370,000	5.4	1.91 U	0.694 UL	NA	681 K	NA	319 K	NA	0.414 UL	NA
Endrin	18,000	2.22	1.91 U	0.694 UL	NA	143 K	NA	51.7	NA	29.5 J	NA
Endrin aldehyde	18,000	2.22	1.91 U	0.733 L	NA	17.4 J	NA	8.26 J	NA	4.39 J	NA
Endrin ketone	18,000	2.22	1.91 U	0.694 UL	NA	49.4 J	NA	22.2 J	NA	15.1 J	NA
gamma-BHC (Lindane)	5,600	2.37	1.91 U	0.694 UL	NA	0.135 J	NA	0.614 J	NA	0.414 UL	NA
gamma-Chlordane	18,000	3.24	2.58 J	0.694 UL	NA	22.7 J	NA	40.1	NA	17.2 J	NA
Heptachlor	1,200	68	1.91 U	1.27 L	NA	0.361 B	NA	0.974	NA	0.414 UL	NA
Heptachlor epoxide	590	2.47	1.91 U	0.343 L	NA	3.58 J	NA	5.37 K	NA	0.981 J	NA
Methoxychlor	310,000	19	1.91 U	0.302 J	NA	49.2 J	NA	25.7 J	NA	12.8 J	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD82	CAPL-SD83[1]		CAPL-SD84		CAPL-SD85		CAPL-SD86	
Sample ID			CAPL-SD82-1012	CAPL-SD83-1012	CAPL-SD83-1012-V	CAPL-SD84-1012	CAPL-SD84-1012-A	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A
Sample Date			10/18/12	10/16/12	10/25/12	10/24/12	10/26/12	10/24/12	10/26/12	10/24/12	10/26/12
Chemical Name											
Explosives (µg/kg)											
1,3-Dinitrobenzene	6,200	6.7	195 U	196 U	NA	182 U	NA	174 U	NA	182 U	NA
2,4,6-Trinitrotoluene	36,000	92	195 U	196 U	NA	182 U	NA	174 U	NA	182 U	NA
3-Nitrotoluene	6,200	1,922	195 U	196 U	NA	182 U	NA	174 U	NA	182 U	NA
4-Nitrotoluene	250,000	4,062	195 U	196 U	NA	182 U	NA	174 U	NA	182 U	NA
HMX	3,800,000	4.74	195 U	196 U	NA	182 U	NA	174 U	NA	182 U	NA
Nitroglycerin	6,200	--	641 J	490 U	NA	455 U	NA	435 U	NA	455 U	NA
Tetryl	120,000	--	195 U	196 U	NA	182 U	NA	174 U	NA	182 U	NA
Total Metals (mg/kg)											
Aluminum	77,000	25,500	17,400	13,300	NA	2,310	NA	6,860	NA	2,270	NA
Antimony	31	3	4.8 U	4.42 U	NA	0.502 U	NA	3.89	NA	0.995 U	NA
Arsenic	6.7	9.79	**46.3**	**30.2**	NA	3.22	NA	5.62	NA	2.24	NA
Barium	15,000	20	72.9	21.7 J	NA	12.9	NA	90.2	NA	22.8	NA
Beryllium	160	--	0.803 J	0.862 J	NA	0.22 J	NA	5.98	NA	1.19	NA
Cadmium	70	0.99	1.2 U	1.1 U	NA	0.112 J	NA	0.712 U	NA	0.249 U	NA
Calcium	--	--	87,900	2,070 J	NA	29,600	NA	50,700	NA	40,200	NA
Chromium	3	43.4	**29.7**	**56.3**	NA	**7.75**	NA	**45**	NA	**11.3**	NA
Cobalt	23	50	5.34 J	5.52 U	NA	1.03	NA	**34.5**	NA	5.24	NA
Copper	3,100	31.6	48.4	13.8	NA	3.99	NA	1,000	NA	98.3	NA
Cyanide	21	--	1.38 U	0.496 U	NA	0.155 J	NA	0.19 J	NA	0.306 U	NA
Iron	55,000	20,000	26,100	**68,200**	NA	8,880	NA	31,600	NA	9,880	NA
Lead	4,000	35.8	49.7	23.6	NA	90.3	NA	853	NA	126	NA
Magnesium	--	--	2,530 J	3,080	NA	772 J	NA	1,940 J	NA	742 J	NA
Manganese	1,800	460	144	98.5	NA	32.4	NA	275	NA	63.6	NA
Mercury	23	0.18	0.14 J	0.0342 J	NA	0.0174 J	NA	0.0196 J	NA	0.0397 U	NA
Nickel	1,500	22.7	13	6.27	NA	2.88	NA	564	NA	65.4	NA
Potassium	--	--	1,900 J	2,010 J	NA	780	NA	1,740 J	NA	730	NA
Selenium	390	2	3 U	2.76 U	NA	0.314 U	NA	1.78 U	NA	0.622 UL	NA
Silver	390	1	1.2 U	1.1 U	NA	0.125 UJ	NA	0.519 J	NA	0.249 UJ	NA
Sodium	--	--	1,800 U	5,040	NA	168 J	NA	519 J	NA	340 J	NA
Vanadium	390	--	45	171	NA	9.12	NA	20.6	NA	7.99	NA
Zinc	23,000	121	110	111	NA	77.7	NA	2,950	NA	525	NA
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)											
Zinc, SEM	--	--	0.752	0.439	NA	NA	0.282 D	NA	4.43 D	NA	0.974
Acid volatile sulfide, SEM	--	--	14.9	7.68	NA	NA	0.114 J	NA	1.03	NA	2.08
Cadmium, SEM	--	--	0.00272 U	0.00122 U	NA	NA	5.73E-04 U	NA	5.52E-04 U	NA	3.84E-04 J
Copper, SEM	--	--	0.248	0.0202 J	NA	NA	0.0178	NA	0.675	NA	0.124
Lead, SEM	--	--	0.164	0.0382	NA	NA	0.0463 D	NA	0.393 D	NA	0.101
Nickel, SEM	--	--	0.0206 J	0.0107 J	NA	NA	0.00368 JY	NA	0.468 Y	NA	0.112 Y
Wet Chemistry											
pH (ph)	--	--	7.16 H3	7.24 H3	NA	8.28 H3	NA	8.11 H3	NA	7.88 H3	NA
Total organic carbon (TOC) (mg/kg)	--	--	134,000	36,100	NA	2,300	NA	3,440	NA	3,210	NA
Grain Size (pct)											
Coarse Sand (%)	--	--	0.9	6.4	NA	6.5	NA	6.9	NA	3.6	NA
Fine Sand (%)	--	--	5.7	30.4	NA	55.8	NA	56.1	NA	73.3	NA
Fines (%)	--	--	92.8	13.7	NA	13.5	NA	2.1	NA	4.4	NA
Gravel (%)	--	--	0.4	34.1	NA	11.6	NA	5.8	NA	4.1	NA
Medium Sand (%)	--	--	0.2	15.4	NA	12.6	NA	29.2	NA	14.6	NA
Sand (%)	--	--	6.8	52.2	NA	74.9	NA	92.2	NA	91.5	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD82	CAPL-SD83[1]		CAPL-SD84		CAPL-SD85		CAPL-SD86	
Sample ID			CAPL-SD82-1012	CAPL-SD83-1012	CAPL-SD83-1012-V	CAPL-SD84-1012	CAPL-SD84-1012-A	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A
Sample Date			10/18/12	10/16/12	10/25/12	10/24/12	10/26/12	10/24/12	10/26/12	10/24/12	10/26/12
Chemical Name											
GRAINSIZE (PCT/P)											
GS03 Sieve 3" (75 mm)	--	--	100	100	NA	100	NA	100	NA	100	NA
GS05 Sieve 2" (50 mm)	--	--	100	100	NA	100	NA	100	NA	100	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	100	100	NA	100	NA	100	NA	100	NA
GS07 Sieve 1" (25.0 mm)	--	--	100	100	NA	100	NA	100	NA	100	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	100	76.3	NA	92.5	NA	100	NA	100	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	100	72.9	NA	91.9	NA	97.4	NA	97.6	NA
Sieve No. 004 (4.75 mm)	--	--	99.6	65.9	NA	88.4	NA	94.2	NA	95.9	NA
Sieve No. 008 (2.36 mm)			NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	98.7	59.5	NA	81.9	NA	87.3	NA	92.3	NA
Sieve No. 016 (1.18 mm)			NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	98.7	54.1	NA	75.9	NA	72.4	NA	87	NA
Sieve No. 030 (600 um)			NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	98.5	44.1	NA	69.3	NA	58.1	NA	77.7	NA
Sieve No. 050 (300 um)			NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	97.7	32.8	NA	42.8	NA	26.6	NA	42.6	NA
Sieve No. 080 (180 um)	--	--	97.1	26.1	NA	22.5	NA	8.9	NA	16.3	NA
Sieve No. 100 (150 um)	--	--	96.5	21.8	NA	17.2	NA	4.9	NA	9.1	NA
Sieve No. 200 (75 um)	--	--	92.8	13.7	NA	13.5	NA	2.1	NA	4.4	NA

Notes:

Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted

Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek
[2]Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD87		CAPL-SWSD62		CAPL-SWSD63		CAPL-SWSD64			
Sample ID			CAPL-SD87-1012	CAPL-SD87-1012-A	CAPL-SD62-1012	CAPL-SD62-1012-V	CAPL-SD63-1012	CAPL-SD63-1012-V	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V
Sample Date			10/24/12	10/26/12	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/17/12	10/25/12	10/25/12
Chemical Name												
Volatile Organic Compounds (µg/kg)												
2-Butanone	27,000,000	--	28.8	NA	NA	101	NA	146	NA	NA	156	135
Acetone	61,000,000	--	111 J	NA	NA	323 J	NA	472 J	NA	NA	543 J	460 J
Carbon disulfide	740,000	0.85	3.7 U	NA	NA	9.93 J	NA	13.3 J	NA	NA	17.5 J	13.2 J
Methyl acetate	29,000,000	--	7.39 U	NA	NA	22.6 U	NA	28.8 U	NA	NA	25.1 U	22.5 U
Methylcyclohexane	--	--	3.7 U	NA	NA	11.3 U	NA	14.4 U	NA	NA	12.6 U	11.3 U
Toluene	820,000	670	3.7 U	NA	NA	11.3 U	NA	14.4 U	NA	NA	12.6 U	11.3 U
Semivolatile Organic Compounds (µg/kg)												
2-Methylnaphthalene	230,000	--	20.3 U	NA	17.7 U	NA	65 U	NA	14.3 U	14.8 U	NA	NA
Acenaphthene	3,500,000	290	336 K	NA	17.7 U	NA	65 U	NA	14.3 U	14.8 U	NA	NA
Acenaphthylene	3,500,000	160	20.3 U	NA	17.7 U	NA	65 U	NA	14.3 U	14.8 U	NA	NA
Anthracene	17,000,000	57.2	265	NA	17.7 U	NA	65 U	NA	14.3 U	14.8 U	NA	NA
Benzaldehyde	1,200,000	--	203 U	NA	888 U	NA	384 J	NA	718 U	744 U	NA	NA
Benzo(a)anthracene	1,500	108	125	NA	17.7 U	NA	78.2 J	NA	14.3 U	14.8 U	NA	NA
Benzo(a)pyrene	150	150	20.3 U	NA	17.7 U	NA	93.3 J	NA	14.3 U	14.8 U	NA	NA
Benzo(b)fluoranthene	1,500	240	81.9 K	NA	17.7 U	NA	96.3 J	NA	14.3 U	14.8 U	NA	NA
Benzo(g,h,i)perylene	--	170	20.3 U	NA	17.7 U	NA	94.2 J	NA	14.3 U	14.8 U	NA	NA
Benzo(k)fluoranthene	15,000	240	20.3 U	NA	17.7 U	NA	102 J	NA	14.3 U	14.8 U	NA	NA
Chrysene	150,000	166	130 K	NA	17.7 U	NA	185	NA	14.3 U	14.8 U	NA	NA
Dibenz(a,h)anthracene	150	33	20.3 U	NA	17.7 U	NA	65 U	NA	14.3 U	14.8 U	NA	NA
Dibenzofuran	72,000	5,100	125 J	NA	888 U	NA	652 U	NA	718 U	744 U	NA	NA
Fluoranthene	2,300,000	423	440	NA	17.7 U	NA	174	NA	16.5 J	20.8 J	NA	NA
Fluorene	2,300,000	77.4	285 K	NA	17.7 U	NA	99.7 J	NA	14.3 U	14.8 U	NA	NA
Indeno(1,2,3-cd)pyrene	1,500	200	24.2 J	NA	17.7 U	NA	90.1 J	NA	14.3 U	14.8 U	NA	NA
Naphthalene	38,000	176	20.3 U	NA	17.7 U	NA	65 U	NA	14.3 U	14.8 U	NA	NA
Phenanthrene	--	204	949	NA	17.7 U	NA	181	NA	14.3 U	14.8 U	NA	NA
Pyrene	1,700,000	195	497 K	NA	17.7 U	NA	194	NA	18.5 J	16.8 J	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)												
4,4'-DDD	22,000	4.88	6.56 J	NA	1.81 UL	NA	7.08 J	NA	10.6 J	4.44 J	NA	NA
4,4'-DDE	16,000	3.16	13.1	NA	9.69 J	NA	39.2 J	NA	16.5 J	8.72 J	NA	NA
4,4'-DDT	19,000	4.16	18.3 J	NA	1.81 UL	NA	4.18 J	NA	1.5 UL	1.48 U	NA	NA
Aldrin	310	2	0.681 J	NA	1.81 UL	NA	1.81 J	NA	1.5 UL	1.48 U	NA	NA
alpha-BHC	850	6	0.419 U	NA	0.777 J	NA	1.32 U	NA	1.5 UL	1.48 U	NA	NA
alpha-Chlordane	18,000	3.24	9.44	NA	1.5 J	NA	3.63 J	NA	2.22 J	1.48 U	NA	NA
Aroclor-1260	2,400	59.8	**3,780 J**	NA	140 J	NA	1,270 J	NA	84.7 J	34.5 J	NA	NA
beta-BHC	3,000	5	0.419 U	NA	1.81 UL	NA	1.32 U	NA	1.5 UL	1.48 U	NA	NA
delta-BHC	3,000	3	1.04 J	NA	1.81 UL	NA	2.71 J	NA	1.5 UL	1.48 U	NA	NA
Dieldrin	330	1.9	79.2	NA	3.58 J	NA	20.7 J	NA	2.41 J	1.34 J	NA	NA
Endosulfan I	370,000	2.9	0.81 J	NA	1.81 UL	NA	0.68 J	NA	1.5 UL	1.48 U	NA	NA
Endosulfan II	370,000	14	15.4 J	NA	1.32 J	NA	13.2 J	NA	1.5 UL	1.48 U	NA	NA
Endosulfan sulfate	370,000	5.4	0.419 U	NA	1.81 UL	NA	41.1 J	NA	2.13 J	1.42 J	NA	NA
Endrin	18,000	2.22	35.7 J	NA	1.81 UL	NA	15.6 J	NA	1.5 UL	1.48 U	NA	NA
Endrin aldehyde	18,000	2.22	5.11 J	NA	3.54 J	NA	4.96 J	NA	1.5 UL	2.02 J	NA	NA
Endrin ketone	18,000	2.22	12.6 J	NA	14.7 J	NA	1.66 J	NA	6.86 J	3.13 J	NA	NA
gamma-BHC (Lindane)	5,600	2.37	0.419 U	NA	1.81 UL	NA	0.692 J	NA	1.5 UL	1.48 U	NA	NA
gamma-Chlordane	18,000	3.24	28.4	NA	0.963 J	NA	41 J	NA	1.52 J	1 J	NA	NA
Heptachlor	1,200	68	0.177 B	NA	1.63 J	NA	1.32 UL	NA	1.5 UL	1.48 U	NA	NA
Heptachlor epoxide	590	2.47	1.22 J	NA	1.81 UL	NA	1.32 UL	NA	1.5 UL	1.48 U	NA	NA
Methoxychlor	310,000	19	11.4 J	NA	1.81 UL	NA	10.7 J	NA	5.43 J	1.48 U	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
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Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD87		CAPL-SWSD62		CAPL-SWSD63		CAPL-SWSD64			
Sample ID			CAPL-SD87-1012	CAPL-SD87-1012-A	CAPL-SD62-1012	CAPL-SD62-1012-V	CAPL-SD63-1012	CAPL-SD63-1012-V	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V
Sample Date			10/24/12	10/26/12	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/17/12	10/25/12	10/25/12
Chemical Name												
Explosives (µg/kg)												
1,3-Dinitrobenzene	6,200	6.7	182 U	NA	194 U	NA	196 U	NA	193 U	185 U	NA	NA
2,4,6-Trinitrotoluene	36,000	92	182 U	NA	194 U	NA	196 U	NA	193 U	185 U	NA	NA
3-Nitrotoluene	6,200	1,922	182 U	NA	194 U	NA	196 U	NA	193 U	185 U	NA	NA
4-Nitrotoluene	250,000	4,062	182 U	NA	194 U	NA	196 U	NA	193 U	185 U	NA	NA
HMX	3,800,000	4.74	182 U	NA	194 U	NA	196 U	NA	193 U	185 U	NA	NA
Nitroglycerin	6,200	--	455 U	NA	328 J	NA	969 J	NA	1,410 J	311 J	NA	NA
Tetryl	120,000	--	182 U	NA	194 U	NA	211 J	NA	193 U	185 U	NA	NA
Total Metals (mg/kg)												
Aluminum	77,000	25,500	2,890	NA	21,600	NA	19,800	NA	20,900	17,400	NA	NA
Antimony	31	3	1.07 U	NA	10.9 U	NA	7.82 U	NA	8.58 U	9.07 U	NA	NA
Arsenic	6.7	9.79	2.42	NA	**38.1**	NA	**36.5**	NA	**47.5**	**39.1**	NA	NA
Barium	15,000	20	16.5	NA	77.3	NA	89	NA	80.5	66.3	NA	NA
Beryllium	160	--	0.393 J	NA	2.73 U	NA	1.14 J	NA	1.15 J	2.27 U	NA	NA
Cadmium	70	0.99	0.267 U	NA	2.73 U	NA	1.95 U	NA	2.14 U	2.27 U	NA	NA
Calcium	--	--	26,000	NA	75,900	NA	122,000	NA	93,700	77,900	NA	NA
Chromium	3	43.4	**8.94**	NA	**49.4**	NA	**38.5**	NA	**44.9**	**36.9**	NA	NA
Cobalt	23	50	1.54 J	NA	13.6 U	NA	5.25 J	NA	5.97 J	11.3 U	NA	NA
Copper	3,100	31.6	16.1	NA	43.9	NA	40.7	NA	51.4	44.5	NA	NA
Cyanide	21	--	0.354 J	NA	1.29 U	NA	0.937 U	NA	1.02 U	1.08 U	NA	NA
Iron	55,000	20,000	6,810	NA	39,600	NA	34,000	NA	35,200	28,400	NA	NA
Lead	4,000	35.8	72.9	NA	80.7	NA	85.8	NA	78.2	63.8	NA	NA
Magnesium	--	--	638 J	NA	3,040 J	NA	3,090 J	NA	3,000 J	2,480 J	NA	NA
Manganese	1,800	460	20.6	NA	142	NA	143	NA	124	102	NA	NA
Mercury	23	0.18	0.0201 J	NA	0.154 J	NA	0.197	NA	1.48	1.23	NA	NA
Nickel	1,500	22.7	11.1	NA	13.5 J	NA	12.2	NA	13.9	11.8	NA	NA
Potassium	--	--	785	NA	2,660 J	NA	2,330 J	NA	2,790 J	2,360 J	NA	NA
Selenium	390	2	0.668 U	NA	6.81 U	NA	4.89 U	NA	5.36 U	5.67 U	NA	NA
Silver	390	1	0.267 UJ	NA	2.73 U	NA	1.95 U	NA	2.14 U	2.27 U	NA	NA
Sodium	--	--	158 J	NA	4,090 U	NA	2,930 U	NA	3,220 U	3,400 U	NA	NA
Vanadium	390	--	8.37	NA	55	NA	45.9	NA	54.6	43.6	NA	NA
Zinc	23,000	121	119	NA	253	NA	201	NA	187	151	NA	NA
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)												
Zinc, SEM	--	--	NA	0.676	2.29 D	NA	2.6 D	NA	1.53 D	NA	NA	NA
Acid volatile sulfide, SEM	--	--	NA	2.57	11.2	NA	13.2	NA	11.8	NA	NA	NA
Cadmium, SEM	--	--	NA	9.26E-04 J	0.00407 J	NA	0.00457 J	NA	0.00218 J	NA	NA	NA
Copper, SEM	--	--	NA	0.0646	0.0655	NA	0.068	NA	0.0695	NA	NA	NA
Lead, SEM	--	--	NA	0.0696	0.266 D	NA	0.345 D	NA	0.232 D	NA	NA	NA
Nickel, SEM	--	--	NA	0.0503 Y	0.0338 J	NA	0.0436 J	NA	0.0388 J	NA	NA	NA
Wet Chemistry												
pH (ph)	--	--	8.04 H3	NA	6.81 H3	NA	6.81 H3	NA	6.83 H3	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	--	--	7,080	NA	74,400	NA	71,400	NA	75,900	NA	NA	NA
Grain Size (pct)												
Coarse Sand (%)	--	--	3.8	NA	0	NA	0	NA	0	NA	NA	NA
Fine Sand (%)	--	--	71.9	NA	10.8	NA	8.5	NA	18.3	NA	NA	NA
Fines (%)	--	--	4.2	NA	88.1	NA	89.6	NA	80.3	NA	NA	NA
Gravel (%)	--	--	10.8	NA	0	NA	0	NA	0	NA	NA	NA
Medium Sand (%)	--	--	9.3	NA	1.1	NA	1.9	NA	1.4	NA	NA	NA
Sand (%)	--	--	85	NA	11.9	NA	10.4	NA	19.7	NA	NA	NA

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
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Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD87		CAPL-SWSD62		CAPL-SWSD63		CAPL-SWSD64			
Sample ID			CAPL-SD87-1012	CAPL-SD87-1012-A	CAPL-SD62-1012	CAPL-SD62-1012-V	CAPL-SD63-1012	CAPL-SD63-1012-V	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V
Sample Date			10/24/12	10/26/12	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/17/12	10/25/12	10/25/12
Chemical Name												
GRAINSIZE (PCT/P)												
GS03 Sieve 3" (75 mm)	--	--	100	NA	100	NA	100	NA	100	NA	NA	NA
GS05 Sieve 2" (50 mm)	--	--	100	NA	100	NA	100	NA	100	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	100	NA	100	NA	100	NA	100	NA	NA	NA
GS07 Sieve 1" (25.0 mm)	--	--	100	NA	100	NA	100	NA	100	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	100	NA	100	NA	100	NA	100	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	94.6	NA	100	NA	100	NA	100	NA	NA	NA
Sieve No. 004 (4.75 mm)	--	--	89.2	NA	100	NA	100	NA	100	NA	NA	NA
Sieve No. 008 (2.36 mm)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	85.4	NA	100	NA	100	NA	100	NA	NA	NA
Sieve No. 016 (1.18 mm)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	82.2	NA	99.7	NA	99.2	NA	99.6	NA	NA	NA
Sieve No. 030 (600 um)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	76.1	NA	98.9	NA	98.1	NA	98.6	NA	NA	NA
Sieve No. 050 (300 um)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	44.4	NA	97.6	NA	96.6	NA	95.3	NA	NA	NA
Sieve No. 080 (180 um)	--	--	18.1	NA	95.6	NA	95.2	NA	90	NA	NA	NA
Sieve No. 100 (150 um)	--	--	10.1	NA	93.7	NA	94.1	NA	86.9	NA	NA	NA
Sieve No. 200 (75 um)	--	--	4.2	NA	88.1	NA	89.6	NA	80.3	NA	NA	NA

Notes:

Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted

Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek
[2]Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
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ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
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Station ID	**RSLs Res Soil X 10 for SD, Adjusted (May 2014)**	**CAX Freshwater SD ESV**	CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID			CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
Sample Date			10/18/12	10/18/12	10/16/12	10/18/12	10/17/12
Chemical Name							
Volatile Organic Compounds (µg/kg)							
2-Butanone	27,000,000	--	17.6 J	25.1	15.9 J	50.3 J	43.7
Acetone	61,000,000	--	70.1 J	87 J	47.2	204 J	140 J
Carbon disulfide	740,000	0.85	4.87 U	4.66 U	4.35 UJ	13.9 L	7.4 U
Methyl acetate	29,000,000	--	9.74 U	9.33 U	8.71 U	30.2 U	14.8 U
Methylcyclohexane	--	--	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Toluene	820,000	670	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Semivolatile Organic Compounds (µg/kg)							
2-Methylnaphthalene	230,000	--	7.52 U	6.29 U	25.6 J	85.8 U	8.37 U
Acenaphthene	3,500,000	290	7.52 U	6.29 U	31.5 U	85.8 U	8.37 U
Acenaphthylene	3,500,000	160	7.52 U	6.29 U	22.2 J	85.8 U	8.37 U
Anthracene	17,000,000	57.2	7.52 U	6.29 U	41.3 J	85.8 U	8.37 U
Benzaldehyde	1,200,000	--	377 U	170 J	316 U	861 U	420 U
Benzo(a)anthracene	1,500	108	7.52 U	6.29 U	223	85.8 U	8.37 U
Benzo(a)pyrene	150	150	7.52 U	6.29 U	**303**	85.8 U	8.37 U
Benzo(b)fluoranthene	1,500	240	13.2 J	6.29 U	400	85.8 U	8.37 U
Benzo(g,h,i)perylene	--	170	7.52 U	7.31 J	208	85.8 U	8.37 U
Benzo(k)fluoranthene	15,000	240	7.52 U	6.29 U	335	85.8 U	8.37 U
Chrysene	150,000	166	10.3 J	9.23 J	285	85.8 U	8.37 U
Dibenz(a,h)anthracene	150	33	7.52 U	6.29 U	74.1	85.8 U	8.37 U
Dibenzofuran	72,000	5,100	377 U	315 U	316 U	861 U	420 U
Fluoranthene	2,300,000	423	16	12.2 J	123	85.8 U	8.37 U
Fluorene	2,300,000	77.4	7.52 U	6.29 U	31.5 U	85.8 U	8.37 U
Indeno(1,2,3-cd)pyrene	1,500	200	7.52 U	6.29 U	238	85.8 U	8.37 U
Naphthalene	38,000	176	7.52 U	6.29 U	31.5 U	85.8 U	8.37 U
Phenanthrene	--	204	12.9 J	10.5 J	69.7	85.8 U	8.37 U
Pyrene	1,700,000	195	13.6 J	13.3	108	85.8 U	8.37 U
Pesticide/Polychlorinated Biphenyls (µg/kg)							
4,4'-DDD	22,000	4.88	0.778 U	0.63 U	4.7 L	1.7 U	0.844 UL
4,4'-DDE	16,000	3.16	6.29 J	4.74	23.7 L	1.7 U	0.844 UL
4,4'-DDT	19,000	4.16	0.778 U	0.63 U	7.55 J	1.7 U	0.844 UL
Aldrin	310	2	0.778 U	0.63 U	0.95 L	1.7 U	0.844 UL
alpha-BHC	850	6	0.778 U	0.63 U	0.427 L	1.7 U	0.844 UL
alpha-Chlordane	18,000	3.24	1.02 J	0.63 U	4.25 L	1.7 U	0.844 UL
Aroclor-1260	2,400	59.8	63.6	35.9	914 L	41.6 U	20.7 UL
beta-BHC	3,000	5	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
delta-BHC	3,000	3	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
Dieldrin	330	1.9	1.5 J	0.63 U	4.55 L	1.7 U	0.844 UL
Endosulfan I	370,000	2.9	0.778 U	0.63 U	0.523 L	1.7 U	0.844 UL
Endosulfan II	370,000	14	0.778 U	0.63 U	11.3 L	1.7 U	0.844 UL
Endosulfan sulfate	370,000	5.4	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
Endrin	18,000	2.22	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
Endrin aldehyde	18,000	2.22	2.75	1.99	3.11 L	1.7 U	0.844 UL
Endrin ketone	18,000	2.22	0.778 U	0.63 U	2.03 L	1.7 U	0.844 UL
gamma-BHC (Lindane)	5,600	2.37	0.778 U	0.63 U	0.245 L	1.7 U	0.844 UL
gamma-Chlordane	18,000	3.24	15.1 B	1.37	8.24 L	1.84 J	5.31 J
Heptachlor	1,200	68	0.958 J	0.63 U	0.619 UL	1.7 U	0.844 UL
Heptachlor epoxide	590	2.47	0.929 J	0.63 U	1.24 L	1.7 U	0.844 UL
Methoxychlor	310,000	19	0.584 J	0.63 U	10.1 J	1.7 U	0.844 UL

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID			CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
Sample Date			10/18/12	10/18/12	10/16/12	10/18/12	10/17/12
Chemical Name							
Explosives (µg/kg)							
1,3-Dinitrobenzene	6,200	6.7	196 U	191 U	191 U	200 U	188 U
2,4,6-Trinitrotoluene	36,000	92	196 U	191 U	191 U	200 U	125 J
3-Nitrotoluene	6,200	1,922	196 U	191 U	191 U	200 U	188 U
4-Nitrotoluene	250,000	4,062	196 U	191 U	191 U	200 U	188 U
HMX	3,800,000	4.74	196 U	191 U	191 U	200 U	188 U
Nitroglycerin	6,200	--	490 U	478 U	478 U	500 U	469 U
Tetryl	120,000	--	196 U	191 U	191 U	200 R	188 U
Total Metals (mg/kg)							
Aluminum	77,000	25,500	6,830	4,010	3,550	26,700	6,560
Antimony	31	3	0.946 U	0.762 U	1.6 U	2.11 UL	5.25 U
Arsenic	6.7	9.79	**9.58**	**8.68**	6.18	**56.7**	6.48 J
Barium	15,000	20	26.7	19.7	30.2	80.2	21.2 J
Beryllium	160	--	0.253 J	0.222 J	0.242 J	1.02 J	1.31 U
Cadmium	70	0.99	0.237 U	0.204 J	0.239 J	0.528 U	1.31 U
Calcium	--	--	26,600	12,500	10,100	33,500	3,630
Chromium	3	43.4	**11.8**	**7.22**	**6.45**	**45.6 K**	**16.1**
Cobalt	23	50	1.67	1.14 J	2.08 J	6.91	6.56 U
Copper	3,100	31.6	10.1	8.22	4.58	26.3	4.31 J
Cyanide	21	--	2.95	0.439 U	0.438 U	1.3 UL	0.649 U
Iron	55,000	20,000	8,450	5,340	8,770	30,900	14,600
Lead	4,000	35.8	14.8	11.7	12.4	33.3	6.8
Magnesium	--	--	978	517	2,380	4,190 K	1,090 J
Manganese	1,800	460	47.6	33.4	165	161	57.5
Mercury	23	0.18	0.0444 J	0.0325 J	0.0664 J	0.0995 J	0.0391 J
Nickel	1,500	22.7	4.18	2.61	3.62	18.2	3.4 J
Potassium	--	--	850	489	428 J	3,370 K	1,470 J
Selenium	390	2	0.591 U	0.476 U	1 U	1.32 U	3.28 U
Silver	390	1	0.237 U	0.191 U	0.4 U	0.528 U	1.31 U
Sodium	--	--	175 J	286 U	600 U	1,290 J	1,970 U
Vanadium	390	--	17.2	9.92	10.9	67.8	19.3
Zinc	23,000	121	41.9	29.9	41.9	90.4	24.2
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)							
Zinc, SEM	--	--	0.344	0.2	0.198	0.539	0.193
Acid volatile sulfide, SEM	--	--	4.49	3.95	2.85	9.51	6.38
Cadmium, SEM	--	--	0.00103 U	0.00104 J	5.00E-04 J	0.00224 U	0.00119 U
Copper, SEM	--	--	0.0572	0.024	0.0162	0.124	0.0167 J
Lead, SEM	--	--	0.0505	0.0281	0.0228	0.0974	0.021
Nickel, SEM	--	--	0.00866 J	0.00419 J	0.00377 J	0.0262 J	0.0114 J
Wet Chemistry							
pH (ph)	--	--	7.24 H3	7.1 H3	7.1 H3	7.1 H3	6.83 H3
Total organic carbon (TOC) (mg/kg)	--	--	37,900 [2]	35,000 [2]	106,000	116,000	72,200 [2]
Grain Size (pct)							
Coarse Sand (%)	--	--	0	0.5	6.4	0.4	2.8
Fine Sand (%)	--	--	56.3	69.4	44.6	7.6	39.2
Fines (%)	--	--	34.1	22.9	19	89.9	52.1
Gravel (%)	--	--	0	0.1	14.7	0	3.3
Medium Sand (%)	--	--	9.6	7.1	15.3	2.1	2.6
Sand (%)	--	--	65.9	77	66.3	10.1	44.6

TABLE 11
Surface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	**RSLs Res Soil X 10 for SD, Adjusted (May 2014)**	**CAX Freshwater SD ESV**	CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID			CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
Sample Date			10/18/12	10/18/12	10/16/12	10/18/12	10/17/12
Chemical Name							
GRAINSIZE (PCT/P)							
GS03 Sieve 3" (75 mm)	--	--	100	100	100	100	100
GS05 Sieve 2" (50 mm)	--	--	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	100	100	92.4	100	100
Sieve No. 004 (4.75 mm)	--	--	100	99.9	85.3	100	96.7
Sieve No. 008 (2.36 mm)			NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	100	99.4	78.9	99.6	93.9
Sieve No. 016 (1.18 mm)			NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	98.6	98.6	74.5	99.4	93
Sieve No. 030 (600 um)			NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	90.4	92.3	63.6	97.5	91.3
Sieve No. 050 (300 um)			NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	66	61.1	43.1	95.1	84.4
Sieve No. 080 (180 um)	--	--	50	37.3	30.4	93.5	73.8
Sieve No. 100 (150 um)	--	--	42.7	29.2	24.9	92.7	66.2
Sieve No. 200 (75 um)	--	--	34.1	22.9	19	89.9	52.1

Notes:

Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted

Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek
[2]Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

Table 12
Subsurface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD70	CAPL-SD71	CAPL-SD72	CAPL-SD73	CAPL-SD74		CAPL-SD75	CAPL-SD76	CAPL-SD77
Sample ID			CAPL-SSD70-1012	CAPL-SSD71-1012	CAPL-SSD72-1012	CAPL-SSD73-1012	CAPL-SSD74-1012	CAPL-SSD74P-1012	CAPL-SSD75-1012	CAPL-SSD76-1012	CAPL-SSD77-1012
Sample Date			10/17/12	10/17/12	10/17/12	10/17/12	10/18/12	10/18/12	10/18/12	10/16/12	10/16/12
Chemical Name											
Volatile Organic Compounds (µg/kg)											
2-Butanone	27,000,000	--	43.3	71.6	39.6 J	92.6	49.2 J	59.5	71.2 J	3.66 J	8.71 J
Acetone	61,000,000	--	141 J	271 J	151 J	347 J	224 J	234 J	323 J	17.3 J	36.3
Carbon disulfide	740,000	0.85	4.48 U	9.37 U	11.5 J	11.8 U	13.4 J	9.4 J	9.7 J	2.46 UJ	2.42 UJ
Semivolatile Organic Compounds (µg/kg)											
2-Methylnaphthalene	230,000	--	1,420	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	10.7
Acenaphthene	3,500,000	290	79,800	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U
Anthracene	17,000,000	57.2	85,600	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U
Benzaldehyde	1,200,000	--	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U
Benzo(a)anthracene	1,500	108	**36,600**	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	19.7
Benzo(a)pyrene	150	150	**20,500**	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	9.1	18.9
Benzo(b)fluoranthene	1,500	240	**16,100**	11 U	19.5 U	15.1 U	20.8 J	15.6 U	77.8 U	7.75 J	15.5
Benzo(g,h,i)perylene	--	170	5,990	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	7.15 J	11
Benzo(k)fluoranthene	15,000	240	**17,700**	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	5.29 J	18
Chrysene	150,000	166	46,300	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	21.8
Dibenz(a,h)anthracene	150	33	**2,710**	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U
Dibenzofuran	72,000	5,100	32,900 J	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U
Fluoranthene	2,300,000	423	125,000	9.84 J	19.5 U	13.1 J	27.1 J	15.6 U	55.5 J	6.27 J	24.2
Fluorene	2,300,000	77.4	81,700	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U
Indeno(1,2,3-cd)pyrene	1,500	200	**5,960**	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	5.21 J	10.6
Naphthalene	38,000	176	548 U	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U
Phenanthrene	--	204	287,000	11 U	19.5 U	15.1 U	22.3 J	15.6 U	77.8 U	4.38 U	4.35 U
Pyrene	1,700,000	195	135,000	9.76 J	19.5 U	14.4 J	25.9 J	15.6 U	48.2 J	7.97 J	23.4
Pesticide/Polychlorinated Biphenyls (µg/kg)											
alpha-Chlordane	18,000	3.24	7.13 J	0.492 J	1.98 U	2.1 J	1.55 J	1.64 UL	1.58 U	0.447 U	3.88 L
Aroclor-1260	2,400	59.8	2,030 J	37.3 J	48.5 U	52.7 J	40.7 U	40.2 UL	38.6 U	10.9 U	1,170
beta-BHC	3,000	5	26.2 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 U	0.438 UL
delta-BHC	3,000	3	6.34 J	1.11 U	1.98 U	1.07 J	1.66 U	1.64 UL	1.58 U	0.447 UL	0.438 U
Dieldrin	330	1.9	8.03 J	2.1 J	1.98 U	3.01 J	1.66 U	0.919 J	1.58 U	0.447 U	5.14 J
Endosulfan I	370,000	2.9	0.571 UL	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.376 L	0.438 UL
Endosulfan II	370,000	14	0.806 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 U	0.438 UL
Endosulfan sulfate	370,000	5.4	45.9 J	0.946 J	1.98 U	1.48 J	0.921 J	1.64 UL	1.58 U	2.01 K	0.438 U
Endrin	18,000	2.22	23.9 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.355 J	0.438 UL
Endrin aldehyde	18,000	2.22	5.18 J	2.29 J	1.98 U	0.813 J	2.27 J	1.64 J	1.58 U	0.447 UL	3.54 J
Endrin ketone	18,000	2.22	3.62 J	2.73	1.98 U	3.04 J	1.66 U	1.64 L	1.58 U	0.447 U	3.41 J
gamma-BHC (Lindane)	5,600	2.37	0.201 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 U	0.438 U
gamma-Chlordane	18,000	3.24	26.9 J	1.11 J	16.4 J	2.69 J	14.7 J	8.95 J	1.8 J	0.667 L	26.1
Heptachlor	1,200	68	1.56 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	0.964 J	0.447 U	0.438 UL
Heptachlor epoxide	590	2.47	0.571 UL	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 UL	0.856 L
Methoxychlor	310,000	19	10.3 J	0.478 J	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	1.12 J	3.14 J
Explosives (µg/kg)											
1,3-Dinitrobenzene	6,200	6.7	551	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U
4-Nitrotoluene	250,000	4,062	178 U	197 U	190 U	109 J	194 U	197 U	192 U	187 U	200 U
Nitroglycerin	6,200	--	444 U	928 J	476 U	1,160	485 U	493 U	842 J	467 U	500 U

Table 12
Subsurface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	**RSLs Res Soil X 10 for SD, Adjusted (May 2014)**	**CAX Freshwater SD ESV**	CAPL-SD70	CAPL-SD71	CAPL-SD72	CAPL-SD73	CAPL-SD74		CAPL-SD75	CAPL-SD76	CAPL-SD77
Sample ID			CAPL-SSD70-1012	CAPL-SSD71-1012	CAPL-SSD72-1012	CAPL-SSD73-1012	CAPL-SSD74-1012	CAPL-SSD74P-1012	CAPL-SSD75-1012	CAPL-SSD76-1012	CAPL-SSD77-1012
Sample Date			10/17/12	10/17/12	10/17/12	10/17/12	10/18/12	10/18/12	10/18/12	10/16/12	10/16/12
Chemical Name											
Total Metals (mg/kg)											
Aluminum	77,000	25,500	4,690	15,900	21,100	29,100	18,800	19,700	22,300	1,740	3,690
Antimony	31	3	3.53 U	6.84 U	11.9 U	9.26 U	4.01 U	3.93 U	3.83 U	0.577 UL	0.561 U
Arsenic	6.7	9.79	**16.5**	**26.5**	**31.2**	**52**	**47**	**43.5**	**40.6**	0.801	2.18
Barium	15,000	20	36.5	59.9	53.7 J	104	62.8	65.6	75.4	7.13	18.7
Beryllium	160	--	0.443 J	0.876 J	2.97 U	1.44 J	1.04 J	1.07 J	1.04 J	0.144 U	0.163 J
Cadmium	70	0.99	0.883 U	1.71 U	2.97 U	2.31 U	1 U	0.983 U	0.958 U	0.144 U	0.14 U
Calcium	--	--	27,300	96,100	20,800	92,000	54,700	59,900	68,300	481 K	667
Chromium	3	43.4	**11.5**	**31.7**	**35.2**	**54.2**	**35.5**	**37.9**	**40.1**	2.65	**5.52**
Cobalt	23	50	2.23 J	4.41 J	14.8 U	7.32 J	5.97 J	6.28	6.54	0.389 J	0.995
Copper	3,100	31.6	10.4	29.2	14.7 J	60	31.7	39.1	44	0.883	2.2
Cyanide	21	--	0.399 U	0.778 U	1.57 U	1.18 U	1.13 U	1.16 U	1.1 U	0.298 U	0.332 U
Iron	55,000	20,000	14,900	24,500	21,200	41,800	31,100	30,500	30,000	1,520	3,530
Lead	4,000	35.8	37.6	47.9	22.3	92.3	41.8	44	48.5	3.98	10.4
Magnesium	--	--	1,050 J	2,760 J	3,410 J	4,650 J	3,170	3,340	4,090	146 K	283 J
Manganese	1,800	460	48.4	106	120	180	151	150	142	5.77	8.18
Mercury	23	0.18	0.0538 J	0.12	0.167 U	0.13 J	0.106 J	0.106 J	0.113 J	0.0234 J	0.0244 J
Nickel	1,500	22.7	4.07 J	9.94	12 J	18	13.4	14	15.8	0.945	1.94
Potassium	--	--	1,110 J	2,180 J	2,830 J	3,510 J	2,390 J	2,520	2,920	130 K	271 J
Sodium	--	--	1,320 U	2,570 U	4,450 U	1,640 J	1,500 U	1,470 U	1,090 J	216 U	210 U
Vanadium	390	--	14.7	41.1	48.9	67	48.8	50.2	52.9	3.89	7.92
Zinc	23,000	121	67.8	102	56.6	186	97.4	103	118	3.99	18.2
Wet Chemistry											
pH (ph)	--	--	7.02 H3	6.86 H3	7.36 H3	7.06 H3	7.71 H3	NA	7.13 H3	6.93 H3	7 H3
Total organic carbon (TOC) (mg/kg)	--	--	33,600	44,500	165,000	57,300	124,000	NA	74,400	7,570	15,800

Notes:
Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted
Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
B - Analyte not detected above the level reported in blanks
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/kg - Milligrams per kilogram
ph - pH units
µg/kg - Micrograms per kilogram

Table 12
Subsurface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD78	CAPL-SD79		CAPL-SD80		CAPL-SD81	CAPL-SD82	CAPL-SD84	CAPL-SD85
Sample ID			CAPL-SSD78-1012	CAPL-SSD79-1012	CAPL-SSD79-1012-V	CAPL-SSD80-1012	CAPL-SSD80-1012-V	CAPL-SSD81-1012	CAPL-SSD82-1012	CAPL-SSD84-1012	CAPL-SSD85-1012
Sample Date			10/16/12	10/16/12	10/25/12	10/16/12	10/25/12	10/18/12	10/18/12	10/24/12	10/24/12
Chemical Name											
Volatile Organic Compounds (µg/kg)											
2-Butanone	27,000,000	--	27.9	NA	3.88 J	NA	57.3	22.7 J	116	7.37 J	3.55 J
Acetone	61,000,000	--	107	NA	17.2 J	NA	195 J	120 J	438 J	25 J	16.7 J
Carbon disulfide	740,000	0.85	6.56 UJ	NA	3.29 U	NA	7.31 J	29.7	22.7 U	2.11 J	2.92 U
Semivolatile Organic Compounds (µg/kg)											
2-Methylnaphthalene	230,000	--	40.3 U	9.45 J	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Acenaphthene	3,500,000	290	40.3 U	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Anthracene	17,000,000	57.2	40.3 U	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Benzaldehyde	1,200,000	--	404 U	242 U	NA	310 U	NA	170 U	5,660 U	205 U	206 U
Benzo(a)anthracene	1,500	108	99.9	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Benzo(a)pyrene	150	150	87.4	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Benzo(b)fluoranthene	1,500	240	87.4	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Benzo(g,h,i)perylene	--	170	92	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Benzo(k)fluoranthene	15,000	240	68.1 J	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Chrysene	150,000	166	194	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Dibenz(a,h)anthracene	150	33	40.3 U	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Dibenzofuran	72,000	5,100	404 U	242 U	NA	310 U	NA	170 U	5,660 U	205 U	206 U
Fluoranthene	2,300,000	423	186	16.2	NA	12.4 J	NA	7.01 J	66.5 J	9.91	4.1 U
Fluorene	2,300,000	77.4	40.3 U	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Indeno(1,2,3-cd)pyrene	1,500	200	63.3 J	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Naphthalene	38,000	176	131	145	NA	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U
Phenanthrene	--	204	131	4.83 U	NA	6.18 U	NA	11.5 U	113 U	6.8 J	4.1 U
Pyrene	1,700,000	195	283	17.3	NA	11.1 J	NA	11.5 U	64.8 J	9.78 K	4.1 U
Pesticide/Polychlorinated Biphenyls (µg/kg)											
alpha-Chlordane	18,000	3.24	34.7	9.94 L	NA	0.607 U	NA	1.12 U	2.32 U	13.4 J	3.34
Aroclor-1260	2,400	59.8	**3,020 J**	630 J	NA	14.9 U	NA	27.4 U	36.6 J	**34,200 J**	1,840 J
beta-BHC	3,000	5	0.792 U	1.12 L	NA	0.607 U	NA	1.12 U	2.32 U	0.422 U	0.423 U
delta-BHC	3,000	3	0.582 J	0.478 U	NA	0.607 U	NA	1.12 U	2.32 U	0.505 J	0.423 U
Dieldrin	330	1.9	50.1 L	6.88 J	NA	0.323 J	NA	1.12 U	2.32 U	**709**	4.07 J
Endosulfan I	370,000	2.9	1.21 J	0.22 J	NA	0.607 U	NA	1.12 U	2.32 U	0.422 U	0.354 J
Endosulfan II	370,000	14	1.3 L	12.5 L	NA	0.607 U	NA	1.12 U	2.32 U	483 J	18.1 J
Endosulfan sulfate	370,000	5.4	102 J	20.3 L	NA	0.607 U	NA	1.12 U	2.32 U	129 J	0.423 U
Endrin	18,000	2.22	49 L	1.15 J	NA	0.607 U	NA	1.12 U	2.32 U	59.1 J	12.2 J
Endrin aldehyde	18,000	2.22	16.2 L	2.1 J	NA	0.607 U	NA	1.12 U	2.32 U	30 J	1.56 J
Endrin ketone	18,000	2.22	8.6 J	1.72 J	NA	0.607 U	NA	1.12 U	2.32 U	28 J	5.59 J
gamma-BHC (Lindane)	5,600	2.37	0.683 J	0.478 U	NA	0.415 J	NA	1.12 U	2.32 U	0.427 J	0.423 U
gamma-Chlordane	18,000	3.24	212	40.6	NA	1.3	NA	1.85 J	3.72 J	40.8 B	11.6
Heptachlor	1,200	68	0.792 U	0.478 U	NA	0.607 U	NA	1.12 U	2.32 U	0.422 U	0.423 U
Heptachlor epoxide	590	2.47	3.43 L	0.72 L	NA	0.607 U	NA	1.12 U	2.32 U	6.42 J	0.965 J
Methoxychlor	310,000	19	276 J	9.38 J	NA	0.607 U	NA	1.12 U	2.32 U	137 J	5.58 J
Explosives (µg/kg)											
1,3-Dinitrobenzene	6,200	6.7	456	117 J	NA	199 U	NA	193 U	193 U	200 U	182 U
4-Nitrotoluene	250,000	4,062	199 U	193 U	NA	199 U	NA	193 U	193 U	200 U	182 U
Nitroglycerin	6,200	--	498 U	483 U	NA	498 U	NA	483 U	968 J	500 U	455 U

Table 12
Subsurface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	**RSLs Res Soil X 10 for SD, Adjusted (May 2014)**	**CAX Freshwater SD ESV**	CAPL-SD78	CAPL-SD79		CAPL-SD80		CAPL-SD81	CAPL-SD82	CAPL-SD84	CAPL-SD85
Sample ID			CAPL-SSD78-1012	CAPL-SSD79-1012	CAPL-SSD79-1012-V	CAPL-SSD80-1012	CAPL-SSD80-1012-V	CAPL-SSD81-1012	CAPL-SSD82-1012	CAPL-SSD84-1012	CAPL-SSD85-1012
Sample Date			10/16/12	10/16/12	10/25/12	10/16/12	10/25/12	10/18/12	10/18/12	10/24/12	10/24/12
Chemical Name											
Total Metals (mg/kg)											
Aluminum	77,000	25,500	10,500	4,070	NA	3,660	NA	34,700	15,600	5,360	6,220
Antimony	31	3	1.99 U	0.599 U	NA	1.47 U	NA	6.94 U	5.62 U	1.04 U	2.58 J
Arsenic	6.7	9.79	**8.75**	3.11	NA	4.29	NA	**24.4**	**45.8**	5.1	5.72
Barium	15,000	20	49.5	21.3	NA	17.1	NA	64.7	66.9	25.6	49.9
Beryllium	160	--	0.558 J	0.209 J	NA	0.26 J	NA	1.63 J	0.731 J	0.474 J	3.09
Cadmium	70	0.99	0.417 J	0.15 U	NA	0.188 J	NA	1.73 U	1.4 U	0.259 U	0.656 U
Calcium	--	--	4,650	1,650	NA	7,440	NA	8,270	85,200	74,500	61,500
Chromium	3	43.4	**15.2**	**6.11**	NA	**7.39**	NA	**61.7**	**26.9**	**14.1**	**27.6**
Cobalt	23	50	2.95 J	1.23	NA	0.949 J	NA	13.1	5.24 J	1.74	11.4
Copper	3,100	31.6	19.8	2.62	NA	3.4	NA	18.4	42.5	2.69	379
Cyanide	21	--	0.577 U	0.351 U	NA	0.434 U	NA	0.826 U	1.7 U	0.205 J	0.246 J
Iron	55,000	20,000	11,300	4,400	NA	4,880	NA	51,400	26,000	14,000	28,400
Lead	4,000	35.8	43	10.6	NA	9.16	NA	25	42.1	13.5	236
Magnesium	--	--	989 J	347 J	NA	579 J	NA	6,550	2,430 J	1,430 J	2,210 J
Manganese	1,800	460	32.3	12.3	NA	24.5	NA	317	144	35.4	153
Mercury	23	0.18	0.0894 J	0.0331 J	NA	0.0297 J	NA	0.0813 J	0.0957 J	0.0229 B	0.0155 B
Nickel	1,500	22.7	6.36	2.15	NA	2.27	NA	26.1	12.5	3.58	242
Potassium	--	--	804 J	338 J	NA	486 J	NA	4,410	1,780 J	1,640	3,040
Sodium	--	--	745 U	224 U	NA	552 U	NA	2,600 U	2,110 U	331 J	539 J
Vanadium	390	--	23.5	9.04	NA	9.33	NA	76.9	39.8	13.8	21.2
Zinc	23,000	121	84.3	21.1	NA	20.3	NA	97.2	101	28.3	1,040
Wet Chemistry											
pH (ph)	--	--	6.79 H3	7 H3	NA	7.53 H3	NA	7.25 H3	7.26 H3	8.02 H3	8.28 H3
Total organic carbon (TOC) (mg/kg)	--	--	63,700	25,500	NA	37,000	NA	75,400	136,000	4,950	2,510

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Notes:
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Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
B - Analyte not detected above the level reported in blanks
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/kg - Milligrams per kilogram
ph - pH units
µg/kg - Micrograms per kilogram

Table 12
Subsurface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	RSLs Res Soil X 10 for SD, Adjusted (May 2014)	CAX Freshwater SD ESV	CAPL-SD86	CAPL-SD87	CAPL-SWSD62	CAPL-SWSD63	CAPL-SWSD64	CAPL-SWSD65	CAPL-SWSD66	
Sample ID			CAPL-SSD86-1012	CAPL-SSD87-1012	CAPL-SSD62-1012	CAPL-SSD63-1012	CAPL-SSD64-1012	CAPL-SSD65-1012	CAPL-SSD66-1012	CAPL-SSD66P-1012
Sample Date			10/24/12	10/24/12	10/17/12	10/17/12	10/17/12	10/18/12	10/18/12	10/18/12
Chemical Name										
Volatile Organic Compounds (µg/kg)										
2-Butanone	27,000,000	--	6.23 J	23.9	89.3	138	117	19.4 J	6.49 J	8.17 J
Acetone	61,000,000	--	26.3 J	90.6 J	331 J	459 J	415 J	77.6 J	35.4 J	35.8 J
Carbon disulfide	740,000	0.85	4.19 J	3.9 U	12.1 U	12.1 U	11.8 U	6.02 J	1.48 J	1.88 J
Semivolatile Organic Compounds (µg/kg)										
2-Methylnaphthalene	230,000	--	4.2 U	47.2 U	12.6 U	50 J	13.1 U	9.9 U	4.6 U	4.6 U
Acenaphthene	3,500,000	290	4.2 U	1,270 K	12.6 U	38.6 J	13.1 U	9.9 U	4.6 U	4.6 U
Anthracene	17,000,000	57.2	4.2 U	2,650	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U
Benzaldehyde	1,200,000	--	211 U	236 U	631 U	931 J	656 U	496 U	231 U	230 U
Benzo(a)anthracene	1,500	108	4.43 J	**2,300**	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U
Benzo(a)pyrene	150	150	4.2 U	**1,230 K**	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U
Benzo(b)fluoranthene	1,500	240	6.61 K	1,400 K	12.6 U	80.1 J	13.1 U	9.9 U	4.6 U	4.6 U
Benzo(g,h,i)perylene	--	170	4.2 U	466 K	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U
Benzo(k)fluoranthene	15,000	240	4.2 U	726	12.6 U	61.3 J	13.1 U	9.9 U	4.6 U	4.6 U
Chrysene	150,000	166	6.28 K	2,350 K	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U
Dibenz(a,h)anthracene	150	33	4.2 U	134 K	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U
Dibenzofuran	72,000	5,100	211 U	380 J	631 U	641 U	656 U	496 U	231 U	230 U
Fluoranthene	2,300,000	423	11	6,230	9.31 J	127 J	9.64 J	8.82 J	2.93 J	2.7 J
Fluorene	2,300,000	77.4	4.2 U	1,340 K	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U
Indeno(1,2,3-cd)pyrene	1,500	200	4.33 J	386	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U
Naphthalene	38,000	176	4.2 U	47.2 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U
Phenanthrene	--	204	4.95 J	7,590	12.6 U	112 J	13.1 U	9.9 U	4.6 U	4.6 U
Pyrene	1,700,000	195	8.84 K	6,970 K	7.72 J	111 J	9.35 J	7.81 J	3.15 J	3.25 J
Pesticide/Polychlorinated Biphenyls (µg/kg)										
alpha-Chlordane	18,000	3.24	17 J	1.48 J	1.64 L	1.04 L	1.44 L	0.457 J	0.471 U	0.465 U
Aroclor-1260	2,400	59.8	**3,700 J**	138 L	169 J	217 J	33.4 UL	24.2 U	7.74 J	6.18 J
beta-BHC	3,000	5	0.441 UL	1.26	1.27 UL	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U
delta-BHC	3,000	3	0.642 L	0.387 L	1.27 UL	0.509 J	1.36 UL	0.986 U	0.471 U	0.465 U
Dieldrin	330	1.9	62.4 J	3.49 J	4.65 J	4.36 J	1.36 UL	0.986 U	0.471 U	0.465 U
Endosulfan I	370,000	2.9	0.663 J	0.493 UL	1.27 UL	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U
Endosulfan II	370,000	14	39.7 J	0.595 J	2.1 J	2.44 J	1.36 UL	0.986 U	0.471 U	0.465 U
Endosulfan sulfate	370,000	5.4	0.441 U	0.493 UL	6.42 J	9.51 J	1.36 UL	1.66 J	0.471 U	0.465 U
Endrin	18,000	2.22	31.1 J	3.12 J	0.859 J	1.09 J	1.36 UL	0.986 U	0.471 U	0.465 U
Endrin aldehyde	18,000	2.22	2.55 J	0.284 J	5.11 L	4.52 J	1.36 UL	1.45 J	0.471 U	0.465 U
Endrin ketone	18,000	2.22	13.1 J	0.592 J	16.5 J	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U
gamma-BHC (Lindane)	5,600	2.37	0.441 UL	0.493 UL	1.27 UL	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U
gamma-Chlordane	18,000	3.24	38.1 B	7.05 L	2.12 J	12.2 L	1.26 J	9.23 B	1.01 J	1.23 J
Heptachlor	1,200	68	0.441 U	0.493 UL	1.27 UL	1.35 UL	1.36 UL	0.927 J	0.471 U	0.465 U
Heptachlor epoxide	590	2.47	1.75 L	0.422 J	1.27 UL	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U
Methoxychlor	310,000	19	10.1 J	0.947 J	16.2 J	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U
Explosives (µg/kg)										
1,3-Dinitrobenzene	6,200	6.7	182 U	190 U	197 U	196 U	194 U	183 U	178 U	182 U
4-Nitrotoluene	250,000	4,062	182 U	190 U	197 U	196 U	194 U	183 U	178 U	182 U
Nitroglycerin	6,200	--	455 U	476 U	326 J	490 U	996 J	459 U	444 U	455 U

Table 12
Subsurface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	**RSLs Res Soil X 10 for SD, Adjusted (May 2014)**	**CAX Freshwater SD ESV**	CAPL-SD86	CAPL-SD87	CAPL-SWSD62	CAPL-SWSD63	CAPL-SWSD64	CAPL-SWSD65	CAPL-SWSD66	
Sample ID			CAPL-SSD86-1012	CAPL-SSD87-1012	CAPL-SSD62-1012	CAPL-SSD63-1012	CAPL-SSD64-1012	CAPL-SSD65-1012	CAPL-SSD66-1012	CAPL-SSD66P-1012
Sample Date			10/24/12	10/24/12	10/17/12	10/17/12	10/17/12	10/18/12	10/18/12	10/18/12
Chemical Name										
Total Metals (mg/kg)										
Aluminum	77,000	25,500	2,840	7,680	18,800	17,800	19,300	20,300	1,770	1,920
Antimony	31	3	2.59 U	2.86 U	7.6 U	8 U	8.22 U	5.96 U	0.564 U	0.56 U
Arsenic	6.7	9.79	3.16 J	5.28	**44.3**	**27.4**	**22.8**	**19**	2.33	2.74
Barium	15,000	20	28.2	32.1	70.2	86.7	71.5	40.3	13.1 J	8.81 J
Beryllium	160	--	1.6 J	0.572 J	1.9 U	2 U	1.15 J	1.49 U	0.156 J	0.153 J
Cadmium	70	0.99	0.648 U	0.715 U	1.9 U	2 U	2.06 U	1.49 U	0.141 U	0.14 U
Calcium	--	--	36,500	34,300	82,000	104,000	74,300	8,410	1,290	1,350
Chromium	3	43.4	**15.1**	**18.6**	**45**	**35.2**	**39.3**	**30.7 J**	**3.99 J**	**4.3**
Cobalt	23	50	9.62	2.78 J	9.5 U	10 U	6.01 J	5.51 J	0.507 J	0.578 J
Copper	3,100	31.6	160	10.9	34.4	32.3	37.6	11.4	1.43	1.59
Cyanide	21	--	0.321 U	0.349 U	0.892 U	0.962 U	1.01 U	0.745 U	0.327 U	0.352 U
Iron	55,000	20,000	9,490	15,300	30,400	33,700	29,600	25,600	2,530	2,870
Lead	4,000	35.8	236	26.4	107	68.4	57.6	15.6	3.41	4.1
Magnesium	--	--	846 J	1,370 J	2,500 J	2,720 J	2,620 J	3,260 J	247 J	262 J
Manganese	1,800	460	79.2	31.4	108	139	97.2	105	9.66	11.7
Mercury	23	0.18	0.0185 B	0.0922 B	0.115 J	0.252	1.45	0.0484 J	0.035 U	0.0384 U
Nickel	1,500	22.7	118	7.09	11	10.9	12.7	12.6	1.08	1.21
Potassium	--	--	630 J	1,630 J	2,220 J	2,190 J	2,430 J	2,470 J	304 J	329 J
Sodium	--	--	972 U	1,070 U	2,850 U	3,000 U	5,440	2,240 U	212 U	73.4 J
Vanadium	390	--	8.15	20.4	45	40	46.6	39.6	6.04	6.62
Zinc	23,000	121	927	73.6	215	165	155	69	6.03	6.81
Wet Chemistry										
pH (ph)	--	--	7.91 H3	7.92 H3	7.31 H3	6.92 H3	6.89 H3	7.16 H3	7.35 H3	NA
Total organic carbon (TOC) (mg/kg)	--	--	11,400	32,400	45,400	103,000	124,000	63,000	10,700	NA

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H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/kg - Milligrams per kilogram
ph - pH units
µg/kg - Micrograms per kilogram

Table 12
Subsurface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	**RSLs Res Soil X 10 for SD, Adjusted (May 2014)**	**CAX Freshwater SD ESV**	CAPL-SWSD67		CAPL-SWSD68	CAPL-SWSD69	
Sample ID			CAPL-SSD67-1012	CAPL-SSD67-1012-V	CAPL-SSD68-1012	CAPL-SSD69-1012	CAPL-SSD69-1012-V
Sample Date			10/16/12	10/25/12	10/18/12	10/17/12	10/25/12
Chemical Name							
Volatile Organic Compounds (µg/kg)							
2-Butanone	27,000,000	--	NA	13.2	21.8 J	NA	44.8
Acetone	61,000,000	--	NA	46.9 J	86.5 J	NA	133 J
Carbon disulfide	740,000	0.85	NA	3.23 U	14.8 J	NA	4.08 J
Semivolatile Organic Compounds (µg/kg)							
2-Methylnaphthalene	230,000	--	8.35 J	NA	14.6 U	5.68 U	NA
Acenaphthene	3,500,000	290	8.55 J	NA	14.6 U	5.68 U	NA
Anthracene	17,000,000	57.2	25.1	NA	14.6 U	5.68 U	NA
Benzaldehyde	1,200,000	--	276 U	NA	735 U	285 U	NA
Benzo(a)anthracene	1,500	108	230	NA	14.6 U	5.68 U	NA
Benzo(a)pyrene	150	150	**369**	NA	14.6 U	5.68 U	NA
Benzo(b)fluoranthene	1,500	240	392	NA	14.6 U	5.68 U	NA
Benzo(g,h,i)perylene	--	170	246	NA	14.6 U	5.68 U	NA
Benzo(k)fluoranthene	15,000	240	467	NA	14.6 U	5.68 U	NA
Chrysene	150,000	166	359	NA	14.6 U	5.68 U	NA
Dibenz(a,h)anthracene	150	33	77.5	NA	14.6 U	5.68 U	NA
Dibenzofuran	72,000	5,100	276 U	NA	735 U	285 U	NA
Fluoranthene	2,300,000	423	199	NA	13.4 J	5.41 J	NA
Fluorene	2,300,000	77.4	10.7 J	NA	14.6 U	5.68 U	NA
Indeno(1,2,3-cd)pyrene	1,500	200	221	NA	14.6 U	5.68 U	NA
Naphthalene	38,000	176	8.6 J	NA	14.6 U	5.68 U	NA
Phenanthrene	--	204	64.4	NA	14.6 U	5.68 U	NA
Pyrene	1,700,000	195	226	NA	14.6 U	3.83 J	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)							
alpha-Chlordane	18,000	3.24	0.908 L	NA	1.48 U	0.569 UL	NA
Aroclor-1260	2,400	59.8	230 L	NA	36.1 U	13.9 UL	NA
beta-BHC	3,000	5	0.548 UL	NA	1.48 U	0.569 UL	NA
delta-BHC	3,000	3	0.548 UL	NA	1.48 U	0.569 UL	NA
Dieldrin	330	1.9	1.11 L	NA	1.48 U	1.07 J	NA
Endosulfan I	370,000	2.9	0.548 UL	NA	1.48 U	0.569 UL	NA
Endosulfan II	370,000	14	0.604 L	NA	1.48 U	0.569 UL	NA
Endosulfan sulfate	370,000	5.4	0.355 L	NA	1.48 U	0.37 J	NA
Endrin	18,000	2.22	3.15 L	NA	1.48 U	0.863 J	NA
Endrin aldehyde	18,000	2.22	3.73 L	NA	1.48 U	0.867 J	NA
Endrin ketone	18,000	2.22	0.548 UL	NA	1.48 U	0.569 UL	NA
gamma-BHC (Lindane)	5,600	2.37	0.548 UL	NA	1.48 U	0.569 UL	NA
gamma-Chlordane	18,000	3.24	5.22 L	NA	1.56 J	4.77 K	NA
Heptachlor	1,200	68	0.54 L	NA	1.48 U	0.569 U	NA
Heptachlor epoxide	590	2.47	0.548 UL	NA	1.48 U	0.569 UL	NA
Methoxychlor	310,000	19	2.42 J	NA	1.48 U	0.569 U	NA
Explosives (µg/kg)							
1,3-Dinitrobenzene	6,200	6.7	198 U	NA	197 U	187 U	NA
4-Nitrotoluene	250,000	4,062	198 U	NA	197 U	187 U	NA
Nitroglycerin	6,200	--	495 U	NA	493 U	467 U	NA

Table 12
Subsurface Sediment Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	**RSLs Res Soil X 10 for SD, Adjusted (May 2014)**	**CAX Freshwater SD ESV**	CAPL-SWSD67		CAPL-SWSD68	CAPL-SWSD69	
Sample ID			CAPL-SSD67-1012	CAPL-SSD67-1012-V	CAPL-SSD68-1012	CAPL-SSD69-1012	CAPL-SSD69-1012-V
Sample Date			10/16/12	10/25/12	10/18/12	10/17/12	10/25/12
Chemical Name							
Total Metals (mg/kg)							
Aluminum	77,000	25,500	2,100	NA	30,700	3,460	NA
Antimony	31	3	1.32 U	NA	8.7 U	0.679 UL	NA
Arsenic	6.7	9.79	**9.01**	NA	**22.5**	5.86	NA
Barium	15,000	20	9.73	NA	60	10.2	NA
Beryllium	160	--	0.329 U	NA	1.14 J	0.224 J	NA
Cadmium	70	0.99	0.329 U	NA	2.17 U	0.17 U	NA
Calcium	--	--	2,130	NA	13,400	2,080	NA
Chromium	3	43.4	**4.65**	NA	**51.4 J**	**10.3**	NA
Cobalt	23	50	1.64 U	NA	6.73 J	0.761 J	NA
Copper	3,100	31.6	4.45	NA	16.3	3.46	NA
Cyanide	21	--	0.396 U	NA	1.04 U	0.399 UL	NA
Iron	55,000	20,000	4,330	NA	28,400	9,000	NA
Lead	4,000	35.8	18.2	NA	19.6	4.92	NA
Magnesium	--	--	405 J	NA	5,360 J	767 K	NA
Manganese	1,800	460	30.7	NA	160	24.6	NA
Mercury	23	0.18	0.0493 J	NA	0.0582 J	0.0233 J	NA
Nickel	1,500	22.7	1.55 J	NA	18.6	2.18 B	NA
Potassium	--	--	367 J	NA	4,110 J	1,190 K	NA
Sodium	--	--	493 U	NA	1,850 J	255 U	NA
Vanadium	390	--	6.4	NA	73.6	12.1	NA
Zinc	23,000	121	50.7	NA	74.6	14.7	NA
Wet Chemistry							
pH (ph)	--	--	7.34 H3	NA	7.53 H3	6.77 H3	NA
Total organic carbon (TOC) (mg/kg)	--	--	30,900	NA	88,200	28,400	NA

Notes:
Bold text indicates exceedance of RSLs Res Soil X 10 for SD, Adjusted
Shading indicates exceedance of CAX Freshwater SD ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
B - Analyte not detected above the level reported in blanks
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/kg - Milligrams per kilogram
ph - pH units
µg/kg - Micrograms per kilogram

Table 13
Surface Water Data Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	Tapwater RSLs X 10 for SW, Adjusted (May 2014)	Surface Water ESV	CAPL-SWSD62	CAPL-SWSD63		CAPL-SWSD64	CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID			CAPL-SW62-1012	CAPL-SW63-1012	CAPL-SW63P-1012	CAPL-SW64-1012	CAPL-SW65-1012	CAPL-SW66-1012	CAPL-SW67-1012	CAPL-SW68-1012	CAPL-SW69-1012
Sample Date			10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Chemical Name											
Volatile Organic Compounds (µg/l)											
Acetone	14,000	1,500	63.7 J	22	5 U	5 U	2.51 J	5 U	5 U	5 U	5 U
Chloromethane	190	5,500	1.86	3.08	6.88	0.5 U	4.84	6.48	6.01	6.69	6.25
Semivolatile Organic Compounds (µg/l)											
Acenaphthene	530	23	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.134 J	0.0943 U	0.098 U	0.0943 U
Anthracene	1,800	0.73	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.126 J	0.0943 U	0.098 U	0.0943 U
Benzo(a)anthracene	0.34	0.027	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0707 J	0.0943 U	0.098 U	0.0563 J
Benzo(b)fluoranthene	0.34	9.07	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0549 J
Benzo(g,h,i)perylene	--	7.64	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0684 J
Benzo(k)fluoranthene	3.4	9.07	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0615 J
Chrysene	34	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0693 J	0.0943 U	0.098 U	0.0783 J
Dibenz(a,h)anthracene	0.034	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	**0.0782 J**
Fluoranthene	800	8.1	0.0604 J	0.0962 U	0.0668 J	0.0488 J	0.0926 U	0.173 J	0.0943 U	0.098 U	0.0943 U
Fluorene	290	3.9	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.131 J	0.0943 U	0.098 U	0.0943 U
Indeno(1,2,3-cd)pyrene	0.34	4.31	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.076 J
Phenanthrene	--	6.3	0.189 U	0.192 U	0.192 U	0.189 U	0.185 U	0.455	0.189 U	0.196 U	0.189 U
Pyrene	120	0.025	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.19	0.0943 U	0.098 U	0.0943 U
Pesticide/Polychlorinated Biphenyls (µg/l)											
Heptachlor	0.02	0.0069	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00538 J
Explosives (µg/l)											
4-Amino-2,6-dinitrotoluene	39	19	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.108 L	0.157 UL	0.16 UL
Total Metals (µg/l)											
Arsenic	0.52	150	**1.5 J**	**1.54 J**	**1.64 J**	**1.44 J**	**2.01 J**	**1.37 J**	**1.85 J**	**1.62 J**	**1.7 J**
Barium	3,800	4	20.1	19.4	19.5	19.1	21.6	20.4	21	21	20.4
Calcium	--	--	37,300	36,300	38,000	36,700	37,300	33,800	36,700	35,600	36,200
Iron	14,000	1,000	361	328	321	390	337	302	359	301	344
Magnesium	--	--	1,550	1,560	1,570	1,530	1,590	1,380	1,590	1,400	1,490
Manganese	430	120	41.3	39.9	40.3	53.5	49.4	47.2	49	49.8	47.5
Potassium	--	--	2,770	2,750	2,800	2,730	2,820	2,640	2,840	2,660	2,780
Sodium	--	--	9,100	9,200	9,210	9,020	9,370	8,330	9,410	8,370	8,970
Dissolved Metals (µg/l)											
Arsenic, Dissolved	0.52	150	**1.31 J**	**1.2 J**	**1.32 J**	**1.17 J**	**1.19 J**	**1.26 J**	**1.24 J**	**1.15 J**	**1.42 J**
Barium, Dissolved	3,800	4	18.5	19.5	18.1	18.4	19.5	19.1	19.2	20.1	19
Calcium, Dissolved	--	--	38,400	41,600	37,100	37,400	34,700	33,800	35,400	35,500	35,600
Iron, Dissolved	14,000	1,000	62.4	83.1	73.4	71.7	73.5	73.2	83.8	76.7	97.6
Magnesium, Dissolved	--	--	1,570	1,680	1,540	1,560	1,380	1,360	1,440	1,460	1,500
Manganese, Dissolved	430	120	14.9	16.1	14.4	13.6	9.88	9.86	12.6	10.4	10.4
Nickel, Dissolved	390	52.0	1.5 U	1.5 U	1.5 U	1.5 U	1.96 J	1.5 U	1.5 U	1.5 U	1.5 U
Potassium, Dissolved	--	--	2,780	2,930	2,720	2,770	2,630	2,600	2,690	2,700	2,710
Sodium, Dissolved	--	--	9,220	9,650	9,130	9,220	8,370	8,250	8,630	8,690	9,000
Zinc, Dissolved	6,000	118.1	2.5 U	1.33 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Wet Chemistry											
Hardness (mg/l)	--	--	91.3	90.7	NA	89.9	86.3	86.5	86.9	87.1	88.1

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Notes:
Bold text indicates exceedance of Tapwater RSLs X 10 for SW, Adjusted
Shading indicates exceedance of Surface Water ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
L - Analyte present, value may be biased low, actual value may be higher
U - The material was analyzed for, but not detected
UL - Analyte not detected, quantitation limit is probably higher
mg/l - Milligrams per liter
µg/l - Micrograms per liter

Table 14
Tissue Detection Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAPL-TS01	CAPL-TS02	CAPL-TS03	CAPL-TS04	CAPL-TS05	CAPL-TS06	CAPL-TS07	CAPL-TS08	CAPL-TS09	CAPL-TS10	CAPL-TS11
Sample ID	CAPL-TS01-1012	CAPL-TS02-1012	CAPL-TS03-1012	CAPL-TS04-1012	CAPL-TS05-1012	CAPL-TS06-1012	CAPL-TS07-1012	CAPL-TS08-1012	CAPL-TS09-1012	CAPL-TS10-WB-1012	CAPL-TS11-WB-1012
Sample Date	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/10/12	10/10/12
Chemical Name											
Pesticide/Polychlorinated Biphenyls (UG/KG)											
4,4'-DDD	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	3.3	3 J
4,4'-DDE	2.3	2 U	2 U	4.6	10	1.1 J	2.1	1.9 U	NA	18	27
4,4'-DDT	2 U	2 U	2 U	5.6 J	1.7 J	5.6 J	5.5 J	1.9 U	NA	2.3 J	4.4 J
alpha-BHC	2 U	2 U	1.1 J	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
alpha-Chlordane	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	2 U	1.4 J	2 U	1.9 U	1.9 U	2.4	1.9 U	1 J	NA	2 J	1.5 J
delta-BHC	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Dieldrin	2 U	2 U	2 U	2.1 J	1.9 U	1.9 U	1.6 J	1.9 U	NA	1.9 U	3.4 U
Endosulfan II	1.1 J	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Endosulfan sulfate	4.7 J	2 U	2 U	7 J	0.88 J	4.2 J	4.4 J	1.9 U	NA	6.6	9.8 J
Endrin	2 U	2 U	2 U	1.9 U	1.5 J	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.1 J
Endrin aldehyde	2 U	2 U	0.83 J	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
gamma-BHC (Lindane)	1.3 J	2 U	2 U	0.97 J	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
gamma-Chlordane	2 U	2 U	2 U	2.4	1.9 U	1.7 J	2	1.9 U	NA	3.6	6.2
Heptachlor epoxide	2 U	2 U	2 U	1.2 J	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Polychlorinated biphenyls (PCBs)	1,400	38.4	46.8	1,450	44.7	2,510	1,240	51	81.4	330	743
Polychlorinated Biphenyl Congeners (PG/G)											
3,3',4,4'-Tetrachlorobiphenyl (77)	20 J	3.47 J	12 U	26.8	4.41 J	11 J	30.9 J	5.35 J	24.4	79	55.1
3,4,4',5-Tetrachlorobiphenyl (81)	9.19 J	13.4 U	12 U	9.33 J	14.8 U	11.1 J	8.82 J	12.8 U	2.44 J	3.48 J	17.2 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	241 K	29.8	44.3	412	59.6	567	450	53.7	291	617	1,000
2,3,4,4',5-Pentachlorobiphenyl (114)	75.2 U	13.4 U	7.24 J	81.5 U	14.8 U	166	70.7	12.8 U	13.7 U	13.4 U	85 U
2,3',4,4',5-Pentachlorobiphenyl (118)	5,950 K	313	375	6,890	417	19,100	8,170	373	849	3,040	5,690
2,3',4,4',5'-Pentachlorobiphenyl (123)	76.6 U	7.32 J	11 J	87.3 U	10.6 J	79.7	70.6	10.8 J	14.7 J	29 J	88.7 U
3,3',4,4',5-Pentachlorobiphenyl (126)	250 K	13.4 U	24 J	251	12.5 J	430 J	227	13.8 J	13.7 U	13.4 U	98 U
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	6,920 K	180	570	7,620	261	11,900	5,560	202	326	804	2,270
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	5,220	81.9	343	4,950	89.9	6,350	3,530	87.2	133	310	875
Decachlorobiphenyl (209)	367	25.8 B	46 B	337	37.8 B	260	187	23.8 B	83.2	42.6 B	63.8 B
Congeners (156/157)	11,700 K	235	782	14,000	252	25,500	10,800	269	507	1,290	3,530
Total Dichlorobiphenyls	32.4	28.9	23.7	29.8	49.7	29	38.1	32.2	64.8	34.6	45.2
Total Heptachlorobiphenyls	735,000	10,300	22,800	639,000	13,000	1,150,000	602,000	12,000	25,500	86,200	239,000
Total Hexachlorobiphenyls	383,000	14,500	9,830	544,000	17,300	1,030,000	436,000	19,200	38,900	159,000	356,000
Total Monochlorobiphenyls	1.45 U	1.12 U	1.8 U	2.26 U	1.67 U	1.73 U	1.48 U	0.911 U	1.78 U	0.761 U	1.18 U
Total Nonachlorobiphenyls	20,600	213	1,070	18,200	246	19,800	13,400	240	660	1,280	2,660
Total Octachlorobiphenyls	230,000	2,510	9,120	209,000	2,620	275,000	162,000	2,500	7,510	21,200	45,000
Total Pentachlorobiphenyls	20,500	4,500	1,760	26,200	4,570	31,500	21,900	7,280	6,100	38,300	68,300
Total Tetrachlorobiphenyls	11,900	6,070	2,030	10,600	6,580	4,340	8,500	9,530	2,440	23,300	30,100
Total Trichlorobiphenyls	316	171	84.2	480	274	189	540	246	121	793	937
Toxic Equivalents (Total TEQ)	25.9	0.0258	2.46	26.1	1.28	44.9	23.6	1.41	0.0668	0.192	0.407
Total Metals (MG/KG)											
Arsenic	0.25	0.1 J	0.19 U	0.2 J	0.07 J	0.068 J	0.064 J	0.065 J	1.9	0.099 J	0.19 U
Cadmium	0.08	0.03	0.032	0.078	0.11	0.085	0.094	0.044	0.19	0.011 J	0.028 U
Chromium	0.98 U	0.96 U	0.95 U	0.99 U	0.98 U	0.98 U	0.78 U	0.94 U	3.1	0.94 U	0.93 U
Copper	2.5	0.94 J	0.4 J	1.5	2	2.1	1.6	1.5	1.8	0.94 U	0.93 U
Mercury	0.044	0.024 J	0.035	0.032	0.03	0.021 J	0.023 J	0.027 J	0.027	0.01 J	0.014 J
Nickel	0.49 U	0.48 U	0.47 U	0.49 U	0.31 J	0.51	0.27 J	0.47 U	1.1	0.47 U	0.46 U
Selenium	0.4	0.36	0.2	0.27	0.34	0.25	0.29	0.28	0.48	0.13	0.18
Silver	0.0078 J	0.0096 J	0.01	0.0039 J	0.011	0.0029 J	0.007 J	0.0066 J	0.0062 J	0.0094 U	0.0093 U
Zinc	33	18	21	21	31	24	21	13	28	31	21
Wet Chemistry											
% Moisture (pct)	76	80	75	78	75	81	77	77	76	76	77
Lipids (%) (pct)	1.8	0.64	0.91	1.6	2.2	0.95	1.9	1	1.9	3	1.8

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Tables\[Table 14_CAPL-TS_Detections_v1_jd.xlsx], Campbell, Clairette/VBO, 03/12/2014

Notes:

Shading indicates detections
NA - Not analyzed
B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
U - The material was analyzed for, but not detected
MG/KG - Milligrams per kilogram
PCT - Percent
PG/G - Picograms per gram
UG/KG - Micrograms per kilogram

Table 14
Tissue Detection Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	CAPL-TS12	CAPL-TS13	CAPL-TS14	CAPL-TS15	CAPL-TS16		CAPL-TS17		CAPL-TS18	
Sample ID	CAPL-TS12-WB-1012	CAPL-TS13-WB-1012	CAPL-TS14-WB-1012	CAPL-TS15-WB-1012	CAPL-TS16-F-1012	CAPL-TS16-O-1012	CAPL-TS17-F-1012	CAPL-TS17-O-1012	CAPL-TS18-F-1012	CAPL-TS18-O-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name										
Pesticide/Polychlorinated Biphenyls (UG/KG)										
4,4'-DDD	4.3	11	7.1 J	18	1.8 U	4.5 J	1.7 J	13 J	1.1 J	11 J
4,4'-DDE	29 J	44	72	72	2.3 J	35	14	140	7 J	95
4,4'-DDT	3.4 J	8.5 J	37 J	9 J	1.8 U	10 J	3.9 J	39 J	1.5 J	30 J
alpha-BHC	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
alpha-Chlordane	3.6 U	7.3 U	10 U	11 U	3.4 J	7.5 U	1.5 J	26 U	2 J	20 U
Aroclor-1260	NA	NA	NA	NA	85	590	370	4,500	140	3,300
beta-BHC	1.9 J	7.3 U	10 U	11 U	2.2 J	5.2 J	1.8 J	26 U	1.5 J	20 U
delta-BHC	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	1.5 J	26 U	2 U	20 U
Dieldrin	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
Endosulfan II	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
Endosulfan sulfate	6.2 J	19 J	120 J	15 J	1.5 J	18 J	9 J	69 J	4.7 J	68 J
Endrin	3.6 U	2.9 J	5 J	11 U	0.82 J	4.7 J	1 J	11 J	0.73 J	8 J
Endrin aldehyde	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
gamma-BHC (Lindane)	3.6 U	7.3 U	10 U	11 U	0.94 J	7.5 U	1.2 J	26 U	1 J	20 U
gamma-Chlordane	4.1 J	14	36 J	10 J	1.8 U	7.5 U	6.1	48	3.3	43
Heptachlor epoxide	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	14 J	2 U	20 U
Polychlorinated biphenyls (PCBs)	485	998	4,400	942	98.4	867	296	7,190	198	3,680
Polychlorinated Biphenyl Congeners (PG/G)										
3,3',4,4'-Tetrachlorobiphenyl (77)	86.7	192	389	16.6 J	12.3 J	63 J	26.6	844	20.2	257 J
3,4,4',5-Tetrachlorobiphenyl (81)	13.8 U	21.9 U	54.9 U	13.1 U	14.1 U	14.9 U	18.5 U	95.7 U	12.7 U	14.9 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	791	1,580	4,270	1,800	152	1,210	385	16,900	269	4,410
2,3,4,4',5-Pentachlorobiphenyl (114)	13.8 U	14.6 U	36.9 U	13.1 U	14.1 U	14.9 U	46 U	31 U	22.1 U	294 U
2,3',4,4',5-Pentachlorobiphenyl (118)	4,160	8,130	29,500	9,410	800	6,480	1,850	137,000	1,270	24,200
2,3',4,4',5'-Pentachlorobiphenyl (123)	45.4	87.6 J	406	102	7.76 J	86.8 J	48.3 U	1,050	26.7 J	301 U
3,3',4,4',5-Pentachlorobiphenyl (126)	157	334	41.4 U	13.1 U	14.1 U	14.9 U	49.5 U	31.9 U	24.8 U	338 U
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	1,390	2,500	12,200	2,930	268	2,780	807	35,500	538	10,100
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	585	1,160	6,770	1,110	100	1,090	418	16,600	258	4,590
Decachlorobiphenyl (209)	58.8 B	109 B	611	106 B	10.1 B	76.8 B	52.1 B	1,200	29.2 B	318
Congeners (156/157)	2,340	4,330	23,000	4,950	440	4,510	1,400	59,800	905	16,700
Total Dichlorobiphenyls	64.8	63.7	33.4	81.9	14.4	34.4	22.9	103	14.1	57.9
Total Heptachlorobiphenyls	152,000	314,000	1,380,000	295,000	27,900	286,000	89,200	2,000,000	65,700	1,090,000
Total Hexachlorobiphenyls	223,000	451,000	1,680,000	465,000	50,100	431,000	145,000	3,100,000	95,000	1,880,000
Total Monochlorobiphenyls	1.96 U	2.32 U	0.983 U	3.8 U	1.61 U	1.9 U	1.72 U	3.62	2.04 U	2.16 U
Total Nonachlorobiphenyls	2,000	5,140	42,600	3,600	363	3,360	2,320	60,400	1,220	18,300
Total Octachlorobiphenyls	35,400	75,900	510,000	64,800	6,220	65,200	32,700	943,000	17,100	285,000
Total Pentachlorobiphenyls	46,400	98,200	494,000	76,900	9,220	64,200	20,800	904,000	14,300	317,000
Total Tetrachlorobiphenyls	25,200	51,100	299,000	34,600	4,420	16,700	5,920	177,000	4,450	82,800
Total Trichlorobiphenyls	826	2,090	3,840	1,200	187	643	96	4,740	236	1,560
Toxic Equivalents (Total TEQ)	16	34	2.32	0.611	0.0543	0.49	0.148	8.09	0.1	1.83
Total Metals (MG/KG)										
Arsenic	0.099 J	0.056 J	0.096 J	0.18 U	0.064 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Cadmium	0.029 U	0.028 U	0.028 U	0.027 U	0.029 U	0.029 U	0.028 U	0.028 U	0.028 U	0.029 U
Chromium	0.95 U	0.92 U	0.92 U	0.91 U	0.97 U	0.97 U	0.93 U	0.95 U	0.95 U	0.96 U
Copper	0.95 U	0.92 U	0.92 U	0.91 U	0.97 U	0.97 U	0.93 U	0.95 U	0.95 U	0.96 U
Mercury	0.017 J	0.028	0.011 J	0.026 J	0.092	0.022 J	0.12	0.047	0.1	0.044
Nickel	0.48 U	0.46 U	0.46 U	0.46 U	0.49 U	0.48 U	0.47 U	0.47 U	0.47 U	0.48 U
Selenium	0.21	0.2	0.19	0.28	0.11	0.18	0.13	0.16	0.095 U	0.15
Silver	0.0095 U	0.0092 U	0.0092 U	0.0091 U	0.0097 U	0.0097 U	0.0093 U	0.0095 U	0.0095 U	0.0096 U
Zinc	42	24	20	28	6.4	29	6.6	17	6.3	22
Wet Chemistry										
% Moisture (pct)	76	72	74	71	80	71	79	65	78	67
Lipids (%) (pct)	3.1	3.4	2	9.1	0.35	3.2	0.57	3	0.24	5

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Mem

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

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

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

U - The material was analyzed for, but not detected

MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

Table 15
Summary of Human Health Risk Screening Step 3 Chemicals of Potential Concern
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Media/Exposure Area	Step 1 COPCs	Step 2 COPCs	Step 3 COPCs
Surface water Penniman Lake	Dibenz(a,h)anthracene	None	N/A
Sediment Surface Sediment, Group 1 - Northwest Lobes and Drainages (North of Site 11)	Benzo(a)pyrene Aroclor-1260 Dieldrin Cobalt Lead	None	N/A
Subsurface Sediment, Group 1 - Northwest Lobes and Drainages (North of Site 11)	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Dieldrin Chromium[a]	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Dieldrin Chromium[a]	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Dieldrin Chromium[a]
Surface Sediment, Group 2 - Northwest Lobes and Drainages (South of Site 11)	Chromium[a] Iron	None	N/A
Subsurface Sediment, Group 2 - Northwest Lobes and Drainages (South of Site 11)	Chromium[a]	None	N/A
Surface Sediment, Group 3 - Northeast Lobe	None	N/A	N/A
Subsurface Sediment, Group 3 - Northeast Lobe	Aroclor-1260	None	N/A
Surface Sediment, Group 4a - Penniman Lake - Northwest	None	N/A	N/A
Subsurface Sediment, Group 4a - Penniman Lake - Northwest	Chromium[a]	None	N/A
Surface Sediment, Group 4b - Penniman Lake - Center	None	N/A	N/A
Subsurface Sediment, Group 4b - Penniman Lake - Center	Chromium[a]	None	N/A

Table 15
Summary of Human Health Risk Screening Step 3 Chemicals of Potential Concern
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Media/Exposure Area	Step 1 COPCs	Step 2 COPCs	Step 3 COPCs
Surface Sediment, Group 4c - Penniman Lake - East	Benzo(a)pyrene	None	N/A
Subsurface Sediment, Group 4c - Penniman Lake - East	Benzo(a)pyrene Chromium[a]	None	N/A
Surface Sediment, Group 5 - Kings Creek	Chromium[a]	None	N/A
Fish Penniman Lake	4,4'-DDE Aroclor-1260 PCBs Arsenic	4,4'-DDE Aroclor-1260 PCBs Arsenic	Not conducted, not enough samples
Soil Surface Soil, Group 1 - Drainages	Benzo(a)pyrene Benzo(b)fluoranthene Aroclor-1260 Dieldrin Nitroglycerin Aluminum Arsenic Chromium[a] Iron Vanadium	Benzo(a)pyrene Benzo(b)fluoranthene Aroclor-1260 Dieldrin Nitroglycerin Arsenic Chromium[a] Iron	Benzo(a)pyrene Benzo(b)fluoranthene Aroclor-1260 Dieldrin Nitroglycerin Arsenic Chromium[a]
Subsurface Soil, Group 1 - Drainages	Benzo(a)pyrene Aroclor-1260 Aluminum Arsenic Chromium[a] Cobalt Iron Vanadium	Benzo(a)pyrene Aroclor-1260 Arsenic Chromium[a] Cobalt Iron	Benzo(a)pyrene Aroclor-1260 Arsenic Chromium[a] Cobalt Iron
Surface Soil, Group 2a - Former Transformer - Pole	Aroclor-1260	None	N/A
Surface Soil, Group 2b - Former Transformer - Pad	None	N/A	N/A

Table 15

Summary of Human Health Risk Screening Step 3 Chemicals of Potential Concern

Penniman Lake Site Inspection - Step 2

Cheatham Annex

Williamsburg, Virginia

Media/Exposure Area	Step 1 COPCs	Step 2 COPCs	Step 3 COPCs
Surface Soil, Group 2c - Upgradient to Drainages	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene 4,4'-DDE Aroclor-1260 Aluminum Antimony Arsenic Chromium[a] Iron Vanadium	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene 4,4'-DDE Aroclor-1260 Antimony Arsenic Chromium[a] Iron	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene 4,4'-DDE Aroclor-1260 Antimony Arsenic Chromium[a] Iron
Subsurface Soil, Group 2c - Upgradient to Drainages	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Aluminum Arsenic Chromium[a] Cobalt Iron Manganese	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Arsenic Chromium[a] Iron	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Arsenic Chromium[a] Iron
Surface Soil, Group 2d - Potential Sprayed Areas	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Arsenic Chromium[a] Manganese	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Arsenic Chromium[a]	Not conducted, not enough samples
Subsurface Soil, Group 2d - Potential Sprayed Areas	Aluminum Arsenic Chromium[a] Iron Manganese	Arsenic Chromium[a] Iron	Not conducted, not enough samples

Notes:

[a] Total chromium identified as a COPC based on comparison to hexavalent chromium screening levels

Table 16
Summary of Ecological Risk Screening Step 3A Chemicals of Potential Concern for Further Risk Evaluatio
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Chemical	Surface Soil										Subsurface Soil					Terrestrial Food Web										Surface Water	Surface Sediment								Subsurface Sediment							Tissue			Aquatic Food Web							
	Group 1A	Group 1B	Group 1C	Group 1D	Group 1E	Group 1F	Group 2A	Group 2B	Group 2C	Group 2D	Group 1B	Group 1F	Group 2B	Group 2C	Group 2D	Group 1A	Group 1B	Group 1C	Group 1D	Group 1E	Group 1F	Group 2A	Group 2B	Group 2C	Group 2D	Penniman Lake	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C	Group 5	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C	Frog	Whole-Body Fish	Reconstituted Fish	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C
Inorganics																																																	
Arsenic																																										N								
Barium																											X	X	X	X	X	X	X		X		X	X	X	X	X										
Beryllium																											N	N		N					N			N	N	N	N										
Cadmium																												X																						
Chromium																												X													N										
Copper																											X	X			X	X	X		X				X	X					X						
Cyanide																											N		N	N			N		N															
Iron																												X								X		X	X	X	X									
Lead		X																									X	X		X	X	X			X			X	X	X										
Manganese										X																																								
Mercury		X							X																					X	X							X	X			N						X		
Nickel																											X								X							X								
Selenium																																										N								
Silver																																										N								
Vanadium																												X																						
Zinc		X							X	X																	X	X		X	X	X			X	X			X			X							
PCBs																																																	
Aroclor-1260	X	X														X	X					X			X		X								X										X					
Total PCBs																																												X	X	X	X	X	X	X
Dioxin-like PCBs																																										N								
Pesticides																																																	
4,4'-DDE		X							X																																								
4,4'-DDT		X							X	X																																N								
Aldrin																											X								X															
alpha-BHC																																										N								
beta-BHC																																										N								
Dieldrin		X															X																		X							N								
Endosulfan II		X								X																									X		X					N								
Endosulfan sulfate		X							X		X			X													X								X							N								
Endrin		X							X					X																																				
Endrin aldehyde		X							X	X																																							
Endrin ketone		X							X	X				X																																			
gamma-BHC (lindane)																																										N								
gamma-Chlordane																																										N								
Heptachlor																																		X															
Heptachlor epoxide																																										N								
Methoxychlor																																					X												

Table 16
Summary of Ecological Risk Screening Step 3A Chemicals of Potential Concern for Further Risk Evaluatio
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Chemical	Surface Soil										Subsurface Soil					Terrestrial Food Web										Surface Water	Surface Sediment								Subsurface Sediment							Tissue			Aquatic Food Web							
	Group 1A	Group 1B	Group 1C	Group 1D	Group 1E	Group 1F	Group 2A	Group 2B	Group 2C	Group 2D	Group 1B	Group 1F	Group 2B	Group 2C	Group 2D	Group 1A	Group 1B	Group 1C	Group 1D	Group 1E	Group 1F	Group 2A	Group 2B	Group 2C	Group 2D	Penniman Lake	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C	Group 5	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C	Frog	Whole-Body Fish	Reconstituted Fish	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C
Semivolatile Organic Compounds																																																	
Acetophenone																											N			N	N																		
Benzaldehyde																											N	N	N	N	N				N	N		N	N										
Di-n-octylphthalate																											N	N		N	N		N			N														
Dibenzofuran																																			X														
HMW PAHs									X																										X														
LMW PAHs																											X								X														
Total PAHs																																			X														
Volatile Organic Compounds																																																
Acetone																																						N	N	N	N								
Carbon disulfide																																			X		X	X		X	X							
Chloromethane																												N																				
Methyl acetate																													N																			
Methylcyclohexane																											N		N																			
Explosives																																																
1,3-Dinitrobenzene																													X						X		X											
HMX																													X																			
Nitroglycerin																														N	N	N	N					N	N	N	N							
Tetryl																													N	N	N																	

Notes:
X - COPC based on exceedance of ESV/UTL; gray shading indicates risk drive
N - COPC based on detection and no ESV

Figures

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_1_BASE_AND_SITE_LOCATION_MAP.MXD JCROCKETT 3/20/2014 1:18:43 PM

Legend

- Cheatham Annex Boundary
- Approximate Study Area Boundary

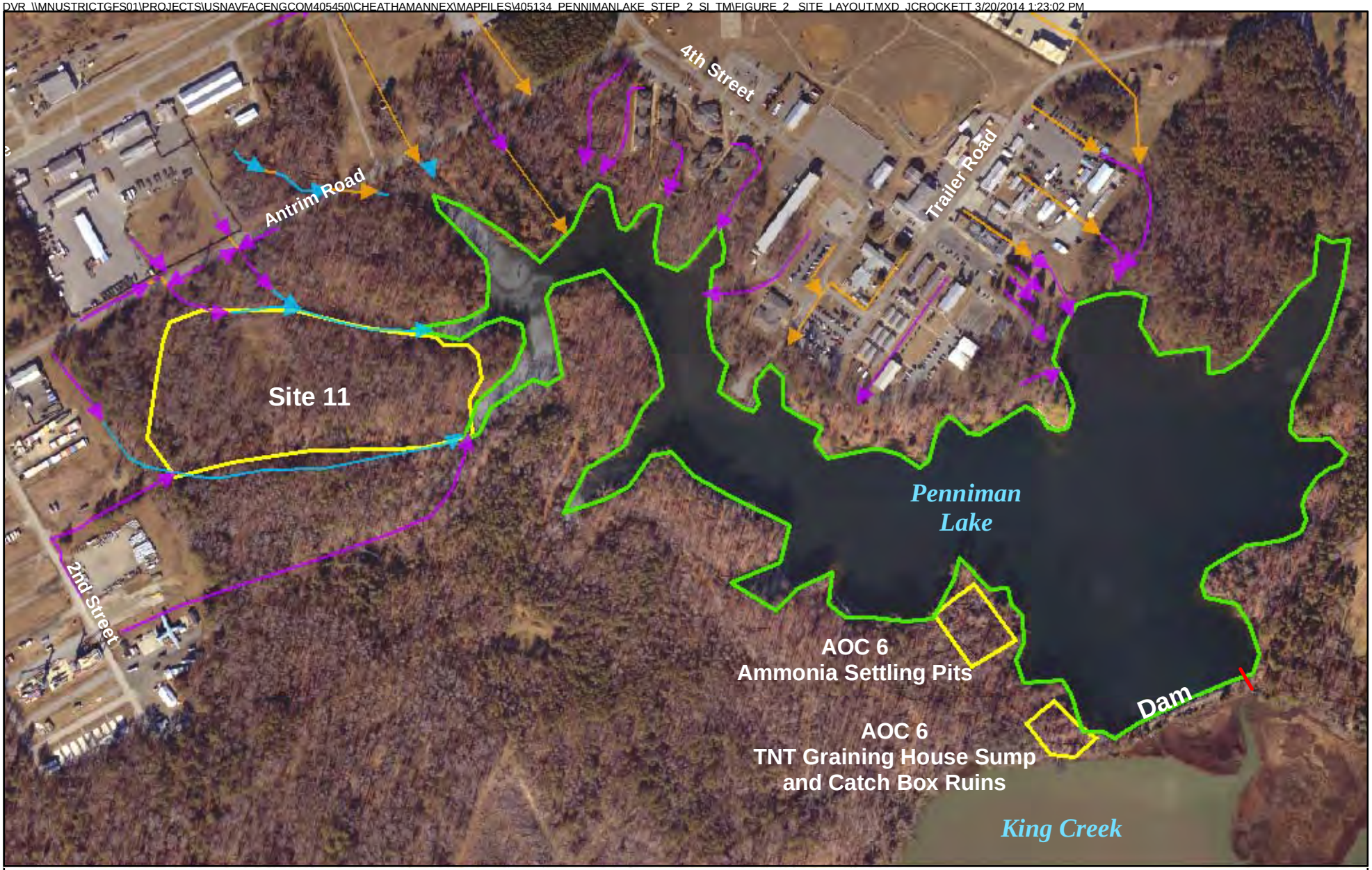
N
W E
S

0 1,000 2,000
Feet

Figure 1
Base and Site Location Map
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_2_SITE_LAYOUT.MXD JCROCKETT 3/20/2014 1:23:02 PM



Legend

- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Adjacent Environmental Restoration Program Sites
- Approximate Study Area Boundary

N
W E
S

0 225 450
Feet

Figure 2
Penniman Lake and Vicinity Detail
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

Legend

- Surface and Subsurface Sediment Sample Locations (October/November 2012)
- Surface and Subsurface Sediment and Surface Water Sample Locations (October/November 2012)
- Sediment Sample Location (July/August 2011)
- Surface and Subsurface Sediment Sample Location - AOC 6 Site Inspection (SI) (October 2008)
- Surface and Subsurface Sediment Sample Location – Site 11 Remedial Investigation (RI) (June 2002)
- Surface Sediment Sample Location – Pond Study (June 2002)
- Soil Sample Location (October/November 2012)
- Surface Soil Sample Location (August 2011)
- Inlet
- Basin
- Outfall Point
- Water Utility Infrastructure
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Fish Sample Collection Area (October 2012)
- Frog Sample Collection Area (October 2012)
- Shoreline

N
W E
S

0 125 250
Feet

Figure 3
Soil, Sediment, Surface Water, and Tissue Sample Locations
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

CH2MHILL.

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_4_SURFACE_SEDIMENT_SAMPLE_LOCS.MXD JCROCKETT 3/20/2014 1:34:06 PM

Legend

- Sediment and Surface Water Sample Location
- Shoreline

N
W E
S

0 130 260
Feet

Figure 4
Reference Sediment and Surface Water Locations – Cheatham Pond
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_11_STEP1_AND_STEP2_AROCLOR1260_EXCEEDANCES_SSSB.MXD JMONTI 10/31/2014 8:38:53 AM

	CAX 95% UTL BKG SS/SB	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Polychlorinated Biphenyls (µg/kg)			
Aroclor-1260	--	240	8,000

Legend

Step 1 Locations (July/August 2011)
- Surface Soil Sample Locations

Step 2 Locations (October/November 2012)
- Surface and Subsurface Soil Locations - Drainages
- Surface and Subsurface Soil Locations - Former Pad Mounted Transformer (PCB 1260)
- Surface and Subsurface Soil Locations - Other Upland Areas
- Surface and Subsurface Soil Locations - Upgradient to Drainage Ditches
- Surface Soil Locations - Pole Mounted Transformer
- Elevation Contours (ft amsl)

Note:
Textboxes only show data for Aroclor-1260 that exceed one or more criteria.
Bold text indicates exceedance of Residential Soils RSLs (May 2014)
Shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
PCB - Polychlorinated Biphenyl
J - Analyte present, value may or may not be accurate or precise
L - Analyte present, value may biased low, actual value may be higher
µg/kg - Micrograms per kilogram

* Duplicate sample collected, most conservative presented
SS01 through SS26 collected during Step 1 of the SI in July/August 2011
SS27 through SS75, and SB34 through SB75 collected during Step 1 of the SI in October and November 2012

Figure 5
Surface and Subsurface Soil – Step 1 and Step 2 Aroclor-1260 Exceedance Results
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_5_SS_LOCS_AND_EXCEEDANCES_TRANSFORMERLOCS.MXD JMONTI 10/31/2014 8:31:32 AM

Sample ID	CAPL-SS31-1012
Sample Date	10/31/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**627**

Sample ID	CAPL-SS27-1012
Sample Date	10/31/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**4,350 J**

	CAX 95% UTL SS Background	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Polychlorinated Biphenyls (µg/kg)			
Aroclor-1260	--	240	8,000

Legend
- Surface Soil Locations - Pole Mounted Transformer
- Surface and Subsurface Soil Locations - Former Pad Mounted Transformer (PCB 1260)
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Notes:
Underline indicates exceedance of CAX 95% UTL Surface Soil (SS) Background value
Bold text indicates exceedance of Adjusted Residential Soil RSLs (May 2014)
Shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
PCBs - Polychlorinated Biphenyls
J - Analyte present, value may or may not be accurate or precise
µg/kg - Micrograms per kilogram

Figure 6
Surface Soil PCB Exceedance Results – Transformer Locations
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_7_SS_SAMPLE_LOCS_AND_EXCEEDANCES_OTHERUPLANDAREAS.MXD JMONTI 11/5/2014 8:39:30 AM

Sample ID	CAPL-SS73-1112
Sample Date	11/05/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**4,630 J**

Sample ID	CAPL-SS75-1112
Sample Date	11/05/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**357 J**

	CAX 95% UTL BKG SS	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Polychlorinated Biphenyls (µg/kg)			
Aroclor-1260	--	240	8,000

Legend

- Surface and Subsurface Soil Locations - Other Upland Areas
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Underline indicates exceedance of CAX 95% UTL BKG SS
Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)
Grey shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
µg/kg - Micrograms per kilogram

Figure 7
Surface Soil PCB and Explosives Exceedance Results – Other Upland Areas
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

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Sample ID	CAPL-SS49-1012*
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**589 J**

Sample ID	CAPL-SS48-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**1,600 J**

Sample ID	CAPL-SS50-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**1,170 J**

Sample ID	CAPL-SS47-1012
Sample Date	10/26/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**9,980 J**

Sample ID	CAPL-SS46-1012
Sample Date	10/26/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**16,500 J**

Sample ID	CAPL-SS58-1012
Sample Date	10/26/12
Explosives (µg/kg)	
Nitroglycerin	**866 J**

	CAX 95% UTL BKG SS	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Polychlorinated Biphenyls (µg/kg)			
Aroclor-1260	--	240	8,000
Explosives (µg/kg)			
Nitroglycerin	--	620	--

Legend

- Surface and Subsurface Soil Locations - Drainages
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Underline indicates exceedance of CAX 95% UTL BKG SS
Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)
Grey shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
µg/kg - Micrograms per kilogram

Figure 8
Surface Soil PCB and Explosives Exceedance Results – Drainage Locations
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

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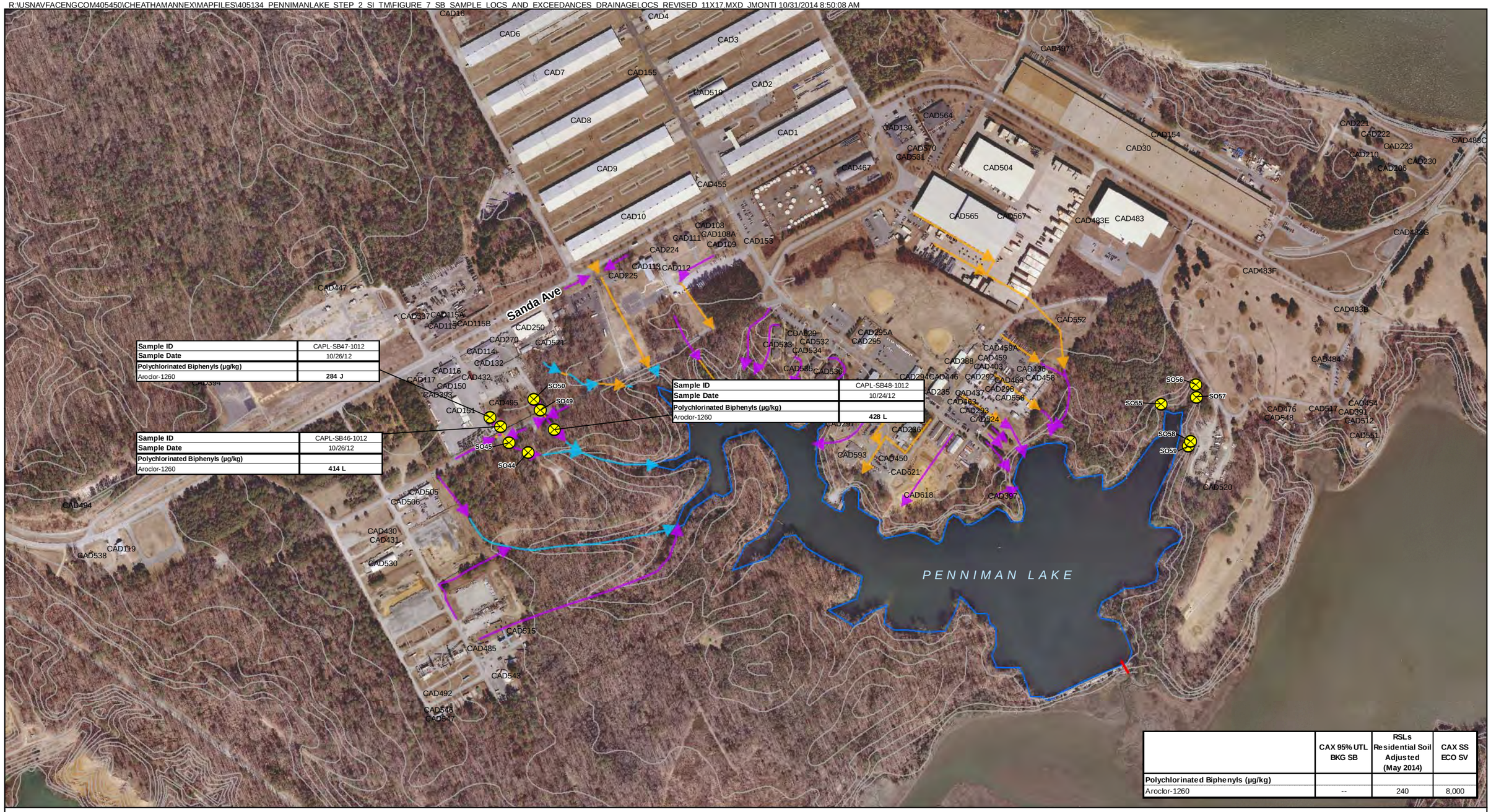

Sample ID	CAPL-SB47-1012
Sample Date	10/26/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**284 J**

Sample ID	CAPL-SB48-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**428 L**

Sample ID	CAPL-SB46-1012
Sample Date	10/26/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**414 L**

	CAX 95% UTL BKG SB	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Polychlorinated Biphenyls (µg/kg)			
Aroclor-1260	--	240	8,000

Legend

- Surface and Subsurface Soil Locations - Drainages
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Notes:

Underline indicates exceedance of CAX 95% UTL Surface Soil (SS) Background value

Bold text indicates exceedance of Adjusted Residential Soil RSLs (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

PCBs - Polychlorinated Biphenyls

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

µg/kg - Micrograms per kilogram

Figure 9

Subsurface Soil PCB and Explosives Exceedance Results – Drainage Locations

Penniman Lake Site Inspection – Step 2

Cheatham Annex

Williamsburg, Virginia

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Feet

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Sample ID	CAPL-SS69-1112*
Sample Date	11/01/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**283 J**

Sample ID	CAPL-SS66-1112
Sample Date	11/01/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**2,770 J**

Sample ID	CAPL-SS63-1112
Sample Date	11/01/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**397**

Sample ID	CAPL-SS61-1112
Sample Date	11/01/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**627 J**

	CAX 95% UTL BKG SS	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Polychlorinated Biphenyls (µg/kg)			
Aroclor-1260	--	240	8,000

Legend

- Surface and Subsurface Soil Locations - Upgradient to Drainage Ditches
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Notes:

Underline indicates exceedance of CAX 95% UTL Surface Soil (SS) Background value

Bold text indicates exceedance of Adjusted Residential Soil RSLs (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

PCBs - Polychlorinated Biphenyls

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

µg/kg - Micrograms per kilogram

Figure 10

Surface Soil PCB and Explosives Exceedance Results – Upgradient to Drainage Locations

Penniman Lake Site Inspection – Step 2

Cheatham Annex

Williamsburg, Virginia

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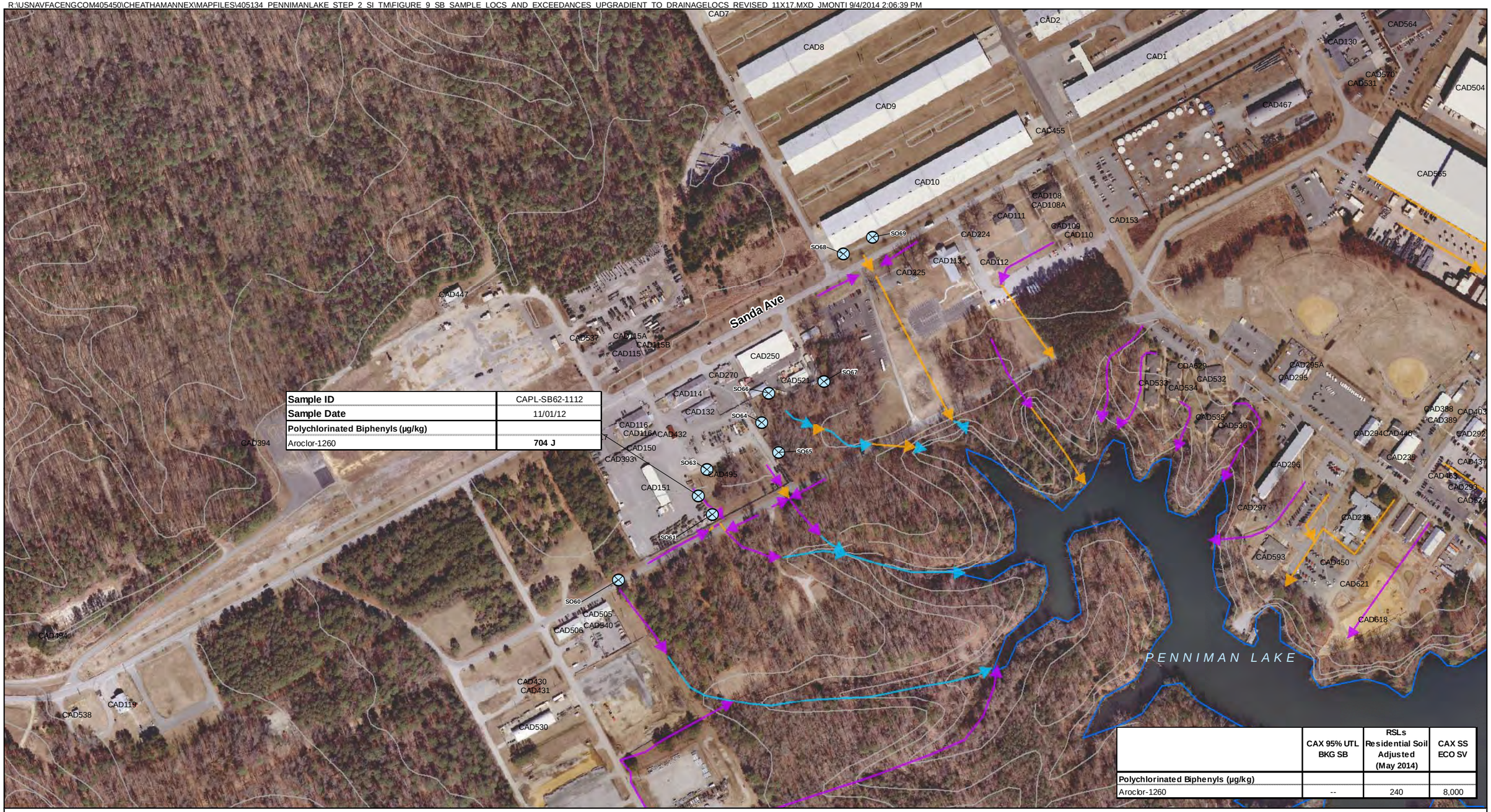

Sample ID	CAPL-SB62-1112
Sample Date	11/01/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**704 J**

	CAX 95% UTL BKG SB	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Polychlorinated Biphenyls (µg/kg)			
Aroclor-1260	--	240	8,000

Legend

- Surface and Subsurface Soil Locations - Drainages
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Notes:

Underline indicates exceedance of CAX 95% UTL Surface Soil (SS) Background value

Bold text indicates exceedance of Adjusted Residential Soil RSLs (May 2014)

Shading indicates exceedance of CAX SS ECO SV

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

PCBs - Polychlorinated Biphenyls

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

µg/kg - Micrograms per kilogram

Figure 11

Subsurface Soil PCB and Explosives Exceedance Results – Upgradient to Drainage Locations

Penniman Lake Site Inspection – Step 2

Cheatham Annex

Williamsburg, Virginia

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Sample ID	CAPL-SD85-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**8,300 J**

Sample ID	CAPL-SD87-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Arodor-1260	**3,780 J**

Sample ID	CAPL-SD70-1012	CAPL-SD70-1012-V
Sample Date	10/17/12	10/25/12
Polychlorinated Biphenyls (µg/kg)		
Arodor-1260	**8,240**	NA

Sample ID	CAPL-SD84-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**16,200 J**

Sample ID	CAPL-SD64-1012*	CAPL-SD64-1012-V*
Sample Date	10/17/12	10/25/12
Polychlorinated Biphenyls (µg/kg)		
Arodor-1260	84.7 J	NA

Sample ID	CAPL-SD86-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**4,090 J**

Sample ID	CAPL-SD63-1012	CAPL-SD63-1012-V
Sample Date	10/17/12	10/25/12
Polychlorinated Biphenyls (µg/kg)		
Aroclor-1260	1,270 J	NA

Sample ID	CAPL-SD62-1012	CAPL-SD62-1012-V
Sample Date	10/17/12	10/25/12
Polychlorinated Biphenyls (µg/kg)		
Aroclor-1260	140 J	NA

Sample ID	CAPL-SD69-1012
Sample Date	10/17/12
Explosives (µg/kg)	
2,4,6-Trinitrotoluene	125 J

Sample ID	CAPL-SD73-1012*	CAPL-SD73-1012-V*
Sample Date	10/17/12	10/25/12
Polychlorinated Biphenyls (µg/kg)		
Aroclor-1260	78.5 J	NA

Sample ID	CAPL-SD76-1012
Sample Date	10/16/12
Explosives (µg/kg)	
1,3-Dinitrobenzene	469 J

Sample ID	CAPL-SD65-1012
Sample Date	10/18/12
Polychlorinated Biphenyls (µg/kg)	
Arodor-1260	63.6

Sample ID	CAPL-SD78-1012
Sample Date	10/16/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	66.1 L
Explosives (µg/kg)	
1,3-Dinitrobenzene	151 J

Sample ID	CAPL-SD77-1012
Sample Date	10/16/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	720 J
Explosives (µg/kg)	
1,3-Dinitrobenzene	303 J

Sample ID	CAPL-SD79-1012*
Sample Date	10/16/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	354 J
Explosives (µg/kg)	
1,3-Dinitrobenzene	384 J
HMX	464 J

Sample ID	CAPL-SD80-1012
Sample Date	10/16/12
Polychlorinated Biphenyls (µg/kg)	
Arodor-1260	156

Sample ID	CAPL-SD66-1012
Sample Date	10/18/12
No Exceedances	

Sample ID	CAPL-SD67-1012
Sample Date	10/16/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	914 L

	Adjusted Residential RSL x 10 for SD 0514	CAX Freshwater Sediment ESV	CAX Marine Sediment ESV[1]
Polychlorinated Biphenyls (µg/kg)			
Aroclor-1260	2,400	59.8	48.0
Explosives (µg/kg)			
1,3-Dinitrobenzene	6,200	6.7	--
2,4,6-Trinitrotoluene	36,000	92	20,000
HMX	3,800,000	4.74	115,000

Legend

- Surface Water, Surface Sediment, and Subsurface Sediment Sample Locations
- Surface and Subsurface Sediment Sample Locations
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Bold text indicates exceedance of Adjusted Residential Soil RSL x 10 for Sediment (May 2014)
Shading indicates exceedance of CAX Freshwater Sediment ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
L - Analyte present, value may be biased low, actual value may be higher
µg/kg - Micrograms per kilogram
* a duplicate was collected at this location, the higher of the two results is shown.

Figure 12
Surface Sediment PCB and Explosives Exceedance Results
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

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Sample ID	CAPL-SSD84-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**34,200 J**

Sample ID	CAPL-SSD85-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	1,840 J

Sample ID	CAPL-SSD86-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**3,700 J**

Sample ID	CAPL-SSD87-1012
Sample Date	10/24/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	138 L

Sample ID	CAPL-SSD62-1012
Sample Date	10/17/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	169 J

Sample ID	CAPL-SSD77-1012
Sample Date	10/16/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	1,170

Sample ID	CAPL-SSD70-1012
Sample Date	10/17/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	2,030 J
Explosives (µg/kg)	
1,3-Dinitrobenzene	551

Sample ID	CAPL-SSD63-1012
Sample Date	10/17/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	217 J

Sample ID	CAPL-SSD78-1012
Sample Date	10/16/12
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**3,020 J**
Explosives (µg/kg)	
1,3-Dinitrobenzene	456

Sample ID	CAPL-SSD79-1012	CAPL-SSD79-1012-V
Sample Date	10/16/12	10/25/2012
Polychlorinated Biphenyls (µg/kg)		
Aroclor-1260	630 J	NA
Explosives (µg/kg)		
1,3-Dinitrobenzene	117 J	NA

Sample ID	CAPL-SSD67-1012	CAPL-SSD67-1012-V
Sample Date	10/16/12	10/25/2012
Polychlorinated Biphenyls (µg/kg)		
Aroclor-1260	230 L	NA

	Adjusted Residential RSL x 10 for SD (May 2014)	CAX Freshwater Sediment ESV
Polychlorinated Biphenyls (µg/kg)		
Aroclor-1260	2,400	59.8
Explosives (µg/kg)		
1,3-Dinitrobenzene	6,200	6.7

Legend
- Surface Water, Surface Sediment, and Subsurface Sediment Sample Locations
- Surface and Subsurface Sediment Sample Locations
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Bold text indicates exceedance of Adjusted Residential Soil RSL x 10 for Sediment (May 2014)
Shading indicates exceedance of CAX Freshwater Sediment ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
L - Analyte present, value may be biased low, actual value may be higher
µg/kg - Micrograms per kilogram
* a duplicate was collected at this location, the higher of the two results is shown.

Figure 13
Subsurface Sediment PCB and Explosives Exceedance Results
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

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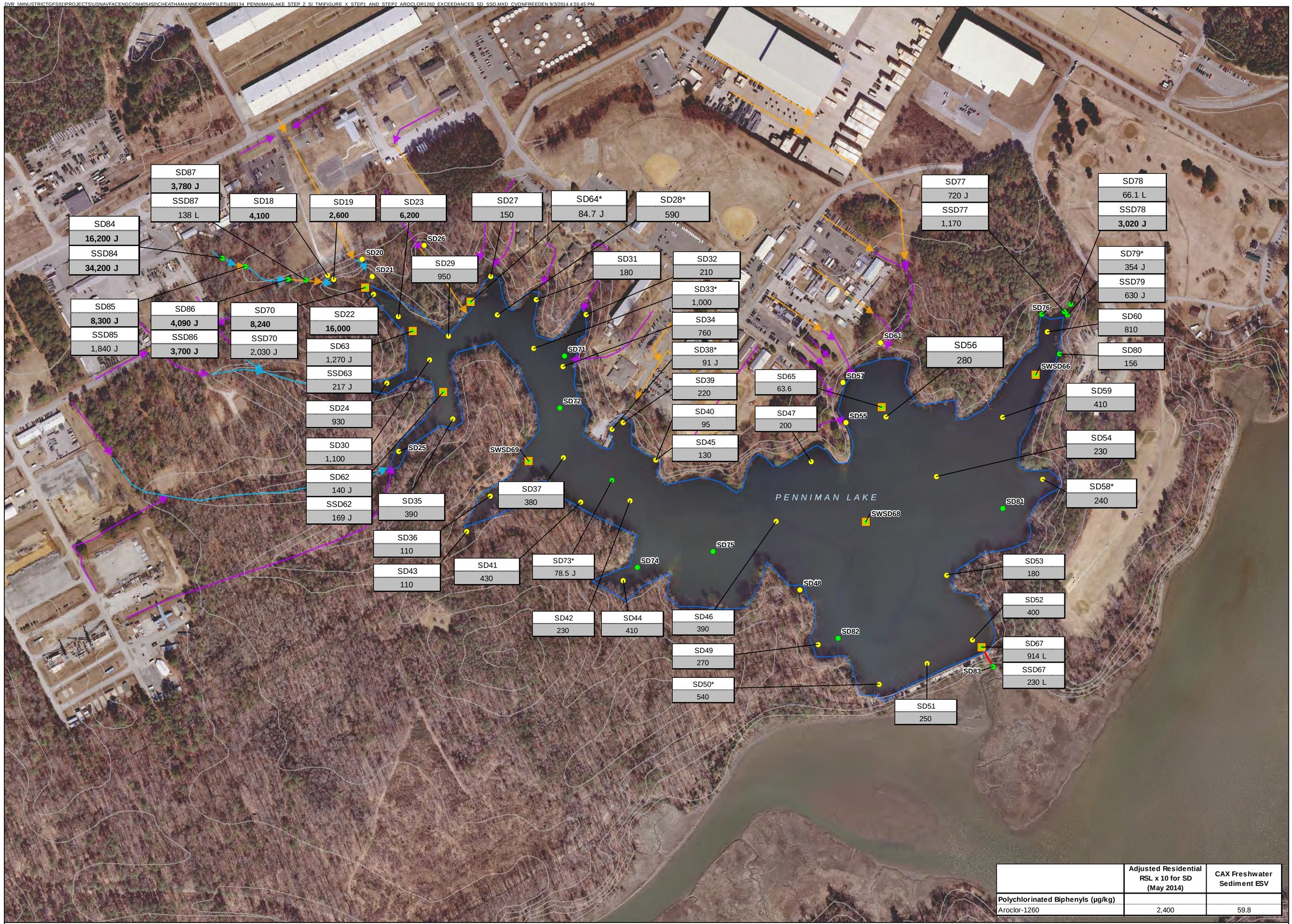

	Adjusted Residential RSL x 10 for SD (May 2014)	CAX Freshwater Sediment ESV
Polychlorinated Biphenyls (µg/kg)		
Aroclor-1260	2,400	59.8

Legend

Step 1 Locations (July/August 2011)
- Surface and Subsurface Sediment Sample Locations

Step 2 Locations (October/November 2012)
- Surface and Subsurface Sediment Sample Locations
- Surface Water, Surface Sediment, and Subsurface Sediment Sample Locations
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)

Note:
Sample ID starting with "SD##" indicates surface sediment sample
Sample ID starting with "SSD##" indicates subsurface sediment sample
Textboxes only show data for Aroclor-1260 that exceed one or more criteria.
Bold text indicates exceedance of Adjusted Residential Soil RSL x 10 for Sediment (May 2014)
Shading indicates exceedance of CAX Freshwater Sediment ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
PCB - Polychlorinated Biphenyl
J - Analyte present, value may or may not be accurate or precise

L - Analyte present, value may be biased low, actual value may be higher
* Duplicate sample collected, most conservative presented
µg/kg - Micrograms per kilogram
SD18 through SD61 collected during Step 1 of the SI in July and August 2011
SD62 through SD87 collected during Step 2 of the SI in October and November 2012

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Figure 14
Surface and Subsurface Sediment - Step 1 and Step 2 Aroclor-1260 Exceedance Results
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, VA

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Sample ID	CAPL-TS07-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDE	2.1
4,4'-DDT	5.5 J
Dieldrin	1.6 J
Endosulfan sulfate	4.4 J
gamma-Chlordane	2
Polychlorinated biphenyls (PCBs)	1,240
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	30.9 J
3,4,4',5-Tetrachlorobiphenyl (81)	8.82 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	450
2,3,4,4',5-Pentachlorobiphenyl (114)	70.7
2,3',4,4',5-Pentachlorobiphenyl (118)	1,170
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	70.6
3,3',4,4',5-Pentachlorobiphenyl (126)	227
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	5,560
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	3,530
Decachlorobiphenyl (209)	187
Congeners (156/157)	10,800
Total Dichlorobiphenyls	38.1
Total Heptachlorobiphenyls	602,000
Total Hexachlorobiphenyls	436,000
Total Nonachlorobiphenyls	13,400
Total Octachlorobiphenyls	162,000
Total Pentachlorobiphenyls	21,900
Total Tetrachlorobiphenyls	8,500
Total Trichlorobiphenyls	540
Toxic Equivalents (Total TEQ)	23.6
Total Metals (MG/KG)	
Arsenic	0.064 J
Cadmium	0.094
Copper	1.6
Mercury	0.023 J
Nickel	0.27 J
Selenium	0.29
Silver	0.007 J
Zinc	21
Wet Chemistry	
% Moisture (pct)	77
Lipids (%) (pct)	1.9

Sample ID	CAPL-TS08-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
beta-BHC	1 J
Polychlorinated biphenyls (PCBs)	51
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	5.35 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	53.7
2,3',4,4',5-Pentachlorobiphenyl (118)	373
2,3,4,4',5-Pentachlorobiphenyl (123)	10.8 J
3,3',4,4',5-Pentachlorobiphenyl (126)	13.8 J
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	202
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	87.2
Congeners (156/157)	269
Total Dichlorobiphenyls	32.2
Total Heptachlorobiphenyls	12,000
Total Hexachlorobiphenyls	19,200
Total Nonachlorobiphenyls	240
Total Octachlorobiphenyls	2,500
Total Pentachlorobiphenyls	7,280
Total Tetrachlorobiphenyls	9,530
Total Trichlorobiphenyls	246
Toxic Equivalents (Total TEQ)	1.41
Total Metals (MG/KG)	
Arsenic	0.065 J
Cadmium	0.044
Copper	1.5
Mercury	0.027 J
Selenium	0.28
Silver	0.0066 J
Zinc	13
Wet Chemistry	
% Moisture (pct)	77
Lipids (%) (pct)	1

Sample ID	CAPL-TS06-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	1.1 J
4,4'-DDT	5.6 J
beta-BHC	2.4
Endosulfan sulfate	4.2 J
gamma-Chlordane	1.7 J
Polychlorinated biphenyls (PCBs)	2,510
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	11 J
3,4,4',5-Tetrachlorobiphenyl (81)	11.1 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	567
2,3,4,4',5-Pentachlorobiphenyl (114)	166
2,3',4,4',5-Pentachlorobiphenyl (118)	19,100
2,3,4,4',5-Pentachlorobiphenyl (123)	79.7
3,3',4,4',5-Pentachlorobiphenyl (126)	430 J
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	11,900
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	6,350
Decachlorobiphenyl (209)	260
Congeners (156/157)	25,500
Total Dichlorobiphenyls	29
Total Heptachlorobiphenyls	1,150,000
Total Hexachlorobiphenyls	1,030,000
Total Nonachlorobiphenyls	19,800
Total Octachlorobiphenyls	275,000
Total Pentachlorobiphenyls	31,500
Total Tetrachlorobiphenyls	4,340
Total Trichlorobiphenyls	189
Toxic Equivalents (Total TEQ)	44.9
Total Metals (MG/KG)	
Arsenic	0.068 J
Cadmium	0.085
Copper	2.1
Mercury	0.021 J
Nickel	0.51
Selenium	0.25
Silver	0.0029 J
Zinc	24
Wet Chemistry	
% Moisture (pct)	81
Lipids (%) (pct)	0.95

Sample ID	CAPL-TS09-1012
Sample Date	10/24/12
Polychlorinated biphenyls (PCBs)	81.4
Pesticide/Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	24.4
3,4,4',5-Tetrachlorobiphenyl (81)	2.44 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	291
2,3',4,4',5-Pentachlorobiphenyl (118)	849
2,3',4,4',5-Pentachlorobiphenyl (123)	14.7 J
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	326
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	133
Decachlorobiphenyl (209)	83.2
Congeners (156/157)	507
Total Dichlorobiphenyls	64.8
Total Heptachlorobiphenyls	25,500
Total Hexachlorobiphenyls	38,900
Total Nonachlorobiphenyls	660
Total Octachlorobiphenyls	7,510
Total Pentachlorobiphenyls	6,100
Total Tetrachlorobiphenyls	2,440
Total Trichlorobiphenyls	121
Toxic Equivalents (Total TEQ)	0.0668
Total Metals (MG/KG)	
Arsenic	1.9
Cadmium	0.19
Chromium	3.1
Copper	1.8
Mercury	0.027
Nickel	1.1
Selenium	0.48
Silver	0.0062 J
Zinc	28
Wet Chemistry	
% Moisture (pct)	76
Lipids (%) (pct)	1.9

Sample ID	CAPL-TS01-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDE	2.3
Endosulfan II	1.1 J
Endosulfan sulfate	4.7 J
gamma-BHC (Lindane)	1.3 J
Polychlorinated biphenyls (PCBs)	1,400
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	20 J
3,4,4',5-Tetrachlorobiphenyl (81)	9.19 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	241 K
2,3',4,4',5-Pentachlorobiphenyl (118)	5,950 K
3,3',4,4',5-Pentachlorobiphenyl (126)	250 K
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	6,920 K
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	5,220
Decachlorobiphenyl (209)	367
Congeners (156/157)	11,700 K
Total Dichlorobiphenyls	32.4
Total Heptachlorobiphenyls	735,000
Total Hexachlorobiphenyls	383,000
Total Nonachlorobiphenyls	20,600
Total Octachlorobiphenyls	230,000
Total Pentachlorobiphenyls	20,500
Total Tetrachlorobiphenyls	11,900
Total Trichlorobiphenyls	316
Toxic Equivalents (Total TEQ)	25.9
Total Metals (MG/KG)	
Arsenic	0.25
Cadmium	0.08
Copper	2.5
Mercury	0.044
Selenium	0.4
Silver	0.0078 J
Zinc	33
Wet Chemistry	
% Moisture (pct)	76

Sample ID	CAPL-TS02-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
beta-BHC	1.4 J
Polychlorinated biphenyls (PCBs)	38.4
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	3.47 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	29.8
2,3',4,4',5-Pentachlorobiphenyl (118)	313
2,3,4,4',5-Pentachlorobiphenyl (123)	7.32 J
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	180
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	81.9
Congeners (156/157)	235
Total Dichlorobiphenyls	28.9
Total Heptachlorobiphenyls	10,300
Total Hexachlorobiphenyls	14,500
Total Nonachlorobiphenyls	213
Total Octachlorobiphenyls	2,510
Total Pentachlorobiphenyls	4,500
Total Tetrachlorobiphenyls	6,070
Total Trichlorobiphenyls	171
Toxic Equivalents (Total TEQ)	0.0258
Total Metals (MG/KG)	
Arsenic	0.1 J
Cadmium	0.03
Copper	0.94 J
Mercury	0.024 J
Selenium	0.36
Silver	0.0096 J
Zinc	18
Wet Chemistry	
% Moisture (pct)	80

Sample ID	CAPL-TS11-WB-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	3 J
4,4'-DDE	27
4,4'-DDT	4.4 J
beta-BHC	1.5 J
Endosulfan sulfate	9.8 J
Endrin	3.1 J
gamma-Chlordane	6.2
Polychlorinated biphenyls (PCBs)	743
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	55.1
2,3,3',4,4'-Pentachlorobiphenyl (105)	1,000
2,3',4,4',5-Pentachlorobiphenyl (118)	5,690
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	2,270
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	875
Congeners (156/157)	3,530
Total Dichlorobiphenyls	45.2
Total Heptachlorobiphenyls	239,000
Total Hexachlorobiphenyls	356,000
Total Nonachlorobiphenyls	2,660
Total Octachlorobiphenyls	45,000
Total Pentachlorobiphenyls	68,300
Total Tetrachlorobiphenyls	30,100
Total Trichlorobiphenyls	937
Toxic Equivalents (Total TEQ)	0.407
Total Metals (MG/KG)	
Mercury	0.014 J
Selenium	0.18
Zinc	21
Wet Chemistry	
% Moisture (pct)	77
Lipids (%) (pct)	1.8

Sample ID	CAPL-TS17-O-1012
Sample Date	10/10/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	13 J
4,4'-DDE	140
4,4'-DDT	39 J
Aroclor-1260	4,500
Endosulfan sulfate	69 J
Endrin	11 J
gamma-Chlordane	48
Heptachlor epoxide	14 J
Polychlorinated biphenyls (PCBs)	7,190
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	844
2,3,3',4,4'-Pentachlorobiphenyl (105)	16,900
2,3',4,4',5-Pentachlorobiphenyl (118)	137,000
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	35,500
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	16,600
Decachlorobiphenyl (209)	1,200
Congeners (156/157)	59,800
Total Dichlorobiphenyls	103
Total Heptachlorobiphenyls	2,000,000
Total Hexachlorobiphenyls	3,100,000
Total Nonachlorobiphenyls	3,62
Total Octachlorobiphenyls	60,400
Total Pentachlorobiphenyls	943,000
Total Tetrachlorobiphenyls	904,000
Total Trichlorobiphenyls	177,000
Toxic Equivalents (Total TEQ)	4,740
Total Metals (MG/KG)	
Mercury	8.09
Selenium	0.16
Zinc	17
Wet Chemistry	
% Moisture (pct)	65
Lipids (%) (pct)	3

Sample ID	CAPL-TS17-F-1012
Sample Date	10/10/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	1.7 J
4,4'-DDE	14
4,4'-DDT	3.9 J
alpha-Chlordane	1.5 J
Aroclor-1260	370
beta-BHC	1.8 J
delta-BHC	1.5 J
Endosulfan sulfate	9 J
Endrin	1 J
gamma-BHC (Lindane)	1 J
gamma-Chlordane	1.2 J
Polychlorinated biphenyls (PCBs)	296
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	26.6
2,3,3',4,4'-Pentachlorobiphenyl (105)	385
2,3',4,4',5-Pentachlorobiphenyl (118)	1,850
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	807
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	418
Congeners (156/157)	1,400
Total Dichlorobiphenyls	22.9
Total Heptachlorobiphenyls	89,200
Total Hexachlorobiphenyls	145,000
Total Nonachlorobiphenyls	2,320
Total Octachlorobiphenyls	32,700
Total Pentachlorobiphenyls	20,800
Total Tetrachlorobiphenyls	5,920
Total Trichlorobiphenyls	96
Toxic Equivalents (Total TEQ)	0.148
Total Metals (MG/KG)	
Mercury	0.12
Selenium	0.13
Zinc	6.6
Wet Chemistry	
% Moisture (pct)	79
Lipids (%) (pct)	0.57

Sample ID	CAPL-TS18-F-1012
Sample Date	10/10/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	1.1 J
4,4'-DDE	7 J
4,4'-DDT	1.5 J
alpha-Chlordane	2 J
Aroclor-1260	140
beta-BHC	1.5 J
Endosulfan sulfate	4.7 J
Endrin	0.73 J
gamma-BHC (Lindane)	1 J
gamma-Chlordane	3.3
Polychlorinated biphenyls (PCBs)	198
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	20.2
2,3,3',4,4'-Pentachlorobiphenyl (105)	269
2,3',4,4',5-Pentachlorobiphenyl (118)	1,270
2,3,4,4',5-Pentachlorobiphenyl (123)	26.7 J
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	538
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	258
Congeners (156/157)	905
Total Dichlorobiphenyls	14.1
Total Heptachlorobiphenyls	65,700
Total Hexachlorobiphenyls	95,000
Total Nonachlorobiphenyls	1,220
Total Octachlorobiphenyls	17,100
Total Pentachlorobiphenyls	14,300
Total Tetrachlorobiphenyls	4,450
Total Trichlorobiphenyls	236
Toxic Equivalents (Total TEQ)	0.1
Total Metals (MG/KG)	
Mercury	0.1
Zinc	6.3
Wet Chemistry	
% Moisture (pct)	78
Lipids (%) (pct)	0.24

Sample ID	CAPL-TS18-O-1012
Sample Date	10/10/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	11 J
4,4'-DDE	95
4,4'-DDT	30 J
Aroclor-1260	3,300
Endosulfan sulfate	68 J
Endrin	8 J
gamma-Chlordane	43
Polychlorinated biphenyls (PCBs)	3,680
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	257 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	4,410
2,3',4,4',5-Pentachlorobiphenyl (118)	24,200
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	10,100
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	4,590
Decachlorobiphenyl (209)	318
Congeners (156/157)	16,700
Total Dichlorobiphenyls	57.9
Total Heptachlorobiphenyls	1,090,000
Total Hexachlorobiphenyls	1,880,000
Total Nonachlorobiphenyls	18,300
Total Octachlorobiphenyls	285,000
Total Pentachlorobiphenyls	317,000
Total Tetrachlorobiphenyls	82,800
Total Trichlorobiphenyls	1,560
Toxic Equivalents (Total TEQ)	1.83
Total Metals (MG/KG)	
Mercury	0.044
Selenium	0.15
Zinc	22
Wet Chemistry	
% Moisture (pct)	67
Lipids (%) (pct)	5

Sample ID	CAPL-TS04-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDE	4.6
4,4'-DDT	5.6 J
Dieldrin	2.1 J
Endosulfan sulfate	7 J
gamma-BHC (Lindane)	0.97 J
gamma-Chlordane	2.4
Heptachlor epoxide	1.2 J
Polychlorinated biphenyls (PCBs)	1,450
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	26.8
3,4,4',5-Tetrachlorobiphenyl (81)	9.33 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	412
2,3',4,4',5-Pentachlorobiphenyl (118)	6,890
3,3',4,4',5-Pentachlorobiphenyl (126)	251
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	7,620
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	4,950
Decachlorobiphenyl (209)	337
Congeners (156/157)	14,000
Total Dichlorobiphenyls	29.8
Total Heptachlorobiphenyls	639,000
Total Hexachlorobiphenyls	544,000
Total Nonachlorobiphenyls	18,200
Total Octachlorobiphenyls	209,000
Total Pentachlorobiphenyls	26,200
Total Tetrachlorobiphenyls	10,600
Total Trichlorobiphenyls	480
Toxic Equivalents (Total TEQ)	26.1
Total Metals (MG/KG)	
Arsenic	0.2 J
Cadmium	0.078
Copper	1.5
Mercury	0.032
Selenium	0.27
Silver	0.0039 J
Zinc	21
Wet Chemistry	
% Moisture (pct)	78
Lipids (%) (pct)	1.6

Sample ID	CAPL-TS10-WB-1012
Sample Date	10/10/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	3.3
4,4'-DDE	18
4,4'-DDT	2.3 J
beta-BHC	2 J
Endosulfan sulfate	6.6
gamma-Chlordane	3.6
Polychlorinated biphenyls (PCBs)	330
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	79
3,4,4',5-Tetrachlorobiphenyl (81)	3.48 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	617
2,3',4,4',5-Pentachlorobiphenyl (118)	3,040
2,3,4,4',5-Pentachlorobiphenyl (123)	29 J
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	804
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	310
Decachlorobiphenyl (209)	1,290
Total Dichlorobiphenyls	34.6
Total Heptachlorobiphenyls	86,200
Total Hexachlorobiphenyls	159,000
Total Nonachlorobiphenyls	1,280
Total Octachlorobiphenyls	21,200
Total Pentachlorobiphenyls	38,300
Total Tetrachlorobiphenyls	23,300
Total Trichlorobiphenyls	793
Toxic Equivalents (Total TEQ)	0.192
Total Metals (MG/KG)	
Arsenic	0.099 J
Cadmium	0.011 J
Mercury	0.01 J
Selenium	0.13
Zinc	31
Wet Chemistry	
% Moisture (pct)	76
Lipids (%) (pct)	3

Sample ID	CAPL-TS14-WB-1012
Sample Date	10/10/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	7.1 J
4,4'-DDE	72
4,4'-DDT	37 J
Endosulfan sulfate	120 J
Endrin	5 J
gamma-Chlordane	36 J
Polychlorinated biphenyls (PCBs)	4,400
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	389
2,3,3',4,4'-Pentachlorobiphenyl (105)	4,270
2,3',4,4',5-Pentachlorobiphenyl (118)	29,500
2,3,4,4',5-Pentachlorobiphenyl (123)	406
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	12,200
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	6,770
Decachlorobiphenyl (209)	611
Congeners (156/157)	23,000
Total Dichlorobiphenyls	33.4
Total Heptachlorobiphenyls	1,380,000
Total Hexachlorobiphenyls	1,680,000
Total Nonachlorobiphenyls	42,600
Total Octachlorobiphenyls	510,000
Total Pentachlorobiphenyls	494,000
Total Tetrachlorobiphenyls	299,000
Total Trichlorobiphenyls	3,840
Toxic Equivalents (Total TEQ)	2.32
Total Metals (MG/KG)	
Arsenic	0.096 J
Mercury	0.011 J
Selenium	0.19
Zinc	20
Wet Chemistry	
% Moisture (pct)	74
Lipids (%) (pct)	2

Sample ID	CAPL-TS05-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDE	10
4,4'-DDT	1.7 J
Endosulfan sulfate	0.88 J
Endrin	1.5 J
Polychlorinated biphenyls (PCBs)	44.7
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	4.41 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	59.6
2,3',4,4',5-Pentachlorobiphenyl (118)	417
2,3',4,4',5'-Pentachlorobiphenyl (123)	10.6 J
3,3',4,4',5-Pentachlorobiphenyl (126)	12.5 J
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	261
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	89.9
Congeners (156/157)	252
Total Dichlorobiphenyls	49.7
Total Heptachlorobiphenyls	13,000
Total Hexachlorobiphenyls	17,300
Total Nonachlorobiphenyls	246
Total Octachlorobiphenyls	2,620
Total Pentachlorobiphenyls	4,570
Total Tetrachlorobiphenyls	6,580
Total Trichlorobiphenyls	274
Toxic Equivalents (Total TEQ)	1.28
Total Metals (MG/KG)	
Arsenic	0.07 J
Cadmium	0.11
Copper	2
Mercury	0.03
Nickel	0.31 J
Selenium	0.34
Silver	0.011
Zinc	31
Wet Chemistry	
% Moisture (pct)	75

Sample ID	CAPL-TS12-WB-1012
Sample Date	10/10/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	4.3
4,4'-DDE	29 J
4,4'-DDT	3.4 J
beta-BHC	1.9 J
Endosulfan sulfate	6.2 J
gamma-Chlordane	4.1 J
Polychlorinated biphenyls (PCBs)	485
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	86.7
2,3,3',4,4'-Pentachlorobiphenyl (105)	791
2,3',4,4',5-Pentachlorobiphenyl (118)	4,160
2,3,4,4',5-Pentachlorobiphenyl (123)	45.4
3,3',4,4',5-Pentachlorobiphenyl (126)	157
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	1,390
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	585
Congeners (156/157)	2,340
Total Dichlorobiphenyls	64.8
Total Heptachlorobiphenyls	152,000
Total Hexachlorobiphenyls	223,000
Total Nonachlorobiphenyls	2,000
Total Octachlorobiphenyls	35,400
Total Pentachlorobiphenyls	46,400
Total Tetrachlorobiphenyls	25,200
Total Trichlorobiphenyls	828
Toxic Equivalents (Total TEQ)	16
Total Metals (MG/KG)	
Arsenic	0.099 J
Mercury	0.017 J
Selenium	0.21
Zinc	42
Wet Chemistry	
% Moisture (pct)	76
Lipids (%) (pct)	3.1

Sample ID	CAPL-TS16-F-1012
Sample Date	10/10/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDE	2.3 J
alpha-Chlordane	3.4 J
Aroclor-1260	85
beta-BHC	2.2 J
Endosulfan sulfate	1.5 J
Endrin	0.82 J
gamma-BHC (Lindane)	0.94 J
Polychlorinated biphenyls (PCBs)	98.4
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	12.3 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	152
2,3',4,4',5-Pentachlorobiphenyl (118)	800
2,3',4,4',5'-Pentachlorobiphenyl (123)	7.76 J
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	268
2,3,3',4,4',5,5'-Hexachlorobiphenyl (189)	100
Congeners (156/157)	440
Total Dichlorobiphenyls	14.4
Total Heptachlorobiphenyls	27,900
Total Hexachlorobiphenyls	50,100
Total Nonachlorobiphenyls	363
Total Octachlorobiphenyls	6,220
Total Pentachlorobiphenyls	9,220
Total Tetrachlorobiphenyls	4,420
Total Trichlorobiphenyls	187
Toxic Equivalents (Total TEQ)	0.0543
Total Metals (MG/KG)	
Arsenic	0.064 J
Mercury	0.092
Selenium	0.11
Zinc	6.4
Wet Chemistry	
% Moisture (pct)	80
Lipids (%) (pct)	0.35

Sample ID	CAPL-TS13-WB-1012
Sample Date	10/10/12
Pesticide/Polychlorinated Biphenyls (UG/KG)	
4,4'-DDD	11
4,4'-DDE	44
4,4'-DDT	8.5 J
Endosulfan sulfate	19 J
Endrin	2.9 J
gamma-Chlordane	14
Polychlorinated biphenyls (PCBs)	998
Polychlorinated Biphenyl Congeners (PG/G)	
3,3',4,4'-Tetrachlorobiphenyl (77)	192
2,3,3',4,4'-Pentachlorobiphenyl (105)	1,580
2,3',4,4',5-Pentachlorobiphenyl (118)	8,130
2,3,4,4',5-Pentachlorobiphenyl (123)	87.6 J
3,3',4,4',5-Pentachlorobiphenyl (126)	334
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	2,500
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	1,160
Congeners (156/157)	4,330
Total Dichlorobiphenyls	63.7
Total Heptachlorobiphenyls	314,000
Total Hexachlorobiphenyls	451,000
Total Nonachlorobiphenyls	5,140
Total Octachlorobiphenyls	75,900
Total Pentachlorobiphenyls	98,200
Total Tetrachlorobiphenyls	51,100
Total Trichlorobiphenyls	2,090
Toxic Equivalents (Total TEQ)	34
Total Metals (MG/KG)	
Arsenic	0.056 J
Cadmium	0.028
Nickel	0.2
Zinc	24
Wet Chemistry	
% Moisture (pct)	72
Lipids (%) (pct)	3.4

PENNIMAN LAKE

Legend
- Inlet
- Basin
- Outfall Point
- Water Utility Infrastructure
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Fish Sample Collection Area (October 2012)
- Frog Sample Collection Area (October 2012)
- Shoreline

Notes:
Shading indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
MG/KG - Milligrams per kilogram
PCT - Percent
PG/G - Picograms per gram
UG/KG - Micrograms per kilogram

N W E S

0 150 300
Feet

Figure 15
Tissue Sample Detection Results
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

Attachment A
Step 1 Site Inspection Technical Memorandum

Results of the Step 1 Polychlorinated Biphenyls Site Inspection at Penniman Lake, Cheatham Annex, Williamsburg, Virginia

PREPARED FOR: Cheatham Annex Partnering Team

PREPARED BY: CH2M HILL

DATE: February 29, 2012

Introduction

This Technical Memorandum (TM) has been prepared to present the results of the Step I field sampling activities for the polychlorinated biphenyls (PCB) Site Inspection (SI) at Penniman Lake, located at Naval Weapons Station Yorktown Cheatham Annex (CAX) in Williamsburg, Virginia (**Figure 1**). The objective of the Penniman Lake SI is to identify potential source(s) of PCBs to Penniman Lake and to determine if additional investigation or action is required. The SI is being conducted using a stepped approach since the source of PCBs is not known.

This TM was prepared under the United States Navy Comprehensive Long-term Environmental Action (CLEAN) Contract N62470-08-D-1000, for submittal to the Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic Division, the United States Environmental Protection Agency (USEPA), and the Virginia Department of Environmental Quality (VDEQ). The Navy, USEPA, and VDEQ work jointly as the CAX Tier I Partnering Team.

Site Background and History

CAX is located in Williamsburg, Virginia, on the York-James Peninsula (**Figure 1**). The peninsula trends northwest-southeast and is roughly bordered to the southwest by the James River, to the northeast by the York River, and to the southeast by the confluence of the James River and the Chesapeake Bay. CAX was established in June 1943 as a satellite unit of the Navy Supply Depot to provide bulk storage facilities. Prior to 1943, CAX had been the location of the Penniman Shell Loading Plant, a large powder and shell loading facility operated by DuPont during World War I. Today the mission of CAX is supplying Atlantic Fleet ships and providing recreational opportunities to military and civilian personnel.

Penniman Lake is a 48-acre fresh water surface water body located in the southeastern portion of CAX, created in 1943 when a portion of King Creek was dammed; it is not tidally influenced (**Figure 3**). Numerous drainage channels and stormwater outfalls discharge to the lake. There is an overflow structure adjacent to the dam (Figure 4) that discharges directly to King's Creek; other major outlets are evaporation and recharge to groundwater. The historical use of the lake is unknown; however, the lake is currently used by the Department of Defense (DoD) for recreational activities. The lake is not open to the general public. Catch-and-release fishing restrictions were implemented for the lake in 2000 following identification of PCBs within lake sediment.

In January 2001, CAX was placed on the National Priorities List (NPL), which required all subsequent activities for Navy Environmental Restoration (ER) sites be conducted under CERCLA procedures. Previously conducted evaluations and investigations that helped characterize potential contamination and contaminant sources at Penniman Lake included: Penniman Shell Loading Plant Site Inspection (Weston, 1999), Pond Study (Baker, 2001), Site 11 Remedial Investigation (RI) (Baker, 2007), AOC 6 Site Inspection (CH2M HILL, 2011), and various site visits. Previous sampling locations and PCB results that exceeded a human health and/or ecological screening level are shown in **Figure 4** (designated with either a yellow, lavender, or green triangle, as noted in the Legend) .

In 1999, an SI of the former Penniman Shell Loading Plant (PSLP) was conducted to determine if contamination existed that could be attributed to the former PSLP activities. The SI included the collection of twenty-nine samples, including waste source, sediment, surface water, and drinking water near various remnants of the former PSLP. As part of this investigation, one sediment sample (PEN-SED-01) and one surface water (PEN1-SW-02) and sediment sample [PEN1-SED-02 (and –SED02A, a duplicate)] were collected from Penniman Lake, adjacent to the Ammonia Settling Pits and TNT Graining House Sump and Catch Box Ruins, respectively as part of

this investigation, at locations shown on **Figure 4**. The sediment samples were analyzed for Target Compound List (TCL) organic compounds, Target Analyte List (TAL) inorganic constituents, and explosive compounds, while the surface water sample was analyzed for TCL organic compounds, and TAL inorganic constituents. The SI concluded that the activities at the former PSLP had not affected Penniman Lake.

In 2000, a Pond Study was conducted that included the collection of eight co-located surface water and surface sediment samples from Penniman Lake that were analyzed for TCL organic compounds, TAL inorganic constituents, and explosive compounds. There were PCB concentrations (Aroclor-1260) detected above both ecological and human health screening values at a maximum concentration of 4,700 micrograms per kilogram (µg/kg). The highest concentrations of PCBs were detected within one cove in the northwestern portion of the lake (**Figure 4**). The report recommended the establishment of catch-and-release fishing restrictions and further investigations to determine the source of PCBs and potential risks to human health and the environment.

In 2002, a Remedial Investigation (RI) at Site 11, located adjacent to the northwestern portion of Penniman Lake, was conducted that consisted of the collection of 24 surface and subsurface soil, 15 surface and subsurface sediment, 13 surface water, and 8 groundwater samples from within Site 11 and adjacent areas. Samples were analyzed for TCL organic compounds, TAL inorganic constituents, and explosive compounds. PCBs were detected in the Penniman Lake sediment, with a maximum concentration of 15,000 µg/kg in the northwest cove of the lake. In addition, PCBs were detected in a sediment sample collected from a drainage channel upgradient of Site 11 at a concentration of 7,500 µg/kg (**Figure 4**). The RI concluded that Site 11 was not the source of PCB contamination in Penniman Lake (Baker, 2007). The RI recommended additional sampling from within the drainage channel upgradient of Outfall NR-029 (**Figure 3**) and in the northwest cove of Penniman Lake to determine the extent of PCB contamination and potentially identify the source(s).

Based on the RI recommendations, the northwest cove of Penniman Lake and associated drainages were the initial focus of a study to determine the source of the PCB contamination. On June 10, 2008, CH2M HILL personnel conducted a site visit to identify upgradient areas that drain to the northwest cove of Penniman Lake and to Outfalls NR-026 through NR-029 (**Figure 4**) in order to help evaluate potential source areas. The following provides a summary of the drainage patterns identified during the site visit:

- Surface water runoff enters the northwest cove of Penniman Lake from the heavily wooded slopes along this portion of the lake, as well as through Outfalls NR-026 and -027.
- Stormwater runoff originating from areas south of Building 10 is collected in drop inlets on the north and south sides of Sanda Avenue, and is channeled to Outfall NR-026.
- Outfall NR-026 discharges to the northwest cove of Penniman Lake via a drainage ditch.
- A ravine upgradient of Outfall NR-027, north of Antrim Road, channels stormwater runoff from areas south of Building 250.
- Outfall NR-027 discharges to the northwest cove of Penniman Lake via a drainage ditch.

In addition, Outfall NR-028 conveys stormwater runoff to Penniman Lake from an intermittent drainage channel that originates south of Building 132 and north of Antrim Road. Outfall NR-029 conveys stormwater runoff from two intermittent drainage channels that originate north of Antrim Road; one flows east, parallel to Antrim road, and the other flows southeast, perpendicular to Antrim Road. A sampling plan was developed and presented to the CAX Partnering Team. In subsequent discussions, the Team decided all drainages to the lake should be evaluated, not just those discharging to the northwest cove, and the focus of the study changed to include all outfalls and natural drainages around the lake.

In October 2008, samples of Penniman Lake surface water and sediment were collected from two locations adjacent to AOC 6 (CAA06-SD/SW01 and CAA06-SD/SW02 – **Figure 4**) to determine if AOC 6 has had an impact on the lake (CH2M HILL, 2011). Based on historic sample results and known site activities, the AOC 6 SI analytical parameters did not include PCBs. Thus, these samples do not contribute to the evaluation of Penniman Lake PCB contamination, but are mentioned here to complete the list of samples collected from the lake prior to the current Step 1 SI activities.

Physical Setting

The area surrounding Penniman Lake is generally forested and slopes towards the lake. The topography ranges from approximately 35 feet above mean sea level (amsl) to less than 10 feet amsl. The direction of surface water flow in the lake is unknown but likely flows to the south towards the dam. There is an overflow structure adjacent to the dam (**Figure 4**) that discharges directly to King's Creek; other major outlets are evaporation and recharge to groundwater. Surface water flow may also be influenced by the wind. The Yorktown- Eastover aquifer extends across all of CAX and ranges from 60 to 100 feet thick. The transmissivity of the aquifer ranges from 0.5 to 40 square feet per day (ft^2/day), with the general direction of groundwater flow from west-to-east. The depth to groundwater in the Yorktown-Eastover aquifer is likely shallow; this aquifer likely discharges to some extent to the lake.

Distribution of Aroclor-1260 Contamination

Based on analytical results from previous investigations, Aroclor-1260 concentrations were detected in surface soil within stormwater drainage ways that discharge to Penniman Lake and in surface sediment throughout Penniman Lake. However, the highest concentrations were detected in sediment in the northwest cove (**Figure 3**). Further investigations to identify the source of this contamination, and the distribution of contamination at this source, are being conducted as part of the SI.

Release History

The source of the PCBs within Penniman Lake is unknown. Several drainages and outfalls discharge to the lake and appear to be the pathway through which Aroclor-1260 was transported to Penniman Lake; these features and potential source areas are being investigated during this SI.

Potential Contaminant Sources and Transport Pathways

No records of PCB releases or discharges that could have contaminated Penniman Lake sediment have been identified to date. Based on what can be inferred from the historical analytical data, there are several potential mechanisms for PCB transport to Penniman Lake: oil or fluids containing PCBs may have been (1) directly released to drainage ditches that discharged through outfalls into the lake, (2) released via disposal to surface soil in areas where stormwater runoff would transport PCBs and discharge into the lake via the drainages, or (3) applied for dust control to former gravel parking areas or roads where stormwater runoff would transport PCBs and discharge into the lake via the drainages. Other potential migration pathways from the terrestrial areas into the lake, such as by wind dispersion, are not expected to be significant because the area is heavily vegetated. Since PCBs tend to bind to soil, they are not expected to migrate downward to groundwater.

At this time, the historical and current use of the buildings located between Sanda Avenue and Antrim Road, near the northwest cove of Penniman Lake, is unknown. Further research is being conducted as part of the SI to determine if historical activities at or within the vicinity of these buildings may be a potential source of the PCBs in Penniman Lake.

Potential Exposure and Receptor Pathways

Potential human receptors exposed to surface water and sediment at Penniman Lake are:

- Adult recreational user
- Child recreational user
- Current on-base workers
- Future construction workers

Recreational users and workers may be exposed to PCBs through ingestion of and dermal contact with surface water and sediment as well as ingestion of fish. It is noted that catch and release fishing restrictions are in place for Penniman Lake. However, there is no way to guarantee that all of the fish caught are released and the most conservative approach is to assume that there is a potential for some fish ingestion. Recreational users and workers may also be exposed to PCBs through dermal contact with surface water and sediment in ditches that drain to Penniman Lake.

Potential ecological receptors exposed to surface water and sediment at Penniman Lake are:

- Aquatic/Wetland Plants
- Birds
- Mammals
- Reptiles
- Amphibians
- Benthic/Aquatic Invertebrates
- Fish

Aquatic and wetland plants may be exposed to PCBs through direct contact with surface water and sediment or through root uptake from the sediment. Fish, amphibians, reptiles and benthic/aquatic invertebrates may be exposed through direct contact with surface water and sediment. Food web exposures via birds, mammals, reptiles, and amphibians include ingestion of aquatic/wetland plants, fish, and benthic/aquatic invertebrates.

Conceptual Site Model

The conceptual site model (CSM) for Penniman Lake is based on data collected as part of previous investigations. The CSM interprets the site background and history, physical setting, distribution of contamination, release history, potential contaminant sources and transport pathways, and the potential exposure and receptor pathways. Since the specific source or sources of contaminants to Penniman Lake have not been identified to date, the CSM remains incomplete. The current CSM for Penniman Lake is shown in **Figure 2**.

Step 1 Field Investigation Activities

Since the source of PCBs in Penniman Lake is not known and Penniman Lake is a receiving body and not the source, a stepped-approach SI has been implemented to identify the source. In accordance with the UFP-SAP, a field survey was conducted to verify all outfalls and identify all natural drainages to the lake. Following identification of potential drainages, 26 surface soil samples were collected from the drainage ways and 44 surface sediment samples were collected from Penniman Lake. Prior to sample collection, a site visit was conducted with a representative from the USEPA's Biological Technical Assistance Group (BTAG) to flag specific sample locations in the northwest cove and associated drainages and to get a general idea of the type of depositional area to sample. Field activities also included site reconnaissance in the wooded area upstream of and surrounding the northwest cove to look for drums and/or an obvious sign of dumping. A bucket-like container, similar in size to a 5 gallon bucket with lid, was found just downstream of sample location SS05 near Isaacson Road. A surface soil sample, SS17, was collected from immediately beneath the container. In addition, surface debris consisting of one metal container and a few sections of pipe was identified on the west bank of the drainage between locations SS10 andSS11.

Surface soil samples were collected with a hand auger, and surface sediment samples were collected with a ponar dredge. All samples were analyzed for PCBs and sediment samples were also analyzed for additional total organic carbon (TOC) and grain size analytical suites. Water quality parameters (i.e., dissolved oxygen, turbidity, temperature, specific conductivity, oxidation/reduction potential and pH) were collected from the top, middle, and bottom of the water column above each sediment sample location.

Discussion of Results

Surface soil and surface sediment data collected during the 2011 Step I field activities have been evaluated to identify or eliminate potential PCB migration pathways into Penniman Lake. **Tables 1** and **2** include the detected PCB concentrations in surface soil and surface sediment, respectively. All analytical data for all samples are provided in **Appendix A**.

Soil

In total, 25 surface soil samples plus 3 duplicate samples were collected from the drainages and outfalls leading into Penniman Lake. These locations were chosen to determine if the PCBs detected in Penniman Lake sediments originated from contaminant transport through the stormwater drainage channel network (either from a

historical or ongoing release). Surface soil samples were analyzed for TCL PCBs in accordance with EPA Method 8082.

The only PCB congener group that was detected in surface soil in the vicinity of Penniman Lake was Aroclor-1260. Aroclor-1260 concentrations ranged from below detection limits in surface soil samples SS16 and SS18 to a maximum of 63,000 µg/kg in surface soil sample SS09. The highest Aroclor-1260 surface soil concentrations were detected in the drainage ways leading to the northwest cove of Penniman Lake (**Figure 5**), including sample locations SS02 (23,000 µg/kg), SS04 (17,000 µg/kg), SS10 (17,000 µg/kg), and SS11 (30,000 µg/kg). The surface soil sample collected fromimmediately beneath the bucket-like container that was identified during the site reconnaissance of the wooded area (SS17) contained Aroclor-1260 at 140 µg/kg. Given this relatively low Aroclor-1260 concentration and the significantly higher concentrations in upstream samples, this container does not appear to represent a PCB source.

Sediment

A total of 44 surface sediment samples and 6 duplicate samples were collected from Penniman Lake. Like the surface soil samples, these locations were selected to determine if a release of PCBs to Penniman Lake originated via transport through the stormwater drainage channel network (either from a historical or ongoing release). Surface sediment samples were analyzed for TCL PCBs in accordance with EPA Method 8082.

The only PCB congener group that was detected in surface sediment samples in Penniman Lake was Aroclor-1260. Aroclor-1260 concentrations ranged from below the detection limit in surface sediment sample SD25 to a maximum of 16,000 µg/kg in sample SD22. The highest surface sediment concentrations were detected in the sediment samples collected in the northwest cove of Penniman Lake (**Figure 6**). Outside of the northwest cove area, the highest Aroclor-1260 concentration was 810 µg/kg in surface sediment sample SD60, located in the northeast finger of Penniman Lake.

Conclusions and Recommendations

Results of the Step 1 PCB sampling indicate that PCBs are distributed throughout Penniman Lake, but the highest concentrations are found in the northwest cove area, nearest the outfalls of the stormwater drainage channels in which the highest concentrations of Aroclor-1260 were detected in upstream surface soil samples. In order to continue the investigation to locate potential sources for the PCBs detected in surface soil and sediment, four areas upstream of Penniman Lake are recommended for Step 2 investigation activities. These areas are shown in **Figure 7**, and include Step 1 sampling locations SS02, SS09, SS12, and SD60, which appear to be along potential migration pathways from a potential PCB source.

In addition, a review of available historical records and information on building usage will be conducted to gather additional information regarding the use of PCBs at the base, and specifically within the four areas recommended for further investigation activities. Lastly, the historic non-PCB data from the Pond Study (Baker 2001), Site 11 RI (Baker, 2007) and AOC 6 SI (CH2M HILL, 2011), will be reviewed to help identify constituents of potential concern that may need further evaluation. The sampling strategy and approach for Step 2 will be determined by the CAX Partnering Team and documented, under separate cover, in an addendum to the UFP-SAP *Site Inspection Sampling and Analysis Plan, Penniman Lake, June 2011*.

References

Baker Environmental, Inc. (Baker) 2001. *Final Pond Study Report, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia.* August.

Baker. 2007. *Remedial Investigation, Site 11 – Bone Yard, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia.* April.

CH2M HILL. 2011. *Draft Site Inspection Report, Areas of Concern 1, 2, 6, 7, and 8, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia*. June.

Roy F. Weston, Inc. (Weston) 1999. *Final Site Inspection Narrative Report Penniman Shell Loading Plant, Williamsburg, Virginia.* August.

Tables

TABLE 1
Surface Soil Analytical Detections
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SS01-0811	CAPL-SS01P-0811	CAPL-SS02-0811	CAPL-SS03-0811	CAPL-SS04-0811	CAPL-SS05-0811	CAPL-SS06-0811	CAPL-SS07-0811	CAPL-SS08-0811	CAPL-SS09-0811	CAPL-SS10-0811	CAPL-SS10P-0811	CAPL-SS11-0811	CAPL-SS12-0811
Sample Date	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	5,600	4,300	23,000	590	17,000	4,400	2,000	73	94	63,000	13,000	17,000	38,000	1,000

Notes:

Shading indicates detection

U - The material was analyzed for, but not detected

UG/KG - Micrograms per kilogram

TABLE 1
Surface Soil Analytical Detections
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SS13-0811	CAPL-SS14-0811	CAPL-SS15-0811	CAPL-SS16-0811	CAPL-SS17-0811	CAPL-SS18-0811	CAPL-SS18P-0811	CAPL-SS19-0811	CAPL-SS21-0811	CAPL-SS22-0811	CAPL-SS23-0811	CAPL-SS24-0811	CAPL-SS25-0811	CAPL-SS26-0811
Sample Date	8/1/11	8/1/11	8/1/11	8/2/11	8/1/11	8/1/11	8/1/11	8/1/11	8/2/11	8/2/11	8/2/11	8/2/11	8/1/11	8/1/11
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	560	340	290	18 U	140	17 U	17 U	450	49	150	30	22	390	30

Notes:

Shading indicates detection

U - The material was analyzed for, but not detected

UG/KG - Micrograms per kilogram

TABLE 2
Surface Sediment Analytical Detections
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SD18-0811	CAPL-SD19-0811	CAPL-SD20-0811	CAPL-SD20P-0811	CAPL-SD21-0811	CAPL-SD22-0711	CAPL-SD23-0711	CAPL-SD24-0711	CAPL-SD25-0711	CAPL-SD26-0811	CAPL-SD27-0711	CAPL-SD28-0711	CAPL-SD28P-0711	CAPL-SD29-0711
Sample Date	8/2/11	8/2/11	8/2/11	8/2/11	8/2/11	7/28/11	7/28/11	7/28/11	7/28/11	8/2/11	7/28/11	7/28/11	7/28/11	7/28/11
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	4,100	2,600	25 U	15 J	45	16,000	6,200	930	18 U	35	150	590	410	950
Wet Chemistry (MG/KG)														
Total organic carbon (TOC)	34,000	3,800	110,000	NS	1,300	180,000	79,000	110,000	12,000	15,000	98,000	87,000	NS	78,000
Grain Size (PCT/P)														
GS03 Sieve 3" (75 mm)	100	100	100	NS	100	100	100	100	100	100	100	100	NS	100
GS06 Sieve 1.5" (37.5 mm)	100	100	100	NS	100	100	100	100	100	100	100	100	NS	100
GS08 Sieve 0.75" (19.0 mm)	96	100	96	NS	100	100	100	100	100	99	100	100	NS	100
GS10 Sieve 0.375" (9.5 mm)	95	98	92	NS	100	98	100	100	99	95	98	100	NS	100
Sieve No. 004 (4.75 mm)	91	95	86	NS	100	91	100	98	98	92	92	100	NS	100
Sieve No. 008 (2.36-MM)	88	91	80	NS	100	73	98	74	94	89	72	90	NS	94
Sieve No. 016 (1.18-MM)	84	82	70	NS	100	49	92	46	89	86	47	58	NS	75
Sieve No. 030 (600-UM)	79	65	55	NS	99	31	75	31	82	76	30	36	NS	52
Sieve No. 040 (425 um)	72	53	47	NS	96	24	64	26	76	65	24	30	NS	44
Sieve No. 050 (300-UM)	48	30	34	NS	75	20	56	22	52	41	20	25	NS	36
Sieve No. 100 (150 um)	8.2	3.3	10	NS	4.6	13	44	15	5.6	10	12	18	NS	28
Sieve No. 200 (75 um)	3.5	1.6	4	NS	0.8	8	25	9.2	1.5	3.5	6.8	11	NS	18

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Notes:

Shading indicates detection

J - Analyte present. Value may or may not be accurate or precise
NS - Not sampled
U - The material was analyzed for, but not detected
MG/KG - Milligrams per kilogram
PCT/P - Percent Passed
UG/KG - Micrograms per kilogram

TABLE 2
Surface Sediment Analytical Detections
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SD30-0711	CAPL-SD31-0711	CAPL-SD32-0711	CAPL-SD33-0711	CAPL-SD33P-0711	CAPL-SD34-0711	CAPL-SD35-0711	CAPL-SD36-0711	CAPL-SD37-0711	CAPL-SD38-0711	CAPL-SD38P-0711	CAPL-SD39-0711	CAPL-SD40-0711	CAPL-SD41-
Sample Date	7/28/11	7/28/11	7/28/11	7/28/11	7/28/11	7/27/11	7/28/11	7/28/11	7/27/11	7/27/11	7/27/11	7/27/11	7/27/11	7/28/11
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	1,100	180	210	580	1,000	760	390	110	380	41 J	91 J	220	95	430
Wet Chemistry (MG/KG)														
Total organic carbon (TOC)	75,000	68,000	110,000	80,000	NS	78,000	110,000	64,000	72,000	85,000	NS	68,000	47,000	81,000
Grain Size (PCT/P)														
GS03 Sieve 3" (75 mm)	100	100	100	100	NS	100	100	100	100	100	NS	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	100	100	NS	100	100	100	100	100	NS	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	100	NS	100	100	100	100	99	NS	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	100	99	100	NS	100	99	100	100	79	NS	100	100	100
Sieve No. 004 (4.75 mm)	100	100	96	100	NS	100	99	100	100	69	NS	99	100	100
Sieve No. 008 (2.36-MM)	89	92	87	92	NS	94	98	82	97	57	NS	96	96	87
Sieve No. 016 (1.18-MM)	59	72	72	60	NS	66	88	50	75	47	NS	90	83	56
Sieve No. 030 (600-UM)	38	54	57	35	NS	45	66	31	50	39	NS	84	70	35
Sieve No. 040 (425 um)	32	48	50	28	NS	38	57	26	42	36	NS	79	65	29
Sieve No. 050 (300-UM)	27	43	41	22	NS	33	47	21	34	33	NS	70	60	24
Sieve No. 100 (150 um)	20	25	20	14	NS	24	29	14	26	23	NS	62	44	17
Sieve No. 200 (75 um)	12	14	7	8.5	NS	15	17	8.4	14	12	NS	46	23	11

C:\Users\jhosmer\Desktop\Recent Work\CAX Penniman Lake\Tables\[Tables 1 and 2.xls

Notes:

Shading indicates detection

J - Analyte present. Value may or may not be accurate or precis
NS - Not sampled
U - The material was analyzed for, but not detected
MG/KG - Milligrams per kilogram
PCT/P - Percent Passed
UG/KG - Micrograms per kilogram

TABLE 2
Surface Sediment Analytical Detections
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	0711	CAPL-SD42-0711	CAPL-SD43-0711	CAPL-SD44-0711	CAPL-SD45-0711	CAPL-SD46-0711	CAPL-SD47-0711	CAPL-SD48-0711	CAPL-SD49-0711	CAPL-SD50-0711	CAPL-SD50P-0711	CAPL-SD51-0711	CAPL-SD52-0711	CAPL-SD53-0711	CAPL-SD54-
Sample Date		7/27/11	7/28/11	7/28/11	7/28/11	7/27/11	7/27/11	7/29/11	7/29/11	7/29/11	7/29/11	7/29/11	7/29/11	7/29/11	7/27/11
Chemical Name															
Pesticide/Polychlorinated Biphenyls (UG/KG)															
Aroclor-1260		230	110	410	130	390	200	23 J	270	540	440	250	400	180	230
Wet Chemistry (MG/KG)															
Total organic carbon (TOC)		80,000	150,000	130,000	5,500	80,000	100,000	8,200	130,000	66,000	NS	70,000	58,000	63,000	83,000
Grain Size (PCT/P)															
GS03 Sieve 3" (75 mm)		100	100	100	100	100	100	100	100	100	NS	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)		100	100	100	100	100	100	100	100	100	NS	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)		100	100	100	99	100	100	100	100	100	NS	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)		100	97	100	99	100	100	100	100	100	NS	100	100	100	100
Sieve No. 004 (4.75 mm)		100	89	88	98	100	100	98	100	100	NS	100	100	100	99
Sieve No. 008 (2.36-MM)		84	72	40	97	86	96	95	97	97	NS	98	96	98	95
Sieve No. 016 (1.18-MM)		53	51	21	92	54	72	92	83	85	NS	82	75	85	81
Sieve No. 030 (600-UM)		34	34	11	75	35	49	72	64	68	NS	55	54	67	59
Sieve No. 040 (425 um)		28	29	8.4	58	29	42	50	55	60	NS	46	47	59	51
Sieve No. 050 (300-UM)		24	23	6.2	39	24	36	29	47	52	NS	38	40	52	43
Sieve No. 100 (150 um)		18	13	3.3	19	18	28	12	34	41	NS	28	31	40	32
Sieve No. 200 (75 um)		9.4	5.8	1.4	6.4	11	18	4.5	18	26	NS	18	20	22	20

C:\Users\jhosmer\Desktop\Recent Work\CAX Penniman Lake\Tables\[Tables 1 and 2.xls

Notes:

Shading indicates detection

J - Analyte present. Value may or may not be accurate or precis
NS - Not sampled
U - The material was analyzed for, but not detected
MG/KG - Milligrams per kilogram
PCT/P - Percent Passed
UG/KG - Micrograms per kilogram

TABLE 2
Surface Sediment Analytical Detections
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	0711	CAPL-SD55-0711	CAPL-SD56-0711	CAPL-SD57-0711	CAPL-SD58-0711	CAPL-SD58P-0711	CAPL-SD59-0711	CAPL-SD60-0711	CAPL-SD61-0811
Sample Date		7/27/11	7/27/11	7/27/11	7/29/11	7/29/11	7/27/11	7/29/11	8/2/11
Chemical Name									
Pesticide/Polychlorinated Biphenyls (UG/KG)									
Aroclor-1260		39	280	48 J	170	240	410	810	40
Wet Chemistry (MG/KG)									
Total organic carbon (TOC)		19,000	84,000	35,000	74,000	NS	98,000	78,000	15,000
Grain Size (PCT/P)									
GS03 Sieve 3" (75 mm)		100	100	100	100	NS	100	100	100
GS06 Sieve 1.5" (37.5 mm)		100	100	100	100	NS	100	100	100
GS08 Sieve 0.75" (19.0 mm)		100	100	100	100	NS	100	100	100
GS10 Sieve 0.375" (9.5 mm)		100	100	100	100	NS	100	100	100
Sieve No. 004 (4.75 mm)		100	100	99	100	NS	100	99	99
Sieve No. 008 (2.36-MM)		99	96	97	93	NS	94	85	98
Sieve No. 016 (1.18-MM)		96	82	93	67	NS	69	60	96
Sieve No. 030 (600-UM)		88	62	82	49	NS	46	45	90
Sieve No. 040 (425 um)		79	53	68	43	NS	39	39	83
Sieve No. 050 (300-UM)		59	46	46	38	NS	33	34	50
Sieve No. 100 (150 um)		18	36	14	29	NS	25	26	17
Sieve No. 200 (75 um)		5.5	22	4.6	18	NS	16	17	5.8

C:\Users\jhosmer\Desktop\Recent Work\CAX Penniman Lake\Tables\[Tables 1 and 2.xls

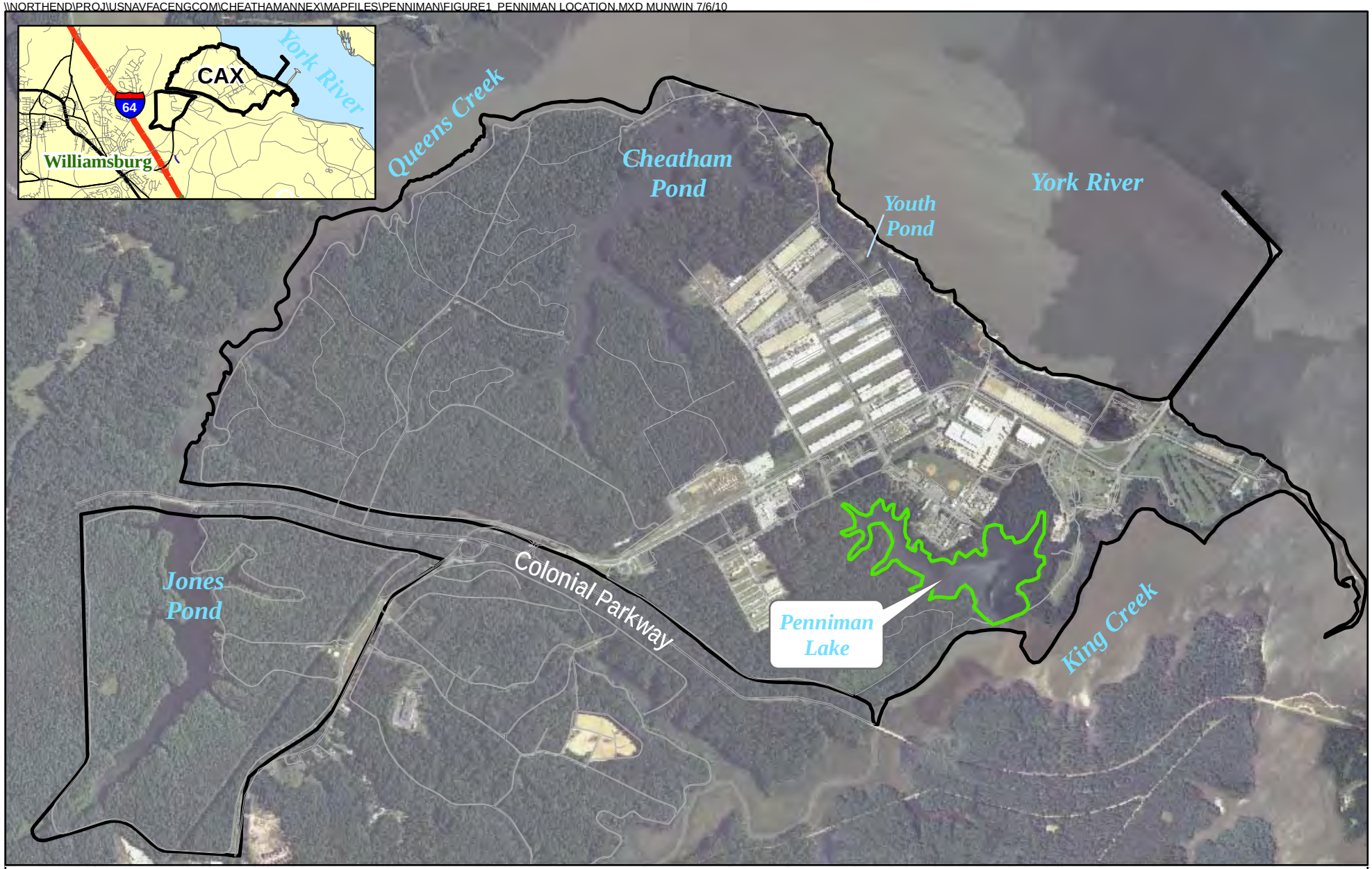
Notes:

Shading indicates detection

J - Analyte present. Value may or may not be accurate or precis
NS - Not sampled
U - The material was analyzed for, but not detected
MG/KG - Milligrams per kilogram
PCT/P - Percent Passed
UG/KG - Micrograms per kilogram

Figures

\\NORTHEND\PROJ\USNAVFACENGCOM\CHEATHAMANNEX\MAPFILES\PENNIMAN\FIGURE1_PENNIMAN LOCATION.MXD MUNWIN 7/6/10



Legend

- Cheatham Annex Boundary
- Approximate Study Area Boundary

N
W E
S

0 1,000 2,000
Feet

Figure 1
Location Map
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

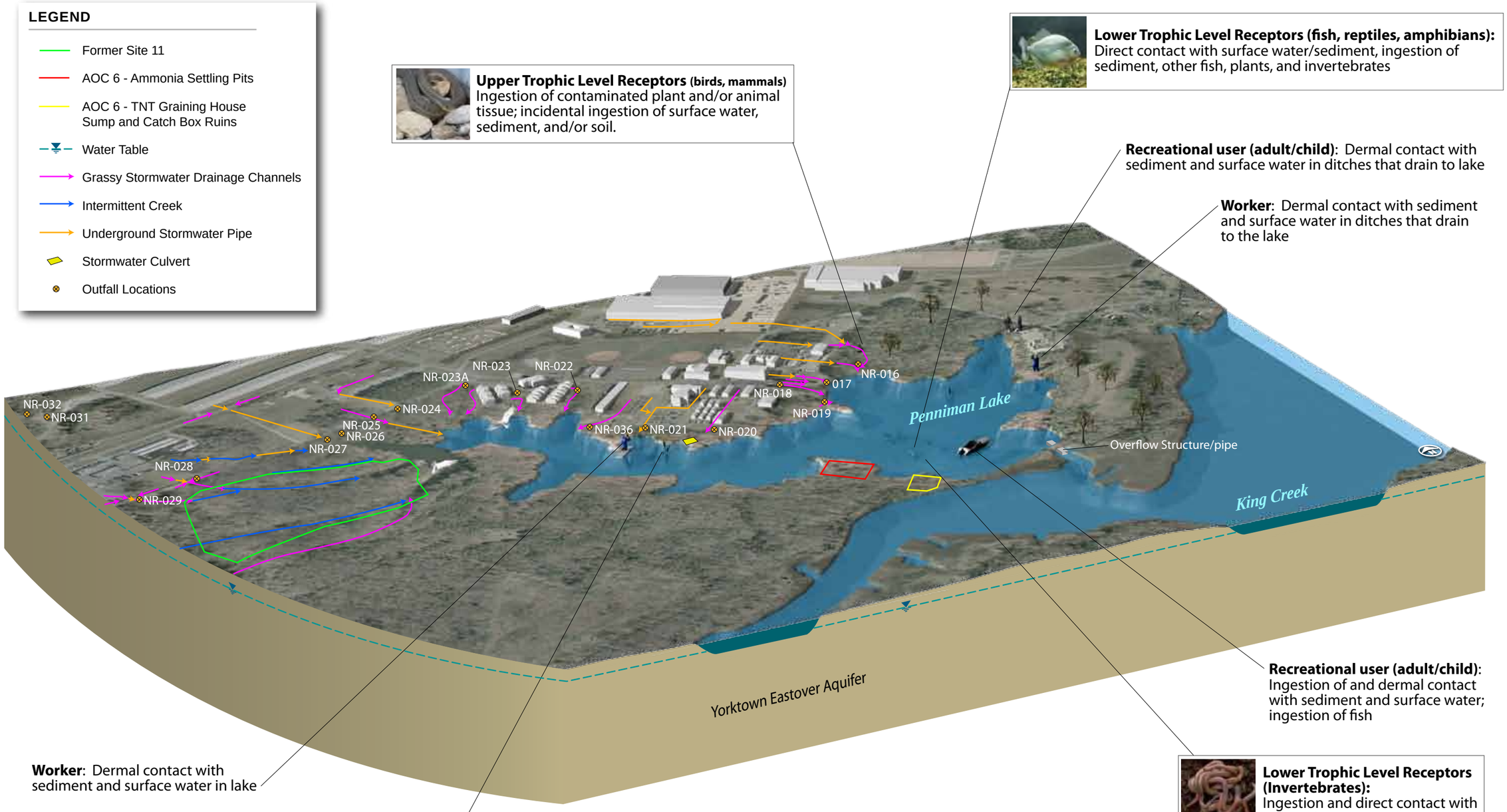
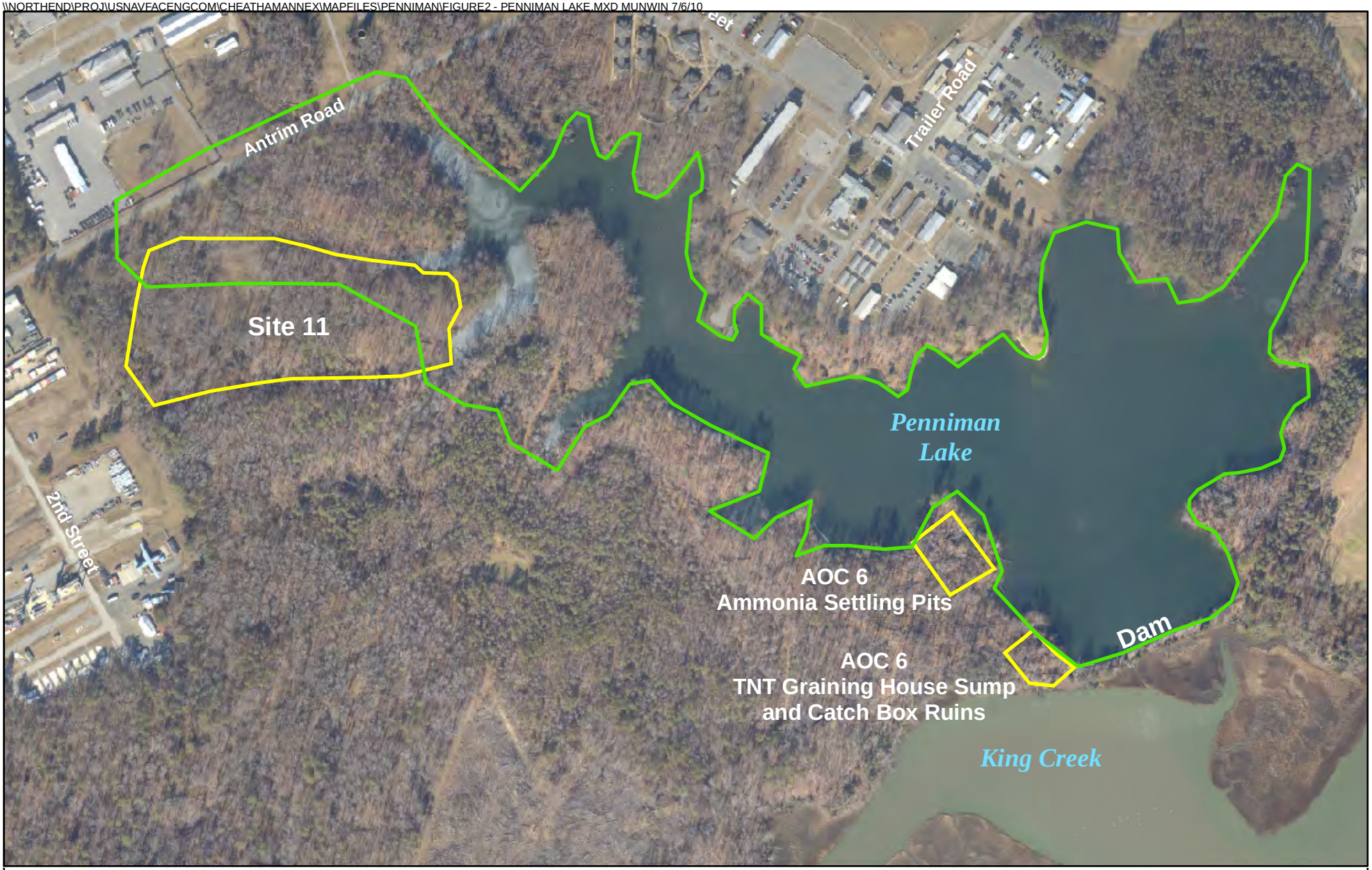


FIGURE 2
Conceptual Site Model
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

\\NORTHEND\PROJ\USNAVFACENGCOM\CHEATHAMANNEX\MAPFILES\PENNIMAN\FIGURE2 - PENNIMAN LAKE.MXD MUNWIN 7/6/10



Legend

- Adjacent Environmental Restoration Program Sites
- Approximate Study Area Boundary

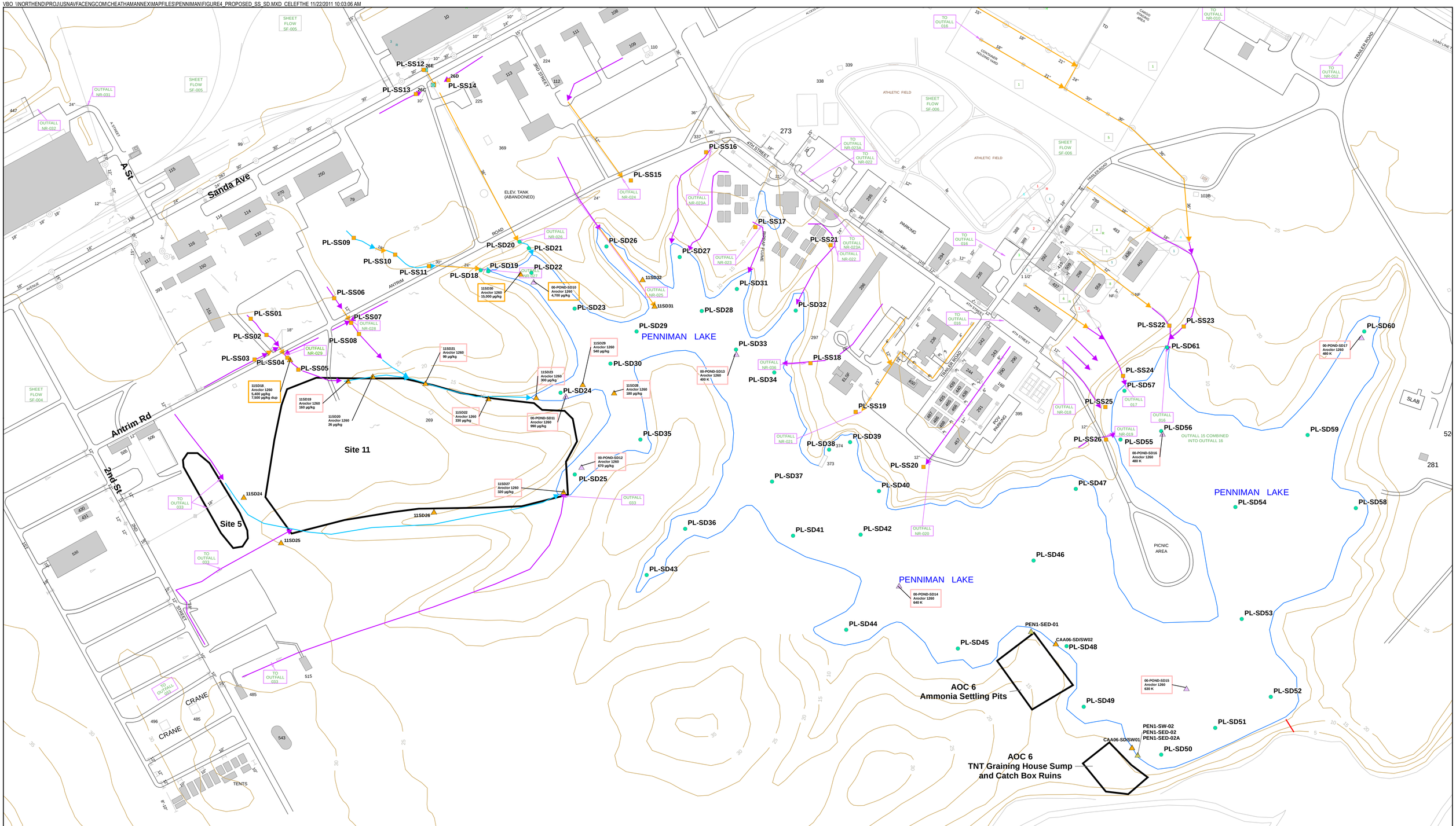
N
W E
S

0 225 450
Feet

Figure 3
Penniman Lake
Layout Map
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\CHEATHAMANNEX\MAPFILES\PENNIMAN\FIGURE4_PROPOSED_SS_SD.MXD CELEFTHE 11/22/2011 10:03:06 AM



Legend

- Proposed Surface Soil Sample Location
- Proposed Surface Sediment Sample Location
- 2002 Remedial Investigation (RI) Sediment Sample
- 2000 Pond Study Sediment Sample
- 1999 Weston SI Sediment and/of Surface Water Sample
- Stormwater Drop Inlets
- Elevation Contours (ft amsl)
- Outfall
- Road curbs
- Shoreline
- Buildings
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe

11SD18 Aroclor 1260 5,400 ppb — Detect Exceeds Human Health Risk Screening Level (2,200 ppb for sediment)

11SD21 Aroclor 1260 99 ppb — Detect Exceeds Ecological Risk Screening Level (59.8 ppb for sediment)

N W E S

0 150 300 450 600 Feet

Figure 4
Proposed Surface Soil and Surface Sediment Sample Locations and Previous Investigation Results
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

V:\USNAVFACENGCOM\CHEATHAMANNEX\MAPFILES\PENNIMAN\CTO_WE25\FIGURE 5 - SURFACE SOIL AROCLOR.MXD CELEETHE 11/22/2011 9:45:54 AM

Sample ID	CAPL-SS11-0811
Sample Date	8/1/11
Aroclor-1260	38,000

Sample ID	CAPL-SS13-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	560

Sample ID	CAPL-SS12-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	1,000

Sample ID	CAPL-SS14-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	340

Sample ID	CAPL-SS15-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	290

Sample ID	CAPL-SS16-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	18 U

Sample ID	CAPL-SS10-0811*
Sample Date	8/1/11
Aroclor-1260 ug/kg	17,000

Sample ID	CAPL-SS09-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	63,000

Sample ID	CAPL-SS21-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	49

Sample ID	CAPL-SS06-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	2,000

Sample ID	CAPL-SS07-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	73

Sample ID	CAPL-SS23-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	30

Sample ID	CAPL-SS01-0811*
Sample Date	8/1/11
Aroclor-1260 ug/kg	5,600

Sample ID	CAPL-SS18-0811*
Sample Date	8/1/11
Aroclor-1260 ug/kg	17 U

Sample ID	CAPL-SS02-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	23,000

Sample ID	CAPL-SS19-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	450

Sample ID	CAPL-SS22-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	150

Sample ID	CAPL-SS03-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	590

Sample ID	CAPL-SS24-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	22

Sample ID	CAPL-SS04-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	17,000

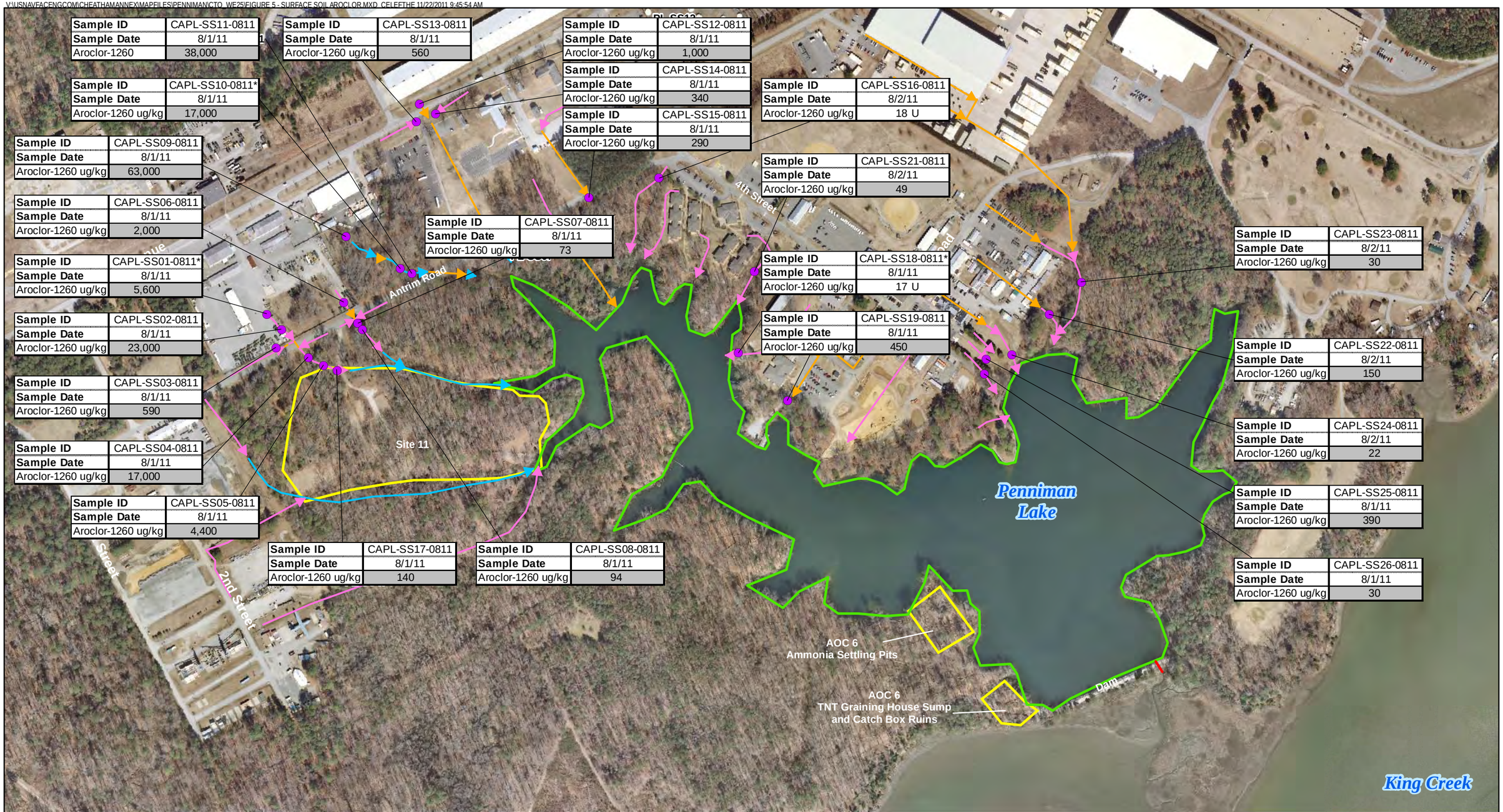
Sample ID	CAPL-SS25-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	390

Sample ID	CAPL-SS05-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	4,400

Sample ID	CAPL-SS26-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	30

Sample ID	CAPL-SS17-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	140

Sample ID	CAPL-SS08-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	94



Legend

- Surface Soil Sample Location (July/August 2011)
- Adjacent Environmental Restoration Program Sites
- Approximate Study Area Boundary
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe

Note:
* duplicate sample collected, most conservative presented

N W E S

0 200 400 Feet

Figure 5
Surface Soil Aroclor-1260 Resuts
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

V:\USNAVFACENGCOM\CHEATHAMANNEX\MAPFILES\PENNIMAN\CTO_WE25\FIGURE 6 - SURFACE SEDIMENT AROCLOR.MXD CELFETHE 11/22/2011 9:48:58 AM

Sample ID	CAPL-SD21-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	45

Sample ID	CAPL-SD20-0811*
Sample Date	8/2/11
Aroclor-1260 ug/kg	15 J

Sample ID	CAPL-SD27-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	150

Sample ID	CAPL-SD61-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	40

Sample ID	CAPL-SD22-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	16,000

Sample ID	CAPL-SD26-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	35

Sample ID	CAPL-SD31-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	180

Sample ID	CAPL-SD55-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	39

Sample ID	CAPL-SD18-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	4,100

Sample ID	CAPL-SD32-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	210

Sample ID	CAPL-SD57-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	48 J

Sample ID	CAPL-SD47-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	200

Sample ID	CAPL-SD19-0811
Sample Date	8/2/11
Aroclor-1260 ug/kg	2,600

Sample ID	CAPL-SD38-0711*
Sample Date	7/27/11
Aroclor-1260 ug/kg	91 J

Sample ID	CAPL-SD60-0711
Sample Date	7/29/11
Aroclor-1260 ug/kg	810

Sample ID	CAPL-SD23-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	6,200

Sample ID	CAPL-SD39-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	220

Sample ID	CAPL-SD56-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	280

Sample ID	CAPL-SD28-0711*
Sample Date	7/28/11
Aroclor-1260 ug/kg	590

Sample ID	CAPL-SD40-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	95

Sample ID	CAPL-SD59-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	410

Sample ID	CAPL-SD29-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	950

Sample ID	CAPL-SD54-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	230

Sample ID	CAPL-SD30-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	1,100

Sample ID	CAPL-SD46-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	390

Sample ID	CAPL-SD58-0711*
Sample Date	7/29/11
Aroclor-1260 ug/kg	240

Sample ID	CAPL-SD24-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	930

Sample ID	CAPL-SD53-0711
Sample Date	7/29/11
Aroclor-1260 ug/kg	180

Sample ID	CAPL-SD33-0711*
Sample Date	7/28/11
Aroclor-1260 ug/kg	1,000

Sample ID	CAPL-SD48-0711
Sample Date	7/29/11
Aroclor-1260 ug/kg	23 J

Sample ID	CAPL-SD35-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	390

Sample ID	CAPL-SD45-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	130

Sample ID	CAPL-SD25-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	18 U

Sample ID	CAPL-SD44-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	410

Sample ID	CAPL-SD52-0711
Sample Date	7/29/11
Aroclor-1260 ug/kg	400

Sample ID	CAPL-SD34-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	760

Sample ID	CAPL-SD37-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	380

Sample ID	CAPL-SD42-0711
Sample Date	7/27/11
Aroclor-1260 ug/kg	230

Sample ID	CAPL-SD51-0711
Sample Date	7/29/11
Aroclor-1260 ug/kg	250

Sample ID	CAPL-SD36-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	110

Sample ID	CAPL-SD43-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	110

Sample ID	CAPL-SD41-0711
Sample Date	7/28/11
Aroclor-1260 ug/kg	430

Sample ID	CAPL-SD49-0711
Sample Date	7/29/11
Aroclor-1260 ug/kg	270

Sample ID	CAPL-SD50-0711*
Sample Date	7/29/11
Aroclor-1260 ug/kg	540

Antrim Road

Site 11

Penniman Lake

AOC 6
Ammonia Settling Pits

AOC 6
TNT Graining House Sump and Catch Box Ruins

Dam

King Creek

Legend

- Sediment Sample Location (July/August 2011)
- Adjacent Environmental Restoration Program Sites
- Approximate Study Area Boundary
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe

Note:
* duplicate sample collected, most conservative presented

N
W E
S

0 200 400
Feet

Figure 6
Surface Sediment Aroclor-1260
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\CHEATHAMANNEX\MAPFILES\PENNIMAN\CTO_WE25\FIGURE 7 - AREAS FOR FURTHER INVESTIGATION.MXD CELEFTHE 11/22/2011 2:57:59 PM

Sample ID	CAPL-SS11-0811
Sample Date	8/1/11
Aroclor-1260	38,000

Sample ID	CAPL-SS12-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	1,000

Sample ID	CAPL-SS10-0811*
Sample Date	8/1/11
Aroclor-1260 ug/kg	17,000

Sample ID	CAPL-SS09-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	63,000

Sample ID	CAPL-SS06-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	2,000

Sample ID	CAPL-SS01-0811*
Sample Date	8/1/11
Aroclor-1260 ug/kg	5,600

Sample ID	CAPL-SS02-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	23,000

Sample ID	CAPL-SD60-0711
Sample Date	7/29/11
Aroclor-1260 ug/kg	810

Sample ID	CAPL-SS04-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	17,000

Sample ID	CAPL-SS05-0811
Sample Date	8/1/11
Aroclor-1260 ug/kg	4,400

Antrim Road
4th Street
Trailer Road
Site 11
2nd Street
Penniman Lake
AOC 6
Ammonia Settling Pits
AOC 6
TNT Graining House Sump
and Catch Box Ruins
Dam
King Creek

Legend

- Surface Soil Sample Location (July/August 2011)
- Adjacent Environmental Restoration Program Sites
- Approximate Study Area Boundary
- Areas Identified for Further Investigation
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe

Note:
* duplicate sample collected, most conservative presented

N
W E
S

0 200 400
Feet

Figure 7
Areas of Further Investigation
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

Appendix A
Analytical Results

Appendix A.1
Surface Soil Analytical Results
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SS01-0811	CAPL-SS01P-0811	CAPL-SS02-0811	CAPL-SS03-0811	CAPL-SS04-0811	CAPL-SS05-0811	CAPL-SS06-0811	CAPL-SS07-0811	CAPL-SS08-0811	CAPL-SS09-0811	CAPL-SS10-0811	CAPL-SS10P-0811	CAPL-SS11-0811	CAPL-SS12-0811
Sample Date	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11	8/1/11
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1016	16 U	16 U	2000 U	17 U	1500 U	16 U	16 U	17 U	18 U	NS	980 U	940 U	3200 U	14 U
Aroclor-1221	16 U	16 U	2000 U	17 U	1500 U	16 U	16 U	17 U	18 U	3700 U	980 U	940 U	3200 U	14 U
Aroclor-1232	16 U	16 U	2000 U	17 U	1500 U	16 U	16 U	17 U	18 U	3700 U	980 U	940 U	3200 U	14 U
Aroclor-1242	16 U	16 U	2000 U	17 U	1500 U	16 U	16 U	17 U	18 U	3700 U	980 U	940 U	3200 U	14 U
Aroclor-1248	16 U	16 U	2000 U	17 U	1500 U	16 U	16 U	17 U	18 U	3700 U	980 U	940 U	3200 U	14 U
Aroclor-1254	16 U	16 U	2000 U	17 U	1500 U	16 U	16 U	17 U	18 U	3700 U	980 U	940 U	3200 U	14 U
Aroclor-1260	5,600	4,300	23,000	590	17,000	4,400	2,000	73	94	63,000	13,000	17,000	38,000	1,000
Aroclor-1262	16 U	16 U	2000 U	17 U	1500 U	16 U	16 U	17 U	18 U	3700 U	980 U	940 U	3200 U	14 U
Aroclor-1268	16 U	16 U	2000 U	17 U	1500 U	16 U	16 U	17 U	18 U	3700 U	980 U	940 U	3200 U	14 U

Notes:

NS - Not sampled

U - The material was analyzed for, but not detected

UG/KG - Micrograms per kilogram

Appendix A.1
Surface Soil Analytical Results
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SS13-0811	CAPL-SS14-0811	CAPL-SS15-0811	CAPL-SS16-0811	CAPL-SS17-0811	CAPL-SS18-0811	CAPL-SS18P-0811	CAPL-SS19-0811	CAPL-SS21-0811	CAPL-SS22-0811	CAPL-SS23-0811	CAPL-SS24-0811	CAPL-SS25-0811	CAPL-SS26-0811
Sample Date	8/1/11	8/1/11	8/1/11	8/2/11	8/1/11	8/1/11	8/1/11	8/1/11	8/2/11	8/2/11	8/2/11	8/2/11	8/1/11	8/1/11
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1016	18 U	17 U	15 U	18 U	17 U	17 U	17 U	15 U	17 U	14 U	15 U	17 U	14 U	14 U
Aroclor-1221	18 U	17 U	15 U	18 U	17 U	17 U	17 U	15 U	17 U	14 U	15 U	17 U	14 U	14 U
Aroclor-1232	18 U	17 U	15 U	18 U	17 U	17 U	17 U	15 U	17 U	14 U	15 U	17 U	14 U	14 U
Aroclor-1242	18 U	17 U	15 U	18 U	17 U	17 U	17 U	15 U	17 U	14 U	15 U	17 U	14 U	14 U
Aroclor-1248	18 U	17 U	15 U	18 U	17 U	17 U	17 U	15 U	17 U	14 U	15 U	17 U	14 U	14 U
Aroclor-1254	18 U	17 U	15 U	18 U	17 U	17 U	17 U	15 U	17 U	14 U	15 U	17 U	14 U	14 U
Aroclor-1260	560	340	290	18 U	140	17 U	17 U	450	49	150	30	22	390	30
Aroclor-1262	18 U	17 U	15 U	18 U	17 U	17 U	17 U	15 U	17 U	14 U	15 U	17 U	14 U	14 U
Aroclor-1268	18 U	17 U	15 U	18 U	17 U	17 U	17 U	15 U	17 U	14 U	15 U	17 U	14 U	14 U

Notes:

NS - Not sampled

U - The material was analyzed for, but not detected

UG/KG - Micrograms per kilogram

Appendix A.2
Surface Sediment Analytical Results
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SD18-0811	CAPL-SD19-0811	CAPL-SD20-0811	CAPL-SD20P-0811	CAPL-SD21-0811	CAPL-SD22-0711	CAPL-SD23-0711	CAPL-SD24-0711	CAPL-SD25-0711	CAPL-SD26-0811	CAPL-SD27-0711	CAPL-SD28-0711	CAPL-SD28P-0711	CAPL-SD29-0711
Sample Date	8/2/11	8/2/11	8/2/11	8/2/11	8/2/11	7/28/11	7/28/11	7/28/11	7/28/11	8/2/11	7/28/11	7/28/11	7/28/11	7/28/11
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1016	25 U	17 U	25 U	27 U	17 U	89 U	65 U	110 U	18 U	19 U	100 U	88 U	83 U	86 U
Aroclor-1221	25 U	17 U	25 U	27 U	17 U	89 U	65 U	110 U	18 U	19 U	100 U	88 U	83 U	86 U
Aroclor-1232	25 U	17 U	25 U	27 U	17 U	89 U	65 U	110 U	18 U	19 U	100 U	88 U	83 U	86 U
Aroclor-1242	25 U	17 U	25 U	27 U	17 U	89 U	65 U	110 U	18 U	19 U	100 U	88 U	83 U	86 U
Aroclor-1248	25 U	17 U	25 U	27 U	17 U	89 U	65 U	110 U	18 U	19 U	100 U	88 U	83 U	86 U
Aroclor-1254	25 U	17 U	25 U	27 U	17 U	89 U	65 U	110 U	18 U	19 U	100 U	88 U	83 U	86 U
Aroclor-1260	4,100	2,600	25 U	15 J	45	16,000	6,200	930	18 U	35	150	590	410	950
Aroclor-1262	25 U	17 U	25 U	27 U	17 U	89 U	65 U	110 U	18 U	19 U	100 U	88 U	83 U	86 U
Aroclor-1268	25 U	17 U	25 U	27 U	17 U	89 U	65 U	110 U	18 U	19 U	100 U	88 U	83 U	86 U
Wet Chemistry (MG/KG)														
Total organic carbon (TOC)	34,000	3,800	110,000	NS	1,300	180,000	79,000	110,000	12,000	15,000	98,000	87,000	NS	78,000
Grain Size (PCT/P)														
GS03 Sieve 3" (75 mm)	100	100	100	NS	100	100	100	100	100	100	100	100	NS	100
GS06 Sieve 1.5" (37.5 mm)	100	100	100	NS	100	100	100	100	100	100	100	100	NS	100
GS08 Sieve 0.75" (19.0 mm)	96	100	96	NS	100	100	100	100	100	99	100	100	NS	100
GS10 Sieve 0.375" (9.5 mm)	95	98	92	NS	100	98	100	100	99	95	98	100	NS	100
Sieve No. 004 (4.75 mm)	91	95	86	NS	100	91	100	98	98	92	92	100	NS	100
Sieve No. 008 (2.36-MM)	88	91	80	NS	100	73	98	74	94	89	72	90	NS	94
Sieve No. 016 (1.18-MM)	84	82	70	NS	100	49	92	46	89	86	47	58	NS	75
Sieve No. 030 (600-UM)	79	65	55	NS	99	31	75	31	82	76	30	36	NS	52
Sieve No. 040 (425 um)	72	53	47	NS	96	24	64	26	76	65	24	30	NS	44
Sieve No. 050 (300-UM)	48	30	34	NS	75	20	56	22	52	41	20	25	NS	36
Sieve No. 100 (150 um)	8.2	3.3	10	NS	4.6	13	44	15	5.6	10	12	18	NS	28
Sieve No. 200 (75 um)	3.5	1.6	4	NS	0.8	8	25	9.2	1.5	3.5	6.8	11	NS	18

Notes:

J - Analyte present. Value may or may not be accurate or precise
NS - Not sampled
U - The material was analyzed for, but not detected
MG/KG - Milligrams per kilogram
PCT/P - Percent Passed
UG/KG - Micrograms per kilogram

Appendix A.2
Surface Sediment Analytical Results
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SD30-0711	CAPL-SD31-0711	CAPL-SD32-0711	CAPL-SD33-0711	CAPL-SD33P-0711	CAPL-SD34-0711	CAPL-SD35-0711	CAPL-SD36-0711	CAPL-SD37-0711	CAPL-SD38-0711	CAPL-SD38P-0711	CAPL-SD39-0711	CAPL-SD40-0711	CAPL-SD41-0711
Sample Date	7/28/11	7/28/11	7/28/11	7/28/11	7/28/11	7/27/11	7/28/11	7/28/11	7/27/11	7/27/11	7/27/11	7/27/11	7/27/11	7/28/11
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1016	72 U	59 U	56 U	76 U	90 U	67 U	85 U	54 U	85 U	NS	88 U	59 U	46 U	74 U
Aroclor-1221	72 U	59 U	56 U	76 U	90 U	67 U	85 U	54 U	85 U	53 U	88 U	59 U	46 U	74 U
Aroclor-1232	72 U	59 U	56 U	76 U	90 U	67 U	85 U	54 U	85 U	53 U	88 U	59 U	46 U	74 U
Aroclor-1242	72 U	59 U	56 U	76 U	90 U	67 U	85 U	54 U	85 U	53 U	88 U	59 U	46 U	74 U
Aroclor-1248	72 U	59 U	56 U	76 U	90 U	67 U	85 U	54 U	85 U	53 U	88 U	59 U	46 U	74 U
Aroclor-1254	72 U	59 U	56 U	76 U	90 U	67 U	85 U	54 U	85 U	53 U	88 U	59 U	46 U	74 U
Aroclor-1260	1,100	180	210	580	1,000	760	390	110	380	41 J	91 J	220	95	430
Aroclor-1262	72 U	59 U	56 U	76 U	90 U	67 U	85 U	54 U	85 U	53 U	88 U	59 U	46 U	74 U
Aroclor-1268	72 U	59 U	56 U	76 U	90 U	67 U	85 U	54 U	85 U	53 U	88 U	59 U	46 U	74 U
Wet Chemistry (MG/KG)														
Total organic carbon (TOC)	75,000	68,000	110,000	80,000	NS	78,000	110,000	64,000	72,000	85,000	NS	68,000	47,000	81,000
Grain Size (PCT/P)														
GS03 Sieve 3" (75 mm)	100	100	100	100	NS	100	100	100	100	100	NS	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	100	100	NS	100	100	100	100	100	NS	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	100	NS	100	100	100	100	99	NS	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	100	99	100	NS	100	99	100	100	79	NS	100	100	100
Sieve No. 004 (4.75 mm)	100	100	96	100	NS	100	99	100	100	69	NS	99	100	100
Sieve No. 008 (2.36-MM)	89	92	87	92	NS	94	98	82	97	57	NS	96	96	87
Sieve No. 016 (1.18-MM)	59	72	72	60	NS	66	88	50	75	47	NS	90	83	56
Sieve No. 030 (600-UM)	38	54	57	35	NS	45	66	31	50	39	NS	84	70	35
Sieve No. 040 (425 um)	32	48	50	28	NS	38	57	26	42	36	NS	79	65	29
Sieve No. 050 (300-UM)	27	43	41	22	NS	33	47	21	34	33	NS	70	60	24
Sieve No. 100 (150 um)	20	25	20	14	NS	24	29	14	26	23	NS	62	44	17
Sieve No. 200 (75 um)	12	14	7	8.5	NS	15	17	8.4	14	12	NS	46	23	11

Notes:

J - Analyte present. Value may or may not be accurate or precis
NS - Not sampled
U - The material was analyzed for, but not detected
MG/KG - Milligrams per kilogram
PCT/P - Percent Passed
UG/KG - Micrograms per kilogram

Appendix A.2
Surface Sediment Analytical Results
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SD42-0711	CAPL-SD43-0711	CAPL-SD44-0711	CAPL-SD45-0711	CAPL-SD46-0711	CAPL-SD47-0711	CAPL-SD48-0711	CAPL-SD49-0711	CAPL-SD50-0711	CAPL-SD50P-0711	CAPL-SD51-0711	CAPL-SD52-0711	CAPL-SD53-0711	CAPL-SD54-0711
Sample Date	7/27/11	7/28/11	7/28/11	7/28/11	7/27/11	7/27/11	7/29/11	7/29/11	7/29/11	7/29/11	7/29/11	7/29/11	7/29/11	7/27/11
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1016	85 U	59 U	98 U	41 U	88 U	84 U	24 U	82 U	68 U	77 U	77 U	67 U	53 U	76 U
Aroclor-1221	85 U	59 U	98 U	41 U	88 U	84 U	24 U	82 U	68 U	77 U	77 U	67 U	53 U	76 U
Aroclor-1232	85 U	59 U	98 U	41 U	88 U	84 U	24 U	82 U	68 U	77 U	77 U	67 U	53 U	76 U
Aroclor-1242	85 U	59 U	98 U	41 U	88 U	84 U	24 U	82 U	68 U	77 U	77 U	67 U	53 U	76 U
Aroclor-1248	85 U	59 U	98 U	41 U	88 U	84 U	24 U	82 U	68 U	77 U	77 U	67 U	53 U	76 U
Aroclor-1254	85 U	59 U	98 U	41 U	88 U	84 U	24 U	82 U	68 U	77 U	77 U	67 U	53 U	76 U
Aroclor-1260	230	110	410	130	390	200	23 J	270	540	440	250	400	180	230
Aroclor-1262	85 U	59 U	98 U	41 U	88 U	84 U	24 U	82 U	68 U	77 U	77 U	67 U	53 U	76 U
Aroclor-1268	85 U	59 U	98 U	41 U	88 U	84 U	24 U	82 U	68 U	77 U	77 U	67 U	53 U	76 U
Wet Chemistry (MG/KG)														
Total organic carbon (TOC)	80,000	150,000	130,000	5,500	80,000	100,000	8,200	130,000	66,000	NS	70,000	58,000	63,000	83,000
Grain Size (PCT/P)														
GS03 Sieve 3" (75 mm)	100	100	100	100	100	100	100	100	100	NS	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	100	100	100	100	100	100	100	NS	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	99	100	100	100	100	100	NS	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	97	100	99	100	100	100	100	100	NS	100	100	100	100
Sieve No. 004 (4.75 mm)	100	89	88	98	100	100	98	100	100	NS	100	100	100	99
Sieve No. 008 (2.36-MM)	84	72	40	97	86	96	95	97	97	NS	98	96	98	95
Sieve No. 016 (1.18-MM)	53	51	21	92	54	72	92	83	85	NS	82	75	85	81
Sieve No. 030 (600-UM)	34	34	11	75	35	49	72	64	68	NS	55	54	67	59
Sieve No. 040 (425 um)	28	29	8.4	58	29	42	50	55	60	NS	46	47	59	51
Sieve No. 050 (300-UM)	24	23	6.2	39	24	36	29	47	52	NS	38	40	52	43
Sieve No. 100 (150 um)	18	13	3.3	19	18	28	12	34	41	NS	28	31	40	32
Sieve No. 200 (75 um)	9.4	5.8	1.4	6.4	11	18	4.5	18	26	NS	18	20	22	20

Notes:

J - Analyte present. Value may or may not be accurate or precis
NS - Not sampled
U - The material was analyzed for, but not detected
MG/KG - Milligrams per kilogram
PCT/P - Percent Passed
UG/KG - Micrograms per kilogram

Appendix A.2
Surface Sediment Analytical Results
Penniman Lake
Cheatham Annex
Williamsburg, Virginia

Sample ID	CAPL-SD55-0711	CAPL-SD56-0711	CAPL-SD57-0711	CAPL-SD58-0711	CAPL-SD58P-0711	CAPL-SD59-0711	CAPL-SD60-0711	CAPL-SD61-0811
Sample Date	7/27/11	7/27/11	7/27/11	7/29/11	7/29/11	7/27/11	7/29/11	8/2/11
Chemical Name								
Pesticide/Polychlorinated Biphenyls (UG/KG)								
Aroclor-1016	22 U	74 U	46 U	67 U	92 U	85 U	64 U	20 U
Aroclor-1221	22 U	74 U	46 U	67 U	92 U	85 U	64 U	20 U
Aroclor-1232	22 U	74 U	46 U	67 U	92 U	85 U	64 U	20 U
Aroclor-1242	22 U	74 U	46 U	67 U	92 U	85 U	64 U	20 U
Aroclor-1248	22 U	74 U	46 U	67 U	92 U	85 U	64 U	20 U
Aroclor-1254	22 U	74 U	46 U	67 U	92 U	85 U	64 U	20 U
Aroclor-1260	39	280	48 J	170	240	410	810	40
Aroclor-1262	22 U	74 U	46 U	67 U	92 U	85 U	64 U	20 U
Aroclor-1268	22 U	74 U	46 U	67 U	92 U	85 U	64 U	20 U
Wet Chemistry (MG/KG)								
Total organic carbon (TOC)	19,000	84,000	35,000	74,000	NS	98,000	78,000	15,000
Grain Size (PCT/P)								
GS03 Sieve 3" (75 mm)	100	100	100	100	NS	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	100	100	NS	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	100	NS	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	100	100	100	NS	100	100	100
Sieve No. 004 (4.75 mm)	100	100	99	100	NS	100	99	99
Sieve No. 008 (2.36-MM)	99	96	97	93	NS	94	85	98
Sieve No. 016 (1.18-MM)	96	82	93	67	NS	69	60	96
Sieve No. 030 (600-UM)	88	62	82	49	NS	46	45	90
Sieve No. 040 (425 um)	79	53	68	43	NS	39	39	83
Sieve No. 050 (300-UM)	59	46	46	38	NS	33	34	50
Sieve No. 100 (150 um)	18	36	14	29	NS	25	26	17
Sieve No. 200 (75 um)	5.5	22	4.6	18	NS	16	17	5.8

Notes:

J - Analyte present. Value may or may not be accurate or precis
NS - Not sampled
U - The material was analyzed for, but not detected
MG/KG - Milligrams per kilogram
PCT/P - Percent Passed
UG/KG - Micrograms per kilogram

Attachment B
Laboratory Analytical Results

Attachment B1
Cheatham Annex, Cheatham Pond
Reference Surface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05
Sample ID	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Volatile Organic Compounds (µg/kg)						
1,1,1-Trichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
1,1,2,2-Tetrachloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U
1,1,2-Trichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
1,1-Dichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
1,1-Dichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
1,2,3-Trichlorobenzene	4.54 UL	15 UL	14.1 UL	4.26 UL	7.55 UL	13.8 UL
1,2,4-Trichlorobenzene	4.54 UL	15 UL	14.1 UL	4.26 UL	7.55 UL	13.8 UL
1,2-Dibromo-3-chloropropane	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U
1,2-Dibromoethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
1,2-Dichlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
1,2-Dichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
1,2-Dichloropropane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
1,3-Dichlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
1,4-Dichlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
2-Butanone	32.2	169	129	31	42.4	109
2-Hexanone	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U
4-Methyl-2-pentanone	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U
Acetone	114 J	563 J	424 J	99.8 J	148 J	629 J
Benzene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Bromochloromethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Bromodichloromethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Bromoform	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Bromomethane	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U
Carbon disulfide	4.54 UJ	15 UJ	7.06 J	4.26 UJ	7.55 UJ	13.8 UJ
Carbon tetrachloride	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Chlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
Chloroethane	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U
Chloroform	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Chloromethane	9.07 UJ	30 UJ	28.2 UJ	8.51 UJ	15.1 UJ	27.6 UJ
cis-1,2-Dichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
cis-1,3-Dichloropropene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
Cyclohexane	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
Dibromochloromethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Dichlorodifluoromethane (Freon-12)	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U
Ethylbenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
Isopropylbenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
Methyl acetate	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U
Methylcyclohexane	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
Methylene chloride	5.21 J	16.9 J	17.1 J	8.51 U	8.18 J	27.6 U
Methyl-tert-butyl ether (MTBE)	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Styrene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
Tetrachloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Toluene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
trans-1,2-Dichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
trans-1,3-Dichloropropene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
Trichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U
Trichlorofluoromethane (Freon-11)	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U
Vinyl chloride	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U
Xylene, total	13.6 U	45 U	42.3 U	12.8 U	22.6 UL	41.4 U

Attachment B1
Cheatham Annex, Cheatham Pond
Reference Surface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05
Sample ID	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Semivolatile Organic Compounds (µg/kg)						
1,1-Biphenyl	324 U	1,130 U	966 U	367 U	480 U	812 U
1,2,4,5-Tetrachlorobenzene	324 U	1,130 U	966 U	367 U	480 U	812 U
2,2'-Oxybis(1-chloropropane)	324 U	1,130 U	966 U	367 U	480 U	812 U
2,3,4,6-Tetrachlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U
2,4,5-Trichlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U
2,4,6-Trichlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U
2,4-Dichlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U
2,4-Dimethylphenol	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U
2,4-Dinitrophenol	3,240 U	11,300 U	9,660 U	3,670 U	4,800 R	8,120 U
2,4-Dinitrotoluene	324 U	1,130 U	966 U	367 U	480 U	812 U
2,6-Dinitrotoluene	324 U	1,130 U	966 U	367 U	480 U	812 U
2-Chloronaphthalene	324 U	1,130 U	966 U	367 U	480 U	812 U
2-Chlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U
2-Methylnaphthalene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
2-Methylphenol	324 U	1,130 U	966 U	367 U	480 U	812 U
2-Nitroaniline	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U
2-Nitrophenol	324 U	1,130 U	966 U	367 U	480 U	812 U
3,3'-Dichlorobenzidine	324 U	1,130 U	966 U	367 U	480 U	812 U
3-Nitroaniline	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U
4,6-Dinitro-2-methylphenol	3,240 U	11,300 U	9,660 U	3,670 U	4,800 U	8,120 U
4-Bromophenyl-phenylether	324 U	1,130 U	966 U	367 U	480 U	812 U
4-Chloro-3-methylphenol	324 U	1,130 U	966 U	367 U	480 U	812 U
4-Chloroaniline	324 U	1,130 U	966 U	367 U	480 U	812 U
4-Chlorophenyl-phenylether	324 U	1,130 U	966 U	367 U	480 U	812 U
4-Methylphenol	324 U	1,130 U	966 U	367 U	480 U	812 U
4-Nitroaniline	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U
4-Nitrophenol	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U
Acenaphthene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Acenaphthylene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Acetophenone	324 U	1,130 U	966 U	367 U	480 U	812 U
Anthracene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Atrazine	324 U	1,130 U	966 U	367 U	480 U	812 U
Benzaldehyde	324 U	1,130 U	966 U	367 U	480 U	812 U
Benzo(a)anthracene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Benzo(a)pyrene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Benzo(b)fluoranthene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Benzo(g,h,i)perylene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Benzo(k)fluoranthene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
bis(2-Chloroethoxy)methane	324 U	1,130 U	966 U	367 U	480 U	812 U
bis(2-Chloroethyl)ether	324 U	1,130 U	966 U	367 U	480 U	812 U
bis(2-Ethylhexyl)phthalate	324 U	1,130 U	966 U	367 U	480 U	812 U
Butylbenzylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U
Caprolactam	324 U	1,130 U	966 U	367 U	480 U	812 U
Carbazole	324 U	1,130 U	966 U	367 U	480 U	812 U
Chrysene	8.69 J	22.4 U	19.3 U	7.33 U	9.57 U	17.3 J
Dibenz(a,h)anthracene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Dibenzofuran	324 U	1,130 U	966 U	367 U	480 U	812 U
Diethylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U
Dimethyl phthalate	324 U	1,130 U	966 U	367 U	480 U	812 U
Di-n-butylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U
Di-n-octylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U
Fluoranthene	8.77 J	19.4 J	31.4 J	6.59 J	12.3 J	19 J
Fluorene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Hexachlorobenzene	324 U	1,130 U	966 U	367 U	480 U	812 U
Hexachlorobutadiene	324 U	1,130 U	966 U	367 U	480 U	812 U
Hexachlorocyclopentadiene	324 U	1,130 U	966 U	367 U	480 R	812 U
Hexachloroethane	324 U	1,130 U	966 U	367 U	480 U	812 U
Indeno(1,2,3-cd)pyrene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
Isophorone	324 U	1,130 U	966 U	367 U	480 U	812 U
Naphthalene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U
n-Nitroso-di-n-propylamine	324 U	1,130 U	966 U	367 U	480 U	812 U
n-Nitrosodiphenylamine	324 U	1,130 U	966 U	367 U	480 U	812 U
Nitrobenzene	324 U	1,130 U	966 U	367 U	480 U	812 U
Pentachlorophenol	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U
Phenanthrene	3.67 J	15.4 J	27.5 J	4.97 J	7.38 J	13.6 J
Phenol	324 U	1,130 U	966 U	367 U	480 U	812 U
Pyrene	7.57 J	25.1 J	27.4 J	7.33 U	12.5 J	21.8 J

Attachment B1
Cheatham Annex, Cheatham Pond
Reference Surface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05
Sample ID	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Pesticide/Polychlorinated Biphenyls (µg/kg)						
4,4'-DDD	0.571 J	2.32 L	7.97 L	4.51 L	2.3 L	154 L
4,4'-DDE	0.945 L	3.27 L	9.3 J	3.75 J	1.5 L	26.2 J
4,4'-DDT	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.45 L
Aldrin	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
alpha-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.813 L	1.62 UL
alpha-Chlordane	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
Aroclor-1016	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL
Aroclor-1221	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL
Aroclor-1232	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL
Aroclor-1242	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL
Aroclor-1248	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL
Aroclor-1254	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL
Aroclor-1260	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL
beta-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
delta-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
Dieldrin	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	0.948 J
Endosulfan I	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
Endosulfan II	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
Endosulfan sulfate	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
Endrin	0.663 UL	2.25 UL	2.27 J	0.763 UL	0.933 UL	7.36 J
Endrin aldehyde	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
Endrin ketone	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
gamma-BHC (Lindane)	0.295 J	2.25 UL	2.03 UL	0.316 J	0.933 UL	2.22 J
gamma-Chlordane	0.663 UL	1.1 L	2.56 B	1.27 B	0.933 UL	1.32 B
Heptachlor	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
Heptachlor epoxide	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL
Methoxychlor	0.663 UJ	2.25 UJ	2.03 UJ	0.763 UJ	0.933 UJ	1.62 UJ
Toxaphene	42.9 UL	145 UL	131 UL	49.3 UL	60.4 UL	105 UL
Explosives (µg/kg)						
1,3,5-Trinitrobenzene	160 U	160 U	167 U	160 U	167 U	167 U
1,3-Dinitrobenzene	160 U	278 J	279 J	160 U	167 U	167 U
2,4,6-Trinitrotoluene	160 U	160 U	436 J	160 U	141 J	167 U
2-Amino-4,6-dinitrotoluene	160 U	160 U	167 U	160 U	167 U	167 U
2-Nitrotoluene	160 U	101 J	167 U	160 U	167 U	167 U
3,5-Dinitroaniline	160 U	160 U	167 U	160 U	167 U	167 U
3-Nitrotoluene	160 U	160 U	167 U	160 U	167 U	167 U
4-Amino-2,6-dinitrotoluene	160 U	160 U	167 U	160 U	167 U	167 U
4-Nitrotoluene	160 U	160 U	167 U	160 U	348	167 U
HMX	160 U	160 U	167 U	174 J	167 U	167 U
Nitroglycerin	400 U	384 J	417 U	400 U	417 U	417 U
Nitroguanidine	105 U	95.2 U	105 U	90.9 U	105 U	100 U
PETN	400 U	400 U	417 U	400 U	417 U	417 U
RDX	160 U	160 U	297 J	160 U	167 U	167 U
Tetryl	160 U	160 U	106 J	160 U	167 U	167 U
Total Metals (mg/kg)						
Aluminum	2,880	5,320	4,460	6,450	1,730	24,200
Antimony	1.63 UL	5.45 U	4.98 U	4.82 U	0.726 J	10.6 U
Arsenic	11.1	147	140	16.3	43.1	43
Barium	23.5	31.7	25.7	34.3	9.62	75
Beryllium	0.45 J	1.36 U	1.24 U	0.74 J	0.287 U	1.39 J
Cadmium	0.408 U	1.36 U	1.24 U	1.2 U	0.287 U	2.64 U
Calcium	2,960	23,000	20,800	3,780	5,490	8,540
Chromium	7.19	18.9	16.8	13.7	5.67	46.2
Cobalt	1.5 J	6.82 U	6.22 U	6.02 U	1.44 U	13.2 U
Copper	2.18	10	9.16	2.57 J	3.38	8.72 J
Cyanide	0.502 U	1.71 U	1.52 U	0.555 U	0.718 U	1.21 U
Iron	5,420	13,500	11,400	16,100	5,730	38,900
Lead	4.46	19	16.6	8.33	6.09	22.2
Magnesium	482 J	716 J	1,870 U	1,100 J	255 J	3,470 J
Manganese	28	69	56.3	54.9	21.9	74.6
Mercury	0.0307 J	0.224 U	0.16 U	0.0327 J	0.0665 U	0.0811 J
Nickel	2.57	4.91 J	4.04 J	4.48 J	1.3 J	13.4
Potassium	530 J	2,040 U	1,870 U	1,180 J	248 J	3,740 J
Selenium	1.02 U	3.41 U	3.11 U	3.01 U	0.718 U	6.61 U
Silver	0.408 U	1.36 U	1.24 U	1.2 U	0.287 U	2.64 U
Sodium	612 U	2,040 U	1,870 U	1,810 U	431 U	3,960 U
Thallium	0.816 U	2.73 U	2.49 U	2.41 U	0.575 U	5.29 U
Vanadium	7.47	18.4	16.8	16.3	8.64	58.3
Zinc	14	60.1	50.8	19.9	14.2	58.5

Attachment B1
Cheatham Annex, Cheatham Pond
Reference Surface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05
Sample ID	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)						
Zinc, SEM	0.0881	0.505	NA	0.0653	0.0717	0.247
Acid volatile sulfide, SEM	1.98 J	12.1	NA	4.5	2.62 J	9.62
Cadmium, SEM	8.22E-04 J	0.00181 J	NA	9.87E-04 U	8.50E-04 U	0.00201 U
Copper, SEM	0.0112 J	0.0145 J	NA	0.0104 J	0.0114 J	0.0163 J
Lead, SEM	0.0138	0.0528	NA	0.0192	0.0103	0.0464
Mercury, SEM	5.69E-05 NU	1.47E-04 NU	NA	5.51E-05 NU	4.84E-05 NU	1.15E-04 NU
Nickel, SEM	0.00813 J	0.0167 J	NA	0.00989 J	0.00373 J	0.0145 J
Silver, SEM	0.00277 U	0.0071 U	NA	0.00269 U	0.00232 U	0.00547 U
Wet Chemistry						
pH (ph)	6.86 H3	6.54 H3	NA	6.91 H3	6.75 H3	6.72 H3
Total organic carbon (TOC) (mg/kg)	56,100 N	97,200 N	NA	37,600 N	51,700 N	57,100 N
Grain Size (pct)						
Coarse Sand (%)	1.8	7.8	NA	3.9	3.9	5.6
Fine Sand (%)	81.1	47	NA	61.8	69	65.3
Fines (%)	10.7	35.2	NA	26.2	16.2	20.6
Gravel (%)	0	0	NA	0	1.6	0
Medium Sand (%)	6.4	10	NA	8.1	9.3	8.5
Sand (%)	89.3	64.8	NA	73.8	82.2	79.4
GRAINSIZE (PCT/P)						
GS03 Sieve 3" (75 mm)	100	100	NA	100	100	100
GS05 Sieve 2" (50 mm)	100	100	NA	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	NA	100	100	100
GS07 Sieve 1" (25.0 mm)	100	100	NA	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	NA	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	100	NA	100	100	100
Sieve No. 004 (4.75 mm)	100	100	NA	100	98.4	100
Sieve No. 010 (2.00 mm)	98.2	92.2	NA	96.1	94.5	94.4
Sieve No. 020 (850 um)	96.3	88.6	NA	93.9	93.4	91.9
Sieve No. 040 (425 um)	91.8	82.2	NA	88	85.2	85.9
Sieve No. 060 (250 um)	66.2	69.4	NA	67.3	67.7	67
Sieve No. 080 (180 um)	40.1	56.2	NA	48.4	49.6	47.6
Sieve No. 100 (150 um)	26.3	47.6	NA	39.7	35.6	37.4
Sieve No. 200 (75 um)	10.7	35.2	NA	26.2	16.2	20.6

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Attachment B_Analytical Results\[B1_CAREF_AllData_SD_raw_v1_jd.xlsx], Campbell, Clairette/VBO, 03/17/2014

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3 - Result estimated; sample received outside the recommended holding time for this analyte

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

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

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

N - Unvalidated data; one or more quality control criteria was not met.

NU - Unvalidated data; analyte was not detected; one or more quality control criteria was not met

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

PCT/P - Percent passed

ph - pH units

µg/kg - Micrograms per kilogram

µmol/g - Micromoles per gram

Attachment B2
Cheatham Annex, Cheatham Pond
Reference Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	
Sample ID	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Volatile Organic Compounds (µg/kg)						
1,1,1-Trichloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,1,2,2-Tetrachloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U
1,1,2-Trichloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,1-Dichloroethane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,1-Dichloroethene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,2,3-Trichlorobenzene	4.56 UL	4.21 UL	2.26 UL	6.46 UL	3.47 UL	4.57 UL
1,2,4-Trichlorobenzene	4.56 UL	4.21 UL	2.26 UL	6.46 UL	3.47 UL	4.57 UL
1,2-Dibromo-3-chloropropane	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U
1,2-Dibromoethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,2-Dichlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,2-Dichloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,2-Dichloropropane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,3-Dichlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
1,4-Dichlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
2-Butanone	19	40.9	11.8	43.9	13.3 J	17.5 J
2-Hexanone	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U
4-Methyl-2-pentanone	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U
Acetone	70.5 J	137 J	43.4 J	157 J	57.6 J	77.4 J
Benzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Bromochloromethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Bromodichloromethane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Bromoform	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Bromomethane	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U
Carbon disulfide	4.56 UJ	4.21 UJ	2.26 UJ	6.46 UJ	3.47 UJ	4.57 UJ
Carbon tetrachloride	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Chlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Chloroethane	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U
Chloroform	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Chloromethane	9.13 UJ	8.42 UJ	4.53 UJ	12.9 UJ	6.94 UJ	9.15 UJ
cis-1,2-Dichloroethene	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
cis-1,3-Dichloropropene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Cyclohexane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Dibromochloromethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Dichlorodifluoromethane (Freon-12)	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U
Ethylbenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Isopropylbenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Methyl acetate	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U
Methylcyclohexane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Methylene chloride	8.03 J	6.33 B	3.93 B	7.11 J	4.33 B	6.31 B
Methyl-tert-butyl ether (MTBE)	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Styrene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Tetrachloroethene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Toluene	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
trans-1,2-Dichloroethene	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
trans-1,3-Dichloropropene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Trichloroethene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Trichlorofluoromethane (Freon-11)	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U
Vinyl chloride	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U
Xylene, total	13.7 UL	12.6 U	6.79 U	19.4 U	10.4 U	13.7 U

Attachment B2
Cheatham Annex, Cheatham Pond
Reference Subsurface Sediment Samples
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Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	
Sample ID	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Semivolatile Organic Compounds (µg/kg)						
1,1-Biphenyl	352 U	326 U	230 U	526 U	274 U	296 U
1,2,4,5-Tetrachlorobenzene	352 U	326 U	230 U	526 U	274 U	296 U
2,2'-Oxybis(1-chloropropane)	352 U	326 U	230 U	526 U	274 U	296 U
2,3,4,6-Tetrachlorophenol	352 U	326 U	230 U	526 U	274 U	296 U
2,4,5-Trichlorophenol	352 U	326 U	230 U	526 U	274 U	296 U
2,4,6-Trichlorophenol	352 U	326 U	230 U	526 U	274 U	296 U
2,4-Dichlorophenol	352 U	326 U	230 U	526 U	274 U	296 U
2,4-Dimethylphenol	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U
2,4-Dinitrophenol	3,520 R	3,260 U	2,300 U	5,260 U	2,740 U	2,960 U
2,4-Dinitrotoluene	352 U	326 U	230 U	526 U	274 U	296 U
2,6-Dinitrotoluene	352 U	326 U	230 U	526 U	274 U	296 U
2-Chloronaphthalene	352 U	326 U	230 U	526 U	274 U	296 U
2-Chlorophenol	352 U	326 U	230 U	526 U	274 U	296 U
2-Methylnaphthalene	7.01 U	6.5 U	4.59 U	10.5 U	3.26 J	5.91 U
2-Methylphenol	352 U	326 U	230 U	526 U	274 U	296 U
2-Nitroaniline	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U
2-Nitrophenol	352 U	326 U	230 U	526 U	274 U	296 U
3,3'-Dichlorobenzidine	352 U	326 U	230 U	526 U	274 U	296 U
3-Nitroaniline	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U
4,6-Dinitro-2-methylphenol	3,520 U	3,260 U	2,300 U	5,260 U	2,740 U	2,960 U
4-Bromophenyl-phenylether	352 U	326 U	230 U	526 U	274 U	296 U
4-Chloro-3-methylphenol	352 U	326 U	230 U	526 U	274 U	296 U
4-Chloroaniline	352 U	326 U	230 U	526 U	274 U	296 U
4-Chlorophenyl-phenylether	352 U	326 U	230 U	526 U	274 U	296 U
4-Methylphenol	352 U	326 U	230 U	526 U	274 U	296 U
4-Nitroaniline	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U
4-Nitrophenol	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U
Acenaphthene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U
Acenaphthylene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U
Acetophenone	352 U	326 U	230 U	526 U	274 U	296 U
Anthracene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U
Atrazine	352 U	326 U	230 U	526 U	274 U	296 U
Benzaldehyde	352 U	326 U	230 U	526 U	274 U	296 U
Benzo(a)anthracene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U
Benzo(a)pyrene	7.01 U	6.5 U	4.59 U	10.5 U	13.6	14.5
Benzo(b)fluoranthene	7.01 U	6.5 U	4.59 U	10.5 U	17.7	16.3
Benzo(g,h,i)perylene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U
Benzo(k)fluoranthene	7.01 U	6.5 U	4.59 U	10.5 U	12.6	8.37 J
bis(2-Chloroethoxy)methane	352 U	326 U	230 U	526 U	274 U	296 U
bis(2-Chloroethyl)ether	352 U	326 U	230 U	526 U	274 U	296 U
bis(2-Ethylhexyl)phthalate	352 U	326 U	230 U	526 U	274 U	296 U
Butylbenzylphthalate	352 U	326 U	230 U	526 U	274 U	296 U
Caprolactam	352 U	326 U	230 U	526 U	274 U	296 U
Carbazole	352 U	326 U	230 U	526 U	274 U	296 U
Chrysene	7.01 U	6.5 U	4.59 U	10.5 U	19.6	5.91 U
Dibenz(a,h)anthracene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U
Dibenzofuran	352 U	326 U	230 U	526 U	274 U	296 U
Diethylphthalate	352 U	326 U	230 U	526 U	274 U	296 U
Dimethyl phthalate	352 U	326 U	230 U	526 U	274 U	296 U
Di-n-butylphthalate	352 U	326 U	230 U	526 U	274 U	296 U
Di-n-octylphthalate	352 U	326 U	230 U	526 U	274 U	296 U
Fluoranthene	8.1 J	11.4 J	3.11 J	11 J	21.2	20
Fluorene	7.01 U	6.5 U	4.59 U	10.5 U	3.18 J	5.91 U
Hexachlorobenzene	352 U	326 U	230 U	526 U	274 U	296 U
Hexachlorobutadiene	352 U	326 U	230 U	526 U	274 U	296 U
Hexachlorocyclopentadiene	352 R	326 U	230 U	526 U	274 U	296 U
Hexachloroethane	352 UL	326 U	230 U	526 U	274 U	296 U
Indeno(1,2,3-cd)pyrene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U
Isophorone	352 U	326 U	230 U	526 U	274 U	296 U
Naphthalene	7.01 U	6.5 U	4.59 U	10.5 U	4.78 J	5.91 U
n-Nitroso-di-n-propylamine	352 U	326 U	230 U	526 U	274 U	296 U
n-Nitrosodiphenylamine	352 U	326 U	230 U	526 U	274 U	296 U
Nitrobenzene	352 U	326 U	230 U	526 U	274 U	296 U
Pentachlorophenol	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U
Phenanthrene	8.42 J	7.31 J	3.59 J	10.5 J	16.7	15.4
Phenol	352 U	326 U	230 U	526 U	274 U	296 U
Pyrene	9.75 J	9.86 J	4.59 U	11.1 J	21.5	20.7

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Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	
Sample ID	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Pesticide/Polychlorinated Biphenyls (µg/kg)						
4,4'-DDD	0.739 UL	1.13 J	1.37 L	18.4 J	13.4 L	11.6 L
4,4'-DDE	0.683 J	1.3 L	0.345 L	8.98 J	7.53 J	6.82 J
4,4'-DDT	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL
Aldrin	0.739 UL	0.668 UL	0.478 UL	0.91 J	0.568 UL	0.619 UL
alpha-BHC	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.322 J	0.318 L
alpha-Chlordane	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL
Aroclor-1016	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL
Aroclor-1221	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL
Aroclor-1232	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL
Aroclor-1242	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL
Aroclor-1248	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL
Aroclor-1254	14.5 L	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL
Aroclor-1260	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL
beta-BHC	0.739 UL	0.668 UL	0.478 UL	2.21 J	0.465 J	0.364 L
delta-BHC	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.294 J	0.264 J
Dieldrin	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL
Endosulfan I	0.739 UL	0.668 UL	0.478 UL	0.805 J	0.568 UL	0.619 UL
Endosulfan II	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL
Endosulfan sulfate	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.568 UL	0.619 UL
Endrin	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.64 J	0.619 UL
Endrin aldehyde	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.568 UL	0.619 UL
Endrin ketone	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL
gamma-BHC (Lindane)	0.739 UL	0.668 UL	0.218 J	1.04 U	0.285 J	0.48 J
gamma-Chlordane	0.739 UL	0.668 UL	0.226 B	0.896 B	0.304 B	0.453 B
Heptachlor	0.739 UL	0.668 UL	0.478 UL	1.35 B	0.316 B	0.619 UL
Heptachlor epoxide	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.568 UL	0.619 UL
Methoxychlor	0.739 UJ	0.668 UJ	0.478 UJ	1.04 UL	0.568 UJ	0.619 UJ
Toxaphene	47.8 UL	43.2 UL	30.9 UL	67.1 U	36.7 UL	40.1 UL
Explosives (µg/kg)						
1,3,5-Trinitrobenzene	190 U	160 U	190 U	174 U	182 U	200 U
1,3-Dinitrobenzene	190 U	160 U	190 U	174 U	182 U	217 J
2,4,6-Trinitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U
2-Amino-4,6-dinitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U
2-Nitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U
3,5-Dinitroaniline	190 U	160 U	190 U	174 U	182 U	200 U
3-Nitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U
4-Amino-2,6-dinitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U
4-Nitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U
HMX	190 U	160 U	190 U	812 J	182 U	200 U
Nitroglycerin	476 U	400 U	476 U	435 U	455 U	500 U
Nitroguanidine	90.9 U	105 U	95.2 U	95.2 U	110 J	105 J
PETN	476 U	400 U	476 U	435 U	455 U	500 U
RDX	190 U	160 U	190 U	174 U	182 U	200 U
Tetryl	190 U	160 U	190 U	174 U	182 U	200 U

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Cheatham Annex, Cheatham Pond
Reference Subsurface Sediment Samples
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Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	
Sample ID	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name						
Total Metals (mg/kg)						
Aluminum	3,110	1,510	3,500	2,570	7,950 J	10,200 J
Antimony	0.888 U	1.54 U	2.83 U	6.58 U	3.65 U	3.56 U
Arsenic	8.08	16.5	3.39 J	57.2	7.85	6.96
Barium	27.7	10.5	17.6	13 J	28.2	36.5
Beryllium	0.492 J	0.386 U	0.448 J	1.65 U	0.914 U	0.599 J
Cadmium	0.222 U	0.386 U	0.706 U	1.65 U	0.914 U	0.89 U
Calcium	3,240	5,050	1,120 J	7,430	2,800	3,160
Chromium	7.29	4	8.9	6.22 J	11.9	15.9
Cobalt	1.69	1.93 U	3.53 U	8.23 U	4.57 U	2.47 J
Copper	2.64	2.09	2.83 U	3.67 J	2.31 J	2.78 J
Cyanide	0.558 U	0.477 U	0.355 U	0.783 U	0.421 U	0.437 U
Iron	5,310	2,840	8,940	6,300	8,740 J	11,300 J
Lead	4.05	3.77	3.58	8.98	9.5	12.1
Magnesium	479 J	197 J	802 J	2,470 U	861 J	1,130 J
Manganese	28.9	18.6	13.6	22.6	21.6	25.1
Mercury	0.0258 J	0.0541 U	0.043 U	0.0499 J	0.047 J	0.0519 J
Nickel	2.75	1.24 J	2.48 J	4.94 U	4.39 J	5.63
Potassium	558	578 U	1,120 J	2,470 U	777 J	1,010 J
Selenium	0.555 U	0.964 U	1.77 U	4.12 U	2.28 U	2.23 U
Silver	0.222 U	0.386 U	0.706 U	1.65 U	0.914 U	0.89 U
Sodium	333 U	578 U	1,060 U	2,470 U	1,370 U	1,340 U
Thallium	0.444 U	0.771 U	1.41 U	3.29 U	1.83 U	1.78 U
Vanadium	7.65	5.09	10.3	8.57 J	15.8	20.4
Zinc	13.3	10.8	8.81	22.3	18.9	22.6
Wet Chemistry						
pH (ph)	6.87 H3	6.89 H3	6.77 H3	6.79 H3	6.94 H3	NA
Total organic carbon (TOC) (mg/kg)	26,500 N	42,500 N	19,600 N	67,800 N	43,400 N	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3 - Result estimated; sample received outside the recommended holding time for this analyte

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

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

N - Unvalidated data; one or more quality control criteria was not met.

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

Attachment B3
Cheatham Annex, Cheatham Pond
Reference Surface Water Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01
Sample ID	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFYP-SW01-1012	CAREFYP-SW02-1012	CAREFYP-SW02P-1012	CAREFYP-SW03-1012	CAREFS04-SW01-1012
Sample Date	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/03/12
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1,1-Trichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,1,2,2-Tetrachloroethane	2.5 UJ	2.5 UJ	0.5 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	0.5 U
1,1,2-Trichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,1-Dichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,1-Dichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,2,3-Trichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,2,4-Trichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,2-Dibromo-3-chloropropane	5 U	5 U	1 U	2 U	2 U	2 U	5 U	5 U	5 U	5 U	1 U
1,2-Dibromoethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,2-Dichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,2-Dichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,2-Dichloropropane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,3-Dichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
1,4-Dichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
2-Butanone	25 U	25 U	5 U	10 U	10 U	10 U	12 U	12 U	12 U	12 U	2.5 U
2-Hexanone	12.5 U	12.5 U	2.5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Methyl-2-pentanone	12.5 U	12.5 U	2.5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	49.5 J	68.4	5 U	65.3	60.5	76.8	12 U	12 U	12 U	12 U	4.3 B
Benzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Bromochloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA
Bromodichloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Bromoform	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Bromomethane	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	5 U	5 U	5 U	5 U	0.5 U
Carbon tetrachloride	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Chlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Chloroethane	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U
Chloroform	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Chloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
cis-1,3-Dichloropropene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Cyclohexane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Dibromochloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Dichlorodifluoromethane (Freon-12)	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Isopropylbenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
m- and p-Xylene	NA	NA	NA	NA	NA	NA	2 U	2 U	2 U	2 U	1 U
Methyl acetate	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	0.75 U
Methylcyclohexane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Methylene chloride	5 U	5 U	1 U	2 U	2 U	2 U	5 U	5 U	5 U	5 U	2.5 U
Methyl-tert-butyl ether (MTBE)	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
o-Xylene	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	1 U	0.5 U
Styrene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Tetrachloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Toluene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
trans-1,2-Dichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
trans-1,3-Dichloropropene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Trichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U
Trichlorofluoromethane (Freon-11)	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	7.5 U	7.5 U	1.5 U	3 U	3 U	3 U	NA	NA	NA	NA	1.5 U

Attachment B3
Cheatham Annex, Cheatham Pond
Reference Surface Water Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01
Sample ID	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFYP-SW01-1012	CAREFYP-SW02-1012	CAREFYP-SW02P-1012	CAREFYP-SW03-1012	CAREFS04-SW01-1012
Sample Date	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/03/12
Chemical Name											
Semivolatile Organic Compounds (µg/l)											
1,1-Biphenyl	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	9 U	9 U	9 U	9 UL	7.4 U
1,2,4,5-Tetrachlorobenzene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
2,2'-Oxybis(1-chloropropane)	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 UJ
2,3,4,6-Tetrachlorophenol	4.72 U	4.81 U	4.63 UL	4.72 U	4.81 U	4.81 U	6 U	6 U	6 U	6 UL	7.4 U
2,4,5-Trichlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	18 U
2,4,6-Trichlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 U
2,4-Dichlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 U
2,4-Dimethylphenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	6 U	6 U	6 U	6 U	7.4 U
2,4-Dinitrophenol	23.6 U	24 U	23.1 UL	23.6 U	24 U	24 U	6 U	6 U	6 U	6 U	18 U
2,4-Dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL
2,6-Dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL
2-Chloronaphthalene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U
2-Chlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
2-Methylnaphthalene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
2-Methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U
2-Nitroaniline	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	3 U	3 U	3 U	3 U	18 U
2-Nitrophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 U
3- and 4-Methylphenol	NA	NA	NA	NA	NA	NA	6 U	6 U	6 U	6 UL	7.4 U
3,3'-Dichlorobenzidine	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
3-Nitroaniline	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	3 U	3 U	3 U	3 U	18 U
4,6-Dinitro-2-methylphenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	6 U	6 U	6 U	6 U	18 U
4-Bromophenyl-phenylether	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
4-Chloro-3-methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
4-Chloroaniline	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
4-Chlorophenyl-phenylether	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
4-Methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	NA	NA	NA	NA	NA
4-Nitroaniline	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	3 U	3 U	3 U	3 U	18 U
4-Nitrophenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	3 U	3 U	3 U	3 U	18 U
Acenaphthene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Acenaphthylene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Acetophenone	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U
Anthracene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Atrazine	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 UJ
Benzaldehyde	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 UJ
Benzo(a)anthracene	0.0943 U	0.0515 L	0.0926 UL	0.0943 U	0.0962 U	0.0666 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Benzo(a)pyrene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Benzo(b)fluoranthene	0.0943 U	0.0627 J	0.0926 UL	0.0943 U	0.0962 U	0.0629 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Benzo(g,h,i)perylene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Benzo(k)fluoranthene	0.0943 U	0.0575 J	0.0926 UL	0.0943 U	0.0962 U	0.0627 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
bis(2-Chloroethoxy)methane	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 U
bis(2-Chloroethyl)ether	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
bis(2-Ethylhexyl)phthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	3 B
Butylbenzylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U
Caprolactam	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U
Carbazole	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U
Chrysene	0.0943 U	0.0542 J	0.0926 UL	0.0943 U	0.0962 U	0.0799 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Dibenz(a,h)anthracene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Dibenzofuran	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U
Diethylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U
Dimethyl phthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U
Di-n-butylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U
Di-n-octylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
Fluoranthene	0.0943 U	0.0901 J	0.0622 L	0.0855 J	0.0962 U	0.177 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Fluorene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Hexachlorobenzene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U
Hexachlorobutadiene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
Hexachlorocyclopentadiene	4.72 U	4.81 U	4.63 UL	4.72 U	4.81 U	4.81 U	6 U	6 U	6 U	6 U	7.4 UJ
Hexachloroethane	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U
Indeno(1,2,3-cd)pyrene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
Isophorone	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U
Naphthalene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U
n-Nitroso-di-n-propylamine	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
n-Nitrosodiphenylamine	2.36 U	2.4 UL	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U
Nitrobenzene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL
Pentachlorophenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	9 U	9 U	9 U	9 U	18 U
Phenanthrene	0.189 U	0.192 U	0.185 UL	0.0988 J	0.192 U	0.124 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.065 J
Phenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U
Pyrene	0.0943 U	0.0742 J	0.0926 UL	0.0591 J	0.0962 U	0.125 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U

Attachment B3
Cheatham Annex, Cheatham Pond
Reference Surface Water Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01
Sample ID	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFYP-SW01-1012	CAREFYP-SW02-1012	CAREFYP-SW02P-1012	CAREFYP-SW03-1012	CAREFS04-SW01-1012
Sample Date	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/03/12
Chemical Name											
Pesticide/Polychlorinated Biphenyls (µg/l)											
4,4'-DDD	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U
4,4'-DDE	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U
4,4'-DDT	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U
Aldrin	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
alpha-BHC	0.00432 J	0.00943 UL	0.00943 UL	0.0404 J	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
alpha-Chlordane	0.00943 UL	0.00943 UL	0.00943 UL	0.0172 J	0.00943 U	0.0082 J	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
Aroclor-1016	0.236 UL	0.236 UJ	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL
Aroclor-1221	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL
Aroclor-1232	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL
Aroclor-1242	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL
Aroclor-1248	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL
Aroclor-1254	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL
Aroclor-1260	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL
beta-BHC	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
delta-BHC	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
Dieldrin	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U
Endosulfan I	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
Endosulfan II	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U
Endosulfan sulfate	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U
Endrin	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U
Endrin aldehyde	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 UL	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U
Endrin ketone	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 UL	0.048 U
gamma-BHC (Lindane)	0.00401 J	0.00943 UL	0.00943 UL	0.0124 J	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
gamma-Chlordane	0.0119 B	0.0109 B	0.00612 B	0.0159 B	0.0213	0.00943 UL	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
Heptachlor	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
Heptachlor epoxide	0.00383 B	0.00943 UL	0.00943 UL	0.0055 B	0.00943 UL	0.00746 J	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U
Methoxychlor	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.24 U
Toxaphene	0.629 UL	0.629 UL	0.629 UL	0.629 UL	0.629 U	0.629 U	0.64 U	0.64 U	0.64 U	0.64 U	0.48 U
Explosives (µg/l)											
1,3,5-Trinitrobenzene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL
1,3-Dinitrobenzene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL
2,4,6-Trinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL
2-Amino-4,6-dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL
2-Nitrotoluene	0.15 U	0.148 U	0.154 UJ	0.814 J	0.152 U	0.148 U	0.168 UL	0.168 U	0.167 UL	0.166 UL	0.12 UL
3,5-Dinitroaniline	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.615 UL	0.615 U	0.612 UL	0.606 UL	0.12 UL
3-Nitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL
4-Amino-2,6-dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL
4-Nitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.308 UL	0.308 U	0.306 UL	0.303 UL	0.12 UL
HMX	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL
Nitroglycerin	0.374 U	0.37 U	0.385 U	0.374 U	0.381 U	0.37 U	0.341 UL	0.341 U	0.339 UL	0.335 UL	2 UL
Nitroguanidine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	6 U
PETN	0.374 U	0.37 U	0.385 U	0.374 U	0.381 U	0.37 U	0.205 UL	0.205 U	0.204 UL	0.202 UL	2 UL
RDX	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL
Tetryl	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL
Total Metals (µg/l)											
Aluminum	61	61.3	52.1	49.8 J	55.6	55.2	614	116 J	92.7 J	112 K	286 J
Antimony	2 U	2 U	2 U	2 U	2 U	2 U	0.2 J	0.161 J	0.164 J	0.171 J	5 U
Arsenic	6.07	6.19	5.28	5.13	5.2	5.3	6.14 J	5.8 J	5.63 J	6.19 J	7.9 J
Barium	20.7	20	18.6	18.7	19	19.1	26.1	35	32.9	33.1	23.1
Beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.37 U	0.37 U	0.37 U	0.37 U	0.5 U
Cadmium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4 U	4 U	4 U	4 U	3 U
Calcium	35,300	36,000	32,300	31,800	32,800	32,400	67,100	89,700	85,600	77,100	39,400
Chromium	1 U	1 U	1 U	1 U	1 U	1 U	0.932 J	1.52 J	1.14 J	1.45 J	0.96 J
Cobalt	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.84 U	0.84 U	0.84 U	0.84 U	4 U
Copper	2 U	2 U	2 U	2 U	2 U	2 U	0.967 J	1.15	1.13	0.922 J	1.7 B
Cyanide	10 U	10 U	10 U	10 U	10 U	10 U	11 U	11 U	11 U	11 U	8 U
Iron	1,260	1,220	994	1,010	996	996	2,160	2,480	2,440	2,340	2,030
Lead	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.444 J	0.51 J	0.49 J	0.511 J	4 U
Magnesium	1,920	1,940	1,910	1,930	1,980	2,000	1,960 J	2,020 J	2,040 J	2,070 K	2,330
Manganese	142	133	98.5	99.2	102	100	108	133	144	153	120
Mercury	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.069 U	0.069 U	0.069 U	0.069 U	0.1 U
Nickel	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.27 J	1.75 J	1.94 J	1.47 J	0.55 B
Potassium	2,600	2,690	2,580	2,590	2,650	2,700	2,310 J	2,010 J	1,990 J	2,100 K	2,960
Selenium	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	2.6 U	2.6 U	2.6 U	2.6 U	2.5 J
Silver	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.12 U	0.12 U	0.12 U	0.12 U	4 U
Sodium	13,200	13,200	13,300	13,400	13,700	14,000	12,200	12,200	12,000	12,000	13,900
Thallium	1 U	1 U	1 U	1 U	1 U	1 U	0.23 U	0.23 U	0.23 U	0.23 U	5 U
Vanadium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.636 J	0.428 J	0.397 J	0.449 J	1.1 J
Zinc	1.38 J	1.31 J	2.5 U	2.5 U	1.64 J	1.29 J	12.9	25.2	17.7	15	4.3 B

Attachment B3
Cheatham Annex, Cheatham Pond
Reference Surface Water Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01
Sample ID	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFYP-SW01-1012	CAREFYP-SW02-1012	CAREFYP-SW02P-1012	CAREFYP-SW03-1012	CAREFS04-SW01-1012
Sample Date	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/03/12
Chemical Name											
Dissolved Metals (µg/l)											
Aluminum, Dissolved	49.3 B	61.8 B	38.8 B	41.5 B	28.4 B	46.4 B	250 U	25 U	250 U	100 K	158 J
Antimony, Dissolved	2 U	2 U	2 U	2 U	2 U	2 U	0.192 B	0.125 B	0.128 B	0.17 B	5 U
Arsenic, Dissolved	4.33 B	5.62 B	4.08 B	4.59 B	3.81 B	4.52 B	4.09 B	2.43 B	2.77 B	4.15 B	5 J
Barium, Dissolved	18.6 B	19.8 B	17.5 B	17.7 B	16.3 B	17.4 B	26.1 B	30.6 B	30.7 B	33 B	16.8
Beryllium, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.37 U	0.37 U	0.37 U	0.37 U	0.5 U
Cadmium, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4 U	4 U	0.186 J	0.226 J	3 U
Calcium, Dissolved	36,200 B	36,100 B	32,800 B	32,200 B	33,000 B	31,100 B	68,600 B	94,300 B	93,400 B	86,200 B	33,900
Chromium, Dissolved	1 U	1 U	1 U	1 U	1 U	1 U	0.966 J	3 U	3 U	1.26 J	0.65 J
Cobalt, Dissolved	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.84 U	0.84 U	0.84 U	0.84 U	4 U
Copper, Dissolved	2 U	2 U	2 U	2 U	2 U	2 U	0.82 J	0.88 U	0.374 J	0.934 J	1.2 B
Iron, Dissolved	613	1,030	634	688	364	707	979	97.2	362	1,550	544
Lead, Dissolved	0.75 U	0.75 U	0.523 J	0.75 U	0.75 U	0.75 U	0.29 J	0.6 U	0.6 U	0.489 J	4 U
Magnesium, Dissolved	1,940 B	1,970 B	1,960 B	1,960 B	1,990 B	1,960 B	1,800 B	2,100 B	2,080 B	1,950 B	2,090
Manganese, Dissolved	70.9	116	64.2	67.6	35.7 B	71.5	99.3	110 B	110 B	136 B	34.8
Mercury, Dissolved	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.069 U	0.069 U	0.069 U	0.069 U	0.04 J
Nickel, Dissolved	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.32 B	1.93 B	1.79 B	1.71 B	0.37 B
Potassium, Dissolved	2,580 B	2,690 B	2,620 B	2,590 B	2,590 B	2,590 B	1,980 B	1,680 B	1,740 B	2,020 B	2,630
Selenium, Dissolved	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	2.6 U	2.6 U	2.6 U	2.6 U	7 U
Silver, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.12 U	0.12 U	0.12 U	0.12 U	4 U
Sodium, Dissolved	13,400 B	13,500 B	13,700 B	13,700 B	13,900 B	13,700 B	11,700	11,600 B	11,000 B	11,600 B	13,300
Thallium, Dissolved	1 U	1 U	1 U	1 U	1 U	1 U	0.23 U	0.23 U	0.23 U	0.23 U	5 U
Vanadium, Dissolved	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.308 B	0.8 U	0.8 U	0.326 B	0.75 J
Zinc, Dissolved	1.48 B	2.09 B	2.5 U	2.5 U	2.5 U	2.5 U	16.9	9.91 J	15	15.8	2.9 B
Wet Chemistry											
Hardness (mg/l)	107 N	98 N	85.5 N	NA	96.3	97.3	160	220	NA	210 Q	94

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Attachment B_Analytical Results\[B3_CAREF_AllData_SW_raw_v1_jd.xls], ccampbe6, 03/20/2013

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

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

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

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

N - Laboratory qualifier. One or more quality control criteria was not met.

Q - Laboratory qualifier. One or more quality control criteria was not met.

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/l - Milligrams per liter

µg/l - Micrograms per liter

Attachment B3
Cheatham Annex, Cheatham Pond
Reference Surface Water Samples
Raw Analytical Results
October 2012

Station ID	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Sample Date	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12
Chemical Name					
Volatile Organic Compounds (µg/l)					
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Hexanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Methyl-2-pentanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	4.3 B	4.6 B	2.7 B	5.4 B	5.8 B
Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane	NA	NA	NA	NA	NA
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	1 U	1 U	1 U	1 U	1 U
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane (Freon-12)	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m- and p-Xylene	1 U	1 U	1 U	1 U	1 U
Methyl acetate	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
o-Xylene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U
Xylene, total	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U

Attachment B3
Cheatham Annex, Cheatham Pond
Reference Surface Water Samples
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Station ID	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Sample Date	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12
Chemical Name					
Semivolatile Organic Compounds (µg/l)					
1,1-Biphenyl	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
1,2,4,5-Tetrachlorobenzene	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2,2'-Oxybis(1-chloropropane)	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
2,3,4,6-Tetrachlorophenol	7.5 U	7.5 U	7.3 UL	7.4 U	7.2 U
2,4,5-Trichlorophenol	19 U	19 U	18 U	19 U	18 U
2,4,6-Trichlorophenol	7.5 U	7.5 U	7.3 UL	7.4 U	7.2 U
2,4-Dichlorophenol	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2,4-Dimethylphenol	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2,4-Dinitrophenol	19 U	19 U	18 UL	19 U	18 U
2,4-Dinitrotoluene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2,6-Dinitrotoluene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2-Chloronaphthalene	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2-Chlorophenol	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2-Methylnaphthalene	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
2-Methylphenol	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2-Nitroaniline	19 U	19 U	18 U	19 U	18 U
2-Nitrophenol	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
3- and 4-Methylphenol	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
3,3'-Dichlorobenzidine	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
3-Nitroaniline	19 U	19 U	18 U	19 U	18 U
4,6-Dinitro-2-methylphenol	19 U	19 U	18 UL	19 U	18 U
4-Bromophenyl-phenylether	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Chloro-3-methylphenol	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Chloroaniline	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Chlorophenyl-phenylether	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Methylphenol	NA	NA	NA	NA	NA
4-Nitroaniline	19 U	19 U	18 U	19 U	18 U
4-Nitrophenol	19 U	19 U	18 U	19 U	18 U
Acenaphthene	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Acenaphthylene	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Acetophenone	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Anthracene	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Atrazine	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
Benzaldehyde	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
Benzo(a)anthracene	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(a)pyrene	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(b)fluoranthene	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Benzo(g,h,i)perylene	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(k)fluoranthene	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
bis(2-Chloroethoxy)methane	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
bis(2-Chloroethyl)ether	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
bis(2-Ethylhexyl)phthalate	7.5 U	9.7 B	7.3 U	7.4 U	7.2 U
Butylbenzylphthalate	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Caprolactam	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Carbazole	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Chrysene	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Dibenz(a,h)anthracene	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Dibenzofuran	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Diethylphthalate	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Dimethyl phthalate	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Di-n-butylphthalate	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Di-n-octylphthalate	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Fluoranthene	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Fluorene	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Hexachlorobenzene	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Hexachlorobutadiene	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Hexachlorocyclopentadiene	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
Hexachloroethane	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Indeno(1,2,3-cd)pyrene	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Isophorone	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Naphthalene	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
n-Nitroso-di-n-propylamine	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
n-Nitrosodiphenylamine	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Nitrobenzene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Pentachlorophenol	19 U	19 U	18 UL	19 U	18 U
Phenanthrene	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Phenol	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Pyrene	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U

Attachment B3
Cheatham Annex, Cheatham Pond
Reference Surface Water Samples
Raw Analytical Results
October 2012

Station ID	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Sample Date	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12
Chemical Name					
Pesticide/Polychlorinated Biphenyls (µg/l)					
4,4'-DDD	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
4,4'-DDE	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
4,4'-DDT	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Aldrin	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
alpha-BHC	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
alpha-Chlordane	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Aroclor-1016	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1221	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1232	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1242	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1248	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1254	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 UL
Aroclor-1260	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
beta-BHC	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
delta-BHC	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
Dieldrin	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Endosulfan I	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Endosulfan II	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
Endosulfan sulfate	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
Endrin	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Endrin aldehyde	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Endrin ketone	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
gamma-BHC (Lindane)	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
gamma-Chlordane	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Heptachlor	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Heptachlor epoxide	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Methoxychlor	0.25 U	0.25 U	0.25 U	0.24 U	0.24 U
Toxaphene	0.5 U	0.5 U	0.5 UL	0.47 U	0.48 U
Explosives (µg/l)					
1,3,5-Trinitrobenzene	0.12 UL	0.12 UL	0.12 UL	0.12 UL	0.12 UL
1,3-Dinitrobenzene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2,4,6-Trinitrotoluene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2-Amino-4,6-dinitrotoluene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2-Nitrotoluene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
3,5-Dinitroaniline	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
3-Nitrotoluene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
4-Amino-2,6-dinitrotoluene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
4-Nitrotoluene	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
HMX	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Nitroglycerin	2 UL	2 UL	2 U	2 UL	2 UL
Nitroguanidine	6 U	6 U	6 U	6 U	6 U
PETN	2 UL	2 UL	2 U	2 UL	2 UL
RDX	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Tetryl	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Total Metals (µg/l)					
Aluminum	97.5 J	141 J	77.9 J	149 J	90.8 J
Antimony	5 U	5 U	5 U	5 U	5 U
Arsenic	5.3 J	7.3 J	6.6 J	6.3 J	6.4 J
Barium	20 J	21.3	19.5	24.6	22.3
Beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	3 U	3 U	3 U	3 U	0.08 J
Calcium	40,700 J	43,400	31,900	57,700	44,100
Chromium	4 U	0.57 J	0.37 J	0.53 J	0.47 J
Cobalt	4 U	4 U	4 U	4 U	4 U
Copper	1.3 B	1.2 B	1.3 B	1.7 B	2.1 B
Cyanide	8 U	8 U	8 U	8 U	8 U
Iron	1,080 J	1,630 J	1,410	2,050	1,710
Lead	4 U	4 U	4 U	4 U	4 U
Magnesium	2,180	2,260	2,190	2,180	2,160
Manganese	79.2 J	98.8 J	86.3	114	115
Mercury	0.04 B	0.02 B	0.02 B	0.1 U	0.02 B
Nickel	4 U	0.63 B	0.7 B	0.57 B	0.57 B
Potassium	2,860 J	2,990	2,750	2,480	2,630
Selenium	7 U	7 U	7 U	7 U	7 U
Silver	4 U	4 U	4 U	4 U	4 U
Sodium	13,200	13,500	14,100	12,300	12,600
Thallium	5 U	5 U	5 U	5 U	5 U
Vanadium	0.44 J	0.88 J	0.47 J	0.57 J	0.4 J
Zinc	3.1 B	3.4 B	15.5 B	3.4 B	3.4 B

Attachment B3
Cheatham Annex, Cheatham Pond
Reference Surface Water Samples
Raw Analytical Results
October 2012

Station ID	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Sample Date	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12
Chemical Name					
Dissolved Metals (µg/l)					
Aluminum, Dissolved	295 J	106 J	69.1 J	113 J	138 J
Antimony, Dissolved	5 U	5 U	5 U	5 U	5 U
Arsenic, Dissolved	6.1 J	4.2 J	5.2 J	5.9 J	5.6 J
Barium, Dissolved	23 J	20.1	17.5	24.5	22.9
Beryllium, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium, Dissolved	3 U	0.05 J	3 U	3 U	3 U
Calcium, Dissolved	46,600 J	41,000	32,500	58,100	48,500
Chromium, Dissolved	1.2 B	0.7 B	0.74 B	0.58 B	0.53 B
Cobalt, Dissolved	4 U	4 U	4 U	4 U	4 U
Copper, Dissolved	2 B	1.3 B	0.83 B	1.1 B	1.1 B
Iron, Dissolved	1,660 J	954 J	934 K	1,800	1,420
Lead, Dissolved	4 U	4 U	4 U	4 U	4 U
Magnesium, Dissolved	2,280	2,170	2,160	2,200	2,200
Manganese, Dissolved	81.4	72.8	65.4	104	107
Mercury, Dissolved	0.04 J	0.1 U	0.02 J	0.04 J	0.01 J
Nickel, Dissolved	0.52 B	4 U	4 U	0.37 B	4 U
Potassium, Dissolved	3,200 J	2,810	2,620	2,540	2,710
Selenium, Dissolved	7 U	2.8 J	7 U	7 U	7 U
Silver, Dissolved	4 U	4 U	4 U	4 U	4 U
Sodium, Dissolved	13,200	13,300	13,500	12,600	13,400
Thallium, Dissolved	5 U	5 U	1.4 J	1.2 J	5 U
Vanadium, Dissolved	0.96 J	0.43 J	0.51 J	0.72 J	0.96 J
Zinc, Dissolved	5.5 B	3.4 B	3 B	3.2 B	3.3 B
Wet Chemistry					
Hardness (mg/l)	98	NA	76	160	120

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Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

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

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

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

N - Laboratory qualifier. One or more quality control criteria was not met.

Q - Laboratory qualifier. One or more quality control criteria was not met.

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/l - Milligrams per liter

µg/l - Micrograms per liter

Attachment B4
Cheatham Annex, Cheatham Pond
Reference Tissue Samples
Raw Analytical Results
October 2012

Station ID	CAREFPL-TS01	CAREFPL-TS02	CAREFPL-TS03	CAREFPL-TS04	CAREFPL-TS05	CAREFPL-TS06	CAREFPL-TS07	CAREFPL-TS08	CAREFPL-TS10		CAREFPL-TS11	
Sample ID	CAREFPL-TS01-1012	CAREFPL-TS02-1012	CAREFPL-TS03-1012	CAREFPL-TS04-1012	CAREFPL-TS05-WB-1012	CAREFPL-TS06-WB-1012	CAREFPL-TS07-WB-1012	CAREFPL-TS08-WB-1012	CAREFPL-TS10-F-1012	CAREFPL-TS10-O-1012	CAREFPL-TS11-F-1012	CAREFPL-TS11-O-1012
Sample Date	10/24/12	10/24/12	10/24/12	10/24/12	10/23/12	10/22/12	10/23/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Chemical Name												
Pesticide/Polychlorinated Biphenyls (UG/KG)												
4,4'-DDD	1.8 U	1.9 U	1.9 U	12 U	2.3	1.6 J	0.72 J	0.89 J	1.9 U	1.1 J	1.8 U	5.8 J
4,4'-DDE	8.9 J	4.5	15 J	74 J	13 J	15 J	13	6.4	1.9 U	17 J	4.6	57
4,4'-DDT	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.8 J	1.8 U	1.8 U	1.9 U	1.1 J	1.8 U	3.7 J
Aldrin	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.3 J	1.9 U	1.8 U	1.8 U	10 U
alpha-BHC	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	10 U
alpha-Chlordane	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.5 J	1.8 U	1.8 U	10 U
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	18 U	80	25	240
beta-BHC	1.8 U	1.9 U	1 J	12 U	1.9 U	1.9 U	1.8 U	2.3 J	2.9 J	1.5 J	3.3 J	10 U
delta-BHC	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	10 U
Dieldrin	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	10 U
Endosulfan I	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	10 U
Endosulfan II	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	10 U
Endosulfan sulfate	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.2 J	1.8 U	3.7 J
Endrin	1.8 U	1.9 U	1.9 U	12 U	1.9 U	0.7 J	1.8 U	1.8 U	1.9 U	0.86 J	1.8 U	10 U
Endrin aldehyde	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	10 U
Endrin ketone	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	10 U
gamma-BHC (Lindane)	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	10 U
gamma-Chlordane	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	0.68 J	1.8 U	10 U
Heptachlor	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	2.5 J	1.8 U	10 U
Heptachlor epoxide	1.8 U	1.9 U	1.9 U	12 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	10 U
Methoxychlor	9.2 U	9.3 U	9.7 U	58 U	9.7 U	9.6 U	8.8 U	9.1 U	9.7 U	9 U	9.2 U	50 U
Polychlorinated biphenyls (PCBs)	125	148	204	137	221	73.9	108	35.4	11.7	191	40.7	433
Toxaphene	92 U	93 U	97 U	580 U	97 U	96 U	88 U	91 U	97 U	90 U	92 U	500 U
Polychlorinated Biphenyl Congeners (PG/G)												
3,3',4,4'-Tetrachlorobiphenyl (77)	7.79 J	8.15 J	17.4 J	12.6 J	24.9 J	20.7	22.4	12.3 J	3.24 J	33.4	6.62 J	80.1
3,4,4',5-Tetrachlorobiphenyl (81)	2.92 J	2.53 J	5.42 J	14.1 U	7.64 J	5.52 J	13.8 U	13.5 U	14.7 U	13.3 U	14.1 U	14.1 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	76.5 J	97.2	177	186	470	162	215	112	25.1	376	90.2	991
2,3,4,4',5-Pentachlorobiphenyl (114)	14.7 J	11.2 J	18 J	14.1 U	13 U	14.2 U	13.8 U	13.5 U	14.7 U	13.3 U	14.1 U	14.8 U
2,3',4,4',5-Pentachlorobiphenyl (118)	867	1,340	1,820	1,270	2,550	873	1,190	480	136	2,260	470	5,080
2,3',4,4',5'-Pentachlorobiphenyl (123)	22.4	18.3 J	29.1 J	20.7	35.3	13.7 J	13.8 U	14.1 U	14.7 U	37.7	12.9 J	57
3,3',4,4',5-Pentachlorobiphenyl (126)	70.1	73.7	105	74.5	13 U	14.2 U	13.8 U	15.1 U	14.7 U	13.3 U	14.1 U	14.8 U
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	1,280	1,540	1,750	969	496	246	266	137	41.5	746	159	1,920
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	14.3 U	28.6 J	13.5 U	14.1 U	13 U	14.2 U	13.8 U	13.5 U	14.7 U	18.9 U	14.1 U	14.8 U
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	522	712	780	376	130	82.9	58.3	48	14.6 J	243	51.8	743
Decachlorobiphenyl (209)	33.3 B	31.6	49.9	37.1	36.2 B	32.1 B	17.3 B	16.2 J	19.6 B	50.5	27.4 B	148
Congeners (156/157)	1,260	1,890	2,170	1,120	754	353	380	206	65.7	1,050	234	2,840
Total Dichlorobiphenyls	24.1	32.2	46	73.3	142	44.7	54.9	30.5	25	70	26.6	121
Total Heptachlorobiphenyls	49,200	61,200	74,900	44,500	43,500	18,800	21,200	9,320	2,990	53,800	10,200	130,000
Total Hexachlorobiphenyls	55,600	69,700	96,000	68,700	121,000	37,100	62,600	19,400	6,170	96,800	22,500	214,000
Total Monochlorobiphenyls	1.07 U	1.02 U	1.7 U	1.47 U	1.39 U	0.916 U	1.18 U	1.22 U	1.2 U	3.14 U	1.43 U	1.79 U
Total Nonachlorobiphenyls	901	1,150	1,360	687	401	290	169	146	40.3	622	148	2,040
Total Octachlorobiphenyls	11,500	12,800	19,400	10,200	7,200	4,150	3,490	2,260	674	11,100	2,370	34,900
Total Pentachlorobiphenyls	5,630	3,220	8,910	8,730	33,400	9,600	14,800	3,430	1,320	21,500	4,300	39,700
Total Tetrachlorobiphenyls	2,130	189	3,130	4,280	14,300	3,670	5,510	685	480	6,450	1,130	12,700
Total Trichlorobiphenyls	66.6	4.13	121	180	491	131	205	102	22.1	258	27.7	390
Toxic Equivalents (Total TEQ)	7.13	8.4	10.7	7.57	0.138	0.0557	0.0655	0.0307	0.00882	0.145	0.0312	0.361
Total Metals (MG/KG)												
Arsenic	0.095 J	0.13 J	0.13 J	0.13 J	0.067 J	0.17 J	0.38	0.15 J	0.19 U	0.19 U	0.19 U	0.19 U
Cadmium	0.068	0.084	0.046	0.049	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Chromium	0.93 U	0.95 U	0.97 U	0.99 U	0.94 U	0.93 U	0.94 U	0.92 U	0.94 U	0.94 U	0.94 U	0.95 U
Copper	1.5	2.2	1	2.2	0.3 J	0.93 U	0.94 U	0.92 U	0.94 U	0.94 U	0.94 U	0.95 U
Lead	0.059 B	0.039 B	0.058 B	0.043 B	0.017 B	0.046 U	0.047 B	0.046 U	0.047 U	0.047 U	0.047 U	0.047 U
Mercury	0.0086 J	0.015 J	0.011 J	0.0052 J	0.014 J	0.0072 L	0.0077 J	0.014 J	0.13	0.064	0.27	0.19
Nickel	0.46 U	0.47 U	0.48 U	0.49 U	0.47 U	0.46 U	0.47 U	0.46 U	0.47 U	0.47 U	0.47 U	0.47 U
Selenium	0.36	0.21	0.31	0.43	0.14	0.11	0.12	0.092 J	0.094 U	0.096	0.048 J	0.15
Silver	0.0046 J	0.0095 J	0.0039 J	0.003 J	0.0094 U	0.0093 U	0.0094 U	0.0092 U	0.0094 U	0.0094 U	0.0094 U	0.0095 U
Zinc	18	18	18	23	24	21	32	36	5	17	5.5	14
Wet Chemistry												
% Moisture (pct)	78	78	76	75	71	73	74	74	80	70	78	71
Lipids (%) (pct)	1.4	1.3	2	2.8	8.9	2.3	2.5	2.8	0.18	2.9	0.54	7.3

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Attachment B_Analytical Results\[B4_CAREFPL-TS_raw_v1_jd.xlsx]. Campbell, Clairette/VBO, 03/12/2014

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

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

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

U - The material was analyzed for, but not detected

MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

Attachment B5
Cheatham Annex, Penniman Lake
Composite Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO27	CAPL-SO28	CAPL-SO29		CAPL-SO30	CAPL-SO31	CAPL-SO32	CAPL-SO33	CAPL-SO34	CAPL-SO35	CAPL-SO36	CAPL-SO37	CAPL-SO38	CAPL-SO39	
Sample ID	CAPL-SS27-1012	CAPL-SS28-1112	CAPL-SS29-1012	CAPL-SS29P-1012	CAPL-SS30-1012	CAPL-SS31-1012	CAPL-SS32-1012	CAPL-SS33-1012	CAPL-SS34-1112	CAPL-SS35-1112	CAPL-SS36-1112	CAPL-SS37-1112	CAPL-SS38-1012	CAPL-SS39-1012	CAPL-SS39P-1012
Sample Date	10/31/12	11/02/12	10/31/12	10/31/12	10/31/12	10/31/12	10/31/12	10/31/12	11/05/12	11/06/12	11/06/12	11/06/12	10/31/12	10/31/12	10/31/12
Chemical Name															
Pesticide/Polychlorinated Biphenyls (µg/kg)															
Aroclor-1260	4,350 J	117 J	94.2	150	26.6	627	34.9	10.6 U	44.6 J	10.4 UL	30.4 K	21.9 K	9.71 U	10.8 U	8.76 UL

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Attachment B_Analytical Results\[B5_PennLake_CompSS_raw_v1_jd.xls], ccampbe6, 03/12/2013

Notes:

Shading indicates detections
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
U - The material was analyzed for, but not detected
UL - Analyte not detected, quantitation limit is probably higher
µg/kg - Micrograms per kilogram

Attachment B5
Cheatham Annex, Penniman Lake
Composite Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO40	CAPL-SO41	CAPL-SO42	CAPL-SO43
Sample ID	CAPL-SS40-1112	CAPL-SS41-1012	CAPL-SS42-1012	CAPL-SS43-1112
Sample Date	11/01/12	10/31/12	10/31/12	11/01/12
Chemical Name				
Pesticide/Polychlorinated Biphenyls (µg/kg)				
Aroclor-1260	9.22 U	16.2 J	10.3 UL	9.52 UL

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Mei

Notes:

Shading indicates detections
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
U - The material was analyzed for, but not detected
UL - Analyte not detected, quantitation limit is probably higher
µg/kg - Micrograms per kilogram

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO44	CAPL-SO45		CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49		CAPL-SO50	CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58
Sample ID	CAPL-SS44-1012	CAPL-SS45-1012	CAPL-SS45P-1012	CAPL-SS46-1012	CAPL-SS47-1012	CAPL-SS48-1012	CAPL-SS49-1012	CAPL-SS49P-1012	CAPL-SS50-1012	CAPL-SS55-1012	CAPL-SS56-1012	CAPL-SS57-1012	CAPL-SS58-1012
Sample Date	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name													
Volatile Organic Compounds (µg/kg)													
1,1,1-Trichloroethane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,1,2,2-Tetrachloroethane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U	8.91 U	15.4 U
1,1,2-Trichloroethane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,1-Dichloroethane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,1-Dichloroethene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,2,3-Trichlorobenzene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,2,4-Trichlorobenzene	3.17 UJ	3.4 UJ	3.41 UJ	3.67 UJ	2.67 UJ	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 UJ	3.58 U	4.45 U	7.68 U
1,2-Dibromo-3-chloropropane	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 UJ	6.52 UJ	6.39 UJ	8.07 UJ	5.65 U	7.16 U	8.91 U	15.4 U
1,2-Dibromoethane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,2-Dichlorobenzene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,2-Dichloroethane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,2-Dichloropropane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,3-Dichlorobenzene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
1,4-Dichlorobenzene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
2-Butanone	6.35 UJ	6.8 UJ	6.82 UJ	7.34 UJ	5.35 UJ	14.7 J	6.52 U	6.39 U	8.07 U	3.06 J	7.16 U	8.91 U	15.4 U
2-Hexanone	6.35 UJ	6.8 UJ	6.82 UJ	7.34 UJ	5.35 UJ	11.1 U	6.52 U	6.39 U	8.07 U	5.65 UJ	7.16 U	8.91 U	15.4 U
4-Methyl-2-pentanone	6.35 UJ	6.8 UJ	6.82 UJ	7.34 UJ	5.35 UJ	11.1 U	6.52 U	6.39 U	8.07 U	5.65 UJ	7.16 U	8.91 U	15.4 U
Acetone	7.77 J	8.33 J	13.6 UJ	14.7 UJ	10.7 UJ	186 L	13 UJ	12.8 UJ	16.1 UJ	96.8 J	14.3 UJ	15.2 J	30.2 J
Benzene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Bromochloromethane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Bromodichloromethane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Bromoform	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Bromomethane	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U	8.91 U	15.4 U
Carbon disulfide	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Carbon tetrachloride	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Chlorobenzene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Chloroethane	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U	8.91 U	15.4 U
Chloroform	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Chloromethane	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U	8.91 U	15.4 U
cis-1,2-Dichloroethene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
cis-1,3-Dichloropropene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Cyclohexane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Dibromochloromethane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Dichlorodifluoromethane (Freon-12)	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U	8.91 U	15.4 U
Ethylbenzene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Isopropylbenzene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Methyl acetate	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U	8.91 U	15.4 U
Methylcyclohexane	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Methylene chloride	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U	8.91 U	15.4 U
Methyl-tert-butyl ether (MTBE)	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Styrene	38.2	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Tetrachloroethene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Toluene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
trans-1,2-Dichloroethene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 U	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
trans-1,3-Dichloropropene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Trichloroethene	3.17 U	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U	4.45 U	7.68 U
Trichlorofluoromethane (Freon-11)	6.35 U	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U	8.91 U	15.4 U
Vinyl chloride	3.17 UJ	3.4 UJ	3.41 UJ	3.67 UJ	2.67 UJ	5.54 UJ	3.26 UJ	3.2 UJ	4.04 UJ	2.82 UJ	3.58 UJ	4.45 UJ	7.68 UJ
Xylene, total	9.52 U	10.2 U	10.2 U	11 U	8.02 U	16.6 UL	9.77 U	9.59 U	12.1 U	8.47 U	10.7 U	13.4 U	23 U

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO44	CAPL-SO45		CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49		CAPL-SO50	CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58
Sample ID	CAPL-SS44-1012	CAPL-SS45-1012	CAPL-SS45P-1012	CAPL-SS46-1012	CAPL-SS47-1012	CAPL-SS48-1012	CAPL-SS49-1012	CAPL-SS49P-1012	CAPL-SS50-1012	CAPL-SS55-1012	CAPL-SS56-1012	CAPL-SS57-1012	CAPL-SS58-1012
Sample Date	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name													
Semivolatile Organic Compounds (µg/kg)													
1,1-Biphenyl	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
1,2,4,5-Tetrachlorobenzene	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2,2'-Oxybis(1-chloropropane)	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2,3,4,6-Tetrachlorophenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2,4,5-Trichlorophenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2,4,6-Trichlorophenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2,4-Dichlorophenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2,4-Dimethylphenol	767 U	794 U	821 U	4,010 U	4,250 U	4,090 U	793 U	802 U	816 U	723 U	90.4 U	1,070 U	1,070 U
2,4-Dinitrophenol	1,920 U	1,990 U	2,050 U	10,000 U	10,700 U	10,300 R	1,980 U	2,010 U	2,040 U	1,810 U	226 U	2,670 U	2,680 U
2,4-Dinitrotoluene	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2,6-Dinitrotoluene	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2-Chloronaphthalene	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2-Chlorophenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2-Methylnaphthalene	9.42	3.96 U	4.1 U	69.7 J	71.6 J	59 K	46 K	91.3	45.9 K	3.61 U	4.53 U	5.33 U	4.84 J
2-Methylphenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
2-Nitroaniline	767 U	794 U	821 U	4,010 U	4,250 U	4,090 U	793 U	802 U	816 U	723 U	90.4 U	1,070 U	1,070 U
2-Nitrophenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
3,3'-Dichlorobenzidine	192 U	199 U	205 U	1,000 U	1,070 U	1,030 R	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
3-Nitroaniline	767 U	794 U	821 U	4,010 U	4,250 U	4,090 R	793 U	802 U	816 U	723 U	90.4 U	1,070 U	1,070 U
4,6-Dinitro-2-methylphenol	1,920 U	1,990 U	2,050 U	10,000 U	10,700 U	10,300 R	1,980 U	2,010 U	2,040 U	1,810 U	226 U	2,670 U	2,680 U
4-Bromophenyl-phenylether	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
4-Chloro-3-methylphenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
4-Chloroaniline	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
4-Chlorophenyl-phenylether	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
4-Methylphenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
4-Nitroaniline	767 U	794 U	821 U	4,010 U	4,250 U	4,090 R	793 U	802 U	816 U	723 U	90.4 U	1,070 U	1,070 U
4-Nitrophenol	767 U	794 U	821 U	4,010 U	4,250 U	4,090 U	793 U	802 U	816 U	723 U	90.4 U	1,070 U	1,070 U
Acenaphthene	3.83 U	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	4 U	20.4 U	3.61 U	4.53 U	5.33 U	5.34 U
Acenaphthylene	3.83 U	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	15	20.4 U	3.61 U	4.53 U	5.33 U	5.34 U
Acetophenone	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Anthracene	3.83 U	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	4 U	20.4 U	3.61 U	4.53 U	5.33 U	5.34 U
Atrazine	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Benzaldehyde	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Benzo(a)anthracene	5.75 J	3.96 U	4.1 U	86.6	72.4 J	56.1 J	23.5	47.3	92.3	4.19 J	6.82 J	5.33 U	5.34 U
Benzo(a)pyrene	6.85 J	3.96 U	4.1 U	122	78.4 J	86.6 K	23.6 K	51.5	90.9 K	3.61 U	4.53 U	5.33 U	6.2 J
Benzo(b)fluoranthene	11.5	4.78 J	4.97 J	197	187	137 K	50.5 K	75.9	135 K	4.31 J	9.95	5.33 U	8.22 J
Benzo(g,h,i)perylene	7.69	3.96 U	4.1 U	133	125	40.9 U	31.3 K	58.8	76.1 K	3.98 J	4.53 U	5.33 U	7.84 J
Benzo(k)fluoranthene	7.66 J	3.96 U	4.1 U	139	83.9 J	40.9 U	33	48.7	90.7	3.61 U	7.61 J	5.33 U	9.57 J
bis(2-Chloroethoxy)methane	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
bis(2-Chloroethyl)ether	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
bis(2-Ethylhexyl)phthalate	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Butylbenzylphthalate	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Caprolactam	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Carbazole	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Chrysene	13.4	4.79 J	4.1 U	200	189	109 K	50.1 K	102	211 K	3.61 U	9.62	5.33 U	13.9
Dibenz(a,h)anthracene	1.98 J	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	9.61 K	4 U	20.4 U	3.61 U	4.53 U	5.33 U	5.34 U
Dibenzofuran	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Diethylphthalate	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Dimethyl phthalate	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Di-n-butylphthalate	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Di-n-octylphthalate	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Fluoranthene	10.3	3.57 J	2.84 J	246	211	145	63.8	107	298	5.6 J	4.77 J	6.21 J	11.3
Fluorene	3.83 U	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	4 U	20.4 U	3.61 U	4.53 U	5.33 U	5.34 U
Hexachlorobenzene	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Hexachlorobutadiene	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Hexachlorocyclopentadiene	192 UJ	199 UJ	205 UJ	1,000 UJ	1,070 UJ	1,030 R	198 U	201 U	204 U	181 UJ	22.6 UJ	267 UJ	268 UJ
Hexachloroethane	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Indeno(1,2,3-cd)pyrene	6.99 J	3.96 U	4.1 U	114	97.7	70 J	29.1	39.3	71.5	4.87 J	8.28 J	5.33 U	7.83 J
Isophorone	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Naphthalene	13.5	3.96 U	4.1 U	62.3 J	49.3 J	40.9 U	30.3 K	51.3	20.4 U	3.61 U	4.53 U	5.33 U	5.34 U
n-Nitroso-di-n-propylamine	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
n-Nitrosodiphenylamine	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Nitrobenzene	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Pentachlorophenol	767 U	794 U	821 U	4,010 U	4,250 U	4,090 U	793 U	802 U	816 U	723 U	90.4 U	1,070 U	1,070 U
Phenanthrene	5.93 J	3.96 U	4.1 U	108	143	92.8	55.7	106	69.5	3.61 U	4.53 U	4.25 J	5.95 J
Phenol	192 U	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U	267 U	268 U
Pyrene	10.9	3.25 J	2.44 J	213	183	134 K	58.5 K	97.2	263 K	5.68 J	4.95 J	4.37 J	10.3 J

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO44	CAPL-SO45		CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49		CAPL-SO50	CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58
Sample ID	CAPL-SS44-1012	CAPL-SS45-1012	CAPL-SS45P-1012	CAPL-SS46-1012	CAPL-SS47-1012	CAPL-SS48-1012	CAPL-SS49-1012	CAPL-SS49P-1012	CAPL-SS50-1012	CAPL-SS55-1012	CAPL-SS56-1012	CAPL-SS57-1012	CAPL-SS58-1012
Sample Date	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name													
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	0.566 J	0.295 J	0.398 J	22.6 J	17 J	26.8 J	44 J	78.5 J	27.3 J	0.356 UL	1.5 J	1.26 J	0.813 J
4,4'-DDE	1.92 L	2.14 L	1.89 L	179	53.6 J	206	186 J	254 J	285 K	0.32 L	2.92 L	1.93	3.76 L
4,4'-DDT	2.15 J	1.76 J	1.6 J	194 J	70.4 J	214 J	30.8 J	40.8	132 K	0.363 L	0.264 J	0.331 J	7.79 J
Aldrin	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.424 UL	0.401 U	0.406 U	0.395 U	0.356 UL	0.452 UL	0.528 U	2.56 L
alpha-BHC	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.418 J	0.401 U	0.406 U	0.395 U	0.356 UL	0.496 J	0.211 J	0.722 J
alpha-Chlordane	0.394 UL	0.409 UL	0.407 UL	8.46 J	4.38 J	1.72 J	0.401 U	0.609 J	1.33 J	0.356 UL	0.452 UL	0.528 U	0.929 J
Aroclor-1260	177 J	134 L	103 L	16,500 J	9,980 J	1,600 J	386	589 J	1,170 J	8.72 UL	14.9 J	12.9 U	39.8 J
beta-BHC	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.211 J	0.401 U	0.406 U	0.395 U	0.356 UL	0.452 UL	0.528 U	0.536 UL
delta-BHC	0.394 UL	0.409 UL	0.407 UL	0.209 J	0.438 UL	0.424 UL	0.401 UL	0.258 J	0.395 UL	0.356 UL	0.452 UL	0.528 U	0.213 J
Dieldrin	2.25 L	1.19 L	1.48 J	253 J	140 L	16.8 J	1.49 J	13.7 J	18.8 J	0.356 UL	0.452 UL	0.528 U	0.565 J
Endosulfan I	0.394 UL	0.409 UL	0.407 UL	0.385 L	0.438 UL	1.06 L	0.401 U	0.406 U	0.395 UJ	0.356 UL	0.452 UL	0.528 U	0.536 UL
Endosulfan II	1.64 J	1.17 J	0.876 J	42.8 J	19.7 J	10.8 J	4.18 J	5.33 J	8.16 J	0.356 UL	0.452 UL	0.528 U	0.536 UL
Endosulfan sulfate	4.63 J	2.99 J	2.32 J	694 J	365 L	4.23 J	0.401 U	20.5	0.395 U	0.356 UL	0.399 L	0.528 U	0.648 J
Endrin	0.432 J	0.279 J	0.205 J	77.7 J	43 J	3.25 J	4.55 J	1.65 J	3.09 J	0.356 UL	0.452 UL	0.528 U	0.536 UL
Endrin aldehyde	0.394 UL	0.409 UL	0.407 UL	22.9 J	16.5 J	1.34 J	0.597 J	0.746 J	1.59 J	0.356 UL	0.452 UL	0.528 U	0.536 UL
Endrin ketone	0.756 J	0.558 J	0.452 J	45.9 J	83.3 J	5.46 J	1.18 J	1.81 J	2.62 J	0.356 UL	0.452 UL	0.528 U	0.273 J
gamma-BHC (Lindane)	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.149 J	0.297 J	0.137 J	0.406 U	0.395 U	0.356 UL	0.452 UL	0.528 U	1.47 J
gamma-Chlordane	2.59 J	1.33 J	3.55 L	9.77 J	15.5 J	4.79 J	3.82 B	0.874 B	4.04 J	1.29 J	2.1 J	2.61 J	3.76 L
Heptachlor	0.394 UL	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.424 UL	0.401 U	0.406 U	0.395 UL	0.356 UL	0.452 UL	0.528 U	3.53 J
Heptachlor epoxide	0.394 UL	0.409 UL	0.407 UL	0.176 J	0.164 J	0.528 J	0.401 UL	0.517 J	0.258 J	0.356 UL	0.452 UL	0.528 U	0.536 UL
Methoxychlor	0.367 J	0.649 J	0.375 J	74.9 J	29.9 J	13.3 J	1.74 J	0.873 J	5.18 J	0.199 L	0.438 J	2.38 J	5.53 J
Toxaphene	25.5 UJ	26.4 UJ	26.4 UJ	26.6 UJ	28.3 UJ	27.4 UJ	26 UJ	26.3 UJ	25.6 UJ	23 UJ	29.2 UJ	34.1 UJ	34.7 UJ
Explosives (µg/kg)													
1,3,5-Trinitrobenzene	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
1,3-Dinitrobenzene	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
2,4,6-Trinitrotoluene	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
2-Amino-4,6-dinitrotoluene	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
2-Nitrotoluene	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
3,5-Dinitroaniline	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
3-Nitrotoluene	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
4-Amino-2,6-dinitrotoluene	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
4-Nitrotoluene	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
HMX	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
Nitroglycerin	435 U	455 U	476 U	500 U	459 U	455 U	455 U	455 U	476 U	495 U	467 U	391 U	866 J
Nitroguanidine	93.9 U	96.2 U	98.5 U	102 U	97.6 U	109 U	105 U	97.6 U	98.5 U	98 U	92.6 U	99 U	94.8 U
PETN	435 U	455 U	476 U	500 U	459 U	455 U	455 U	455 U	476 U	495 U	467 U	391 U	455 U
RDX	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
Tetryl	174 U	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U	156 U	182 U
Total Metals (mg/kg)													
Aluminum	10,100	25,200	24,000	20,500	19,500	9,730	9,410	11,000	9,410	4,920	2,100	2,480	2,910
Antimony	0.914 U	2.45 U	2.46 U	2.46 U	2.7 U	2.55 U	2.48 U	2.59 U	2.38 U	0.901 U	1.09 J	1.28 U	1.34 U
Arsenic	2.54	7.03	6.21	6.07	6.69	6.35	5.54	5.69	5.48	1.64	1.55	1.17 J	1.12 J
Barium	36.1	43.5	39	73.7	84.5	46.6	76.1	60.6	50.5	23.2	13.9	16.8	17
Beryllium	0.397 J	1.64	1.46 J	0.97 J	1.24 J	0.491 J	0.749 J	0.718 J	0.854 J	0.199 J	0.274 U	0.166 J	0.335 U
Cadmium	0.228 U	0.612 U	0.615 U	1.14 J	2.32	0.639 U	0.333 J	0.648 U	0.387 J	0.225 U	0.274 U	0.213 J	1.89
Calcium	1,370	2,220	2,040	3,610	4,590	4,810	9,650 J	5,640 J	7,710	368 J	567 J	2,260	1,840
Chromium	14	45.9	46.3	41.4	35.3	17.2	16.1	17.7	19.9	5.46	3.54	4.76	4.26
Cobalt	1.71	4.96	4.78	3.76 J	4.71	2.38 J	3.09 J	3.02 J	2.94 J	0.861 J	1.37 U	1.07 J	0.938 J
Copper	6.4	6.59	5.42	24.9	39.3	11.9	18.1 J	12.7 J	19.8	2.07	3.12	1.97	4.16
Cyanide	0.284 U	0.296 U	0.312 U	0.306 U	0.302 U	0.315 U	0.307 U	0.305 U	0.298 U	0.272 U	0.336 U	0.383 U	0.383 U
Iron	10,100	48,000	43,400	26,000	25,100	13,400	14,500 J	22,500 J	15,300	6,440	2,780	2,310	3,990
Lead	17.6	16.5	14.4	141	211	65	61.6 J	40.7 J	81	12.5	9.1	29.3 J	13.1 J
Magnesium	856	2,650	2,740	2,450	3,130	1,240 J	1,360 J	1,300 J	2,060	400 J	232 J	327 J	732 J
Manganese	51.1	30.2	25.9	213	308	212	170	141	297	59	7.46	11.7	58.8
Mercury	0.0491 B	0.0603 B	0.0473 B	0.138	0.134	0.0712	0.061	0.0734	0.0472	0.0348 B	0.0421 B	0.0488 B	0.064 B
Nickel	3.72	13.2	11.3	9.03	11.1	5.96	6.9	6.44	7.18	2.47	1.35 J	2.31	2.43
Potassium	445 J	1,910	2,030	874 J	959 J	933 J	1,050 J	911 J	1,040 J	280 J	317 J	275 J	299 J
Selenium	0.571 U	1.53 U	1.54 U	1.54 U	1.69 U	1.6 U	1.55 U	1.62 U	1.49 U	0.563 U	0.686 U	0.799 U	0.837 U
Silver	0.228 U	0.612 U	0.615 U	0.615 U	0.675 U	0.639 UJ	0.62 U	0.648 U	0.596 U	0.225 U	0.274 U	0.32 U	0.335 U
Sodium	343 U	918 U	922 U	922 U	1,010 U	958 U	930 U	973 U	893 U	338 U	411 U	480 U	502 U
Thallium	0.457 U	1.22 U	1.23 U	1.23 U	1.35 U	1.28 U	1.24 U	1.3 U	1.19 U	0.45 U	0.549 U	0.639 U	0.67 U
Vanadium	19.6	67.3	64.5	45.8	43.9	28.9	22.8	23.4	22	9.48	5.28	7.73	7.3
Zinc	36.7	41	33.7	315	428	139	71	55.4	85.2	10.9	31.7	16.1	74.4
Wet Chemistry													
pH (ph)	5.99 H3	5.25 H3	NA	5.79 H3	6.46 H3	6.25 H3	7.65 H3	NA	7.55 H3	5.48 H3	5.71 H3	5.99 H3	6.38 H3
Total organic carbon (TOC) (mg/kg)	5,900	24,700	NA	24,400	36,000	42,600	44,200	NA	52,300	9,100	16,200	43,700	41,500
Grain Size (pct)													
Coarse Sand (%)	0.6	0.2	NA	0.9	0.8	1	5.1	NA	3.9	0.9	0.5	0.8	1
Fine Sand (%)	45.6	46.6	NA	37.9	29.2	43.3	37.7	NA	37	71.6	85.3	76.2	58.8
Fines (%)	42.6	46	NA	53.4	65.9	40.2	39.3	NA	36.4	16.9	6.6	16.9	28.1
Gravel (%)	0.7	2.8	NA	1.3	0	3.6	10.1	NA	13.3	0.2	0.3	0.4	2.5

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO44	CAPL-SO45		CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49		CAPL-SO50	CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58
Sample ID	CAPL-SS44-1012	CAPL-SS45-1012	CAPL-SS45P-1012	CAPL-SS46-1012	CAPL-SS47-1012	CAPL-SS48-1012	CAPL-SS49-1012	CAPL-SS49P-1012	CAPL-SS50-1012	CAPL-SS55-1012	CAPL-SS56-1012	CAPL-SS57-1012	CAPL-SS58-1012
Sample Date	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name													
Medium Sand (%)	10.5	4.4	NA	6.5	4.1	11.9	7.8	NA	9.4	10.4	7.4	5.7	9.6
Sand (%)	56.7	51.2	NA	45.3	34.1	56.2	50.6	NA	50.3	82.9	93.2	82.7	69.4
GRAINSIZE (PCT/P)													
GS03 Sieve 3" (75 mm)	100	100	NA	100	100	100	100	NA	100	100	100	100	100
GS05 Sieve 2" (50 mm)	100	100	NA	100	100	100	100	NA	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	NA	100	100	100	100	NA	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	100	100	NA	100	100	100	100	NA	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	NA	100	100	100	100	NA	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	98	NA	100	100	97.4	97.3	NA	92.8	100	100	100	98.4
Sieve No. 004 (4.75 mm)	99.3	97.2	NA	98.7	100	96.4	89.9	NA	86.7	99.8	99.7	99.6	97.5
Sieve No. 010 (2.00 mm)	98.7	97	NA	97.8	99.2	95.4	84.8	NA	82.8	98.9	99.2	98.8	96.5
Sieve No. 020 (850 um)	96.3	96.3	NA	96.1	98.2	94.1	81.6	NA	78.9	97.3	98.6	98	94.5
Sieve No. 040 (425 um)	88.2	92.6	NA	91.3	95.1	83.5	77	NA	73.4	88.5	91.8	93.1	86.9
Sieve No. 060 (250 um)	66.6	70.8	NA	75.5	83.9	70.8	63.3	NA	59.9	55.5	53.2	63.8	63.6
Sieve No. 080 (180 um)	53.8	56.5	NA	64.8	76.2	61.2	52.8	NA	49.7	33.2	22.6	38.3	45.6
Sieve No. 100 (150 um)	49	52	NA	60.2	72.8	54.1	47.7	NA	44.6	25.3	12.1	27.8	37.2
Sieve No. 200 (75 um)	42.6	46	NA	53.4	65.9	40.2	39.3	NA	36.4	16.9	6.6	16.9	28.1

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Attachment B_Analytical Results\[B6_PennLake_SS_raw_v1_jd.xlsx], Campbell, Clairette/VBO, 03/13/2014

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

ph - pH units

µg/kg - Micrograms per kilogram

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO59		CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	
Sample ID	CAPL-SS59-1012	CAPL-SS59P-1012	CAPL-SS60-1112	CAPL-SS61-1112	CAPL-SS62-1112	CAPL-SS63-1112	CAPL-SS64-1112	CAPL-SS65-1112	CAPL-SS66-1112	CAPL-SS67-1112	CAPL-SS68-1112	CAPL-SS69-1112	CAPL-SS69P-1112
Sample Date	10/26/12	10/26/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12
Chemical Name													
Volatile Organic Compounds (µg/kg)													
1,1,1-Trichloroethane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
1,1,2,2-Tetrachloroethane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
1,1,2-Trichloroethane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
1,1-Dichloroethane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
1,1-Dichloroethene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
1,2,3-Trichlorobenzene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
1,2,4-Trichlorobenzene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
1,2-Dibromo-3-chloropropane	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
1,2-Dibromoethane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
1,2-Dichlorobenzene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
1,2-Dichloroethane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
1,2-Dichloropropane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
1,3-Dichlorobenzene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
1,4-Dichlorobenzene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
2-Butanone	8.44 J	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	23.5	5.38 J	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
2-Hexanone	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UL	4.61 U	4.44 U
4-Methyl-2-pentanone	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 U	4.61 U	4.44 U
Acetone	149 J	20.5 J	10.4 UJ	13.1 UJ	17.2 J	10.4 UJ	24.3 J	210 J	10.7 UJ	34.9 J	10.1 UJ	9.22 UJ	8.88 UJ
Benzene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Bromochloromethane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
Bromodichloromethane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Bromoform	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
Bromomethane	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
Carbon disulfide	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
Carbon tetrachloride	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
Chlorobenzene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Chloroethane	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
Chloroform	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Chloromethane	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
cis-1,2-Dichloroethene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
cis-1,3-Dichloropropene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Cyclohexane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
Dibromochloromethane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Dichlorodifluoromethane (Freon-12)	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
Ethylbenzene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Isopropylbenzene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Methyl acetate	24	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UL	4.61 U	4.44 U
Methylcyclohexane	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Methylene chloride	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
Methyl-tert-butyl ether (MTBE)	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
Styrene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	15.2	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Tetrachloroethene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
Toluene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
trans-1,2-Dichloroethene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UJ	2.31 U	2.22 U
trans-1,3-Dichloropropene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U
Trichloroethene	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	3.34 U	2.67 U	2.39 U	2.53 U	2.31 U	2.22 U
Trichlorofluoromethane (Freon-11)	7.65 U	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U
Vinyl chloride	3.82 UJ	4.23 UJ	2.61 UJ	3.28 UJ	2.07 UJ	2.6 UJ	2.33 UJ	3.34 UJ	2.67 UJ	2.39 UJ	2.53 UJ	2.31 UJ	2.22 UJ
Xylene, total	11.5 U	12.7 U	7.83 U	9.84 U	6.21 U	7.81 U	6.99 U	10 U	8.01 U	7.18 U	7.59 UL	6.92 U	6.66 U

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO59		CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	
Sample ID	CAPL-SS59-1012	CAPL-SS59P-1012	CAPL-SS60-1112	CAPL-SS61-1112	CAPL-SS62-1112	CAPL-SS63-1112	CAPL-SS64-1112	CAPL-SS65-1112	CAPL-SS66-1112	CAPL-SS67-1112	CAPL-SS68-1112	CAPL-SS69-1112	CAPL-SS69P-1112
Sample Date	10/26/12	10/26/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12
Chemical Name													
Semivolatile Organic Compounds (µg/kg)													
1,1-Biphenyl	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
1,2,4,5-Tetrachlorobenzene	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2,2'-Oxybis(1-chloropropane)	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2,3,4,6-Tetrachlorophenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2,4,5-Trichlorophenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2,4,6-Trichlorophenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2,4-Dichlorophenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2,4-Dimethylphenol	851 U	972 U	887 U	7,620 U	781 U	780 U	838 U	945 U	4,280 U	4,040 U	899 U	3,800 U	7,410 U
2,4-Dinitrophenol	2,130 U	2,430 U	2,220 U	19,100 U	1,950 U	1,950 U	2,100 U	2,370 U	10,700 U	10,100 U	2,250 U	9,510 U	18,500 U
2,4-Dinitrotoluene	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2,6-Dinitrotoluene	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2-Chloronaphthalene	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2-Chlorophenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2-Methylnaphthalene	4.25 U	4.85 U	3.51 J	190 U	3.9 U	23.2 J	12.4	117	45.9 J	69.5 J	4.49 U	37.9 U	37 U
2-Methylphenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
2-Nitroaniline	851 U	972 U	887 U	7,620 U	781 U	780 U	838 U	945 U	4,280 U	4,040 U	899 U	3,800 U	7,410 U
2-Nitrophenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
3,3'-Dichlorobenzidine	213 UL	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
3-Nitroaniline	851 UL	972 U	887 U	7,620 U	781 U	780 U	838 U	945 U	4,280 U	4,040 U	899 U	3,800 U	7,410 U
4,6-Dinitro-2-methylphenol	2,130 U	2,430 U	2,220 U	19,100 U	1,950 U	1,950 U	2,100 U	2,370 U	10,700 U	10,100 U	2,250 U	9,510 U	18,500 U
4-Bromophenyl-phenylether	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
4-Chloro-3-methylphenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
4-Chloroaniline	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
4-Chlorophenyl-phenylether	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
4-Methylphenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
4-Nitroaniline	851 UL	972 U	887 U	7,620 U	781 U	780 U	838 U	945 U	4,280 U	4,040 U	899 U	3,800 U	7,410 U
4-Nitrophenol	851 U	972 U	887 U	7,620 U	781 U	780 U	838 U	945 U	4,280 U	4,040 U	899 U	3,800 U	7,410 U
Acenaphthene	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	4.18 U	4.72 U	42.7 U	75.6 J	4.49 U	37.9 U	37 U
Acenaphthylene	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	4.18 U	4.72 U	42.7 U	144	4.49 U	37.9 U	37 U
Acetophenone	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Anthracene	4.25 U	4.85 U	4.43 U	271 J	3.9 U	19.5 U	4.18 U	4.72 U	42.7 U	1,690	4.49 U	37.9 U	37 U
Atrazine	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Benzaldehyde	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	517	1,070 U	1,010 U	225 U	951 U	1,850 U
Benzo(a)anthracene	4.25 U	4.85 U	4.43 U	3,570	30.5	34.1 J	9.99	142	182	14,400	55.8	37.9 U	37 U
Benzo(a)pyrene	5.61 J	4.85 U	4.43 U	4,780	54.6	23.9 J	11.8	195	192	8,120	54.3	37.9 U	37 U
Benzo(b)fluoranthene	9.68	8.38 J	5.97 J	8,910	150	40.4	15.9	242	335	11,300	116	37.9 U	78.9
Benzo(g,h,i)perylene	5.93 J	4.85 U	4.43 U	4,730	73.4	47.8	11	153	172	3,320	45.5	37.9 U	37 U
Benzo(k)fluoranthene	6.64 J	8.49 J	4.52 J	7,950	85.2	40	7.92 J	289	330	8,830	70.6	40.3 J	37 U
bis(2-Chloroethoxy)methane	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
bis(2-Chloroethyl)ether	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
bis(2-Ethylhexyl)phthalate	186 J	131 J	141 J	1,910 U	195 U	205 J	210 U	137 J	1,070 U	1,010 U	1,000 J	951 U	1,850 U
Butylbenzylphthalate	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Caprolactam	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Carbazole	213 U	243 U	222 U	968 J	195 U	195 U	210 U	237 U	1,070 U	1,450 J	225 U	951 U	1,850 U
Chrysene	4.25 U	4.85 U	4.43 U	8,790	143	67	18.5	373	386	19,200	104	91.7	52.7 J
Dibenz(a,h)anthracene	4.25 U	4.85 U	4.43 U	1,260	17.6	19.5 U	4.18 U	62.6	42.7 U	2,080	15.8	37.9 U	37 U
Dibenzofuran	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Diethylphthalate	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Dimethyl phthalate	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Di-n-butylphthalate	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Di-n-octylphthalate	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Fluoranthene	16.2 B	17.4 B	5.38 J	12,200	118	62.9	17.1	115	384	72,300	112	64.4 J	43.7 J
Fluorene	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	4.18 U	4.72 U	42.7 U	40.4 U	4.49 U	37.9 U	37 U
Hexachlorobenzene	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Hexachlorobutadiene	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Hexachlorocyclopentadiene	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Hexachloroethane	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Indeno(1,2,3-cd)pyrene	5.82 J	4.85 U	4.43 U	4,200	65.6	19.5 U	9.11	134	175	3,800	44.5	37.9 U	37 U
Isophorone	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Naphthalene	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	7.72 J	423	31.4 J	104	4.49 U	37.9 U	37 U
n-Nitroso-di-n-propylamine	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
n-Nitrosodiphenylamine	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Nitrobenzene	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Pentachlorophenol	851 U	972 U	887 U	7,620 U	781 U	780 U	838 U	945 U	4,280 U	4,040 U	899 U	3,800 U	7,410 U
Phenanthrene	6.9 B	5.98 B	10.2	3,190	17.4	33.9 J	19.7	213	121	6,370	17.1	42.1 J	37 U
Phenol	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	237 U	1,070 U	1,010 U	225 U	951 U	1,850 U
Pyrene	13.8 B	16.6 B	6.11 J	13,300	119	67.7	17	135	374	54,600	118	60.8 J	38.9 J

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO59		CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	
Sample ID	CAPL-SS59-1012	CAPL-SS59P-1012	CAPL-SS60-1112	CAPL-SS61-1112	CAPL-SS62-1112	CAPL-SS63-1112	CAPL-SS64-1112	CAPL-SS65-1112	CAPL-SS66-1112	CAPL-SS67-1112	CAPL-SS68-1112	CAPL-SS69-1112	CAPL-SS69P-1112
Sample Date	10/26/12	10/26/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12
Chemical Name													
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	0.747 J	0.36 J	0.442 U	10.9 J	0.386 UL	353	0.519 J	0.381 J	6.28 J	1.89 J	0.68 J	2 J	1.08 J
4,4'-DDE	2.44 J	4.52 J	0.442 UJ	127 K	1.28 L	2,640	1.68 L	4.44 J	91.1 K	4.92 J	0.459 UJ	4.22 J	3.34 J
4,4'-DDT	0.324 J	0.491 U	0.442 UJ	122 K	1 J	808	0.433 UJ	0.605 J	31.9 J	7.1 J	0.595 J	17.6 J	3.97 J
Aldrin	0.432 UL	0.397 J	0.442 U	0.397 U	0.386 U	0.415 U	0.433 U	0.467 U	0.441 U	0.399 UL	0.459 U	0.392 U	0.37 U
alpha-BHC	0.514 J	1.05 J	0.442 U	0.397 U	0.386 U	0.415 U	0.433 U	0.467 U	0.441 U	0.399 U	0.459 U	0.392 U	0.37 U
alpha-Chlordane	0.432 UL	0.491 UL	0.442 U	0.518 J	0.386 UL	8.88 L	0.433 UL	0.467 UL	0.441 UL	0.259 J	0.459 U	1.78 J	1.52 J
Aroclor-1260	13.5 L	12 U	10.8 U	627 J	42.3	397	10.6 U	11.4 U	2,770 J	9.77 U	36.9 J	266 J	283 J
beta-BHC	0.432 UL	0.491 U	0.442 U	0.397 U	0.386 U	0.415 U	0.433 U	0.467 U	0.441 U	0.305 J	0.459 U	0.392 U	0.37 U
delta-BHC	0.432 UL	0.907 J	0.442 U	1.07 J	0.386 U	0.156 L	0.424 J	0.455 J	0.377 J	0.681 J	0.459 U	0.392 UL	0.37 UL
Dieldrin	0.432 UL	0.491 U	0.442 U	13.3 J	0.462 J	7.09 L	0.433 U	0.344 J	26.5 K	0.399 U	0.264 J	5.69 L	5.53
Endosulfan I	0.432 UL	0.275 J	0.442 U	0.397 U	0.386 U	0.263 J	0.433 U	0.467 U	0.441 U	1.14 J	0.459 U	0.392 UL	0.37 U
Endosulfan II	0.432 UL	0.491 UL	0.442 U	4.69 J	0.386 UL	9.2 L	0.231 J	0.467 U	6.04 J	2.5 J	0.387 J	2.99 J	3.26 J
Endosulfan sulfate	0.432 UL	1.48 J	0.442 U	4.08 J	0.303 J	12.4 J	1.68 J	0.467 UL	64.2 L	0.347 J	0.459 U	9.13 L	10.1 L
Endrin	0.432 UL	0.491 UL	0.442 U	1.75 J	0.492 J	13.3 J	0.433 U	0.467 UL	13.6 J	0.399 U	0.459 U	2.62 J	2.5 J
Endrin aldehyde	0.432 UL	0.953 J	0.442 U	0.397 U	0.386 U	0.9 J	5.31 J	3.16 J	2.19 J	1.73 J	0.459 U	0.518 J	0.397 J
Endrin ketone	0.432 UL	0.491 U	0.442 UJ	4.97 J	0.359 L	4.05 L	0.433 UL	1.65 K	26.5 J	0.399 UL	0.459 U	3.04 J	0.834 J
gamma-BHC (Lindane)	0.523 J	1.84 J	0.442 U	4.76 J	0.386 U	0.415 U	0.433 U	0.467 U	0.159 J	0.399 UL	0.205 J	0.392 U	0.37 U
gamma-Chlordane	2.51 L	0.491 U	0.484 J	1.62 K	0.428 J	14.5	0.251 J	0.253 J	1.81 J	0.399 UL	0.402 J	1.55 J	1.24 J
Heptachlor	1.16 J	0.372 J	0.442 U	0.397 U	0.386 UL	0.417 L	0.433 UL	0.467 UL	0.148 J	0.399 UL	0.459 U	0.392 UL	0.37 U
Heptachlor epoxide	0.363 L	0.491 UL	0.442 U	0.397 UL	0.386 U	9.28 J	0.433 UL	0.467 U	0.272 J	0.399 UL	0.459 U	0.392 UL	0.37 UL
Methoxychlor	0.392 J	6.65 J	0.442 UJ	3.55 J	0.316 J	2.8 J	0.433 UL	2.72 K	10 J	1.91 J	0.459 UJ	0.712 J	0.206 J
Toxaphene	28 UJ	31.8 UJ	28.6 UJ	25.7 UJ	25 U	26.8 UJ	28 UJ	30.2 UJ	28.5 UL	25.8 UL	29.7 UJ	25.4 UJ	24 UJ
Explosives (µg/kg)													
1,3,5-Trinitrobenzene	192 U	181 U	162 U	110 J	160 U	193 U	183 U	194 U	176 U	161 J	173 U	160 U	175 U
1,3-Dinitrobenzene	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
2,4,6-Trinitrotoluene	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
2-Amino-4,6-dinitrotoluene	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
2-Nitrotoluene	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
3,5-Dinitroaniline	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
3-Nitrotoluene	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
4-Amino-2,6-dinitrotoluene	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
4-Nitrotoluene	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
HMX	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
Nitroglycerin	481 U	452 U	405 U	446 U	400 U	483 U	457 U	485 U	441 U	478 U	433 U	400 U	439 U
Nitroguanidine	102 U	94.8 U	100 U	97.6 U	88.9 U	96.2 U	104 U	104 U	101 U	102 U	91.7 U	104 U	94.8 U
PETN	481 U	452 U	405 U	446 U	400 U	483 U	457 U	485 U	441 U	478 U	433 U	400 U	439 U
RDX	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
Tetryl	192 U	181 U	162 U	179 U	160 U	193 U	183 U	194 U	176 U	191 U	173 U	160 U	175 U
Total Metals (mg/kg)													
Aluminum	4,720	4,380	14,800	11,100	5,400	6,090	13,700	6,660	8,330	4,340	25,800	10,300	10,000
Antimony	1.03 U	1.16 U	2.73 U	2.33 U	0.942 U	2.51 U	2.69 U	11.6	2.53 U	2.42 U	2.67 UL	2.46 U	2.28 U
Arsenic	1.45	1.73	19.3	8.12	3.47	8.93	10	2.44 J	6.5	2.69 J	14.4	5.74 J	7.9 J
Barium	16.4	14.9	80.8	50.2	44.8	27.4	48.2	175	66.3	39.9	81.8	52.6 J	37.1 J
Beryllium	0.257 J	0.238 J	1.4 J	0.838 J	0.571 J	1.3 J	0.866 J	0.887 J	0.677 J	0.441 J	1.44	0.537 J	0.418 J
Cadmium	0.724	0.538 J	0.412 J	1.94	0.413 J	1.21 J	0.674 U	0.989 J	0.613 J	0.606 U	0.668 U	0.615 U	0.57 U
Calcium	1,600	1,600	15,000	11,200	539 J	19,000	5,740	3,910	4,370	1,170 J	6,660	5,630 J	3,740 J
Chromium	6.91	6.69	40.3	69.7	10.9	66.7	29.9	8.21	18.5	8.3	56.1	19.4	21.1
Cobalt	1.23 J	1.24 J	6.04	4.6	2.53	2.73 J	3.28 J	2.91 J	3.75 J	3.03 U	5.81	2.12 J	1.61 J
Copper	7.11	5.67	5.81	26.1	6.24	12	8.2	10.7	20.1	5.05	9.67	12.4 J	7.95 J
Cyanide	0.314 U	0.358 U	0.322 U	0.279 U	0.286 U	0.291 U	0.317 U	0.354 U	0.323 U	0.289 U	0.334 U	0.281 U	0.261 U
Iron	7,050	7,610	53,300	22,300	8,330	32,800	33,300	8,680	17,500	9,300	49,100	18,400	16,800
Lead	12 J	11.7 J	14.5	107	25.3	46.8	21.3	42.5	77.7	28.8	14.7	29.9	22.7
Magnesium	1,290	1,320	3,950	2,050	654	1,960	2,110	1,590 J	2,080	580 J	4,380	1,290 J	1,230 J
Manganese	78.4	90.4	259	151	256	140	77.7	264	216	86.5	133 L	123 J	90.1 J
Mercury	0.0204 B	0.0291 B	0.0327 J	0.0835	0.11	0.145	0.0672	0.0499	0.247	0.034 J	0.0784	0.0476	0.0465
Nickel	2.87	3	15.8	11.4	4.59	8.33	8.8	5.9	7.21	2.99 J	18.5	4.96 J	3.4 J
Potassium	517 J	540 J	4,240	1,600	401 J	1,840	1,800	451 J	807 J	437 J	3,420	795 J	821 J
Selenium	0.644 U	0.727 U	1.71 U	1.46 U	0.589 U	1.57 U	1.68 U	1.82 U	1.58 U	1.51 U	1.67 U	1.54 U	1.42 U
Silver	0.257 U	0.291 U	0.683 U	0.582 U	0.235 U	0.627 U	0.674 U	0.73 U	0.631 U	0.606 U	0.668 U	0.615 U	0.57 U
Sodium	386 U	436 U	1,020 U	873 U	353 U	940 U	1,010 U	1,090 U	947 U	909 U	200 U	923 U	855 U
Thallium	0.515 U	0.581 U	1.37 U	1.16 U	0.471 U	1.25 U	1.35 U	1.46 U	1.26 U	1.21 U	1.34 U	1.23 U	1.14 U
Vanadium	11.4	11.1	40.3	29.1	10.6	26.7	33.3	10.9	24.1	11.1	55.6	24.7	26.5
Zinc	60.2	56.4	63.4	235	45.5	83.9	59.6	190	142	35.2	73.9 K	58.6 J	40.2 J
Wet Chemistry													
pH (ph)	6.5 H3	NA	7.66 H3	7.74 H3	6.06 H3	8.25 H3	7.96 H3	6.25 H3	7.5 H3	6.7 H3	7.77 H3	8.19 H3	NA
Total organic carbon (TOC) (mg/kg)	15,000	NA	18,400	33,500 N	12,300 N	16,000 N	29,800	128,000	60,800	39,400	21,100 N	20,900 N	NA
Grain Size (pct)													
Coarse Sand (%)	4.9	NA	0.3	3.8	1.2	5.3	1	7.2	6	2.7	0.7	5.5	NA
Fine Sand (%)	40.6	NA	46.7	51.4	67.1	52.7	38.8	41.6	33.1	55.6	27.7	36.4	NA
Fines (%)	0.5	NA	49.1	31.3	24.8	22.3	43.9	21.8	32.4	31.3	67.2	28.7	NA
Gravel (%)	45.1	NA	0.4	3.5	0.3	12.9	11	14.7	15.7	3.7	2.1	18.2	NA

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO59		CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	
Sample ID	CAPL-SS59-1012	CAPL-SS59P-1012	CAPL-SS60-1112	CAPL-SS61-1112	CAPL-SS62-1112	CAPL-SS63-1112	CAPL-SS64-1112	CAPL-SS65-1112	CAPL-SS66-1112	CAPL-SS67-1112	CAPL-SS68-1112	CAPL-SS69-1112	CAPL-SS69P-1112
Sample Date	10/26/12	10/26/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12
Chemical Name													
Medium Sand (%)	8.9	NA	3.5	10	6.6	6.8	5.3	14.7	12.8	6.7	2.3	11.2	NA
Sand (%)	54.4	NA	50.5	65.2	74.9	64.8	45.1	63.5	51.9	65	30.7	53.1	NA
GRAINSIZE (PCT/P)													
GS03 Sieve 3" (75 mm)	100	NA	100	100	100	100	100	100	100	100	100	100	NA
GS05 Sieve 2" (50 mm)	100	NA	100	100	100	100	100	100	100	100	100	100	NA
GS06 Sieve 1.5" (37.5 mm)	100	NA	100	100	100	100	100	100	100	100	100	100	NA
GS07 Sieve 1" (25.0 mm)	100	NA	100	100	100	100	100	100	100	100	100	100	NA
GS08 Sieve 0.75" (19.0 mm)	80.3	NA	100	100	100	100	100	100	100	100	100	100	NA
GS10 Sieve 0.375" (9.5 mm)	58	NA	100	100	100	95.4	91.4	94.2	89.2	98.4	100	89.5	NA
Sieve No. 004 (4.75 mm)	54.9	NA	99.6	96.5	99.7	87.1	89	85.3	84.3	96.3	97.9	81.8	NA
Sieve No. 010 (2.00 mm)	50	NA	99.3	92.7	98.5	81.8	88	78.1	78.3	93.6	97.2	76.3	NA
Sieve No. 020 (850 um)	46.7	NA	98.5	88.4	97.5	78.7	86.5	72.3	73.2	91.7	96.4	71.8	NA
Sieve No. 040 (425 um)	41.1	NA	95.8	82.7	91.9	75	82.7	63.4	65.5	86.9	94.9	65.1	NA
Sieve No. 060 (250 um)	27.3	NA	73.8	64.4	63.2	59	65.8	44.5	49.5	62.8	85	50.6	NA
Sieve No. 080 (180 um)	15.7	NA	57.3	49.9	44.3	39.8	53.4	32.3	40.6	43.5	76.1	40.7	NA
Sieve No. 100 (150 um)	8.7	NA	53.5	42.4	35.3	30.2	49.3	27.8	37	37.7	73.5	36.2	NA
Sieve No. 200 (75 um)	0.5	NA	49.1	31.3	24.8	22.3	43.9	21.8	32.4	31.3	67.2	28.7	NA

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Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

ph - pH units

µg/kg - Micrograms per kilogram

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75
Sample ID	CAPL-SS70-1112	CAPL-SS71-1112	CAPL-SS72-1112	CAPL-SS73-1112	CAPL-SS74-1112	CAPL-SS75-1112
Sample Date	11/02/12	11/02/12	11/02/12	11/05/12	11/05/12	11/05/12
Chemical Name						
Volatile Organic Compounds (µg/kg)						
1,1,1-Trichloroethane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,1,2,2-Tetrachloroethane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
1,1,2-Trichloroethane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,1-Dichloroethane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,1-Dichloroethene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,2,3-Trichlorobenzene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,2,4-Trichlorobenzene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,2-Dibromo-3-chloropropane	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
1,2-Dibromoethane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,2-Dichlorobenzene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,2-Dichloroethane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,2-Dichloropropane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,3-Dichlorobenzene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
1,4-Dichlorobenzene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
2-Butanone	7.37 J	4.4 J	7.92	4.61 U	5.79 U	7.06 U
2-Hexanone	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
4-Methyl-2-pentanone	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
Acetone	25.3 J	58.1 J	40.7 J	9.23 UJ	10.6 J	14.1 UJ
Benzene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Bromochloromethane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Bromodichloromethane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Bromoform	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Bromomethane	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
Carbon disulfide	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Carbon tetrachloride	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Chlorobenzene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Chloroethane	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
Chloroform	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Chloromethane	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
cis-1,2-Dichloroethene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
cis-1,3-Dichloropropene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Cyclohexane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Dibromochloromethane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Dichlorodifluoromethane (Freon-12)	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
Ethylbenzene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Isopropylbenzene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Methyl acetate	4.14 UJ	4.09 UJ	3.95 UJ	4.61 U	5.79 U	7.06 U
Methylcyclohexane	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Methylene chloride	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
Methyl-tert-butyl ether (MTBE)	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Styrene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Tetrachloroethene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Toluene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
trans-1,2-Dichloroethene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
trans-1,3-Dichloropropene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Trichloroethene	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Trichlorofluoromethane (Freon-11)	4.14 U	4.09 U	3.95 U	4.61 U	5.79 U	7.06 U
Vinyl chloride	2.07 UJ	2.04 UJ	1.98 UJ	2.31 UJ	2.9 UJ	3.53 UJ
Xylene, total	6.21 U	6.13 U	5.93 U	6.92 U	8.69 U	10.6 U

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75
Sample ID	CAPL-SS70-1112	CAPL-SS71-1112	CAPL-SS72-1112	CAPL-SS73-1112	CAPL-SS74-1112	CAPL-SS75-1112
Sample Date	11/02/12	11/02/12	11/02/12	11/05/12	11/05/12	11/05/12
Chemical Name						
Semivolatile Organic Compounds (µg/kg)						
1,1-Biphenyl	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
1,2,4,5-Tetrachlorobenzene	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
2,2'-Oxybis(1-chloropropane)	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
2,3,4,6-Tetrachlorophenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
2,4,5-Trichlorophenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
2,4,6-Trichlorophenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
2,4-Dichlorophenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
2,4-Dimethylphenol	6,730 U	7,860 U	6,900 U	7,980 U	7,120 UL	8,370 U
2,4-Dinitrophenol	16,800 U	19,700 U	17,300 U	20,000 U	17,800 UL	20,900 U
2,4-Dinitrotoluene	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
2,6-Dinitrotoluene	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
2-Chloronaphthalene	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
2-Chlorophenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
2-Methylnaphthalene	37.7 J	39.2 U	26.6 J	37.7 J	28.7 J	41.8 U
2-Methylphenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
2-Nitroaniline	6,730 U	7,860 U	6,900 U	7,980 U	7,120 U	8,370 U
2-Nitrophenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
3,3'-Dichlorobenzidine	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
3-Nitroaniline	6,730 U	7,860 U	6,900 U	7,980 U	7,120 U	8,370 U
4,6-Dinitro-2-methylphenol	16,800 U	19,700 U	17,300 U	20,000 U	17,800 UL	20,900 U
4-Bromophenyl-phenylether	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
4-Chloro-3-methylphenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
4-Chloroaniline	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
4-Chlorophenyl-phenylether	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
4-Methylphenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
4-Nitroaniline	6,730 U	7,860 U	6,900 U	7,980 U	7,120 U	8,370 U
4-Nitrophenol	6,730 U	7,860 U	6,900 U	7,980 U	7,120 UL	8,370 U
Acenaphthene	33.6 U	39.2 U	34.5 U	39.8 U	166	41.8 U
Acenaphthylene	33.6 U	39.2 U	34.5 U	39.8 U	35.5 U	41.8 U
Acetophenone	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Anthracene	33.6 U	39.2 U	34.5 U	39.8 U	512	41.8 U
Atrazine	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Benzaldehyde	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Benzo(a)anthracene	33.6 U	39.2 U	34.5 U	128	797	41.8 U
Benzo(a)pyrene	33.6 U	39.2 U	34.5 U	119	722	41.8 U
Benzo(b)fluoranthene	33.6 U	39.2 U	34.5 U	157	418	46.3 J
Benzo(g,h,i)perylene	33.6 U	39.2 U	34.5 U	114	399	41.8 U
Benzo(k)fluoranthene	33.6 U	39.2 U	34.5 U	128	506	41.8 U
bis(2-Chloroethoxy)methane	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
bis(2-Chloroethyl)ether	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
bis(2-Ethylhexyl)phthalate	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Butylbenzylphthalate	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Caprolactam	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Carbazole	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Chrysene	46.5 J	39.2 U	65.7 J	192	906	82.8 J
Dibenz(a,h)anthracene	33.6 U	39.2 U	34.5 U	39.8 U	137	41.8 U
Dibenzofuran	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Diethylphthalate	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Dimethyl phthalate	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Di-n-butylphthalate	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Di-n-octylphthalate	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Fluoranthene	36.7 J	40.5 J	30.6 J	260	1,510	69.7 J
Fluorene	33.6 U	39.2 U	34.5 U	39.8 U	169	41.8 U
Hexachlorobenzene	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Hexachlorobutadiene	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Hexachlorocyclopentadiene	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Hexachloroethane	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Indeno(1,2,3-cd)pyrene	33.6 U	39.2 U	34.5 U	102	321	41.8 U
Isophorone	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Naphthalene	33.6 U	39.2 U	34.5 U	39.8 U	35.5 U	41.8 U
n-Nitroso-di-n-propylamine	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
n-Nitrosodiphenylamine	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Nitrobenzene	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Pentachlorophenol	6,730 U	7,860 U	6,900 U	7,980 U	7,120 UL	8,370 U
Phenanthrene	44.2 J	39.2 U	73.8	172	1,910	53.3 J
Phenol	1,680 U	1,970 U	1,730 U	2,000 U	1,780 UL	2,090 U
Pyrene	51.6 J	46.1 J	47.8 J	231	2,080	54 J

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75
Sample ID	CAPL-SS70-1112	CAPL-SS71-1112	CAPL-SS72-1112	CAPL-SS73-1112	CAPL-SS74-1112	CAPL-SS75-1112
Sample Date	11/02/12	11/02/12	11/02/12	11/05/12	11/05/12	11/05/12
Chemical Name						
Pesticide/Polychlorinated Biphenyls (µg/kg)						
4,4'-DDD	0.351 UJ	0.394 UJ	0.718 J	19.3 J	0.565 J	1.84 J
4,4'-DDE	0.351 UJ	0.394 UJ	4.42 J	146 L	2.46 J	16.4 J
4,4'-DDT	0.337 J	0.525 J	4.85 J	334 L	0.373 UJ	5.95 J
Aldrin	0.351 U	0.394 UJ	0.358 L	0.398 UL	0.373 U	0.415 UL
alpha-BHC	0.351 U	0.394 U	0.362 UL	0.398 UL	0.373 U	0.415 UL
alpha-Chlordane	0.351 U	0.394 U	0.362 UJ	13.3 J	1.42 J	0.415 UJ
Aroclor-1260	8.59 U	12.1 J	34.9 L	4,630 J	9.13 U	357 J
beta-BHC	0.351 U	0.394 U	0.362 UL	0.398 UL	0.373 U	0.415 UL
delta-BHC	0.351 UJ	0.394 UJ	0.362 UL	0.398 UJ	0.373 U	0.415 UL
Dieldrin	0.351 U	0.394 U	0.453 J	19.1 J	0.306 J	0.704 J
Endosulfan I	0.351 U	0.394 U	0.362 UJ	0.398 UL	0.373 U	0.415 UL
Endosulfan II	0.351 U	0.394 U	0.273 L	39.2 L	0.373 U	0.415 UJ
Endosulfan sulfate	0.351 U	0.394 U	9.86 J	0.559 J	0.373 U	2.3 L
Endrin	0.351 UJ	0.394 UJ	0.362 UL	0.398 UJ	0.373 U	0.415 UJ
Endrin aldehyde	0.351 U	0.394 UJ	0.362 UL	7.81 J	0.373 U	0.759 J
Endrin ketone	0.351 U	0.394 U	0.362 UL	40.2 J	0.373 U	1.36 J
gamma-BHC (Lindane)	0.351 U	0.394 U	0.362 UL	0.398 UL	0.373 UJ	0.415 UL
gamma-Chlordane	0.642 J	0.916 L	0.53 J	12.7 L	3.31 J	0.765 L
Heptachlor	0.351 U	0.394 U	0.362 UL	0.398 UJ	0.373 UJ	0.415 UL
Heptachlor epoxide	0.351 UJ	0.394 UJ	0.362 UL	0.483 J	0.373 UJ	0.415 UJ
Methoxychlor	0.351 UJ	0.394 UJ	0.215 J	21.2 J	0.373 UJ	1.52 J
Toxaphene	22.7 UJ	25.5 UJ	23.4 UJ	25.7 UJ	24.1 UJ	26.8 UJ
Explosives (µg/kg)						
1,3,5-Trinitrobenzene	186 U	191 U	191 U	170 U	174 U	173 U
1,3-Dinitrobenzene	186 U	191 U	191 U	170 U	174 U	173 U
2,4,6-Trinitrotoluene	186 U	191 U	191 U	170 U	174 U	173 U
2-Amino-4,6-dinitrotoluene	186 U	191 U	191 U	170 U	174 U	173 U
2-Nitrotoluene	186 U	191 U	191 U	170 U	174 U	173 U
3,5-Dinitroaniline	186 U	191 U	191 U	170 U	174 U	173 U
3-Nitrotoluene	186 U	191 U	191 U	170 U	174 U	173 U
4-Amino-2,6-dinitrotoluene	186 U	191 U	191 U	170 U	174 U	173 U
4-Nitrotoluene	186 U	191 U	191 U	170 U	174 U	173 U
HMX	186 U	191 U	191 U	170 U	174 U	173 U
Nitroglycerin	465 U	478 U	478 U	426 U	435 U	433 U
Nitroguanidine	109 UJ	110 U	102 UJ	109 UJ	96.2 UJ	103 U
PETN	465 U	478 U	478 U	426 U	435 U	433 U
RDX	186 U	191 U	191 U	170 U	174 U	173 U
Tetryl	186 U	191 U	191 U	170 U	174 U	173 U
Total Metals (mg/kg)						
Aluminum	6,070	9,460	3,260	5,380	7,640	9,110
Antimony	0.787 U	2.3 U	2.14 U	2.33 U	2.27 U	2.65 U
Arsenic	1.19	2.1 J	0.941 J	2.6 J	5.29	7.22
Barium	10.9	14	46	34.1	66.4	61.1
Beryllium	1.63	1.35 J	0.535 U	0.363 J	0.521 J	0.759 J
Cadmium	0.197 U	0.575 U	0.535 U	0.984 J	0.568 U	0.339 J
Calcium	15,900	11,000	40,800	2,070	58,200	2,170
Chromium	5.78	10.5	7.84	16.7	23.3	19.3
Cobalt	2.09	2.05 J	2.01 J	2.02 J	3.8	3.66 J
Copper	3.29	4.57	6.47	44.8	28.3	51.5
Cyanide	0.246 U	0.29 U	0.265 U	0.297 U	0.272 U	0.155 J
Iron	10,400	15,100	6,370	11,100	10,900	18,500
Lead	12.9	10.3	15.1	127	14.7	159
Magnesium	2,530	2,620	22,800	1,480	2,520	1,680
Manganese	405	331	117	140	161	351
Mercury	0.031 U	0.0355 U	0.0242 J	0.0861	0.0188 J	0.0835
Nickel	2.28	2.64 J	3.24	6.27	11.8	6.5
Potassium	667	987 J	421 J	414 J	1,280 J	975 J
Selenium	0.492 U	1.44 U	1.34 U	1.46 U	1.42 U	1.65 U
Silver	0.197 U	0.575 U	0.535 U	0.582 U	0.568 U	0.661 U
Sodium	295 U	863 U	803 U	874 U	852 U	992 U
Thallium	0.393 U	1.15 U	1.07 U	1.16 U	1.14 U	1.32 U
Vanadium	13.7	19.7	12.8	19.4	28.3	25.6
Zinc	44.6	33.3	21.7	175	47.5	196
Wet Chemistry						
pH (ph)	9.11 H3	9.12 H3	8.15 H3	7 H3	11.9 H3	5.85 H3
Total organic carbon (TOC) (mg/kg)	7,450	9,410	13,500	29,600	13,200	40,100
Grain Size (pct)						
Coarse Sand (%)	18.2	11.5	10.9	4.4	20.3	2.8
Fine Sand (%)	17.8	20.6	20.1	44.6	15.9	44.6
Fines (%)	16	14.7	18.1	25.9	6.2	38.5
Gravel (%)	25.6	36.3	32.3	1.3	38.6	2.1

Attachment B6
Cheatham Annex, Penniman Lake
Surface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75
Sample ID	CAPL-SS70-1112	CAPL-SS71-1112	CAPL-SS72-1112	CAPL-SS73-1112	CAPL-SS74-1112	CAPL-SS75-1112
Sample Date	11/02/12	11/02/12	11/02/12	11/05/12	11/05/12	11/05/12
Chemical Name						
Medium Sand (%)	22.4	16.9	18.6	23.8	19	12
Sand (%)	58.4	49	49.6	72.8	55.2	59.4
GRAINSIZE (PCT/P)						
GS03 Sieve 3" (75 mm)	100	100	100	100	100	100
GS05 Sieve 2" (50 mm)	100	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	92.5	76.7	79.3	100	82.8	99.1
Sieve No. 004 (4.75 mm)	74.4	63.7	67.7	98.7	61.4	97.9
Sieve No. 010 (2.00 mm)	56.2	52.2	56.8	94.3	41.1	95.1
Sieve No. 020 (850 um)	43.3	42.6	48.6	83.4	31.5	89.7
Sieve No. 040 (425 um)	33.8	35.3	38.2	70.5	22.1	83.1
Sieve No. 060 (250 um)	27.1	27	28.7	51.6	14.9	63
Sieve No. 080 (180 um)	23.2	21.7	23.5	39.6	11.2	49.5
Sieve No. 100 (150 um)	20.8	19.1	21.5	34	9.4	44.6
Sieve No. 200 (75 um)	16	14.7	18.1	25.9	6.2	38.5

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Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

N - The MS/MSD accuracy and or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

ph - pH units

µg/kg - Micrograms per kilogram

Attachment B7
Cheatham Annex, Penniman Lake
Composite Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO34	CAPL-SO35	CAPL-SO36	CAPL-SO37	CAPL-SO38	CAPL-SO39	CAPL-SO40		CAPL-SO41	CAPL-SO42	CAPL-SO43
Sample ID	CAPL-SB34-1112	CAPL-SB35-1112	CAPL-SB36-1112	CAPL-SB37-1112	CAPL-SB38-1012	CAPL-SB39-1012	CAPL-SB40-1112	CAPL-SB40P-1112	CAPL-SB41-1012	CAPL-SB42-1012	CAPL-SB43-1112
Sample Date	11/05/12	11/06/12	11/06/12	11/06/12	10/31/12	10/31/12	11/01/12	11/01/12	10/31/12	10/31/12	11/01/12
Chemical Name											
Pesticide/Polychlorinated Biphenyls (µg/kg)											
Aroclor-1260	10.2 U	10.8 U	10.4 U	10.4 U	10.4 U	9.44 U	10.8 U	11.3 U	8.89 U	9.15 U	9.44 UL

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Notes:

Shading indicates detections

U - The material was analyzed for, but not detected

UL - Analyte not detected, quantitation limit is probably higher

µg/kg - Micrograms per kilogram

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO44	CAPL-SO45	CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49	CAPL-SO50		CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58	CAPL-SO59
Sample ID	CAPL-SB44-1012	CAPL-SB45-1012	CAPL-SB46-1012	CAPL-SB47-1012	CAPL-SB48-1012	CAPL-SB49-1012	CAPL-SB50-1012	CAPL-SB50P-1012	CAPL-SB55-1012	CAPL-SB56-1012	CAPL-SB57-1012	CAPL-SB58-1012	CAPL-SB59-1012
Sample Date	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name													
Volatile Organic Compounds (µg/kg)													
1,1,1-Trichloroethane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
1,1,2,2-Tetrachloroethane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	5.16 U	6.99 U	7.61 U	5.95 U	6.28 U	5.28 U	7.55 U	6.9 U	5.05 U	7.07 U	6.83 U	6.44 U	6.04 U
1,1,2-Trichloroethane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
1,1-Dichloroethane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
1,1-Dichloroethene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
1,2,3-Trichlorobenzene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
1,2,4-Trichlorobenzene	2.58 UJ	3.5 UJ	3.8 UJ	2.97 UJ	3.14 U	2.64 U	3.78 U	3.45 U	2.53 UJ	3.54 U	3.42 U	3.22 UL	3.02 U
1,2-Dibromo-3-chloropropane	5.16 U	6.99 U	7.61 U	5.95 U	6.28 UJ	5.28 UJ	7.55 UJ	6.9 U	5.05 U	7.07 U	6.83 U	6.44 U	6.04 U
1,2-Dibromoethane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
1,2-Dichlorobenzene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
1,2-Dichloroethane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
1,2-Dichloropropane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
1,3-Dichlorobenzene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
1,4-Dichlorobenzene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
2-Butanone	5.16 UJ	6.99 UJ	7.61 UJ	5.95 UJ	6.28 U	5.28 U	7.55 U	6.9 U	5.05 UJ	93.1	6.83 U	6.44 UJ	3.88 J
2-Hexanone	5.16 UJ	6.99 UJ	7.61 UJ	5.95 UJ	6.28 U	5.28 U	7.55 U	6.9 U	5.05 UJ	7.07 U	6.83 U	6.44 UJ	6.04 U
4-Methyl-2-pentanone	5.16 UJ	6.99 UJ	7.61 UJ	5.95 UJ	6.28 U	5.28 U	7.55 U	6.9 U	5.05 UJ	7.07 U	6.83 U	6.44 UJ	6.04 U
Acetone	10.3 UJ	14 UJ	15.2 UJ	6.84 J	61 J	10.6 UJ	15.1 UJ	13.8 UJ	7.89 J	261 J	13.7 UJ	9.05 J	14.8 J
Benzene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Bromochloromethane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Bromodichloromethane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Bromoform	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Bromomethane	5.16 U	6.99 U	7.61 U	5.95 U	6.28 U	5.28 U	7.55 U	6.9 U	5.05 U	7.07 U	6.83 U	6.44 U	6.04 U
Carbon disulfide	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	2.89 J	3.42 U	3.22 U	1.93 J
Carbon tetrachloride	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Chlorobenzene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
Chloroethane	5.16 U	6.99 U	7.61 U	5.95 U	6.28 U	5.28 U	7.55 U	6.9 U	5.05 U	7.07 U	6.83 U	6.44 U	6.04 U
Chloroform	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Chloromethane	5.16 U	6.99 U	7.61 U	5.95 U	6.28 U	5.28 U	7.55 U	6.9 U	5.05 U	7.07 U	6.83 U	6.44 U	6.04 U
cis-1,2-Dichloroethene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
cis-1,3-Dichloropropene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Cyclohexane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Dibromochloromethane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Dichlorodifluoromethane (Freon-12)	5.16 U	6.99 U	7.61 U	5.95 U	6.28 U	5.28 U	7.55 U	6.9 U	5.05 U	7.07 U	6.83 U	6.44 U	6.04 U
Ethylbenzene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
Isopropylbenzene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
Methyl acetate	5.16 U	6.99 U	7.61 U	5.95 U	6.28 U	5.28 U	7.55 U	6.9 U	5.05 U	7.07 U	6.83 U	6.44 U	6.04 U
Methylcyclohexane	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
Methylene chloride	5.16 U	6.99 U	7.61 U	5.95 U	6.28 U	5.28 U	7.55 U	6.9 U	5.05 U	7.07 U	6.83 U	6.44 U	6.04 U
Methyl-tert-butyl ether (MTBE)	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Styrene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
Tetrachloroethene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Toluene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
trans-1,2-Dichloroethene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
trans-1,3-Dichloropropene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 U	3.02 U
Trichloroethene	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U	3.54 U	3.42 U	3.22 UL	3.02 U
Trichlorofluoromethane (Freon-11)	5.16 U	6.99 U	7.61 U	5.95 U	6.28 U	5.28 U	7.55 U	6.9 U	5.05 U	7.07 U	6.83 U	6.44 U	6.04 U
Vinyl chloride	2.58 UJ	3.5 UJ	3.8 UJ	2.97 UJ	3.14 UJ	2.64 UJ	3.78 UJ	3.45 UJ	2.53 UJ	3.54 UJ	3.42 UJ	3.22 UJ	3.02 UJ
Xylene, total	7.74 U	10.5 U	11.4 U	8.92 U	9.42 U	7.91 U	11.3 U	10.4 U	7.58 U	10.6 U	10.2 U	9.66 UL	9.06 U

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO44	CAPL-SO45	CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49	CAPL-SO50		CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58	CAPL-SO59
Sample ID	CAPL-SB44-1012	CAPL-SB45-1012	CAPL-SB46-1012	CAPL-SB47-1012	CAPL-SB48-1012	CAPL-SB49-1012	CAPL-SB50-1012	CAPL-SB50P-1012	CAPL-SB55-1012	CAPL-SB56-1012	CAPL-SB57-1012	CAPL-SB58-1012	CAPL-SB59-1012
Sample Date	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name													
Semivolatile Organic Compounds (µg/kg)													
1,1-Biphenyl	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
1,2,4,5-Tetrachlorobenzene	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2,2'-Oxybis(1-chloropropane)	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2,3,4,6-Tetrachlorophenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2,4,5-Trichlorophenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2,4,6-Trichlorophenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2,4-Dichlorophenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2,4-Dimethylphenol	733 U	873 U	790 U	787 U	741 U	801 U	854 U	803 U	808 U	879 U	901 U	846 U	820 U
2,4-Dinitrophenol	1,830 U	2,190 U	1,980 U	1,970 U	1,850 U	2,010 U	2,140 U	2,010 U	2,020 U	2,200 U	2,260 U	2,120 U	2,050 U
2,4-Dinitrotoluene	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2,6-Dinitrotoluene	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2-Chloronaphthalene	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2-Chlorophenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2-Methylnaphthalene	3.66 U	4.36 U	3.04 J	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.56 J	4.5 U	4.23 U	4.1 U
2-Methylphenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
2-Nitroaniline	733 U	873 U	790 U	787 U	741 U	801 U	854 U	803 U	808 U	879 U	901 U	846 U	820 U
2-Nitrophenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
3,3'-Dichlorobenzidine	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
3-Nitroaniline	733 U	873 U	790 U	787 U	741 U	801 U	854 U	803 U	808 U	879 U	901 U	846 U	820 U
4,6-Dinitro-2-methylphenol	1,830 U	2,190 U	1,980 U	1,970 U	1,850 U	2,010 U	2,140 U	2,010 U	2,020 U	2,200 U	2,260 U	2,120 U	2,050 U
4-Bromophenyl-phenylether	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
4-Chloro-3-methylphenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
4-Chloroaniline	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
4-Chlorophenyl-phenylether	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
4-Methylphenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
4-Nitroaniline	733 U	873 U	790 U	787 U	741 U	801 U	854 U	803 U	808 U	879 U	901 U	846 U	820 U
4-Nitrophenol	733 U	873 U	790 U	787 U	741 U	801 U	854 U	803 U	808 U	879 U	901 U	846 U	820 U
Acenaphthene	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Acenaphthylene	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Acetophenone	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Anthracene	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Atrazine	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Benzaldehyde	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Benzo(a)anthracene	3.66 U	4.36 U	3.94 U	3.93 U	23.8 J	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Benzo(a)pyrene	3.66 U	4.36 U	5.81 J	3.93 U	23.2 K	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Benzo(b)fluoranthene	3.66 U	4.36 U	22.4	3.93 U	57 K	4 U	4.26 U	5.56 K	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Benzo(g,h,i)perylene	3.66 U	4.36 U	11.9	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Benzo(k)fluoranthene	3.66 U	4.36 U	9.43	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	6.87 J	4.5 U	4.23 U	4.1 U
bis(2-Chloroethoxy)methane	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
bis(2-Chloroethyl)ether	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
bis(2-Ethylhexyl)phthalate	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Butylbenzylphthalate	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Caprolactam	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Carbazole	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Chrysene	3.66 U	4.36 U	17.3	3.93 U	31.6 K	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Dibenz(a,h)anthracene	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Dibenzofuran	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Diethylphthalate	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Dimethyl phthalate	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Di-n-butylphthalate	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Di-n-octylphthalate	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Fluoranthene	3.66 U	4.36 U	17.5	3.93 U	49	4 U	4.26 U	5.42 J	4.57 J	10.7	3.62 J	3.52 J	4.1 U
Fluorene	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Hexachlorobenzene	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Hexachlorobutadiene	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Hexachlorocyclopentadiene	183 UJ	219 UJ	198 UJ	197 UJ	185 U	201 U	214 U	201 U	202 UJ	220 UJ	226 UJ	212 UJ	205 U
Hexachloroethane	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Indeno(1,2,3-cd)pyrene	3.66 U	4.36 U	9.69	3.93 U	23.3 J	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
Isophorone	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Naphthalene	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U	4.39 U	4.5 U	4.23 U	4.1 U
n-Nitroso-di-n-propylamine	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
n-Nitrosodiphenylamine	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Nitrobenzene	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Pentachlorophenol	733 U	873 U	790 U	787 U	741 U	801 U	854 U	803 U	808 U	879 U	901 U	846 U	820 U
Phenanthrene	3.66 U	4.36 U	6.01 J	3.93 U	30.2 J	4 U	4.26 U	7.26 J	4.03 U	8.77 J	4.5 U	4.23 U	4.1 U
Phenol	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U	220 U	226 U	212 U	205 U
Pyrene	3.66 U	4.36 U	16.5	3.93 U	43.5 K	4 U	4.26 U	6.22 K	4.22 J	10.7	3.46 J	3.17 J	4.1 U

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO44	CAPL-SO45	CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49	CAPL-SO50		CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58	CAPL-SO59
Sample ID	CAPL-SB44-1012	CAPL-SB45-1012	CAPL-SB46-1012	CAPL-SB47-1012	CAPL-SB48-1012	CAPL-SB49-1012	CAPL-SB50-1012	CAPL-SB50P-1012	CAPL-SB55-1012	CAPL-SB56-1012	CAPL-SB57-1012	CAPL-SB58-1012	CAPL-SB59-1012
Sample Date	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name													
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	0.23 J	0.47 UL	0.851 J	3.08 J	13 J	1.69 J	2.68 J	0.675 J	0.396 UL	11.3 J	19.7 J	0.243 J	2.7 J
4,4'-DDE	0.456 L	0.47 UL	7.49 J	3.01 J	143 J	9.02	7.1	4.78	0.346 J	9.67	11.5 L	3.53 L	14.3 L
4,4'-DDT	0.353 J	0.47 UL	2.96 J	2.11 J	60 J	0.467 J	3.71 J	2.88 J	0.396 U	0.663 J	2.53 J	1.28 J	1.54 L
Aldrin	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.451 UL	0.333 J	0.429 UL
alpha-BHC	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.307 J	0.444 UL	0.594 J
alpha-Chlordane	0.367 UL	0.47 UL	0.768 J	0.394 UL	0.656 J	0.412 U	0.441 U	0.398 U	0.396 U	0.449 UL	0.451 UL	0.444 UL	0.429 UL
Aroclor-1260	35.6 J	23.2 L	414 L	284 J	428 L	13.9 J	39.7	31.7	9.7 U	54.3 J	19.9 L	35.2 L	9.07 L
beta-BHC	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.252 J	0.444 UL	0.429 UL
delta-BHC	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 UL	0.396 UL	0.449 UL	0.451 UL	0.444 UL	0.429 UL
Dieldrin	0.602 L	0.47 UL	6.49 L	3.65 L	8.16 J	0.412 U	0.613 J	0.449 J	0.396 U	1.66 J	0.451 UL	0.444 UL	0.429 UL
Endosulfan I	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.451 UL	0.444 UL	0.429 UL
Endosulfan II	0.367 UL	0.47 UL	4.18 J	0.81 J	4.07 J	0.412 U	0.441 U	0.398 UL	0.396 U	0.449 UL	0.451 UL	0.444 UL	0.429 UL
Endosulfan sulfate	0.937 J	0.484 J	29.3 J	9.05 L	0.367 UL	0.412 U	0.441 U	1.45 J	0.396 U	0.449 U	0.681 J	0.444 UL	0.227 J
Endrin	0.367 UL	0.47 UL	1.1 J	1.54 J	1.25 J	0.412 U	0.441 U	0.398 U	0.396 U	0.905 J	0.403 L	0.519 J	0.429 UL
Endrin aldehyde	0.367 UL	0.47 UL	0.452 J	0.441 J	0.646 J	0.412 U	0.441 U	0.398 U	0.396 U	1.15 J	0.429 J	0.444 UL	0.429 UL
Endrin ketone	0.367 UL	0.47 UL	1.84 J	0.81 J	1.73 J	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.451 UL	0.444 UL	0.429 UL
gamma-BHC (Lindane)	0.367 UL	0.47 UL	0.411 U	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.451 UL	0.444 UL	0.429 UL
gamma-Chlordane	2.17 J	1.76 J	2.1 J	1.88 L	3.66 B	0.412 UJ	0.366 B	0.411 B	1.45 J	0.296 J	0.303 J	3.23 L	2.5 L
Heptachlor	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.185 J	0.246 J	1.97 J
Heptachlor epoxide	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U	0.449 U	0.451 UL	0.201 L	0.437 J
Methoxychlor	0.367 UL	0.47 UL	3.49 J	0.85 J	4.95 J	0.412 UJ	0.441 U	0.398 U	0.396 U	1.63 J	3.61 J	0.52 J	1.28 J
Toxaphene	23.8 UJ	30.4 UJ	26.6 UJ	25.5 UJ	23.8 UJ	26.7 UJ	28.5 UJ	25.8 UJ	25.6 UJ	29.1 UJ	29.2 UJ	28.8 UJ	27.8 UJ
Explosives (µg/kg)													
1,3,5-Trinitrobenzene	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
1,3-Dinitrobenzene	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
2,4,6-Trinitrotoluene	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
2-Amino-4,6-dinitrotoluene	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
2-Nitrotoluene	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
3,5-Dinitroaniline	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
3-Nitrotoluene	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
4-Amino-2,6-dinitrotoluene	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
4-Nitrotoluene	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
HMX	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
Nitroglycerin	455 U	493 U	498 U	478 U	455 U	500 U	500 U	455 U	478 U	465 U	469 U	493 U	452 U
Nitroguanidine	102 U	97.1 U	98.5 U	102 U	103 U	98 U	94.8 U	94.3 U	99 U	102 U	95.7 U	99 U	94.3 U
PETN	455 U	493 U	498 U	478 U	455 U	500 U	500 U	455 U	478 U	465 U	469 U	493 U	452 U
RDX	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
Tetryl	182 U	197 U	199 U	191 U	182 U	200 U	200 U	182 U	191 U	186 U	188 U	197 U	181 U
Total Metals (mg/kg)													
Aluminum	11,600	27,600	22,400	24,000	11,500	10,900	23,400	24,500	6,480	3,590	2,580	4,220	1,600
Antimony	0.874 U	2.79 U	2.44 U	2.51 U	2.28 UL	0.986 U	2.5 U	2.49 U	1.01 U	1.07 U	1.16 U	0.558 UL	1.02 U
Arsenic	2.12	16.3	4.87	4.01	4.51	2.91	11.5 J	7.98 J	1.9	2.76	1.44 J	1.5	1.11 J
Barium	33.4	52.8	39.6	46.8	26.2	47.3	55.7 J	87.3 J	29.4	18.4	12.2	24.3	7.04
Beryllium	0.421 J	1.89	0.786 J	0.552 J	0.323 J	0.52 J	1.1 J	1.07 J	0.263 J	0.21 J	0.228 J	0.25 J	0.254 U
Cadmium	0.218 U	0.697 U	0.61 U	0.627 U	0.57 U	0.246 U	0.626 U	0.622 U	0.252 U	0.268 U	0.204 J	1.64 K	0.254 U
Calcium	1,160	2,690	3,920	3,190	1,800	1,570	3,360	3,320	283 J	681	1,660	760 L	695
Chromium	15.1	58.5	44.9	42.6	19.1 K	15.2	41.8	37.7	6.74	5.6	5.41	5.56	3.67
Cobalt	2.54	6.45	2.62 J	1.97 J	1.51 J	2.69	4.1	4.62	1.27 J	1.07 J	2.16	0.947	1.27 U
Copper	3.59	8.05	4.26	8.85	5.1	3.71	5.35	4.65	3.02	3.17	2.37	3.54	1.26 J
Cyanide	0.257 U	0.343 U	0.276 U	0.283 U	0.256 U	0.297 U	0.313 U	0.294 U	0.284 U	0.327 U	0.333 U	0.328 U	0.313 U
Iron	10,300	63,500	33,600	27,100	14,200	13,400	52,600	38,700	5,460	5,560	2,570	4,220	2,470
Lead	7.96	16	11.9	9.33	23.6	9.17	15	12.4	13.3	8.58	22 J	16.8 K	4.59 J
Magnesium	844	4,280	2,740	1,750	957 J	969	2,440	2,080	489 J	341 J	312 J	601 K	268 J
Manganese	35.2	65.1	28.3	16.2	59.4	50.6	78.7 J	45 J	22.8	11.3	7.37	34.4 K	7.12
Mercury	0.0354 J	0.0947	0.0344 J	0.0446 J	0.0462	0.0298 J	0.0671	0.0642	0.0354 J	0.0226 J	0.0437	0.0454 L	0.036 U
Nickel	3.96	16.1	7.25	5.86	4.06	4.37	9.19	8.36	3.06 B	2.19 B	3.17 B	2.63 B	1.15 B
Potassium	483 J	4,420	1,920	863 J	744 J	593 J	1,510 J	887 J	362 J	412 J	351 J	315 K	364 J
Selenium	0.546 U	1.74 U	1.52 U	1.57 U	1.42 U	0.616 U	1.56 U	1.55 U	0.631 U	0.669 U	0.54 J	0.349 U	0.636 U
Silver	0.218 U	0.697 U	0.61 U	0.627 U	0.57 UL	0.246 UL	0.626 UL	0.622 UL	0.252 U	0.268 U	0.289 U	0.139 U	0.254 U
Sodium	328 U	1,050 U	915 U	941 U	855 U	370 U	939 U	932 U	379 U	402 U	434 U	209 U	381 U
Thallium	0.437 U	1.39 U	1.22 U	1.25 U	1.14 U	0.493 U	1.25 U	1.24 U	0.505 U	0.536 U	0.579 U	0.279 U	0.509 U
Vanadium	20.2	66.7	51.4	54.3	27.9 K	17.7	47.7	43.8	11.3	8.95	6.94	8.78 K	4.81
Zinc	14.1	48.8	43	20.2	42.3	16.8	29.5	25.7	11.7	48.2	13.2	72.7 K	52.7
Wet Chemistry													
pH (ph)	5.82 H3	5.06 H3	6.6 H3	5.52 H3	5.88 H3	7.86 H3	8.08 H3	NA	5.7 H3	6.02 H3	6.96 H3	5.82 H3	5.87 H3
Total organic carbon (TOC) (mg/kg)	4,100	1,770	3,180	5,670	20,300	3,740	5,900	NA	5,480	13,300	26,000	11,900	8,970

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO44	CAPL-SO45	CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49	CAPL-SO50		CAPL-SO55	CAPL-SO56	CAPL-SO57	CAPL-SO58	CAPL-SO59
Sample ID	CAPL-SB44-1012	CAPL-SB45-1012	CAPL-SB46-1012	CAPL-SB47-1012	CAPL-SB48-1012	CAPL-SB49-1012	CAPL-SB50-1012	CAPL-SB50P-1012	CAPL-SB55-1012	CAPL-SB56-1012	CAPL-SB57-1012	CAPL-SB58-1012	CAPL-SB59-1012
Sample Date	10/26/12	10/26/12	10/26/12	10/26/12	10/24/12	10/24/12	10/24/12	10/24/12	10/26/12	10/26/12	10/26/12	10/26/12	10/26/12
Chemical Name													

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N - The MS/MSD accuracy and or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
*- Exceeding quality control criteria are associated with the reported results (unvalidated data)
mg/kg - Milligrams per kilogram
ph - pH units
µg/kg - Micrograms per kilogram

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO60		CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	CAPL-SO70	CAPL-SO71
Sample ID	CAPL-SB60-1112	CAPL-SB60P-1112	CAPL-SB61-1112	CAPL-SB62-1112	CAPL-SB63-1112	CAPL-SB64-1112	CAPL-SB65-1112	CAPL-SB66-1112	CAPL-SB67-1112	CAPL-SB68-1112	CAPL-SB69-1112	CAPL-SB70-1112	CAPL-SB71-1112
Sample Date	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/02/12	11/02/12
Chemical Name													
Volatile Organic Compounds (µg/kg)													
1,1,1-Trichloroethane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,1,2,2-Tetrachloroethane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
1,1,2-Trichloroethane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,1-Dichloroethane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,1-Dichloroethene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,2,3-Trichlorobenzene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,2,4-Trichlorobenzene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,2-Dibromo-3-chloropropane	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
1,2-Dibromoethane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,2-Dichlorobenzene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,2-Dichloroethane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,2-Dichloropropane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,3-Dichlorobenzene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
1,4-Dichlorobenzene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
2-Butanone	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
2-Hexanone	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
4-Methyl-2-pentanone	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
Acetone	11.6 UJ	12.7 UJ	8.57 UJ	5.13 J	9.44 UJ	9.53 UJ	9.24 UJ	11.7 UJ	5.86 J	12.3 UJ	9.1 UJ	11.1 UJ	6.84 J
Benzene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Bromochloromethane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Bromodichloromethane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Bromoform	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Bromomethane	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
Carbon disulfide	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Carbon tetrachloride	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Chlorobenzene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Chloroethane	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
Chloroform	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Chloromethane	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
cis-1,2-Dichloroethene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
cis-1,3-Dichloropropene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Cyclohexane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Dibromochloromethane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Dichlorodifluoromethane (Freon-12)	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
Ethylbenzene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Isopropylbenzene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Methyl acetate	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 UJ	4.84 UJ
Methylcyclohexane	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Methylene chloride	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
Methyl-tert-butyl ether (MTBE)	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Styrene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Tetrachloroethene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Toluene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
trans-1,2-Dichloroethene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
trans-1,3-Dichloropropene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Trichloroethene	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U
Trichlorofluoromethane (Freon-11)	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U
Vinyl chloride	2.89 UJ	3.18 UJ	2.14 UJ	2.04 UJ	2.36 UJ	2.38 UJ	2.31 UJ	2.92 UJ	2.86 UJ	3.07 UJ	2.28 UJ	2.77 UJ	2.42 UJ
Xylene, total	8.68 U	9.53 U	6.43 U	6.13 U	7.08 U	7.15 U	6.93 U	8.76 U	8.58 U	9.22 U	6.83 U	8.3 U	7.26 U

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO60		CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	CAPL-SO70	CAPL-SO71
Sample ID	CAPL-SB60-1112	CAPL-SB60P-1112	CAPL-SB61-1112	CAPL-SB62-1112	CAPL-SB63-1112	CAPL-SB64-1112	CAPL-SB65-1112	CAPL-SB66-1112	CAPL-SB67-1112	CAPL-SB68-1112	CAPL-SB69-1112	CAPL-SB70-1112	CAPL-SB71-1112
Sample Date	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/02/12	11/02/12
Chemical Name													
Semivolatile Organic Compounds (µg/kg)													
1,1-Biphenyl	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
1,2,4,5-Tetrachlorobenzene	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2,2'-Oxybis(1-chloropropane)	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2,3,4,6-Tetrachlorophenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2,4,5-Trichlorophenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2,4,6-Trichlorophenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2,4-Dichlorophenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2,4-Dimethylphenol	841 U	882 U	772 U	3,920 U	799 U	783 U	778 U	787 U	741 U	843 U	4,010 U	773 U	856 U
2,4-Dinitrophenol	2,110 U	2,210 U	1,930 U	9,830 U	2,000 U	1,960 U	1,950 U	1,970 U	1,860 U	2,110 U	10,000 U	1,930 U	2,140 U
2,4-Dinitrotoluene	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2,6-Dinitrotoluene	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2-Chloronaphthalene	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2-Chlorophenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2-Methylnaphthalene	4.2 U	4.4 U	3.85 U	39.2 U	35.5	9.96	3.89 U	16.4	3.7 U	4.21 U	23.1 J	3.86 U	4.28 U
2-Methylphenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
2-Nitroaniline	841 U	882 U	772 U	3,920 U	799 U	783 U	778 U	787 U	741 U	843 U	4,010 U	773 U	856 U
2-Nitrophenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
3,3'-Dichlorobenzidine	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
3-Nitroaniline	841 U	882 U	772 U	3,920 U	799 U	783 U	778 U	787 U	741 U	843 U	4,010 U	773 U	856 U
4,6-Dinitro-2-methylphenol	2,110 U	2,210 U	1,930 U	9,830 U	2,000 U	1,960 U	1,950 U	1,970 U	1,860 U	2,110 U	10,000 U	1,930 U	2,140 U
4-Bromophenyl-phenylether	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
4-Chloro-3-methylphenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
4-Chloroaniline	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
4-Chlorophenyl-phenylether	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
4-Methylphenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
4-Nitroaniline	841 U	882 U	772 U	3,920 U	799 U	783 U	778 U	787 U	741 U	843 U	4,010 U	773 U	856 U
4-Nitrophenol	841 U	882 U	772 U	3,920 U	799 U	783 U	778 U	787 U	741 U	843 U	4,010 U	773 U	856 U
Acenaphthene	4.2 U	4.4 U	3.85 U	39.2 U	3.99 U	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	40.1 U	3.86 U	4.28 U
Acenaphthylene	4.2 U	4.4 U	3.85 U	39.2 U	3.99 U	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	40.1 U	3.86 U	4.28 U
Acetophenone	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Anthracene	4.2 U	4.4 U	3.85 U	83.6	65.4	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	40.1 U	3.86 U	4.28 U
Atrazine	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Benzaldehyde	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Benzo(a)anthracene	4.2 U	4.4 U	3.85 U	610	3.99 U	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	122	3.86 U	4.28 U
Benzo(a)pyrene	4.2 U	4.4 U	3.85 U	859	3.99 U	4.99 J	3.89 U	3.93 U	3.7 U	4.21 U	213	3.86 U	4.28 U
Benzo(b)fluoranthene	4.2 U	4.4 U	3.85 U	2,100	7.82 J	9.11	3.89 U	8	3.7 U	4.21 U	292	3.86 U	4.28 U
Benzo(g,h,i)perylene	4.2 U	4.4 U	3.85 U	1,140	3.99 U	6.09 J	3.89 U	5.27 J	3.7 U	4.21 U	186	3.86 U	4.28 U
Benzo(k)fluoranthene	4.2 U	4.4 U	3.85 U	2,210	3.99 U	5.51 J	3.89 U	3.93 U	3.7 U	4.21 U	274	3.86 U	4.28 U
bis(2-Chloroethoxy)methane	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
bis(2-Chloroethyl)ether	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
bis(2-Ethylhexyl)phthalate	211 U	221 U	167 J	512 J	200 U	196 U	130 J	197 U	186 U	553	1,000 U	109 J	167 J
Butylbenzylphthalate	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Caprolactam	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Carbazole	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Chrysene	4.2 U	4.4 U	3.85 U	3,070	14.8	22.8	3.89 U	16.4	3.7 U	4.21 U	346	3.86 U	4.28 U
Dibenz(a,h)anthracene	4.2 U	4.4 U	3.85 U	250	3.99 U	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	56.2 J	3.86 U	4.28 U
Dibenzofuran	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Diethylphthalate	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Dimethyl phthalate	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Di-n-butylphthalate	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Di-n-octylphthalate	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Fluoranthene	4.2 U	4.4 U	3.85 U	3,360	6.05 J	6.26 J	3.89 U	5.35 J	2.31 J	4.21 U	343	3.86 U	4.28 U
Fluorene	4.2 U	4.4 U	3.85 U	39.2 U	8.88	3.91 U	3.89 U	3.93 U	3.7 U	4.21 U	40.1 U	3.86 U	4.28 U
Hexachlorobenzene	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Hexachlorobutadiene	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Hexachlorocyclopentadiene	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Hexachloroethane	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Indeno(1,2,3-cd)pyrene	4.2 U	4.4 U	3.85 U	1,000	3.99 U	4.3 J	3.89 U	3.93 U	3.7 U	4.21 U	161	3.86 U	4.28 U
Isophorone	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Naphthalene	4.2 U	4.4 U	3.85 U	39.2 U	53	7.17 J	3.89 U	16.7	3.7 U	4.21 U	40.1 U	3.86 U	4.28 U
n-Nitroso-di-n-propylamine	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
n-Nitrosodiphenylamine	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Nitrobenzene	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Pentachlorophenol	841 U	882 U	772 U	3,920 U	799 U	783 U	778 U	787 U	741 U	843 U	4,010 U	773 U	856 U
Phenanthrene	4.2 U	4.4 U	3.85 U	405	46.7	17.7	3.89 U	17.5	3.7 U	4.21 U	88	3.86 U	4.28 U
Phenol	211 U	221 U	193 U	983 U	200 U	196 U	195 U	197 U	186 U	211 U	1,000 U	193 U	214 U
Pyrene	4.2 U	4.4 U	3.85 U	2,980	10.2	7.48 J	3.89 U	7.02 J	2.21 J	4.21 U	361	3.86 U	4.28 U

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO60		CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	CAPL-SO70	CAPL-SO71
Sample ID	CAPL-SB60-1112	CAPL-SB60P-1112	CAPL-SB61-1112	CAPL-SB62-1112	CAPL-SB63-1112	CAPL-SB64-1112	CAPL-SB65-1112	CAPL-SB66-1112	CAPL-SB67-1112	CAPL-SB68-1112	CAPL-SB69-1112	CAPL-SB70-1112	CAPL-SB71-1112
Sample Date	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/02/12	11/02/12
Chemical Name													
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	0.43 U	0.442 U	0.399 U	3.36 L	0.837	0.957 J	0.387 U	0.811 J	0.392 U	0.425 UL	5.6 J	0.407 U	0.421 U
4,4'-DDE	0.43 UJ	0.442 UJ	0.399 UJ	23.1 K	8.29 J	3.66	0.387 UJ	0.347 J	0.392 UJ	0.217 J	5.45 J	0.407 U	0.421 U
4,4'-DDT	0.43 U	0.442 U	0.399 U	32.1 L	1.13 J	0.801 J	0.387 UJ	0.401 U	0.392 UJ	1.41 J	19.6 L	0.407 UJ	0.421 UJ
Aldrin	0.43 U	0.442 U	0.399 U	0.929 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.594 J	0.409 U	0.407 U	0.421 U
alpha-BHC	0.43 U	0.442 U	0.399 U	0.352 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.251 J	0.409 U	0.407 UJ	0.421 U
alpha-Chlordane	0.43 U	0.442 U	0.399 U	0.512 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 U	1.9 J	0.407 U	0.421 U
Aroclor-1260	10.5 U	7.83 J	9.77 U	704 J	9.88 U	75.9 J	9.49 U	13.5 J	9.61 U	141	211 J	9.97 U	10.3 U
beta-BHC	0.43 U	0.442 U	0.399 U	0.403 U	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U	0.407 U	0.421 U
delta-BHC	0.43 U	0.442 U	0.399 UL	0.403 UL	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 UL	0.409 U	0.407 U	0.421 U
Dieldrin	0.43 U	0.442 U	0.399 U	2.91 L	0.403 U	1.02 J	0.387 U	0.401 U	0.392 U	4.4 L	4.36	0.407 U	0.421 U
Endosulfan I	0.43 U	0.442 U	0.399 U	0.403 UL	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U	0.407 U	0.421 U
Endosulfan II	0.43 U	0.442 U	0.399 U	2.32 L	0.403 U	0.757 J	0.387 U	0.401 U	0.392 U	2.31 J	2.29 J	0.407 U	0.421 U
Endosulfan sulfate	0.43 U	0.442 U	0.399 U	19.7 K	0.403 U	0.401 U	0.387 U	0.54 J	0.392 U	4.43 L	7.5 L	0.407 U	0.421 U
Endrin	0.43 U	0.442 U	0.399 U	6.12 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	4.14 J	0.529 J	0.407 UJ	0.421 U
Endrin aldehyde	0.43 U	0.442 U	0.399 U	1.27 K	0.403 U	0.523 J	0.387 U	0.401 U	0.392 U	0.276 J	0.409 U	0.407 U	0.421 U
Endrin ketone	0.43 U	0.442 U	0.399 UL	7.34 L	0.403 U	0.401 U	0.387 U	0.401 UJ	0.392 U	1.36 L	2.52 J	0.407 U	0.421 U
gamma-BHC (Lindane)	0.43 U	0.442 U	0.399 U	1.17 K	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U	0.407 U	0.421 U
gamma-Chlordane	0.301 J	0.538 J	0.399 U	3.76 L	0.403 U	0.394 J	0.252 J	0.283 J	0.392 U	1.86	1.79	0.332 J	0.219 J
Heptachlor	0.43 U	0.442 U	0.399 U	0.27 L	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U	0.407 U	0.421 U
Heptachlor epoxide	0.43 U	0.442 U	0.399 U	1.44 K	0.403 U	0.401 U	0.387 U	0.401 U	0.392 U	0.187 J	0.409 UL	0.407 UJ	0.421 U
Methoxychlor	0.43 U	0.442 U	0.399 UJ	4.71 K	0.403 UJ	0.545 J	0.387 UJ	0.401 UJ	0.392 UJ	0.327 J	0.257 J	0.407 UJ	0.421 UJ
Toxaphene	27.8 UJ	28.6 UJ	25.8 UJ	26.1 UJ	26.1 UJ	25.9 UJ	25.1 UJ	25.9 UJ	25.4 UJ	27.5 UJ	26.4 UJ	26.3 UJ	27.2 UJ
Explosives (µg/kg)													
1,3,5-Trinitrobenzene	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
1,3-Dinitrobenzene	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
2,4,6-Trinitrotoluene	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
2-Amino-4,6-dinitrotoluene	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
2-Nitrotoluene	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
3,5-Dinitroaniline	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
3-Nitrotoluene	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
4-Amino-2,6-dinitrotoluene	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
4-Nitrotoluene	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
HMX	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
Nitroglycerin	446 U	500 U	435 U	566 J	441 U	448 U	467 U	485 U	457 U	488 U	493 U	444 U	403 U
Nitroguanidine	93.9 U	109 U	96.6 U	96.2 U	95.2 U	101 U	92.2 U	105 U	90.9 U	93 U	88.1 U	102 UJ	98.5 U
PETN	446 U	500 U	435 U	435 U	441 U	448 U	467 U	485 U	457 U	488 U	493 U	444 U	403 U
RDX	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
Tetryl	179 U	200 U	174 U	174 U	176 U	179 U	187 U	194 U	183 U	195 U	197 U	178 U	161 U
Total Metals (mg/kg)													
Aluminum	12,100	15,800	16,400	8,930	11,600	13,600	16,800	8,500	18,100	15,300	10,300	8,670	13,700
Antimony	2.67 U	2.79 U	2.44 U	2.4 U	2.45 U	2.51 U	2.27 U	2.3 U	2.37 U	2.59 U	2.44 U	0.969 U	2.57 U
Arsenic	14.2 J	22.4 J	1.9 J	2.64 J	3.41	10.7	6.91	6.85	11.9	17.1	7.05	1.82	7.08
Barium	49.2 J	77.2 J	38.2	48.8	40.5	49	71	89.3	64.7	61.8	37.7	26.9	70.6
Beryllium	0.95 J	1.32 J	0.45 J	0.495 J	0.431 J	0.821 J	0.908 J	0.737 J	1.21 J	1.14 J	0.555 J	0.251 J	0.965 J
Cadmium	0.668 U	0.365 J	0.609 U	1.02 J	0.613 U	0.628 U	0.566 U	0.574 U	0.592 U	0.647 U	0.61 U	0.242 U	0.642 U
Calcium	116,000 J	16,800 J	3,160	1,780	6,460	16,900	2,890	3,150	3,020	79,700	5,690	988	3,990
Chromium	30.9	41.8	34.6	20	19.7	31.7	33	19.2	39.6	39.4	22.2	13.9	37.3
Cobalt	4.52 J	9.11 J	3.05 U	1.88 J	1.89 J	3.4 J	3.27 J	2.13 J	3.67 J	5.26	2.12 J	1.28 J	3 J
Copper	4.48	5.19	4.89	10.1	5.31	6.64	2.95	5.04	4.57	4.12	12.6	3.48	2.57 U
Cyanide	0.321 U	0.325 U	0.275 U	0.297 U	0.298 U	0.296 U	0.289 U	0.29 U	0.276 U	0.325 U	0.301 U	0.299 U	0.312 U
Iron	42,300	51,100	26,600	12,700	19,300	38,600	37,200	22,500	51,400	34,400	23,800	10,200	37,600
Lead	9.66 J	14 J	14.4	66.5	11.2	190	8.99	14.8	10.7	10.8	23.2	6.49	8.19
Magnesium	3,300	3,790	1,490 J	983 J	1,100 J	8,710	1,770	1,670	2,180	3,870	2,280	632	3,290
Manganese	208 J	520 J	17.8	90.6	36.4	75.4	40.4	92.3	67.5	155	111	15.8	32.5
Mercury	0.0227 J	0.0316 J	0.0511	0.0674	0.0795	0.0789	0.0311 J	0.049	0.0358 J	0.0299 J	0.0432	0.053	0.0261 J
Nickel	14	18.2	3.49	4.5	3.95	9.1	6.12	4.95	7.82	15.9	4.85	2.46	6
Potassium	2,730	3,170	665 J	547 J	532 J	2,000	769 J	1,470	1,690	3,620	1,270 J	276 J	3,450
Selenium	1.67 U	1.74 U	1.52 U	1.5 U	1.53 U	1.57 U	1.42 U	1.43 U	1.48 U	1.62 U	1.53 U	0.606 U	1.61 U
Silver	0.668 U	0.697 U	0.609 U	0.6 U	0.613 U	0.628 U	0.566 U	0.574 U	0.592 U	0.647 U	0.61 U	0.242 U	0.642 U
Sodium	1,000 U	1,050 U	914 U	899 U	919 U	942 U	850 U	861 U	888 U	970 U	915 U	364 U	964 U
Thallium	1.34 U	1.39 U	1.22 U	1.2 U	1.23 U	1.26 U	1.13 U	1.15 U	1.18 U	1.29 U	1.22 U	0.485 U	1.28 U
Vanadium	30.3	40	34	20.4	22.7	33.5	34.5	20.4	45.1	34.4	24.5	18.9	34
Zinc	44.8	51.5	24.3	98.6	16.2	32.2	17.1	27.4	22.9	49.9	53.8	6.44	24.6
Wet Chemistry													
pH (ph)	8.14 H3	NA	7.93 H3	6.73 H3	8.12 H3	8.12 H3	7.42 H3	7.73 H3	7.2 H3	8.16 H3	8.32 H3	7.35 H3	5.95 H3
Total organic carbon (TOC) (mg/kg)	6,880	NA	2,690 N	27,500 N	10,900 N*	32,800	3,960	9,110	3,180	1,640 J	15,600 N	1,480	1,940

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Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO60		CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69	CAPL-SO70	CAPL-SO71
Sample ID	CAPL-SB60-1112	CAPL-SB60P-1112	CAPL-SB61-1112	CAPL-SB62-1112	CAPL-SB63-1112	CAPL-SB64-1112	CAPL-SB65-1112	CAPL-SB66-1112	CAPL-SB67-1112	CAPL-SB68-1112	CAPL-SB69-1112	CAPL-SB70-1112	CAPL-SB71-1112
Sample Date	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/01/12	11/02/12	11/02/12
Chemical Name													

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N - The MS/MSD accuracy and or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
*- Exceeding quality control criteria are associated with the reported results (unvalidated data)
mg/kg - Milligrams per kilogram
ph - pH units
µg/kg - Micrograms per kilogram

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75	
Sample ID	CAPL-SB72-1112	CAPL-SB73-1112	CAPL-SB74-1112	CAPL-SB75-1112	CAPL-SB75P-1112
Sample Date	11/02/12	11/05/12	11/05/12	11/05/12	11/05/12
Chemical Name					
Volatile Organic Compounds (µg/kg)					
1,1,1-Trichloroethane	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
1,1,2,2-Tetrachloroethane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
1,1,2-Trichloroethane	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
1,1-Dichloroethane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
1,1-Dichloroethene	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
1,2,3-Trichlorobenzene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
1,2,4-Trichlorobenzene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
1,2-Dibromo-3-chloropropane	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
1,2-Dibromoethane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
1,2-Dichlorobenzene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
1,2-Dichloroethane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
1,2-Dichloropropane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
1,3-Dichlorobenzene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
1,4-Dichlorobenzene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
2-Butanone	4.75 J	4.16 U	4.24 J	4.76 U	4.9 U
2-Hexanone	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
4-Methyl-2-pentanone	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
Acetone	25.8 J	8.32 UJ	28.8 J	9.51 UJ	9.8 UJ
Benzene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Bromochloromethane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Bromodichloromethane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Bromoform	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
Bromomethane	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
Carbon disulfide	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
Carbon tetrachloride	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
Chlorobenzene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Chloroethane	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
Chloroform	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Chloromethane	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
cis-1,2-Dichloroethene	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
cis-1,3-Dichloropropene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Cyclohexane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Dibromochloromethane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Dichlorodifluoromethane (Freon-12)	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
Ethylbenzene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Isopropylbenzene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Methyl acetate	3.56 UJ	4.16 U	4.03 U	4.76 U	4.9 U
Methylcyclohexane	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Methylene chloride	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
Methyl-tert-butyl ether (MTBE)	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
Styrene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Tetrachloroethene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Toluene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
trans-1,2-Dichloroethene	1.78 U	2.08 U	2.01 U	2.38 U	2.45 U
trans-1,3-Dichloropropene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Trichloroethene	1.78 U	2.08 UL	2.01 U	2.38 U	2.45 U
Trichlorofluoromethane (Freon-11)	3.56 U	4.16 U	4.03 U	4.76 U	4.9 U
Vinyl chloride	1.78 UJ	2.08 UJ	2.01 UJ	2.38 UJ	2.45 UJ
Xylene, total	5.33 U	6.24 UL	6.04 U	7.14 U	7.35 U

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75	
Sample ID	CAPL-SB72-1112	CAPL-SB73-1112	CAPL-SB74-1112	CAPL-SB75-1112	CAPL-SB75P-1112
Sample Date	11/02/12	11/05/12	11/05/12	11/05/12	11/05/12
Chemical Name					
Semivolatile Organic Compounds (µg/kg)					
1,1-Biphenyl	177 U	185 U	177 U	202 U	229 U
1,2,4,5-Tetrachlorobenzene	177 U	185 U	177 U	202 U	229 U
2,2'-Oxybis(1-chloropropane)	177 U	185 U	177 U	202 U	229 U
2,3,4,6-Tetrachlorophenol	177 U	185 U	177 U	202 U	229 U
2,4,5-Trichlorophenol	177 U	185 U	177 U	202 U	229 U
2,4,6-Trichlorophenol	177 U	185 U	177 U	202 U	229 U
2,4-Dichlorophenol	177 U	185 U	177 U	202 U	229 U
2,4-Dimethylphenol	706 U	737 U	706 U	809 U	916 U
2,4-Dinitrophenol	1,770 U	1,850 U	1,770 U	2,020 U	2,290 U
2,4-Dinitrotoluene	177 U	185 U	177 U	202 U	229 U
2,6-Dinitrotoluene	177 U	185 U	177 U	202 U	229 U
2-Chloronaphthalene	177 U	185 U	177 U	202 U	229 U
2-Chlorophenol	177 U	185 U	177 U	202 U	229 U
2-Methylnaphthalene	17.6 U	4.41 J	3.52 U	8.87	7.32 J
2-Methylphenol	177 U	185 U	177 U	202 U	229 U
2-Nitroaniline	706 U	737 U	706 U	809 U	916 U
2-Nitrophenol	177 U	185 U	177 U	202 U	229 U
3,3'-Dichlorobenzidine	177 U	185 U	177 U	202 U	229 U
3-Nitroaniline	706 U	737 U	706 U	809 U	916 U
4,6-Dinitro-2-methylphenol	1,770 U	1,850 U	1,770 U	2,020 U	2,290 U
4-Bromophenyl-phenylether	177 U	185 U	177 U	202 U	229 U
4-Chloro-3-methylphenol	177 U	185 U	177 U	202 U	229 U
4-Chloroaniline	177 U	185 U	177 U	202 U	229 U
4-Chlorophenyl-phenylether	177 U	185 U	177 U	202 U	229 U
4-Methylphenol	177 U	185 U	177 U	202 U	229 U
4-Nitroaniline	706 U	737 U	706 U	809 U	916 U
4-Nitrophenol	706 U	737 U	706 U	809 U	916 U
Acenaphthene	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Acenaphthylene	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Acetophenone	177 U	185 U	177 U	202 U	229 U
Anthracene	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Atrazine	177 U	185 U	177 U	202 U	229 U
Benzaldehyde	177 U	185 U	177 U	202 U	229 U
Benzo(a)anthracene	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Benzo(a)pyrene	17.6 U	3.68 U	3.52 U	5.02 J	4.58 U
Benzo(b)fluoranthene	17.6 U	8.24	3.52 U	10.8	5.39 J
Benzo(g,h,i)perylene	17.6 U	3.96 J	3.52 U	5.46 J	4.58 U
Benzo(k)fluoranthene	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
bis(2-Chloroethoxy)methane	177 U	185 U	177 U	202 U	229 U
bis(2-Chloroethyl)ether	177 U	185 U	177 U	202 U	229 U
bis(2-Ethylhexyl)phthalate	302 J	185 U	177 U	202 U	164 J
Butylbenzylphthalate	177 U	185 U	177 U	202 U	229 U
Caprolactam	177 U	185 U	177 U	202 U	229 U
Carbazole	177 U	185 U	177 U	202 U	229 U
Chrysene	24.1 J	10.5	3.52 U	20.4	11.8
Dibenz(a,h)anthracene	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Dibenzofuran	177 U	185 U	177 U	202 U	229 U
Diethylphthalate	177 U	185 U	177 U	202 U	229 U
Dimethyl phthalate	177 U	185 U	177 U	202 U	229 U
Di-n-butylphthalate	177 U	185 U	177 U	202 U	229 U
Di-n-octylphthalate	177 U	185 U	177 U	202 U	229 U
Fluoranthene	17.6 U	6.38 J	3.52 U	7.37 J	4.58 U
Fluorene	17.6 U	3.68 U	3.52 U	4.04 U	4.58 U
Hexachlorobenzene	177 U	185 U	177 U	202 U	229 U
Hexachlorobutadiene	177 U	185 U	177 U	202 U	229 U
Hexachlorocyclopentadiene	177 U	185 U	177 U	202 U	229 U
Hexachloroethane	177 U	185 U	177 U	202 U	229 U
Indeno(1,2,3-cd)pyrene	17.6 U	3.68 U	3.52 U	4.28 J	4.58 U
Isophorone	177 U	185 U	177 U	202 U	229 U
Naphthalene	17.6 U	4.46 J	3.52 U	6.63 J	6.05 J
n-Nitroso-di-n-propylamine	177 U	185 U	177 U	202 U	229 U
n-Nitrosodiphenylamine	177 U	185 U	177 U	202 U	229 U
Nitrobenzene	177 U	185 U	177 U	202 U	229 U
Pentachlorophenol	706 U	737 U	706 U	809 U	916 U
Phenanthrene	26.1 J	8.88	3.52 U	19.4	12.6
Phenol	177 U	185 U	177 U	202 U	229 U
Pyrene	17.6 U	6.56 J	3.52 U	8.55	4.67 J

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75	
Sample ID	CAPL-SB72-1112	CAPL-SB73-1112	CAPL-SB74-1112	CAPL-SB75-1112	CAPL-SB75P-1112
Sample Date	11/02/12	11/05/12	11/05/12	11/05/12	11/05/12
Chemical Name					
Pesticide/Polychlorinated Biphenyls (µg/kg)					
4,4'-DDD	0.356 UL	0.616 J	0.37 U	0.406 UJ	0.447 U
4,4'-DDE	0.356 UL	4.16 L	3.78 J	0.561 J	0.795 J
4,4'-DDT	0.356 UJ	3.63 J	0.37 UJ	0.406 U	0.447 U
Aldrin	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
alpha-BHC	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
alpha-Chlordane	0.356 UL	0.375 UJ	0.37 U	0.406 U	0.447 U
Aroclor-1260	8.72 UL	56.9	9.06 U	9.95 UL	11 UL
beta-BHC	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
delta-BHC	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
Dieldrin	0.356 UL	1 J	0.37 U	0.406 U	0.447 U
Endosulfan I	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
Endosulfan II	0.356 UL	0.375 UJ	0.37 U	0.406 U	0.447 U
Endosulfan sulfate	0.356 UJ	0.375 U	0.37 U	0.406 U	0.447 UL
Endrin	0.356 UL	0.375 UJ	0.37 U	0.406 U	0.447 U
Endrin aldehyde	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
Endrin ketone	0.356 UL	0.375 UL	0.37 U	0.406 U	0.447 UL
gamma-BHC (Lindane)	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
gamma-Chlordane	0.356 UJ	0.565 J	0.316 J	0.312 J	0.364 J
Heptachlor	0.356 UL	0.375 U	0.37 U	0.406 U	0.447 U
Heptachlor epoxide	0.356 UL	0.375 UL	0.37 UJ	0.406 U	0.447 U
Methoxychlor	0.356 UJ	0.456 J	0.37 UJ	0.406 UJ	0.447 UL
Toxaphene	23 UJ	24.2 UJ	23.9 UJ	26.3 UJ	28.9 U
Explosives (µg/kg)					
1,3,5-Trinitrobenzene	164 U	195 U	173 U	165 U	176 U
1,3-Dinitrobenzene	164 U	195 U	173 U	165 U	176 U
2,4,6-Trinitrotoluene	164 U	195 U	173 U	165 U	176 U
2-Amino-4,6-dinitrotoluene	164 U	195 U	173 U	165 U	176 U
2-Nitrotoluene	164 U	195 U	173 U	165 U	176 U
3,5-Dinitroaniline	164 U	195 U	173 U	165 U	176 U
3-Nitrotoluene	164 U	195 U	173 U	165 U	176 U
4-Amino-2,6-dinitrotoluene	164 U	195 U	173 U	165 U	176 U
4-Nitrotoluene	164 U	195 U	173 U	165 U	176 U
HMX	164 U	195 U	173 U	165 U	176 U
Nitroglycerin	410 U	488 U	433 U	413 U	441 U
Nitroguanidine	100 UJ	101 UL	98.5 UJ	106 U	104 U
PETN	410 U	488 U	433 U	413 U	441 U
RDX	164 U	195 U	173 U	165 U	176 U
Tetryl	164 U	195 U	173 U	165 U	176 U
Total Metals (mg/kg)					
Aluminum	5,140	8,690	13,400	12,900	11,400
Antimony	2.29 U	0.481 UL	2.14 U	2.46 U	2.81 U
Arsenic	1.51 J	2.69	11.6	6.7	7.79
Barium	44	62.8	31.7	212 J	99.8 J
Beryllium	0.573 U	0.454	0.88 J	1.24 J	0.858 J
Cadmium	0.573 U	0.196 J	0.535 U	0.616 U	0.703 U
Calcium	1,020 J	2,550	3,590	8,710 J	6,360 J
Chromium	8.4	16.5 K	33.3	22.6	25.8
Cobalt	2.87 U	1.52	2.71 J	2.63 J	2.9 J
Copper	2.77 J	10.9 L	3.96	11.5	11.7
Cyanide	0.275 U	0.286 U	0.274 U	0.292 U	0.33 U
Iron	8,050	14,700	64,700	25,900	34,200
Lead	6.53	34.4 L	10.6	18.4	21.7
Magnesium	545 J	886 K	1,670	2,960 J	2,050 J
Manganese	33.2	82 L	100	373 J	126 J
Mercury	0.0251 J	0.0578	0.0324 U	0.0661 J	0.0387 UJ
Nickel	1.69 J	3.11	7.28	6.42	7.29
Potassium	860 U	421 K	1,570	1,510 J	1,540 J
Selenium	1.43 U	0.301 U	1.34 U	1.54 U	1.76 U
Silver	0.573 U	0.12 U	0.535 U	0.616 U	0.703 U
Sodium	860 U	180 U	803 U	924 U	1,050 U
Thallium	1.15 U	0.241 U	1.07 U	1.23 U	1.41 U
Vanadium	10.7	20.4	42.3	26.4	31.1
Zinc	29.9	36.5 L	21.2	37.4	38.8
Wet Chemistry					
pH (ph)	8.03 H3	8.05 H3	7.8 H3	8.24 H3	NA
Total organic carbon (TOC) (mg/kg)	6,290	14,300	2,880	13,800	NA

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Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

Attachment B8
Cheatham Annex, Penniman Lake
Subsurface Soil Samples
Raw Analytical Results
October-November 2012

Station ID	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75	
Sample ID	CAPL-SB72-1112	CAPL-SB73-1112	CAPL-SB74-1112	CAPL-SB75-1112	CAPL-SB75P-1112
Sample Date	11/02/12	11/05/12	11/05/12	11/05/12	11/05/12
Chemical Name					

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
N - The MS/MSD accuracy and or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter. (unvalidated data)
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
*- Exceeding quality control criteria are associated with the reported results (unvalidated data)
mg/kg - Milligrams per kilogram
ph - pH units
µg/kg - Micrograms per kilogram

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD70		CAPL-SD71		CAPL-SD72		CAPL-SD73				CAPL-SD74	CAPL-SD75	CAPL-SD76
Sample ID	CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V	CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012	CAPL-SD75-1012	CAPL-SD76-1012
Sample Date	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12
Chemical Name													
Volatile Organic Compounds (µg/kg)													
1,1,1-Trichloroethane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,1,2,2-Tetrachloroethane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 UJ
1,1,2-Trichloroethane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,1-Dichloroethane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,1-Dichloroethene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 UJ
1,2,3-Trichlorobenzene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,2,4-Trichlorobenzene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 UL	13.4 UL	5.3 U
1,2-Dibromo-3-chloropropane	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 U
1,2-Dibromoethane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,2-Dichlorobenzene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,2-Dichloroethane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,2-Dichloropropane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,3-Dichlorobenzene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
1,4-Dichlorobenzene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
2-Butanone	NA	125	NA	131	NA	50.6 J	NA	NA	59.5 J	79.9	108	71.2	17.3 J
2-Hexanone	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 U
4-Methyl-2-pentanone	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 U
Acetone	NA	330 J	NA	477 J	NA	181 J	NA	NA	215 J	309 J	418 J	273 J	60.6
Benzene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Bromochloromethane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Bromodichloromethane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Bromoform	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Bromomethane	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 UJ
Carbon disulfide	NA	4.41 J	NA	13.6 J	NA	26.7 J	NA	NA	29.9 J	19 J	19.2 U	13.4 U	5.3 UJ
Carbon tetrachloride	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Chlorobenzene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Chloroethane	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 UJ
Chloroform	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Chloromethane	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 UJ	26.8 UJ	10.6 UJ
cis-1,2-Dichloroethene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
cis-1,3-Dichloropropene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Cyclohexane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 UJ
Dibromochloromethane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Dichlorodifluoromethane (Freon-12)	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 UJ
Ethylbenzene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Isopropylbenzene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Methyl acetate	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 U
Methylcyclohexane	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Methylene chloride	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 UJ
Methyl-tert-butyl ether (MTBE)	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Styrene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Tetrachloroethene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Toluene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
trans-1,2-Dichloroethene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
trans-1,3-Dichloropropene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Trichloroethene	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U	13.4 U	5.3 U
Trichlorofluoromethane (Freon-11)	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U	26.8 U	10.6 U
Vinyl chloride	NA	6.64 UJ	NA	15 UJ	NA	16.2 UJ	NA	NA	15.5 UJ	19.9 UJ	19.2 U	13.4 U	5.3 U
Xylene, total	NA	19.9 U	NA	45 U	NA	48.5 U	NA	NA	46.6 U	59.7 U	57.7 U	40.2 U	15.9 U

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD70		CAPL-SD71		CAPL-SD72		CAPL-SD73				CAPL-SD74	CAPL-SD75	CAPL-SD76
Sample ID	CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V	CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012	CAPL-SD75-1012	CAPL-SD76-1012
Sample Date	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12
Chemical Name													
Semivolatile Organic Compounds (µg/kg)													
1,1-Biphenyl	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
1,2,4,5-Tetrachlorobenzene	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2,2'-Oxybis(1-chloropropane)	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2,3,4,6-Tetrachlorophenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2,4,5-Trichlorophenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2,4,6-Trichlorophenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2,4-Dichlorophenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2,4-Dimethylphenol	1,890 U	NA	3,080 U	NA	5,460 U	NA	3,240 U	3,400 U	NA	NA	4,260 U	3,330 U	1,340 U
2,4-Dinitrophenol	4,740 U	NA	7,710 U	NA	13,700 U	NA	8,110 U	8,520 U	NA	NA	10,700 U	8,330 U	3,370 U
2,4-Dinitrotoluene	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2,6-Dinitrotoluene	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2-Chloronaphthalene	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2-Chlorophenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2-Methylnaphthalene	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U
2-Methylphenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
2-Nitroaniline	1,890 U	NA	3,080 U	NA	5,460 U	NA	3,240 U	3,400 U	NA	NA	4,260 U	3,330 U	1,340 U
2-Nitrophenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
3,3'-Dichlorobenzidine	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
3-Nitroaniline	1,890 U	NA	3,080 U	NA	5,460 U	NA	3,240 U	3,400 U	NA	NA	4,260 U	3,330 U	1,340 U
4,6-Dinitro-2-methylphenol	4,740 U	NA	7,710 U	NA	13,700 U	NA	8,110 U	8,520 U	NA	NA	10,700 U	8,330 U	3,370 U
4-Bromophenyl-phenylether	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
4-Chloro-3-methylphenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
4-Chloroaniline	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
4-Chlorophenyl-phenylether	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
4-Methylphenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
4-Nitroaniline	1,890 U	NA	3,080 U	NA	5,460 U	NA	3,240 U	3,400 U	NA	NA	4,260 U	3,330 U	1,340 U
4-Nitrophenol	1,890 U	NA	3,080 U	NA	5,460 U	NA	3,240 U	3,400 U	NA	NA	4,260 U	3,330 U	1,340 U
Acenaphthene	140	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U
Acenaphthylene	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U
Acetophenone	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Anthracene	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U
Atrazine	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Benzaldehyde	323 J	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	184 J
Benzo(a)anthracene	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U
Benzo(a)pyrene	79.3 J	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	36.9
Benzo(b)fluoranthene	143	NA	20.5 J	NA	27.2 U	NA	19.1 J	17 U	NA	NA	23.3 J	16.6 U	34.9
Benzo(g,h,i)perylene	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	29.9
Benzo(k)fluoranthene	94.6 J	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	28.3
bis(2-Chloroethoxy)methane	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
bis(2-Chloroethyl)ether	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
bis(2-Ethylhexyl)phthalate	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Butylbenzylphthalate	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Caprolactam	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Carbazole	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Chrysene	173	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U
Dibenz(a,h)anthracene	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U
Dibenzofuran	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Diethylphthalate	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Dimethyl phthalate	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Di-n-butylphthalate	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Di-n-octylphthalate	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Fluoranthene	227	NA	32.5	NA	27.2 U	NA	22.4 J	17 U	NA	NA	34.9 J	13.4 J	48.2
Fluorene	70.7 J	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U
Hexachlorobenzene	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Hexachlorobutadiene	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Hexachlorocyclopentadiene	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Hexachloroethane	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Indeno(1,2,3-cd)pyrene	66 J	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	23.2
Isophorone	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Naphthalene	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U	16.6 U	6.71 U
n-Nitroso-di-n-propylamine	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
n-Nitrosodiphenylamine	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Nitrobenzene	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Pentachlorophenol	1,890 U	NA	3,080 U	NA	5,460 U	NA	3,240 U	3,400 U	NA	NA	4,260 U	3,330 U	1,340 U
Phenanthrene	138	NA	16.3 J	NA	27.2 U	NA	16.2 U	17 U	NA	NA	22.5 J	16.6 U	30.5
Phenol	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U	833 U	337 U
Pyrene	216	NA	29.6 J	NA	27.2 U	NA	23.7 J	17 U	NA	NA	32.4 J	12.2 J	53.3

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
Raw Analytical Results
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Station ID	CAPL-SD70		CAPL-SD71		CAPL-SD72		CAPL-SD73				CAPL-SD74	CAPL-SD75	CAPL-SD76
Sample ID	CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V	CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012	CAPL-SD75-1012	CAPL-SD76-1012
Sample Date	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12
Chemical Name													
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	43.9 J	NA	1.52 J	NA	2.79 U	NA	1.66 J	1.23 J	NA	NA	2.13 U	1.67 U	23.3 J
4,4'-DDE	121 J	NA	7.95 J	NA	6.03 J	NA	14 J	10.1 J	NA	NA	5.19 J	4.58 J	45.9 J
4,4'-DDT	21 J	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.966 J
Aldrin	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U
alpha-BHC	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U
alpha-Chlordane	29.6 L	NA	1.51 UL	NA	2.79 U	NA	1.97 J	1.73 U	NA	NA	2.13 U	1.67 U	0.69 UL
Aroclor-1260	8,240	NA	57.4 J	NA	68.2 U	NA	78.5 J	48.4 J	NA	NA	52.3 U	25.9 J	37.3 J
beta-BHC	0.98 J	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U
delta-BHC	0.954 UL	NA	1.51 U	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 UL
Dieldrin	106 J	NA	1.68 J	NA	2.86 J	NA	2.64 J	1.48 J	NA	NA	2.13 U	1.67 U	0.377 L
Endosulfan I	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U
Endosulfan II	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	23.8 J	0.69 UL
Endosulfan sulfate	0.954 UL	NA	2.36 J	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U
Endrin	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.576 L
Endrin aldehyde	16.4 J	NA	2.38 J	NA	3.95 J	NA	3.53 J	2.58 J	NA	NA	2.14 J	2.49 J	0.368 L
Endrin ketone	34.7 J	NA	4.31 J	NA	4.6 J	NA	5.62 J	3.4 J	NA	NA	2.88 J	1.67 U	0.69 U
gamma-BHC (Lindane)	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.485 J
gamma-Chlordane	94.2 J	NA	5.18 J	NA	17 J	NA	1.8 J	2.98 J	NA	NA	12.7 J	3.09 J	4.03 L
Heptachlor	0.954 UL	NA	1.51 U	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 U
Heptachlor epoxide	2.42 J	NA	1.51 U	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 UL
Methoxychlor	82.2 J	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U	1.67 U	0.69 UL
Toxaphene	61.7 UJ	NA	97.9 UJ	NA	180 UJ	NA	106 UJ	112 UJ	NA	NA	138 UJ	108 UJ	44.6 UJ
Explosives (µg/kg)													
1,3,5-Trinitrobenzene	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	194 U
1,3-Dinitrobenzene	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	469 J
2,4,6-Trinitrotoluene	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	194 U
2-Amino-4,6-dinitrotoluene	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	194 U
2-Nitrotoluene	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	194 U
3,5-Dinitroaniline	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	194 U
3-Nitrotoluene	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	882
4-Amino-2,6-dinitrotoluene	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	194 U
4-Nitrotoluene	189 U	NA	195 U	NA	196 U	NA	198 U	104 J	NA	NA	192 U	330 J	194 U
HMX	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	194 U
Nitroglycerin	472 U	NA	1,210 J	NA	490 U	NA	1,250 J	1,250	NA	NA	486 J	1,230 J	485 U
Nitroguanidine	95.7 U	NA	101 U	NA	97.1 U	NA	104 U	96.2 U	NA	NA	109 U	102 U	101 U
PETN	472 U	NA	488 U	NA	490 U	NA	495 U	488 U	NA	NA	481 U	493 U	485 U
RDX	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	194 U
Tetryl	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U	197 U	245 J
Total Metals (mg/kg)													
Aluminum	8,670	NA	18,300	NA	28,200	NA	25,200	22,700	NA	NA	17,200	20,500	6,530
Antimony	6.01 U	NA	9.2 U	NA	17.2 U	NA	9.92 U	10.3 U	NA	NA	5.35 U	4.27 U	1.65 U
Arsenic	12.7	NA	33.9	NA	51.5	NA	51.7	50.9	NA	NA	42.4	47.3	5.56
Barium	43	NA	72.6	NA	107	NA	93.9	85.5	NA	NA	75.4	88.3	28.1
Beryllium	1.5 U	NA	2.3 U	NA	4.3 U	NA	2.48 U	2.57 U	NA	NA	0.949 J	1 J	0.283 J
Cadmium	1.5 U	NA	2.3 U	NA	4.3 U	NA	2.48 U	2.57 U	NA	NA	1.34 U	1.07 U	0.414 U
Calcium	32,700	NA	102,000	NA	122,000	NA	88,800	89,300	NA	NA	80,400	104,000	2,870
Chromium	19.4	NA	36.6	NA	50.4	NA	46.3	43.1	NA	NA	36.1	38.7	9
Cobalt	7.51 U	NA	11.5 U	NA	21.5 U	NA	12.4 U	12.8 U	NA	NA	4.99 J	5.77 J	1.46 J
Copper	33	NA	43.1	NA	40.2	NA	50.1	43.7	NA	NA	46	56.9	4.7
Cyanide	0.682 U	NA	1.05 U	NA	2.26 U	NA	1.27 U	1.24 U	NA	NA	1.66 U	1.18 U	0.522 U
Iron	21,900	NA	30,100	NA	41,300	NA	39,300	36,000	NA	NA	34,900	34,000	5,960
Lead	66.8	NA	72.8	NA	69.2	NA	81.6	74.7	NA	NA	56.2	69.3	16.3
Magnesium	2,100 J	NA	2,900 J	NA	4,320 J	NA	3,820 J	3,440 J	NA	NA	2,800 J	3,270	531 J
Manganese	102	NA	119	NA	206	NA	163	147	NA	NA	163	143	25.4
Mercury	0.11	NA	0.134 J	NA	0.198 J	NA	0.147 J	0.164 J	NA	NA	0.126 J	0.136 J	0.0408 J
Nickel	11.7	NA	11.9	NA	18.1 J	NA	15.4	14.4	NA	NA	13	14.8	3.63
Potassium	1,480 J	NA	2,400 J	NA	3,570 J	NA	3,070 J	2,770 J	NA	NA	2,390 J	2,570 J	397 J
Selenium	3.75 U	NA	5.75 U	NA	10.7 U	NA	6.2 U	6.42 U	NA	NA	3.34 U	2.67 U	1.03 U
Silver	1.5 U	NA	2.3 U	NA	4.3 U	NA	2.48 U	2.57 U	NA	NA	1.34 U	1.07 U	0.414 U
Sodium	2,250 U	NA	3,450 U	NA	6,450 U	NA	3,720 U	3,850 U	NA	NA	2,010 U	755 J	621 U
Thallium	3 U	NA	4.6 U	NA	8.6 U	NA	4.96 U	5.14 U	NA	NA	2.68 U	2.14 U	0.827 U
Vanadium	25.4	NA	46.3	NA	69.9	NA	58.3	57.1	NA	NA	52.1	55.5	15
Zinc	190	NA	173	NA	186	NA	173	160	NA	NA	133	148	18.7

Attachment B9
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Surface Sediment Samples
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Station ID	CAPL-SD70		CAPL-SD71		CAPL-SD72		CAPL-SD73				CAPL-SD74	CAPL-SD75	CAPL-SD76
Sample ID	CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V	CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012	CAPL-SD75-1012	CAPL-SD76-1012
Sample Date	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/25/12	10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12
Chemical Name													
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)													
Zinc, SEM	2.64	NA	1.66 D	NA	1.22	NA	1.54 D	NA	NA	NA	1.08	0.377 D	0.0847
Acid volatile sulfide, SEM	10.3	NA	13.7	NA	14.4	NA	12.8	NA	NA	NA	19.8	4.16	0.411
Cadmium, SEM	0.00566	NA	0.00245 J	NA	0.00191 J	NA	0.00176 J	NA	NA	NA	0.00246 J	4.06E-04 J	8.24E-04 U
Copper, SEM	0.112	NA	0.0751	NA	0.159	NA	0.303	NA	NA	NA	0.246	0.103	0.0079 J
Lead, SEM	0.324	NA	0.246 D	NA	0.162	NA	0.279 D	NA	NA	NA	0.18	0.0722 D	0.0256
Mercury, SEM	9.79E-05 U	NA	1.23E-04 U	NA	1.55E-04 U	NA	1.30E-04 U	NA	NA	NA	1.68E-04 U	4.41E-05 U	4.68E-05 U
Nickel, SEM	0.103	NA	0.0307 J	NA	0.0266 J	NA	0.0361 J	NA	NA	NA	0.0364 J	0.00837 J	0.00343 J
Silver, SEM	0.0047 U	NA	0.0069 MU	NA	0.00746 U	NA	0.00727 MU	NA	NA	NA	0.0094 MU	0.00247 MU	0.00225 U
Wet Chemistry													
pH (ph)	7.47 H3	NA	6.85 H3	NA	6.93 H3	NA	7.01 H3	NA	NA	NA	7.3 H3	7.34 H3	6.83 H3
Total organic carbon (TOC) (mg/kg)	98,300	NA	51,800	NA	107,000	NA	37,100	NA	NA	NA	79,300	84,300	51,400
Grain Size (pct)													
Coarse Sand (%)	2.3	NA	0	NA	1.8	NA	0	NA	NA	NA	0	0	4
Fine Sand (%)	42.5	NA	7.4	NA	14.2	NA	3.1	NA	NA	NA	5	4	75
Fines (%)	46.7	NA	92.2	NA	79.7	NA	96.6	NA	NA	NA	94.6	95.8	12.4
Gravel (%)	1.9	NA	0	NA	1.1	NA	0	NA	NA	NA	0	0	0.9
Medium Sand (%)	6.6	NA	0.4	NA	3.2	NA	0.3	NA	NA	NA	0.4	0.2	7.7
Sand (%)	51.4	NA	7.8	NA	19.2	NA	3.4	NA	NA	NA	5.4	4.2	86.7
GRAINSIZE (PCT/P)													
GS03 Sieve 3" (75 mm)	100	NA	100	NA	100	NA	100	NA	NA	NA	100	100	100
GS05 Sieve 2" (50 mm)	100	NA	100	NA	100	NA	100	NA	NA	NA	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	NA	100	NA	100	NA	100	NA	NA	NA	100	100	100
GS07 Sieve 1" (25.0 mm)	100	NA	100	NA	100	NA	100	NA	NA	NA	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	NA	100	NA	100	NA	100	NA	NA	NA	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	NA	100	NA	100	NA	100	NA	NA	NA	100	100	100
Sieve No. 004 (4.75 mm)	98.1	NA	100	NA	98.9	NA	100	NA	NA	NA	100	100	99.1
Sieve No. 010 (2.00 mm)	95.8	NA	100	NA	97.1	NA	100	NA	NA	NA	100	100	95.1
Sieve No. 020 (850 um)	94.3	NA	99.9	NA	96.1	NA	99.9	NA	NA	NA	100	100	93.6
Sieve No. 040 (425 um)	89.2	NA	99.6	NA	93.9	NA	99.7	NA	NA	NA	99.6	99.8	87.4
Sieve No. 060 (250 um)	66.2	NA	98.5	NA	90.6	NA	99.3	NA	NA	NA	98.8	99.4	57.1
Sieve No. 080 (180 um)	54.9	NA	97	NA	88.1	NA	98.9	NA	NA	NA	98.1	99	31.9
Sieve No. 100 (150 um)	52.2	NA	95.9	NA	86.2	NA	98.4	NA	NA	NA	97.5	98.6	22.5
Sieve No. 200 (75 um)	46.7	NA	92.2	NA	79.7	NA	96.6	NA	NA	NA	94.6	95.8	12.4

Notes:

Shading indicates detections

NA - Not analyzed

* - Exceeding quality control criteria are associated with the reported result (unvalidated data)

B - Analyte not detected above the level reported in blanks

D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

M - Indicates that the sample matrix interfered with the quantitation of the analyte (unvalidated data)

N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)

mg/kg - Milligrams per kilogram

pct - Percent

pct/p - Percent passed

ph - pH units

µg/kg - Micrograms per kilogram

µmol/g - Micromoles per gram

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81	CAPL-SD82	CAPL-SD83		CAPL-SD84	
Sample ID	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012	CAPL-SD82-1012	CAPL-SD83-1012	CAPL-SD83-1012-V	CAPL-SD84-1012	CAPL-SD84-1012-A
Sample Date	10/16/12	10/25/12	10/16/12	10/16/12	10/16/12	10/16/12	10/18/12	10/18/12	10/16/12	10/25/12	10/24/12	10/26/12
Chemical Name												
Volatile Organic Compounds (µg/kg)												
1,1,1-Trichloroethane	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,1,2,2-Tetrachloroethane	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	12.4 U	10.4 UJ	9.81 UJ	13 UJ	10.1 UJ	19.8 U	32.3 U	NA	7.63 U	6.15 U	NA
1,1,2-Trichloroethane	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,1-Dichloroethane	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,1-Dichloroethene	NA	6.19 U	5.21 UJ	4.9 UJ	6.48 UJ	5.03 UJ	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,2,3-Trichlorobenzene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,2,4-Trichlorobenzene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 UL	16.1 UL	NA	3.82 U	3.07 U	NA
1,2-Dibromo-3-chloropropane	NA	12.4 U	10.4 U	9.81 U	13 U	10.1 U	19.8 U	32.3 U	NA	7.63 U	6.15 UJ	NA
1,2-Dibromoethane	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,2-Dichlorobenzene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,2-Dichloroethane	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,2-Dichloropropane	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,3-Dichlorobenzene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
1,4-Dichlorobenzene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
2-Butanone	NA	42.7	23.1 J	23.8	39.7	42.7	42.2	90.7	NA	5.92 J	6.15 U	NA
2-Hexanone	NA	12.4 U	10.4 U	9.81 U	13 U	10.1 U	19.8 U	32.3 U	NA	7.63 U	6.15 U	NA
4-Methyl-2-pentanone	NA	12.4 U	10.4 U	9.81 U	13 U	10.1 U	19.8 U	32.3 U	NA	7.63 U	6.15 U	NA
Acetone	NA	137 J	77.5 J	85.3	121	150	229 J	399 J	NA	22.6 J	12.3 UJ	NA
Benzene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Bromochloromethane	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Bromodichloromethane	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Bromoform	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Bromomethane	NA	12.4 U	10.4 UJ	9.81 UJ	13 UJ	10.1 UJ	19.8 U	32.3 U	NA	7.63 U	6.15 U	NA
Carbon disulfide	NA	6.19 U	5.21 UL	4.9 UJ	6.48 UJ	3.5 J	9.22 J	11.7 J	NA	2.26 J	3.07 U	NA
Carbon tetrachloride	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Chlorobenzene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Chloroethane	NA	12.4 U	10.4 UJ	9.81 UJ	13 UJ	10.1 UJ	19.8 U	32.3 U	NA	7.63 U	6.15 U	NA
Chloroform	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Chloromethane	NA	12.4 U	10.4 UJ	9.81 UJ	13 UJ	10.1 UJ	19.8 UJ	32.3 UJ	NA	7.63 U	6.15 U	NA
cis-1,2-Dichloroethene	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
cis-1,3-Dichloropropene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Cyclohexane	NA	6.19 U	5.21 UL	4.9 UJ	6.48 UJ	5.03 UJ	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Dibromochloromethane	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Dichlorodifluoromethane (Freon-12)	NA	12.4 U	10.4 UJ	9.81 UJ	13 UJ	10.1 UJ	19.8 U	32.3 U	NA	7.63 U	6.15 U	NA
Ethylbenzene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Isopropylbenzene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Methyl acetate	NA	12.4 U	10.4 UJ	5.12 J	8.47 J	10.1 U	19.8 U	32.3 U	NA	7.63 U	6.15 U	NA
Methylcyclohexane	NA	26.4	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Methylene chloride	NA	12.4 U	10.4 UJ	9.81 UJ	13 UJ	10.1 UJ	19.8 U	32.3 U	NA	7.63 U	6.15 U	NA
Methyl-tert-butyl ether (MTBE)	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Styrene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Tetrachloroethene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Toluene	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	6.87 J	3.07 U	NA
trans-1,2-Dichloroethene	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
trans-1,3-Dichloropropene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Trichloroethene	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 U	3.07 U	NA
Trichlorofluoromethane (Freon-11)	NA	12.4 U	10.4 U	9.81 U	13 U	10.1 U	19.8 U	32.3 U	NA	7.63 U	6.15 U	NA
Vinyl chloride	NA	6.19 UJ	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U	NA	3.82 UJ	3.07 UJ	NA
Xylene, total	NA	18.6 U	15.6 UL	14.7 U	19.4 U	15.1 U	29.7 U	48.4 U	NA	11.4 U	9.22 U	NA

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81	CAPL-SD82	CAPL-SD83		CAPL-SD84	
Sample ID	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012	CAPL-SD82-1012	CAPL-SD83-1012	CAPL-SD83-1012-V	CAPL-SD84-1012	CAPL-SD84-1012-A
Sample Date	10/16/12	10/25/12	10/16/12	10/16/12	10/16/12	10/16/12	10/18/12	10/18/12	10/16/12	10/25/12	10/24/12	10/26/12
Chemical Name												
Semivolatile Organic Compounds (µg/kg)												
1,1-Biphenyl	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
1,2,4,5-Tetrachlorobenzene	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2,2'-Oxybis(1-chloropropane)	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2,3,4,6-Tetrachlorophenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2,4,5-Trichlorophenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2,4,6-Trichlorophenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2,4-Dichlorophenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2,4-Dimethylphenol	1,680 U	NA	1,590 U	1,300 U	1,830 U	1,460 U	2,560 U	19,400 U	1,400 U	NA	784 U	NA
2,4-Dinitrophenol	4,210 U	NA	3,980 R	3,260 U	4,590 U	3,650 U	6,400 U	48,600 U	3,490 U	NA	1,960 U	NA
2,4-Dinitrotoluene	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2,6-Dinitrotoluene	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2-Chloronaphthalene	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2-Chlorophenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2-Methylnaphthalene	34.2 J	NA	39.2 J	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
2-Methylphenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
2-Nitroaniline	1,680 U	NA	1,590 U	1,300 U	1,830 U	1,460 U	2,560 U	19,400 U	1,400 U	NA	784 U	NA
2-Nitrophenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
3,3'-Dichlorobenzidine	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
3-Nitroaniline	1,680 U	NA	1,590 U	1,300 U	1,830 U	1,460 U	2,560 U	19,400 U	1,400 U	NA	784 U	NA
4,6-Dinitro-2-methylphenol	4,210 U	NA	3,980 U	3,260 U	4,590 U	3,650 U	6,400 U	48,600 U	3,490 U	NA	1,960 U	NA
4-Bromophenyl-phenylether	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
4-Chloro-3-methylphenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
4-Chloroaniline	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
4-Chlorophenyl-phenylether	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
4-Methylphenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
4-Nitroaniline	1,680 U	NA	1,590 U	1,300 U	1,830 U	1,460 U	2,560 U	19,400 U	1,400 U	NA	784 U	NA
4-Nitrophenol	1,680 U	NA	1,590 U	1,300 U	1,830 U	1,460 U	2,560 U	19,400 U	1,400 U	NA	784 U	NA
Acenaphthene	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Acenaphthylene	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Acetophenone	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Anthracene	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Atrazine	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Benzaldehyde	421 U	NA	398 U	326 U	459 U	212 J	640 U	4,860 U	349 U	NA	196 U	NA
Benzo(a)anthracene	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Benzo(a)pyrene	42 U	NA	39.7 U	9.18 J	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Benzo(b)fluoranthene	42 U	NA	39.7 U	10.5 J	45.8 U	36.4 U	17.9 J	96.9 U	6.97 U	NA	19.6 U	NA
Benzo(g,h,i)perylene	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Benzo(k)fluoranthene	42 U	NA	39.7 U	8.89 J	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
bis(2-Chloroethoxy)methane	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
bis(2-Chloroethyl)ether	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
bis(2-Ethylhexyl)phthalate	421 U	NA	398 U	326 U	508 B	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Butylbenzylphthalate	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Caprolactam	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Carbazole	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Chrysene	42 U	NA	57.2 J	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Dibenz(a,h)anthracene	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Dibenzofuran	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Diethylphthalate	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Dimethyl phthalate	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Di-n-butylphthalate	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Di-n-octylphthalate	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Fluoranthene	27 J	NA	36.8 J	22.4	36.4 J	33 J	18.5 J	63.6 J	6.97 U	NA	19.6 U	NA
Fluorene	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Hexachlorobenzene	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Hexachlorobutadiene	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Hexachlorocyclopentadiene	421 U	NA	398 R	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Hexachloroethane	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Indeno(1,2,3-cd)pyrene	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
Isophorone	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Naphthalene	42 U	NA	24.4 J	6.51 U	34.5 J	36.4 U	12.8 U	96.9 U	6.97 U	NA	19.6 U	NA
n-Nitroso-di-n-propylamine	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
n-Nitrosodiphenylamine	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Nitrobenzene	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Pentachlorophenol	1,680 U	NA	1,590 U	1,300 U	1,830 U	1,460 U	2,560 U	19,400 U	1,400 U	NA	784 U	NA
Phenanthrene	53.1 J	NA	35.5 J	6.51 U	45.8 U	37 J	13.9 J	96.9 U	6.97 U	NA	19.6 U	NA
Phenol	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U	349 U	NA	196 U	NA
Pyrene	23.2 J	NA	41.4 J	22.2	34.5 J	44.3 J	14.6 J	67.2 J	6.97 U	NA	19.6 U	NA

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81	CAPL-SD82	CAPL-SD83		CAPL-SD84	
Sample ID	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012	CAPL-SD82-1012	CAPL-SD83-1012	CAPL-SD83-1012-V	CAPL-SD84-1012	CAPL-SD84-1012-A
Sample Date	10/16/12	10/25/12	10/16/12	10/16/12	10/16/12	10/16/12	10/18/12	10/18/12	10/16/12	10/25/12	10/24/12	10/26/12
Chemical Name												
Pesticide/Polychlorinated Biphenyls (µg/kg)												
4,4'-DDD	2.64 L	NA	10.3 J	1.69 L	3.47 J	1.39 L	1.31 U	1.91 U	2.88 L	NA	10.2 J	NA
4,4'-DDE	46.5 J	NA	12.6	13.6 J	23.6 J	21.5	1.22 J	3.49 J	2.15 L	NA	50.8 J	NA
4,4'-DDT	3.61 J	NA	0.932 J	1.14 J	1.12 J	0.696 J	1.31 U	1.91 U	0.694 UJ	NA	137 K	NA
Aldrin	0.83 U	NA	0.8 UL	0.66 U	0.328 J	0.505 L	1.31 U	1.91 U	0.468 L	NA	3.54 J	NA
alpha-BHC	1.54 J	NA	0.536 J	0.66 U	0.912 U	0.585 L	1.31 U	1.91 U	0.49 L	NA	0.408 U	NA
alpha-Chlordane	9.57 L	NA	0.8 UL	0.914 J	0.302 J	0.715 U	1.31 U	1.91 U	0.694 UL	NA	6.82 J	NA
Aroclor-1260	720 J	NA	66.1 L	212 J	354 J	156	32 U	46.9 U	29.3 L	NA	16,200 J	NA
beta-BHC	0.287 L	NA	0.8 UL	0.66 U	0.912 U	0.744 L	1.31 U	1.91 U	0.694 UL	NA	0.408 UL	NA
delta-BHC	1.14 J	NA	0.8 U	1.5 J	0.912 U	0.503 J	1.31 U	1.91 U	0.694 UL	NA	0.208 J	NA
Dieldrin	15.1 J	NA	0.8 U	4.13 J	6.63 J	2.42 L	1.31 U	1.91 U	0.694 UL	NA	364 K	NA
Endosulfan I	0.83 U	NA	0.8 U	0.66 U	0.912 U	0.715 UL	1.31 U	1.91 U	0.694 UL	NA	0.408 U	NA
Endosulfan II	1.41 L	NA	0.8 U	2.25 J	3.37 J	1.36 J	1.31 U	1.91 U	0.694 UL	NA	56.1 J	NA
Endosulfan sulfate	12.8 J	NA	22.8 K	4.47 J	6.65 J	0.715 U	1.31 U	1.91 U	0.694 UL	NA	681 K	NA
Endrin	13.7	NA	1.14 L	3.07 L	5.37 J	0.715 UL	1.31 U	1.91 U	0.694 UL	NA	143 K	NA
Endrin aldehyde	0.637 J	NA	0.8 UL	0.79 J	0.683 J	3.05 L	1.31 U	1.91 U	0.733 L	NA	17.4 J	NA
Endrin ketone	0.83 UL	NA	0.8 U	0.66 U	0.912 U	0.715 U	1.31 U	1.91 U	0.694 UL	NA	49.4 J	NA
gamma-BHC (Lindane)	0.364 J	NA	1 J	0.573 J	0.744 J	0.715 U	1.31 U	1.91 U	0.694 UL	NA	0.135 J	NA
gamma-Chlordane	35.9 J	NA	2.58	3.78 J	6.3 J	2.71	0.735 J	2.58 J	0.694 UL	NA	22.7 J	NA
Heptachlor	1.97 J	NA	0.9 L	0.66 U	0.744 J	0.715 UL	1.31 U	1.91 U	1.27 L	NA	0.361 B	NA
Heptachlor epoxide	0.708 L	NA	0.8 UL	0.66 UL	0.912 U	0.715 UL	1.31 U	1.91 U	0.343 L	NA	3.58 J	NA
Methoxychlor	0.83 UL	NA	4.11 J	0.66 UL	0.912 U	4.73 J	1.31 U	1.91 U	0.302 J	NA	49.2 J	NA
Toxaphene	53.7 UJ	NA	51.8 UJ	42.7 UJ	59 UJ	46.2 UJ	84.4 UJ	124 UJ	44.9 UJ	NA	26.4 UJ	NA
Explosives (µg/kg)												
1,3,5-Trinitrobenzene	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
1,3-Dinitrobenzene	303 J	NA	151 J	179 U	384 J	200 U	190 U	195 U	196 U	NA	182 U	NA
2,4,6-Trinitrotoluene	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
2-Amino-4,6-dinitrotoluene	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
2-Nitrotoluene	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
3,5-Dinitroaniline	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
3-Nitrotoluene	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
4-Amino-2,6-dinitrotoluene	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
4-Nitrotoluene	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
HMX	198 U	NA	195 U	179 U	464 J	200 U	190 U	195 U	196 U	NA	182 U	NA
Nitroglycerin	495 U	NA	488 U	448 U	493 U	500 U	476 U	641 J	490 U	NA	455 U	NA
Nitroguanidine	101 U	NA	108 U	104 U	93 U	105 U	96.2 U	105 U	103 U	NA	105 U	NA
PETN	495 U	NA	488 U	448 U	493 U	500 U	476 U	488 U	490 U	NA	455 U	NA
RDX	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
Tetryl	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U	196 U	NA	182 U	NA
Total Metals (mg/kg)												
Aluminum	2,430	NA	4,040	2,630	3,200	5,770	26,000	17,400	13,300	NA	2,310	NA
Antimony	1.03 U	NA	0.952 UL	0.778 U	1.14 U	1.78 U	7.78 U	4.8 U	4.42 U	NA	0.502 U	NA
Arsenic	9.1	NA	5.53	7.87	7.53	16.8	27.9	46.3	30.2	NA	3.22	NA
Barium	12.9	NA	22.3	15.6	18.6	26.8	63.5	72.9	21.7 J	NA	12.9	NA
Beryllium	0.171 J	NA	0.253 J	0.181 J	0.214 J	0.306 J	1.15 J	0.803 J	0.862 J	NA	0.22 J	NA
Cadmium	0.144 J	NA	0.242 J	0.136 J	0.157 J	0.456 J	1.95 U	1.2 U	1.1 U	NA	0.112 J	NA
Calcium	2,560	NA	4,310	3,380	3,720	23,100	18,700	87,900	2,070 J	NA	29,600	NA
Chromium	5.73	NA	8.21	5.31	5.91	9.76	45.6 J	29.7	56.3	NA	7.75	NA
Cobalt	1.71	NA	1.83	1.15 J	1.43 J	1.6 J	8.67 J	5.34 J	5.52 U	NA	1.03	NA
Copper	4.63	NA	6.98	3.81	4.54	14.1	25.8	48.4	13.8	NA	3.99	NA
Cyanide	0.641 U	NA	0.56 U	4.86	0.672 U	0.516 U	0.922 U	1.38 U	0.496 U	NA	0.155 J	NA
Iron	4,360	NA	7,870	4,300	4,900	7,790	36,600	26,100	68,200	NA	8,880	NA
Lead	15.2	NA	19.8	11.6	13.2	23	30.4	49.7	23.6	NA	90.3	NA
Magnesium	337 J	NA	556 J	328 J	377 J	803 J	4,270 J	2,530 J	3,080	NA	772 J	NA
Manganese	14.6	NA	14.9	13.4	15.5	40.2	199	144	98.5	NA	32.4	NA
Mercury	0.0656 J	NA	0.0413 J	0.0476 J	0.0733 J	0.0641 J	0.103 J	0.14 J	0.0342 J	NA	0.0174 J	NA
Nickel	2.17	NA	3.06	1.99	2.31	3.72	18.4	13	6.27	NA	2.88	NA
Potassium	384 J	NA	724 L	343 J	409 J	663 J	3,220 J	1,900 J	2,010 J	NA	780	NA
Selenium	0.644 U	NA	0.53 J	0.486 U	0.71 U	1.11 U	4.86 U	3 U	2.76 U	NA	0.314 U	NA
Silver	0.258 U	NA	0.238 U	0.194 U	0.284 U	0.446 U	1.95 U	1.2 U	1.1 U	NA	0.125 UJ	NA
Sodium	386 U	NA	357 U	292 U	426 U	668 U	2,920 U	1,800 U	5,040	NA	168 J	NA
Thallium	0.515 U	NA	0.476 U	0.389 U	0.568 U	0.891 U	3.89 U	2.4 U	2.21 U	NA	0.251 U	NA
Vanadium	7.66	NA	12.2	7.34	7.96	13.7	58.5	45	171	NA	9.12	NA
Zinc	48.6	NA	83.1 L	33.5	37	70	89.5	110	111	NA	77.7	NA

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
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Station ID	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81	CAPL-SD82	CAPL-SD83		CAPL-SD84	
Sample ID	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012	CAPL-SD82-1012	CAPL-SD83-1012	CAPL-SD83-1012-V	CAPL-SD84-1012	CAPL-SD84-1012-A
Sample Date	10/16/12	10/25/12	10/16/12	10/16/12	10/16/12	10/16/12	10/18/12	10/18/12	10/16/12	10/25/12	10/24/12	10/26/12
Chemical Name												
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)												
Zinc, SEM	0.597	NA	0.859	0.385	NA	0.764	0.53	0.752	0.439	NA	NA	0.282 D
Acid volatile sulfide, SEM	4.96	NA	0.484 J	3.42	NA	5.52	5.47	14.9	7.68	NA	NA	0.114 J
Cadmium, SEM	0.00119 J	NA	0.00218 J	0.0013 J	NA	0.00383	0.00184 U	0.00272 U	0.00122 U	NA	NA	5.73E-04 U
Copper, SEM	0.0193 J	NA	0.0618	0.0117 J	NA	0.0865	0.0261 J	0.248	0.0202 J	NA	NA	0.0178
Lead, SEM	0.0832	NA	0.0796	0.0405	NA	0.0882	0.0617	0.164	0.0382	NA	NA	0.0463 D
Mercury, SEM	7.61E-05 U	NA	7.35E-05 U	7.04E-05 U	NA	6.03E-05 U	1.04E-04 U	1.55E-04 U	6.94E-05 U	NA	NA	3.26E-05 NU
Nickel, SEM	0.0116 J	NA	0.015 J	0.0071 J	NA	0.00828 J	0.0142 J	0.0206 J	0.0107 J	NA	NA	0.00368 JY
Silver, SEM	0.00365 U	NA	0.00353 U	0.00338 U	NA	0.0029 U	0.00585 MU	0.00867 MU	0.00333 U	NA	NA	0.00156 UY
Wet Chemistry												
pH (ph)	6.71 H3	NA	6.9 H3	6.98 H3	NA	7.29 H3	7.19 H3	7.16 H3	7.24 H3	NA	8.28 H3	NA
Total organic carbon (TOC) (mg/kg)	91,100	NA	71,500	68,400	NA	69,200	108,000	134,000	36,100	NA	2,300	NA
Grain Size (pct)												
Coarse Sand (%)	2.9	NA	5.1	2.2	NA	1	0	0.9	6.4	NA	6.5	NA
Fine Sand (%)	56.3	NA	73.8	77.8	NA	51.2	3.7	5.7	30.4	NA	55.8	NA
Fines (%)	26	NA	10.6	11.1	NA	40.6	95.9	92.8	13.7	NA	13.5	NA
Gravel (%)	1.7	NA	2.3	0.3	NA	0.3	0	0.4	34.1	NA	11.6	NA
Medium Sand (%)	13.1	NA	8.2	8.6	NA	6.9	0.4	0.2	15.4	NA	12.6	NA
Sand (%)	72.3	NA	87.1	88.6	NA	59.1	4.1	6.8	52.2	NA	74.9	NA
GRAINSIZE (PCT/P)												
GS03 Sieve 3" (75 mm)	100	NA	100	100	NA	100	100	100	100	NA	100	NA
GS05 Sieve 2" (50 mm)	100	NA	100	100	NA	100	100	100	100	NA	100	NA
GS06 Sieve 1.5" (37.5 mm)	100	NA	100	100	NA	100	100	100	100	NA	100	NA
GS07 Sieve 1" (25.0 mm)	100	NA	100	100	NA	100	100	100	100	NA	100	NA
GS08 Sieve 0.75" (19.0 mm)	100	NA	100	100	NA	100	100	100	76.3	NA	92.5	NA
GS10 Sieve 0.375" (9.5 mm)	100	NA	98.7	100	NA	100	100	100	72.9	NA	91.9	NA
Sieve No. 004 (4.75 mm)	98.3	NA	97.7	99.7	NA	99.7	100	99.6	65.9	NA	88.4	NA
Sieve No. 010 (2.00 mm)	95.4	NA	92.6	97.5	NA	98.7	100	98.7	59.5	NA	81.9	NA
Sieve No. 020 (850 um)	92.2	NA	91.2	96.4	NA	97.2	100	98.7	54.1	NA	75.9	NA
Sieve No. 040 (425 um)	82.3	NA	84.4	88.9	NA	91.8	99.6	98.5	44.1	NA	69.3	NA
Sieve No. 060 (250 um)	53.6	NA	57.8	57.1	NA	75	98.7	97.7	32.8	NA	42.8	NA
Sieve No. 080 (180 um)	36.7	NA	35	31.4	NA	61.3	98	97.1	26.1	NA	22.5	NA
Sieve No. 100 (150 um)	30.6	NA	21	20.6	NA	53.3	97.6	96.5	21.8	NA	17.2	NA
Sieve No. 200 (75 um)	26	NA	10.6	11.1	NA	40.6	95.9	92.8	13.7	NA	13.5	NA

Notes:

Shading indicates detections

NA - Not analyzed
* - Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
M - Indicates that the sample matrix interfered with the quantitation of the analyte (unvalidated data)
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
Raw Analytical Results
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Station ID	CAPL-SD85		CAPL-SD86		CAPL-SD87		CAPL-SWSD62		CAPL-SWSD63	
Sample ID	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A	CAPL-SD87-1012	CAPL-SD87-1012-A	CAPL-SD62-1012	CAPL-SD62-1012-V	CAPL-SD63-1012	CAPL-SD63-1012-V
Sample Date	10/24/12	10/26/12	10/24/12	10/26/12	10/24/12	10/26/12	10/17/12	10/25/12	10/17/12	10/25/12
Chemical Name										
Volatile Organic Compounds (µg/kg)										
1,1,1-Trichloroethane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,1,2,2-Tetrachloroethane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
1,1,2-Trichloroethane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,1-Dichloroethane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,1-Dichloroethene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,2,3-Trichlorobenzene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,2,4-Trichlorobenzene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,2-Dibromo-3-chloropropane	6.08 UJ	NA	4.8 UJ	NA	7.39 UJ	NA	NA	22.6 U	NA	28.8 U
1,2-Dibromoethane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,2-Dichlorobenzene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,2-Dichloroethane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,2-Dichloropropane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,3-Dichlorobenzene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
1,4-Dichlorobenzene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
2-Butanone	3.93 J	NA	4.8 U	NA	28.8	NA	NA	101	NA	146
2-Hexanone	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
4-Methyl-2-pentanone	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
Acetone	21.3 J	NA	9.6 UJ	NA	111 J	NA	NA	323 J	NA	472 J
Benzene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Bromochloromethane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Bromodichloromethane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Bromoform	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Bromomethane	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
Carbon disulfide	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	9.93 J	NA	13.3 J
Carbon tetrachloride	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Chlorobenzene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Chloroethane	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
Chloroform	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Chloromethane	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
cis-1,2-Dichloroethene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
cis-1,3-Dichloropropene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Cyclohexane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Dibromochloromethane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Dichlorodifluoromethane (Freon-12)	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
Ethylbenzene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Isopropylbenzene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Methyl acetate	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
Methylcyclohexane	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Methylene chloride	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
Methyl-tert-butyl ether (MTBE)	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Styrene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Tetrachloroethene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Toluene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
trans-1,2-Dichloroethene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
trans-1,3-Dichloropropene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Trichloroethene	3.04 U	NA	2.4 U	NA	3.7 U	NA	NA	11.3 U	NA	14.4 U
Trichlorofluoromethane (Freon-11)	6.08 U	NA	4.8 U	NA	7.39 U	NA	NA	22.6 U	NA	28.8 U
Vinyl chloride	3.04 UJ	NA	2.4 UJ	NA	3.7 UJ	NA	NA	11.3 UJ	NA	14.4 UJ
Xylene, total	9.12 U	NA	7.2 U	NA	11.1 U	NA	NA	33.9 U	NA	43.2 U

Attachment B9
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Station ID	CAPL-SD85		CAPL-SD86		CAPL-SD87		CAPL-SWSD62		CAPL-SWSD63	
Sample ID	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A	CAPL-SD87-1012	CAPL-SD87-1012-A	CAPL-SD62-1012	CAPL-SD62-1012-V	CAPL-SD63-1012	CAPL-SD63-1012-V
Sample Date	10/24/12	10/26/12	10/24/12	10/26/12	10/24/12	10/26/12	10/17/12	10/25/12	10/17/12	10/25/12
Chemical Name										
Semivolatile Organic Compounds (µg/kg)										
1,1-Biphenyl	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
1,2,4,5-Tetrachlorobenzene	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2,2'-Oxybis(1-chloropropane)	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2,3,4,6-Tetrachlorophenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2,4,5-Trichlorophenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2,4,6-Trichlorophenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2,4-Dichlorophenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2,4-Dimethylphenol	880 U	NA	813 U	NA	812 U	NA	3,550 U	NA	2,600 U	NA
2,4-Dinitrophenol	2,200 U	NA	2,040 U	NA	2,030 U	NA	8,880 U	NA	6,520 U	NA
2,4-Dinitrotoluene	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2,6-Dinitrotoluene	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2-Chloronaphthalene	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2-Chlorophenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2-Methylnaphthalene	22 U	NA	20.3 U	NA	20.3 U	NA	17.7 U	NA	65 U	NA
2-Methylphenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
2-Nitroaniline	880 U	NA	813 U	NA	812 U	NA	3,550 U	NA	2,600 U	NA
2-Nitrophenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
3,3'-Dichlorobenzidine	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
3-Nitroaniline	880 U	NA	813 U	NA	812 U	NA	3,550 U	NA	2,600 U	NA
4,6-Dinitro-2-methylphenol	2,200 U	NA	2,040 U	NA	2,030 U	NA	8,880 U	NA	6,520 U	NA
4-Bromophenyl-phenylether	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
4-Chloro-3-methylphenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
4-Chloroaniline	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
4-Chlorophenyl-phenylether	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
4-Methylphenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
4-Nitroaniline	880 U	NA	813 U	NA	812 U	NA	3,550 U	NA	2,600 U	NA
4-Nitrophenol	880 U	NA	813 U	NA	812 U	NA	3,550 U	NA	2,600 U	NA
Acenaphthene	22 U	NA	20.3 U	NA	336 K	NA	17.7 U	NA	65 U	NA
Acenaphthylene	22 U	NA	20.3 U	NA	20.3 U	NA	17.7 U	NA	65 U	NA
Acetophenone	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Anthracene	22 U	NA	20.3 U	NA	265	NA	17.7 U	NA	65 U	NA
Atrazine	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Benzaldehyde	220 U	NA	204 U	NA	203 U	NA	888 U	NA	384 J	NA
Benzo(a)anthracene	22 U	NA	20.3 U	NA	125	NA	17.7 U	NA	78.2 J	NA
Benzo(a)pyrene	22 U	NA	20.3 U	NA	20.3 U	NA	17.7 U	NA	93.3 J	NA
Benzo(b)fluoranthene	22 U	NA	20.3 U	NA	81.9 K	NA	17.7 U	NA	96.3 J	NA
Benzo(g,h,i)perylene	22 U	NA	20.3 U	NA	20.3 U	NA	17.7 U	NA	94.2 J	NA
Benzo(k)fluoranthene	22 U	NA	20.3 U	NA	20.3 U	NA	17.7 U	NA	102 J	NA
bis(2-Chloroethoxy)methane	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
bis(2-Chloroethyl)ether	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
bis(2-Ethylhexyl)phthalate	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Butylbenzylphthalate	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Caprolactam	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Carbazole	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Chrysene	22 U	NA	20.3 U	NA	130 K	NA	17.7 U	NA	185	NA
Dibenz(a,h)anthracene	22 U	NA	20.3 U	NA	20.3 U	NA	17.7 U	NA	65 U	NA
Dibenzofuran	220 U	NA	204 U	NA	125 J	NA	888 U	NA	652 U	NA
Diethylphthalate	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Dimethyl phthalate	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Di-n-butylphthalate	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Di-n-octylphthalate	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Fluoranthene	22.2 J	NA	20.3 U	NA	440	NA	17.7 U	NA	174	NA
Fluorene	22 U	NA	20.3 U	NA	285 K	NA	17.7 U	NA	99.7 J	NA
Hexachlorobenzene	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Hexachlorobutadiene	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Hexachlorocyclopentadiene	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Hexachloroethane	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Indeno(1,2,3-cd)pyrene	22 U	NA	20.3 U	NA	24.2 J	NA	17.7 U	NA	90.1 J	NA
Isophorone	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Naphthalene	22 U	NA	20.3 U	NA	20.3 U	NA	17.7 U	NA	65 U	NA
n-Nitroso-di-n-propylamine	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
n-Nitrosodiphenylamine	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Nitrobenzene	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Pentachlorophenol	880 U	NA	813 U	NA	812 U	NA	3,550 U	NA	2,600 U	NA
Phenanthrene	22 U	NA	20.3 U	NA	949	NA	17.7 U	NA	181	NA
Phenol	220 U	NA	204 U	NA	203 U	NA	888 U	NA	652 U	NA
Pyrene	20.1 J	NA	20.3 U	NA	497 K	NA	17.7 U	NA	194	NA

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Station ID	CAPL-SD85		CAPL-SD86		CAPL-SD87		CAPL-SWSD62		CAPL-SWSD63	
Sample ID	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A	CAPL-SD87-1012	CAPL-SD87-1012-A	CAPL-SD62-1012	CAPL-SD62-1012-V	CAPL-SD63-1012	CAPL-SD63-1012-V
Sample Date	10/24/12	10/26/12	10/24/12	10/26/12	10/24/12	10/26/12	10/17/12	10/25/12	10/17/12	10/25/12
Chemical Name										
Pesticide/Polychlorinated Biphenyls (µg/kg)										
4,4'-DDD	12.8 K	NA	6.53 J	NA	6.56 J	NA	1.81 UL	NA	7.08 J	NA
4,4'-DDE	64.9 J	NA	18.5 L	NA	13.1	NA	9.69 J	NA	39.2 J	NA
4,4'-DDT	71 J	NA	27.6 J	NA	18.3 J	NA	1.81 UL	NA	4.18 J	NA
Aldrin	1.2 J	NA	0.407 J	NA	0.681 J	NA	1.81 UL	NA	1.81 J	NA
alpha-BHC	0.443 U	NA	0.414 UL	NA	0.419 U	NA	0.777 J	NA	1.32 U	NA
alpha-Chlordane	13.1 K	NA	8.56 J	NA	9.44	NA	1.5 J	NA	3.63 J	NA
Aroclor-1260	8,300 J	NA	4,090 J	NA	3,780 J	NA	140 J	NA	1,270 J	NA
beta-BHC	2.09 K	NA	0.414 UL	NA	0.419 U	NA	1.81 UL	NA	1.32 U	NA
delta-BHC	1.3 K	NA	0.505 J	NA	1.04 J	NA	1.81 UL	NA	2.71 J	NA
Dieldrin	167 K	NA	66.6 J	NA	79.2	NA	3.58 J	NA	20.7 J	NA
Endosulfan I	0.615 J	NA	0.325 J	NA	0.81 J	NA	1.81 UL	NA	0.68 J	NA
Endosulfan II	26.1 K	NA	43.9 J	NA	15.4 J	NA	1.32 J	NA	13.2 J	NA
Endosulfan sulfate	319 K	NA	0.414 UL	NA	0.419 U	NA	1.81 UL	NA	41.1 J	NA
Endrin	51.7	NA	29.5 J	NA	35.7 J	NA	1.81 UL	NA	15.6 J	NA
Endrin aldehyde	8.26 J	NA	4.39 J	NA	5.11 J	NA	3.54 J	NA	4.96 J	NA
Endrin ketone	22.2 J	NA	15.1 J	NA	12.6 J	NA	14.7 J	NA	1.66 J	NA
gamma-BHC (Lindane)	0.614 J	NA	0.414 UL	NA	0.419 U	NA	1.81 UL	NA	0.692 J	NA
gamma-Chlordane	40.1	NA	17.2 J	NA	28.4	NA	0.963 J	NA	41 J	NA
Heptachlor	0.974	NA	0.414 UL	NA	0.177 B	NA	1.63 J	NA	1.32 UL	NA
Heptachlor epoxide	5.37 K	NA	0.981 J	NA	1.22 J	NA	1.81 UL	NA	1.32 UL	NA
Methoxychlor	25.7 J	NA	12.8 J	NA	11.4 J	NA	1.81 UL	NA	10.7 J	NA
Toxaphene	28.7 UJ	NA	26.8 UJ	NA	27.1 UJ	NA	117 UJ	NA	85.6 UJ	NA
Explosives (µg/kg)										
1,3,5-Trinitrobenzene	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
1,3-Dinitrobenzene	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
2,4,6-Trinitrotoluene	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
2-Amino-4,6-dinitrotoluene	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
2-Nitrotoluene	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
3,5-Dinitroaniline	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
3-Nitrotoluene	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
4-Amino-2,6-dinitrotoluene	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
4-Nitrotoluene	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
HMX	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
Nitroglycerin	435 U	NA	455 U	NA	455 U	NA	328 J	NA	969 J	NA
Nitroguanidine	95.2 U	NA	94.3 U	NA	108 U	NA	95.2 U	NA	100 U	NA
PETN	435 U	NA	455 U	NA	455 U	NA	485 U	NA	490 U	NA
RDX	174 U	NA	182 U	NA	182 U	NA	194 U	NA	196 U	NA
Tetryl	174 U	NA	182 U	NA	182 U	NA	194 U	NA	211 J	NA
Total Metals (mg/kg)										
Aluminum	6,860	NA	2,270	NA	2,890	NA	21,600	NA	19,800	NA
Antimony	3.89	NA	0.995 U	NA	1.07 U	NA	10.9 U	NA	7.82 U	NA
Arsenic	5.62	NA	2.24	NA	2.42	NA	38.1	NA	36.5	NA
Barium	90.2	NA	22.8	NA	16.5	NA	77.3	NA	89	NA
Beryllium	5.98	NA	1.19	NA	0.393 J	NA	2.73 U	NA	1.14 J	NA
Cadmium	0.712 U	NA	0.249 U	NA	0.267 U	NA	2.73 U	NA	1.95 U	NA
Calcium	50,700	NA	40,200	NA	26,000	NA	75,900	NA	122,000	NA
Chromium	45	NA	11.3	NA	8.94	NA	49.4	NA	38.5	NA
Cobalt	34.5	NA	5.24	NA	1.54 J	NA	13.6 U	NA	5.25 J	NA
Copper	1,000	NA	98.3	NA	16.1	NA	43.9	NA	40.7	NA
Cyanide	0.19 J	NA	0.306 U	NA	0.354 J	NA	1.29 U	NA	0.937 U	NA
Iron	31,600	NA	9,880	NA	6,810	NA	39,600	NA	34,000	NA
Lead	853	NA	126	NA	72.9	NA	80.7	NA	85.8	NA
Magnesium	1,940 J	NA	742 J	NA	638 J	NA	3,040 J	NA	3,090 J	NA
Manganese	275	NA	63.6	NA	20.6	NA	142	NA	143	NA
Mercury	0.0196 J	NA	0.0397 U	NA	0.0201 J	NA	0.154 J	NA	0.197	NA
Nickel	564	NA	65.4	NA	11.1	NA	13.5 J	NA	12.2	NA
Potassium	1,740 J	NA	730	NA	785	NA	2,660 J	NA	2,330 J	NA
Selenium	1.78 U	NA	0.622 UL	NA	0.668 U	NA	6.81 U	NA	4.89 U	NA
Silver	0.519 J	NA	0.249 UJ	NA	0.267 UJ	NA	2.73 U	NA	1.95 U	NA
Sodium	519 J	NA	340 J	NA	158 J	NA	4,090 U	NA	2,930 U	NA
Thallium	1.42 U	NA	0.497 U	NA	0.535 U	NA	5.45 U	NA	3.91 U	NA
Vanadium	20.6	NA	7.99	NA	8.37	NA	55	NA	45.9	NA
Zinc	2,950	NA	525	NA	119	NA	253	NA	201	NA

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Station ID	CAPL-SD85		CAPL-SD86		CAPL-SD87		CAPL-SWSD62		CAPL-SWSD63	
Sample ID	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A	CAPL-SD87-1012	CAPL-SD87-1012-A	CAPL-SD62-1012	CAPL-SD62-1012-V	CAPL-SD63-1012	CAPL-SD63-1012-V
Sample Date	10/24/12	10/26/12	10/24/12	10/26/12	10/24/12	10/26/12	10/17/12	10/25/12	10/17/12	10/25/12
Chemical Name										
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)										
Zinc, SEM	NA	4.43 D	NA	0.974	NA	0.676	2.29 D	NA	2.6 D	NA
Acid volatile sulfide, SEM	NA	1.03	NA	2.08	NA	2.57	11.2	NA	13.2	NA
Cadmium, SEM	NA	5.52E-04 U	NA	3.84E-04 J	NA	9.26E-04 J	0.00407 J	NA	0.00457 J	NA
Copper, SEM	NA	0.675	NA	0.124	NA	0.0646	0.0655	NA	0.068	NA
Lead, SEM	NA	0.393 D	NA	0.101	NA	0.0696	0.266 D	NA	0.345 D	NA
Mercury, SEM	NA	3.14E-05 NU	NA	3.08E-05 NU	NA	3.63E-05 NU	1.17E-04 U	NA	1.21E-04 U	NA
Nickel, SEM	NA	0.468 Y	NA	0.112 Y	NA	0.0503 Y	0.0338 J	NA	0.0436 J	NA
Silver, SEM	NA	0.00151 UY	NA	0.00148 UY	NA	0.00174 UY	0.00654 MU	NA	0.00583 U	NA
Wet Chemistry										
pH (ph)	8.11 H3	NA	7.88 H3	NA	8.04 H3	NA	6.81 H3	NA	6.81 H3	NA
Total organic carbon (TOC) (mg/kg)	3,440	NA	3,210	NA	7,080	NA	74,400	NA	71,400	NA
Grain Size (pct)										
Coarse Sand (%)	6.9	NA	3.6	NA	3.8	NA	0	NA	0	NA
Fine Sand (%)	56.1	NA	73.3	NA	71.9	NA	10.8	NA	8.5	NA
Fines (%)	2.1	NA	4.4	NA	4.2	NA	88.1	NA	89.6	NA
Gravel (%)	5.8	NA	4.1	NA	10.8	NA	0	NA	0	NA
Medium Sand (%)	29.2	NA	14.6	NA	9.3	NA	1.1	NA	1.9	NA
Sand (%)	92.2	NA	91.5	NA	85	NA	11.9	NA	10.4	NA
GRAINSIZE (PCT/P)										
GS03 Sieve 3" (75 mm)	100	NA	100	NA	100	NA	100	NA	100	NA
GS05 Sieve 2" (50 mm)	100	NA	100	NA	100	NA	100	NA	100	NA
GS06 Sieve 1.5" (37.5 mm)	100	NA	100	NA	100	NA	100	NA	100	NA
GS07 Sieve 1" (25.0 mm)	100	NA	100	NA	100	NA	100	NA	100	NA
GS08 Sieve 0.75" (19.0 mm)	100	NA	100	NA	100	NA	100	NA	100	NA
GS10 Sieve 0.375" (9.5 mm)	97.4	NA	97.6	NA	94.6	NA	100	NA	100	NA
Sieve No. 004 (4.75 mm)	94.2	NA	95.9	NA	89.2	NA	100	NA	100	NA
Sieve No. 010 (2.00 mm)	87.3	NA	92.3	NA	85.4	NA	100	NA	100	NA
Sieve No. 020 (850 um)	72.4	NA	87	NA	82.2	NA	99.7	NA	99.2	NA
Sieve No. 040 (425 um)	58.1	NA	77.7	NA	76.1	NA	98.9	NA	98.1	NA
Sieve No. 060 (250 um)	26.6	NA	42.6	NA	44.4	NA	97.6	NA	96.6	NA
Sieve No. 080 (180 um)	8.9	NA	16.3	NA	18.1	NA	95.6	NA	95.2	NA
Sieve No. 100 (150 um)	4.9	NA	9.1	NA	10.1	NA	93.7	NA	94.1	NA
Sieve No. 200 (75 um)	2.1	NA	4.4	NA	4.2	NA	88.1	NA	89.6	NA

Notes:

Shading indicates detections

NA - Not analyzed
* - Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
M - Indicates that the sample matrix interfered with the quantitation of the analyte (unvalidated data)
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

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Station ID	CAPL-SWSD64				CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V	CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
Sample Date	10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12	10/18/12	10/17/12
Chemical Name									
Volatile Organic Compounds (µg/kg)									
1,1,1-Trichloroethane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 U	7.4 U
1,1,2,2-Tetrachloroethane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 UJ	30.2 U	14.8 U
1,1,2-Trichloroethane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 U	7.4 U
1,1-Dichloroethane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 UL
1,1-Dichloroethene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 UJ	15.1 UL	7.4 U
1,2,3-Trichlorobenzene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
1,2,4-Trichlorobenzene	NA	NA	12.6 U	11.3 U	4.87 UL	4.66 UL	4.35 U	15.1 UL	7.4 U
1,2-Dibromo-3-chloropropane	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 U	30.2 U	14.8 U
1,2-Dibromoethane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
1,2-Dichlorobenzene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
1,2-Dichloroethane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
1,2-Dichloropropane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
1,3-Dichlorobenzene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
1,4-Dichlorobenzene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
2-Butanone	NA	NA	156	135	17.6 J	25.1	15.9 J	50.3 J	43.7
2-Hexanone	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 U	30.2 U	14.8 U
4-Methyl-2-pentanone	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 U	30.2 U	14.8 U
Acetone	NA	NA	543 J	460 J	70.1 J	87 J	47.2	204 J	140 J
Benzene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Bromochloromethane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 U	7.4 U
Bromodichloromethane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Bromoform	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Bromomethane	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 UJ	30.2 U	14.8 U
Carbon disulfide	NA	NA	17.5 J	13.2 J	4.87 U	4.66 U	4.35 UJ	13.9 L	7.4 U
Carbon tetrachloride	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Chlorobenzene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Chloroethane	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 UJ	30.2 U	14.8 UJ
Chloroform	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Chloromethane	NA	NA	25.1 U	22.5 U	9.74 UJ	9.33 UJ	8.71 UJ	30.2 UL	14.8 UJ
cis-1,2-Dichloroethene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 U	7.4 U
cis-1,3-Dichloropropene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Cyclohexane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 UJ	15.1 UL	7.4 U
Dibromochloromethane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Dichlorodifluoromethane (Freon-12)	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 UJ	30.2 U	14.8 U
Ethylbenzene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Isopropylbenzene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Methyl acetate	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 U	30.2 U	14.8 U
Methylcyclohexane	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Methylene chloride	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 UJ	30.2 U	14.8 UJ
Methyl-tert-butyl ether (MTBE)	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 U	7.4 U
Styrene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 R	7.4 U
Tetrachloroethene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Toluene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
trans-1,2-Dichloroethene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
trans-1,3-Dichloropropene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Trichloroethene	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Trichlorofluoromethane (Freon-11)	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 U	30.2 U	14.8 U
Vinyl chloride	NA	NA	12.6 UJ	11.3 UJ	4.87 U	4.66 U	4.35 U	15.1 U	7.4 U
Xylene, total	NA	NA	37.7 U	33.8 U	14.6 U	14 U	13.1 U	45.3 UL	22.2 U

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
Raw Analytical Results
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Station ID	CAPL-SWSD64				CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V	CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
Sample Date	10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12	10/18/12	10/17/12
Chemical Name									
Semivolatile Organic Compounds (µg/kg)									
1,1-Biphenyl	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
1,2,4,5-Tetrachlorobenzene	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2,2'-Oxybis(1-chloropropane)	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2,3,4,6-Tetrachlorophenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2,4,5-Trichlorophenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2,4,6-Trichlorophenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2,4-Dichlorophenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2,4-Dimethylphenol	2,870 U	2,970 U	NA	NA	1,510 U	1,260 U	1,260 U	3,440 U	1,680 U
2,4-Dinitrophenol	7,180 U	7,440 U	NA	NA	3,770 U	3,150 U	3,160 U	8,610 R	4,200 U
2,4-Dinitrotoluene	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2,6-Dinitrotoluene	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2-Chloronaphthalene	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2-Chlorophenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2-Methylnaphthalene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	25.6 J	85.8 U	8.37 U
2-Methylphenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
2-Nitroaniline	2,870 U	2,970 U	NA	NA	1,510 U	1,260 U	1,260 U	3,440 U	1,680 U
2-Nitrophenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
3,3'-Dichlorobenzidine	718 U	744 U	NA	NA	377 U	315 U	316 U	861 UL	420 U
3-Nitroaniline	2,870 U	2,970 U	NA	NA	1,510 U	1,260 U	1,260 U	3,440 U	1,680 U
4,6-Dinitro-2-methylphenol	7,180 U	7,440 U	NA	NA	3,770 U	3,150 U	3,160 U	8,610 R	4,200 U
4-Bromophenyl-phenylether	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
4-Chloro-3-methylphenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
4-Chloroaniline	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
4-Chlorophenyl-phenylether	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
4-Methylphenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
4-Nitroaniline	2,870 U	2,970 U	NA	NA	1,510 U	1,260 U	1,260 U	3,440 UL	1,680 U
4-Nitrophenol	2,870 U	2,970 U	NA	NA	1,510 U	1,260 U	1,260 U	3,440 U	1,680 U
Acenaphthene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	31.5 U	85.8 U	8.37 U
Acenaphthylene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	22.2 J	85.8 U	8.37 U
Acetophenone	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Anthracene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	41.3 J	85.8 U	8.37 U
Atrazine	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Benzaldehyde	718 U	744 U	NA	NA	377 U	170 J	316 U	861 U	420 U
Benzo(a)anthracene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	223	85.8 U	8.37 U
Benzo(a)pyrene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	303	85.8 U	8.37 U
Benzo(b)fluoranthene	14.3 U	14.8 U	NA	NA	13.2 J	6.29 U	400	85.8 U	8.37 U
Benzo(g,h,i)perylene	14.3 U	14.8 U	NA	NA	7.52 U	7.31 J	208	85.8 U	8.37 U
Benzo(k)fluoranthene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	335	85.8 U	8.37 U
bis(2-Chloroethoxy)methane	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
bis(2-Chloroethyl)ether	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
bis(2-Ethylhexyl)phthalate	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Butylbenzylphthalate	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Caprolactam	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Carbazole	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Chrysene	14.3 U	14.8 U	NA	NA	10.3 J	9.23 J	285	85.8 U	8.37 U
Dibenz(a,h)anthracene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	74.1	85.8 U	8.37 U
Dibenzofuran	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Diethylphthalate	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Dimethyl phthalate	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Di-n-butylphthalate	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Di-n-octylphthalate	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Fluoranthene	16.5 J	20.8 J	NA	NA	16	12.2 J	123	85.8 U	8.37 U
Fluorene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	31.5 U	85.8 U	8.37 U
Hexachlorobenzene	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Hexachlorobutadiene	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Hexachlorocyclopentadiene	718 U	744 U	NA	NA	377 U	315 U	316 U	861 R	420 U
Hexachloroethane	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Indeno(1,2,3-cd)pyrene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	238	85.8 U	8.37 U
Isophorone	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Naphthalene	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	31.5 U	85.8 U	8.37 U
n-Nitroso-di-n-propylamine	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
n-Nitrosodiphenylamine	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Nitrobenzene	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Pentachlorophenol	2,870 U	2,970 U	NA	NA	1,510 U	1,260 U	1,260 U	3,440 U	1,680 U
Phenanthrene	14.3 U	14.8 U	NA	NA	12.9 J	10.5 J	69.7	85.8 U	8.37 U
Phenol	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Pyrene	18.5 J	16.8 J	NA	NA	13.6 J	13.3	108	85.8 U	8.37 U

Attachment B9
Cheatham Annex, Penniman Lake
Surface Sediment Samples
Raw Analytical Results
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Station ID	CAPL-SWSD64				CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V	CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
Sample Date	10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12	10/18/12	10/17/12
Chemical Name									
Pesticide/Polychlorinated Biphenyls (µg/kg)									
4,4'-DDD	10.6 J	4.44 J	NA	NA	0.778 U	0.63 U	4.7 L	1.7 U	0.844 UL
4,4'-DDE	16.5 J	8.72 J	NA	NA	6.29 J	4.74	23.7 L	1.7 U	0.844 UL
4,4'-DDT	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	7.55 J	1.7 U	0.844 UL
Aldrin	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.95 L	1.7 U	0.844 UL
alpha-BHC	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.427 L	1.7 U	0.844 UL
alpha-Chlordane	2.22 J	1.48 U	NA	NA	1.02 J	0.63 U	4.25 L	1.7 U	0.844 UL
Aroclor-1260	84.7 J	34.5 J	NA	NA	63.6	35.9	914 L	41.6 U	20.7 UL
beta-BHC	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
delta-BHC	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
Dieldrin	2.41 J	1.34 J	NA	NA	1.5 J	0.63 U	4.55 L	1.7 U	0.844 UL
Endosulfan I	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.523 L	1.7 U	0.844 UL
Endosulfan II	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	11.3 L	1.7 U	0.844 UL
Endosulfan sulfate	2.13 J	1.42 J	NA	NA	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
Endrin	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
Endrin aldehyde	1.5 UL	2.02 J	NA	NA	2.75	1.99	3.11 L	1.7 U	0.844 UL
Endrin ketone	6.86 J	3.13 J	NA	NA	0.778 U	0.63 U	2.03 L	1.7 U	0.844 UL
gamma-BHC (Lindane)	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.245 L	1.7 U	0.844 UL
gamma-Chlordane	1.52 J	1 J	NA	NA	15.1 B	1.37	8.24 L	1.84 J	5.31 J
Heptachlor	1.5 UL	1.48 U	NA	NA	0.958 J	0.63 U	0.619 UL	1.7 U	0.844 UL
Heptachlor epoxide	1.5 UL	1.48 U	NA	NA	0.929 J	0.63 U	1.24 L	1.7 U	0.844 UL
Methoxychlor	5.43 J	1.48 U	NA	NA	0.584 J	0.63 U	10.1 J	1.7 U	0.844 UL
Toxaphene	97 UJ	96 UJ	NA	NA	50.3 UJ	40.8 UJ	40 UJ	110 UJ	54.6 UJ
Explosives (µg/kg)									
1,3,5-Trinitrobenzene	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
1,3-Dinitrobenzene	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
2,4,6-Trinitrotoluene	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	125 J
2-Amino-4,6-dinitrotoluene	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
2-Nitrotoluene	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
3,5-Dinitroaniline	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
3-Nitrotoluene	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
4-Amino-2,6-dinitrotoluene	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
4-Nitrotoluene	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
HMX	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
Nitroglycerin	1,410 J	311 J	NA	NA	490 U	478 U	478 U	500 U	469 U
Nitroguanidine	104 U	103 U	NA	NA	103 U	105 U	96.2 U	104 U	103 U
PETN	483 U	463 U	NA	NA	490 U	478 U	478 U	500 U	469 U
RDX	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
Tetryl	193 U	185 U	NA	NA	196 U	191 U	191 U	200 R	188 U
Total Metals (mg/kg)									
Aluminum	20,900	17,400	NA	NA	6,830	4,010	3,550	26,700	6,560
Antimony	8.58 U	9.07 U	NA	NA	0.946 U	0.762 U	1.6 U	2.11 UL	5.25 U
Arsenic	47.5	39.1	NA	NA	9.58	8.68	6.18	56.7	6.48 J
Barium	80.5	66.3	NA	NA	26.7	19.7	30.2	80.2	21.2 J
Beryllium	1.15 J	2.27 U	NA	NA	0.253 J	0.222 J	0.242 J	1.02 J	1.31 U
Cadmium	2.14 U	2.27 U	NA	NA	0.237 U	0.204 J	0.239 J	0.528 U	1.31 U
Calcium	93,700	77,900	NA	NA	26,600	12,500	10,100	33,500	3,630
Chromium	44.9	36.9	NA	NA	11.8	7.22	6.45	45.6 K	16.1
Cobalt	5.97 J	11.3 U	NA	NA	1.67	1.14 J	2.08 J	6.91	6.56 U
Copper	51.4	44.5	NA	NA	10.1	8.22	4.58	26.3	4.31 J
Cyanide	1.02 U	1.08 U	NA	NA	2.95	0.439 U	0.438 U	1.3 UL	0.649 U
Iron	35,200	28,400	NA	NA	8,450	5,340	8,770	30,900	14,600
Lead	78.2	63.8	NA	NA	14.8	11.7	12.4	33.3	6.8
Magnesium	3,000 J	2,480 J	NA	NA	978	517	2,380	4,190 K	1,090 J
Manganese	124	102	NA	NA	47.6	33.4	165	161	57.5
Mercury	1.48	1.23	NA	NA	0.0444 J	0.0325 J	0.0664 J	0.0995 J	0.0391 J
Nickel	13.9	11.8	NA	NA	4.18	2.61	3.62	18.2	3.4 J
Potassium	2,790 J	2,360 J	NA	NA	850	489	428 J	3,370 K	1,470 J
Selenium	5.36 U	5.67 U	NA	NA	0.591 U	0.476 U	1 U	1.32 U	3.28 U
Silver	2.14 U	2.27 U	NA	NA	0.237 U	0.191 U	0.4 U	0.528 U	1.31 U
Sodium	3,220 U	3,400 U	NA	NA	175 J	286 U	600 U	1,290 J	1,970 U
Thallium	4.29 U	4.54 U	NA	NA	0.473 U	0.381 U	0.8 U	1.06 U	2.62 U
Vanadium	54.6	43.6	NA	NA	17.2	9.92	10.9	67.8	19.3
Zinc	187	151	NA	NA	41.9	29.9	41.9	90.4	24.2

Attachment B9
Cheatham Annex, Penniman Lake
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October 2012

Station ID	CAPL-SWSD64				CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V	CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
Sample Date	10/17/12	10/17/12	10/25/12	10/25/12	10/18/12	10/18/12	10/16/12	10/18/12	10/17/12
Chemical Name									
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)									
Zinc, SEM	1.53 D	NA	NA	NA	0.344	0.2	0.198	0.539	0.193
Acid volatile sulfide, SEM	11.8	NA	NA	NA	4.49	3.95	2.85	9.51	6.38
Cadmium, SEM	0.00218 J	NA	NA	NA	0.00103 U	0.00104 J	5.00E-04 J	0.00224 U	0.00119 U
Copper, SEM	0.0695	NA	NA	NA	0.0572	0.024	0.0162	0.124	0.0167 J
Lead, SEM	0.232 D	NA	NA	NA	0.0505	0.0281	0.0228	0.0974	0.021
Mercury, SEM	1.15E-04 U	NA	NA	NA	5.87E-05 U	4.63E-05 U	2.95E-05 U	1.27E-04 U	6.74E-05 U
Nickel, SEM	0.0388 J	NA	NA	NA	0.00866 J	0.00419 J	0.00377 J	0.0262 J	0.0114 J
Silver, SEM	0.0055 U	NA	NA	NA	0.00282 U	0.00222 U	0.00141 U	0.00712 MU	0.00324 U
Wet Chemistry									
pH (ph)	6.83 H3	NA	NA	NA	7.24 H3	7.1 H3	7.1 H3	7.1 H3	6.83 H3
Total organic carbon (TOC) (mg/kg)	75,900	NA	NA	NA	37,900 *	35,000 *	106,000	116,000	72,200 *
Grain Size (pct)									
Coarse Sand (%)	0	NA	NA	NA	0	0.5	6.4	0.4	2.8
Fine Sand (%)	18.3	NA	NA	NA	56.3	69.4	44.6	7.6	39.2
Fines (%)	80.3	NA	NA	NA	34.1	22.9	19	89.9	52.1
Gravel (%)	0	NA	NA	NA	0	0.1	14.7	0	3.3
Medium Sand (%)	1.4	NA	NA	NA	9.6	7.1	15.3	2.1	2.6
Sand (%)	19.7	NA	NA	NA	65.9	77	66.3	10.1	44.6
GRAINSIZE (PCT/P)									
GS03 Sieve 3" (75 mm)	100	NA	NA	NA	100	100	100	100	100
GS05 Sieve 2" (50 mm)	100	NA	NA	NA	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	NA	NA	NA	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	100	NA	NA	NA	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	NA	NA	NA	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	NA	NA	NA	100	100	92.4	100	100
Sieve No. 004 (4.75 mm)	100	NA	NA	NA	100	99.9	85.3	100	96.7
Sieve No. 010 (2.00 mm)	100	NA	NA	NA	100	99.4	78.9	99.6	93.9
Sieve No. 020 (850 um)	99.6	NA	NA	NA	98.6	98.6	74.5	99.4	93
Sieve No. 040 (425 um)	98.6	NA	NA	NA	90.4	92.3	63.6	97.5	91.3
Sieve No. 060 (250 um)	95.3	NA	NA	NA	66	61.1	43.1	95.1	84.4
Sieve No. 080 (180 um)	90	NA	NA	NA	50	37.3	30.4	93.5	73.8
Sieve No. 100 (150 um)	86.9	NA	NA	NA	42.7	29.2	24.9	92.7	66.2
Sieve No. 200 (75 um)	80.3	NA	NA	NA	34.1	22.9	19	89.9	52.1

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Notes:

Shading indicates detections

NA - Not analyzed
* - Exceeding quality control criteria are associated with the reported result (unvalidated data)
B - Analyte not detected above the level reported in blanks
D - Compound identified in an analysis at a secondary dilution factor (unvalidated data)
H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
M - Indicates that the sample matrix interfered with the quantitation of the analyte (unvalidated data)
N- The MS/MSD accuracy and/ or precision are outside criteria or the predigested spike recovery is not within control limits for the associated parameter (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
Y- The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side (unvalidated data)
mg/kg - Milligrams per kilogram
pct - Percent
pct/p - Percent passed
ph - pH units
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD70	CAPL-SD71	CAPL-SD72	CAPL-SD73	CAPL-SD74		CAPL-SD75	CAPL-SD76	CAPL-SD77	CAPL-SD78	CAPL-SD79	
Sample ID	CAPL-SSD70-1012	CAPL-SSD71-1012	CAPL-SSD72-1012	CAPL-SSD73-1012	CAPL-SSD74-1012	CAPL-SSD74P-1012	CAPL-SSD75-1012	CAPL-SSD76-1012	CAPL-SSD77-1012	CAPL-SSD78-1012	CAPL-SSD79-1012	CAPL-SSD79-1012-V
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/18/12	10/18/12	10/18/12	10/16/12	10/16/12	10/16/12	10/16/12	10/25/12
Chemical Name												
Volatile Organic Compounds (µg/kg)												
1,1,1-Trichloroethane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
1,1,2,2-Tetrachloroethane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	8.95 U	18.7 U	24.1 U	23.7 U	27.1 U	24.1 U	37.6 U	4.91 UJ	4.85 UJ	13.1 UJ	NA	6.57 U
1,1,2-Trichloroethane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
1,1-Dichloroethane	4.48 UL	9.37 UL	12 UL	11.8 UL	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
1,1-Dichloroethene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UJ	2.42 UJ	6.56 UJ	NA	3.29 U
1,2,3-Trichlorobenzene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 U	6.56 U	NA	3.29 U
1,2,4-Trichlorobenzene	4.48 U	9.37 U	12 U	11.8 U	13.6 UL	12.1 UL	18.8 UL	2.46 UL	2.42 U	6.56 U	NA	3.29 U
1,2-Dibromo-3-chloropropane	8.95 U	18.7 U	24.1 U	23.7 U	27.1 U	24.1 U	37.6 U	4.91 U	4.85 U	13.1 U	NA	6.57 U
1,2-Dibromoethane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
1,2-Dichlorobenzene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 U	6.56 U	NA	3.29 U
1,2-Dichloroethane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
1,2-Dichloropropane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
1,3-Dichlorobenzene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 U	6.56 U	NA	3.29 U
1,4-Dichlorobenzene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 U	6.56 U	NA	3.29 U
2-Butanone	43.3	71.6	39.6 J	92.6	49.2 J	59.5	71.2 J	3.66 J	8.71 J	27.9	NA	3.88 J
2-Hexanone	8.95 U	18.7 U	24.1 U	23.7 U	27.1 U	24.1 U	37.6 U	4.91 U	4.85 U	13.1 U	NA	6.57 U
4-Methyl-2-pentanone	8.95 U	18.7 U	24.1 U	23.7 U	27.1 U	24.1 U	37.6 U	4.91 U	4.85 U	13.1 U	NA	6.57 U
Acetone	141 J	271 J	151 J	347 J	224 J	234 J	323 J	17.3 J	36.3	107	NA	17.2 J
Benzene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Bromochloromethane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Bromodichloromethane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Bromoform	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Bromomethane	8.95 U	18.7 U	24.1 U	23.7 U	27.1 U	24.1 U	37.6 U	4.91 UJ	4.85 UJ	13.1 UJ	NA	6.57 U
Carbon disulfide	4.48 U	9.37 U	11.5 J	11.8 U	13.4 J	9.4 J	9.7 J	2.46 UJ	2.42 UJ	6.56 UJ	NA	3.29 U
Carbon tetrachloride	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Chlorobenzene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 U	6.56 U	NA	3.29 U
Chloroethane	8.95 UJ	18.7 UJ	24.1 UJ	23.7 UJ	27.1 U	24.1 U	37.6 U	4.91 UJ	4.85 UJ	13.1 UJ	NA	6.57 U
Chloroform	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Chloromethane	8.95 UJ	18.7 UJ	24.1 UJ	23.7 UJ	27.1 UJ	24.1 UJ	37.6 UJ	4.91 UJ	4.85 UJ	13.1 UJ	NA	6.57 U
cis-1,2-Dichloroethene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
cis-1,3-Dichloropropene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 U	6.56 U	NA	3.29 U
Cyclohexane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 UJ	6.56 UJ	NA	3.29 U
Dibromochloromethane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Dichlorodifluoromethane (Freon-12)	8.95 U	18.7 U	24.1 U	23.7 U	27.1 U	24.1 U	37.6 U	4.91 UJ	4.85 UJ	13.1 UJ	NA	6.57 U
Ethylbenzene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Isopropylbenzene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 U	6.56 U	NA	3.29 U
Methyl acetate	8.95 U	18.7 U	24.1 U	23.7 U	27.1 U	24.1 U	37.6 U	4.91 U	4.85 U	13.1 U	NA	6.57 U
Methylcyclohexane	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 U	6.56 U	NA	3.29 U
Methylene chloride	8.95 UJ	18.7 UJ	24.1 UJ	23.7 UJ	27.1 U	24.1 U	37.6 U	4.91 UJ	4.85 UJ	13.1 UJ	NA	6.57 U
Methyl-tert-butyl ether (MTBE)	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Styrene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 UL	2.42 U	6.56 U	NA	3.29 U
Tetrachloroethene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Toluene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
trans-1,2-Dichloroethene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
trans-1,3-Dichloropropene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Trichloroethene	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 U
Trichlorofluoromethane (Freon-11)	8.95 U	18.7 U	24.1 U	23.7 U	27.1 U	24.1 U	37.6 U	4.91 U	4.85 U	13.1 U	NA	6.57 U
Vinyl chloride	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U	2.46 U	2.42 U	6.56 U	NA	3.29 UJ
Xylene, total	13.4 U	28.1 U	36.1 U	35.5 U	40.7 U	36.2 U	56.4 U	7.37 UL	7.27 U	19.7 U	NA	9.86 U

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD70	CAPL-SD71	CAPL-SD72	CAPL-SD73	CAPL-SD74		CAPL-SD75	CAPL-SD76	CAPL-SD77	CAPL-SD78	CAPL-SD79	
Sample ID	CAPL-SSD70-1012	CAPL-SSD71-1012	CAPL-SSD72-1012	CAPL-SSD73-1012	CAPL-SSD74-1012	CAPL-SSD74P-1012	CAPL-SSD75-1012	CAPL-SSD76-1012	CAPL-SSD77-1012	CAPL-SSD78-1012	CAPL-SSD79-1012	CAPL-SSD79-1012-V
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/18/12	10/18/12	10/18/12	10/16/12	10/16/12	10/16/12	10/16/12	10/25/12
Chemical Name												
Semivolatile Organic Compounds (µg/kg)												
1,1-Biphenyl	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
1,2,4,5-Tetrachlorobenzene	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2,2'-Oxybis(1-chloropropane)	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2,3,4,6-Tetrachlorophenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2,4,5-Trichlorophenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2,4,6-Trichlorophenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2,4-Dichlorophenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2,4-Dimethylphenol	110,000 U	2,200 U	3,910 U	3,020 U	3,260 U	3,120 U	15,600 U	876 U	871 U	1,620 U	967 U	NA
2,4-Dinitrophenol	275,000 U	5,500 U	9,790 U	7,560 U	8,160 U	7,820 U	39,000 U	2,190 U	2,180 U	4,040 U	2,420 U	NA
2,4-Dinitrotoluene	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2,6-Dinitrotoluene	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2-Chloronaphthalene	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2-Chlorophenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2-Methylnaphthalene	1,420	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	10.7	40.3 U	9.45 J	NA
2-Methylphenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
2-Nitroaniline	110,000 U	2,200 U	3,910 U	3,020 U	3,260 U	3,120 U	15,600 U	876 U	871 U	1,620 U	967 U	NA
2-Nitrophenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
3,3'-Dichlorobenzidine	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
3-Nitroaniline	110,000 U	2,200 U	3,910 U	3,020 U	3,260 U	3,120 U	15,600 U	876 U	871 U	1,620 U	967 U	NA
4,6-Dinitro-2-methylphenol	275,000 U	5,500 U	9,790 U	7,560 U	8,160 U	7,820 U	39,000 U	2,190 U	2,180 U	4,040 U	2,420 U	NA
4-Bromophenyl-phenylether	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
4-Chloro-3-methylphenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
4-Chloroaniline	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
4-Chlorophenyl-phenylether	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
4-Methylphenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
4-Nitroaniline	110,000 U	2,200 U	3,910 U	3,020 U	3,260 U	3,120 U	15,600 U	876 U	871 U	1,620 U	967 U	NA
4-Nitrophenol	110,000 U	2,200 U	3,910 U	3,020 U	3,260 U	3,120 U	15,600 U	876 U	871 U	1,620 U	967 U	NA
Acenaphthene	79,800	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U	40.3 U	4.83 U	NA
Acenaphthylene	548 U	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U	40.3 U	4.83 U	NA
Acetophenone	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Anthracene	85,600	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U	40.3 U	4.83 U	NA
Atrazine	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Benzaldehyde	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Benzo(a)anthracene	36,600	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	19.7	99.9	4.83 U	NA
Benzo(a)pyrene	20,500	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	9.1	18.9	87.4	4.83 U	NA
Benzo(b)fluoranthene	16,100	11 U	19.5 U	15.1 U	20.8 J	15.6 U	77.8 U	7.75 J	15.5	87.4	4.83 U	NA
Benzo(g,h,i)perylene	5,990	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	7.15 J	11	92	4.83 U	NA
Benzo(k)fluoranthene	17,700	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	5.29 J	18	68.1 J	4.83 U	NA
bis(2-Chloroethoxy)methane	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
bis(2-Chloroethyl)ether	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
bis(2-Ethylhexyl)phthalate	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Butylbenzylphthalate	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Caprolactam	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Carbazole	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Chrysene	46,300	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	21.8	194	4.83 U	NA
Dibenz(a,h)anthracene	2,710	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U	40.3 U	4.83 U	NA
Dibenzofuran	32,900 J	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Diethylphthalate	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Dimethyl phthalate	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Di-n-butylphthalate	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Di-n-octylphthalate	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Fluoranthene	125,000	9.84 J	19.5 U	13.1 J	27.1 J	15.6 U	55.5 J	6.27 J	24.2	186	16.2	NA
Fluorene	81,700	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U	40.3 U	4.83 U	NA
Hexachlorobenzene	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Hexachlorobutadiene	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Hexachlorocyclopentadiene	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 R	218 U	404 U	242 U	NA
Hexachloroethane	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Indeno(1,2,3-cd)pyrene	5,960	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	5.21 J	10.6	63.3 J	4.83 U	NA
Isophorone	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Naphthalene	548 U	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U	4.38 U	4.35 U	131	145	NA
n-Nitroso-di-n-propylamine	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
n-Nitrosodiphenylamine	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Nitrobenzene	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Pentachlorophenol	110,000 U	2,200 U	3,910 U	3,020 U	3,260 U	3,120 U	15,600 U	876 U	871 U	1,620 U	967 U	NA
Phenanthrene	287,000	11 U	19.5 U	15.1 U	22.3 J	15.6 U	77.8 U	4.38 U	4.35 U	131	4.83 U	NA
Phenol	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U	219 U	218 U	404 U	242 U	NA
Pyrene	135,000	9.76 J	19.5 U	14.4 J	25.9 J	15.6 U	48.2 J	7.97 J	23.4	283	17.3	NA

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD70	CAPL-SD71	CAPL-SD72	CAPL-SD73	CAPL-SD74		CAPL-SD75	CAPL-SD76	CAPL-SD77	CAPL-SD78	CAPL-SD79	
Sample ID	CAPL-SSD70-1012	CAPL-SSD71-1012	CAPL-SSD72-1012	CAPL-SSD73-1012	CAPL-SSD74-1012	CAPL-SSD74P-1012	CAPL-SSD75-1012	CAPL-SSD76-1012	CAPL-SSD77-1012	CAPL-SSD78-1012	CAPL-SSD79-1012	CAPL-SSD79-1012-V
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/18/12	10/18/12	10/18/12	10/16/12	10/16/12	10/16/12	10/16/12	10/25/12
Chemical Name												
Pesticide/Polychlorinated Biphenyls (µg/kg)												
4,4'-DDD	70.7 J	3.85 J	1.98 U	6.99 J	2.96 J	1.86 J	1.58 U	3.16 J	0.438 UL	33.6 L	0.804 L	NA
4,4'-DDE	50.1 J	8.61 J	1.98 U	21.6 J	6.22 J	5.12 J	3.67 J	6.3	20 J	251 J	32.7 J	NA
4,4'-DDT	4.21 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.67 J	5.25 J	9.17 J	3.14 J	NA
Aldrin	0.453 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 U	0.414 J	0.792 U	0.934 J	NA
alpha-BHC	3.69 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 UL	0.438 UL	0.792 U	0.478 U	NA
alpha-Chlordane	7.13 J	0.492 J	1.98 U	2.1 J	1.55 J	1.64 UL	1.58 U	0.447 U	3.88 L	34.7	9.94 L	NA
Aroclor-1260	2,030 J	37.3 J	48.5 U	52.7 J	40.7 U	40.2 UL	38.6 U	10.9 U	1,170	3,020 J	630 J	NA
beta-BHC	26.2 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 U	0.438 UL	0.792 U	1.12 L	NA
delta-BHC	6.34 J	1.11 U	1.98 U	1.07 J	1.66 U	1.64 UL	1.58 U	0.447 UL	0.438 U	0.582 J	0.478 U	NA
Dieldrin	8.03 J	2.1 J	1.98 U	3.01 J	1.66 U	0.919 J	1.58 U	0.447 U	5.14 J	50.1 L	6.88 J	NA
Endosulfan I	0.571 UL	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.376 L	0.438 UL	1.21 J	0.22 J	NA
Endosulfan II	0.806 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 U	0.438 UL	1.3 L	12.5 L	NA
Endosulfan sulfate	45.9 J	0.946 J	1.98 U	1.48 J	0.921 J	1.64 UL	1.58 U	2.01 K	0.438 U	102 J	20.3 L	NA
Endrin	23.9 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.355 J	0.438 UL	49 L	1.15 J	NA
Endrin aldehyde	5.18 J	2.29 J	1.98 U	0.813 J	2.27 J	1.64 J	1.58 U	0.447 UL	3.54 J	16.2 L	2.1 J	NA
Endrin ketone	3.62 J	2.73	1.98 U	3.04 J	1.66 U	1.64 L	1.58 U	0.447 U	3.41 J	8.6 J	1.72 J	NA
gamma-BHC (Lindane)	0.201 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 U	0.438 U	0.683 J	0.478 U	NA
gamma-Chlordane	26.9 J	1.11 J	16.4 J	2.69 J	14.7 J	8.95 J	1.8 J	0.667 L	26.1	212	40.6	NA
Heptachlor	1.56 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	0.964 J	0.447 U	0.438 UL	0.792 U	0.478 U	NA
Heptachlor epoxide	0.571 UL	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	0.447 UL	0.856 L	3.43 L	0.72 L	NA
Methoxychlor	10.3 J	0.478 J	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U	1.12 J	3.14 J	276 J	9.38 J	NA
Toxaphene	37 UL	71.9 UJ	128 UJ	97.2 UJ	108 UJ	106 UJ	102 UJ	28.9 UJ	28.4 UJ	51.3 UJ	30.9 UJ	NA
Explosives (µg/kg)												
1,3,5-Trinitrobenzene	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
1,3-Dinitrobenzene	551	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	456	117 J	NA
2,4,6-Trinitrotoluene	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
2-Amino-4,6-dinitrotoluene	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
2-Nitrotoluene	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
3,5-Dinitroaniline	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
3-Nitrotoluene	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
4-Amino-2,6-dinitrotoluene	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
4-Nitrotoluene	178 U	197 U	190 U	109 J	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
HMX	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
Nitroglycerin	444 U	928 J	476 U	1,160	485 U	493 U	842 J	467 U	500 U	498 U	483 U	NA
Nitroguanidine	94.3 U	98 U	107 U	96.6 U	105 U	105 U	103 U	104 U	103 U	103 U	97.6 U	NA
PETN	444 U	493 U	476 U	474 U	485 U	493 U	481 U	467 U	500 U	498 U	483 U	NA
RDX	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
Tetryl	178 U	197 U	190 U	190 U	194 U	197 U	192 U	187 U	200 U	199 U	193 U	NA
Total Metals (mg/kg)												
Aluminum	4,690	15,900	21,100	29,100	18,800	19,700	22,300	1,740	3,690	10,500	4,070	NA
Antimony	3.53 U	6.84 U	11.9 U	9.26 U	4.01 U	3.93 U	3.83 U	0.577 UL	0.561 U	1.99 U	0.599 U	NA
Arsenic	16.5	26.5	31.2	52	47	43.5	40.6	0.801	2.18	8.75	3.11	NA
Barium	36.5	59.9	53.7 J	104	62.8	65.6	75.4	7.13	18.7	49.5	21.3	NA
Beryllium	0.443 J	0.876 J	2.97 U	1.44 J	1.04 J	1.07 J	1.04 J	0.144 U	0.163 J	0.558 J	0.209 J	NA
Cadmium	0.883 U	1.71 U	2.97 U	2.31 U	1 U	0.983 U	0.958 U	0.144 U	0.14 U	0.417 J	0.15 U	NA
Calcium	27,300	96,100	20,800	92,000	54,700	59,900	68,300	481 K	667	4,650	1,650	NA
Chromium	11.5	31.7	35.2	54.2	35.5	37.9	40.1	2.65	5.52	15.2	6.11	NA
Cobalt	2.23 J	4.41 J	14.8 U	7.32 J	5.97 J	6.28	6.54	0.389 J	0.995	2.95 J	1.23	NA
Copper	10.4	29.2	14.7 J	60	31.7	39.1	44	0.883	2.2	19.8	2.62	NA
Cyanide	0.399 U	0.778 U	1.57 U	1.18 U	1.13 U	1.16 U	1.1 U	0.298 U	0.332 U	0.577 U	0.351 U	NA
Iron	14,900	24,500	21,200	41,800	31,100	30,500	30,000	1,520	3,530	11,300	4,400	NA
Lead	37.6	47.9	22.3	92.3	41.8	44	48.5	3.98	10.4	43	10.6	NA
Magnesium	1,050 J	2,760 J	3,410 J	4,650 J	3,170	3,340	4,090	146 K	283 J	989 J	347 J	NA
Manganese	48.4	106	120	180	151	150	142	5.77	8.18	32.3	12.3	NA
Mercury	0.0538 J	0.12	0.167 U	0.13 J	0.106 J	0.106 J	0.113 J	0.0234 J	0.0244 J	0.0894 J	0.0331 J	NA
Nickel	4.07 J	9.94	12 J	18	13.4	14	15.8	0.945	1.94	6.36	2.15	NA
Potassium	1,110 J	2,180 J	2,830 J	3,510 J	2,390 J	2,520	2,920	130 K	271 J	804 J	338 J	NA
Selenium	2.21 U	4.28 U	7.42 U	5.79 U	2.51 U	2.46 U	2.4 U	0.36 U	0.351 U	1.24 U	0.374 U	NA
Silver	0.883 U	1.71 U	2.97 U	2.31 U	1 U	0.983 U	0.958 U	0.144 U	0.14 U	0.497 U	0.15 U	NA
Sodium	1,320 U	2,570 U	4,450 U	1,640 J	1,500 U	1,470 U	1,090 J	216 U	210 U	745 U	224 U	NA
Thallium	1.77 U	3.42 U	5.94 U	4.63 U	2 U	1.97 U	1.92 U	0.288 U	0.28 U	0.993 U	0.299 U	NA
Vanadium	14.7	41.1	48.9	67	48.8	50.2	52.9	3.89	7.92	23.5	9.04	NA
Zinc	67.8	102	56.6	186	97.4	103	118	3.99	18.2	84.3	21.1	NA

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD70	CAPL-SD71	CAPL-SD72	CAPL-SD73	CAPL-SD74		CAPL-SD75	CAPL-SD76	CAPL-SD77	CAPL-SD78	CAPL-SD79	
Sample ID	CAPL-SSD70-1012	CAPL-SSD71-1012	CAPL-SSD72-1012	CAPL-SSD73-1012	CAPL-SSD74-1012	CAPL-SSD74P-1012	CAPL-SSD75-1012	CAPL-SSD76-1012	CAPL-SSD77-1012	CAPL-SSD78-1012	CAPL-SSD79-1012	CAPL-SSD79-1012-V
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/18/12	10/18/12	10/18/12	10/16/12	10/16/12	10/16/12	10/16/12	10/25/12
Chemical Name												
Wet Chemistry												
pH (ph)	7.02 H3	6.86 H3	7.36 H3	7.06 H3	7.71 H3	NA	7.13 H3	6.93 H3	7 H3	6.79 H3	7 H3	NA
Total organic carbon (TOC) (mg/kg)	33,600	44,500	165,000	57,300	124,000	NA	74,400	7,570	15,800	63,700	25,500	NA

\\VBOFPP01\Proj\CLEAN\IBASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Attachment B_Analytical Results\[B10_PennLake_SSD_raw_v1_jd.xlsx], Campbell, Clairette/VBO, 03/14/2014

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD80		CAPL-SD81	CAPL-SD82	CAPL-SD84	CAPL-SD85	CAPL-SD86	CAPL-SD87	CAPL-SWSD62	CAPL-SWSD63	CAPL-SWSD64	CAPL-SWSD65
Sample ID	CAPL-SSD80-1012	CAPL-SSD80-1012-V	CAPL-SSD81-1012	CAPL-SSD82-1012	CAPL-SSD84-1012	CAPL-SSD85-1012	CAPL-SSD86-1012	CAPL-SSD87-1012	CAPL-SSD62-1012	CAPL-SSD63-1012	CAPL-SSD64-1012	CAPL-SSD65-1012
Sample Date	10/16/12	10/25/12	10/18/12	10/18/12	10/24/12	10/24/12	10/24/12	10/24/12	10/17/12	10/17/12	10/17/12	10/18/12
Chemical Name												
Volatile Organic Compounds (µg/kg)												
1,1,1-Trichloroethane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,1,2,2-Tetrachloroethane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	10.4 U	24.2 U	45.5 U	6.52 U	5.85 U	5.19 U	7.8 U	24.3 U	24.2 U	23.5 U	14.8 U
1,1,2-Trichloroethane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,1-Dichloroethane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 UL	12.1 UL	11.8 UL	7.41 U
1,1-Dichloroethene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,2,3-Trichlorobenzene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,2,4-Trichlorobenzene	NA	5.2 U	12.1 UL	22.7 UL	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 UL
1,2-Dibromo-3-chloropropane	NA	10.4 U	24.2 U	45.5 U	6.52 UJ	5.85 UJ	5.19 UJ	7.8 UJ	24.3 U	24.2 U	23.5 U	14.8 U
1,2-Dibromoethane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,2-Dichlorobenzene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,2-Dichloroethane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,2-Dichloropropane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,3-Dichlorobenzene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
1,4-Dichlorobenzene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
2-Butanone	NA	57.3	22.7 J	116	7.37 J	3.55 J	6.23 J	23.9	89.3	138	117	19.4 J
2-Hexanone	NA	10.4 U	24.2 U	45.5 U	6.52 U	5.85 U	5.19 U	7.8 U	24.3 U	24.2 U	23.5 U	14.8 U
4-Methyl-2-pentanone	NA	10.4 U	24.2 U	45.5 U	6.52 U	5.85 U	5.19 U	7.8 U	24.3 U	24.2 U	23.5 U	14.8 U
Acetone	NA	195 J	120 J	438 J	25 J	16.7 J	26.3 J	90.6 J	331 J	459 J	415 J	77.6 J
Benzene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Bromochloromethane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Bromodichloromethane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Bromoform	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Bromomethane	NA	10.4 U	24.2 U	45.5 U	6.52 U	5.85 U	5.19 U	7.8 U	24.3 U	24.2 U	23.5 U	14.8 U
Carbon disulfide	NA	7.31 J	29.7	22.7 U	2.11 J	2.92 U	4.19 J	3.9 U	12.1 U	12.1 U	11.8 U	6.02 J
Carbon tetrachloride	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Chlorobenzene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Chloroethane	NA	10.4 U	24.2 U	45.5 U	6.52 U	5.85 U	5.19 U	7.8 U	24.3 UJ	24.2 UJ	23.5 UJ	14.8 U
Chloroform	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Chloromethane	NA	10.4 U	24.2 UJ	45.5 UJ	6.52 U	5.85 U	5.19 U	7.8 U	24.3 UJ	24.2 UJ	23.5 UJ	14.8 UJ
cis-1,2-Dichloroethene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
cis-1,3-Dichloropropene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Cyclohexane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Dibromochloromethane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Dichlorodifluoromethane (Freon-12)	NA	10.4 U	24.2 U	45.5 U	6.52 U	5.85 U	5.19 U	7.8 U	24.3 U	24.2 U	23.5 U	14.8 U
Ethylbenzene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Isopropylbenzene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Methyl acetate	NA	10.4 U	24.2 U	45.5 U	6.52 U	5.85 U	5.19 U	7.8 U	24.3 U	24.2 U	23.5 U	14.8 U
Methylcyclohexane	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Methylene chloride	NA	10.4 U	24.2 U	45.5 U	6.52 U	5.85 U	5.19 U	7.8 U	24.3 UJ	24.2 UJ	23.5 UJ	14.8 U
Methyl-tert-butyl ether (MTBE)	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Styrene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Tetrachloroethene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Toluene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
trans-1,2-Dichloroethene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
trans-1,3-Dichloropropene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Trichloroethene	NA	5.2 U	12.1 U	22.7 U	3.26 U	2.92 U	2.59 U	3.9 U	12.1 U	12.1 U	11.8 U	7.41 U
Trichlorofluoromethane (Freon-11)	NA	10.4 U	24.2 U	45.5 U	6.52 U	5.85 U	5.19 U	7.8 U	24.3 U	24.2 U	23.5 U	14.8 U
Vinyl chloride	NA	5.2 UJ	12.1 U	22.7 U	3.26 UJ	2.92 UJ	2.59 UJ	3.9 UJ	12.1 U	12.1 U	11.8 U	7.41 U
Xylene, total	NA	15.6 U	36.3 U	68.2 U	9.78 U	8.77 U	7.78 U	11.7 U	36.4 U	36.3 U	35.3 U	22.2 U

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD80		CAPL-SD81	CAPL-SD82	CAPL-SD84	CAPL-SD85	CAPL-SD86	CAPL-SD87	CAPL-SWSD62	CAPL-SWSD63	CAPL-SWSD64	CAPL-SWSD65
Sample ID	CAPL-SSD80-1012	CAPL-SSD80-1012-V	CAPL-SSD81-1012	CAPL-SSD82-1012	CAPL-SSD84-1012	CAPL-SSD85-1012	CAPL-SSD86-1012	CAPL-SSD87-1012	CAPL-SSD62-1012	CAPL-SSD63-1012	CAPL-SSD64-1012	CAPL-SSD65-1012
Sample Date	10/16/12	10/25/12	10/18/12	10/18/12	10/24/12	10/24/12	10/24/12	10/24/12	10/17/12	10/17/12	10/17/12	10/18/12
Chemical Name												
Semivolatile Organic Compounds (µg/kg)												
1,1-Biphenyl	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
1,2,4,5-Tetrachlorobenzene	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2,2'-Oxybis(1-chloropropane)	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2,3,4,6-Tetrachlorophenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2,4,5-Trichlorophenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2,4,6-Trichlorophenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2,4-Dichlorophenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2,4-Dimethylphenol	1,240 U	NA	680 U	22,600 U	820 U	822 U	842 U	944 U	2,520 U	2,560 U	2,620 U	1,980 U
2,4-Dinitrophenol	3,100 U	NA	1,700 U	56,600 U	2,050 U	2,060 U	2,110 U	2,360 U	6,310 U	6,410 U	6,560 U	4,960 U
2,4-Dinitrotoluene	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2,6-Dinitrotoluene	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2-Chloronaphthalene	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2-Chlorophenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2-Methylnaphthalene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	47.2 U	12.6 U	50 J	13.1 U	9.9 U
2-Methylphenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
2-Nitroaniline	1,240 U	NA	680 U	22,600 U	820 U	822 U	842 U	944 U	2,520 U	2,560 U	2,620 U	1,980 U
2-Nitrophenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
3,3'-Dichlorobenzidine	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
3-Nitroaniline	1,240 U	NA	680 U	22,600 U	820 U	822 U	842 U	944 U	2,520 U	2,560 U	2,620 U	1,980 U
4,6-Dinitro-2-methylphenol	3,100 U	NA	1,700 U	56,600 U	2,050 U	2,060 U	2,110 U	2,360 U	6,310 U	6,410 U	6,560 U	4,960 U
4-Bromophenyl-phenylether	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
4-Chloro-3-methylphenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
4-Chloroaniline	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
4-Chlorophenyl-phenylether	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
4-Methylphenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
4-Nitroaniline	1,240 U	NA	680 U	22,600 U	820 U	822 U	842 U	944 U	2,520 U	2,560 U	2,620 U	1,980 U
4-Nitrophenol	1,240 U	NA	680 U	22,600 U	820 U	822 U	842 U	944 U	2,520 U	2,560 U	2,620 U	1,980 U
Acenaphthene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	1,270 K	12.6 U	38.6 J	13.1 U	9.9 U
Acenaphthylene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	47.2 U	12.6 U	63.9 U	13.1 U	9.9 U
Acetophenone	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Anthracene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	2,650	12.6 U	63.9 U	13.1 U	9.9 U
Atrazine	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Benzaldehyde	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	931 J	656 U	496 U
Benzo(a)anthracene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.43 J	2,300	12.6 U	63.9 U	13.1 U	9.9 U
Benzo(a)pyrene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	1,230 K	12.6 U	63.9 U	13.1 U	9.9 U
Benzo(b)fluoranthene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	6.61 K	1,400 K	12.6 U	80.1 J	13.1 U	9.9 U
Benzo(g,h,i)perylene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	466 K	12.6 U	63.9 U	13.1 U	9.9 U
Benzo(k)fluoranthene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	726	12.6 U	61.3 J	13.1 U	9.9 U
bis(2-Chloroethoxy)methane	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
bis(2-Chloroethyl)ether	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
bis(2-Ethylhexyl)phthalate	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Butylbenzylphthalate	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Caprolactam	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Carbazole	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Chrysene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	6.28 K	2,350 K	12.6 U	63.9 U	13.1 U	9.9 U
Dibenz(a,h)anthracene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	134 K	12.6 U	63.9 U	13.1 U	9.9 U
Dibenzofuran	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	380 J	631 U	641 U	656 U	496 U
Diethylphthalate	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Dimethyl phthalate	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Di-n-butylphthalate	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Di-n-octylphthalate	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Fluoranthene	12.4 J	NA	7.01 J	66.5 J	9.91	4.1 U	11	6,230	9.31 J	127 J	9.64 J	8.82 J
Fluorene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	1,340 K	12.6 U	63.9 U	13.1 U	9.9 U
Hexachlorobenzene	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Hexachlorobutadiene	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Hexachlorocyclopentadiene	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Hexachloroethane	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Indeno(1,2,3-cd)pyrene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.33 J	386	12.6 U	63.9 U	13.1 U	9.9 U
Isophorone	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Naphthalene	6.18 U	NA	11.5 U	113 U	4.09 U	4.1 U	4.2 U	47.2 U	12.6 U	63.9 U	13.1 U	9.9 U
n-Nitroso-di-n-propylamine	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
n-Nitrosodiphenylamine	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Nitrobenzene	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Pentachlorophenol	1,240 U	NA	680 U	22,600 U	820 U	822 U	842 U	944 U	2,520 U	2,560 U	2,620 U	1,980 U
Phenanthrene	6.18 U	NA	11.5 U	113 U	6.8 J	4.1 U	4.95 J	7,590	12.6 U	112 J	13.1 U	9.9 U
Phenol	310 U	NA	170 U	5,660 U	205 U	206 U	211 U	236 U	631 U	641 U	656 U	496 U
Pyrene	11.1 J	NA	11.5 U	64.8 J	9.78 K	4.1 U	8.84 K	6,970 K	7.72 J	111 J	9.35 J	7.81 J

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD80		CAPL-SD81	CAPL-SD82	CAPL-SD84	CAPL-SD85	CAPL-SD86	CAPL-SD87	CAPL-SWSD62	CAPL-SWSD63	CAPL-SWSD64	CAPL-SWSD65
Sample ID	CAPL-SSD80-1012	CAPL-SSD80-1012-V	CAPL-SSD81-1012	CAPL-SSD82-1012	CAPL-SSD84-1012	CAPL-SSD85-1012	CAPL-SSD86-1012	CAPL-SSD87-1012	CAPL-SSD62-1012	CAPL-SSD63-1012	CAPL-SSD64-1012	CAPL-SSD65-1012
Sample Date	10/16/12	10/25/12	10/18/12	10/18/12	10/24/12	10/24/12	10/24/12	10/24/12	10/17/12	10/17/12	10/17/12	10/18/12
Chemical Name												
Pesticide/Polychlorinated Biphenyls (µg/kg)												
4,4'-DDD	0.607 U	NA	1.12 U	2.32 U	0.422 U	3.02 J	7.08 L	13.6 J	17.7 J	3.06 J	5.53 J	0.986 U
4,4'-DDE	3.57 J	NA	1.12 U	4.8	17.1 J	9.61	23.5 L	2.09 J	26.4 J	10.1 J	9.13 J	3.35 J
4,4'-DDT	0.607 U	NA	1.12 U	2.32 U	218 J	11.2 J	13.9 J	0.441 J	0.848 J	0.959 J	1.36 UL	0.986 U
Aldrin	0.607 U	NA	1.12 U	2.32 U	5.33 J	0.196 J	0.715 J	0.493 UL	1.27 UL	1.35 UL	1.36 UL	0.986 U
alpha-BHC	0.606 J	NA	1.12 U	2.32 U	0.422 U	0.423 U	0.441 U	0.493 UL	0.563 J	1.35 UL	1.36 UL	0.986 U
alpha-Chlordane	0.607 U	NA	1.12 U	2.32 U	13.4 J	3.34	17 J	1.48 J	1.64 L	1.04 L	1.44 L	0.457 J
Aroclor-1260	14.9 U	NA	27.4 U	36.6 J	34,200 J	1,840 J	3,700 J	138 L	169 J	217 J	33.4 UL	24.2 U
beta-BHC	0.607 U	NA	1.12 U	2.32 U	0.422 U	0.423 U	0.441 UL	1.26	1.27 UL	1.35 UL	1.36 UL	0.986 U
delta-BHC	0.607 U	NA	1.12 U	2.32 U	0.505 J	0.423 U	0.642 L	0.387 L	1.27 UL	0.509 J	1.36 UL	0.986 U
Dieldrin	0.323 J	NA	1.12 U	2.32 U	709	4.07 J	62.4 J	3.49 J	4.65 J	4.36 J	1.36 UL	0.986 U
Endosulfan I	0.607 U	NA	1.12 U	2.32 U	0.422 U	0.354 J	0.663 J	0.493 UL	1.27 UL	1.35 UL	1.36 UL	0.986 U
Endosulfan II	0.607 U	NA	1.12 U	2.32 U	483 J	18.1 J	39.7 J	0.595 J	2.1 J	2.44 J	1.36 UL	0.986 U
Endosulfan sulfate	0.607 U	NA	1.12 U	2.32 U	129 J	0.423 U	0.441 U	0.493 UL	6.42 J	9.51 J	1.36 UL	1.66 J
Endrin	0.607 U	NA	1.12 U	2.32 U	59.1 J	12.2 J	31.1 J	3.12 J	0.859 J	1.09 J	1.36 UL	0.986 U
Endrin aldehyde	0.607 U	NA	1.12 U	2.32 U	30 J	1.56 J	2.55 J	0.284 J	5.11 L	4.52 J	1.36 UL	1.45 J
Endrin ketone	0.607 U	NA	1.12 U	2.32 U	28 J	5.59 J	13.1 J	0.592 J	16.5 J	1.35 UL	1.36 UL	0.986 U
gamma-BHC (Lindane)	0.415 J	NA	1.12 U	2.32 U	0.427 J	0.423 U	0.441 UL	0.493 UL	1.27 UL	1.35 UL	1.36 UL	0.986 U
gamma-Chlordane	1.3	NA	1.85 J	3.72 J	40.8 B	11.6	38.1 B	7.05 L	2.12 J	12.2 L	1.26 J	9.23 B
Heptachlor	0.607 U	NA	1.12 U	2.32 U	0.422 U	0.423 U	0.441 U	0.493 UL	1.27 UL	1.35 UL	1.36 UL	0.927 J
Heptachlor epoxide	0.607 U	NA	1.12 U	2.32 U	6.42 J	0.965 J	1.75 L	0.422 J	1.27 UL	1.35 UL	1.36 UL	0.986 U
Methoxychlor	0.607 U	NA	1.12 U	2.32 U	137 J	5.58 J	10.1 J	0.947 J	16.2 J	1.35 UL	1.36 UL	0.986 U
Toxaphene	39.3 UJ	NA	72.5 UJ	150 UJ	27.3 UJ	27.4 UJ	28.5 UJ	31.9 UJ	82.4 UJ	87.5 UJ	88.2 UJ	63.8 UJ
Explosives (µg/kg)												
1,3,5-Trinitrobenzene	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
1,3-Dinitrobenzene	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
2,4,6-Trinitrotoluene	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
2-Amino-4,6-dinitrotoluene	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
2-Nitrotoluene	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
3,5-Dinitroaniline	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
3-Nitrotoluene	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
4-Amino-2,6-dinitrotoluene	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
4-Nitrotoluene	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
HMX	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
Nitroglycerin	498 U	NA	483 U	968 J	500 U	455 U	455 U	476 U	326 J	490 U	996 J	459 U
Nitroguanidine	103 U	NA	109 U	103 U	93.9 U	99.5 U	101 U	102 U	103 U	98 U	92.6 U	97.1 U
PETN	498 U	NA	483 U	483 U	500 U	455 U	455 U	476 U	493 U	490 U	485 U	459 U
RDX	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
Tetryl	199 U	NA	193 U	193 U	200 U	182 U	182 U	190 U	197 U	196 U	194 U	183 U
Total Metals (mg/kg)												
Aluminum	3,660	NA	34,700	15,600	5,360	6,220	2,840	7,680	18,800	17,800	19,300	20,300
Antimony	1.47 U	NA	6.94 U	5.62 U	1.04 U	2.58 J	2.59 U	2.86 U	7.6 U	8 U	8.22 U	5.96 U
Arsenic	4.29	NA	24.4	45.8	5.1	5.72	3.16 J	5.28	44.3	27.4	22.8	19
Barium	17.1	NA	64.7	66.9	25.6	49.9	28.2	32.1	70.2	86.7	71.5	40.3
Beryllium	0.26 J	NA	1.63 J	0.731 J	0.474 J	3.09	1.6 J	0.572 J	1.9 U	2 U	1.15 J	1.49 U
Cadmium	0.188 J	NA	1.73 U	1.4 U	0.259 U	0.656 U	0.648 U	0.715 U	1.9 U	2 U	2.06 U	1.49 U
Calcium	7,440	NA	8,270	85,200	74,500	61,500	36,500	34,300	82,000	104,000	74,300	8,410
Chromium	7.39	NA	61.7	26.9	14.1	27.6	15.1	18.6	45	35.2	39.3	30.7 J
Cobalt	0.949 J	NA	13.1	5.24 J	1.74	11.4	9.62	2.78 J	9.5 U	10 U	6.01 J	5.51 J
Copper	3.4	NA	18.4	42.5	2.69	379	160	10.9	34.4	32.3	37.6	11.4
Cyanide	0.434 U	NA	0.826 U	1.7 U	0.205 J	0.246 J	0.321 U	0.349 U	0.892 U	0.962 U	1.01 U	0.745 U
Iron	4,880	NA	51,400	26,000	14,000	28,400	9,490	15,300	30,400	33,700	29,600	25,600
Lead	9.16	NA	25	42.1	13.5	236	236	26.4	107	68.4	57.6	15.6
Magnesium	579 J	NA	6,550	2,430 J	1,430 J	2,210 J	846 J	1,370 J	2,500 J	2,720 J	2,620 J	3,260 J
Manganese	24.5	NA	317	144	35.4	153	79.2	31.4	108	139	97.2	105
Mercury	0.0297 J	NA	0.0813 J	0.0957 J	0.0229 B	0.0155 B	0.0185 B	0.0922 B	0.115 J	0.252	1.45	0.0484 J
Nickel	2.27	NA	26.1	12.5	3.58	242	118	7.09	11	10.9	12.7	12.6
Potassium	486 J	NA	4,410	1,780 J	1,640	3,040	630 J	1,630 J	2,220 J	2,190 J	2,430 J	2,470 J
Selenium	0.919 U	NA	4.33 U	3.51 U	0.647 U	1.64 U	1.62 U	1.79 U	4.75 U	5 U	5.14 U	3.73 U
Silver	0.368 U	NA	1.73 U	1.4 U	0.259 UJ	0.656 UJ	0.648 UJ	0.715 UJ	1.9 U	2 U	2.06 U	1.49 U
Sodium	552 U	NA	2,600 U	2,110 U	331 J	539 J	972 U	1,070 U	2,850 U	3,000 U	5,440	2,240 U
Thallium	0.735 U	NA	3.47 U	2.81 U	0.518 U	1.31 U	1.3 U	1.43 U	3.8 U	4 U	4.11 U	2.98 U
Vanadium	9.33	NA	76.9	39.8	13.8	21.2	8.15	20.4	45	40	46.6	39.6
Zinc	20.3	NA	97.2	101	28.3	1,040	927	73.6	215	165	155	69

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SD80		CAPL-SD81	CAPL-SD82	CAPL-SD84	CAPL-SD85	CAPL-SD86	CAPL-SD87	CAPL-SWSD62	CAPL-SWSD63	CAPL-SWSD64	CAPL-SWSD65
Sample ID	CAPL-SSD80-1012	CAPL-SSD80-1012-V	CAPL-SSD81-1012	CAPL-SSD82-1012	CAPL-SSD84-1012	CAPL-SSD85-1012	CAPL-SSD86-1012	CAPL-SSD87-1012	CAPL-SSD62-1012	CAPL-SSD63-1012	CAPL-SSD64-1012	CAPL-SSD65-1012
Sample Date	10/16/12	10/25/12	10/18/12	10/18/12	10/24/12	10/24/12	10/24/12	10/24/12	10/17/12	10/17/12	10/17/12	10/18/12
Chemical Name												
Wet Chemistry												
pH (ph)	7.53 H3	NA	7.25 H3	7.26 H3	8.02 H3	8.28 H3	7.91 H3	7.92 H3	7.31 H3	6.92 H3	6.89 H3	7.16 H3
Total organic carbon (TOC) (mg/kg)	37,000	NA	75,400	136,000	4,950	2,510	11,400	32,400	45,400	103,000	124,000	63,000

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Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
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Station ID	CAPL-SWSD66		CAPL-SWSD67		CAPL-SWSD68	CAPL-SWSD69	
Sample ID	CAPL-SSD66-1012	CAPL-SSD66P-1012	CAPL-SSD67-1012	CAPL-SSD67-1012-V	CAPL-SSD68-1012	CAPL-SSD69-1012	CAPL-SSD69-1012-V
Sample Date	10/18/12	10/18/12	10/16/12	10/25/12	10/18/12	10/17/12	10/25/12
Chemical Name							
Volatile Organic Compounds (µg/kg)							
1,1,1-Trichloroethane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,1,2,2-Tetrachloroethane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
1,1,2-Trichloroethane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,1-Dichloroethane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,1-Dichloroethene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,2,3-Trichlorobenzene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,2,4-Trichlorobenzene	2.55 UL	2.83 UL	NA	3.23 U	11.2 UL	NA	4.4 U
1,2-Dibromo-3-chloropropane	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
1,2-Dibromoethane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,2-Dichlorobenzene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,2-Dichloroethane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,2-Dichloropropane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,3-Dichlorobenzene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
1,4-Dichlorobenzene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
2-Butanone	6.49 J	8.17 J	NA	13.2	21.8 J	NA	44.8
2-Hexanone	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
4-Methyl-2-pentanone	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
Acetone	35.4 J	35.8 J	NA	46.9 J	86.5 J	NA	133 J
Benzene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Bromochloromethane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Bromodichloromethane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Bromoform	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Bromomethane	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
Carbon disulfide	1.48 J	1.88 J	NA	3.23 U	14.8 J	NA	4.08 J
Carbon tetrachloride	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Chlorobenzene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Chloroethane	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
Chloroform	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Chloromethane	5.1 UJ	5.66 UJ	NA	6.46 U	22.4 UJ	NA	8.8 U
cis-1,2-Dichloroethene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
cis-1,3-Dichloropropene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Cyclohexane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Dibromochloromethane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Dichlorodifluoromethane (Freon-12)	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
Ethylbenzene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Isopropylbenzene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Methyl acetate	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
Methylcyclohexane	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Methylene chloride	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
Methyl-tert-butyl ether (MTBE)	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Styrene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Tetrachloroethene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Toluene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
trans-1,2-Dichloroethene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
trans-1,3-Dichloropropene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Trichloroethene	2.55 U	2.83 U	NA	3.23 U	11.2 U	NA	4.4 U
Trichlorofluoromethane (Freon-11)	5.1 U	5.66 U	NA	6.46 U	22.4 U	NA	8.8 U
Vinyl chloride	2.55 U	2.83 U	NA	3.23 UJ	11.2 U	NA	4.4 UJ
Xylene, total	7.65 U	8.49 U	NA	9.69 U	33.5 U	NA	13.2 U

Attachment B10
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Station ID	CAPL-SWSD66		CAPL-SWSD67		CAPL-SWSD68	CAPL-SWSD69	
Sample ID	CAPL-SSD66-1012	CAPL-SSD66P-1012	CAPL-SSD67-1012	CAPL-SSD67-1012-V	CAPL-SSD68-1012	CAPL-SSD69-1012	CAPL-SSD69-1012-V
Sample Date	10/18/12	10/18/12	10/16/12	10/25/12	10/18/12	10/17/12	10/25/12
Chemical Name							
Semivolatile Organic Compounds (µg/kg)							
1,1-Biphenyl	231 U	230 U	276 U	NA	735 U	285 U	NA
1,2,4,5-Tetrachlorobenzene	231 U	230 U	276 U	NA	735 U	285 U	NA
2,2'-Oxybis(1-chloropropane)	231 U	230 U	276 U	NA	735 U	285 U	NA
2,3,4,6-Tetrachlorophenol	231 U	230 U	276 U	NA	735 U	285 U	NA
2,4,5-Trichlorophenol	231 U	230 U	276 U	NA	735 U	285 U	NA
2,4,6-Trichlorophenol	231 U	230 U	276 U	NA	735 U	285 U	NA
2,4-Dichlorophenol	231 U	230 U	276 U	NA	735 U	285 U	NA
2,4-Dimethylphenol	921 U	920 U	1,100 U	NA	2,930 U	1,140 U	NA
2,4-Dinitrophenol	2,310 U	2,300 U	2,760 U	NA	7,350 U	2,850 U	NA
2,4-Dinitrotoluene	231 U	230 U	276 U	NA	735 U	285 U	NA
2,6-Dinitrotoluene	231 U	230 U	276 U	NA	735 U	285 U	NA
2-Chloronaphthalene	231 U	230 U	276 U	NA	735 U	285 U	NA
2-Chlorophenol	231 U	230 U	276 U	NA	735 U	285 U	NA
2-Methylnaphthalene	4.6 U	4.6 U	8.35 J	NA	14.6 U	5.68 U	NA
2-Methylphenol	231 U	230 U	276 U	NA	735 U	285 U	NA
2-Nitroaniline	921 U	920 U	1,100 U	NA	2,930 U	1,140 U	NA
2-Nitrophenol	231 U	230 U	276 U	NA	735 U	285 U	NA
3,3'-Dichlorobenzidine	231 U	230 U	276 U	NA	735 U	285 U	NA
3-Nitroaniline	921 U	920 U	1,100 U	NA	2,930 U	1,140 U	NA
4,6-Dinitro-2-methylphenol	2,310 U	2,300 U	2,760 U	NA	7,350 U	2,850 U	NA
4-Bromophenyl-phenylether	231 U	230 U	276 U	NA	735 U	285 U	NA
4-Chloro-3-methylphenol	231 U	230 U	276 U	NA	735 U	285 U	NA
4-Chloroaniline	231 U	230 U	276 U	NA	735 U	285 U	NA
4-Chlorophenyl-phenylether	231 U	230 U	276 U	NA	735 U	285 U	NA
4-Methylphenol	231 U	230 U	276 U	NA	735 U	285 U	NA
4-Nitroaniline	921 U	920 U	1,100 U	NA	2,930 U	1,140 U	NA
4-Nitrophenol	921 U	920 U	1,100 U	NA	2,930 U	1,140 U	NA
Acenaphthene	4.6 U	4.6 U	8.55 J	NA	14.6 U	5.68 U	NA
Acenaphthylene	4.6 U	4.6 U	5.49 U	NA	14.6 U	5.68 U	NA
Acetophenone	231 U	230 U	276 U	NA	735 U	285 U	NA
Anthracene	4.6 U	4.6 U	25.1	NA	14.6 U	5.68 U	NA
Atrazine	231 U	230 U	276 U	NA	735 U	285 U	NA
Benzaldehyde	231 U	230 U	276 U	NA	735 U	285 U	NA
Benzo(a)anthracene	4.6 U	4.6 U	230	NA	14.6 U	5.68 U	NA
Benzo(a)pyrene	4.6 U	4.6 U	369	NA	14.6 U	5.68 U	NA
Benzo(b)fluoranthene	4.6 U	4.6 U	392	NA	14.6 U	5.68 U	NA
Benzo(g,h,i)perylene	4.6 U	4.6 U	246	NA	14.6 U	5.68 U	NA
Benzo(k)fluoranthene	4.6 U	4.6 U	467	NA	14.6 U	5.68 U	NA
bis(2-Chloroethoxy)methane	231 U	230 U	276 U	NA	735 U	285 U	NA
bis(2-Chloroethyl)ether	231 U	230 U	276 U	NA	735 U	285 U	NA
bis(2-Ethylhexyl)phthalate	231 U	230 U	276 U	NA	735 U	285 U	NA
Butylbenzylphthalate	231 U	230 U	276 U	NA	735 U	285 U	NA
Caprolactam	231 U	230 U	276 U	NA	735 U	285 U	NA
Carbazole	231 U	230 U	276 U	NA	735 U	285 U	NA
Chrysene	4.6 U	4.6 U	359	NA	14.6 U	5.68 U	NA
Dibenz(a,h)anthracene	4.6 U	4.6 U	77.5	NA	14.6 U	5.68 U	NA
Dibenzofuran	231 U	230 U	276 U	NA	735 U	285 U	NA
Diethylphthalate	231 U	230 U	276 U	NA	735 U	285 U	NA
Dimethyl phthalate	231 U	230 U	276 U	NA	735 U	285 U	NA
Di-n-butylphthalate	231 U	230 U	276 U	NA	735 U	285 U	NA
Di-n-octylphthalate	231 U	230 U	276 U	NA	735 U	285 U	NA
Fluoranthene	2.93 J	2.7 J	199	NA	13.4 J	5.41 J	NA
Fluorene	4.6 U	4.6 U	10.7 J	NA	14.6 U	5.68 U	NA
Hexachlorobenzene	231 U	230 U	276 U	NA	735 U	285 U	NA
Hexachlorobutadiene	231 U	230 U	276 U	NA	735 U	285 U	NA
Hexachlorocyclopentadiene	231 U	230 U	276 U	NA	735 U	285 R	NA
Hexachloroethane	231 U	230 U	276 U	NA	735 U	285 U	NA
Indeno(1,2,3-cd)pyrene	4.6 U	4.6 U	221	NA	14.6 U	5.68 U	NA
Isophorone	231 U	230 U	276 U	NA	735 U	285 U	NA
Naphthalene	4.6 U	4.6 U	8.6 J	NA	14.6 U	5.68 U	NA
n-Nitroso-di-n-propylamine	231 U	230 U	276 U	NA	735 U	285 U	NA
n-Nitrosodiphenylamine	231 U	230 U	276 U	NA	735 U	285 U	NA
Nitrobenzene	231 U	230 U	276 U	NA	735 U	285 U	NA
Pentachlorophenol	921 U	920 U	1,100 U	NA	2,930 U	1,140 U	NA
Phenanthrene	4.6 U	4.6 U	64.4	NA	14.6 U	5.68 U	NA
Phenol	231 U	230 U	276 U	NA	735 U	285 U	NA
Pyrene	3.15 J	3.25 J	226	NA	14.6 U	3.83 J	NA

Attachment B10
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Station ID	CAPL-SWSD66		CAPL-SWSD67		CAPL-SWSD68	CAPL-SWSD69	
Sample ID	CAPL-SSD66-1012	CAPL-SSD66P-1012	CAPL-SSD67-1012	CAPL-SSD67-1012-V	CAPL-SSD68-1012	CAPL-SSD69-1012	CAPL-SSD69-1012-V
Sample Date	10/18/12	10/18/12	10/16/12	10/25/12	10/18/12	10/17/12	10/25/12
Chemical Name							
Pesticide/Polychlorinated Biphenyls (µg/kg)							
4,4'-DDD	0.471 U	0.465 U	2.18 L	NA	1.48 U	0.434 J	NA
4,4'-DDE	0.617 J	0.567 J	14 L	NA	1.48 U	1.51 J	NA
4,4'-DDT	0.471 U	0.465 U	1.51 J	NA	1.48 U	0.569 UL	NA
Aldrin	0.471 U	0.465 U	0.531 L	NA	1.48 U	0.569 UL	NA
alpha-BHC	0.471 U	0.465 U	0.548 UL	NA	1.48 U	0.569 UL	NA
alpha-Chlordane	0.471 U	0.465 U	0.908 L	NA	1.48 U	0.569 UL	NA
Aroclor-1260	7.74 J	6.18 J	230 L	NA	36.1 U	13.9 UL	NA
beta-BHC	0.471 U	0.465 U	0.548 UL	NA	1.48 U	0.569 UL	NA
delta-BHC	0.471 U	0.465 U	0.548 UL	NA	1.48 U	0.569 UL	NA
Dieldrin	0.471 U	0.465 U	1.11 L	NA	1.48 U	1.07 J	NA
Endosulfan I	0.471 U	0.465 U	0.548 UL	NA	1.48 U	0.569 UL	NA
Endosulfan II	0.471 U	0.465 U	0.604 L	NA	1.48 U	0.569 UL	NA
Endosulfan sulfate	0.471 U	0.465 U	0.355 L	NA	1.48 U	0.37 J	NA
Endrin	0.471 U	0.465 U	3.15 L	NA	1.48 U	0.863 J	NA
Endrin aldehyde	0.471 U	0.465 U	3.73 L	NA	1.48 U	0.867 J	NA
Endrin ketone	0.471 U	0.465 U	0.548 UL	NA	1.48 U	0.569 UL	NA
gamma-BHC (Lindane)	0.471 U	0.465 U	0.548 UL	NA	1.48 U	0.569 UL	NA
gamma-Chlordane	1.01 J	1.23 J	5.22 L	NA	1.56 J	4.77 K	NA
Heptachlor	0.471 U	0.465 U	0.54 L	NA	1.48 U	0.569 U	NA
Heptachlor epoxide	0.471 U	0.465 U	0.548 UL	NA	1.48 U	0.569 UL	NA
Methoxychlor	0.471 U	0.465 U	2.42 J	NA	1.48 U	0.569 U	NA
Toxaphene	30.5 UJ	30.1 UJ	35.5 UJ	NA	95.5 UJ	36.8 UJ	NA
Explosives (µg/kg)							
1,3,5-Trinitrobenzene	178 U	182 U	198 U	NA	197 U	187 U	NA
1,3-Dinitrobenzene	178 U	182 U	198 U	NA	197 U	187 U	NA
2,4,6-Trinitrotoluene	178 U	182 U	198 U	NA	197 U	187 U	NA
2-Amino-4,6-dinitrotoluene	178 U	182 U	198 U	NA	197 U	187 U	NA
2-Nitrotoluene	178 U	182 U	198 U	NA	197 U	187 U	NA
3,5-Dinitroaniline	178 U	182 U	198 U	NA	197 U	187 U	NA
3-Nitrotoluene	178 U	182 U	198 U	NA	197 U	187 U	NA
4-Amino-2,6-dinitrotoluene	178 U	182 U	198 U	NA	197 U	187 U	NA
4-Nitrotoluene	178 U	182 U	198 U	NA	197 U	187 U	NA
HMX	178 U	182 U	198 U	NA	197 U	187 U	NA
Nitroglycerin	444 U	455 U	495 U	NA	493 U	467 U	NA
Nitroguanidine	103 U	102 U	93 U	NA	109 U	99 U	NA
PETN	444 U	455 U	495 U	NA	493 U	467 U	NA
RDX	178 U	182 U	198 U	NA	197 U	187 U	NA
Tetryl	178 U	182 U	198 U	NA	197 U	187 U	NA
Total Metals (mg/kg)							
Aluminum	1,770	1,920	2,100	NA	30,700	3,460	NA
Antimony	0.564 U	0.56 U	1.32 U	NA	8.7 U	0.679 UL	NA
Arsenic	2.33	2.74	9.01	NA	22.5	5.86	NA
Barium	13.1 J	8.81 J	9.73	NA	60	10.2	NA
Beryllium	0.156 J	0.153 J	0.329 U	NA	1.14 J	0.224 J	NA
Cadmium	0.141 U	0.14 U	0.329 U	NA	2.17 U	0.17 U	NA
Calcium	1,290	1,350	2,130	NA	13,400	2,080	NA
Chromium	3.99 J	4.3	4.65	NA	51.4 J	10.3	NA
Cobalt	0.507 J	0.578 J	1.64 U	NA	6.73 J	0.761 J	NA
Copper	1.43	1.59	4.45	NA	16.3	3.46	NA
Cyanide	0.327 U	0.352 U	0.396 U	NA	1.04 U	0.399 UL	NA
Iron	2,530	2,870	4,330	NA	28,400	9,000	NA
Lead	3.41	4.1	18.2	NA	19.6	4.92	NA
Magnesium	247 J	262 J	405 J	NA	5,360 J	767 K	NA
Manganese	9.66	11.7	30.7	NA	160	24.6	NA
Mercury	0.035 U	0.0384 U	0.0493 J	NA	0.0582 J	0.0233 J	NA
Nickel	1.08	1.21	1.55 J	NA	18.6	2.18 B	NA
Potassium	304 J	329 J	367 J	NA	4,110 J	1,190 K	NA
Selenium	0.353 U	0.35 U	0.822 U	NA	5.43 U	0.424 U	NA
Silver	0.141 U	0.14 U	0.329 U	NA	2.17 U	0.17 U	NA
Sodium	212 U	73.4 J	493 U	NA	1,850 J	255 U	NA
Thallium	0.282 U	0.28 U	0.658 U	NA	4.35 U	0.339 U	NA
Vanadium	6.04	6.62	6.4	NA	73.6	12.1	NA
Zinc	6.03	6.81	50.7	NA	74.6	14.7	NA

Attachment B10
Cheatham Annex, Penniman Lake
Subsurface Sediment Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SWSD66		CAPL-SWSD67		CAPL-SWSD68	CAPL-SWSD69	
Sample ID	CAPL-SSD66-1012	CAPL-SSD66P-1012	CAPL-SSD67-1012	CAPL-SSD67-1012-V	CAPL-SSD68-1012	CAPL-SSD69-1012	CAPL-SSD69-1012-V
Sample Date	10/18/12	10/18/12	10/16/12	10/25/12	10/18/12	10/17/12	10/25/12
Chemical Name							
Wet Chemistry							
pH (ph)	7.35 H3	NA	7.34 H3	NA	7.53 H3	6.77 H3	NA
Total organic carbon (TOC) (mg/kg)	10,700	NA	30,900	NA	88,200	28,400	NA

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Mei

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3- The sample for this analyte was received outside of the EPA recommended holding time (unvalidated data)

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

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

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

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

Attachment B11
Cheatham Annex, Penniman Lake
Surface Water Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SWSD62	CAPL-SWSD63		CAPL-SWSD64	CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID	CAPL-SW62-1012	CAPL-SW63-1012	CAPL-SW63P-1012	CAPL-SW64-1012	CAPL-SW65-1012	CAPL-SW66-1012	CAPL-SW67-1012	CAPL-SW68-1012	CAPL-SW69-1012
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Chemical Name									
Volatile Organic Compounds (µg/l)									
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Methyl-2-pentanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	63.7 J	22	5 U	5 U	2.51 J	5 U	5 U	5 U	5 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	1.86	3.08	6.88	0.5 U	4.84	6.48	6.01	6.69	6.25
cis-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane (Freon-12)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl acetate	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
Xylene, total	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Semivolatile Organic Compounds (µg/l)									
1,1-Biphenyl	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
1,2,4,5-Tetrachlorobenzene	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
2,2'-Oxybis(1-chloropropane)	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
2,3,4,6-Tetrachlorophenol	4.72 U	4.81 U	4.81 U	4.72 U	4.63 U	4.72 U	4.72 U	4.9 U	4.72 U
2,4,5-Trichlorophenol	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
2,4,6-Trichlorophenol	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
2,4-Dichlorophenol	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
2,4-Dimethylphenol	9.43 U	9.62 U	9.62 U	9.43 U	9.26 U	9.43 U	9.43 U	9.8 U	9.43 U
2,4-Dinitrophenol	23.6 U	24 U	24 U	23.6 U	23.1 U	23.6 U	23.6 U	24.5 U	23.6 U
2,4-Dinitrotoluene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
2,6-Dinitrotoluene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
2-Chloronaphthalene	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
2-Chlorophenol	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
2-Methylnaphthalene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0943 U
2-Methylphenol	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
2-Nitroaniline	9.43 U	9.62 U	9.62 U	9.43 U	9.26 U	9.43 U	9.43 U	9.8 U	9.43 U
2-Nitrophenol	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
3,3'-Dichlorobenzidine	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
3-Nitroaniline	9.43 U	9.62 U	9.62 U	9.43 U	9.26 U	9.43 U	9.43 U	9.8 U	9.43 U
4,6-Dinitro-2-methylpheno	9.43 U	9.62 U	9.62 U	9.43 U	9.26 U	9.43 U	9.43 U	9.8 U	9.43 U
4-Bromophenyl-phenylether	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
4-Chloro-3-methylpheno	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
4-Chloroaniline	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
4-Chlorophenyl-phenylether	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
4-Methylphenol	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
4-Nitroaniline	9.43 U	9.62 U	9.62 U	9.43 U	9.26 U	9.43 U	9.43 U	9.8 U	9.43 U
4-Nitrophenol	9.43 U	9.62 U	9.62 U	9.43 U	9.26 U	9.43 U	9.43 U	9.8 U	9.43 U
Acenaphthene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.134 J	0.0943 U	0.098 U	0.0943 U
Acenaphthylene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0943 U
Acetophenone	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Anthracene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.126 J	0.0943 U	0.098 U	0.0943 U
Atrazine	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Benzaldehyde	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Benzo(a)anthracene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0707 J	0.0943 U	0.098 U	0.0563 J
Benzo(a)pyrene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0943 U
Benzo(b)fluoranthene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0549 J
Benzo(g,h,i)perylene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0684 J
Benzo(k)fluoranthene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0615 J
bis(2-Chloroethoxy)methane	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
bis(2-Chloroethyl)ether	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
bis(2-Ethylhexyl)phthalate	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Butylbenzylphthalate	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Caprolactam	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Carbazole	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Chrysene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0693 J	0.0943 U	0.098 U	0.0783 J
Dibenz(a,h)anthracene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0782 J
Dibenzofuran	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Diethylphthalate	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Dimethyl phthalate	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Di-n-butylphthalate	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Di-n-octylphthalate	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Fluoranthene	0.0604 J	0.0962 U	0.0668 J	0.0488 J	0.0926 U	0.173 J	0.0943 U	0.098 U	0.0943 U
Fluorene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.131 J	0.0943 U	0.098 U	0.0943 U
Hexachlorobenzene	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Hexachlorobutadiene	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Hexachlorocyclopentadiene	4.72 R	4.81 R	4.81 R	4.72 R	4.63 R	4.72 R	4.72 R	4.9 R	4.72 R
Hexachloroethane	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Indeno(1,2,3-cd)pyrene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.076 J
Isophorone	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Naphthalene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0943 U
n-Nitroso-di-n-propylamine	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
n-Nitrosodiphenylamine	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Nitrobenzene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
Pentachlorophenol	9.43 U	9.62 U	9.62 U	9.43 U	9.26 U	9.43 U	9.43 U	9.8 U	9.43 U
Phenanthrene	0.189 U	0.192 U	0.192 U	0.189 U	0.185 U	0.455	0.189 U	0.196 U	0.189 U
Phenol	2.36 U	2.4 U	2.4 U	2.36 U	2.31 U	2.36 U	2.36 U	2.45 U	2.36 U
Pyrene	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.19	0.0943 U	0.098 U	0.0943 U

Attachment B11
Cheatham Annex, Penniman Lake
Surface Water Samples
Raw Analytical Results
October 2012

Station ID	CAPL-SWSD62	CAPL-SWSD63		CAPL-SWSD64	CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
Sample ID	CAPL-SW62-1012	CAPL-SW63-1012	CAPL-SW63P-1012	CAPL-SW64-1012	CAPL-SW65-1012	CAPL-SW66-1012	CAPL-SW67-1012	CAPL-SW68-1012	CAPL-SW69-1012
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Chemical Name									
Pesticide/Polychlorinated Biphenyls (µg/l)									
4,4'-DDD	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
4,4'-DDE	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
4,4'-DDT	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Aldrin	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
alpha-BHC	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
alpha-Chlordane	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Aroclor-1260	0.25 U	0.25 U	0.25 U	0.24 U	0.24 U	0.245 U	0.236 U	0.24 U	0.236 U
beta-BHC	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
delta-BHC	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Dieldrin	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Endosulfan I	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Endosulfan II	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Endosulfan sulfate	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Endrin	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Endrin aldehyde	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Endrin ketone	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
gamma-BHC (Lindane)	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
gamma-Chlordane	0.0107 B	0.00709 B	0.0167 B	0.0211 B	0.00378 B	0.0105 B	0.00974 B	0.00962 U	0.00551 B
Heptachlor	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00538 J
Heptachlor epoxide	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Methoxychlor	0.01 U	0.01 U	0.01 U	0.00962 U	0.00962 U	0.0098 U	0.00943 U	0.00962 U	0.00943 U
Toxaphene	0.667 U	0.667 U	0.667 U	0.641 U	0.641 U	0.654 U	0.629 U	0.641 U	0.629 U
Explosives (µg/l)									
1,3,5-Trinitrobenzene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
1,3-Dinitrobenzene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
2,4,6-Trinitrotoluene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
2-Amino-4,6-dinitrotoluene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
2-Nitrotoluene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
3,5-Dinitroaniline	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
3-Nitrotoluene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
4-Amino-2,6-dinitrotoluene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.108 L	0.157 UL	0.16 UL
4-Nitrotoluene	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
HMX	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
Nitroglycerin	0.444 U	0.392 U	0.392 U	0.444 U	0.396 U	0.471 U	0.444 UL	0.392 UL	0.4 UL
Nitroguanidine	10 UL	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
PETN	0.444 U	0.392 U	0.392 U	0.444 U	0.396 U	0.471 U	0.444 UL	0.392 UL	0.4 UL
RDX	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 UL	0.157 UL	0.16 UL
Tetryl	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.178 R	0.157 UL	0.16 UL
Total Metals (µg/l)									
Aluminum	55.2 B	55.8 B	50.7 B	54 B	46.8 B	33.1 B	46.1 B	28.5 B	44.4 B
Antimony	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Arsenic	1.5 J	1.54 J	1.64 J	1.44 J	2.01 J	1.37 J	1.85 J	1.62 J	1.7 J
Barium	20.1	19.4	19.5	19.1	21.6	20.4	21	21	20.4
Beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Calcium	37,300	36,300	38,000	36,700	37,300	33,800	36,700	35,600	36,200
Chromium	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cobalt	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Copper	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Cyanide	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Iron	361	328	321	390	337	302	359	301	344
Lead	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Magnesium	1,550	1,560	1,570	1,530	1,590	1,380	1,590	1,400	1,490
Manganese	41.3	39.9	40.3	53.5	49.4	47.2	49	49.8	47.5
Mercury	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Nickel	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Potassium	2,770	2,750	2,800	2,730	2,820	2,640	2,840	2,660	2,780
Selenium	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U
Silver	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sodium	9,100	9,200	9,210	9,020	9,370	8,330	9,410	8,370	8,970
Thallium	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vanadium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Dissolved Metals (µg/l)									
Aluminum, Dissolved	27.2 B	26 B	30 B	27.3 B	17.1 B	19.4 B	21.6 B	21.1 B	25.4 B
Antimony, Dissolved	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Arsenic, Dissolved	1.31 J	1.2 J	1.32 J	1.17 J	1.19 J	1.26 J	1.24 J	1.15 J	1.42 J
Barium, Dissolved	18.5	19.5	18.1	18.4	19.5	19.1	19.2	20.1	19
Beryllium, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Calcium, Dissolved	38,400	41,600	37,100	37,400	34,700	33,800	35,400	35,500	35,600
Chromium, Dissolved	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cobalt, Dissolved	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Copper, Dissolved	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Iron, Dissolved	62.4	83.1	73.4	71.7	73.5	73.2	83.8	76.7	97.6
Lead, Dissolved	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Magnesium, Dissolved	1,570	1,680	1,540	1,560	1,380	1,360	1,440	1,460	1,500
Manganese, Dissolved	14.9	16.1	14.4	13.6	9.88	9.86	12.6	10.4	10.4
Mercury, Dissolved	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Nickel, Dissolved	1.5 U	1.5 U	1.5 U	1.5 U	1.96 J	1.5 U	1.5 U	1.5 U	1.5 U
Potassium, Dissolved	2,780	2,930	2,720	2,770	2,630	2,600	2,690	2,700	2,710
Selenium, Dissolved	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U
Silver, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sodium, Dissolved	9,220	9,650	9,130	9,220	8,370	8,250	8,630	8,690	9,000
Thallium, Dissolved	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vanadium, Dissolved	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc, Dissolved	2.5 U	1.33 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Wet Chemistry									
Hardness (mg/l)	91.3	90.7	NA	89.9	86.3	86.5	86.9	87.1	88.1

Notes:

Shading indicates detections
NA - Not analyzed
B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
L - Analyte present, value may be biased low, actual value may be higher
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/l - Milligrams per liter
µg/l - Micrograms per liter

Attachment B12
Cheatham Annex, Penniman Lake
Tissue Samples
Raw Analytical Results
October 2012

Station ID	CAPL-TS01	CAPL-TS02	CAPL-TS03	CAPL-TS04	CAPL-TS05	CAPL-TS06	CAPL-TS07	CAPL-TS08	CAPL-TS09	CAPL-TS10	CAPL-TS11
Sample ID	CAPL-TS01-1012	CAPL-TS02-1012	CAPL-TS03-1012	CAPL-TS04-1012	CAPL-TS05-1012	CAPL-TS06-1012	CAPL-TS07-1012	CAPL-TS08-1012	CAPL-TS09-1012	CAPL-TS10-WB-1012	CAPL-TS11-WB-1012
Sample Date	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/10/12	10/10/12
Chemical Name											
Pesticide/Polychlorinated Biphenyls (UG/KG)											
4,4'-DDD	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	3.3	3 J
4,4'-DDE	2.3	2 U	2 U	4.6	10	1.1 J	2.1	1.9 U	NA	18	27
4,4'-DDT	2 U	2 U	2 U	5.6 J	1.7 J	5.6 J	5.5 J	1.9 U	NA	2.3 J	4.4 J
Aldrin	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
alpha-BHC	2 U	2 U	1.1 J	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
alpha-Chlordane	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	2 U	1.4 J	2 U	1.9 U	1.9 U	2.4	1.9 U	1 J	NA	2 J	1.5 J
delta-BHC	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Dieldrin	2 U	2 U	2 U	2.1 J	1.9 U	1.9 U	1.6 J	1.9 U	NA	1.9 U	3.4 U
Endosulfan I	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Endosulfan II	1.1 J	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Endosulfan sulfate	4.7 J	2 U	2 U	7 J	0.88 J	4.2 J	4.4 J	1.9 U	NA	6.6	9.8 J
Endrin	2 U	2 U	2 U	1.9 U	1.5 J	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.1 J
Endrin aldehyde	2 U	2 U	0.83 J	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Endrin ketone	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
gamma-BHC (Lindane)	1.3 J	2 U	2 U	0.97 J	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
gamma-Chlordane	2 U	2 U	2 U	2.4	1.9 U	1.7 J	2	1.9 U	NA	3.6	6.2
Heptachlor	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Heptachlor epoxide	2 U	2 U	2 U	1.2 J	1.9 U	1.9 U	1.9 U	1.9 U	NA	1.9 U	3.4 U
Methoxychlor	10 U	9.9 U	9.8 U	9.3 U	9.4 U	9.7 U	9.7 U	9.6 U	NA	9.4 U	17 U
Polychlorinated biphenyls (PCBs)	1,400	38.4	46.8	1,450	44.7	2,510	1,240	51	81.4	330	743
Toxaphene	100 U	99 U	98 U	93 U	94 U	97 U	97 U	96 U	NA	94 U	170 U
Polychlorinated Biphenyl Congeners (PG/G)											
3,3',4,4'-Tetrachlorobiphenyl (77)	20 J	3.47 J	12 U	26.8	4.41 J	11 J	30.9 J	5.35 J	24.4	79	55.1
3,4,4',5-Tetrachlorobiphenyl (81)	9.19 J	13.4 U	12 U	9.33 J	14.8 U	11.1 J	8.82 J	12.8 U	2.44 J	3.48 J	17.2 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	241 K	29.8	44.3	412	59.6	567	450	53.7	291	617	1,000
2,3,4,4',5-Pentachlorobiphenyl (114)	75.2 U	13.4 U	7.24 J	81.5 U	14.8 U	166	70.7	12.8 U	13.7 U	13.4 U	85 U
2,3',4,4',5-Pentachlorobiphenyl (118)	5,950 K	313	375	6,890	417	19,100	8,170	373	849	3,040	5,690
2,3',4,4',5'-Pentachlorobiphenyl (123)	76.6 U	7.32 J	11 J	87.3 U	10.6 J	79.7	70.6	10.8 J	14.7 J	29 J	88.7 U
3,3',4,4',5-Pentachlorobiphenyl (126)	250 K	13.4 U	24 J	251	12.5 J	430 J	227	13.8 J	13.7 U	13.4 U	98 U
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	6,920 K	180	570	7,620	261	11,900	5,560	202	326	804	2,270
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	153 U	13.4 U	12 U	26.6 U	14.8 U	14 U	14.2 U	12.8 U	13.7 U	15.9 U	92.6 U
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	5,220	81.9	343	4,950	89.9	6,350	3,530	87.2	133	310	875
Decachlorobiphenyl (209)	367	25.8 B	46 B	337	37.8 B	260	187	23.8 B	83.2	42.6 B	63.8 B
Congeners (156/157)	11,700 K	235	782	14,000	252	25,500	10,800	269	507	1,290	3,530
Total Dichlorobiphenyls	32.4	28.9	23.7	29.8	49.7	29	38.1	32.2	64.8	34.6	45.2
Total Heptachlorobiphenyls	735,000	10,300	22,800	639,000	13,000	1,150,000	602,000	12,000	25,500	86,200	239,000
Total Hexachlorobiphenyls	383,000	14,500	9,830	544,000	17,300	1,030,000	436,000	19,200	38,900	159,000	356,000
Total Monochlorobiphenyls	1.45 U	1.12 U	1.8 U	2.26 U	1.67 U	1.73 U	1.48 U	0.911 U	1.78 U	0.761 U	1.18 U
Total Nonachlorobiphenyls	20,600	213	1,070	18,200	246	19,800	13,400	240	660	1,280	2,660
Total Octachlorobiphenyls	230,000	2,510	9,120	209,000	2,620	275,000	162,000	2,500	7,510	21,200	45,000
Total Pentachlorobiphenyls	20,500	4,500	1,760	26,200	4,570	31,500	21,900	7,280	6,100	38,300	68,300
Total Tetrachlorobiphenyls	11,900	6,070	2,030	10,600	6,580	4,340	8,500	9,530	2,440	23,300	30,100
Total Trichlorobiphenyls	316	171	84.2	480	274	189	540	246	121	793	937
Toxic Equivalents (Total TEQ)	25.9	0.0258	2.46	26.1	1.28	44.9	23.6	1.41	0.0668	0.192	0.407

Attachment B12
Cheatham Annex, Penniman Lake
Tissue Samples
Raw Analytical Results
October 2012

Station ID	CAPL-TS01	CAPL-TS02	CAPL-TS03	CAPL-TS04	CAPL-TS05	CAPL-TS06	CAPL-TS07	CAPL-TS08	CAPL-TS09	CAPL-TS10	CAPL-TS11
Sample ID	CAPL-TS01-1012	CAPL-TS02-1012	CAPL-TS03-1012	CAPL-TS04-1012	CAPL-TS05-1012	CAPL-TS06-1012	CAPL-TS07-1012	CAPL-TS08-1012	CAPL-TS09-1012	CAPL-TS10-WB-1012	CAPL-TS11-WB-1012
Sample Date	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/24/12	10/10/12	10/10/12
Chemical Name											
Total Metals (MG/KG)											
Arsenic	0.25	0.1 J	0.19 U	0.2 J	0.07 J	0.068 J	0.064 J	0.065 J	1.9	0.099 J	0.19 U
Cadmium	0.08	0.03	0.032	0.078	0.11	0.085	0.094	0.044	0.19	0.011 J	0.028 U
Chromium	0.98 U	0.96 U	0.95 U	0.99 U	0.98 U	0.98 U	0.78 U	0.94 U	3.1	0.94 U	0.93 U
Copper	2.5	0.94 J	0.4 J	1.5	2	2.1	1.6	1.5	1.8	0.94 U	0.93 U
Lead	0.18 B	0.034 B	0.19 B	0.3 B	0.16 B	1.4 B	0.27 B	0.03 B	4 B	0.047 U	0.046 U
Mercury	0.044	0.024 J	0.035	0.032	0.03	0.021 J	0.023 J	0.027 J	0.027	0.01 J	0.014 J
Nickel	0.49 U	0.48 U	0.47 U	0.49 U	0.31 J	0.51	0.27 J	0.47 U	1.1	0.47 U	0.46 U
Selenium	0.4	0.36	0.2	0.27	0.34	0.25	0.29	0.28	0.48	0.13	0.18
Silver	0.0078 J	0.0096 J	0.01	0.0039 J	0.011	0.0029 J	0.007 J	0.0066 J	0.0062 J	0.0094 U	0.0093 U
Zinc	33	18	21	21	31	24	21	13	28	31	21
Wet Chemistry											
% Moisture (pct)	76	80	75	78	75	81	77	77	76	76	77
Lipids (%) (pct)	1.8	0.64	0.91	1.6	2.2	0.95	1.9	1	1.9	3	1.8

\\VBOFPP01\Proj\CLEANII\BASES\CAX\Penniman_Lake\Step 2 Tech Memo\Part 2\DRAFT TO PARTNERING TEAM\Attachment B_Analytical Results\[B12_CAPL-TS_raw_v1_jd.xlsx], Campbell, Clairette/VBO, 03/12/2014

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

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

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

U - The material was analyzed for, but not detected

MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

Attachment B12
Cheatham Annex, Penniman Lake
Tissue Samples
Raw Analytical Results
October 2012

Station ID	CAPL-TS12	CAPL-TS13	CAPL-TS14	CAPL-TS15	CAPL-TS16		CAPL-TS17		CAPL-TS18	
Sample ID	CAPL-TS12-WB-1012	CAPL-TS13-WB-1012	CAPL-TS14-WB-1012	CAPL-TS15-WB-1012	CAPL-TS16-F-1012	CAPL-TS16-O-1012	CAPL-TS17-F-1012	CAPL-TS17-O-1012	CAPL-TS18-F-1012	CAPL-TS18-O-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name										
Pesticide/Polychlorinated Biphenyls (UG/KG)										
4,4'-DDD	4.3	11	7.1 J	18	1.8 U	4.5 J	1.7 J	13 J	1.1 J	11 J
4,4'-DDE	29 J	44	72	72	2.3 J	35	14	140	7 J	95
4,4'-DDT	3.4 J	8.5 J	37 J	9 J	1.8 U	10 J	3.9 J	39 J	1.5 J	30 J
Aldrin	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
alpha-BHC	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
alpha-Chlordane	3.6 U	7.3 U	10 U	11 U	3.4 J	7.5 U	1.5 J	26 U	2 J	20 U
Aroclor-1260	NA	NA	NA	NA	85	590	370	4,500	140	3,300
beta-BHC	1.9 J	7.3 U	10 U	11 U	2.2 J	5.2 J	1.8 J	26 U	1.5 J	20 U
delta-BHC	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	1.5 J	26 U	2 U	20 U
Dieldrin	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
Endosulfan I	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
Endosulfan II	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
Endosulfan sulfate	6.2 J	19 J	120 J	15 J	1.5 J	18 J	9 J	69 J	4.7 J	68 J
Endrin	3.6 U	2.9 J	5 J	11 U	0.82 J	4.7 J	1 J	11 J	0.73 J	8 J
Endrin aldehyde	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
Endrin ketone	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
gamma-BHC (Lindane)	3.6 U	7.3 U	10 U	11 U	0.94 J	7.5 U	1.2 J	26 U	1 J	20 U
gamma-Chlordane	4.1 J	14	36 J	10 J	1.8 U	7.5 U	6.1	48	3.3	43
Heptachlor	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	26 U	2 U	20 U
Heptachlor epoxide	3.6 U	7.3 U	10 U	11 U	1.8 U	7.5 U	2 U	14 J	2 U	20 U
Methoxychlor	18 U	37 U	51 U	54 U	9.1 U	38 U	9.9 U	130 U	10 U	100 U
Polychlorinated biphenyls (PCBs)	485	998	4,400	942	98.4	867	296	7,190	198	3,680
Toxaphene	180 U	370 U	510 U	540 U	91 U	380 U	99 U	1,300 U	100 U	1,000 U
Polychlorinated Biphenyl Congeners (PG/G)										
3,3',4,4'-Tetrachlorobiphenyl (77)	86.7	192	389	16.6 J	12.3 J	63 J	26.6	844	20.2	257 J
3,4,4',5-Tetrachlorobiphenyl (81)	13.8 U	21.9 U	54.9 U	13.1 U	14.1 U	14.9 U	18.5 U	95.7 U	12.7 U	14.9 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	791	1,580	4,270	1,800	152	1,210	385	16,900	269	4,410
2,3,4,4',5-Pentachlorobiphenyl (114)	13.8 U	14.6 U	36.9 U	13.1 U	14.1 U	14.9 U	46 U	31 U	22.1 U	294 U
2,3',4,4',5-Pentachlorobiphenyl (118)	4,160	8,130	29,500	9,410	800	6,480	1,850	137,000	1,270	24,200
2,3',4,4',5'-Pentachlorobiphenyl (123)	45.4	87.6 J	406	102	7.76 J	86.8 J	48.3 U	1,050	26.7 J	301 U
3,3',4,4',5-Pentachlorobiphenyl (126)	157	334	41.4 U	13.1 U	14.1 U	14.9 U	49.5 U	31.9 U	24.8 U	338 U
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	1,390	2,500	12,200	2,930	268	2,780	807	35,500	538	10,100
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	13.8 U	14.6 U	298 U	13.1 U	23.4 U	132 U	18.8 U	63.6 U	12.7 U	374 U
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	585	1,160	6,770	1,110	100	1,090	418	16,600	258	4,590
Decachlorobiphenyl (209)	58.8 B	109 B	611	106 B	10.1 B	76.8 B	52.1 B	1,200	29.2 B	318
Congeners (156/157)	2,340	4,330	23,000	4,950	440	4,510	1,400	59,800	905	16,700
Total Dichlorobiphenyls	64.8	63.7	33.4	81.9	14.4	34.4	22.9	103	14.1	57.9
Total Heptachlorobiphenyls	152,000	314,000	1,380,000	295,000	27,900	286,000	89,200	2,000,000	65,700	1,090,000
Total Hexachlorobiphenyls	223,000	451,000	1,680,000	465,000	50,100	431,000	145,000	3,100,000	95,000	1,880,000
Total Monochlorobiphenyls	1.96 U	2.32 U	0.983 U	3.8 U	1.61 U	1.9 U	1.72 U	3.62	2.04 U	2.16 U
Total Nonachlorobiphenyls	2,000	5,140	42,600	3,600	363	3,360	2,320	60,400	1,220	18,300
Total Octachlorobiphenyls	35,400	75,900	510,000	64,800	6,220	65,200	32,700	943,000	17,100	285,000
Total Pentachlorobiphenyls	46,400	98,200	494,000	76,900	9,220	64,200	20,800	904,000	14,300	317,000
Total Tetrachlorobiphenyls	25,200	51,100	299,000	34,600	4,420	16,700	5,920	177,000	4,450	82,800
Total Trichlorobiphenyls	826	2,090	3,840	1,200	187	643	96	4,740	236	1,560
Toxic Equivalents (Total TEQ)	16	34	2.32	0.611	0.0543	0.49	0.148	8.09	0.1	1.83

Attachment B12
Cheatham Annex, Penniman Lake
Tissue Samples
Raw Analytical Results
October 2012

Station ID	CAPL-TS12	CAPL-TS13	CAPL-TS14	CAPL-TS15	CAPL-TS16		CAPL-TS17		CAPL-TS18	
Sample ID	CAPL-TS12-WB-1012	CAPL-TS13-WB-1012	CAPL-TS14-WB-1012	CAPL-TS15-WB-1012	CAPL-TS16-F-1012	CAPL-TS16-O-1012	CAPL-TS17-F-1012	CAPL-TS17-O-1012	CAPL-TS18-F-1012	CAPL-TS18-O-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12
Chemical Name										
Total Metals (MG/KG)										
Arsenic	0.099 J	0.056 J	0.096 J	0.18 U	0.064 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Cadmium	0.029 U	0.028 U	0.028 U	0.027 U	0.029 U	0.029 U	0.028 U	0.028 U	0.028 U	0.029 U
Chromium	0.95 U	0.92 U	0.92 U	0.91 U	0.97 U	0.97 U	0.93 U	0.95 U	0.95 U	0.96 U
Copper	0.95 U	0.92 U	0.92 U	0.91 U	0.97 U	0.97 U	0.93 U	0.95 U	0.95 U	0.96 U
Lead	0.024 B	0.046 U	0.035 B	0.019 B	0.049 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Mercury	0.017 J	0.028	0.011 J	0.026 J	0.092	0.022 J	0.12	0.047	0.1	0.044
Nickel	0.48 U	0.46 U	0.46 U	0.46 U	0.49 U	0.48 U	0.47 U	0.47 U	0.47 U	0.48 U
Selenium	0.21	0.2	0.19	0.28	0.11	0.18	0.13	0.16	0.095 U	0.15
Silver	0.0095 U	0.0092 U	0.0092 U	0.0091 U	0.0097 U	0.0097 U	0.0093 U	0.0095 U	0.0095 U	0.0096 U
Zinc	42	24	20	28	6.4	29	6.6	17	6.3	22
Wet Chemistry										
% Moisture (pct)	76	72	74	71	80	71	79	65	78	67
Lipids (%) (pct)	3.1	3.4	2	9.1	0.35	3.2	0.57	3	0.24	5

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Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

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

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

U - The material was analyzed for, but not detected

MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

Attachment C
Human Health Risk Screening

Human Health Risk Screening

A conservative human health risk screening (HHRS) was performed for Penniman Lake. Although the primary purpose of the Step 2 Technical Memorandum is to evaluate the potential sources of contamination to Penniman Lake, potential risks associated with exposure to all media sampled (surface water, sediment, fish tissue, and soil) during the Step 1 and Step 2 Site Investigations were evaluated in the HHRS. The results of the HHRS provide a preliminary indication of potential risks from exposure to chemicals of potential concern (COPCs) identified for each of the different exposure areas for each media, and are used to help determine whether further evaluation (e.g., further risk assessment or additional data collection) is necessary or future unrestricted use of the site is acceptable based on human health risks.

C.1 Human Health Conceptual Site Model

The human health conceptual site model (CSM) presents an overview of site conditions, potential contaminant migration pathways, and exposure pathways to potential receptors. The human health CSM for Penniman Lake is presented in Figure C-1.

Penniman Lake is a 48-acre freshwater lake located in the southeastern portion of CAX. The lake was created in 1943 when a portion of King Creek was dammed. Numerous drainage channels and stormwater outfalls discharge to the lake. An overflow structure adjacent to the dam discharges directly to King's Creek; other major outflows from the lake are evaporation and recharge to groundwater. The historical use of the lake is unknown; however, the lake is currently used by the Department of Defense for recreational activities. The lake is not open to the general public. Catch-and-release fishing restrictions were implemented for the lake in 2000 following identification of PCBs within lake sediment.

There are several potential mechanisms for PCB transport to Penniman Lake: oil or fluids containing PCBs may have been (1) directly released to drainage ditches that discharged through outfalls into the lake, (2) released via disposal to surface soil in areas where stormwater runoff would transport PCBs and discharge into the lake via the drainages, or (3) applied for dust control to former gravel parking areas or roads where stormwater runoff would transport PCBs and discharge into the lake via the drainages. Other potential migration pathways from the terrestrial areas into the lake, such as by wind dispersion, are not expected to be significant because the area is heavily vegetated. Since PCBs tend to bind to soil, they are not expected to migrate downward to groundwater.

Potential human receptors exposed to Penniman Lake surface water and sediment and the drainage channels to Penniman Lake include current and future adult and child recreational users, adult and adolescent trespassers, base workers, and future construction workers. They are also considered the most likely receptors for exposure to soil around former pole mounted transformer locations, former pad mounted transformer locations, areas upgradient to drainage areas to Penniman Lake, drainage areas to Penniman Lake, and areas potentially sprayed for dust control. Additionally, if the site and areas evaluated in the SI are developed for future residential use, future adult and child residents may be exposed to soil.

Potential receptors may be exposed to PCBs and any additional site-related contaminants through ingestion of and dermal contact with surface water, sediment, and soil. Recreational users may also be exposed to site-related contaminants through ingestion of fish caught in Penniman Lake. It is noted that catch and release fishing restrictions are in place for Penniman Lake. However, there is no way to guarantee that all of the fish caught are released and the most conservative approach is to assume that there is a potential for some fish ingestion.

Analytical samples collected at the site were separated into the following exposure areas for evaluation in the human health risk screening:

- Surface Water
    - Penniman Lake
- Sediment (surface sediment samples collected from 0-4 inches below water surface, subsurface sediment samples collected from 4-8 inches below water surface)
    - Surface sediment in Northwest Lobes and Drainages (North of Site 11)
    - Subsurface sediment in Northwest Lobes and Drainages (North of Site 11)
    - Surface sediment in Northwest Lobes and Drainages (South of Site 11)
    - Subsurface sediment in Northwest Lobes and Drainages (South of Site 11)
    - Surface sediment in Northeast Lobe
    - Subsurface sediment in Northeast Lobe
    - Northwest Penniman Lake surface sediment
    - Northwest Penniman Lake subsurface sediment
    - Center of Penniman Lake surface sediment
    - Center of Penniman Lake subsurface sediment
    - East Penniman Lake surface sediment
    - East Penniman Lake subsurface sediment
    - Surface sediment in King's Creek
- Fish
    - Fish fillets from Penniman Lake
- Soil (surface soil samples collected from 0-6 inches below ground surface, subsurface soil samples collected from 6-24 inches below ground surface)
    - Surface soil at Drainages to Penniman Lake
    - Subsurface soil at Drainages to Penniman Lake
    - Surface soil at Former Transformer Pole locations
    - Surface soil at Former Transformer Pad locations
    - Subsurface soil at Former Transformer Pad locations
    - Surface soil at areas Upgradient of Drainages to Penniman Lake
    - Subsurface soil at areas Upgradient of Drainages to Penniman Lake
    - Surface soil at Potential Sprayed Areas
    - Subsurface soil at Potential Sprayed Areas

C.2 Human Health Risk Screening Methodology

The human health risk screening was conducted in three steps using a risk ratio technique (U.S. Navy, 2000). The risk screening evaluation for each media and data grouping are presented in the Table 2 series at the end of this attachment.

C.2.1 Step 1

The maximum detected analyte concentrations for each exposure area in each medium were compared to USEPA risk-based screening levels (RSLs; USEPA, 2014) and site specific background concentrations (if available). RSLs based on noncarcinogenic effects were based on a hazard quotient of 0.1 to account for exposure to multiple constituents with the same target organ/target effect. RSLs based on carcinogenic endpoints were based on a carcinogenic risk of 1×10^{-6}.

The surface soil and subsurface soil data were compared to the residential soil RSLs, and the surface and subsurface sediment data were compared to ten times the residential soil RSLs as exposure to sediment would be expected to be less than exposure to soil. Although recreational users and maintenance workers are the most likely receptors for soil, construction workers and industrial workers are potential receptors, in addition to residential receptors. Residential soil RSLs are more conservative (i.e., lower) than industrial soil RSLs, and are therefore protective of all potential receptors (e.g., recreational users, trespassers, residents, industrial workers, and construction workers). The soil data were also compared to USEPA soil screening levels (SSLs) for the protection of groundwater (USEPA, 2014); however this comparison was not used to identify the soil COPCs to carry forward to Step 2 but used to indicate the potential for leaching from the soil to groundwater at concentrations of potential concern to human receptors. The surface water data were compared to ten times the tap water RSLs as exposure to surface water is expected to be less than exposure to tap water. The fish tissue data were compared to fish tissue RSLs calculated using the RSL calculator tool (http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search, accessed February 2014).

The maximum detected site concentrations were compared to background concentrations as follows. The maximum detected site concentrations for surface water and surface sediment were compared to media specific UTL values from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media. The maximum detected concentrations for surface sediment were compared to the UTL values for the pooled data from Site 4, Penniman Lake, and Pond Study, shown in Table D-1. The maximum detected site concentrations for fish tissue were compared to the lower of the detected concentrations from two reference fish tissue samples from Penniman Lake. The maximum detected site concentrations for surface soil were compared to the 95% UTL for Cheatham Annex/Yorktown background surface soil samples and the maximum detected concentrations for subsurface soil were compared to the 95% UTL for Cheatham Annex/Yorktown background subsurface soil samples.

If the maximum detected concentration in any exposure area for a medium exceeded the appropriate screening value and background concentration, the screening level risk evaluation proceeded to Step 2 for that exposure area.

C.2.2 Step 2

For chemicals identified in Step 1 for evaluation in Step 2, a corresponding risk level was calculated using the following equation:

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

The concentration is the maximum detected concentration (the same concentration that was used in Step 1). The acceptable risk level is 1 for noncarcinogens and 10^{-6} for carcinogens (constituents that are both noncarcinogens and carcinogens were evaluated as both). RSLs for noncarcinogenic effects are not based on a hazard quotient of 0.1 as was done in Step 1; but are based on a hazard quotient of 1. All of the corresponding risk levels for each constituent within a media are summed to calculate the cumulative corresponding hazard index (for noncarcinogens) and cumulative corresponding carcinogenic risk (for carcinogens). A cumulative corresponding hazard index is also calculated for each target organ/effect. If the cumulative corresponding hazard index for a target organ/effect is greater than the risk-ratio screening benchmark of 0.5, or the cumulative corresponding carcinogenic risk is greater than the 5×10^{-5} risk-ratio screening benchmark, the chemicals contributing to these values are retained as COPCs and carried forward to Step 3.

C.2.3 Step 3

For constituents identified as COPCs in Step 2, a corresponding risk level was calculated as discussed above for Step 2 for data sets with eight or more samples. However, the 95 percent upper confidence limit (UCL) was used in place of the maximum detected concentration to obtain a more site-specific risk ratio. If the cumulative corresponding HI by target organ/effect is greater than the risk-ratio screening benchmark of 0.5, or the cumulative corresponding carcinogenic risk is greater than the 5×10^{-5} risk-ratio screening benchmark, then chemicals contributing to these values are considered COPCs.

The most current version of the ProUCL software program (USEPA, 2013), was used to test the data distribution and calculate 95 percent UCL exposure point concentrations (EPC) used for the Step 3 risk ratio calculations.

C.3 Human Health Risk Screening Results

Tables 2.1 through 2.23a present the risk-based screening and risk ratio evaluation for all exposure areas and media sampled at Penniman Lake. The samples included in each exposure area and media are identified on Table C-1. The COPCs are summarized on Table C-2. The results of the HHRS are discussed below by media.

C.3.1 Penniman Lake Surface Water

Tables 2.1 and 2.1a present the HHRS for Penniman Lake surface water. As summarized on Table C-2, no COPCs were identified for Penniman Lake surface water following Step 2 of the screening process. Therefore, exposure to Penniman Lake surface water would not be expected to result in unacceptable human health risks.

C.3.2 Sediment

The HHRS was conducted separately for seven sediment exposure areas. When both surface sediment and subsurface sediment samples were collected from an exposure area, they were evaluated separately.

C.3.2.1 Northwest Lobes and Drainages (Group 1 - North of Site 11)

Both surface and subsurface sediment samples were collected from the Northwest Lobes and Drainages north of Site 11. Tables 2.2 through 2.2b present the risk-based screening evaluation for surface sediment and Tables 2.3 through 2.3b present the risk-based screening evaluation for subsurface sediment. As shown on Table C-2, no COPCs were identified following Step 2 of the screening process for surface sediment. For subsurface sediment, six PAHs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2-cd)pyrene], one PCB (Aroclor-1260), one pesticide (dieldrin), and one metal (chromium) were identified as COPCs as shown on Table C-2. Therefore, exposure to surface sediment in the Northwest Lobes and Drainages north of Site 11 would not be expected to result in unacceptable risks; however exposure to subsurface sediment may result in unacceptable risks.

C.3.2.2 Northwest Lobes and Drainages (Group 2 - South of Site 11)

Surface sediment and subsurface sediment samples were collected from the Northwest Lobes and Drainages south of Site 11. Tables 2.4 and 2.4a present the risk-based screening evaluation for surface sediment and Tables 2.5 and 2.5a present the risk-based screening evaluation for subsurface sediment. As summarized on Table C-2, no COPCs were identified for surface sediment or subsurface sediment. Therefore, there would be no unacceptable risks associated with exposure to sediment in the Northwest Lobes and Drainages south of Site 11.

C.3.2.3 Group 3 - Northeast Lobe

Surface and subsurface sediment samples were collected from the Northeast Lobe of Penniman Lake. Table 2.6 presents the risk-based screening evaluation for surface sediment and Tables 2.7 and 2.7a present the risk-based screening evaluation for subsurface sediment from the Northeast Lobe. As summarized on Table C-2, no COPCs were identified for surface sediment or subsurface sediment after the screening process. Therefore, there would be no unacceptable risks associated with exposure to sediment from the Northeast Lobe.

C.3.2.4 Group 4a - Penniman Lake - Northwest

Both surface sediment and subsurface sediment samples were collected from the northwest section of Penniman Lake. Table 2.8 presents the risk-based screening evaluation for surface sediment and Tables 2.9 through 2.9a present the risk-based screening evaluation for subsurface sediment. As summarized on Table C-2, no COPCs were identified for surface or subsurface sediment in the northwest section of Penniman Lake Northwest. Therefore, there would be no unacceptable risks associated with exposure to sediment from the northwest section of Penniman Lake.

C.3.2.5 Group 4b - Center of Penniman Lake

Both surface sediment and subsurface sediment samples were collected from the center of Penniman Lake. Table 2.10 presents the risk-based screening evaluation for surface sediment and Tables 2.11 through 2.11a present the risk-based screening evaluation for subsurface sediment. As summarized on Table C-2, no COPCs were identified for surface or subsurface sediment from the center of Penniman Lake. Therefore, there would be no unacceptable risks associated with exposure to sediment from the center of Penniman Lake.

C.3.2.6 Group 4c - Penniman Lake - East

Surface sediment and subsurface sediment samples were collected from the east section of Penniman Lake. Tables 2.12 and 2.12a present the risk-based screening evaluation for surface sediment and Tables 2.13 through 2.13a present the risk-based screening evaluation for subsurface sediment. As summarized on Table C-2, no COPCs were identified for surface or subsurface sediment from the east section of Penniman Lake. Therefore, there would be no unacceptable risks associated with exposure to sediment from the east section of Penniman Lake.

C.3.2.7 Group 5 - Kings Creek

One surface sediment sample was collected from the Kings Creek side of the overflow pipe from Penniman Lake to Kings Creek. Tables 2.14 and 2.14a present the risk-based screening evaluation for surface sediment. As summarized on Table C-2, no COPCs were identified. Therefore, there would be no unacceptable risks associated with exposure to surface sediment from the Kings Creek side of the overflow pipe from Penniman Lake to Kings Creek.

C.3.3 Fish

Tables 2.15 through 2.15b present the HHRS for fish tissue from Penniman Lake. As summarized on Table C-2, 4,4'-DDE, Aroclor-1260, PCBs, and arsenic are COPCs for ingestion of fish caught from Penniman Lake.

C.3.4 Soil

The HHRS was conducted separately for five different soil exposure areas. When both surface soil and subsurface soil samples were collected from an exposure area, they were evaluated separately.

C.3.4.1 Group 1 - Drainages to Penniman Lake

Both surface soil and subsurface soil samples were collected from the drainages to Penniman Lake. Tables 2.16 through 2.16b present the risk-based screening evaluation for surface soil and Tables 2.17 through 2.17b present the risk-based screening evaluation for subsurface soil. As summarized on Table C-2, two PAHs [benzo(a)pyrene and benzo(b)fluoranthene], one PCB (Aroclor-1260), one pesticide (dieldrin), one explosive (nitroglycerin), and two metals (arsenic and chromium) were identified as COPCs based on potential human exposure to surface soil. For subsurface soil, one PAH [benzo(a)pyrene], one PCB (Aroclor-1260), and four metals (arsenic, chromium, cobalt, and iron) were identified as COPCs based on potential human contact with subsurface soil.

C.3.4.2 Group 2a - Former Transformers - Pole

Surface soil samples were collected from former pole mounted transformer areas and analyzed for Aroclor-1260. Tables 2.18 and 2.18a present the risk-based screening evaluation for this surface soil. As shown on Table C-2, Aroclor-1260 was not identified as a COPC following Step 2 of the screening process. Therefore, there would be no unacceptable risks associated with exposure to this surface soil.

C.3.4.3 Group 2b - Former Transformers - Pad

Surface soil and subsurface soil samples were collected from former pad mounted transformer areas and analyzed for Aroclor-1260. Table 2.19 presents the risk-based screening evaluation for this surface soil. As shown on Table C-2, Aroclor-1260 was not identified as a COPC following Step 1 of the screening process. Aroclor-1260 was not detected in the subsurface soil samples. Therefore, there would be no unacceptable risks associated with exposure to this soil.

C.3.4.4 Group 2c - Upgradient to Drainages

Both surface soil and subsurface soil samples were collected from the areas upgradient to drainages to Penniman Lake. Tables 2.20 through 2.20b present the risk-based screening evaluation for surface soil and Tables 2.21 through 2.21b present the risk-based screening evaluation for subsurface soil. As summarized on Table C-2, seven PAHs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2-cd)pyrene], one pesticide (4,4'-DDE), one PCB (Aroclor-1260), and four metals (antimony, arsenic, chromium, and iron) were identified as COPCs based on potential human exposure to surface soil. For subsurface soil, six PAHs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2-cd)pyrene], one PCB (Aroclor-1260), and three metals (arsenic, chromium, and iron) were identified as COPCs based on potential human contact with subsurface soil.

C.3.4.5 Group 2d - Potential Sprayed Areas

Both surface soil and subsurface soil samples were collected from potential sprayed areas that may result in transport of contaminants to Penniman Lake. Tables 2.22 and 2.22a present the risk-based screening evaluation for surface soil and Tables 2.23 and 2.23a present the risk-based screening evaluation for subsurface soil. As summarized on Table C-2, five PAHs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene], one PCB (Aroclor-1260), and two metals (arsenic and chromium) were identified as COPCs based on potential human exposure to surface soil. For subsurface soil, three metals (arsenic, chromium, and iron) were identified as COPCs based on potential human contact with subsurface soil. Step 3 was not performed for either the surface or the subsurface soil as there were less than eight samples available for each.

C.4 Human Health Risk Screening Summary

The HHRS for the media and exposure areas associated with Penniman Lake indicates that exposure to surface water in Penniman Lake, surface sediment in Northwest Lobes and Drainages north of Site 11, surface and subsurface sediment from the Northwest Lobes and

Drainages south of Site 11, surface and subsurface sediment from the Northeast Lobe of Penniman Lake, surface and subsurface soil from the northwest, east, or center sections of Penniman Lake, and surface sediment on the Kings Creek side of the Penniman Lake overflow pipe would not result in any potential unacceptable risks to human health. Additionally, exposure to surface soil around the former pole mounted transformers, and surface soil and subsurface soil around the former pad mounted transformers would not result in any potential unacceptable risks to human health.

The human health risk based screening identified COPCs associated with exposure to the following media and exposure areas:

- subsurface sediment in Northwest Lobes and Drainages north of Site 11,
- fish caught in Penniman Lake,
- surface soil and subsurface soil from the drainages to Penniman Lake, areas upgradient to drainages to Penniman Lake, and the spray areas.

Therefore, exposure to these media and exposure areas may result in unacceptable risks to potential receptors.

C.5 References

U.S. Navy. 2000. Overview of Screening, Risk Ratio, and Toxicological Evaluation. Procedures for Northern Division Human Health Risk Assessments. May.

USEPA. 2014. Regional Screening Levels for Chemicals at Superfund Sites. November.

USEPA. 2013. ProUCL, Version 5.0. Prepared by Lockheed Martin Environmental Services. September.

TABLE C-1

Summary of Samples Used in HHRS

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Sample Date	Analysis
Surface Water (Group 1; Penniman Lake)			
CAPL-SWSD62	CAPL-SW62-1012	10/15/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD63	CAPL-SW63-1012	10/15/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD63	CAPL-SW63P-1012*	10/15/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD64	CAPL-SW64-1012	10/15/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD65	CAPL-SW65-1012	10/15/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD66	CAPL-SW66-1012	10/15/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD67	CAPL-SW67-1012	10/15/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD68	CAPL-SW68-1012	10/15/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD69	CAPL-SW69-1012	10/15/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Surface Sediment [Group 1; Northwest Lobes and Drainages, (North of Site 11)]			
CAPL-SWSD24	CAPL-SD24-0711	07/28/11	PCBs
CAS011-11SD23	CAS011-11SD23-00-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD29	CAS011-11SD29-00-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
Penniman Lake-SD11	PL-00-POND-SD11-0300	03/30/00	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAS011-11SD18	CAS011-11SD18-00-0602	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD18	CAS011-11SD18-00D-0602*	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD19	CAS011-11SD19-00-0602	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD20	CAS011-11SD20-00-0602	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD21	CAS011-11SD21-00-0602	06/14/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD21	CAS011-11SD21-00D-0602*	06/14/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD22	CAS011-11SD22-00-0602	06/14/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAPL-SWSD22	CAPL-SD22-0711	07/28/11	PCBs
CAPL-SWSD23	CAPL-SD23-0711	07/28/11	PCBs
CAPL-SWSD26	CAPL-SD26-0811	07/28/11	PCBs
CAPL-SD70	CAPL-SD70-1012	10/17/12	SVOCs, Explosives, Aroclor-1260, Metals
CAPL-SD70	CAPL-SD70-1012-V	10/25/12	VOCs
CAS011-11SD30	CAS011-11SD30-00-0602	06/18/02	VOCs, SVOCs, Pesticides/PCBs, Metals
Penniman Lake-SD10	PL-00-POND-SD10-0300	03/29/00	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
Penniman Lake-SD10	PL-00-POND-SD10D-0300*	03/29/00	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SWSD18	CAPL-SD18-0811	08/02/11	PCBs
CAPL-SWSD19	CAPL-SD19-0811	08/02/11	PCBs
CAPL-SD84	CAPL-SD84-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD85	CAPL-SD85-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD86	CAPL-SD86-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD87	CAPL-SD87-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD20	CAPL-SD20-0811	08/02/11	PCBs
CAPL-SWSD20	CAPL-SD20P-0811*	08/02/11	PCBs
CAPL-SWSD21	CAPL-SD21-0811	08/02/11	PCBs

TABLE C-1

Summary of Samples Used in HHRS

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Sample Date	Analysis
Subsurface Sediment [Group 1; Northwest Lobes and Drainages (North of Site 11)]			
CAS011-11SD23	CAS011-11SD23-01-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD29	CAS011-11SD29-01-0602	06/18/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD18	CAS011-11SD18-01-0602	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD18	CAS011-11SD18-01D-0602*	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD19	CAS011-11SD19-01-0602	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD21	CAS011-11SD21-01-0602	06/14/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD21	CAS011-11SD21-01D-0602*	06/14/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD22	CAS011-11SD22-01-0602	06/14/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAPL-SD70	CAPL-SSD70-1012	10/17/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAS011-11SD30	CAS011-11SD30-01-0602	06/18/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAPL-SD84	CAPL-SSD84-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD85	CAPL-SSD85-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD86	CAPL-SSD86-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD87	CAPL-SSD87-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Surface Sediment [(Group 2; Northwest Lobes and Drainages (South of Site 11)]			
CAPL-SWSD25	CAPL-SD25-0711	07/28/11	PCBs
CAS011-11SD27	CAS011-11SD27-00-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD28	CAS011-11SD28-00-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
Penniman Lake-SD12	PL-00-POND-SD12-0300	03/29/00	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAS011-11SD24	CAS011-11SD24-00-0602	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD25	CAS011-11SD25-00-0602	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD26	CAS011-11SD26-00-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
Subsurface Sediment [(Group 2; Northwest Lobes and Drainages (South of Site 11)]			
CAS011-11SD27	CAS011-11SD27-01-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD28	CAS011-11SD28-01-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD24	CAS011-11SD24-01-0602	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD25	CAS011-11SD25-01-0602	06/13/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD26	CAS011-11SD26-01-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
Surface Sediment (Group 3; Northeast Lobe)			
CAPL-SWSD59	CAPL-SD59-0711	07/27/11	PCBs
CAPL-SWSD60	CAPL-SD60-0711	07/29/11	PCBs
Penniman Lake-SD17	PL-00-POND-SD17-0300	03/29/00	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SWSD66	CAPL-SD66-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD76	CAPL-SD76-1012	10/16/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD77	CAPL-SD77-1012	10/16/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD77	CAPL-SD77-1012-V	10/25/12	VOCs
CAPL-SD78	CAPL-SD78-1012	10/16/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD79	CAPL-SD79-1012	10/16/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD79	CAPL-SD79P-1012*	10/16/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD80	CAPL-SD80-1012	10/16/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Subsurface Sediment (Group 3 Northeast Lobe)			
CAPL-SWSD66	CAPL-SSD66-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD66	CAPL-SSD66P-1012*	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD76	CAPL-SSD76-1012	10/16/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD77	CAPL-SSD77-1012	10/16/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD78	CAPL-SSD78-1012	10/16/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD79	CAPL-SSD79-1012	10/16/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD79	CAPL-SSD79-1012-V	10/25/12	VOCs
CAPL-SD80	CAPL-SSD80-1012	10/16/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD80	CAPL-SSD80-1012-V	10/25/12	VOCs

TABLE C-1

Summary of Samples Used in HHRS

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Sample Date	Analysis
Surface Sediment (Group 4a; Penniman Lake - Northwest)			
CAPL-SWSD23	CAPL-SD23-0711	07/28/11	PCBs
CAPL-SWSD26	CAPL-SD26-0811	08/02/11	PCBs
CAPL-SWSD27	CAPL-SD27-0711	07/28/11	PCBs
CAPL-SWSD28	CAPL-SD28-0711	07/28/11	PCBs
CAPL-SWSD28	CAPL-SD28P-0711*	07/28/11	PCBs
CAS011-11SD28	CAS011-11SD28-00-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAPL-SWSD29	CAPL-SD29-0711	07/28/11	PCBs
CAPL-SWSD30	CAPL-SD30-0711	07/28/11	PCBs
CAPL-SWSD35	CAPL-SD35-0711	07/28/11	PCBs
CAS011-11SD31	CAS011-11SD31-00-0602	06/18/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD32	CAS011-11SD32-00-0602	06/18/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAPL-SWSD62	CAPL-SD62-1012	10/17/12	VOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD62	CAPL-SD62-1012-V	10/25/12	VOCs
CAPL-SWSD63	CAPL-SD63-1012	10/17/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD63	CAPL-SD63-1012-V	10/25/12	VOCs
CAPL-SWSD64	CAPL-SD64-1012	10/17/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD64	CAPL-SD64P-1012*	10/17/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD64	CAPL-SD64-1012-V	10/25/12	VOCs
CAPL-SWSD64	CAPL-SD64P-1012-V*	10/25/12	VOCs
Subsurface Sediment (Group 4a; Penniman Lake - Northwest)			
CAPL-SWSD62	CAPL-SSD62-1012	10/17/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD63	CAPL-SSD63-1012	10/17/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD64	CAPL-SSD64-1012	10/17/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAS011-11SD28	CAS011-11SD28-01-0602	06/17/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD31	CAS011-11SD31-01-0602	06/18/02	VOCs, SVOCs, Pesticides/PCBs, Metals
CAS011-11SD32	CAS011-11SD32-01-0602	06/18/02	VOCs, SVOCs, Pesticides/PCBs, Metals

TABLE C-1

Summary of Samples Used in HHRS

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Sample Date	Analysis
Surface Sediment (Group 4b; Penniman Lake - Center)			
CAPL-SWSD31	CAPL-SD31-0711	07/28/11	PCBs
CAPL-SWSD32	CAPL-SD32-0711	07/28/11	PCBs
CAPL-SWSD33	CAPL-SD33-0711	07/28/11	PCBs
CAPL-SWSD33	CAPL-SD33P-0711*	07/28/11	PCBs
CAPL-SWSD34	CAPL-SD34-0711	07/27/11	PCBs
CAPL-SWSD36	CAPL-SD36-0711	07/28/11	PCBs
CAPL-SWSD37	CAPL-SD37-0711	07/27/11	PCBs
CAPL-SWSD38	CAPL-SD38-0711	07/27/11	PCBs
CAPL-SWSD38	CAPL-SD38P-0711*	07/27/11	PCBs
CAPL-SWSD39	CAPL-SD39-0711	07/27/11	PCBs
CAPL-SWSD40	CAPL-SD40-0711	07/27/11	PCBs
CAPL-SWSD41	CAPL-SD41-0711	07/28/11	PCBs
CAPL-SWSD42	CAPL-SD42-0711	07/27/11	PCBs
CAPL-SWSD43	CAPL-SD43-0711	07/28/11	PCBs
CAPL-SWSD44	CAPL-SD44-0711	07/28/11	PCBs
CAPL-SWSD45	CAPL-SD45-0711	07/28/11	PCBs
CAPL-SWSD46	CAPL-SD46-0711	07/27/11	PCBs
CAPL-SWSD47	CAPL-SD47-0711	07/27/11	PCBs
CAPL-SWSD69	CAPL-SD69-1012	10/17/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD71	CAPL-SD71-1012	10/17/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD71	CAPL-SD71-1012-V	10/25/12	VOCs
CAPL-SD72	CAPL-SD72-1012	10/17/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD72	CAPL-SD72-1012-V	10/25/12	VOCs
CAPL-SD73	CAPL-SD73-1012	10/17/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD73	CAPL-SD73P-1012*	10/17/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD73	CAPL-SD73-1012-V	10/25/12	VOCs
CAPL-SD73	CAPL-SD73P-1012-V*	10/25/12	VOCs
CAPL-SD74	CAPL-SD74-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD75	CAPL-SD75-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Penniman Lake-SD13	PL-00-POND-SD13-0300	03/30/00	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
Penniman Lake-SD14	PL-00-POND-SD14-0300	03/29/00	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
Subsurface Sediment (Group 4b; Penniman Lake - Center)			
CAPL-SWSD69	CAPL-SSD69-1012	10/17/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD69	CAPL-SSD69-1012-V	10/25/12	VOCs
CAPL-SD71	CAPL-SSD71-1012	10/17/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD72	CAPL-SSD72-1012	10/17/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD73	CAPL-SSD73-1012	10/17/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD74	CAPL-SSD74-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD74	CAPL-SSD74P-1012*	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD75	CAPL-SSD75-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals

TABLE C-1

Summary of Samples Used in HHRS

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Sample Date	Analysis
Surface Sediment (Group 4c; Penniman Lake - East)			
CAA06-SD01	CAA06-SD01-1008	10/23/08	SVOCs, Explosives, Metals
CAA06-SD01	CAA06-SD01P-1008*	10/23/08	SVOCs, Explosives, Metals
CAA06-SD02	CAA06-SD02-1008	10/23/08	SVOCs, Explosives, Metals
CAPL-SWSD48	CAPL-SD48-0711	07/29/11	PCBs
CAPL-SWSD49	CAPL-SD49-0711	07/29/11	PCBs
CAPL-SWSD50	CAPL-SD50-0711	07/29/11	PCBs
CAPL-SWSD50	CAPL-SD50P-0711*	07/29/11	PCBs
CAPL-SWSD51	CAPL-SD51-0711	07/29/11	PCBs
CAPL-SWSD52	CAPL-SD52-0711	07/29/11	PCBs
CAPL-SWSD53	CAPL-SD53-0711	07/29/11	PCBs
CAPL-SWSD54	CAPL-SD54-0711	07/27/11	PCBs
CAPL-SWSD55	CAPL-SD55-0711	07/27/11	PCBs
CAPL-SWSD56	CAPL-SD56-0711	07/27/11	PCBs
CAPL-SWSD57	CAPL-SD57-0711	07/27/11	PCBs
CAPL-SWSD58	CAPL-SD58-0711	07/29/11	PCBs
CAPL-SWSD58	CAPL-SD58P-0711*	07/29/11	PCBs
CAPL-SWSD61	CAPL-SD61-0811	08/02/11	PCBs
CAPL-SWSD65	CAPL-SD65-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD67	CAPL-SD67-1012	10/16/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD68	CAPL-SD68-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD81	CAPL-SD81-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD82	CAPL-SD82-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Penniman Lake-SD15	PL-00-POND-SD15-0300	03/29/00	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
Penniman Lake-SD16	PL-00-POND-SD16-0300	03/29/00	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
Subsurface Sediment (Group 4c; Penniman Lake - East)			
CAA06-SD01	CAA06-SSD01-1008	10/23/08	SVOCs, Explosives, Metals
CAA06-SD02	CAA06-SSD02-1008	10/23/08	SVOCs, Explosives, Metals
CAPL-SWSD65	CAPL-SSD65-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SWSD67	CAPL-SSD67-1012	10/16/12	SVOCs, Explosives, Metals
CAPL-SWSD67	CAPL-SSD67-1012-V	10/25/12	VOCs
CAPL-SWSD68	CAPL-SSD68-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD81	CAPL-SSD81-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD82	CAPL-SSD82-1012	10/18/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Surface Sediment (Group 5; King Creek)			
CAPL-SD83	CAPL-SD83-1012	10/16/12	SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SD83	CAPL-SD83-1012-V	10/16/12	VOCs

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Summary of Samples Used in HHRS

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Sample Date	Analysis
Surface Soil (Group 1; Drainages)			
CAPL-SO55	CAPL-SS55-1012	10/26/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO56	CAPL-SS56-1012	10/26/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO57	CAPL-SS57-1012	10/26/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO58	CAPL-SS58-1012	10/26/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO59	CAPL-SS59-1012	10/26/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO59	CAPL-SS59P-1012*	10/26/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO01	CAPL-SS01-0811	08/01/11	PCBs
CAPL-SO01	CAPL-SS01P-0811*	08/01/11	PCBs
CAPL-SO02	CAPL-SS02-0811	08/01/11	PCBs
CAPL-SO03	CAPL-SS03-0811	08/01/11	PCBs
CAPL-SO04	CAPL-SS04-0811	08/01/11	PCBs
CAPL-SO05	CAPL-SS05-0811	08/01/11	PCBs
CAPL-SO06	CAPL-SS06-0811	08/01/11	PCBs
CAPL-SO07	CAPL-SS07-0811	08/01/11	PCBs
CAPL-SO08	CAPL-SS08-0811	08/01/11	PCBs
CAPL-SO44	CAPL-SS44-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO45	CAPL-SS45-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO45	CAPL-SS45P-1012*	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO46	CAPL-SS46-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO47	CAPL-SS47-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO48	CAPL-SS48-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO49	CAPL-SS49-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO49	CAPL-SS49P-1012*	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO50	CAPL-SS50-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO09	CAPL-SS09-0811	08/01/11	PCBs
CAPL-SO10	CAPL-SS10-0811	08/01/11	PCBs
CAPL-SO10	CAPL-SS10P-0811*	08/01/11	PCBs
CAPL-SO11	CAPL-SS11-0811	08/01/11	PCBs
CAPL-SO12	CAPL-SS12-0811	08/01/11	PCBs
CAPL-SO13	CAPL-SS13-0811	08/01/11	PCBs
CAPL-SO14	CAPL-SS14-0811	08/01/11	PCBs
CAPL-SO15	CAPL-SS15-0811	08/01/11	PCBs
CAPL-SO16	CAPL-SS16-0811	08/02/11	PCBs
CAPL-SO17	CAPL-SS17-0811	08/01/11	PCBs
CAPL-SO18	CAPL-SS18-0811	08/01/11	PCBs
CAPL-SO18	CAPL-SS18P-0811*	08/01/11	PCBs
CAPL-SO19	CAPL-SS19-0811	08/01/11	PCBs
CAPL-SO21	CAPL-SS21-0811	08/02/11	PCBs
CAPL-SO22	CAPL-SS22-0811	08/02/11	PCBs
CAPL-SO23	CAPL-SS23-0811	08/02/11	PCBs
CAPL-SO24	CAPL-SS24-0811	08/02/11	PCBs
CAPL-SO25	CAPL-SS25-0811	08/01/11	PCBs
CAPL-SO26	CAPL-SS26-0811	08/01/11	PCBs

TABLE C-1

Summary of Samples Used in HHRS

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Sample Date	Analysis
Subsurface Soil (Group 1; Drainages)			
CAPL-SO55	CAPL-SB55-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO56	CAPL-SB56-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO57	CAPL-SB57-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO58	CAPL-SB58-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO59	CAPL-SB59-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO44	CAPL-SB44-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO45	CAPL-SB45-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO46	CAPL-SB46-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO47	CAPL-SB47-1012	10/26/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO48	CAPL-SB48-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO49	CAPL-SB49-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO50	CAPL-SB50-1012	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO50	CAPL-SB50P-1012*	10/24/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Surface Soil (Group 2a; Former Transformer - Pole)			
CAPL-SO27	CAPL-SS27-1012	10/31/12	Aroclor-1260
CAPL-SO28	CAPL-SS28-1112	11/02/12	Aroclor-1260
CAPL-SO29	CAPL-SS29-1012	10/31/12	Aroclor-1260
CAPL-SO29	CAPL-SS29P-1012*	10/31/12	Aroclor-1260
CAPL-SO30	CAPL-SS30-1012	10/31/12	Aroclor-1260
CAPL-SO31	CAPL-SS31-1012	10/31/12	Aroclor-1260
CAPL-SO32	CAPL-SS32-1012	10/31/12	Aroclor-1260
CAPL-SO33	CAPL-SS33-1012	10/31/12	Aroclor-1260
Surface Soil (Group 2b; Former Transformer- Pad)			
CAPL-SO34	CAPL-SS34-1112	11/05/12	Aroclor-1260
CAPL-SO35	CAPL-SS35-1112	11/06/12	Aroclor-1260
CAPL-SO36	CAPL-SS36-1112	11/06/12	Aroclor-1260
CAPL-SO37	CAPL-SS37-1112	11/06/12	Aroclor-1260
CAPL-SO38	CAPL-SS38-1012	10/31/12	Aroclor-1260
CAPL-SO39	CAPL-SS39-1012	10/31/12	Aroclor-1260
CAPL-SO39	CAPL-SS39P-1012*	10/31/12	Aroclor-1260
CAPL-SO40	CAPL-SS40-1112	11/01/12	Aroclor-1260
CAPL-SO41	CAPL-SS41-1012	10/31/12	Aroclor-1260
CAPL-SO42	CAPL-SS42-1012	10/31/12	Aroclor-1260
CAPL-SO43	CAPL-SS43-1112	11/01/12	Aroclor-1260
Subsurface Soil (Group 2b; Former Transformer- Pad)			
CAPL-SO34	CAPL-SB34-1112	11/05/12	Aroclor-1260
CAPL-SO35	CAPL-SB35-1112	11/06/12	Aroclor-1260
CAPL-SO36	CAPL-SB36-1112	11/06/12	Aroclor-1260
CAPL-SO37	CAPL-SB37-1112	11/06/12	Aroclor-1260
CAPL-SO38	CAPL-SB38-1012	10/31/12	Aroclor-1260
CAPL-SO39	CAPL-SB39-1012	10/31/12	Aroclor-1260
CAPL-SO40	CAPL-SB40-1112	11/01/12	Aroclor-1260
CAPL-SO40	CAPL-SB40P-1112*	10/31/12	Aroclor-1260
CAPL-SO41	CAPL-SB41-1012	10/31/12	Aroclor-1260
CAPL-SO42	CAPL-SB42-1012	10/31/12	Aroclor-1260
CAPL-SO43	CAPL-SB43-1112	11/01/12	Aroclor-1260

TABLE C-1

Summary of Samples Used in HHRS

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Sample Date	Analysis
Surface Soil (Group 2c; Upgradient to Drainages)			
CAPL-SO60	CAPL-SS60-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO61	CAPL-SS61-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO62	CAPL-SS62-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO63	CAPL-SS63-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO64	CAPL-SS64-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO65	CAPL-SS65-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO66	CAPL-SS66-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO67	CAPL-SS67-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO68	CAPL-SS68-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO69	CAPL-SS69-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO69	CAPL-SS69P-1112*	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Subsurface Soil (Group 2c; Upgradient to Drainages)			
CAPL-SO60	CAPL-SB60-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO60	CAPL-SB60P-1112*	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO61	CAPL-SB61-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO62	CAPL-SB62-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO63	CAPL-SB63-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO64	CAPL-SB64-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO65	CAPL-SB65-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO66	CAPL-SB66-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO67	CAPL-SB67-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO68	CAPL-SB68-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO69	CAPL-SB69-1112	11/01/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Surface Soil (Group 2d; Potential Sprayed Areas)			
CAPL-SO70	CAPL-SS70-1112	11/02/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO71	CAPL-SS71-1112	11/02/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO72	CAPL-SS72-1112	11/02/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO73	CAPL-SS73-1112	11/05/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO74	CAPL-SS74-1112	11/05/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
CAPL-SO75	CAPL-SS75-1112	11/05/12	VOCs, SVOCs, Pesticides, Aroclor-1260, Explosives, Metals
Subsurface Soil (Group 2d; Potential Sprayed Areas)			
CAPL-SO70	CAPL-SB70-1112	11/02/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO71	CAPL-SB71-1112	11/02/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO72	CAPL-SB72-1112	11/02/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO73	CAPL-SB73-1112	11/05/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO74	CAPL-SB74-1112	11/05/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO75	CAPL-SB75-1112	11/05/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
CAPL-SO75	CAPL-SB75P-1112*	11/05/12	VOCs, SVOCs, Pesticides/PCBs, Explosives, Metals
Fish (Penniman Lake)			
CAPL-TS16	CAPL-TS16-F-1012	10/10/12	Pesticides/PCBs, Metals
CAPL-TS17	CAPL-TS17-F-1012	10/10/12	Pesticides/PCBs, Metals
CAPL-TS18	CAPL-TS18-F-1012	10/10/12	Pesticides/PCBs, Metals

* Duplicate of previous sample.

VOC = Volatile Organic Compound

SVOC = Semivolatile Organic Compound

PCB = Polychlorinated Biphenol

TABLE C-2
Summary of Human Health COPCs
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Media/Exposure Area	Step 1 COPCs	Step 2 COPCs	Step 3 COPCs
Surface water Penniman Lake	Dibenz(a,h)anthracene	None	N/A
Sediment Surface Sediment, Group 1 - Northwest Lobes and Drainages (North of Site 11)	Benzo(a)pyrene Aroclor-1260 Dieldrin Cobalt Lead	None	N/A
Subsurface Sediment, Group 1 - Northwest Lobes and Drainages (North of Site 11)	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Dieldrin Chromium[a]	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Dieldrin Chromium[a]	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Dieldrin Chromium[a]
Surface Sediment, Group 2 - Northwest Lobes and Drainages (South of Site 11)	Chromium[a] Iron	None	N/A
Subsurface Sediment, Group 2 - Northwest Lobes and Drainages (South of Site 11)	Chromium[a]	None	N/A
Surface Sediment, Group 3 - Northeast Lobe	None	N/A	N/A
Subsurface Sediment, Group 3 - Northeast Lobe	Aroclor-1260	None	N/A
Surface Sediment, Group 4a - Penniman Lake - Northwest	None	N/A	N/A
Subsurface Sediment, Group 4a - Penniman Lake - Northwest	Chromium[a]	None	N/A
Surface Sediment, Group 4b - Penniman Lake - Center	None	N/A	N/A
Subsurface Sediment, Group 4b - Penniman Lake - Center	Chromium[a]	None	N/A

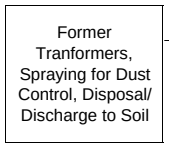
TABLE C-2
Summary of Human Health COPCs
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

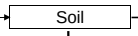
Media/Exposure Area	Step 1 COPCs	Step 2 COPCs	Step 3 COPCs
Surface Sediment, Group 4c - Penniman Lake - East	Benzo(a)pyrene	None	N/A
Subsurface Sediment, Group 4c - Penniman Lake - East	Benzo(a)pyrene Chromium[a]	None	N/A
Surface Sediment, Group 5 - Kings Creek	Chromium[a]	None	N/A
Fish Penniman Lake	4,4'-DDE Aroclor-1260 PCBs Arsenic	4,4'-DDE Aroclor-1260 PCBs Arsenic	Not conducted, not enough samples
Soil Surface Soil, Group 1 - Drainages	Benzo(a)pyrene Benzo(b)fluoranthene Aroclor-1260 Dieldrin Nitroglycerin Aluminum Arsenic Chromium[a] Iron Vanadium	Benzo(a)pyrene Benzo(b)fluoranthene Aroclor-1260 Dieldrin Nitroglycerin Arsenic Chromium[a] Iron	Benzo(a)pyrene Benzo(b)fluoranthene Aroclor-1260 Dieldrin Nitroglycerin Arsenic Chromium[a]
Subsurface Soil, Group 1 - Drainages	Benzo(a)pyrene Aroclor-1260 Aluminum Arsenic Chromium[a] Cobalt Iron Vanadium	Benzo(a)pyrene Aroclor-1260 Arsenic Chromium[a] Cobalt Iron	Benzo(a)pyrene Aroclor-1260 Arsenic Chromium[a] Cobalt Iron
Surface Soil, Group 2a - Former Transformer - Pole	Aroclor-1260	None	N/A
Surface Soil, Group 2b - Former Transformer - Pad	None	N/A	N/A

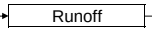
TABLE C-2
Summary of Human Health COPCs
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

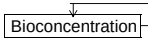
Media/Exposure Area	Step 1 COPCs	Step 2 COPCs	Step 3 COPCs
Surface Soil, Group 2c - Upgradient to Drainages	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene 4,4'-DDE Aroclor-1260 Aluminum Antimony Arsenic Chromium[a] Iron Vanadium	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene 4,4'-DDE Aroclor-1260 Antimony Arsenic Chromium[a] Iron	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene 4,4'-DDE Aroclor-1260 Antimony Arsenic Chromium[a] Iron
Subsurface Soil, Group 2c - Upgradient to Drainages	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Aluminum Arsenic Chromium[a] Cobalt Iron Manganese	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Arsenic Chromium[a] Iron	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Arsenic Chromium[a] Iron
Surface Soil, Group 2d - Potential Sprayed Areas	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Arsenic Chromium[a] Manganese	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor-1260 Arsenic Chromium[a]	Not conducted, not enough samples
Subsurface Soil, Group 2d - Potential Sprayed Areas	Aluminum Arsenic Chromium[a] Iron Manganese	Arsenic Chromium[a] Iron	Not conducted, not enough samples

[a] total chromium identified as a COPC based on comparison to hexavalent chromium screening levels.









Primary Sources	Primary Release Mechanism	Secondary Source	Secondary Release Mechanism	Exposure Media	Exposure Route	Potential Human Receptors: Current/Future: Recreational Users (Adult and Child)	Current/Future: Trespassers (Adult and Adolescent)	Current/Future: Maintenance Workers	Current/Future: Industrial Workers	Future: Residents (Adult and Child)	Future: Construction Workers
Former Tranformers, Spraying for Dust Control, Disposal/ Discharge to Soil	Leaks, Disposal, Discharges, Spills, Spraying	Soil		Surface Soil[1]	Ingestion	X	X	X	X	X	X
					Dermal Contact	X	X	X	X	X	X
					Inhalation	X	X	X	X	X	X
				Subsurface Soil[1]	Ingestion	X	X	X	X	X	X
					Dermal Contact	X	X	X	X	X	X
					Inhalation	X	X	X	X	X	X
			Leaching	Groundwater	Ingestion	NA	NA	NA	NA	X1	NA
					Dermal Contact	NA	NA	NA	NA	X1	X1
					Inhalation	NA	NA	NA	NA	X1	X1
			Runoff	Surface Water and Sediment	Ingestion	X	X	NA	NA	NA	NA
					Dermal Contact	X	X	NA	NA	NA	NA
					Inhalation	NA	NA	NA	NA	NA	NA
			Bioconcentration	Fish	Ingestion	X	NA	NA	NA	NA	NA

1. Current exposure to surface soil only, future expsoure to surface soil and subsurface soil

NA - Not Applicable or pathway is incomplete
X - Potentially complete exposure pathways
X1 - Potentially complete exposure pathway if leaching to soil, however, groundwater not sampled or evalauted during this phase of the investigation.

FIGURE C-1
Human Health Conceptual Site Model
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Table 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Penniman Lake	67-64-1	Acetone	2.5E+00 J	6.4E+01 J	UG/L	CAPL-SW62-1012	3/8	10 - 10	6.4E+01	N/A	1.4E+04 N	N/A		NO	BSL
	74-87-3	Chloromethane	1.9E+00	6.9E+00	UG/L	CAPL-SW63P-1012	7/8	1 - 1	6.9E+00	N/A	1.9E+02 N	N/A		NO	BSL
	83-32-9	Acenaphthene	1.3E-01 J	1.3E-01 J	UG/L	CAPL-SW66-1012	1/8	0.185 - 0.196	1.3E-01	N/A	5.3E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	1.3E-01 J	1.3E-01 J	UG/L	CAPL-SW66-1012	1/8	0.185 - 0.196	1.3E-01	N/A	1.8E+03 N	N/A		NO	BSL
	56-55-3	Benzo(a)anthracene	5.6E-02 J	7.1E-02 J	UG/L	CAPL-SW66-1012	2/8	0.185 - 0.196	7.1E-02	5.2E-02	3.4E-01 C	N/A		NO	BSL
	205-99-2	Benzo(b)fluoranthene	5.5E-02 J	5.5E-02 J	UG/L	CAPL-SW69-1012	1/8	0.185 - 0.196	5.5E-02	N/A	3.4E-01 C	N/A		NO	BSL
	191-24-2	Benzo(g,h,i)perylene	6.8E-02 J	6.8E-02 J	UG/L	CAPL-SW69-1012	1/8	0.185 - 0.196	6.8E-02	N/A	1.2E+02 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	6.2E-02 J	6.2E-02 J	UG/L	CAPL-SW69-1012	1/8	0.185 - 0.196	6.2E-02	N/A	3.4E+00 C	N/A		NO	BSL
	218-01-9	Chrysene	6.9E-02 J	7.8E-02 J	UG/L	CAPL-SW69-1012	2/8	0.185 - 0.196	7.8E-02	N/A	3.4E+01 C	N/A		NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**7.8E-02 J**	**7.8E-02 J**	**UG/L**	**CAPL-SW69-1012**	**1/8**	**0.185 - 0.196**	**7.8E-02**	**N/A**	**3.4E-02 C**	**N/A**		**YES**	**ASL**
	206-44-0	Fluoranthene	4.9E-02 J	1.7E-01 J	UG/L	CAPL-SW66-1012	4/8	0.185 - 0.196	1.7E-01	9.5E-02	8.0E+02 N	N/A		NO	BSL
	86-73-7	Fluorene	1.3E-01 J	1.3E-01 J	UG/L	CAPL-SW66-1012	1/8	0.185 - 0.196	1.3E-01	N/A	2.9E+02 N	N/A		NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	7.6E-02 J	7.6E-02 J	UG/L	CAPL-SW69-1012	1/8	0.185 - 0.196	7.6E-02	N/A	3.4E-01 C	N/A		NO	BSL
	85-01-8	Phenanthrene	4.6E-01	4.6E-01	UG/L	CAPL-SW66-1012	1/8	0.37 - 0.392	4.6E-01	1.4E-01	1.8E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	1.9E-01	1.9E-01	UG/L	CAPL-SW66-1012	1/8	0.185 - 0.196	1.9E-01	5.9E-02	1.2E+02 N	N/A		NO	BSL
	76-44-8	Heptachlor	5.4E-03 J	5.4E-03 J	UG/L	CAPL-SW69-1012	1/8	0.0189 - 0.02	5.4E-03	N/A	2.0E-02 C	N/A		NO	BSL
	19406-51-0	4-Amino-2,6-dinitrotoluene	1.1E-01 L	1.1E-01 L	UG/L	CAPL-SW67-1012	1/8	0.314 - 0.376	1.1E-01	N/A	3.9E+01 N	N/A		NO	BSL
	7440-38-2	Arsenic	1.4E+00 J	2.0E+00 J	UG/L	CAPL-SW65-1012	8/8	2.5 - 2.5	2.0E+00	8.8E+00	5.2E-01 C	N/A		NO	BBK
	7440-39-3	Barium	1.9E+01	2.2E+01	UG/L	CAPL-SW65-1012	8/8	10 - 10	2.2E+01	2.7E+01	3.8E+03 N	N/A		NO	BSL
	7440-70-2	Calcium	3.4E+04	3.8E+04	UG/L	CAPL-SW63P-1012	8/8	1250 - 1250	3.8E+04	N/A	N/A	N/A		NO	NUT
	7439-89-6	Iron	3.0E+02	3.9E+02	UG/L	CAPL-SW64-1012	8/8	25 - 25	3.9E+02	2.6E+03	1.4E+04 N	N/A		NO	BSL
	7439-95-4	Magnesium	1.4E+03	1.6E+03	UG/L	CAPL-SW65-1012 : CAPL-SW67-1012	8/8	1250 - 1250	1.6E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	4.0E+01	5.4E+01	UG/L	CAPL-SW64-1012	8/8	3.75 - 3.75	5.4E+01	1.6E+02	4.3E+02 N	N/A		NO	BSL
	7440-09-7	Potassium	2.6E+03	2.8E+03	UG/L	CAPL-SW67-1012	8/8	1250 - 1250	2.8E+03	N/A	N/A	N/A		NO	NUT
	7440-23-5	Sodium	8.3E+03	9.4E+03	UG/L	CAPL-SW67-1012	8/8	1250 - 1250	9.4E+03	N/A	N/A	N/A		NO	NUT

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Tap Water RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
UG/L = Microgram per liter

TABLE 2.1a

Step 2 Penniman Lake Surface Water - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration (UG/L)	Carcinogenic Tap Water RSL x 10 (UG/L)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Tap Water RSL x 10 (UG/L)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Dibenz(a,h)anthracene	1 / 8	7.8E-02 J	CAPL-SW69-1012	3.4E-02	1E-06	2E-06	N/A		N/A	NA
Cumulative Corresponding Hazard Index[c]									**N/A**	
Cumulative Corresponding Cancer Risk[d]						**2E-06**				

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

J = Estimated Value

UG/L = Microgram per liter

N/A = Not available/not applicable

Table 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 1															
Northwest Lobes	78-93-3	2-Butanone	3.9E-03 J	1.3E-01	MG/KG	CAPL-SD70-1012-V	9/15	0.001 - 0.073	1.3E-01	5.9E-01	2.7E+04 N	N/A		NO	BSL
and Drainages	75-07-0	Acetaldehyde	8.9E-02 J	8.9E-02 J	MG/KG	CAS011-11SD29-00-0602	1/1	0.089 - 0.089	8.9E-02	N/A	8.2E+01 N	N/A		NO	BSL
(North of Site 11)	67-64-1	Acetone	2.1E-02 J	3.3E-01 J	MG/KG	CAPL-SD70-1012-V	7/15	0.0008 - 0.073	3.3E-01	2.5E+00	6.1E+04 N	N/A		NO	BSL
	75-15-0	Carbon disulfide	7.0E-04 J	9.0E-03 J	MG/KG	PL-00-POND-SD11-0300	6/15	0.0003 - 0.073	9.0E-03	2.6E-02	7.7E+02 N	N/A		NO	BSL
	108-87-2	Methylcyclohexane	5.0E-03 J	5.0E-03 J	MG/KG	CAS011-11SD30-00-0602	1/13	0.0004 - 0.0133	5.0E-03	N/A	5.4E+02 N	N/A		NO	BSL
	75-09-2	Methylene chloride	8.0E-04 J	4.0E-03 J	MG/KG	CAS011-11SD20-00-0602	4/15	0.0006 - 0.073	4.0E-03	N/A	3.5E+02 N	N/A		NO	BSL
	83-32-9	Acenaphthene	1.4E-01	3.4E-01 K	MG/KG	CAPL-SD87-1012	2/15	0.009 - 2.4	3.4E-01	N/A	3.5E+03 N	N/A		NO	BSL
	208-96-8	Acenaphthylene	1.7E-02 J	1.7E-02 J	MG/KG	CAS011-11SD18-00-0602	1/15	0.008 - 2.4	1.7E-02	N/A	3.5E+03 N	N/A		NO	BSL
	98-86-2	Acetophenone	1.6E-02 J	3.9E-02 J	MG/KG	CAS011-11SD22-00-0602	3/13	0.01 - 0.946	3.9E-02	N/A	7.8E+03 N	N/A		NO	BSL
	120-12-7	Anthracene	2.7E-02 J	2.7E-01	MG/KG	CAPL-SD87-1012	3/15	0.008 - 2.4	2.7E-01	N/A	1.7E+04 N	N/A		NO	BSL
	100-52-7	Benzaldehyde	1.9E-02 J	3.2E-01 J	MG/KG	CAPL-SD70-1012	7/13	0.004 - 0.946	3.2E-01	N/A	7.8E+03 N	N/A		NO	BSL
	56-55-3	Benzo(a)anthracene	6.0E-02 J	2.3E-01 J	MG/KG	PL-00-POND-SD10D-0300	4/15	0.009 - 2.4	2.3E-01	1.8E-02	1.5E+00 C	N/A		NO	BSL
	50-32-8	**Benzo(a)pyrene**	**1.2E-02 J**	**2.2E-01 J**	**MG/KG**	**PL-00-POND-SD10D-0300**	**6/15**	**0.008 - 2.4**	**2.2E-01**	**N/A**	**1.5E-01 C**	**N/A**		**YES**	**ASL**
	205-99-2	Benzo(b)fluoranthene	2.0E-02 J	5.9E-01 J	MG/KG	PL-00-POND-SD10-0300	10/15	0.013 - 2.4	5.9E-01	3.0E-02	1.5E+00 C	N/A		NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.4E-01 J	1.8E-01 J	MG/KG	PL-00-POND-SD10-0300	2/15	0.0392 - 2.4	1.8E-01	2.5E-02	1.7E+03 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	5.6E-02 J	2.4E-01 J	MG/KG	CAS011-11SD18-00-0602	5/15	0.014 - 2.4	2.4E-01	N/A	1.5E+01 C	N/A		NO	BSL
	86-74-8	Carbazole	3.3E-02 J	3.3E-02 J	MG/KG	CAS011-11SD18-00-0602	1/15	0.009 - 2.4	3.3E-02	N/A	N/A	N/A		NO	NTX
	218-01-9	Chrysene	2.2E-02 J	4.3E-01 J	MG/KG	PL-00-POND-SD10-0300	9/15	0.008 - 2.4	4.3E-01	2.2E-02	1.5E+02 C	N/A		NO	BSL
	53-70-3	Dibenz(a,h)anthracene	2.9E-02 J	2.9E-02 J	MG/KG	CAS011-11SD18-00-0602	1/15	0.011 - 2.4	2.9E-02	N/A	1.5E-01 C	N/A		NO	BSL
	132-64-9	Dibenzofuran	1.3E-01 J	1.3E-01 J	MG/KG	CAPL-SD87-1012	1/15	0.007 - 2.4	1.3E-01	N/A	7.2E+01 N	N/A		NO	BSL
	84-74-2	Di-n-butylphthalate	1.5E-02 J	2.0E-02 J	MG/KG	CAS011-11SD21-00-0602	2/15	0.011 - 2.4	2.0E-02	N/A	6.2E+03 N	N/A		NO	BSL
	117-84-0	Di-n-octylphthalate	1.9E-02 J	4.7E-01 J	MG/KG	CAS011-11SD29-00-0602	3/15	0.009 - 2.4	4.7E-01	N/A	6.2E+02 N	N/A		NO	BSL
	206-44-0	Fluoranthene	2.0E-02 J	4.9E-01 J	MG/KG	PL-00-POND-SD10-0300	12/15	0.007 - 2.4	4.9E-01	2.4E-02	2.3E+03 N	N/A		NO	BSL
	86-73-7	Fluorene	7.1E-02 J	2.9E-01 K	MG/KG	CAPL-SD87-1012	2/15	0.008 - 2.4	2.9E-01	N/A	2.3E+03 N	N/A		NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	1.2E-02 J	2.0E-01 J	MG/KG	PL-00-POND-SD10D-0300	8/15	0.008 - 2.4	2.0E-01	N/A	1.5E+00 C	N/A		NO	BSL
	85-01-8	Phenanthrene	3.6E-02 J	9.5E-01	MG/KG	CAPL-SD87-1012	7/15	0.01 - 2.4	9.5E-01	3.3E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	2.0E-02 J	6.2E-01 J	MG/KG	PL-00-POND-SD10-0300	12/15	0.013 - 2.4	6.2E-01	3.5E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	6.5E-03 J	4.4E-02 J	MG/KG	CAPL-SD70-1012	6/15	0.0008 - 0.02	4.4E-02	1.0E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	4.4E-03 J	1.9E-01	MG/KG	CAS011-11SD30-00-0602	14/15	0.0008 - 0.02	1.9E-01	4.4E-02	1.6E+01 C	N/A		NO	BSL
	50-29-3	4,4'-DDT	1.8E-02 J	9.2E-01 K	MG/KG	PL-00-POND-SD10-0300	6/15	0.0008 - 0.11	9.2E-01	1.5E-03	1.9E+01 C	N/A		NO	BSL
	309-00-2	Aldrin	4.1E-04 J	3.5E-03 J	MG/KG	CAPL-SD84-1012	4/15	0.0008 - 0.01	3.5E-03	N/A	3.1E-01 C	N/A		NO	BSL
	319-84-6	alpha-BHC	3.5E-03 J	3.5E-03 J	MG/KG	CAS011-11SD23-00-0602	1/15	0.0004 - 0.01	3.5E-03	8.1E-04	8.5E-01 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	6.8E-03 J	3.0E-02 L	MG/KG	CAPL-SD70-1012	6/15	0.0008 - 0.01	3.0E-02	N/A	1.8E+01 C	N/A		NO	BSL
	11096-82-5	**Aroclor-1260**	**1.5E-02 J**	**1.6E+01 J**	**MG/KG**	**CAPL-SD84-1012**	**22/22**	**0.0058 - 1.1**	**1.6E+01**	**N/A**	**2.4E+00 C**	**N/A**		**YES**	**ASL**
	319-85-7	beta-BHC	9.8E-04 J	7.3E-03	MG/KG	CAS011-11SD23-00-0602	3/15	0.0008 - 0.01	7.3E-03	N/A	3.0E+00 C	N/A		NO	BSL
	319-86-8	delta-BHC	2.1E-04 J	1.3E-03 K	MG/KG	CAPL-SD85-1012	4/15	0.0008 - 0.01	1.3E-03	N/A	3.0E+00 C	N/A		NO	BSL
	60-57-1	**Dieldrin**	**5.9E-02 K**	**3.6E-01 K**	**MG/KG**	**CAPL-SD84-1012**	**6/15**	**0.0008 - 0.02**	**3.6E-01**	**9.5E-04**	**3.3E-01 C**	**N/A**		**YES**	**ASL**
	959-98-8	Endosulfan I	3.3E-04 J	5.6E-02	MG/KG	CAS011-11SD30-00-0602	4/15	0.0003 - 0.01	5.6E-02	N/A	3.7E+02 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	1.5E-02 J	5.6E-02 J	MG/KG	CAPL-SD84-1012	4/15	0.0008 - 0.02	5.6E-02	N/A	3.7E+02 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	2.7E-02 K	6.8E-01 K	MG/KG	CAPL-SD84-1012	3/15	0.0008 - 0.02	6.8E-01	N/A	3.7E+02 N	N/A		NO	BSL

Table 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 1	72-20-8	Endrin	3.0E-02 J	1.4E-01 K	MG/KG	CAPL-SD84-1012	5/15	0.0008 - 0.02	1.4E-01	8.6E-03	1.8E+01 N	N/A		NO	BSL
Surface Sediment	7421-93-4	Endrin aldehyde	4.4E-03 J	1.7E-02 J	MG/KG	CAPL-SD84-1012	5/15	0.0008 - 0.02	1.7E-02	N/A	1.8E+01 N	N/A		NO	BSL
(cont'd)	53494-70-5	Endrin ketone	1.1E-02 K	4.9E-02 J	MG/KG	CAPL-SD84-1012	6/15	0.0008 - 0.02	4.9E-02	N/A	1.8E+01 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	1.4E-04 J	6.1E-04 J	MG/KG	CAPL-SD85-1012	2/15	0.0008 - 0.01	6.1E-04	2.9E-03	5.6E+00 C	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	9.4E-03 J	9.4E-02 J	MG/KG	CAPL-SD70-1012	8/15	0.0007 - 0.01	9.4E-02	1.1E-03	1.8E+01 C	N/A		NO	BSL
	76-44-8	Heptachlor	9.7E-04	9.7E-04	MG/KG	CAPL-SD85-1012	1/15	0.0008 - 0.01	9.7E-04	N/A	1.2E+00 C	N/A		NO	BSL
	1024-57-3	Heptachlor epoxide	9.8E-04 J	9.1E-03 K	MG/KG	PL-00-POND-SD10D-0300	6/15	0.0008 - 0.01	9.1E-03	N/A	5.9E-01 C	N/A		NO	BSL
	72-43-5	Methoxychlor	1.1E-02 J	8.2E-02 J	MG/KG	CAPL-SD70-1012	5/15	0.0008 - 0.12	8.2E-02	N/A	3.1E+02 N	N/A		NO	BSL
	7429-90-5	Aluminum	8.3E+02 K	1.5E+04	MG/KG	PL-00-POND-SD10D-0300	15/15	3.3 - 240	1.5E+04	2.3E+04	7.7E+04 N	N/A		NO	BSL
	7440-36-0	Antimony	5.6E-01 J	3.9E+00	MG/KG	CAPL-SD85-1012	3/15	0.38 - 7.51	3.9E+00	1.7E+00	3.1E+01 N	N/A		NO	BSL
	7440-38-2	Arsenic	1.9E+00 J	4.1E+01	MG/KG	PL-00-POND-SD11-0300	14/15	0.627 - 12	4.1E+01	1.1E+02	6.7E+00 C	N/A		NO	BBK
	7440-39-3	Barium	6.5E+00 J	9.0E+01	MG/KG	CAPL-SD85-1012	15/15	0.024 - 240	9.0E+01	7.5E+01	1.5E+04 N	N/A		NO	BSL
	7440-41-7	Beryllium	2.2E-01 J	6.0E+00	MG/KG	CAPL-SD85-1012	5/15	0.047 - 4.2	6.0E+00	1.4E+00	1.6E+02 N	N/A		NO	BSL
	7440-43-9	Cadmium	1.1E-01 J	2.3E+00	MG/KG	PL-00-POND-SD10-0300	3/15	0.071 - 4.2	2.3E+00	5.7E-01	7.0E+01 N	N/A		NO	BSL
	7440-70-2	Calcium	2.3E+03	1.0E+05	MG/KG	CAS011-11SD29-00-0602	15/15	0.4 - 6000	1.0E+05	N/A	N/A	N/A		NO	NUT
	7440-47-3	Chromium	4.0E+00 K	4.5E+01	MG/KG	CAPL-SD85-1012	15/15	0.12 - 12	4.5E+01	5.2E+01	2.9E+00 C	N/A		NO	BBK
	7440-48-4	**Cobalt**	**5.5E-01 J**	**3.5E+01**	**MG/KG**	**CAPL-SD85-1012**	**14/15**	**0.14 - 60**	**3.5E+01**	**9.5E+00**	**2.3E+01 N**	**N/A**		**YES**	**ASL**
	7440-50-8	Copper	1.8E+00 J	1.0E+03	MG/KG	CAPL-SD85-1012	15/15	0.17 - 30	1.0E+03	2.6E+01	3.1E+03 N	N/A		NO	BSL
	57-12-5	Cyanide	1.6E-01 J	3.5E-01 J	MG/KG	CAPL-SD87-1012	3/15	0.036 - 6	3.5E-01	N/A	2.1E+01 N	N/A		NO	BSL
	7439-89-6	Iron	3.9E+03	4.3E+04	MG/KG	PL-00-POND-SD10D-0300	15/15	2.7 - 120	4.3E+04	4.6E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	**Lead**	**6.1E+00**	**8.5E+02**	**MG/KG**	**CAPL-SD85-1012**	**15/15**	**0.188 - 3.6**	**8.5E+02**	**4.2E+01**	**4.0E+02 NL**	**N/A**		**YES**	**ASL**
	7439-95-4	Magnesium	4.4E+02 J	2.9E+03	MG/KG	PL-00-POND-SD10D-0300	15/15	2.9 - 6000	2.9E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	1.0E+01	2.8E+02	MG/KG	CAPL-SD85-1012	15/15	0.024 - 18	2.8E+02	3.7E+02	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	1.7E-02 J	2.9E-01	MG/KG	PL-00-POND-SD10D-0300 : PL-00-POND-SD11-0300	7/15	0.038 - 0.23	2.9E-01	2.6E-01	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	1.3E+00 J	5.6E+02	MG/KG	CAPL-SD85-1012	14/15	0.12 - 29	5.6E+02	1.7E+01	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	5.8E+02 J	2.3E+03	MG/KG	PL-00-POND-SD10-0300 : PL-00-POND-SD10D-0300	15/15	3.2 - 6000	2.3E+03	N/A	N/A	N/A		NO	NUT
	7782-49-2	Selenium	6.0E-01 J	1.8E+00 J	MG/KG	CAS011-11SD30-00-0602	2/15	0.52 - 7.51	1.8E+00	2.7E+00	3.9E+02 N	N/A		NO	BSL
	7440-22-4	Silver	5.2E-01 J	5.2E-01 J	MG/KG	CAPL-SD85-1012	1/15	0.17 - 7.51	5.2E-01	N/A	3.9E+02 N	N/A		NO	BSL
	7440-23-5	Sodium	1.6E+02 J	5.2E+02 J	MG/KG	CAPL-SD85-1012	7/15	34.4 - 6000	5.2E+02	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	4.2E+00 J	5.0E+01	MG/KG	PL-00-POND-SD10-0300 : PL-00-POND-SD10D-0300	15/15	0.12 - 60	5.0E+01	6.3E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	2.3E+01	3.0E+03	MG/KG	CAPL-SD85-1012	15/15	0.33 - 24	3.0E+03	1.1E+02	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.
[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for n-hexane used as a surrogate for methylcyclohexane.
RSL value for acenaphthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chlordane used as surrogate for alpha-chlordane and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
C* = Carcinogenic, n SL < 100 x c SL
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram
SAT = RSL exceeds soil saturation concentration, therefore, soil saturation concentration used as screening level

Table 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[5] Rationale Codes

Selection Reason:	Above Screening Levels (ASL)
Deletion Reason:	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)
	Below Screening Level (BSL)
	Below Background (BBK)

TABLE 2.2a

Step 2 Penniman Lake Surface Sediment, Group 1, Northwest Lobes and Drainages (North of Site 11) - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)pyrene	6 / 15	2.2E-01 J	PL-00-POND-SD10D-0300	1.5E-01	1E-06	1E-06	N/A		N/A	NA
Aroclor-1260	22 / 22	1.6E+01 J	CAPL-SD84-1012	2.4E+00	1E-06	7E-06	N/A		N/A	NA
Dieldrin	6 / 15	3.6E-01 K	CAPL-SD84-1012	3.0E-01	1E-06	1E-06	3.1E+01	1	0.01	Liver
Cobalt	14 / 15	3.5E+01	CAPL-SD85-1012	3.7E+03	1E-06	9E-09	2.3E+02	1	0.2	Thyroid
Lead[e]	15 / 15	8.5E+02	CAPL-SD85-1012	N/A		N/A			N/A	N/A
Cumulative Corresponding Hazard Index[c]									**0.2**	
Cumulative Corresponding Cancer Risk[d]						**9E-06**				

Total Liver HI = 0.01

Total Thyroid HI = 0.2

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent. Also note, average lead concentration of 117 mg/kg does not exceed screening level.

[e] Lead residential soil RSL not multiplied by 10 for sediment.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

K = Biased High

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 1															
Northwest Lobes	78-93-3	2-Butanone	3.6E-03 J	4.6E-02	MG/KG	CAS011-11SD23-01-0602	6/12	0.001 - 0.02	4.6E-02	4.4E-02	2.7E+04 N	N/A		NO	BSL
and Drainages	67-64-1	Acetone	1.0E-02 J	1.4E-01 J	MG/KG	CAPL-SSD70-1012	11/12	0.001 - 0.04	1.4E-01	1.6E-01	6.1E+04 N	N/A		NO	BSL
(North of Site 11)	91-57-6	2-Methylnaphthalene	1.6E-02 J	1.4E+00	MG/KG	CAPL-SSD70-1012	2/12	0.008 - 1.1	1.4E+00	3.3E-03	2.3E+02 N	N/A		NO	BSL
	83-32-9	Acenaphthene	1.6E-02 J	8.0E+01	MG/KG	CAPL-SSD70-1012	4/12	0.008 - 1.1	8.0E+01	N/A	3.5E+03 N	N/A		NO	BSL
	120-12-7	Anthracene	1.5E-02 J	8.6E+01	MG/KG	CAPL-SSD70-1012	6/12	0.008 - 1.1	8.6E+01	N/A	1.7E+04 N	N/A		NO	BSL
	100-52-7	Benzaldehyde	2.3E-02 J	5.7E-02 J	MG/KG	CAS011-11SD19-01-0602	4/12	0.004 - 55	5.7E-02	N/A	7.8E+03 N	N/A		NO	BSL
	56-55-3	**Benzo(a)anthracene**	**4.4E-03 J**	**3.7E+01**	**MG/KG**	**CAPL-SSD70-1012**	**8/12**	**0.008 - 1.1**	**3.7E+01**	**N/A**	**1.5E+00 C**	**N/A**		**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**2.3E-02 J**	**2.1E+01**	**MG/KG**	**CAPL-SSD70-1012**	**8/12**	**0.008 - 1.1**	**2.1E+01**	**1.5E-02**	**1.5E-01 C**	**N/A**		**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**6.6E-03 K**	**1.6E+01**	**MG/KG**	**CAPL-SSD70-1012**	**9/12**	**0.008 - 1.1**	**1.6E+01**	**1.8E-02**	**1.5E+00 C**	**N/A**		**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	4.7E-01 K	6.0E+00	MG/KG	CAPL-SSD70-1012	2/12	0.008 - 1.1	6.0E+00	N/A	1.7E+03 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**2.4E-02 J**	**1.8E+01**	**MG/KG**	**CAPL-SSD70-1012**	**7/12**	**0.008 - 1.1**	**1.8E+01**	**1.3E-02**	**1.5E+01 C**	**N/A**		**YES**	**ASL**
	86-74-8	Carbazole	1.6E-02 J	1.6E-02 J	MG/KG	CAS011-11SD30-01-0602	1/12	0.009 - 55	1.6E-02	N/A	N/A	N/A		NO	NTX
	218-01-9	Chrysene	6.3E-03 K	4.6E+01	MG/KG	CAPL-SSD70-1012	9/12	0.008 - 1.10	4.6E+01	2.0E-02	1.5E+02 C	N/A		NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**1.3E-01 K**	**2.7E+00**	**MG/KG**	**CAPL-SSD70-1012**	**2/12**	**0.008 - 1.10**	**2.7E+00**	**N/A**	**1.5E-01 C**	**N/A**		**YES**	**ASL**
	132-64-9	Dibenzofuran	3.8E-01 J	3.3E+01 J	MG/KG	CAPL-SSD70-1012	2/12	0.41 - 55	3.3E+01	N/A	7.2E+01 N	N/A		NO	BSL
	206-44-0	Fluoranthene	9.9E-03	1.3E+02	MG/KG	CAPL-SSD70-1012	10/12	0.007 - 1.1	1.3E+02	2.1E-02	2.3E+03 N	N/A		NO	BSL
	86-73-7	Fluorene	1.3E+00 K	8.2E+01	MG/KG	CAPL-SSD70-1012	2/12	0.008 - 1.1	8.2E+01	3.2E-03	2.3E+03 N	N/A		NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.3E-03 J**	**6.0E+00**	**MG/KG**	**CAPL-SSD70-1012**	**5/12**	**0.008 - 1.1**	**6.0E+00**	**N/A**	**1.5E+00 C**	**N/A**		**YES**	**ASL**
	85-01-8	Phenanthrene	5.0E-03 J	2.9E+02	MG/KG	CAPL-SSD70-1012	10/12	0.008 - 1.1	2.9E+02	1.7E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	8.8E-03 K	1.4E+02	MG/KG	CAPL-SSD70-1012	10/12	0.008 - 1.1	1.4E+02	2.2E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	3.0E-03 J	7.1E-02 J	MG/KG	CAPL-SSD70-1012	8/12	0.001 - 0.01	7.1E-02	1.8E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	2.1E-03 J	5.0E-02 J	MG/KG	CAPL-SSD70-1012	10/12	0.001 - 0.01	5.0E-02	9.0E-03	1.6E+01 C	N/A		NO	BSL
	50-29-3	4,4'-DDT	4.4E-04 J	2.2E-01 J	MG/KG	CAPL-SSD84-1012	5/12	0.001 - 0.04	2.2E-01	N/A	1.9E+01 C	N/A		NO	BSL
	309-00-2	Aldrin	2.0E-04 J	5.3E-03 J	MG/KG	CAPL-SSD84-1012	4/12	0.001 - 0.004	5.3E-03	9.1E-04	3.1E-01 C	N/A		NO	BSL
	319-84-6	alpha-BHC	2.4E-03 J	3.7E-03 J	MG/KG	CAPL-SSD70-1012	2/12	0.0004 - 0.004	3.7E-03	3.2E-04	8.5E-01 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	1.5E-03 J	1.7E-02 J	MG/KG	CAPL-SSD86-1012	8/12	0.001 - 0.003	1.7E-02	N/A	1.8E+01 C	N/A		NO	BSL
	11096-82-5	**Aroclor-1260**	**1.4E-01 L**	**3.4E+01 J**	**MG/KG**	**CAPL-SSD84-1012**	**10/12**	**0.006 - 1.1**	**3.4E+01**	**N/A**	**2.4E+00 C**	**N/A**		**YES**	**ASL**
	319-85-7	beta-BHC	7.7E-04 J	2.6E-02 J	MG/KG	CAPL-SSD70-1012	3/12	0.001 - 0.004	2.6E-02	2.2E-03	3.0E+00 C	N/A		NO	BSL
	319-86-8	delta-BHC	3.9E-04 L	6.3E-03 J	MG/KG	CAPL-SSD70-1012	4/12	0.001 - 0.004	6.3E-03	2.9E-04	3.0E+00 C	N/A		NO	BSL
	60-57-1	**Dieldrin**	**3.3E-03 J**	**7.1E-01**	**MG/KG**	**CAPL-SSD84-1012**	**6/12**	**0.001 - 0.04**	**7.1E-01**	**N/A**	**3.3E-01 C**	**N/A**		**YES**	**ASL**
	959-98-8	Endosulfan I	3.5E-04 J	6.6E-04 J	MG/KG	CAPL-SSD86-1012	2/12	0.001 - 0.004	6.6E-04	8.1E-04	3.7E+02 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	6.0E-04 J	4.8E-01 J	MG/KG	CAPL-SSD84-1012	5/12	0.001 - 0.04	4.8E-01	N/A	3.7E+02 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	4.6E-02 J	1.3E-01 J	MG/KG	CAPL-SSD84-1012	2/12	0.001 - 0.04	1.3E-01	N/A	3.7E+02 N	N/A		NO	BSL
	72-20-8	Endrin	3.1E-03 J	5.9E-02 J	MG/KG	CAPL-SSD84-1012	5/12	0.001 - 0.04	5.9E-02	6.4E-04	1.8E+01 N	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	2.8E-04 J	3.0E-02 J	MG/KG	CAPL-SSD84-1012	6/12	0.001 - 0.01	3.0E-02	N/A	1.8E+01 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	5.9E-04 J	2.8E-02 J	MG/KG	CAPL-SSD84-1012	5/12	0.001 - 0.04	2.8E-02	N/A	1.8E+01 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	2.0E-04 J	4.3E-04 J	MG/KG	CAPL-SSD84-1012	2/12	0.0004 - 0.004	4.3E-04	4.8E-04	5.6E+00 C	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	2.1E-03 J	2.7E-02 J	MG/KG	CAPL-SSD70-1012	7/12	0.001 - 0.004	2.7E-02	N/A	1.8E+01 C	N/A		NO	BSL
	76-44-8	Heptachlor	1.6E-03 J	5.5E-03 J	MG/KG	CAS011-11SD30-01-0602	2/12	0.001 - 0.004	5.5E-03	N/A	1.2E+00 C	N/A		NO	BSL
	1024-57-3	Heptachlor epoxide	4.2E-04 J	6.4E-03 J	MG/KG	CAPL-SSD84-1012	4/12	0.001 - 0.004	6.4E-03	N/A	5.9E-01 C	N/A		NO	BSL
	72-43-5	Methoxychlor	9.5E-04 J	1.4E-01 J	MG/KG	CAPL-SSD84-1012	5/12	0.001 - 0.04	1.4E-01	N/A	3.1E+02 N	N/A		NO	BSL
	99-65-0	1,3-Dinitrobenzene	5.5E-01	5.5E-01	MG/KG	CAPL-SSD70-1012	1/5	0.4 - 0.4	5.5E-01	N/A	6.2E+00 N	N/A		NO	BSL
	7429-90-5	Aluminum	1.0E+03	1.4E+04	MG/KG	CAS011-11SD18-01D-0602	12/12	3.3 - 88	1.4E+04	1.0E+04	7.7E+04 N	N/A		NO	BSL

Table 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 1	7440-36-0	Antimony	5.3E-01 J	2.6E+00 J	MG/KG	CAPL-SSD85-1012	2/12	0.4 - 4.4	2.6E+00	N/A	3.1E+01 N	N/A		NO	BSL
Northwest Lobes	7440-38-2	Arsenic	1.2E+00 J	1.7E+01	MG/KG	CAPL-SSD70-1012	12/12	1 - 4.4	1.7E+01	5.7E+01	6.7E+00 C	N/A		NO	BBK
and Drainages	7440-39-3	Barium	8.4E+00 J	6.0E+01 J	MG/KG	CAS011-11SD30-01-0602	12/12	0.02 - 18	6.0E+01	3.7E+01	1.5E+04 N	N/A		NO	BSL
(North of Site 11)	7440-41-7	Beryllium	4.4E-01 J	3.1E+00	MG/KG	CAPL-SSD85-1012	5/12	0.05 - 2.2	3.1E+00	6.0E-01	1.6E+02 N	N/A		NO	BSL
(cont'd)	7440-70-2	Calcium	2.7E+03	7.5E+04	MG/KG	CAPL-SSD84-1012	12/12	0.4 - 2210	7.5E+04	N/A	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**4.8E+00 K**	**4.0E+01**	**MG/KG**	**CAS011-11SD18-01D-0602**	**12/12**	**0.1 - 4.4**	**4.0E+01**	**1.6E+01**	**2.9E+00 C**	**N/A**		**YES**	**ASL**
	7440-48-4	Cobalt	1.3E+00 J	1.1E+01	MG/KG	CAPL-SSD85-1012	9/12	0.1 - 5.5	1.1E+01	2.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	2.7E+00	3.8E+02	MG/KG	CAPL-SSD85-1012	11/12	0.2 - 4.4	3.8E+02	3.7E+00	3.1E+03 N	N/A		NO	BSL
	57-12-5	Cyanide	2.1E-01 J	2.5E-01 J	MG/KG	CAPL-SSD85-1012	2/12	0.03 - 1.2	2.5E-01	N/A	2.1E+01 N	N/A		NO	BSL
	7439-89-6	Iron	3.6E+03	2.8E+04	MG/KG	CAPL-SSD85-1012	12/12	2.7 - 44	2.8E+04	1.1E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	Lead	7.2E+00	2.4E+02	MG/KG	CAPL-SSD85-1012 : CAPL-SSD86-1012	12/12	0.3 - 1.3	2.4E+02	1.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	6.5E+02 J	2.2E+03	MG/KG	CAS011-11SD18-01D-0602	12/12	2.9 - 2210	2.2E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	1.1E+01	1.5E+02	MG/KG	CAPL-SSD85-1012	12/12	0.02 - 6.6	1.5E+02	2.9E+01	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	5.4E-02 J	1.9E-01	MG/KG	CAS011-11SD30-01-0602	2/12	0.04 - 0.09	1.9E-01	5.2E-02	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	8.0E-01 J	2.4E+02	MG/KG	CAPL-SSD85-1012	12/12	0.1 - 4.4	2.4E+02	5.6E+00	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	6.3E+02 J	3.0E+03	MG/KG	CAPL-SSD85-1012	12/12	3.2 - 2210	3.0E+03	N/A	N/A	N/A		NO	NUT
	7782-49-2	Selenium	7.6E-01 J	8.3E-01 J	MG/KG	CAS011-11SD23-01-0602	4/12	0.5 - 4.4	8.3E-01	N/A	3.9E+02 N	N/A		NO	BSL
	7440-23-5	Sodium	3.3E+02 J	5.4E+02 J	MG/KG	CAPL-SSD85-1012	3/12	35 - 2210	5.4E+02	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	3.9E+00 J	4.1E+01	MG/KG	CAS011-11SD18-01-0602	12/12	0.1 - 5.5	4.1E+01	2.0E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	1.4E+01	1.0E+03	MG/KG	CAPL-SSD85-1012	12/12	0.3 - 8.8	1.0E+03	2.3E+01	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram

TABLE 2.3b

Step 2 Penniman Lake Subsurface Sediment, Group 1, Northwest Lobes and Drainages (North of Site 11) - Risk Ratio, Maximum Detected Concentration
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)anthracene	8 / 12	3.7E+01	CAPL-SSD70-1012	1.5E+00	1E-06	2E-05	N/A	N/A	N/A	NA
Benzo(a)pyrene	8 / 12	2.1E+01	CAPL-SSD70-1012	1.5E-01	1E-06	1E-04	N/A	N/A	N/A	NA
Benzo(b)fluoranthene	9 / 12	1.6E+01	CAPL-SSD70-1012	1.5E+00	1E-06	1E-05	N/A	N/A	N/A	NA
Benzo(k)fluoranthene	7 / 12	1.8E+01	CAPL-SSD70-1012	1.5E+01	1E-06	1E-06	N/A	N/A	N/A	NA
Dibenz(a,h)anthracene	2 / 12	2.7E+00	CAPL-SSD70-1012	1.5E-01	1E-06	2E-05	N/A	N/A	N/A	NA
Indeno(1,2,3-cd)pyrene	5 / 12	6.0E+00	CAPL-SSD70-1012	1.5E+00	1E-06	4E-06	N/A	N/A	N/A	NA
Aroclor-1260	10 / 12	3.4E+01 J	CAPL-SSD84-1012	2.4E+00	1E-06	1E-05	N/A	N/A	N/A	NA
Dieldrin	6 / 12	7.1E-01	CAPL-SSD84-1012	3.0E-01	1E-06	2E-06	3.1E+01	1	0.02	Liver
Chromium[e]	12 / 12	4.0E+01 J	CAS011-11SD18-01D-0602	2.9E+00	1E-06	1E-05	2.3E+02	1	0.2	No Observed Effects
Cumulative Corresponding Hazard Index[c]									**0.2**	
Cumulative Corresponding Cancer Risk[d]						**2E-04**				
								Total Liver HI =		0.02

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

TABLE 2.3c

Step 2 Penniman Lake Subsurface Sediment, Group 1, Northwest Lobes and Drainages (North of Site 11) - Risk Ratio, 95% UCL Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	95% UCL (mg/kg)		95% UCL Rationale	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)anthracene	8 / 12	3.4E+01	99% KM-c	1	1.5E+00	1E-06	2E-05	N/A	N/A	N/A	N/A
Benzo(a)pyrene	8 / 12	1.9E+01	99% KM-c	1	1.5E-01	1E-06	1E-04	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	9 / 12	1.5E+01	99% KM-c	1	1.5E+00	1E-06	1E-05	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	7 / 12	1.7E+01	99% KM-c	1	1.5E+01	1E-06	1E-06	N/A	N/A	N/A	N/A
Dibenz(a,h)anthracene	2 / 12	2.7E+00	Max	5	1.5E-01	1E-06	2E-05	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	5 / 12	6.0E+00	Max	1, 3	1.5E+00	1E-06	4E-06	N/A	N/A	N/A	N/A
Aroclor-1260	10 / 12	2.7E+01	95% Adj-G	1, 3	2.4E+00	1E-06	1E-05	N/A	N/A	N/A	N/A
Dieldrin	6 / 12	7.1E-01	Max	6	3.0E-01	1E-06	2E-06	3.1E+01	1	0.02	Liver
Chromium[e]	12 / 12	2.2E+01	95% Stud-t	1, 2, 3	2.9E+00	1E-06	8E-06	2.3E+02	1	0.1	No Observed Effects
Cumulative Corresponding Hazard Index[c]										**0.1**	
Cumulative Corresponding Cancer Risk[d]							**2E-04**				
										Total Liver HI =	0.02

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Oak Ridge National Laboratory (ORNL).November 2013. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites. [Online].
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

ProUCL, Version 5.0 used to determine distribution of data. ProUCL used to calculate EPC, following recommendations based on distribution and standard deviation in users guide (USEPA. September, 2013. ProUCL, Version 5.0. Prepared by Lockheed Martin Environmental Services).

Options: 99% KM (Chebyshev) UCL (99% KM-c); 95% Adjusted Gamma UCL (95% Adj-G); 95% Adjusted Gamma (Adj. Gamma); 95% Student's-t UCL (95% Stud-t); Maximum Detected Concentration (Max).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test indicates data are normally distributed.

(3) Data fit gamma distribution.

(4) Data do not fit lognormal, normal, or gamma distribution.

(5) Maximum concentration used as EPC since only 2 detected concentrations in data set. As shown in ProUCL output, not enough to compute meaningful or reliable statistics and estimates.

(6) Maximum concentration used because calculated UCL exceeds maximum concentration.

mg/kg = milligrams per kilogram

N/A = Not available/not applicable

Table 2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 2															
Northwest Lobes	78-93-3	2-Butanone	6.0E-03 J	8.4E-02	MG/KG	PL-00-POND-SD12-0300	3/5	0.001 - 0.07	8.4E-02	5.9E-01	2.7E+04 N	N/A		NO	BSL
and Drainages	67-64-1	Acetone	1.0E-01	1.0E-01	MG/KG	CAS011-11SD27-00-0602	1/5	0.0008 - 0.07	1.0E-01	2.5E+00	6.1E+04 N	N/A		NO	BSL
(South of Site 11)	74-87-3	Chloromethane	2.0E-03 J	2.0E-03 J	MG/KG	CAS011-11SD27-00-0602	1/5	0.0003 - 0.07	2.0E-03	N/A	1.1E+02 N	N/A		NO	BSL
	156-59-2	cis-1,2-Dichloroethene	1.3E-02 J	1.3E-02 J	MG/KG	CAS011-11SD24-00-0602	1/4	0.0003 - 0.0003	1.3E-02	N/A	1.6E+02 N	N/A		NO	BSL
	75-09-2	Methylene chloride	3.0E-03 J	4.0E-03 J	MG/KG	CAS011-11SD25-00-0602	2/5	0.0006 - 0.07	4.0E-03	N/A	3.5E+02 N	N/A		NO	BSL
	79-01-6	Trichloroethene	5.0E-03 J	5.0E-03 J	MG/KG	CAS011-11SD24-00-0602	1/5	0.0004 - 0.07	5.0E-03	N/A	4.1E+00 N	N/A		NO	BSL
	100-52-7	Benzaldehyde	1.5E-02 J	8.2E-02 J	MG/KG	CAS011-11SD27-00-0602	4/4	0.004 - 0.004	8.2E-02	N/A	7.8E+03 N	N/A		NO	BSL
	56-55-3	Benzo(a)anthracene	2.1E-02 J	2.1E-02 J	MG/KG	CAS011-11SD24-00-0602	1/5	0.009 - 2.4	2.1E-02	1.8E-02	1.5E+00 C	N/A		NO	BSL
	50-32-8	Benzo(a)pyrene	2.0E-02 J	2.0E-02 J	MG/KG	CAS011-11SD24-00-0602	1/5	0.008 - 2.4	2.0E-02	N/A	1.5E-01 C	N/A		NO	BSL
	205-99-2	Benzo(b)fluoranthene	4.5E-02 J	2.2E-01 J	MG/KG	PL-00-POND-SD12-0300	2/5	0.01 - 2.4	2.2E-01	3.0E-02	1.5E+00 C	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	3.6E-02 J	3.6E-02 J	MG/KG	CAS011-11SD24-00-0602	1/5	0.01 - 2.4	3.6E-02	N/A	1.5E+01 C	N/A		NO	BSL
	218-01-9	Chrysene	4.4E-02 J	1.6E-01 J	MG/KG	PL-00-POND-SD12-0300	2/5	0.008 - 2.4	1.6E-01	2.2E-02	1.5E+02 C	N/A		NO	BSL
	117-84-0	Di-n-octylphthalate	2.2E-01 J	2.2E-01 J	MG/KG	CAS011-11SD27-00-0602	1/5	0.009 - 2.4	2.2E-01	N/A	6.2E+02 N	N/A		NO	BSL
	206-44-0	Fluoranthene	4.1E-02 J	1.5E-01 J	MG/KG	PL-00-POND-SD12-0300	3/5	0.007 - 2.4	1.5E-01	2.4E-02	2.3E+03 N	N/A		NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	2.5E-02 J	2.5E-02 J	MG/KG	CAS011-11SD24-00-0602	1/5	0.008 - 2.4	2.5E-02	N/A	1.5E+00 C	N/A		NO	BSL
	85-01-8	Phenanthrene	1.8E-02 J	1.8E-02 J	MG/KG	CAS011-11SD24-00-0602	1/5	0.01 - 2.4	1.8E-02	3.3E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	5.1E-02 J	1.6E-01 J	MG/KG	PL-00-POND-SD12-0300	2/5	0.01 - 2.4	1.6E-01	3.5E-02	1.7E+03 N	N/A		NO	BSL
	72-55-9	4,4'-DDE	3.1E-03 J	3.9E-02 K	MG/KG	PL-00-POND-SD12-0300	4/5	0.0009 - 0.02	3.9E-02	4.4E-02	1.6E+01 C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	8.1E-02	6.7E-01 K	MG/KG	PL-00-POND-SD12-0300	3/6	0.006 - 0.2	6.7E-01	N/A	2.4E+00 C	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	1.2E-02 K	1.2E-02 K	MG/KG	PL-00-POND-SD12-0300	1/5	0.004 - 0.02	1.2E-02	N/A	3.7E+02 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	1.5E-02 K	1.5E-02 K	MG/KG	PL-00-POND-SD12-0300	1/5	0.004 - 0.02	1.5E-02	N/A	1.8E+01 N	N/A		NO	BSL
	7429-90-5	Aluminum	1.7E+03 K	3.4E+04	MG/KG	PL-00-POND-SD12-0300	5/5	3.5 - 260	3.4E+04	2.3E+04	7.7E+04 N	N/A		NO	BSL
	7440-36-0	Antimony	1.5E+00 J	1.5E+00 J	MG/KG	CAS011-11SD24-00-0602	1/5	0.4 - 3.07	1.5E+00	1.7E+00	3.1E+01 N	N/A		NO	BSL
	7440-38-2	Arsenic	2.3E+00 J	3.1E+01	MG/KG	PL-00-POND-SD12-0300	5/5	1 - 13	3.1E+01	1.1E+02	6.7E+00 C	N/A		NO	BBK
	7440-39-3	Barium	1.5E+01 J	1.6E+02	MG/KG	PL-00-POND-SD12-0300	5/5	0.03 - 260	1.6E+02	7.5E+01	1.5E+04 N	N/A		NO	BSL
	7440-41-7	Beryllium	2.8E+00	2.8E+00	MG/KG	PL-00-POND-SD12-0300	1/5	0.05 - 6.6	2.8E+00	1.4E+00	1.6E+02 N	N/A		NO	BSL
	7440-43-9	Cadmium	5.9E+00	5.9E+00	MG/KG	PL-00-POND-SD12-0300	1/5	0.08 - 6.6	5.9E+00	5.7E-01	7.0E+01 N	N/A		NO	BSL
	7440-70-2	Calcium	3.6E+04	2.2E+05	MG/KG	PL-00-POND-SD12-0300	5/5	0.4 - 6600	2.2E+05	N/A	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**8.4E+00**	**9.1E+01**	**MG/KG**	**PL-00-POND-SD12-0300**	**5/5**	**0.1 - 13**	**9.1E+01**	**5.2E+01**	**2.9E+00 C**	**N/A**		**YES**	**ASL**
	7440-48-4	Cobalt	5.6E-01 J	1.2E+01	MG/KG	PL-00-POND-SD12-0300	5/5	0.2 - 66	1.2E+01	9.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	1.6E+00 J	4.8E+01	MG/KG	PL-00-POND-SD12-0300	5/5	0.2 - 33	4.8E+01	2.6E+01	3.1E+03 N	N/A		NO	BSL
	7439-89-6	**Iron**	**7.7E+03**	**6.9E+04**	**MG/KG**	**PL-00-POND-SD12-0300**	**5/5**	**2.8 - 130**	**6.9E+04**	**4.6E+04**	**5.5E+04 N**	**N/A**		**YES**	**ASL**
	7439-92-1	Lead	6.0E+00	1.2E+02	MG/KG	PL-00-POND-SD12-0300	5/5	0.3 - 4	1.2E+02	4.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	1.9E+03	7.1E+03	MG/KG	PL-00-POND-SD12-0300	5/5	3 - 6600	7.1E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	3.0E+01	4.7E+02	MG/KG	PL-00-POND-SD12-0300	5/5	0.03 - 20	4.7E+02	3.7E+02	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	2.0E-01	2.0E-01	MG/KG	PL-00-POND-SD12-0300	1/5	0.04 - 0.2	2.0E-01	2.6E-01	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	1.4E+00 J	2.8E+01	MG/KG	PL-00-POND-SD12-0300	5/5	0.1 - 53	2.8E+01	1.7E+01	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	1.7E+03 J	5.9E+03	MG/KG	PL-00-POND-SD12-0300	5/5	3.3 - 6600	5.9E+03	N/A	N/A	N/A		NO	NUT
	7440-23-5	Sodium	5.6E+02 J	2.2E+04	MG/KG	PL-00-POND-SD12-0300	3/5	36 - 6600	2.2E+04	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	7.5E+00 J	8.7E+01	MG/KG	PL-00-POND-SD12-0300	5/5	0.1 - 66	8.7E+01	6.3E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	2.2E+01	5.7E+02	MG/KG	PL-00-POND-SD12-0300	5/5	0.4 - 26	5.7E+02	1.1E+02	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan sulfate.
RSL value for endrin used as surrogate for endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram

TABLE 2.4a

Step 2 Penniman Lake Surface Sediment, Group 2, Northwest Lobes and Drainages (South of Site 11) - Risk Ratio, Maximum Detected Concentration
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Chromium[e]	5 / 5	9.1E+01	PL-00-POND-SD12-0300	2.9E+00	1E-06	3E-05	2.3E+03	1	0.04	No Observed Effects
Iron	5 / 5	6.9E+04	PL-00-POND-SD12-0300	N/A	N/A	N/A	5.5E+05	1	0.1	Gastrointestinal System
Cumulative Corresponding Hazard Index[c]									**0.2**	
Cumulative Corresponding Cancer Risk[d]						**3E-05**				
								Total Gastrointestinal System HI =		0.1

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 2															
Northwest Lobes	67-64-1	Acetone	1.8E-02	9.8E-02	MG/KG	CAS011-11SD27-01-0602	2/4	0.0008 - 0.0008	9.8E-02	1.6E-01	6.1E+04 N	N/A		NO	BSL
and Drainages	156-59-2	cis-1,2-Dichloroethene	2.0E-03 J	2.0E-03 J	MG/KG	CAS011-11SD24-01-0602	1/4	0.0003 - 0.02	2.0E-03	N/A	1.6E+02 N	N/A		NO	BSL
(South of Site 11)	100-52-7	Benzaldehyde	5.9E-02 J	5.9E-02 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.004 - 0.5	5.9E-02	N/A	7.8E+03 N	N/A		NO	BSL
	56-55-3	Benzo(a)anthracene	2.7E-02 J	2.7E-02 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.009 - 0.5	2.7E-02	N/A	1.5E+00 C	N/A		NO	BSL
	50-32-8	Benzo(a)pyrene	2.9E-02 J	2.9E-02 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.008 - 0.5	2.9E-02	1.5E-02	1.5E-01 C	N/A		NO	BSL
	205-99-2	Benzo(b)fluoranthene	3.8E-02 J	3.8E-02 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.013 - 0.5	3.8E-02	1.8E-02	1.5E+00 C	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	3.0E-02 J	3.0E-02 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.014 - 0.5	3.0E-02	1.3E-02	1.5E+01 C	N/A		NO	BSL
	218-01-9	Chrysene	5.0E-02 J	5.0E-02 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.008 - 0.5	5.0E-02	2.0E-02	1.5E+02 C	N/A		NO	BSL
	117-84-0	Di-n-octylphthalate	9.0E-02 J	9.0E-02 J	MG/KG	CAS011-11SD25-01-0602	1/4	0.009 - 0.66	9.0E-02	N/A	6.2E+02 N	N/A		NO	BSL
	206-44-0	Fluoranthene	8.7E-02 J	8.7E-02 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.007 - 0.5	8.7E-02	2.1E-02	2.3E+03 N	N/A		NO	BSL
	85-01-8	Phenanthrene	5.0E-02 J	5.0E-02 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.01 - 0.5	5.0E-02	1.7E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	1.2E-01 J	1.2E-01 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.013 - 0.5	1.2E-01	2.2E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	3.5E-03 J	1.3E-02	MG/KG	CAS011-11SD27-01-0602	2/4	0.00097 - 0.005	1.3E-02	1.8E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	7.4E-03	1.1E-01	MG/KG	CAS011-11SD27-01-0602	2/4	0.0009 - 0.005	1.1E-01	9.0E-03	1.6E+01 C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	1.3E-01 J	1.3E-01 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.0058 - 0.05	1.3E-01	N/A	2.4E+00 C	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	1.4E-03 J	1.4E-03 J	MG/KG	CAS011-11SD27-01-0602	1/4	0.00072 - 0.0026	1.4E-03	N/A	1.8E+01 C	N/A		NO	BSL
	7429-90-5	Aluminum	3.2E+03	8.1E+03	MG/KG	CAS011-11SD24-01-0602	4/4	3.5 - 5.3	8.1E+03	1.0E+04	7.7E+04 N	N/A		NO	BSL
	7440-36-0	Antimony	4.3E-01 J	8.3E-01 J	MG/KG	CAS011-11SD24-01-0602	3/4	0.4 - 0.61	8.3E-01	N/A	3.1E+01 N	N/A		NO	BSL
	7440-38-2	Arsenic	4.5E+00	1.5E+01	MG/KG	CAS011-11SD27-01-0602	4/4	1.1 - 1.6	1.5E+01	5.7E+01	6.7E+00 C	N/A		NO	BBK
	7440-39-3	Barium	1.4E+01 J	3.6E+01 J	MG/KG	CAS011-11SD27-01-0602	4/4	0.025 - 0.038	3.6E+01	3.7E+01	1.5E+04 N	N/A		NO	BSL
	7440-70-2	Calcium	4.9E+04	1.7E+05	MG/KG	CAS011-11SD25-01-0602	4/4	0.48 - 0.85	1.7E+05	N/A	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**1.5E+01**	**3.3E+01**	**MG/KG**	**CAS011-11SD24-01-0602**	**4/4**	**0.12 - 0.19**	**3.3E+01**	**1.6E+01**	**2.9E+00 C**	**N/A**		**YES**	**ASL**
	7440-48-4	Cobalt	1.1E+00 J	2.1E+00 J	MG/KG	CAS011-11SD27-01-0602	4/4	0.15 - 0.23	2.1E+00	2.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	2.0E+00 J	5.8E+00 J	MG/KG	CAS011-11SD24-01-0602	4/4	0.17 - 0.27	5.8E+00	3.7E+00	3.1E+03 N	N/A		NO	BSL
	7439-89-6	Iron	1.3E+04	3.3E+04	MG/KG	CAS011-11SD24-01-0602	4/4	2.9 - 4.3	3.3E+04	1.1E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	Lead	6.0E+00	3.3E+01	MG/KG	CAS011-11SD27-01-0602	4/4	0.33 - 0.5	3.3E+01	1.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	1.9E+03	4.0E+03	MG/KG	CAS011-11SD24-01-0602	4/4	3 - 4.6	4.0E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	2.8E+01	6.7E+01	MG/KG	CAS011-11SD27-01-0602	4/4	0.025 - 0.038	6.7E+01	2.9E+01	1.8E+03 N	N/A		NO	BSL
	7440-02-0	Nickel	3.0E+00 J	5.3E+00 J	MG/KG	CAS011-11SD24-01-0602	4/4	0.12 - 0.19	5.3E+00	5.6E+00	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	2.4E+03 J	6.8E+03 J	MG/KG	CAS011-11SD24-01-0602	4/4	3.4 - 5.1	6.8E+03	N/A	N/A	N/A		NO	NUT
	7440-23-5	Sodium	6.2E+02 J	8.6E+02 J	MG/KG	CAS011-11SD25-01-0602	3/4	36.5 - 55.6	8.6E+02	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	1.4E+01 J	2.9E+01	MG/KG	CAS011-11SD24-01-0602	4/4	0.12 - 0.19	2.9E+01	2.0E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	3.0E+01	1.6E+02	MG/KG	CAS011-11SD27-01-0602	4/4	0.35 - 0.53	1.6E+02	2.3E+01	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.

[5] Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram

TABLE 2.5a

Step 2 Penniman Lake Subsurface Sediment, Group 2, Northwest Lobes and Drainages (South of Site 11) - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Chromium[e]	4 / 4	3.3E+01	CAS011-11SD24-01-0602	2.9E+00	1E-06	1E-05	2.3E+03	1	0.01	No Observed Effects
Cumulative Corresponding Hazard Index[c]									**0.01**	
Cumulative Corresponding Cancer Risk[d]						**1E-05**				

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 3															
Northeast	78-93-3	2-Butanone	1.7E-02 J	4.3E-02	MG/KG	CAPL-SD77-1012-V : CAPL-SD80-1012	6/7	0.019 - 0.084	4.3E-02	5.9E-01	2.7E+04 N	N/A		NO	BSL
Lobe	67-64-1	Acetone	6.1E-02	7.3E-01	MG/KG	PL-00-POND-SD17-0300	7/7	0.037 - 0.084	7.3E-01	2.5E+00	6.1E+04 N	N/A		NO	BSL
	75-15-0	Carbon disulfide	3.5E-03 J	3.5E-03 J	MG/KG	CAPL-SD80-1012	1/7	0.0093 - 0.084	3.5E-03	2.6E-02	7.7E+02 N	N/A		NO	BSL
	79-20-9	Methyl acetate	5.1E-03 J	5.1E-03 J	MG/KG	CAPL-SD79-1012	1/6	0.019 - 0.026	5.1E-03	N/A	7.8E+04 N	N/A		NO	BSL
	108-87-2	Methylcyclohexane	2.6E-02	2.6E-02	MG/KG	CAPL-SD77-1012-V	1/6	0.0093 - 0.013	2.6E-02	N/A	5.4E+02 N	N/A		NO	BSL
	91-57-6	2-Methylnaphthalene	3.4E-02 J	3.9E-02 J	MG/KG	CAPL-SD78-1012	2/7	0.013 - 2.8	3.9E-02	N/A	2.3E+02 N	N/A		NO	BSL
	100-52-7	Benzaldehyde	1.7E-01 J	2.1E-01 J	MG/KG	CAPL-SD80-1012	3/6	0.63 - 0.92	2.1E-01	N/A	7.8E+03 N	N/A		NO	BSL
	50-32-8	Benzo(a)pyrene	9.2E-03 J	3.7E-02	MG/KG	CAPL-SD76-1012	2/7	0.013 - 2.8	3.7E-02	N/A	1.5E-01 C	N/A		NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.1E-02 J	3.5E-02	MG/KG	CAPL-SD76-1012	2/7	0.013 - 2.8	3.5E-02	3.0E-02	1.5E+00 C	N/A		NO	BSL
	191-24-2	Benzo(g,h,i)perylene	7.3E-03 J	3.0E-02	MG/KG	CAPL-SD76-1012	2/7	0.013 - 2.8	3.0E-02	2.5E-02	1.7E+03 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	8.9E-03 J	2.8E-02	MG/KG	CAPL-SD76-1012	2/7	0.013 - 2.8	2.8E-02	N/A	1.5E+01 C	N/A		NO	BSL
	218-01-9	Chrysene	9.2E-03 J	5.7E-02 J	MG/KG	CAPL-SD78-1012	2/7	0.013 - 2.8	5.7E-02	2.2E-02	1.5E+02 C	N/A		NO	BSL
	206-44-0	Fluoranthene	1.2E-02 J	4.8E-02	MG/KG	CAPL-SD76-1012	6/7	0.013 - 2.8	4.8E-02	2.4E-02	2.3E+03 N	N/A		NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	2.3E-02	2.3E-02	MG/KG	CAPL-SD76-1012	1/7	0.013 - 2.8	2.3E-02	N/A	1.5E+00 C	N/A		NO	BSL
	91-20-3	Naphthalene	2.4E-02 J	2.4E-02 J	MG/KG	CAPL-SD78-1012	1/7	0.013 - 2.8	2.4E-02	N/A	3.8E+01 C	N/A		NO	BSL
	85-01-8	Phenanthrene	1.1E-02 J	5.3E-02 J	MG/KG	CAPL-SD77-1012	5/7	0.013 - 2.8	5.3E-02	3.0E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	1.3E-02	5.3E-02	MG/KG	CAPL-SD76-1012	6/7	0.013 - 2.8	5.3E-02	3.5E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	1.4E-03 L	2.3E-02 J	MG/KG	CAPL-SD76-1012	5/7	0.0012 - 0.028	2.3E-02	1.0E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	4.7E-03	4.7E-02 J	MG/KG	CAPL-SD77-1012	7/7	0.0012 - 0.028	4.7E-02	4.4E-02	1.6E+01 C	N/A		NO	BSL
	50-29-3	4,4'-DDT	7.0E-04 J	3.4E-02 K	MG/KG	PL-00-POND-SD17-0300	6/7	0.0012 - 0.028	3.4E-02	1.5E-03	1.9E+01 C	N/A		NO	BSL
	309-00-2	Aldrin	5.1E-04 L	5.1E-04 L	MG/KG	CAPL-SD80-1012	2/7	0.0012 - 0.014	5.1E-04	N/A	3.1E-01 C	N/A		NO	BSL
	319-84-6	alpha-BHC	5.4E-04 J	1.5E-03 J	MG/KG	CAPL-SD77-1012	3/7	0.0012 - 0.014	1.5E-03	8.1E-04	8.5E-01 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	9.1E-04 J	9.6E-03 L	MG/KG	CAPL-SD77-1012	2/7	0.0012 - 0.014	9.6E-03	N/A	1.8E+01 C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	3.6E-02	8.1E-01	MG/KG	CAPL-SD60-0711	9/9	0.032 - 0.28	8.1E-01	N/A	2.4E+00 C	N/A		NO	BSL
	319-85-7	beta-BHC	2.9E-04 L	7.4E-04 L	MG/KG	CAPL-SD80-1012	2/7	0.0012 - 0.014	7.4E-04	N/A	3.0E+00 C	N/A		NO	BSL
	319-86-8	delta-BHC	5.0E-04 J	1.5E-03 J	MG/KG	CAPL-SD79-1012	3/7	0.0012 - 0.014	1.5E-03	N/A	3.0E+00 C	N/A		NO	BSL
	60-57-1	Dieldrin	3.8E-04 L	1.5E-02 J	MG/KG	CAPL-SD77-1012	4/7	0.0012 - 0.028	1.5E-02	9.5E-04	3.3E-01 C	N/A		NO	BSL
	33213-65-9	Endosulfan II	1.4E-03 J	2.3E-03 J	MG/KG	CAPL-SD79-1012	3/7	0.0012 - 0.028	2.3E-03	N/A	3.7E+02 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	4.5E-03 J	2.3E-02 K	MG/KG	CAPL-SD78-1012	4/7	0.0012 - 0.028	2.3E-02	N/A	3.7E+02 N	N/A		NO	BSL
	72-20-8	Endrin	5.8E-04 L	1.4E-02	MG/KG	CAPL-SD77-1012	4/7	0.0012 - 0.028	1.4E-02	8.6E-03	1.8E+01 N	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	3.7E-04 L	3.1E-03 L	MG/KG	CAPL-SD80-1012	5/7	0.0012 - 0.028	3.1E-03	N/A	1.8E+01 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	3.6E-04 J	1.0E-03 J	MG/KG	CAPL-SD78-1012	4/7	0.0012 - 0.028	1.0E-03	2.9E-03	5.6E+00 C	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	1.4E-03	3.6E-02 J	MG/KG	CAPL-SD77-1012	6/7	0.0012 - 0.014	3.6E-02	1.1E-03	1.8E+01 C	N/A		NO	BSL
	76-44-8	Heptachlor	9.0E-04 L	2.0E-03 J	MG/KG	CAPL-SD77-1012	2/7	0.0012 - 0.014	2.0E-03	N/A	1.2E+00 C	N/A		NO	BSL
	1024-57-3	Heptachlor epoxide	7.1E-04 L	7.1E-04 L	MG/KG	CAPL-SD77-1012	1/7	0.0012 - 0.014	7.1E-04	N/A	5.9E-01 C	N/A		NO	BSL
	72-43-5	Methoxychlor	4.1E-03 J	4.7E-03 J	MG/KG	CAPL-SD80-1012	2/7	0.00124 - 0.014	4.7E-03	N/A	3.1E+02 N	N/A		NO	BSL
	99-65-0	1,3-Dinitrobenzene	1.5E-01 J	4.7E-01 J	MG/KG	CAPL-SD76-1012	4/7	0.25 - 0.4	4.7E-01	N/A	6.2E+00 N	N/A		NO	BSL
	99-08-1	3-Nitrotoluene	8.8E-01	8.8E-01	MG/KG	CAPL-SD76-1012	1/7	0.25 - 0.4	8.8E-01	N/A	6.2E+00 N	N/A		NO	BSL
	2691-41-0	HMX	4.6E-01 J	4.6E-01 J	MG/KG	CAPL-SD79P-1012	1/7	0.36 - 0.5	4.6E-01	N/A	3.8E+03 N	N/A		NO	BSL
	479-45-8	Tetryl	2.5E-01 J	2.5E-01 J	MG/KG	CAPL-SD76-1012	1/7	0.36 - 0.65	2.5E-01	N/A	1.2E+02 N	N/A		NO	BSL

Table 2.6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 3	7429-90-5	Aluminum	2.4E+03	1.2E+04	MG/KG	PL-00-POND-SD17-0300	7/7	19.1 - 250	1.2E+04	2.3E+04	7.7E+04 N	N/A		NO	BSL
Northeast	7440-38-2	Arsenic	5.5E+00	2.4E+01	MG/KG	PL-00-POND-SD17-0300	7/7	0.95 - 12	2.4E+01	1.1E+02	6.7E+00 C	N/A		NO	BBK
Lobe	7440-39-3	Barium	1.3E+01	8.7E+01	MG/KG	PL-00-POND-SD17-0300	7/7	3.81 - 250	8.7E+01	7.5E+01	1.5E+04 N	N/A		NO	BSL
(cont'd)	7440-41-7	Beryllium	1.7E-01 J	1.4E+00	MG/KG	PL-00-POND-SD17-0300	7/7	0.48 - 6.3	1.4E+00	1.4E+00	1.6E+02 N	N/A		NO	BSL
	7440-43-9	Cadmium	1.4E-01 J	4.6E-01 J	MG/KG	CAPL-SD80-1012	5/7	0.48 - 3.27	4.6E-01	5.7E-01	7.0E+01 N	N/A		NO	BSL
	7440-70-2	Calcium	2.6E+03	1.5E+05	MG/KG	PL-00-POND-SD17-0300	7/7	476 - 6300	1.5E+05	N/A	N/A	N/A		NO	NUT
	7440-47-3	Chromium	5.3E+00	2.7E+01	MG/KG	PL-00-POND-SD17-0300	7/7	0.95 - 12	2.7E+01	5.2E+01	2.9E+00 C	N/A		NO	BBK
	7440-48-4	Cobalt	1.1E+00 J	8.3E+00	MG/KG	PL-00-POND-SD17-0300	7/7	1.2 - 63	8.3E+00	9.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	3.8E+00	5.3E+01	MG/KG	PL-00-POND-SD17-0300	7/7	0.95 - 31	5.3E+01	2.6E+01	3.1E+03 N	N/A		NO	BSL
	57-12-5	Cyanide	4.9E+00	4.9E+00	MG/KG	CAPL-SD79-1012	1/7	1.3 - 7	4.9E+00	N/A	2.1E+01 N	N/A		NO	BSL
	7439-89-6	Iron	4.3E+03	2.3E+04	MG/KG	PL-00-POND-SD17-0300	7/7	9.5 - 120	2.3E+04	4.6E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	Lead	1.2E+01	5.5E+01	MG/KG	PL-00-POND-SD17-0300	7/7	0.29 - 3.8	5.5E+01	4.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	3.3E+02 J	2.1E+03	MG/KG	PL-00-POND-SD17-0300	7/7	476 - 6300	2.1E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	1.3E+01	1.9E+02	MG/KG	PL-00-POND-SD17-0300	7/7	1.4 - 19	1.9E+02	3.7E+02	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	3.3E-02 J	2.3E-01	MG/KG	PL-00-POND-SD17-0300	7/7	0.067 - 0.26	2.3E-01	2.6E-01	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	2.0E+00	3.7E+00	MG/KG	CAPL-SD80-1012	6/7	0.95 - 14.9	3.7E+00	1.7E+01	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	3.4E+02 J	1.5E+03	MG/KG	PL-00-POND-SD17-0300	7/7	476 - 6300	1.5E+03	N/A	N/A	N/A		NO	NUT
	7782-49-2	Selenium	5.3E-01 J	5.3E-01 J	MG/KG	CAPL-SD78-1012	1/7	0.95 - 3.73	5.3E-01	2.7E+00	3.9E+02 N	N/A		NO	BSL
	7440-23-5	Sodium	2.7E+02	2.7E+02	MG/KG	PL-00-POND-SD17-0300	1/7	476 - 6300	2.7E+02	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	7.3E+00	3.5E+01	MG/KG	PL-00-POND-SD17-0300	7/7	1.19 - 63	3.5E+01	6.3E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	1.9E+01	2.0E+02	MG/KG	PL-00-POND-SD17-0300	7/7	1.91 - 25	2.0E+02	1.1E+02	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for n-hexane used as surrogate for methylcyclohexane.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan II and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram
SAT = RSL exceeds soil saturation concentration, therefore, soil saturation concentration used as screening level

Table 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 3															
Northeast	78-93-3	2-Butanone	3.7E-03 J	5.7E-02	MG/KG	CAPL-SSD80-1012-V	6/6	0.0097 - 0.026	5.7E-02	4.4E-02	2.7E+04 N	N/A		NO	BSL
Lobe	67-64-1	Acetone	1.7E-02 J	2.0E-01 J	MG/KG	CAPL-SSD80-1012-V	6/6	0.019 - 0.052	2.0E-01	1.6E-01	6.1E+04 N	N/A		NO	BSL
	75-15-0	Carbon disulfide	1.9E-03 J	7.3E-03 J	MG/KG	CAPL-SSD80-1012-V	2/6	0.0049 - 0.013	7.3E-03	N/A	7.7E+02 N	N/A		NO	BSL
	91-57-6	2-Methylnaphthalene	9.5E-03 J	1.1E-02	MG/KG	CAPL-SSD77-1012	2/6	0.0087 - 0.081	1.1E-02	3.3E-03	2.3E+02 N	N/A		NO	BSL
	56-55-3	Benzo(a)anthracene	2.0E-02	1.0E-01	MG/KG	CAPL-SSD78-1012	2/6	0.0087 - 0.081	1.0E-01	N/A	1.5E+00 C	N/A		NO	BSL
	50-32-8	Benzo(a)pyrene	9.1E-03	8.7E-02	MG/KG	CAPL-SSD78-1012	3/6	0.0087 - 0.081	8.7E-02	1.5E-02	1.5E-01 C	N/A		NO	BSL
	205-99-2	Benzo(b)fluoranthene	7.8E-03 J	8.7E-02	MG/KG	CAPL-SSD78-1012	3/6	0.0087 - 0.081	8.7E-02	1.8E-02	1.5E+00 C	N/A		NO	BSL
	191-24-2	Benzo(g,h,i)perylene	7.2E-03 J	9.2E-02	MG/KG	CAPL-SSD78-1012	3/6	0.0087 - 0.081	9.2E-02	N/A	1.7E+03 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	5.3E-03 J	6.8E-02 J	MG/KG	CAPL-SSD78-1012	3/6	0.0087 - 0.081	6.8E-02	1.3E-02	1.5E+01 C	N/A		NO	BSL
	218-01-9	Chrysene	2.2E-02	1.9E-01	MG/KG	CAPL-SSD78-1012	2/6	0.0087 - 0.081	1.9E-01	2.0E-02	1.5E+02 C	N/A		NO	BSL
	206-44-0	Fluoranthene	2.9E-03 J	1.9E-01	MG/KG	CAPL-SSD78-1012	6/6	0.0087 - 0.081	1.9E-01	2.1E-02	2.3E+03 N	N/A		NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	5.2E-03 J	6.3E-02 J	MG/KG	CAPL-SSD78-1012	3/6	0.0087 - 0.081	6.3E-02	N/A	1.5E+00 C	N/A		NO	BSL
	91-20-3	Naphthalene	1.3E-01	1.5E-01	MG/KG	CAPL-SSD79-1012	2/6	0.0087 - 0.081	1.5E-01	4.8E-03	3.8E+01 C	N/A		NO	BSL
	85-01-8	Phenanthrene	1.3E-01	1.3E-01	MG/KG	CAPL-SSD78-1012	1/6	0.0087 - 0.081	1.3E-01	1.7E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	3.3E-03 J	2.8E-01	MG/KG	CAPL-SSD78-1012	6/6	0.0087 - 0.081	2.8E-01	2.2E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	8.0E-04 L	3.4E-02 L	MG/KG	CAPL-SSD78-1012	3/6	0.000864 - 0.002	3.4E-02	1.8E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	6.2E-04 J	2.5E-01 J	MG/KG	CAPL-SSD78-1012	6/6	0.000864 - 0.016	2.5E-01	9.0E-03	1.6E+01 C	N/A		NO	BSL
	50-29-3	4,4'-DDT	6.7E-04 J	9.2E-03 J	MG/KG	CAPL-SSD78-1012	4/6	0.000864 - 0.0016	9.2E-03	N/A	1.9E+01 C	N/A		NO	BSL
	309-00-2	Aldrin	4.1E-04 J	9.3E-04 J	MG/KG	CAPL-SSD79-1012	2/6	0.000864 - 0.0016	9.3E-04	9.1E-04	3.1E-01 C	N/A		NO	BSL
	319-84-6	alpha-BHC	6.1E-04 J	6.1E-04 J	MG/KG	CAPL-SSD80-1012	1/6	0.000864 - 0.0016	6.1E-04	3.2E-04	8.5E-01 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	3.9E-03 L	3.5E-02	MG/KG	CAPL-SSD78-1012	3/6	0.000864 - 0.0016	3.5E-02	N/A	1.8E+01 C	N/A		NO	BSL
	11096-82-5	**Aroclor-1260**	**7.7E-03 J**	**3.0E+00 J**	**MG/KG**	**CAPL-SSD78-1012**	**4/6**	**0.022 - 0.4**	**3.0E+00**	**N/A**	**2.4E+00 C**	**N/A**		**YES**	**ASL**
	319-85-7	beta-BHC	1.1E-03 L	1.1E-03 L	MG/KG	CAPL-SSD79-1012	1/6	0.000864 - 0.0016	1.1E-03	2.2E-03	3.0E+00 C	N/A		NO	BSL
	319-86-8	delta-BHC	5.8E-04 J	5.8E-04 J	MG/KG	CAPL-SSD78-1012	1/6	0.000864 - 0.0016	5.8E-04	2.9E-04	3.0E+00 C	N/A		NO	BSL
	60-57-1	Dieldrin	3.2E-04 J	5.0E-02 L	MG/KG	CAPL-SSD78-1012	4/6	0.000864 - 0.0016	5.0E-02	N/A	3.3E-01 C	N/A		NO	BSL
	959-98-8	Endosulfan I	2.2E-04 J	1.2E-03 J	MG/KG	CAPL-SSD78-1012	3/6	0.000864 - 0.0016	1.2E-03	8.1E-04	3.7E+02 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	1.3E-03 L	1.3E-02 L	MG/KG	CAPL-SSD79-1012	2/6	0.000864 - 0.0016	1.3E-02	N/A	3.7E+02 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	2.0E-03 K	1.0E-01 J	MG/KG	CAPL-SSD78-1012	3/6	0.000864 - 0.0016	1.0E-01	N/A	3.7E+02 N	N/A		NO	BSL
	72-20-8	Endrin	3.6E-04 J	4.9E-02 L	MG/KG	CAPL-SSD78-1012	3/6	0.000864 - 0.0016	4.9E-02	6.4E-04	1.8E+01 N	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	2.1E-03 J	1.6E-02 L	MG/KG	CAPL-SSD78-1012	3/6	0.000864 - 0.0016	1.6E-02	N/A	1.8E+01 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	1.7E-03 J	8.6E-03 J	MG/KG	CAPL-SSD78-1012	3/6	0.000864 - 0.0016	8.6E-03	N/A	1.8E+01 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	4.2E-04 J	6.8E-04 J	MG/KG	CAPL-SSD78-1012	2/6	0.000864 - 0.0016	6.8E-04	4.8E-04	5.6E+00 C	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	6.7E-04 L	2.1E-01	MG/KG	CAPL-SSD78-1012	6/6	0.000864 - 0.0156	2.1E-01	N/A	1.8E+01 C	N/A		NO	BSL
	1024-57-3	Heptachlor epoxide	7.2E-04 L	3.4E-03 L	MG/KG	CAPL-SSD78-1012	3/6	0.000864 - 0.0016	3.4E-03	N/A	5.9E-01 C	N/A		NO	BSL
	72-43-5	Methoxychlor	1.1E-03 J	2.8E-01 J	MG/KG	CAPL-SSD78-1012	4/6	0.000864 - 0.0156	2.8E-01	N/A	3.1E+02 N	N/A		NO	BSL
	99-65-0	1,3-Dinitrobenzene	1.2E-01 J	4.6E-01	MG/KG	CAPL-SSD78-1012	2/6	0.36 - 0.4	4.6E-01	N/A	6.2E+00 N	N/A		NO	BSL

Table 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 3	7429-90-5	Aluminum	1.7E+03	1.1E+04	MG/KG	CAPL-SSD78-1012	6/6	14 - 49.7	1.1E+04	1.0E+04	7.7E+04 N	N/A		NO	BSL
Northeast	7440-38-2	Arsenic	8.0E-01	8.8E+00	MG/KG	CAPL-SSD78-1012	6/6	0.7 - 2.48	8.8E+00	5.7E+01	6.7E+00 C	N/A		NO	BBK
Lobe	7440-39-3	Barium	7.1E+00	5.0E+01	MG/KG	CAPL-SSD78-1012	6/6	2.8 - 9.93	5.0E+01	3.7E+01	1.5E+04 N	N/A		NO	BSL
(cont'd)	7440-41-7	Beryllium	1.6E-01 J	5.6E-01 J	MG/KG	CAPL-SSD78-1012	5/6	0.35 - 1.24	5.6E-01	6.0E-01	1.6E+02 N	N/A		NO	BSL
	7440-43-9	Cadmium	1.9E-01 J	4.2E-01 J	MG/KG	CAPL-SSD78-1012	2/6	0.35 - 1.24	4.2E-01	N/A	7.0E+01 N	N/A		NO	BSL
	7440-70-2	Calcium	4.8E+02 K	7.4E+03	MG/KG	CAPL-SSD80-1012	6/6	350 - 1240	7.4E+03	N/A	N/A	N/A		NO	NUT
	7440-47-3	Chromium	2.7E+00	1.5E+01	MG/KG	CAPL-SSD78-1012	6/6	0.7 - 2.48	1.5E+01	1.6E+01	2.9E+00 C	N/A		NO	BBK
	7440-48-4	Cobalt	3.9E-01 J	3.0E+00 J	MG/KG	CAPL-SSD78-1012	6/6	0.88 - 3.1	3.0E+00	2.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	8.8E-01	2.0E+01	MG/KG	CAPL-SSD78-1012	6/6	0.7 - 2.48	2.0E+01	3.7E+00	3.1E+03 N	N/A		NO	BSL
	7439-89-6	Iron	1.5E+03	1.1E+04	MG/KG	CAPL-SSD78-1012	6/6	7 - 24.8	1.1E+04	1.1E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	Lead	4.0E+00	4.3E+01	MG/KG	CAPL-SSD78-1012	6/6	0.21 - 0.75	4.3E+01	1.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	1.5E+02 K	9.9E+02 J	MG/KG	CAPL-SSD78-1012	6/6	350 - 1240	9.9E+02	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	5.8E+00	3.2E+01	MG/KG	CAPL-SSD78-1012	6/6	1.05 - 3.72	3.2E+01	2.9E+01	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	2.3E-02 J	8.9E-02 J	MG/KG	CAPL-SSD78-1012	5/6	0.042 - 0.094	8.9E-02	5.2E-02	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	9.5E-01	6.4E+00	MG/KG	CAPL-SSD78-1012	6/6	0.7 - 2.48	6.4E+00	5.6E+00	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	1.3E+02 K	8.0E+02 J	MG/KG	CAPL-SSD78-1012	6/6	350 - 1240	8.0E+02	N/A	N/A	N/A		NO	NUT
	7440-23-5	Sodium	7.3E+01 J	7.3E+01 J	MG/KG	CAPL-SSD66P-1012	1/6	350 - 1240	7.3E+01	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	3.9E+00	2.4E+01	MG/KG	CAPL-SSD78-1012	6/6	0.88 - 3.1	2.4E+01	2.0E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	4.0E+00	8.4E+01	MG/KG	CAPL-SSD78-1012	6/6	1.4 - 4.97	8.4E+01	2.3E+01	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram

Table 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Below Background (BBK)															

TABLE 2.7a

Step 2 Penniman Lake Subsurface Sediment, Group 3, Northeast Lobe - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Aroclor-1260	4 / 6	3.0E+00 J	CAPL-SSD78-1012	2.4E+00	1E-06	1E-06	N/A	N/A	N/A	NA
Cumulative Corresponding Hazard Index[c]									**N/A**	
Cumulative Corresponding Cancer Risk[d]						**1E-06**				

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.8
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4a															
Penniman Lake	78-93-3	2-Butanone	3.5E-02	1.6E-01	MG/KG	CAPL-SD64-1012-V	4/6	0.001 - 0.058	1.6E-01	5.9E-01	2.7E+04 N	N/A		NO	BSL
Northwest	67-64-1	Acetone	9.2E-02	5.4E-01 J	MG/KG	CAPL-SD64-1012-V	4/6	0.0008 - 0.115	5.4E-01	2.5E+00	6.1E+04 N	N/A		NO	BSL
	75-15-0	Carbon disulfide	9.9E-03 J	1.8E-02 J	MG/KG	CAPL-SD64-1012-V	3/6	0.0003 - 0.029	1.8E-02	2.6E-02	7.7E+02 N	N/A		NO	BSL
	83-32-9	Acenaphthene	2.9E-02 J	2.9E-02 J	MG/KG	CAS011-11SD32-00-0602	1/6	0.009 - 0.13	2.9E-02	N/A	3.5E+03 N	N/A		NO	BSL
	98-86-2	Acetophenone	1.7E-02 J	4.7E-02 J	MG/KG	CAS011-11SD32-00-0602	2/6	0.01 - 1.8	4.7E-02	N/A	7.8E+03 N	N/A		NO	BSL
	120-12-7	Anthracene	3.9E-02 J	3.9E-02 J	MG/KG	CAS011-11SD32-00-0602	1/6	0.008 - 0.13	3.9E-02	N/A	1.7E+04 N	N/A		NO	BSL
	100-52-7	Benzaldehyde	5.0E-02 J	3.8E-01 J	MG/KG	CAPL-SD63-1012	4/6	0.004 - 1.8	3.8E-01	N/A	7.8E+03 N	N/A		NO	BSL
	56-55-3	Benzo(a)anthracene	7.8E-02 J	7.8E-02 J	MG/KG	CAPL-SD63-1012	1/6	0.009 - 0.13	7.8E-02	1.8E-02	1.5E+00 C	N/A		NO	BSL
	50-32-8	Benzo(a)pyrene	9.3E-02 J	9.3E-02 J	MG/KG	CAPL-SD63-1012	1/6	0.008 - 0.13	9.3E-02	N/A	1.5E-01 C	N/A		NO	BSL
	205-99-2	Benzo(b)fluoranthene	9.6E-02 J	9.6E-02 J	MG/KG	CAPL-SD63-1012	1/6	0.013 - 0.13	9.6E-02	3.0E-02	1.5E+00 C	N/A		NO	BSL
	191-24-2	Benzo(g,h,i)perylene	9.4E-02 J	9.4E-02 J	MG/KG	CAPL-SD63-1012	1/6	0.029 - 0.13	9.4E-02	2.5E-02	1.7E+03 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	1.0E-01 J	1.0E-01 J	MG/KG	CAPL-SD63-1012	1/6	0.014 - 0.13	1.0E-01	N/A	1.5E+01 C	N/A		NO	BSL
	218-01-9	Chrysene	3.2E-02 J	1.9E-01	MG/KG	CAPL-SD63-1012	2/6	0.008 - 0.13	1.9E-01	2.2E-02	1.5E+02 C	N/A		NO	BSL
	117-84-0	Di-n-octylphthalate	2.8E-02 J	2.8E-02 J	MG/KG	CAS011-11SD32-00-0602	1/6	0.009 - 1.8	2.8E-02	N/A	6.2E+02 N	N/A		NO	BSL
	206-44-0	Fluoranthene	2.1E-02 J	1.7E-01	MG/KG	CAPL-SD63-1012	4/6	0.007 - 0.13	1.7E-01	2.4E-02	2.3E+03 N	N/A		NO	BSL
	86-73-7	Fluorene	1.0E-01 J	1.0E-01 J	MG/KG	CAPL-SD63-1012	1/6	0.008 - 0.13	1.0E-01	N/A	2.3E+03 N	N/A		NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	9.0E-02 J	9.0E-02 J	MG/KG	CAPL-SD63-1012	1/6	0.008 - 0.13	9.0E-02	N/A	1.5E+00 C	N/A		NO	BSL
	85-01-8	Phenanthrene	3.4E-02 J	1.8E-01	MG/KG	CAPL-SD63-1012	3/6	0.01 - 0.13	1.8E-01	3.0E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	1.9E-02 J	1.9E-01	MG/KG	CAPL-SD63-1012	3/6	0.013 - 0.13	1.9E-01	3.5E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	7.1E-03 J	1.1E-02 J	MG/KG	CAPL-SD64-1012	2/6	0.003 - 0.009	1.1E-02	1.0E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	7.6E-03 J	4.1E-02	MG/KG	CAS011-11SD28-00-0602	5/6	0.0009 - 0.005	3.9E-02	4.4E-02	1.6E+01 C	N/A		NO	BSL
	50-29-3	4,4'-DDT	4.2E-03 J	4.2E-03 J	MG/KG	CAPL-SD63-1012	1/6	0.003 - 0.009	4.2E-03	1.5E-03	1.9E+01 C	N/A		NO	BSL
	309-00-2	Aldrin	1.8E-03 J	1.8E-03 J	MG/KG	CAPL-SD63-1012	1/6	0.003 - 0.005	1.8E-03	N/A	3.1E-01 C	N/A		NO	BSL
	319-84-6	alpha-BHC	7.8E-04 J	7.8E-04 J	MG/KG	CAPL-SD62-1012	1/6	0.003 - 0.005	7.8E-04	8.1E-04	8.5E-01 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	1.5E-03 J	3.6E-03 J	MG/KG	CAPL-SD63-1012	3/6	0.003 - 0.005	3.6E-03	N/A	1.8E+01 C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	3.5E-02	6.2E+00	MG/KG	CAPL-SD23-0711	11/13	0.024 - 0.13	1.3E+00	N/A	2.4E+00 C	N/A		NO	BSL
	319-86-8	delta-BHC	2.7E-03 J	2.7E-03 J	MG/KG	CAPL-SD63-1012	1/6	0.003 - 0.005	2.7E-03	N/A	3.0E+00 C	N/A		NO	BSL
	60-57-1	Dieldrin	2.4E-03 J	2.1E-02 J	MG/KG	CAPL-SD63-1012	3/6	0.003 - 0.009	2.1E-02	9.5E-04	3.3E-01 C	N/A		NO	BSL
	959-98-8	Endosulfan I	6.8E-04 J	6.8E-04 J	MG/KG	CAPL-SD63-1012	1/6	0.003 - 0.005	6.8E-04	N/A	3.7E+02 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	1.3E-03 J	1.3E-02 J	MG/KG	CAPL-SD63-1012	2/6	0.003 - 0.009	1.3E-02	N/A	3.7E+02 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	2.1E-03 J	4.1E-02 J	MG/KG	CAPL-SD63-1012	2/6	0.003 - 0.009	4.1E-02	N/A	3.7E+02 N	N/A		NO	BSL
	72-20-8	Endrin	1.6E-02 J	1.6E-02 J	MG/KG	CAPL-SD63-1012	1/6	0.003 - 0.009	1.6E-02	8.6E-03	1.8E+01 N	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	2.0E-03 J	5.0E-03 J	MG/KG	CAPL-SD63-1012	3/6	0.003 - 0.009	5.0E-03	N/A	1.8E+01 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	1.7E-03 J	1.5E-02 J	MG/KG	CAPL-SD62-1012	3/6	0.003 - 0.009	1.5E-02	N/A	1.8E+01 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	6.9E-04 J	6.9E-04 J	MG/KG	CAPL-SD63-1012	1/6	0.003 - 0.005	6.9E-04	2.9E-03	5.6E+00 C	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	9.6E-04 J	4.1E-02 J	MG/KG	CAPL-SD63-1012	3/6	0.003 - 0.005	4.1E-02	1.1E-03	1.8E+01 C	N/A		NO	BSL
	76-44-8	Heptachlor	1.6E-03 J	1.6E-03 J	MG/KG	CAPL-SD62-1012	1/6	0.003 - 0.005	1.6E-03	N/A	1.2E+00 C	N/A		NO	BSL
	72-43-5	Methoxychlor	5.4E-03 J	1.1E-02 J	MG/KG	CAPL-SD63-1012	2/6	0.003 - 0.05	1.1E-02	N/A	3.1E+02 N	N/A		NO	BSL
	55-63-0	Nitroglycerin	3.3E-01 J	1.4E+00 J	MG/KG	CAPL-SD64-1012	3/3	0.93 - 0.98	1.4E+00	N/A	6.2E+00 N	N/A		NO	BSL
	479-45-8	Tetryl	2.1E-01 J	2.1E-01 J	MG/KG	CAPL-SD63-1012	1/3	0.37 - 0.39	2.1E-01	N/A	1.2E+02 N	N/A		NO	BSL

Table 2.8
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4a	7429-90-5	Aluminum	2.6E+03 K	2.2E+04	MG/KG	CAPL-SD62-1012	6/6	4.1 - 273	2.2E+04	2.3E+04	7.7E+04 N	N/A		NO	BSL
Penniman Lake	7440-38-2	Arsenic	6.9E+00	4.8E+01	MG/KG	CAPL-SD64-1012	6/6	1.2 - 13.6	4.8E+01	1.1E+02	6.7E+00 C	N/A		NO	BBK
Northwest	7440-39-3	Barium	1.3E+01 J	8.9E+01	MG/KG	CAPL-SD63-1012	6/6	0.03 - 54.5	8.9E+01	7.5E+01	1.5E+04 N	N/A		NO	BSL
(cont'd)	7440-41-7	Beryllium	1.1E+00 J	1.2E+00 J	MG/KG	CAPL-SD64-1012	2/6	0.059 - 6.81	1.2E+00	1.4E+00	1.6E+02 N	N/A		NO	BSL
	7440-70-2	Calcium	1.6E+04	1.2E+05	MG/KG	CAPL-SD63-1012	6/6	0.5 - 6810	1.2E+05	N/A	N/A	N/A		NO	NUT
	7440-47-3	Chromium	9.6E+00	4.9E+01	MG/KG	CAPL-SD62-1012	6/6	0.15 - 13.6	4.9E+01	5.2E+01	2.9E+00 C	N/A		NO	BBK
	7440-48-4	Cobalt	9.9E-01 J	6.0E+00 J	MG/KG	CAPL-SD64-1012	5/6	0.18 - 17	6.0E+00	9.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	3.1E+00 J	5.1E+01	MG/KG	CAPL-SD64-1012	6/6	0.21 - 13.6	5.1E+01	2.6E+01	3.1E+03 N	N/A		NO	BSL
	7439-89-6	Iron	9.6E+03	4.0E+04	MG/KG	CAPL-SD62-1012	6/6	3.4 - 136	4.0E+04	4.6E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	Lead	5.6E+00	8.6E+01	MG/KG	CAPL-SD63-1012	6/6	0.39 - 4.09	8.6E+01	4.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	6.6E+02 J	3.1E+03 J	MG/KG	CAPL-SD63-1012	6/6	3.6 - 6810	3.1E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	2.2E+01	1.4E+02	MG/KG	CAPL-SD63-1012	6/6	0.03 - 20.4	1.4E+02	3.7E+02	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	1.5E-01 J	1.5E+00	MG/KG	CAPL-SD64-1012	4/6	0.058 - 0.19	1.5E+00	2.6E-01	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	2.2E+00 J	1.4E+01	MG/KG	CAPL-SD64-1012	6/6	0.15 - 13.6	1.4E+01	1.7E+01	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	7.8E+02 J	2.8E+03 J	MG/KG	CAPL-SD64-1012	6/6	4 - 6810	2.8E+03	N/A	N/A	N/A		NO	NUT
	7782-49-2	Selenium	7.1E-01 J	7.1E-01 J	MG/KG	CAS011-11SD31-00-0602	1/6	0.65 - 13.6	7.1E-01	2.7E+00	3.9E+02 N	N/A		NO	BSL
	7440-23-5	Sodium	7.2E+02 J	7.2E+02 J	MG/KG	CAS011-11SD32-00-0602	1/6	43.2 - 6810	7.2E+02	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	1.1E+01 J	5.5E+01	MG/KG	CAPL-SD62-1012	6/6	0.15 - 17	5.5E+01	6.3E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	1.4E+01	2.5E+02	MG/KG	CAPL-SD62-1012	6/6	0.41 - 27.3	2.5E+02	1.1E+02	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram
SAT = RSL exceeds soil saturation concentration, therefore, soil saturation concentration used as screening level

Table 2.9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4a															
Penniman Lake	78-93-3	2-Butanone	8.8E-02	1.4E-01	MG/KG	CAPL-SSD63-1012	4/6	0.001 - 0.049	1.4E-01	4.4E-02	2.7E+04 N	N/A		NO	BSL
Northwest	67-64-1	Acetone	5.3E-02	4.6E-01 J	MG/KG	CAPL-SSD63-1012	6/6	0.0008 - 0.097	4.6E-01	1.6E-01	6.1E+04 N	N/A		NO	BSL
	91-57-6	2-Methylnaphthalene	5.0E-02 J	5.0E-02 J	MG/KG	CAPL-SSD63-1012	1/6	0.0252 - 0.94	5.0E-02	3.3E-03	2.3E+02 N	N/A		NO	BSL
	83-32-9	Acenaphthene	3.9E-02 J	3.9E-02 J	MG/KG	CAPL-SSD63-1012	1/6	0.0252 - 0.94	3.9E-02	N/A	3.5E+03 N	N/A		NO	BSL
	120-12-7	Benzaldehyde	1.8E-02 J	9.3E-01 J	MG/KG	CAPL-SSD63-1012	3/6	0.004 - 1.31	9.3E-01	N/A	7.8E+03 N	N/A		NO	BSL
	100-52-7	Benzo(b)fluoranthene	8.0E-02 J	8.0E-02 J	MG/KG	CAPL-SSD63-1012	1/6	0.0252 - 0.9	8.0E-02	1.8E-02	1.5E+00 C	N/A		NO	BSL
	205-99-2	Benzo(k)fluoranthene	6.1E-02 J	6.1E-02 J	MG/KG	CAPL-SSD63-1012	1/6	0.0252 - 0.94	6.1E-02	1.3E-02	1.5E+01 C	N/A		NO	BSL
	207-08-9	Chrysene	3.8E-02 J	3.8E-02 J	MG/KG	CAS011-11SD28-01-0602	1/6	0.008 - 0.59	3.8E-02	2.0E-02	1.5E+02 C	N/A		NO	BSL
	218-01-9	Fluoranthene	9.3E-03 J	1.3E-01 J	MG/KG	CAPL-SSD63-1012	4/6	0.007 - 0.59	1.3E-01	2.1E-02	2.3E+03 N	N/A		NO	BSL
	117-84-0	Phenanthrene	1.1E-01 J	1.1E-01 J	MG/KG	CAPL-SSD63-1012	1/6	0.0252 - 0.94	1.1E-01	1.7E-02	1.7E+04 N	N/A		NO	BSL
	206-44-0	Pyrene	7.7E-03 J	1.1E-01 J	MG/KG	CAPL-SSD63-1012	3/6	0.0252 - 0.94	1.1E-01	2.2E-02	1.7E+03 N	N/A		NO	BSL
	85-01-8	4,4'-DDD	3.1E-03 J	1.8E-02 J	MG/KG	CAPL-SSD62-1012	3/6	0.00251 - 0.01	1.8E-02	1.8E-02	2.2E+01 C	N/A		NO	BSL
	129-00-0	4,4'-DDE	9.1E-03 J	2.6E-02 J	MG/KG	CAPL-SSD62-1012	4/6	0.0009 - 0.01	2.6E-02	9.0E-03	1.6E+01 C	N/A		NO	BSL
	72-54-8	alpha-BHC	5.6E-04 J	5.6E-04 J	MG/KG	CAPL-SSD62-1012	1/6	0.0023 - 0.0049	5.6E-04	3.2E-04	8.5E-01 C	N/A		NO	BSL
	72-55-9	alpha-Chlordane	1.0E-03 L	1.6E-03 L	MG/KG	CAPL-SSD62-1012	3/6	0.0023 - 0.0049	1.6E-03	N/A	1.8E+01 C	N/A		NO	BSL
	50-29-3	Aroclor-1260	3.4E-02 J	2.2E-01 J	MG/KG	CAPL-SSD63-1012	3/6	0.0058 - 0.094	2.2E-01	N/A	2.4E+00 C	N/A		NO	BSL
	319-84-6	delta-BHC	5.1E-04 J	5.1E-04 J	MG/KG	CAPL-SSD63-1012	1/6	0.0023 - 0.0049	5.1E-04	2.9E-04	3.0E+00 C	N/A		NO	BSL
	5103-71-9	Dieldrin	4.4E-03 J	4.7E-03 J	MG/KG	CAPL-SSD62-1012	2/6	0.0025 - 0.0094	4.7E-03	N/A	3.3E-01 C	N/A		NO	BSL
	11096-82-5	Endosulfan II	2.1E-03 J	2.4E-03 J	MG/KG	CAPL-SSD63-1012	2/6	0.00251 - 0.0094	2.4E-03	N/A	3.7E+02 N	N/A		NO	BSL
	319-86-8	Endosulfan sulfate	6.4E-03 J	9.5E-03 J	MG/KG	CAPL-SSD63-1012	2/6	0.0025 - 0.0094	9.5E-03	N/A	3.7E+02 N	N/A		NO	BSL
	60-57-1	Endrin	8.6E-04 J	1.1E-03 J	MG/KG	CAPL-SSD63-1012	2/6	0.0025 - 0.0094	1.1E-03	6.4E-04	1.8E+01 N	N/A		NO	BSL
	33213-65-9	Endrin aldehyde	4.5E-03 J	5.1E-03 L	MG/KG	CAPL-SSD62-1012	2/6	0.0025 - 0.0094	5.1E-03	N/A	1.8E+01 N	N/A		NO	BSL
	1031-07-8	Endrin ketone	1.7E-02 J	1.7E-02 J	MG/KG	CAPL-SSD62-1012	1/6	0.0025 - 0.0094	1.7E-02	N/A	1.8E+01 N	N/A		NO	BSL
	72-20-8	gamma-Chlordane	1.3E-03 J	1.2E-02 L	MG/KG	CAPL-SSD63-1012	3/6	0.0023 - 0.0049	1.2E-02	N/A	1.8E+01 C	N/A		NO	BSL
	7421-93-4	Methoxychlor	1.6E-02 J	1.6E-02 J	MG/KG	CAPL-SSD62-1012	1/6	0.0025 - 0.049	1.6E-02	N/A	3.1E+02 N	N/A		NO	BSL
	53494-70-5	Nitroglycerin	3.3E-01 J	1.0E+00 J	MG/KG	CAPL-SSD64-1012	2/3	0.9710 - 0.985	1.0E+00	N/A	6.1E+00 N	N/A		NO	BSL
	5103-74-2	Aluminum	2.8E+03	1.9E+04	MG/KG	CAPL-SSD64-1012	6/6	3.6 - 206	1.9E+04	1.0E+04	7.7E+04 N	N/A		NO	BSL
	72-43-5	Antimony	8.3E-01 J	8.3E-01 J	MG/KG	CAS011-11SD32-01-0602	1/6	0.42 - 10.3	8.3E-01	N/A	3.1E+01 N	N/A		NO	BSL
	55-63-0	Arsenic	3.7E+00	4.4E+01	MG/KG	CAPL-SSD62-1012	6/6	1.10 - 10.3	4.4E+01	5.7E+01	6.7E+00 C	N/A		NO	BBK
	7429-90-5	Barium	9.3E+00 J	8.7E+01	MG/KG	CAPL-SSD63-1012	6/6	0.026 - 41.1	8.7E+01	3.7E+01	1.5E+04 N	N/A		NO	BSL
	7440-38-2	Beryllium	1.2E+00 J	1.2E+00 J	MG/KG	CAPL-SSD64-1012	1/6	0.052 - 5.14	1.2E+00	6.0E-01	1.6E+02 N	N/A		NO	BSL
	7440-39-3	Calcium	3.4E+03	1.0E+05	MG/KG	CAPL-SSD63-1012	6/6	0.44 - 5140	1.0E+05	N/A	N/A	N/A		NO	NUT
	7440-41-7	**Chromium**	**1.1E+01**	**4.5E+01**	**MG/KG**	**CAPL-SSD62-1012**	**6/6**	**0.13 - 10.3**	**4.5E+01**	**1.6E+01**	**2.9E+00 C**	**N/A**		**YES**	**ASL**
	7440-70-2	Cobalt	1.3E+00 J	6.0E+00 J	MG/KG	CAPL-SSD64-1012	4/6	0.16 - 12.8	6.0E+00	2.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-47-3	Copper	6.4E+00 J	3.8E+01	MG/KG	CAPL-SSD64-1012	5/6	0.18 - 10.3	3.8E+01	3.7E+00	3.1E+03 N	N/A		NO	BSL

Table 2.9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4a	7440-48-4	Iron	1.0E+04	3.7E+04	MG/KG	CAS011-11SD32-01-0602	6/6	3 - 103	3.7E+04	1.1E+04	5.5E+04 N	N/A		NO	BSL
Penniman Lake	7440-50-8	Lead	3.0E+00	1.1E+02	MG/KG	CAPL-SSD62-1012	6/6	0.34 - 3.08	1.1E+02	1.2E+01	4.0E+02 NL	N/A		NO	BSL
Northwest	7439-89-6	Magnesium	5.5E+02 J	3.1E+03	MG/KG	CAS011-11SD32-01-0602	6/6	3.2 - 5140	3.1E+03	N/A	N/A	N/A		NO	NUT
	7439-92-1	Manganese	1.5E+01	1.4E+02	MG/KG	CAPL-SSD63-1012	6/6	0.026 - 15.4	1.4E+02	2.9E+01	1.8E+03 N	N/A		NO	BSL
	7439-95-4	Mercury	1.2E-01 J	1.5E+00	MG/KG	CAPL-SSD64-1012	3/6	0.075 - 0.14	1.5E+00	5.2E-02	9.4E+00 N	N/A		NO	BSL
	7439-96-5	Nickel	2.3E+00 J	1.3E+01	MG/KG	CAPL-SSD64-1012	6/6	0.13 - 10.3	1.3E+01	5.6E+00	1.5E+03 N	N/A		NO	BSL
	7439-97-6	Potassium	6.0E+02 J	4.1E+03 J	MG/KG	CAS011-11SD32-01-0602	6/6	3.5 - 5140	4.1E+03	N/A	N/A	N/A		NO	NUT
	7440-02-0	Selenium	2.1E+00 J	2.1E+00 J	MG/KG	CAS011-11SD28-01-0602	1/6	0.57 - 10.3	2.1E+00	N/A	3.9E+02 N	N/A		NO	BSL
	7440-09-7	Sodium	5.0E+02 J	5.4E+03	MG/KG	CAPL-SSD64-1012	2/6	38 - 5140	5.4E+03	N/A	N/A	N/A		NO	NUT
	7782-49-2	Vanadium	1.2E+01 J	4.7E+01	MG/KG	CAPL-SSD64-1012	6/6	0.13 - 12.8	4.7E+01	2.0E+01	3.9E+02 N	N/A		NO	BSL
	7440-23-5	Zinc	8.7E+00	2.2E+02	MG/KG	CAPL-SSD62-1012	6/6	0.37 - 20.6	2.2E+02	2.3E+01	2.3E+04 N	N/A		NO	BSL
	7440-62-2	Vanadium	1.1E+01 J	4.7E+01	MG/KG	CAPL-SSD64-1012	6/6	0.13 - 12.8	4.7E+01	2.0E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	1.4E+01	2.2E+02	MG/KG	CAPL-SSD62-1012	6/6	0.37 - 20.6	2.2E+02	2.3E+01	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan II and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram
SAT = RSL exceeds soil saturation concentration, therefore, soil saturation concentration used as screening level

TABLE 2.9a

Step 2 Penniman Lake Subsurface Sediment, Group 4a, Northwest - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Chromium[e]	6 / 6	4.5E+01	CAPL-SSD62-1012	2.9E+00	1E-06	2E-05	2.3E+03	1	0.02	No Observed Effects
Cumulative Corresponding Hazard Index[c]									**0.02**	
Cumulative Corresponding Cancer Risk[d]						**2E-05**				

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.10
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4b															
Penniman Lake	78-93-3	2-Butanone	4.4E-02	1.3E-01	MG/KG	CAPL-SD71-1012-V	6/8	0.030 - 0.091	1.3E-01	5.9E-01	2.7E+04 N	N/A		NO	BSL
Center	67-64-1	Acetone	1.4E-01 J	4.8E-01 J	MG/KG	CAPL-SD71-1012-V	6/8	0.059 - 0.159	4.8E-01	2.5E+00	6.1E+04 N	N/A		NO	BSL
	75-15-0	Carbon disulfide	1.4E-02 J	3.0E-02 J	MG/KG	CAPL-SD73-1012-V	3/8	0.015 - 0.091	3.0E-02	2.6E-02	7.7E+02 N	N/A		NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.9E-02 J	2.3E-02 J	MG/KG	CAPL-SD74-1012	3/8	0.017 - 3.0	2.3E-02	3.0E-02	1.5E+00 C	N/A		NO	BSL
	206-44-0	Fluoranthene	1.3E-02 J	3.5E-02 J	MG/KG	CAPL-SD74-1012	4/8	0.017 - 3.0	3.5E-02	2.4E-02	2.3E+03 N	N/A		NO	BSL
	85-01-8	Phenanthrene	1.6E-02 J	2.3E-02 J	MG/KG	CAPL-SD74-1012	2/8	0.017 - 3.0	2.3E-02	3.3E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	1.2E-02 J	3.2E-02 J	MG/KG	CAPL-SD74-1012	4/8	0.017 - 3.0	3.2E-02	3.5E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	1.5E-03 J	1.7E-03 J	MG/KG	CAPL-SD73-1012	2/8	0.002 - 0.030	1.7E-03	1.0E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	4.6E-03 J	4.7E-02 K	MG/KG	PL-00-POND-SD14-0300	7/8	0.002 - 0.030	4.7E-02	4.4E-02	1.6E+01 C	N/A		NO	BSL
	50-29-3	4,4'-DDT	4.2E-02 K	4.2E-02 K	MG/KG	PL-00-POND-SD14-0300	1/8	0.002 - 0.030	4.2E-02	1.5E-03	1.9E+01 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	2.0E-03 J	2.0E-03 J	MG/KG	CAPL-SD73-1012	1/8	0.002 - 0.015	2.0E-03	N/A	1.8E+01 C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	2.6E-02 J	1.0E+00	MG/KG	CAPL-SD33P-0711	21/24	0.042 - 0.30	1.0E+00	N/A	2.4E+00 C	N/A		NO	BSL
	60-57-1	Dieldrin	1.7E-03 J	2.9E-03 J	MG/KG	CAPL-SD72-1012	3/8	0.002 - 0.030	2.9E-03	9.5E-04	3.3E-01 C	N/A		NO	BSL
	33213-65-9	Endosulfan II	2.4E-02 J	2.4E-02 J	MG/KG	CAPL-SD75-1012	1/8	0.002 - 0.030	2.4E-02	N/A	3.7E+02 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	2.4E-03 J	2.4E-03 J	MG/KG	CAPL-SD71-1012	1/8	0.002 - 0.030	2.4E-03	N/A	3.7E+02 N	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	2.1E-03 J	4.0E-03 J	MG/KG	CAPL-SD72-1012	5/8	0.002 - 0.030	4.0E-03	N/A	1.8E+01 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	2.9E-03 J	1.7E-02 K	MG/KG	PL-00-POND-SD14-0300	5/8	0.002 - 0.030	1.7E-02	N/A	1.8E+01 N	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	3.0E-03 J	1.7E-02 J	MG/KG	CAPL-SD72-1012	6/8	0.002 - 0.015	1.7E-02	1.1E-03	1.8E+01 C	N/A		NO	BSL
	118-96-7	2,4,6-Trinitrotoluene	1.3E-01 J	1.3E-01 J	MG/KG	CAPL-SD69-1012	1/8	0.25 - 0.40	1.3E-01	N/A	3.6E+01 N	N/A		NO	BSL
	99-99-0	4-Nitrotoluene	1.0E-01 J	3.3E-01 J	MG/KG	CAPL-SD75-1012	2/8	0.25 - 0.40	3.3E-01	N/A	2.5E+02 N	N/A		NO	BSL
	55-63-0	Nitroglycerin	4.9E-01 J	1.3E+00	MG/KG	CAPL-SD73-1012 : CAPL-SD73P-1012	4/6	0.94 - 0.99	1.3E+00	N/A	6.2E+00 C	N/A		NO	BSL
	7429-90-5	Aluminum	6.6E+03	2.8E+04	MG/KG	CAPL-SD72-1012	8/8	107 - 430	2.8E+04	2.3E+04	7.7E+04 N	N/A		NO	BSL
	7440-38-2	Arsenic	6.5E+00 J	5.2E+01	MG/KG	CAPL-SD73-1012	8/8	5.34 - 21.5	5.2E+01	1.1E+02	6.7E+00 C	N/A		NO	BBK
	7440-39-3	Barium	2.1E+01 J	1.1E+02	MG/KG	CAPL-SD72-1012	8/8	21.4 - 290	1.1E+02	7.5E+01	1.5E+04 N	N/A		NO	BSL
	7440-41-7	Beryllium	9.5E-01 J	1.6E+00	MG/KG	PL-00-POND-SD13-0300 : PL-00-POND-SD14-0300	4/8	2.67 - 10.7	1.6E+00	1.4E+00	1.6E+02 N	N/A		NO	BSL
	7440-70-2	Calcium	3.6E+03	1.5E+05	MG/KG	PL-00-POND-SD14-0300	8/8	2670 - 10700	1.5E+05	N/A	N/A 0	N/A		NO	NUT
	7440-47-3	Chromium	1.6E+01	5.0E+01	MG/KG	CAPL-SD72-1012	8/8	5.34 - 21.5	5.0E+01	5.2E+01	2.9E+00 C	N/A		NO	BBK
	7440-48-4	Cobalt	4.6E+00	6.4E+00	MG/KG	PL-00-POND-SD13-0300	4/8	6.68 - 72	6.4E+00	9.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	4.3E+00 J	5.7E+01	MG/KG	CAPL-SD75-1012	8/8	5.34 - 36	5.7E+01	2.6E+01	3.1E+03 N	N/A		NO	BSL
	7439-89-6	Iron	1.5E+04	4.1E+04	MG/KG	CAPL-SD72-1012	8/8	53.4 - 215	4.1E+04	4.6E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	Lead	6.8E+00	8.2E+01	MG/KG	CAPL-SD73-1012	8/8	1.6 - 6.45	8.2E+01	4.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	1.1E+03 J	4.3E+03 J	MG/KG	CAPL-SD72-1012	8/8	2670 - 10700	4.3E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	5.8E+01	2.3E+02	MG/KG	PL-00-POND-SD13-0300	8/8	8.01 - 32.2	2.3E+02	3.7E+02	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	3.9E-02 J	2.8E-01	MG/KG	PL-00-POND-SD14-0300	8/8	0.087 - 0.29	2.8E-01	2.6E-01	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	3.4E+00 J	2.3E+01	MG/KG	PL-00-POND-SD14-0300	7/8	5.34 - 58	2.3E+01	1.7E+01	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	1.5E+03 J	3.6E+03 J	MG/KG	CAPL-SD72-1012	8/8	2670 - 10700	3.6E+03	N/A	N/A	N/A		NO	NUT
	7440-23-5	Sodium	2.1E+02	7.6E+02 J	MG/KG	CAPL-SD75-1012	3/8	2670 - 10700	7.6E+02	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	1.9E+01	7.0E+01	MG/KG	CAPL-SD72-1012	8/8	6.68 - 72	7.0E+01	6.3E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	2.4E+01	2.0E+02	MG/KG	PL-00-POND-SD13-0300	8/8	10.7 - 43	2.0E+02	1.1E+02	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan II and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram

Table 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4b															
Penniman Lake	78-93-3	2-Butanone	4.0E-02 J	9.3E-02	MG/KG	CAPL-SSD73-1012	6/6	0.018 - 0.075	9.3E-02	4.4E-02	2.7E+04 N	N/A		NO	BSL
Center	67-64-1	Acetone	1.3E-01 J	3.5E-01 J	MG/KG	CAPL-SSD73-1012	6/6	0.035 - 0.15	3.5E-01	1.6E-01	6.1E+04 N	N/A		NO	BSL
	75-15-0	Carbon disulfide	4.1E-03 J	1.3E-02 J	MG/KG	CAPL-SSD74-1012	4/6	0.009 - 0.04	1.3E-02	N/A	7.7E+02 N	N/A		NO	BSL
	205-99-2	Benzo(b)fluoranthene	2.1E-02 J	2.1E-02 J	MG/KG	CAPL-SSD74-1012	1/6	0.011 - 0.16	2.1E-02	1.8E-02	1.5E+00 C	N/A		NO	BSL
	206-44-0	Fluoranthene	5.4E-03 J	5.6E-02 J	MG/KG	CAPL-SSD75-1012	5/6	0.011 - 0.16	5.6E-02	2.1E-02	2.3E+03 N	N/A		NO	BSL
	85-01-8	Phenanthrene	2.2E-02 J	2.2E-02 J	MG/KG	CAPL-SSD74-1012	1/6	0.011 - 0.16	2.2E-02	1.7E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	3.8E-03 J	4.8E-02 J	MG/KG	CAPL-SSD75-1012	5/6	0.011 - 0.16	4.8E-02	2.2E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	4.3E-04 J	7.0E-03 J	MG/KG	CAPL-SSD73-1012	4/6	0.001 - 0.004	7.0E-03	1.8E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	1.5E-03 J	2.2E-02 J	MG/KG	CAPL-SSD73-1012	5/6	0.001 - 0.004	2.2E-02	9.0E-03	1.6E+01 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	4.9E-04 J	2.1E-03 J	MG/KG	CAPL-SSD73-1012	3/6	0.001 - 0.004	2.1E-03	N/A	1.8E+01 C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	3.7E-02 J	5.3E-02 J	MG/KG	CAPL-SSD73-1012	2/6	0.028 - 0.099	5.3E-02	N/A	2.4E+00 C	N/A		NO	BSL
	319-86-8	delta-BHC	1.1E-03 J	1.1E-03 J	MG/KG	CAPL-SSD73-1012	1/6	0.001 - 0.004	1.1E-03	2.9E-04	3.0E+00 C	N/A		NO	BSL
	60-57-1	Dieldrin	9.2E-04 J	3.0E-03 J	MG/KG	CAPL-SSD73-1012	4/6	0.001 - 0.004	3.0E-03	N/A	3.3E-01 C	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	3.7E-04 J	1.5E-03 J	MG/KG	CAPL-SSD73-1012	4/6	0.001 - 0.004	1.5E-03	N/A	3.7E+02 N	N/A		NO	BSL
	72-20-8	Endrin	8.6E-04 J	8.6E-04 J	MG/KG	CAPL-SSD69-1012	1/6	0.001 - 0.004	8.6E-04	6.4E-04	1.8E+01 N	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	8.1E-04 J	2.3E-03 J	MG/KG	CAPL-SSD71-1012	4/6	0.001 - 0.004	2.3E-03	N/A	1.8E+01 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	1.6E-03 L	3.0E-03 J	MG/KG	CAPL-SSD73-1012	3/6	0.001 - 0.004	3.0E-03	N/A	1.8E+01 N	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	1.1E-03 J	1.6E-02 J	MG/KG	CAPL-SSD72-1012	6/6	0.001 - 0.004	1.6E-02	N/A	1.8E+01 C	N/A		NO	BSL
	76-44-8	Heptachlor	9.6E-04 J	9.6E-04 J	MG/KG	CAPL-SSD75-1012	1/6	0.001 - 0.004	9.6E-04	N/A	1.2E+00 C	N/A		NO	BSL
	72-43-5	Methoxychlor	4.8E-04 J	4.8E-04 J	MG/KG	CAPL-SSD71-1012	1/6	0.001 - 0.004	4.8E-04	N/A	3.1E+02 N	N/A		NO	BSL
	99-99-0	4-Nitrotoluene	1.1E-01 J	1.1E-01 J	MG/KG	CAPL-SSD73-1012	1/6	0.37 - 0.39	1.1E-01	N/A	2.5E+02 N	N/A		NO	BSL
	55-63-0	Nitroglycerin	8.4E-01 J	1.2E+00	MG/KG	CAPL-SSD73-1012	3/6	0.94 - 0.99	1.2E+00	N/A	6.2E+00 N	N/A		NO	BSL
	7429-90-5	Aluminum	3.5E+03	2.9E+04	MG/KG	CAPL-SSD73-1012	6/6	17 - 297	2.9E+04	1.0E+04	7.7E+04 N	N/A		NO	BSL
	7440-38-2	Arsenic	5.9E+00	5.2E+01	MG/KG	CAPL-SSD73-1012	6/6	0.85 - 14.8	5.2E+01	5.7E+01	6.7E+00 C	N/A		NO	BBK
	7440-39-3	Barium	1.0E+01	1.0E+02	MG/KG	CAPL-SSD73-1012	6/6	3.4 - 59.4	1.0E+02	3.7E+01	1.5E+04 N	N/A		NO	BSL
	7440-41-7	Beryllium	2.2E-01 J	1.4E+00 J	MG/KG	CAPL-SSD73-1012	5/6	0.4 - 7.4	1.4E+00	6.0E-01	1.6E+02 N	N/A		NO	BSL
	7440-70-2	Calcium	2.1E+03	9.6E+04	MG/KG	CAPL-SSD71-1012	6/6	424 - 7420	9.6E+04	N/A	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**1.0E+01**	**5.4E+01**	**MG/KG**	**CAPL-SSD73-1012**	**6/6**	**0.8 - 14.8**	**5.4E+01**	**1.6E+01**	**2.9E+00 C**	**N/A**		**YES**	**ASL**
	7440-48-4	Cobalt	7.6E-01 J	7.3E+00 J	MG/KG	CAPL-SSD73-1012	5/6	1.1 - 18.5	7.3E+00	2.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	3.5E+00	6.0E+01	MG/KG	CAPL-SSD73-1012	6/6	0.8 - 14.8	6.0E+01	3.7E+00	3.1E+03 N	N/A		NO	BSL
	7439-89-6	Iron	9.0E+03	4.2E+04	MG/KG	CAPL-SSD73-1012	6/6	8.5 - 148	4.2E+04	1.1E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	Lead	4.9E+00	9.2E+01	MG/KG	CAPL-SSD73-1012	6/6	0.3 - 4.5	9.2E+01	1.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	7.7E+02 K	4.7E+03 J	MG/KG	CAPL-SSD73-1012	6/6	424 - 7420	4.7E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	2.5E+01	1.8E+02	MG/KG	CAPL-SSD73-1012	6/6	1.3 - 22.3	1.8E+02	2.9E+01	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	2.3E-02 J	1.3E-01 J	MG/KG	CAPL-SSD73-1012	5/6	0.1 - 0.2	1.3E-01	5.2E-02	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	9.9E+00	1.8E+01	MG/KG	CAPL-SSD73-1012	5/6	0.8 - 14.8	1.8E+01	5.6E+00	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	1.2E+03 K	3.5E+03 J	MG/KG	CAPL-SSD73-1012	6/6	424 - 7420	3.5E+03	N/A	N/A	N/A		NO	NUT
	7440-23-5	Sodium	1.1E+03 J	1.6E+03 J	MG/KG	CAPL-SSD73-1012	2/6	424 - 7420	1.6E+03	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	1.2E+01	6.7E+01	MG/KG	CAPL-SSD73-1012	6/6	1.1 - 18.5	6.7E+01	2.0E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	1.5E+01	1.9E+02	MG/KG	CAPL-SSD73-1012	6/6	1.7 - 29.7	1.9E+02	2.3E+01	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 1
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram

TABLE 2.119a

Step 2 Penniman Lake Subsurface Sediment, Group 4b, Center - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Chromium[e]	6 / 6	5.4E+01	CAPL-SSD73-1012	2.9E+00	1E-06	2E-05	2.3E+03	1	0.02	No Observed Effects
Cumulative Corresponding Hazard Index[c]									**0.02**	
Cumulative Corresponding Cancer Risk[d]						**2E-05**				

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.12
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4c															
Penniman Lake	78-93-3	2-Butanone	1.6E-02 J	9.1E-02	MG/KG	CAPL-SD82-1012	5/7	0.017 - 0.089	9.1E-02	5.9E-01	2.7E+04 N	N/A		NO	BSL
East	67-64-1	Acetone	4.7E-02	4.0E-01 J	MG/KG	CAPL-SD82-1012	6/7	0.03 - 0.13	4.0E-01	2.5E+00	6.1E+04 N	N/A		NO	BSL
	75-15-0	Carbon disulfide	9.2E-03 J	1.4E-02 L	MG/KG	CAPL-SD68-1012	3/7	0.0087 - 0.089	1.4E-02	2.6E-02	7.7E+02 N	N/A		NO	BSL
	91-57-6	2-Methylnaphthalene	2.6E-02 J	2.6E-02 J	MG/KG	CAPL-SD67-1012	1/9	0.015 - 2.9	2.6E-02	N/A	2.3E+02 N	N/A		NO	BSL
	208-96-8	Acenaphthylene	2.2E-02 J	2.2E-02 J	MG/KG	CAPL-SD67-1012	1/9	0.015 - 2.9	2.2E-02	N/A	3.5E+03 N	N/A		NO	BSL
	120-12-7	Anthracene	4.1E-02 J	4.1E-02 J	MG/KG	CAPL-SD67-1012	1/9	0.015 - 2.9	4.1E-02	N/A	1.7E+04 N	N/A		NO	BSL
	56-55-3	Benzo(a)anthracene	2.2E-01	2.2E-01	MG/KG	CAPL-SD67-1012	1/9	0.015 - 2.9	2.2E-01	1.8E-02	1.5E+00 C	N/A		NO	BSL
	50-32-8	**Benzo(a)pyrene**	**3.0E-01**	**3.0E-01**	**MG/KG**	**CAPL-SD67-1012**	**1/9**	**0.015 - 2.9**	**3.0E-01**	**N/A**	**1.5E-01 C**	**N/A**		**YES**	**ASL**
	205-99-2	Benzo(b)fluoranthene	1.3E-02 J	4.0E-01	MG/KG	CAPL-SD67-1012	3/9	0.015 - 2.9	4.0E-01	3.0E-02	1.5E+00 C	N/A		NO	BSL
	191-24-2	Benzo(g,h,i)perylene	2.1E-01	2.1E-01	MG/KG	CAPL-SD67-1012	1/9	0.015 - 2.9	2.1E-01	2.5E-02	1.7E+03 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	3.4E-01	3.4E-01	MG/KG	CAPL-SD67-1012	1/9	0.015 - 2.9	3.4E-01	N/A	1.5E+01 C	N/A		NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	3.3E+00 J	3.3E+00 J	MG/KG	CAA06-SD01-1008	1/9	0.48 - 9.69	3.3E+00	N/A	3.8E+02 C	N/A		NO	BSL
	218-01-9	Chrysene	1.0E-02 J	2.9E-01	MG/KG	CAPL-SD67-1012	2/9	0.015 - 2.9	2.9E-01	2.2E-02	1.5E+02 C	N/A		NO	BSL
	53-70-3	Dibenz(a,h)anthracene	7.4E-02	7.4E-02	MG/KG	CAPL-SD67-1012	1/9	0.015 - 2.9	7.4E-02	N/A	1.5E-01 C	N/A		NO	BSL
	117-84-0	Di-n-octylphthalate	2.5E+00 J	2.5E+00 J	MG/KG	CAA06-SD01-1008	1/9	0.48 - 9.69	2.5E+00	N/A	6.2E+02 N	N/A		NO	BSL
	206-44-0	Fluoranthene	1.6E-02	1.2E-01	MG/KG	CAPL-SD67-1012	4/9	0.015 - 2.9	1.2E-01	2.4E-02	2.3E+03 N	N/A		NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	2.4E-01	2.4E-01	MG/KG	CAPL-SD67-1012	1/9	0.015 - 2.9	2.4E-01	N/A	1.5E+00 C	N/A		NO	BSL
	85-01-8	Phenanthrene	1.3E-02 J	7.0E-02	MG/KG	CAPL-SD67-1012	3/9	0.015 - 2.9	7.0E-02	3.3E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	1.4E-02 J	1.1E-01	MG/KG	CAPL-SD67-1012	4/9	0.015 - 2.9	1.1E-01	3.5E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	4.7E-03 L	4.7E-03 L	MG/KG	CAPL-SD67-1012	1/7	0.0012 - 0.030	4.7E-03	1.0E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	1.2E-03 J	5.3E-02 K	MG/KG	PL-00-POND-SD16-0300	6/7	0.0012 - 0.030	5.3E-02	4.4E-02	1.6E+01 C	N/A		NO	BSL
	50-29-3	4,4'-DDT	7.6E-03 J	3.6E-02 K	MG/KG	PL-00-POND-SD16-0300	2/7	0.0012 - 0.030	3.6E-02	1.5E-03	1.9E+01 C	N/A		NO	BSL
	309-00-2	Aldrin	9.5E-04 L	9.5E-04 L	MG/KG	CAPL-SD67-1012	1/7	0.0012 - 0.015	9.5E-04	N/A	3.1E-01 C	N/A		NO	BSL
	319-84-6	alpha-BHC	4.3E-04 L	4.3E-04 L	MG/KG	CAPL-SD67-1012	1/7	0.0012 - 0.015	4.3E-04	8.1E-04	8.5E-01 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	1.0E-03 J	4.3E-03 L	MG/KG	CAPL-SD67-1012	2/7	0.0012 - 0.015	4.3E-03	N/A	1.8E+01 C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	2.3E-02 J	9.1E-01 L	MG/KG	CAPL-SD67-1012	16/19	0.026 - 0.303	9.1E-01	N/A	2.4E+00 C	N/A		NO	BSL
	60-57-1	Dieldrin	1.5E-03 J	4.6E-03 L	MG/KG	CAPL-SD67-1012	2/7	0.0012 - 0.030	4.6E-03	9.5E-04	3.3E-01 C	N/A		NO	BSL
	959-98-8	Endosulfan I	5.2E-04 L	5.2E-04 L	MG/KG	CAPL-SD67-1012	1/7	0.0012 - 0.015	5.2E-04	N/A	3.7E+02 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	1.1E-02 L	1.1E-02 L	MG/KG	CAPL-SD67-1012	1/7	0.0012 - 0.030	1.1E-02	N/A	3.7E+02 N	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	2.8E-03	3.1E-03 L	MG/KG	CAPL-SD67-1012	2/7	0.0012 - 0.030	3.1E-03	N/A	1.8E+01 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	2.0E-03 L	1.5E-02 K	MG/KG	PL-00-POND-SD16-0300	2/7	0.0012 - 0.030	1.5E-02	N/A	1.8E+01 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	2.5E-04 L	2.5E-04 L	MG/KG	CAPL-SD67-1012	1/7	0.0012 - 0.015	2.5E-04	2.9E-03	5.6E+00 C	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	7.4E-04 J	8.2E-03 L	MG/KG	CAPL-SD67-1012	4/7	0.0012 - 0.015	8.2E-03	1.1E-03	1.8E+01 C	N/A		NO	BSL
	76-44-8	Heptachlor	9.6E-04 J	9.6E-04 J	MG/KG	CAPL-SD65-1012	1/7	0.0012 - 0.015	9.6E-04	N/A	1.8E+01 C	N/A		NO	BSL
	1024-57-3	Heptachlor epoxide	9.3E-04 J	1.2E-03 L	MG/KG	CAPL-SD67-1012	2/7	0.0012 - 0.015	1.2E-03	N/A	5.9E-01 C	N/A		NO	BSL
	72-43-5	Methoxychlor	5.8E-04 J	1.0E-02 J	MG/KG	CAPL-SD67-1012	2/7	0.0012 - 0.152	1.0E-02	N/A	3.1E+02 N	N/A		NO	BSL
	19406-51-0	4-Amino-2,6-dinitrotoluene	1.1E-01	1.1E-01	MG/KG	CAA06-SD01P-1008	1/9	0.099 - 0.4	1.1E-01	N/A	1.5E+02 N	N/A		NO	BSL
	55-63-0	Nitroglycerin	6.4E-01 J	6.4E-01 J	MG/KG	CAPL-SD82-1012	1/6	0.95 - 2.5	6.4E-01	N/A	6.2E+00 N	N/A		NO	BSL

Table 2.12
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4c	7429-90-5	Aluminum	1.5E+03	2.7E+04	MG/KG	CAPL-SD68-1012	9/9	15 - 290	2.7E+04	2.3E+04	7.7E+04 N	N/A		NO	BSL
Penniman Lake	7440-36-0	Antimony	1.7E-01 L	1.7E-01 L	MG/KG	CAA06-SD01-1008	1/9	1.18 - 12	1.7E-01	1.7E+00	3.1E+01 N	N/A		NO	BSL
East	7440-38-2	Arsenic	1.2E+00 J	5.7E+01	MG/KG	CAPL-SD68-1012	9/9	0.74 - 14	5.7E+01	1.1E+02	6.7E+00 C	N/A		NO	BBK
(cont'd)	7440-39-3	Barium	4.1E+00 J	8.6E+01	MG/KG	PL-00-POND-SD15-0300	9/9	4.73 - 290	8.6E+01	7.5E+01	1.5E+04 N	N/A		NO	BSL
	7440-41-7	Beryllium	7.0E-02 J	1.9E+00	MG/KG	PL-00-POND-SD15-0300	9/9	0.37 - 7.2	1.9E+00	1.4E+00	1.6E+02 N	N/A		NO	BSL
	7440-43-9	Cadmium	2.4E-01 J	2.4E-01 J	MG/KG	CAPL-SD67-1012	1/9	0.37 - 4.86	2.4E-01	5.7E-01	7.0E+01 N	N/A		NO	BSL
	7440-70-2	Calcium	6.1E+02	1.3E+05	MG/KG	PL-00-POND-SD15-0300	9/9	370 - 7200	1.3E+05	N/A	N/A	N/A		NO	NUT
	7440-47-3	Chromium	2.9E+00 J	4.6E+01 K	MG/KG	CAPL-SD68-1012 : CAPL-SD81-1012	9/9	0.74 - 14	4.6E+01	5.2E+01	2.9E+00 C	N/A		NO	BBK
	7440-48-4	Cobalt	3.5E-01 J	8.7E+00 J	MG/KG	CAPL-SD81-1012	9/9	1.48 - 72	8.7E+00	9.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	4.6E+00	4.8E+01	MG/KG	CAPL-SD82-1012 : PL-00-POND-SD15-0300	7/9	1.18 - 36	4.8E+01	2.6E+01	3.1E+03 N	N/A		NO	BSL
	57-12-5	Cyanide	3.0E+00	3.0E+00	MG/KG	CAPL-SD65-1012	1/9	0.65 - 8	3.0E+00	N/A	2.1E+01 N	N/A		NO	BSL
	7439-89-6	Iron	1.8E+03 J	3.7E+04	MG/KG	CAPL-SD81-1012	9/9	7.4 - 140	3.7E+04	4.6E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	Lead	2.9E+00 J	6.4E+01	MG/KG	PL-00-POND-SD16-0300	9/9	0.355 - 4.3	6.4E+01	4.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	1.1E+02 J	4.3E+03 J	MG/KG	CAPL-SD81-1012	9/9	370 - 7200	4.3E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	1.5E+01	2.1E+02	MG/KG	PL-00-POND-SD16-0300	9/9	1.1 - 22	2.1E+02	3.7E+02	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	4.4E-02 J	2.0E-01	MG/KG	PL-00-POND-SD15-0300	7/9	0.068 - 0.36	2.0E-01	2.6E-01	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	8.8E-01 J	2.0E+01	MG/KG	PL-00-POND-SD16-0300	8/9	1.18 - 56	2.0E+01	1.7E+01	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	9.9E+01 J	3.4E+03 K	MG/KG	CAPL-SD68-1012	9/9	370 - 7200	3.4E+03	N/A	N/A	N/A		NO	NUT
	7440-23-5	Sodium	1.1E+01 J	1.3E+03 J	MG/KG	CAPL-SD68-1012	6/9	370 - 7200	1.3E+03	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	3.8E+00 J	6.8E+01	MG/KG	CAPL-SD68-1012	9/9	1.48 - 72	6.8E+01	6.3E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	6.9E+00	1.5E+02	MG/KG	PL-00-POND-SD16-0300	9/9	2.37 - 29	1.5E+02	1.1E+02	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for acenaphthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I and endosulfan II.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
C = Carcinogenic
L = Biased Low
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram

Table 2.12

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Below Background (BBK)															

TABLE 2.12a

Step 2 Penniman Lake Surface Sediment, Group 4c, East - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)pyrene	1 / 9	3.0E-01	CAPL-SD67-1012	1.5E-01	1E-06	2E-06	N/A		N/A	NA
Cumulative Corresponding Hazard Index[c]									**N/A**	
Cumulative Corresponding Cancer Risk[d]						**2E-06**				

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.13
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4c															
Penniman Lake	78-93-3	2-Butanone	1.3E-02	1.2E-01	MG/KG	CAPL-SSD82-1012	5/5	0.013 - 0.091	1.2E-01	4.4E-02	2.7E+04 N	N/A		NO	BSL
East	67-64-1	Acetone	4.7E-02 J	4.4E-01 J	MG/KG	CAPL-SSD82-1012	5/5	0.0259 - 0.182	4.4E-01	1.6E-01	6.1E+04 N	N/A		NO	BSL
	75-15-0	Carbon disulfide	6.0E-03 J	3.0E-02	MG/KG	CAPL-SSD81-1012	3/5	0.00646 - 0.0455	3.0E-02	N/A	7.7E+02 N	N/A		NO	BSL
	91-57-6	2-Methylnaphthalene	8.4E-03 J	8.4E-03 J	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	8.4E-03	3.3E-03	2.3E+02 N	N/A		NO	BSL
	83-32-9	Acenaphthene	8.6E-03 J	8.6E-03 J	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	8.6E-03	N/A	3.5E+03 N	N/A		NO	BSL
	120-12-7	Anthracene	2.5E-02	2.5E-02	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	2.5E-02	N/A	1.7E+04 N	N/A		NO	BSL
	56-55-3	Benzo(a)anthracene	2.3E-01	2.3E-01	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	2.3E-01	N/A	1.5E+00 C	N/A		NO	BSL
	50-32-8	**Benzo(a)pyrene**	**3.7E-01**	**3.7E-01**	**MG/KG**	**CAPL-SSD67-1012**	**1/7**	**0.011 - 0.68**	**3.7E-01**	**1.5E-02**	**1.5E-01 C**	**N/A**		**YES**	**ASL**
	205-99-2	Benzo(b)fluoranthene	3.9E-01	3.9E-01	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	3.9E-01	1.8E-02	1.5E+00 C	N/A		NO	BSL
	191-24-2	Benzo(g,h,i)perylene	2.5E-01	2.5E-01	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	2.5E-01	N/A	1.7E+03 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	4.7E-01	4.7E-01	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	4.7E-01	1.3E-02	1.5E+01 C	N/A		NO	BSL
	218-01-9	Chrysene	3.6E-01	3.6E-01	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	3.6E-01	2.0E-02	1.5E+02 C	N/A		NO	BSL
	53-70-3	Dibenz(a,h)anthracene	7.8E-02	7.8E-02	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	7.8E-02	N/A	1.5E-01 C	N/A		NO	BSL
	206-44-0	Fluoranthene	7.0E-03 J	2.0E-01	MG/KG	CAPL-SSD67-1012	5/7	0.011 - 0.68	2.0E-01	2.1E-02	2.3E+03 N	N/A		NO	BSL
	86-73-7	Fluorene	1.1E-02 J	1.1E-02 J	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	1.1E-02	3.2E-03	2.3E+03 N	N/A		NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	2.2E-01	2.2E-01	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	2.2E-01	N/A	1.5E+00 C	N/A		NO	BSL
	91-20-3	Naphthalene	8.6E-03 J	8.6E-03 J	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	8.6E-03	4.8E-03	3.8E+01 C	N/A		NO	BSL
	85-01-8	Phenanthrene	6.4E-02	6.4E-02	MG/KG	CAPL-SSD67-1012	1/7	0.011 - 0.68	6.4E-02	1.7E-02	1.7E+04 N	N/A		NO	BSL
	129-00-0	Pyrene	7.8E-03 J	2.3E-01	MG/KG	CAPL-SSD67-1012	3/7	0.011 - 0.68	2.3E-01	2.2E-02	1.7E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	2.2E-03 L	2.2E-03 L	MG/KG	CAPL-SSD67-1012	1/5	0.0011 - 0.0046	2.2E-03	1.8E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	3.4E-03 J	1.4E-02 L	MG/KG	CAPL-SSD67-1012	3/5	0.0011 - 0.0046	1.4E-02	9.0E-03	1.6E+01 C	N/A		NO	BSL
	50-29-3	4,4'-DDT	1.5E-03 J	1.5E-03 J	MG/KG	CAPL-SSD67-1012	1/5	0.0011 - 0.0046	1.5E-03	N/A	1.9E+01 C	N/A		NO	BSL
	309-00-2	Aldrin	5.3E-04 L	5.3E-04 L	MG/KG	CAPL-SSD67-1012	1/5	0.0011 - 0.0046	5.3E-04	9.1E-04	3.1E-01 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	4.6E-04 J	9.1E-04 L	MG/KG	CAPL-SSD67-1012	2/5	0.0011 - 0.0046	9.1E-04	N/A	1.8E+01 C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	3.7E-02 J	2.3E-01 L	MG/KG	CAPL-SSD67-1012	2/5	0.027 - 0.116	2.3E-01	N/A	2.4E+00 C	N/A		NO	BSL
	60-57-1	Dieldrin	1.1E-03 L	1.1E-03 L	MG/KG	CAPL-SSD67-1012	1/5	0.0011 - 0.0046	1.1E-03	N/A	3.3E-01 C	N/A		NO	BSL
	33213-65-9	Endosulfan II	6.0E-04 L	6.0E-04 L	MG/KG	CAPL-SSD67-1012	1/5	0.0011 - 0.0046	6.0E-04	N/A	3.7E+02 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	3.6E-04 L	1.7E-03 J	MG/KG	CAPL-SSD65-1012	2/5	0.0011 - 0.0046	1.7E-03	N/A	3.7E+02 N	N/A		NO	BSL
	72-20-8	Endrin	3.2E-03 L	3.2E-03 L	MG/KG	CAPL-SSD67-1012	1/5	0.0011 - 0.0046	3.2E-03	6.4E-04	1.8E+01 N	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	1.5E-03 J	3.7E-03 L	MG/KG	CAPL-SSD67-1012	2/5	0.0011 - 0.0046	3.7E-03	N/A	1.8E+01 N	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	1.6E-03 J	5.2E-03 L	MG/KG	CAPL-SSD67-1012	4/5	0.0011 - 0.0046	5.2E-03	N/A	1.8E+01 C	N/A		NO	BSL
	76-44-8	Heptachlor	5.4E-04 L	9.3E-04 J	MG/KG	CAPL-SSD65-1012	2/5	0.0011 - 0.0046	9.3E-04	N/A	1.8E+01 C	N/A		NO	BSL
	72-43-5	Methoxychlor	2.4E-03 J	2.4E-03 J	MG/KG	CAPL-SSD67-1012	1/5	0.0011 - 0.0046	2.4E-03	N/A	3.1E+02 N	N/A		NO	BSL
	118-96-7	2,4,6-Trinitrotoluene	1.5E-01	1.5E-01	MG/KG	CAA06-SSD02-1008	1/7	0.1 - 0.40	1.5E-01	N/A	3.6E+01 N	N/A		NO	BSL
	55-63-0	Nitroglycerin	9.7E-01 J	9.7E-01 J	MG/KG	CAPL-SSD82-1012	1/6	0.92 - 2.5	9.7E-01	N/A	6.2E+00 N	N/A		NO	BSL

Table 2.13
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 4c	7429-90-5	Aluminum	1.7E+03	3.5E+04	MG/KG	CAPL-SSD81-1012	7/7	16 - 217	3.5E+04	1.0E+04	7.7E+04 N	N/A		NO	BSL
Penniman Lake	7440-36-0	Antimony	1.8E-01 L	1.8E-01 L	MG/KG	CAA06-SSD01-1008	1/7	1.64 - 10.9	1.8E-01	N/A	3.1E+01 N	N/A		NO	BSL
East	7440-38-2	Arsenic	4.6E+00 J	4.6E+01	MG/KG	CAPL-SSD82-1012	7/7	0.81 - 10.9	4.6E+01	5.7E+01	6.7E+00 C	N/A		NO	BBK
(cont'd)	7440-39-3	Barium	8.3E+00 J	6.7E+01	MG/KG	CAPL-SSD82-1012	7/7	6.58 - 43.5	6.7E+01	3.7E+01	1.5E+04 N	N/A		NO	BSL
	7440-41-7	Beryllium	1.2E-01 J	1.6E+00 J	MG/KG	CAPL-SSD81-1012	5/7	0.4 - 5.43	1.6E+00	6.0E-01	1.6E+02 N	N/A		NO	BSL
	7440-70-2	Calcium	2.1E+03	8.5E+04	MG/KG	CAPL-SSD82-1012	7/7	400 - 5430	8.5E+04	N/A	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**2.9E+00 J**	**6.2E+01**	**MG/KG**	**CAPL-SSD81-1012**	**7/7**	**0.81 - 10.9**	**6.2E+01**	**1.6E+01**	**2.9E+00 C**	**N/A**		**YES**	**ASL**
	7440-48-4	Cobalt	4.9E-01 J	1.3E+01	MG/KG	CAPL-SSD81-1012	6/7	2.06 - 13.6	1.3E+01	2.5E+00	2.3E+01 N	N/A		NO	BSL
	7440-50-8	Copper	2.7E+00	4.3E+01	MG/KG	CAPL-SSD82-1012	7/7	1.64 - 10.9	4.3E+01	3.7E+00	3.1E+03 N	N/A		NO	BSL
	7439-89-6	Iron	3.6E+03 J	5.1E+04	MG/KG	CAPL-SSD81-1012	7/7	8.1 - 109	5.1E+04	1.1E+04	5.5E+04 N	N/A		NO	BSL
	7439-92-1	Lead	6.4E+00 J	4.2E+01	MG/KG	CAPL-SSD82-1012	7/7	0.49 - 3.26	4.2E+01	1.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	1.7E+02 J	6.6E+03	MG/KG	CAPL-SSD81-1012	7/7	400 - 5430	6.6E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	3.1E+01	3.2E+02	MG/KG	CAPL-SSD81-1012	7/7	1.2 - 16.3	3.2E+02	2.9E+01	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	4.8E-02 J	9.6E-02 J	MG/KG	CAPL-SSD82-1012	5/7	0.05 - 0.22	9.6E-02	5.2E-02	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	1.3E+00 J	2.6E+01	MG/KG	CAPL-SSD81-1012	7/7	1.64 - 10.9	2.6E+01	5.6E+00	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	1.4E+02 J	4.4E+03	MG/KG	CAPL-SSD81-1012	7/7	400 - 5430	4.4E+03	N/A	N/A	N/A		NO	NUT
	7440-23-5	Sodium	2.9E+01 J	1.9E+03 J	MG/KG	CAPL-SSD68-1012	3/7	400 - 5430	1.9E+03	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	4.4E+00 J	7.7E+01	MG/KG	CAPL-SSD81-1012	7/7	2.06 - 13.6	7.7E+01	2.0E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	1.0E+01	1.0E+02	MG/KG	CAPL-SSD82-1012	7/7	3.29 - 21.7	1.0E+02	2.3E+01	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan II and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde.

[5] Rationale Codes

Selection Reason:	Above Screening Levels (ASL)
Deletion Reason:	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)
	Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram

TABLE 2.13b

Step 2 Penniman Lake Subsurface Sediment, Group 4c, East - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)pyrene	1 / 7	3.7E-01	CAPL-SSD67-1012	1.5E-01	1E-06	2E-06	N/A	N/A	N/A	NA
Chromium[e]	7 / 7	6.2E+01	CAPL-SSD81-1012	2.9E+00	1E-06	2E-05	2.3E+03	1	0.03	No Observed Effects
Cumulative Corresponding Hazard Index[c]									**0.03**	
Cumulative Corresponding Cancer Risk[d]						**2E-05**				

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 5															
Kings Creek	78-93-3	2-Butanone	5.9E-03 J	5.9E-03 J	MG/KG	CAPL-SD83-1012-V	1/1	0.015 - 0.015	5.9E-03	5.9E-01	2.7E+04 N	N/A		NO	BSL
	67-64-1	Acetone	2.3E-02 J	2.3E-02 J	MG/KG	CAPL-SD83-1012-V	1/1	0.0305 - 0.0305	2.3E-02	2.5E+00	6.1E+04 N	N/A		NO	BSL
	75-15-0	Carbon disulfide	2.3E-03 J	2.3E-03 J	MG/KG	CAPL-SD83-1012-V	1/1	0.00763 - 0.00763	2.3E-03	2.6E-02	7.7E+02 N	N/A		NO	BSL
	108-88-3	Toluene	6.9E-03 J	6.9E-03 J	MG/KG	CAPL-SD83-1012-V	1/1	0.00763 - 0.00763	6.9E-03	N/A	4.9E+03 N	N/A		NO	BSL
	72-54-8	4,4'-DDD	2.9E-03 L	2.9E-03 L	MG/KG	CAPL-SD83-1012	1/1	0.00137 - 0.00137	2.9E-03	1.0E-02	2.2E+01 C	N/A		NO	BSL
	72-55-9	4,4'-DDE	2.2E-03 L	2.2E-03 L	MG/KG	CAPL-SD83-1012	1/1	0.00137 - 0.00137	2.2E-03	4.4E-02	1.6E+01 C	N/A		NO	BSL
	309-00-2	Aldrin	4.7E-04 L	4.7E-04 L	MG/KG	CAPL-SD83-1012	1/1	0.00137 - 0.00137	4.7E-04	N/A	3.1E-01 C	N/A		NO	BSL
	319-84-6	alpha-BHC	4.9E-04 L	4.9E-04 L	MG/KG	CAPL-SD83-1012	1/1	0.00137 - 0.00137	4.9E-04	8.1E-04	8.5E-01 C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	2.9E-02 L	2.9E-02 L	MG/KG	CAPL-SD83-1012	1/1	0.0347 - 0.0347	2.9E-02	N/A	2.4E+00 C	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	7.3E-04 L	7.3E-04 L	MG/KG	CAPL-SD83-1012	1/1	0.00137 - 0.00137	7.3E-04	N/A	1.8E+01 N	N/A		NO	BSL
	76-44-8	Heptachlor	1.3E-03 L	1.3E-03 L	MG/KG	CAPL-SD83-1012	1/1	0.00137 - 0.00137	1.3E-03	N/A	1.8E+01 C	N/A		NO	BSL
	1024-57-3	Heptachlor epoxide	3.4E-04 L	3.4E-04 L	MG/KG	CAPL-SD83-1012	1/1	0.00137 - 0.00137	3.4E-04	N/A	5.9E-01 C	N/A		NO	BSL
	72-43-5	Methoxychlor	3.0E-04 J	3.0E-04 J	MG/KG	CAPL-SD83-1012	1/1	0.00137 - 0.00137	3.0E-04	N/A	3.1E+02 N	N/A		NO	BSL
	7429-90-5	Aluminum	1.3E+04	1.3E+04	MG/KG	CAPL-SD83-1012	1/1	110 - 110	1.3E+04	2.3E+04	7.7E+04 N	N/A		NO	BSL
	7440-38-2	Arsenic	3.0E+01	3.0E+01	MG/KG	CAPL-SD83-1012	1/1	5.52 - 5.52	3.0E+01	1.1E+02	6.7E+00 C	N/A		NO	BBK
	7440-39-3	Barium	2.2E+01 J	2.2E+01 J	MG/KG	CAPL-SD83-1012	1/1	22.1 - 22.1	2.2E+01	7.5E+01	1.5E+04 N	N/A		NO	BSL
	7440-41-7	Beryllium	8.6E-01 J	8.6E-01 J	MG/KG	CAPL-SD83-1012	1/1	2.76 - 2.76	8.6E-01	1.4E+00	1.6E+02 N	N/A		NO	BSL
	7440-70-2	Calcium	2.1E+03 J	2.1E+03 J	MG/KG	CAPL-SD83-1012	1/1	2760 - 2760	2.1E+03	N/A	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**5.6E+01**	**5.6E+01**	**MG/KG**	**CAPL-SD83-1012**	**1/1**	**5.52 - 5.52**	**5.6E+01**	**5.2E+01**	**2.9E+00 C**	**N/A**		**YES**	**ASL**
	7440-50-8	Copper	1.4E+01	1.4E+01	MG/KG	CAPL-SD83-1012	1/1	5.52 - 5.52	1.4E+01	2.6E+01	3.1E+03 N	N/A		NO	BSL
	7439-89-6	Iron	6.8E+04	6.8E+04	MG/KG	CAPL-SD83-1012	1/1	55.2 - 55.2	6.8E+04	4.6E+04	5.5E+04 N	N/A		NO	BBK
	7439-92-1	Lead	2.4E+01	2.4E+01	MG/KG	CAPL-SD83-1012	1/1	1.66 - 1.66	2.4E+01	4.2E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	3.1E+03	3.1E+03	MG/KG	CAPL-SD83-1012	1/1	2760 - 2760	3.1E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	9.9E+01	9.9E+01	MG/KG	CAPL-SD83-1012	1/1	8.28 - 8.28	9.9E+01	3.7E+02	1.8E+03 N	N/A		NO	BSL
	7439-97-6	Mercury	3.4E-02 J	3.4E-02 J	MG/KG	CAPL-SD83-1012	1/1	0.0691 - 0.0691	3.4E-02	2.6E-01	9.4E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	6.3E+00	6.3E+00	MG/KG	CAPL-SD83-1012	1/1	5.52 - 5.52	6.3E+00	1.7E+01	1.5E+03 N	N/A		NO	BSL
	7440-09-7	Potassium	2.0E+03 J	2.0E+03 J	MG/KG	CAPL-SD83-1012	1/1	2760 - 2760	2.0E+03	N/A	N/A	N/A		NO	NUT
	7440-23-5	Sodium	5.0E+03	5.0E+03	MG/KG	CAPL-SD83-1012	1/1	2760 - 2760	5.0E+03	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	1.7E+02	1.7E+02	MG/KG	CAPL-SD83-1012	1/1	6.9 - 6.9	1.7E+02	6.3E+01	3.9E+02 N	N/A		NO	BSL
	7440-66-6	Zinc	1.1E+02	1.1E+02	MG/KG	CAPL-SD83-1012	1/1	11 - 11	1.1E+02	1.1E+02	2.3E+04 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL from Table D-1, Background Data and Upper Tolerance Limits (UTLs) for Physical Media.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Residential soil RSL x 10. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endrin used as surrogate for endrin aldehyde.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = Milligram per kilogram

TABLE 2.14a

Step 2 Penniman Lake Surface Sediment, Group 5, Kings Creek- Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL x 10 (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Chromium[e]	1 / 1	5.6E+01	CAPL-SD83-1012	2.9E+00	1E-06	2E-05	2.3E+03	1	0.02	No Observed Effects
Cumulative Corresponding Hazard Index[c]									**0.02**	
Cumulative Corresponding Cancer Risk[d]						**2E-05**				

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.15
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Fish Fillet	72-54-8	4,4'-DDD	1.1E-03 J	1.7E-03 J	MG/KG	CAPL-TS17-F-1012	2/3	0.0018 - 0.002	1.7E-03	ND	1.7E-02 C	N/A		NO	BSL
	72-55-9	**4,4'-DDE**	**2.3E-03 J**	**1.4E-02**	**MG/KG**	**CAPL-TS17-F-1012**	**3/3**	**0.0018 - 0.002**	**1.4E-02**	**4.6E-03**	**1.2E-02 C**	**N/A**		**YES**	**ASL**
	50-29-3	4,4'-DDT	1.5E-03 J	3.9E-03 J	MG/KG	CAPL-TS17-F-1012	2/3	0.0018 - 0.002	3.9E-03	ND	1.2E-02 C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	1.5E-03 J	3.4E-03 J	MG/KG	CAPL-TS16-F-1012	3/3	0.0018 - 0.002	3.4E-03	1.5E-03	1.2E-01 C	N/A		NO	BSL
	11096-82-5	**Aroclor-1260**	**8.5E-02**	**3.7E-01**	**MG/KG**	**CAPL-TS17-F-1012**	**3/3**	**N/A**	**3.7E-01**	**2.5E-02**	**2.1E-03 C**	**N/A**		**YES**	**ASL**
	319-85-7	beta-BHC	1.5E-03 J	2.2E-03 J	MG/KG	CAPL-TS16-F-1012	3/3	0.002 - 0.002	2.2E-03	2.9E-03	2.3E-03 C	N/A		NO	BBK
	319-86-8	delta-BHC	1.5E-03 J	1.5E-03 J	MG/KG	CAPL-TS17-F-1012	1/3	0.0018 - 0.002	1.5E-03	ND	2.3E-03 C	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	1.5E-03 J	9.0E-03 J	MG/KG	CAPL-TS17-F-1012	3/3	0.0018 - 0.002	9.0E-03	ND	9.3E-01 N	N/A		NO	BSL
	72-20-8	Endrin	7.3E-04 J	1.0E-03 J	MG/KG	CAPL-TS17-F-1012	3/3	0.0018 - 0.002	1.0E-03	ND	4.6E-02 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	9.4E-04 J	1.2E-03 J	MG/KG	CAPL-TS17-F-1012	3/3	0.0018 - 0.002	1.2E-03	ND	2.9E-03 C	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	3.3E-03	6.1E-03	MG/KG	CAPL-TS17-F-1012	2/3	0.0018 - 0.0018	6.1E-03	ND	1.2E-02 C	N/A		NO	BSL
		Total PCB dioxin TEQ Concentration	**5.4E-08**	**1.5E-07**	**MG/KG**	**CAPL-TS17-F-1012**	**3/3**	**N/A**	**1.5E-07**	**8.8E-09**	**3.2E-08 C**	**N/A**		**YES**	**ASL**
	7440-38-2	**Arsenic**	**6.4E-02 J**	**6.4E-02 J**	**MG/KG**	**CAPL-TS16-F-1012**	**1/3**	**0.19 - 0.19**	**6.4E-02**	**ND**	**2.8E-03 C**	**N/A**		**YES**	**ASL**
	7439-97-6	Mercury	9.2E-02	1.2E-01	MG/KG	CAPL-TS17-F-1012	3/3	0.026 - 0.03	1.2E-01	1.3E-01	1.5E-02 N	N/A		NO	BBK
	7782-49-2	Selenium	1.1E-01	1.3E-01	MG/KG	CAPL-TS17-F-1012	2/3	0.093 - 0.097	1.3E-01	4.8E-02	7.7E-01 N	N/A		NO	BSL
	7440-66-6	Zinc	6.3E+00	6.6E+00	MG/KG	CAPL-TS17-F-1012	3/3	N/A	6.6E+00	5.0E+00	4.6E+01 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Background values are lower of detected concentration from two reference fish tissue samples (CAREFPL-TS10-F-1012 and CAREFPL-TS11-F-1012) from Penniman Lake.
[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Fish tissue RSL. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for chlordane used as surrogate for alpha-chlordane and gamma-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for methyl mercury used for mercury.
RSL value for endosulfan used as surrogate for endosulfan sulfate.
[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
ND = Not detected
N/A = Not available
MG/KG = Milligram per kilogram

Table 2.15a
PCB Concentration Calculations, Fish Tissue
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

StationID		CAPL-TS16		CAPL-TS17		CAPL-TS18	
SampleID		CAPL-TS16-F-1012		CAPL-TS17-F-1012		CAPL-TS18-F-1012	
SampleDate		10/10/2012		10/10/2012		10/10/2012	
AnalyteName	TEF	Concentration (pg/g)	TEQ Concentration (pg/g)	Concentration (pg/g)	TEQ Concentration (pg/g)	Concentration (pg/g)	TEQ Concentration (pg/g)
PCBCONG(PG/G)							
3,3',4,4'-Tetrachlorobiphenyl (77)	0.0001	**12.3 J**	**0.00123**	**26.6**	**0.00266**	**20.2**	**0.00202**
3,4,4',5-Tetrachlorobiphenyl (81)	0.0003	14.1 U	0.00423	18.5 U	0.00555	12.7 U	0.00381
2,3,3',4,4'-Pentachlorobiphenyl (105)	0.00003	**152**	**0.00456**	**385**	**0.01155**	**269**	**0.00807**
2,3,4,4',5-Pentachlorobiphenyl (114)	0.00003	14.1 U	0.000423	46 U	0.00138	22.1 U	0.000663
2,3',4,4',5-Pentachlorobiphenyl (118)	0.00003	**800**	**0.024**	**1850**	**0.0555**	**1270**	**0.0381**
2,3',4,4',5'-Pentachlorobiphenyl (123)	0.00003	**7.76 J**	**0.0002328**	48.3 U	0.001449	**26.7 J**	**0.000801**
3,3',4,4',5-Pentachlorobiphenyl (126)	0.1	14.1 U	1.41	49.5 U	4.95	24.8 U	2.48
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	0.00003	**268**	**0.00804**	**807**	**0.02421**	**538**	**0.01614**
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	0.03	23.4 U	0.702	18.8 U	0.564	12.7 U	0.381
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	0.00003	**100**	**0.003**	**418**	**0.01254**	**258**	**0.00774**
Decachlorobiphenyl (209)	N/A	10.1 B	N/A	52.1 B	N/A	29.2 B	N/A
Congeners (156/157)	0.00003	**440**	**0.0132**	**1400**	**0.042**	**905**	**0.02715**
Dioxin TEQ Concentration - detects			**0.054**		**0.15**		**0.10**
Dioxin TEQ Concentration - including non-detects			**2.171**		**5.671**		**2.965**

pg/g = picograms per gram
TEF = toxicity equivalent factor
TEQ = toxicity equivalent

TABLE 2.15b
Step 2 Fish Fillet - Risk Ratio, Maximum Detected Concentration
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (mg/kg)	Sample Location of Maximum Detected Concentration	Carcinogenic Fish Tissue RSL (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Fish Tissue RSL (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
4,4'-DDE	3 / 3	1.4E-02	CAPL-TS17-F-1012	1.2E-02	1E-06	1E-06	N/A		N/A	N/A
Aroclor-1260	3 / 3	3.7E-01	CAPL-TS17-F-1012	2.1E-03	1E-06	2E-04	N/A		N/A	N/A
Total PCB dioxin TEQ Concentration	3 / 3	1.5E-07	CAPL-TS17-F-1012	3.2E-08	1E-06	5E-06	9.5E-07	1	0.2	Sperm
Arsenic	3 / 3	6.4E-02 J	CAPL-TS16-F-1012	2.8E-03	1E-06	2E-05	4.1E-01	1	0.2	Skin, Blood
Cumulative Corresponding Hazard Index[c]									**0.3**	
Cumulative Corresponding Cancer Risk[d]						**2E-04**				

Total Sperm HI =	0.2
Total Skin HI =	0.2
Total Blood HI =	0.2

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

J = Estimated Value

mg/kg = milligrams per kilogram

N/A = Not available/not applicable

Table 2.16
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 1 Drainages	78-93-3	2-Butanone	3.1E-03 J	1.5E-02 J	MG/KG	CAPL-SS48-1012	3/12	0.011 - 0.031	1.5E-02	N/A	2.8E+03 N	1.2E-01	SSL	NO	BSL
	67-64-1	Acetone	7.8E-03 J	1.9E-01 L	MG/KG	CAPL-SS48-1012	7/12	0.0214 - 0.0614	1.9E-01	N/A	6.1E+03 N	2.9E-01	SSL	NO	BSL
	79-20-9	Methyl acetate	2.4E-02	2.4E-02	MG/KG	CAPL-SS59-1012	1/12	0.0107 - 0.0307	2.4E-02	N/A	7.8E+03 N	4.1E-01	SSL	NO	BSL
	100-42-5	Styrene	3.8E-02	3.8E-02	MG/KG	CAPL-SS44-1012	1/12	0.00535 - 0.0154	3.8E-02	N/A	6.0E+02 N	1.3E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	4.8E-03 J	9.1E-02	MG/KG	CAPL-SS49P-1012	7/12	0.00723 - 0.0851	9.1E-02	N/A	2.3E+01 N	1.9E-02	SSL	NO	BSL
	208-96-8	Acenaphthylene	1.5E-02	1.5E-02	MG/KG	CAPL-SS49P-1012	1/12	0.00723 - 0.0851	1.5E-02	N/A	3.5E+02 N	N/A		NO	BSL
	56-55-3	Benzo(a)anthracene	4.2E-03 J	9.2E-02	MG/KG	CAPL-SS50-1012	8/12	0.00723 - 0.0851	9.2E-02	N/A	1.5E-01 C	1.2E-02	SSL	NO	BSL
	50-32-8	**Benzo(a)pyrene**	**5.6E-03 J**	**1.2E-01**	**MG/KG**	**CAPL-SS46-1012**	**8/12**	**0.00723 - 0.0851**	**1.2E-01**	**N/A**	**1.5E-02 C**	**4.0E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**4.3E-03 J**	**2.0E-01**	**MG/KG**	**CAPL-SS46-1012**	**11/12**	**0.00723 - 0.0851**	**2.0E-01**	**N/A**	**1.5E-01 C**	**4.1E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	4.0E-03 J	1.3E-01	MG/KG	CAPL-SS46-1012	8/12	0.00723 - 0.0851	1.3E-01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	7.6E-03 J	1.4E-01	MG/KG	CAPL-SS46-1012	8/12	0.00723 - 0.0851	1.4E-01	N/A	1.5E+00 C	4.0E-01	SSL	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.9E-01 J	1.9E-01 J	MG/KG	CAPL-SS59-1012	1/12	0.0451 - 2.12	1.9E-01	N/A	3.8E+01 C	1.3E+00	SSL	NO	BSL
	218-01-9	Chrysene	4.8E-03 J	2.1E-01 K	MG/KG	CAPL-SS50-1012	9/12	0.00723 - 0.0851	2.1E-01	N/A	1.5E+01 C	1.2E+00	SSL	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	2.0E-03 J	9.6E-03 K	MG/KG	CAPL-SS49-1012	2/12	0.00723 - 0.0851	9.6E-03	N/A	1.5E-02 C	1.3E-02	SSL	NO	BSL
	206-44-0	Fluoranthene	3.6E-03 J	3.0E-01	MG/KG	CAPL-SS50-1012	11/12	0.00723 - 0.0851	3.0E-01	N/A	2.3E+02 N	8.9E+00	SSL	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	4.9E-03 J	1.1E-01	MG/KG	CAPL-SS46-1012	10/12	0.00723 - 0.0851	1.1E-01	N/A	1.5E-01 C	2.4E-01	SSL	NO	BSL
	91-20-3	Naphthalene	1.4E-02	6.2E-02 J	MG/KG	CAPL-SS46-1012	4/12	0.00723 - 0.0851	6.2E-02	N/A	3.8E+00 C	5.4E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	4.3E-03 J	1.4E-01	MG/KG	CAPL-SS47-1012	8/12	0.00723 - 0.0851	1.4E-01	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	3.3E-03 J	2.6E-01 K	MG/KG	CAPL-SS50-1012	11/12	0.00723 - 0.0851	2.6E-01	N/A	1.7E+02 N	1.3E+00	SSL	NO	BSL
	72-54-8	4,4'-DDD	4.0E-04 J	7.9E-02 J	MG/KG	CAPL-SS49P-1012	11/12	0.000701 - 0.00106	7.9E-02	N/A	2.2E+00 C	7.2E-03	SSL	NO	BSL
	72-55-9	4,4'-DDE	3.2E-04 L	2.9E-01 K	MG/KG	CAPL-SS50-1012	12/12	0.000701 - 0.0417	2.9E-01	N/A	1.6E+00 C	5.4E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	2.6E-04 J	2.1E-01 J	MG/KG	CAPL-SS48-1012	12/12	0.000701 - 0.0417	2.1E-01	N/A	1.9E+00 C	7.7E-02	SSL	NO	BSL
	309-00-2	Aldrin	4.0E-04 J	2.6E-03 L	MG/KG	CAPL-SS58-1012	2/12	0.000701 - 0.00106	2.6E-03	N/A	3.1E-02 C	7.5E-04	SSL	NO	BSL
	319-84-6	alpha-BHC	2.1E-04 J	1.1E-03 J	MG/KG	CAPL-SS59P-1012	5/12	0.000701 - 0.00106	1.1E-03	N/A	8.5E-02 c	4.1E-05	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	6.1E-04 J	8.5E-03 J	MG/KG	CAPL-SS46-1012	6/12	0.000701 - 0.00106	8.5E-03	N/A	1.8E+00 C	1.5E-02	SSL	NO	BSL
	11096-82-5	**Aroclor-1260**	**1.4E-02 L**	**6.3E+01**	**MG/KG**	**CAPL-SS09-0811**	**33/37**	**0.0178 - 4.7**	**6.3E+01**	**N/A**	2.4E-01 C	**2.7E-02**	**SSL**	**YES**	**ASL**
	319-85-7	beta-BHC	2.1E-04 J	2.1E-04 J	MG/KG	CAPL-SS48-1012	1/12	0.000701 - 0.00106	2.1E-04	N/A	3.0E-01 C	1.4E-04	SSL	NO	BSL
	319-86-8	delta-BHC	2.1E-04 J	9.1E-04 J	MG/KG	CAPL-SS59P-1012	4/12	0.000701 - 0.00106	9.1E-04	N/A	3.0E-01 C	1.4E-04	SSL	NO	BSL
	60-57-1	**Dieldrin**	**5.7E-04 J**	**2.5E-01 J**	**MG/KG**	**CAPL-SS46-1012**	**8/12**	**0.000701 - 0.0203**	**2.5E-01**	**N/A**	**3.3E-02 C**	**6.9E-05**	**SSL**	**YES**	**ASL**
	959-98-8	Endosulfan I	2.8E-04 J	1.1E-03 L	MG/KG	CAPL-SS48-1012	3/12	0.000701 - 0.00106	1.1E-03	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	33213-65-9	Endosulfan II	1.2E-03 J	4.3E-02 J	MG/KG	CAPL-SS46-1012	7/12	0.000701 - 0.00106	4.3E-02	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	1031-07-8	Endosulfan sulfate	4.0E-04 L	6.9E-01 J	MG/KG	CAPL-SS46-1012	9/12	0.000701 - 0.0203	6.9E-01	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	72-20-8	Endrin	2.8E-04 J	7.8E-02 J	MG/KG	CAPL-SS46-1012	7/12	0.000701 - 0.00106	7.8E-02	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	7.5E-04 J	2.3E-02 J	MG/KG	CAPL-SS46-1012	6/12	0.000701 - 0.00106	2.3E-02	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	53494-70-5	Endrin ketone	2.7E-04 J	8.3E-02 J	MG/KG	CAPL-SS47-1012	8/12	0.000701 - 0.00106	8.3E-02	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	58-89-9	gamma-BHC (Lindane)	1.4E-04 J	1.8E-03 J	MG/KG	CAPL-SS59P-1012	5/12	0.000701 - 0.00106	1.8E-03	N/A	5.6E-01 C	2.4E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	1.3E-03 J	1.6E-02 J	MG/KG	CAPL-SS47-1012	11/12	0.000701 - 0.00106	1.6E-02	N/A	1.8E+00 C	N/A	SSL	NO	BSL
	76-44-8	Heptachlor	1.2E-03 J	3.5E-03 J	MG/KG	CAPL-SS58-1012	2/12	0.000701 - 0.00106	3.5E-03	N/A	1.2E-01 C	1.6E-04	SSL	NO	BSL
	1024-57-3	Heptachlor epoxide	1.6E-04 J	5.3E-04 J	MG/KG	CAPL-SS48-1012	6/12	0.000701 - 0.00106	5.3E-04	N/A	5.9E-02 C	7.8E-05	SSL	NO	BSL
	72-43-5	Methoxychlor	2.0E-04 L	7.5E-02 J	MG/KG	CAPL-SS46-1012	12/12	0.000701 - 0.00106	7.5E-02	N/A	3.1E+01 N	2.0E-01	SSL	NO	BSL
	55-63-0	**Nitroglycerin**	**8.7E-01 J**	**8.7E-01 J**	**MG/KG**	**CAPL-SS58-1012**	**1/12**	**0.781 - 1**	**8.7E-01**	**N/A**	**6.2E-01 N**	**8.5E-05**	**SSL**	**YES**	**ASL**

Table 2.16
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 1 Drainages (cont'd)	**7429-90-5**	**Aluminum**	**2.1E+03**	**2.5E+04**	**MG/KG**	**CAPL-SS45-1012**	**12/12**	**22.5 - 67.5**	**2.5E+04**	**1.2E+04**	**7.7E+03 N**	**3.0E+03**	**SSL**	**YES**	**ASL**
	7440-36-0	Antimony	1.1E+00 J	1.1E+00 J	MG/KG	CAPL-SS56-1012	1/12	1.13 - 3.38	1.1E+00	1.1E+01	3.1E+00 N	3.5E-02	SSL	NO	BSL
	7440-38-2	**Arsenic**	**1.1E+00 J**	**7.0E+00**	**MG/KG**	**CAPL-SS45-1012**	**12/12**	**1.13 - 3.38**	**7.0E+00**	**6.4E+00**	**6.7E-01 C**	**1.5E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.4E+01	8.5E+01	MG/KG	CAPL-SS47-1012	12/12	4.5 - 13.5	8.5E+01	5.3E+01	1.5E+03 N	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.7E-01 J	1.6E+00	MG/KG	CAPL-SS45-1012	10/12	0.563 - 1.69	1.6E+00	5.9E-01	1.6E+01 N	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	2.1E-01 J	2.3E+00	MG/KG	CAPL-SS47-1012	7/12	0.563 - 1.69	2.3E+00	1.5E+00	7.0E+00 N	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	3.7E+02 J	9.7E+03 J	MG/KG	CAPL-SS49-1012	12/12	563 - 1690	9.7E+03	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**3.5E+00**	**4.6E+01**	**MG/KG**	**CAPL-SS45P-1012**	**12/12**	**1.13 - 3.38**	**4.6E+01**	**1.8E+01**	**3.0E-01 C**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	Cobalt	8.6E-01 J	5.0E+00	MG/KG	CAPL-SS45-1012	11/12	1.41 - 4.22	5.0E+00	9.9E+00	2.3E+00 N	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	2.0E+00	3.9E+01	MG/KG	CAPL-SS47-1012	12/12	1.13 - 3.38	3.9E+01	4.3E+00	3.1E+02 N	2.8E+00	SSL	NO	BSL
	7439-89-6	**Iron**	**2.3E+03**	**4.8E+04**	**MG/KG**	**CAPL-SS45-1012**	**12/12**	**11.3 - 33.8**	**4.8E+04**	**2.0E+04**	**5.5E+03 N**	**3.5E+01**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	9.1E+00	2.1E+02	MG/KG	CAPL-SS47-1012	12/12	0.338 - 1.01	2.1E+02	1.7E+01	4.0E+02 NL	N/A	SSL	NO	BSL
	7439-95-4	Magnesium	2.3E+02 J	3.1E+03	MG/KG	CAPL-SS47-1012	12/12	563 - 1690	3.1E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	Manganese	7.5E+00	3.1E+02	MG/KG	CAPL-SS47-1012	12/12	1.69 - 5.07	3.1E+02	3.2E+02	1.8E+02 N	2.8E+00	SSL	NO	BBK
	7439-97-6	Mercury	4.7E-02	1.4E-01	MG/KG	CAPL-SS46-1012	5/12	0.031 - 0.0589	1.4E-01	1.1E-01	2.3E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	1.4E+00 J	1.3E+01	MG/KG	CAPL-SS45-1012	12/12	1.13 - 3.38	1.3E+01	9.5E+00	1.5E+02 N	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	2.8E+02 J	2.0E+03	MG/KG	CAPL-SS45P-1012	12/12	563 - 1690	2.0E+03	7.1E+02	N/A	N/A		NO	NUT
	7440-62-2	**Vanadium**	**5.3E+00**	**6.7E+01**	**MG/KG**	**CAPL-SS45-1012**	**12/12**	**1.41 - 4.22**	**6.7E+01**	**2.8E+01**	**3.9E+01 N**	**8.6E+00**	**SSL**	**YES**	**ASL**
	7440-66-6	Zinc	1.1E+01	4.3E+02	MG/KG	CAPL-SS47-1012	12/12	2.25 - 6.75	4.3E+02	2.7E+01	2.3E+03 N	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values from Cheatham Annex/Yorktown background surface soil samples; values represent the 95% UTL.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Residential soil RSL. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for acenaphthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha-chlordane and gamma-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for Mercury (inorganic salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
ND = Not detected
SSL = Soil Screening Level, Protection of Groundwater, May 2014 RSL table
MG/KG = Milligram per kilogram
NL = Noncarcinogenic lead residential soil RSL based on IEUBK model.

TABLE 2.16a
Step 2 Surface Soil from Group 1 Drainages Screening - Risk Ratio, Maximum Detected Concentratior
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (MG/KG)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL (MG/KG)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL (MG/KG)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)pyrene	8 / 12	1.2E-01	CAPL-SS46-1012	1.5E-02	1E-06	8E-06	N/A		N/A	N/A
Benzo(b)fluoranthene	11 / 12	2.0E-01	CAPL-SS46-1012	1.5E-01	1E-06	1E-06	N/A		N/A	N/A
Aroclor-1260	33 / 37	6.3E+01	CAPL-SS09-0811	2.4E-01	1E-06	3E-04	N/A		N/A	N/A
Dieldrin	8 / 12	2.5E-01 J	CAPL-SS46-1012	3.3E-02	1E-06	8E-06	3.1E+00	1	0.08	Liver
Nitroglycerin	1 / 12	8.7E-01 J	CAPL-SS58-1012	2.9E+01	1E-06	3E-08	6.2E+00	1	0.1	Blood
Aluminum	12 / 12	2.5E+04	CAPL-SS45-1012	N/A		N/A	7.7E+04	1	0.3	Neurological
Arsenic	12 / 12	7.0E+00	CAPL-SS45-1012	6.7E-01	1E-06	1E-05	3.4E+01	1	0.2	Skin, Blood
Chromium[e]	12 / 12	4.6E+01	CAPL-SS45P-1012	3.0E-01	1E-06	2E-04	2.3E+02	1	0.2	None Reported
Iron	12 / 12	4.8E+04	CAPL-SS45-1012	N/A		N/A	5.5E+04	1	0.9	Gastrointestinal
Vanadium	12 / 12	6.7E+01	CAPL-SS45-1012	N/A		N/A	3.9E+02	1	0.2	Hair
Cumulative Corresponding Hazard Index[c]									**2**	
Cumulative Corresponding Cancer Risk[d]						**4E-04**				

Total Liver HI =	0.08
Total Blood HI =	0.3
Total Neurological HI =	0.3
Total Skin =	0.2
Total Gastrointestinal HI =	0.9
Total Hair HI =	0.2

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.16b
Step 3 Surface Soil from Group 1 Drainages Screening - Risk Ratio, 95% UCL Concentration
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	95% UCL (mg/kg)		95% UCL Rationale	Carcinogenic Residential Soil RSL (MG/KG)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL (MG/KG)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)pyrene	8 / 12	6.2E-02	95% KM(t)	1, 2, 3	1.5E-02	1E-06	4E-06	N/A		N/A	N/A
Benzo(b)fluoranthene	11 / 12	2.0E-01	MAX	1, 5	1.5E-01	1E-06	1E-06	N/A		N/A	N/A
Aroclor-1260	33 / 12	2.6E+01	99% KM-c	1	2.4E-01	1E-06	1E-04	N/A		N/A	N/A
Dieldrin	8 / 12	2.0E-01	95% G-AdjG	1, 3	3.3E-02	1E-06	6E-06	3.1E+00	1	0.07	Liver
Nitroglycerin	1 / 12	8.7E-01	MAX	6	2.9E+01	1E-06	3E-08	6.2E+00	1	0.1	Blood
Arsenic	12 / 12	5.2E+00	95% Stud-t	2	6.7E-01	1E-06	8E-06	3.4E+01	1	0.2	Skin, Blood
Chromium[e]	12 / 12	2.6E+01	95% Stud-t	1, 2, 3	3.0E-01	1E-06	9E-05	2.3E+02	1	0.1	None Reported
Iron	12 / 12	2.2E+04	95% Stud-t	1, 2, 3	N/A		N/A	5.5E+04	1	0.4	Gastrointestinal
Cumulative Corresponding Hazard Index[c]										**0.9**	
Cumulative Corresponding Cancer Risk[d]							**2E-04**				

Total Liver HI =	0.07
Total Skin HI =	0.2
Total Blood HI =	0.3
Total Gastrointestinal HI =	0.4

[a] Corresponding Cancer Risk equals 95% UCL divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals 95% UCL divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,
Constituents selected as COPCs are indicated by shading.
mg/kg = milligrams per kilogram
N/A = Not available/not applicable

ProUCL, Version 5.0 used to determine distribution of data and calculate 95% UCL, following recommendations
in users guide (USEPA. May 2013. ProUCL, Version 5.0. Prepared by Lockheed Martin Environmental Services).
Options: Maximum detected concentration (MAX); 95% Kaplan-Meier (t) UCL (95% KM(t)); 99% Kaplan-Meier (Chebyshev) UCL (99% KM-c); 95% GROS Adjusted Gamma UCL (95% G-AdjG);
95% Student's-t UCL (95% Stud-t).

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Statistical Tests indicate data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Max value used because 95% UCL greater than max.

Table 2.17
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 1															
Drainages	78-93-3	2-Butanone	3.9E-03 J	9.3E-02	MG/KG	CAPL-SB56-1012	2/12	0.010 - 0.015	9.3E-02	N/A	2.8E+03 N	1.2E-01	SSL	NO	BSL
	67-64-1	Acetone	6.8E-03 J	2.6E-01 J	MG/KG	CAPL-SB56-1012	6/12	0.0202 - 0.0304	2.6E-01	N/A	6.1E+03 N	2.9E-01	SSL	NO	BSL
	75-15-0	Carbon disulfide	1.9E-03 J	2.9E-03 J	MG/KG	CAPL-SB56-1012	2/12	0.00505 - 0.00761	2.9E-03	N/A	7.7E+01 N	2.4E-02	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	3.0E-03 J	4.6E-03 J	MG/KG	CAPL-SB56-1012	2/12	0.00733 - 0.037	4.6E-03	N/A	2.3E+01 N	1.9E-02	SSL	NO	BSL
	56-55-3	Benzo(a)anthracene	2.4E-02 J	2.4E-02 J	MG/KG	CAPL-SB48-1012	1/12	0.00733 - 0.037	2.4E-02	N/A	1.5E-01 C	1.2E-02	SSL	NO	BSL
	50-32-8	**Benzo(a)pyrene**	**5.8E-03 J**	**2.3E-02 K**	**MG/KG**	**CAPL-SB48-1012**	**2/12**	**0.00733 - 0.037**	**2.3E-02**	**N/A**	**1.5E-02 C**	**4.0E-03**	**SSL**	**YES**	**ASL**
	205-99-2	Benzo(b)fluoranthene	5.6E-03 K	5.7E-02 K	MG/KG	CAPL-SB48-1012	3/12	0.00733 - 0.037	5.7E-02	N/A	1.5E-01 C	4.1E-02	SSL	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.2E-02	1.2E-02	MG/KG	CAPL-SB46-1012	1/12	0.00733 - 0.037	1.2E-02	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	6.9E-03 J	9.4E-03	MG/KG	CAPL-SB46-1012	2/12	0.00733 - 0.037	9.4E-03	N/A	1.5E+00 C	4.0E-01	SSL	NO	BSL
	218-01-9	Chrysene	1.7E-02	3.2E-02 K	MG/KG	CAPL-SB48-1012	2/12	0.00733 - 0.037	3.2E-02	N/A	1.5E+01 C	1.2E+00	SSL	NO	BSL
	206-44-0	Fluoranthene	3.5E-03 J	4.9E-02	MG/KG	CAPL-SB48-1012	7/12	0.00733 - 0.037	4.9E-02	N/A	2.3E+02 N	8.9E+00	SSL	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	9.7E-03	2.3E-02 J	MG/KG	CAPL-SB48-1012	2/12	0.00733 - 0.037	2.3E-02	N/A	1.5E-01 C	2.4E-01	SSL	NO	BSL
	85-01-8	Phenanthrene	6.0E-03 J	3.0E-02 J	MG/KG	CAPL-SB48-1012	4/12	0.00733 - 0.037	3.0E-02	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	3.2E-03 J	4.4E-02 K	MG/KG	CAPL-SB48-1012	7/12	0.00733 - 0.037	4.4E-02	N/A	1.7E+02 N	1.3E+00	SSL	NO	BSL
	72-54-8	4,4'-DDD	2.3E-04 J	2.0E-02 J	MG/KG	CAPL-SB57-1012	10/12	0.00072 - 0.00093	2.0E-02	N/A	2.2E+00 C	7.2E-03	SSL	NO	BSL
	72-55-9	4,4'-DDE	3.5E-04 J	1.4E-01 J	MG/KG	CAPL-SB48-1012	11/12	0.00072 - 0.00724	1.4E-01	N/A	1.6E+00 C	5.4E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	3.5E-04 J	6.0E-02 J	MG/KG	CAPL-SB48-1012	10/12	0.00072 - 0.00093	6.0E-02	N/A	1.9E+00 C	7.7E-02	SSL	NO	BSL
	309-00-2	Aldrin	3.3E-04 J	3.3E-04 J	MG/KG	CAPL-SB58-1012	1/12	0.00072 - 0.00093	3.3E-04	N/A	3.1E-02 C	7.5E-04	SSL	NO	BSL
	319-84-6	alpha-BHC	3.1E-04 J	5.9E-04 J	MG/KG	CAPL-SB59-1012	2/12	0.00072 - 0.00093	5.9E-04	N/A	8.5E-02 c	4.1E-05	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	6.6E-04 J	7.7E-04 J	MG/KG	CAPL-SB46-1012	2/12	0.00072 - 0.00093	7.7E-04	N/A	1.8E+00 C	1.5E-02	SSL	NO	BSL
	11096-82-5	**Aroclor-1260**	**9.1E-03 L**	**4.3E-01 L**	**MG/KG**	**CAPL-SB48-1012**	**11/12**	**0.0184 - 0.0235**	**4.3E-01**	**N/A**	**2.4E-01 C**	**2.7E-02**	**SSL**	**YES**	**ASL**
	319-85-7	beta-BHC	2.5E-04 J	2.5E-04 J	MG/KG	CAPL-SB57-1012	1/12	0.00072 - 0.00093	2.5E-04	N/A	3.0E-01 C	1.4E-04	SSL	NO	BSL
	60-57-1	Dieldrin	6.0E-04 L	8.2E-03 J	MG/KG	CAPL-SB48-1012	6/12	0.00072 - 0.00093	8.2E-03	N/A	3.3E-02 C	6.9E-05	SSL	NO	BSL
	33213-65-9	Endosulfan II	8.1E-04 J	4.2E-03 J	MG/KG	CAPL-SB46-1012	3/12	0.00072 - 0.00093	4.2E-03	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	1031-07-8	Endosulfan sulfate	2.3E-04 J	2.9E-02 J	MG/KG	CAPL-SB46-1012	7/12	0.00072 - 0.00093	2.9E-02	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	72-20-8	Endrin	4.0E-04 L	1.5E-03 J	MG/KG	CAPL-SB47-1012	6/12	0.00072 - 0.00093	1.5E-03	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	4.3E-04 J	1.2E-03 J	MG/KG	CAPL-SB56-1012	5/12	0.00072 - 0.00093	1.2E-03	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	53494-70-5	Endrin ketone	8.1E-04 J	1.8E-03 J	MG/KG	CAPL-SB46-1012	3/12	0.00072 - 0.00093	1.8E-03	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	3.0E-04 J	3.2E-03 L	MG/KG	CAPL-SB58-1012	9/12	0.00072 - 0.00093	3.2E-03	N/A	1.8E+00 C	N/A	SSL	NO	BSL
	76-44-8	Heptachlor	1.9E-04 J	2.0E-03 J	MG/KG	CAPL-SB59-1012	3/12	0.00072 - 0.00093	2.0E-03	N/A	1.2E-01 C	1.6E-04	SSL	NO	BSL
	1024-57-3	Heptachlor epoxide	2.0E-04 L	4.4E-04 J	MG/KG	CAPL-SB59-1012	2/12	0.00072 - 0.00093	4.4E-04	N/A	5.9E-02 C	7.8E-05	SSL	NO	BSL
	72-43-5	Methoxychlor	5.2E-04 J	5.0E-03 J	MG/KG	CAPL-SB48-1012	7/12	0.00072 - 0.00093	5.0E-03	N/A	3.1E+01 N	2.0E-01	SSL	NO	BSL

Table 2.17

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 1	**7429-90-5**	**Aluminum**	**1.6E+03**	**2.8E+04**	**MG/KG**	**CAPL-SB45-1012**	**12/12**	**13.9 - 69.7**	**2.8E+04**	**1.3E+04**	**7.7E+03 N**	**3.0E+03**	**SSL**	**YES**	**ASL**
Drainages	**7440-38-2**	**Arsenic**	**1.1E+00 J**	**1.6E+01**	**MG/KG**	**CAPL-SB45-1012**	**12/12**	**0.697 - 3.49**	**1.6E+01**	**5.5E+00**	**6.7E-01 C**	**1.5E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	7.0E+00	8.7E+01 J	MG/KG	CAPL-SB50P-1012	12/12	2.79 - 13.9	8.7E+01	8.5E+01	1.5E+03 N	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	2.1E-01 J	1.9E+00	MG/KG	CAPL-SB45-1012	11/12	0.349 - 1.74	1.9E+00	5.2E-01	1.6E+01 N	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	2.0E-01 J	1.6E+00 K	MG/KG	CAPL-SB58-1012	2/12	0.349 - 1.74	1.6E+00	ND	7.0E+00 N	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	2.8E+02 J	3.9E+03	MG/KG	CAPL-SB46-1012	12/12	349 - 1740	3.9E+03	2.4E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**3.7E+00**	**5.9E+01**	**MG/KG**	**CAPL-SB45-1012**	**12/12**	**0.697 - 3.49**	**5.9E+01**	**3.4E+01**	**3.0E-01 C**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**9.5E-01**	**6.5E+00**	**MG/KG**	**CAPL-SB45-1012**	**11/12**	**0.872 - 4.36**	**6.5E+00**	**5.2E+00**	**2.3E+00 N**	**2.7E-02**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.3E+00 J	8.9E+00	MG/KG	CAPL-SB47-1012	12/12	0.697 - 3.49	8.9E+00	3.2E+00	3.1E+02 N	2.8E+00	SSL	NO	BSL
	7439-89-6	**Iron**	**2.5E+03**	**6.4E+04**	**MG/KG**	**CAPL-SB45-1012**	**12/12**	**6.97 - 34.9**	**6.4E+04**	**3.2E+04**	**5.5E+03 N**	**3.5E+01**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	4.6E+00 J	2.4E+01	MG/KG	CAPL-SB48-1012	12/12	0.209 - 1.05	2.4E+01	8.8E+00	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	2.7E+02 J	4.3E+03	MG/KG	CAPL-SB45-1012	12/12	349 - 1740	4.3E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	Manganese	7.1E+00	7.9E+01 J	MG/KG	CAPL-SB50-1012	12/12	1.05 - 5.23	7.9E+01	1.8E+02	1.8E+02 N	2.8E+00	SSL	NO	BSL
	7439-97-6	Mercury	2.3E-02 J	9.5E-02	MG/KG	CAPL-SB45-1012	11/12	0.035 - 0.0474	9.5E-02	1.4E-01	2.3E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	4.0E+00	1.6E+01	MG/KG	CAPL-SB45-1012	7/12	0.697 - 3.49	1.6E+01	1.8E+01	1.5E+02 N	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	3.2E+02 K	4.4E+03	MG/KG	CAPL-SB45-1012	12/12	349 - 1740	4.4E+03	9.0E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	5.4E-01 J	5.4E-01 J	MG/KG	CAPL-SB57-1012	1/12	0.697 - 3.49	5.4E-01	6.4E-01	3.9E+01 N	5.2E-02	SSL	NO	BSL
	7440-62-2	**Vanadium**	**4.8E+00**	**6.7E+01**	**MG/KG**	**CAPL-SB45-1012**	**12/12**	**0.872 - 4.36**	**6.7E+01**	**4.8E+01**	**3.9E+01 N**	**8.6E+00**	**SSL**	**YES**	**ASL**
	7440-66-6	Zinc	1.2E+01	7.3E+01 K	MG/KG	CAPL-SB58-1012	12/12	1.39 - 6.97	7.3E+01	2.8E+01	2.3E+03 N	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values from Cheatham Annex/Yorktown background subsurface soil samples; values represent the 95% UTL.

[4] Oak Ridge National Laboratory (ORNL).May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Residential soil RSL. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha-chlordane and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan II and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
ND = Not detected
SSL = Soil Screening Level, Protection of Groundwater, May 2014 RSL table
MG/KG = Milligram per kilogram
NL = Noncarcinogenic lead residential soil RSL based on IEUBK model.

Table 2.17

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
		Essential Nutrient (NUT)													
		Below Screening Level (BSL)													

TABLE 2.17a

Step 2 Subsurface Soil from Group 1 Drainages Screening - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (MG/KG)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL (MG/KG)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL (MG/KG)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)pyrene	2 / 12	2.3E-02 K	CAPL-SB48-1012	1.5E-02	1E-06	2E-06	N/A		N/A	N/A
Aroclor-1260	11 / 12	4.3E-01 L	CAPL-SB48-1012	2.4E-01	1E-06	2E-06	N/A		N/A	N/A
Aluminum	12 / 12	2.8E+04	CAPL-SB45-1012	N/A		N/A	7.7E+04	1	0.4	Neurological
Arsenic	12 / 12	1.6E+01	CAPL-SB45-1012	6.7E-01	1E-06	2E-05	3.4E+01	1	0.5	Skin, Blood
Chromium[e]	12 / 12	5.9E+01	CAPL-SB45-1012	3.0E-01	1E-06	2E-04	2.3E+02	1	0.3	None Reported
Cobalt	11 / 12	6.5E+00	CAPL-SB45-1012	3.7E+02	1E-06	2E-08	2.3E+01	1	0.3	Thyroid
Iron	12 / 12	6.4E+04	CAPL-SB45-1012	N/A		N/A	5.5E+04	1	1	Gastrointestinal
Vanadium	12 / 12	6.7E+01	CAPL-SB45-1012	N/A		N/A	3.9E+02	1	0.2	Hair
Cumulative Corresponding Hazard Index[c]									**3**	
Cumulative Corresponding Cancer Risk[d]						**2E-04**				

Total Neurological HI =	0.4
Total Skin HI =	0.5
Total Blood HI =	0.5
Total Thyroid HI =	0.3
Total Gastrointestinal HI =	1
Total Hair HI =	0.2

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

K = Biased High

L = Biased Low

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.17b
Step 3 Subsurface Soil from Group 1 Drainages Screening - Risk Ratio, 95% UCL Concentration
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	95% UCL (mg/kg)		95% UCL Rationale	Carcinogenic Residential Soil RSL (MG/KG)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL (MG/KG)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)pyrene	2 / 12	9.4E-03	95% KM(t)	4	1.5E-02	1E-06	6E-07	N/A		N/A	N/A
Aroclor-1260	11 / 12	4.1E-01	97.5% KM-c	1	2.4E-01	1E-06	2E-06	N/A		N/A	N/A
Arsenic	12 / 12	8.0E+00	95% AdjG	1, 3	6.7E-01	1E-06	1E-05	3.4E+01	1	0.2	Skin, Blood
Chromium[e]	12 / 12	3.2E+01	95% Stud-t	1, 2, 3	3.0E-01	1E-06	1E-04	2.3E+02	1	0.1	None Reported
Cobalt	11 / 12	3.7E+00	95% GROS-G	1, 3	3.7E+02	1E-06	1E-08	2.3E+01	1	0.2	Thyroid
Iron	12 / 12	3.9E+04	95% AdjG	1, 3	N/A		N/A	5.5E+04	1	0.7	Gastrointestinal
Cumulative Corresponding Hazard Index[c]										**1**	
Cumulative Corresponding Cancer Risk[d]							**1E-04**				

Total Skin HI =	0.2
Total Blood HI =	0.2
Total Thyroid HI =	0.2
Total Gastrointestinal HI =	0.7

[a] Corresponding Cancer Risk equals 95% UCL divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals 95% UCL divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,
Constituents selected as COPCs are indicated by shading.
mg/kg = milligrams per kilogram
N/A = Not available/not applicable

ProUCL, Version 5.0 used to determine distribution of data and calculate 95% UCL, following recommendations
in users guide (USEPA. May 2013. ProUCL, Version 5.0. Prepared by Lockheed Martin Environmental Services).
Options: 95% Kaplan-Meier (t) UCL (95% KM(t)); 97.5% Kaplan-Meier (Chebyshev) UCL (97.5% KM-c); 95% GROS Adjusted Gamma UCL (95% GROS-G);
95% Adjusted Gamma UCL (95% AdjG); 95% Student's-t UCL (95% Stud-t).
UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Statistical Tests indicate data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Max value used because 95% UCL greater than max.

Table 2.18

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 2a Former Transformer - Pole	**11096-82-5**	**Aroclor-1260**	**2.7E-02**	**4.4E+00 J**	**MG/KG**	**CAPL-SS27-1012**	**6/7**	**0.0198 - 0.201**	**4.4E+00**	**N/A**	**2.4E-01 C**	**2.7E-02**	**SSL**	**YES**	**ASL**

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Residential soil RSL. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
SSL = Soil Screening Level, Protection of Groundwater, May 2014 RSL table
MG/KG = Milligram per kilogram

TABLE 2.18a

Step 2 Surface Soil, Group 2a, Former Transformer - Pole - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (MG/KG)	Sample Location of Maximum Detected Concentration (MG/KG)	Carcinogenic Residential Soil RSL (MG/KG)	Acceptable Risk Level	Corresponding Cancer Risk[b]	Non-carcinogenic Residential Soil RSL (MG/KG)	Acceptable Hazard Level	Corresponding Hazard Index[a]	Target Organ
Aroclor-1260	6 / 7	4.4E+00 J	CAPL-SS27-1012	2.4E-01	1E-06	2E-05	N/A		N/A	NA
Cumulative Corresponding Hazard Index[c]									**N/A**	
Cumulative Corresponding Cancer Risk[d]						**2E-05**				

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

J = Estimated Value

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.19

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 2b Former Transformer - Pad	11096-82-5	Aroclor-1260	1.6E-02 J	4.5E-02 J	MG/KG	CAPL-SS34-1112	4/10	0.0179 - 0.0221	4.5E-02	N/A	2.4E-01 C	2.7E-02	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Residential soil RSL. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
SSL = Soil Screening Level, Protection of Groundwater, November 2013 RSL table
MG/KG = Milligram per kilogram

Table 2.20
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 2c Upgradient to Drainages	78-93-3	2-Butanone	5.4E-03 J	2.4E-02	MG/KG	CAPL-SS64-1112	2/10	0.00828 - 0.0133	2.4E-02	N/A	2.8E+03 N	1.2E-01	SSL	NO	BSL
	67-64-1	Acetone	1.7E-02 J	2.1E-01 J	MG/KG	CAPL-SS65-1112	4/10	0.0166 - 0.0267	2.1E-01	N/A	6.1E+03 N	2.9E-01	SSL	NO	BSL
	100-42-5	Styrene	1.5E-02	1.5E-02	MG/KG	CAPL-SS65-1112	1/10	0.00414 - 0.00667	1.5E-02	N/A	6.0E+02 N	1.3E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	0.00351	1.2E-01	MG/KG	CAPL-SS65-1112	6/10	0.00781 - 0.381	1.2E-01	N/A	2.3E+01 N	1.9E-02	SSL	NO	BSL
	83-32-9	Acenaphthene	7.6E-02 J	7.6E-02 J	MG/KG	CAPL-SS67-1112	1/10	0.00781 - 0.381	7.6E-02	N/A	3.5E+02 N	5.5E-01	SSL	NO	BSL
	208-96-8	Acenaphthylene	1.4E-01	1.4E-01	MG/KG	CAPL-SS67-1112	1/10	0.00781 - 0.381	1.4E-01	N/A	3.5E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	2.7E-01 J	1.7E+00	MG/KG	CAPL-SS67-1112	2/10	0.00781 - 0.381	1.7E+00	N/A	1.7E+03 N	5.8E+00	SSL	NO	BSL
	100-52-7	Benzaldehyde	5.2E-01	5.2E-01	MG/KG	CAPL-SS65-1112	1/10	0.39 - 3.81	5.2E-01	N/A	7.8E+02 N	4.3E-02	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**1.0E-02**	**1.4E+01**	**MG/KG**	**CAPL-SS67-1112**	**8/10**	**0.00781 - 0.381**	**1.4E+01**	**N/A**	**1.5E-01 C**	**1.2E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**1.2E-02**	**8.1E+00**	**MG/KG**	**CAPL-SS67-1112**	**8/10**	**0.00781 - 0.381**	**8.1E+00**	**N/A**	**1.5E-02 C**	**4.0E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**6.0E-03 J**	**1.1E+01**	**MG/KG**	**CAPL-SS67-1112**	**10/10**	**0.00781 - 0.381**	**1.1E+01**	**N/A**	**1.5E-01 C**	**4.1E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	1.1E-02	4.7E+00	MG/KG	CAPL-SS61-1112	8/10	0.00781 - 0.381	4.7E+00	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**4.5E-03 J**	**8.8E+00**	**MG/KG**	**CAPL-SS67-1112**	**10/10**	**0.00781 - 0.381**	**8.8E+00**	**N/A**	**1.5E+00 C**	**4.0E-01**	**SSL**	**YES**	**ASL**
	117-81-7	bis(2-Ethylhexyl)phthalate	1.4E-01 J	1.0E+00 J	MG/KG	CAPL-SS68-1112	4/10	0.39 - 3.81	1.0E+00	N/A	3.8E+01 C	1.3E+00	SSL	NO	BSL
	86-74-8	Carbazole	9.7E-01 J	1.5E+00 J	MG/KG	CAPL-SS67-1112	2/10	0.39 - 3.81	1.5E+00	N/A	2.7E+01 C	N/A		NO	BSL
	218-01-9	**Chrysene**	**1.9E-02**	**1.9E+01**	**MG/KG**	**CAPL-SS67-1112**	**9/10**	**0.00781 - 0.381**	**1.9E+01**	**N/A**	**1.5E+01 C**	**1.2E+00**	**SSL**	**YES**	**ASL**
	53-70-3	**Dibenz(a,h)anthracene**	**1.6E-02**	**2.1E+00**	**MG/KG**	**CAPL-SS67-1112**	**5/10**	**0.00781 - 0.381**	**2.1E+00**	**N/A**	**1.5E-02 C**	1.3E-02	**SSL**	**YES**	**ASL**
	206-44-0	Fluoranthene	5.4E-03 J	7.2E+01	MG/KG	CAPL-SS67-1112	10/10	0.00781 - 0.809	7.2E+01	N/A	2.3E+02 N	8.9E+00	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**9.1E-03**	**4.2E+00**	**MG/KG**	**CAPL-SS61-1112**	**7/10**	**0.00781 - 0.381**	**4.2E+00**	**N/A**	**1.5E-01 C**	**2.4E-01**	**SSL**	**YES**	**ASL**
	91-20-3	Naphthalene	7.7E-03 J	4.2E-01	MG/KG	CAPL-SS65-1112	4/10	0.00781 - 0.381	4.2E-01	N/A	3.8E+00 C	5.4E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	1.0E-02	6.4E+00	MG/KG	CAPL-SS67-1112	10/10	0.00781 - 0.381	6.4E+00	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	6.1E-03 J	5.5E+01	MG/KG	CAPL-SS67-1112	10/10	0.00781 - 0.809	5.5E+01	N/A	1.7E+02 N	1.3E+00	SSL	NO	BSL
	72-54-8	4,4'-DDD	3.8E-04 J	3.5E-01	MG/KG	CAPL-SS63-1112	8/10	0.00073 - 0.0409	3.5E-01	N/A	2.2E+00 C	7.2E-03	SSL	NO	BSL
	72-55-9	**4,4'-DDE**	**1.3E-03 L**	**2.6E+00**	**MG/KG**	**CAPL-SS63-1112**	**8/10**	**0.00073 - 0.0409**	**2.6E+00**	**N/A**	**1.6E+00 C**	**5.4E-02**	**SSL**	**YES**	**ASL**
	50-29-3	4,4'-DDT	6.0E-04 J	8.1E-01	MG/KG	CAPL-SS63-1112	8/10	0.00073 - 0.0409	8.1E-01	N/A	1.9E+00 C	7.7E-02	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	2.6E-04 J	8.9E-03 L	MG/KG	CAPL-SS63-1112	4/10	0.00073 - 0.00092	8.9E-03	N/A	1.8E+00 C	1.5E-02	SSL	NO	BSL
	11096-82-5	**Aroclor-1260**	**3.7E-02 J**	**2.8E+00 J**	**MG/KG**	**CAPL-SS66-1112**	**6/10**	**0.0185 - 0.11**	**2.8E+00**	**N/A**	**2.4E-01 C**	**2.7E-02**	**SSL**	**YES**	**ASL**
	319-85-7	beta-BHC	3.1E-04 J	3.1E-04 J	MG/KG	CAPL-SS67-1112	1/10	0.00073 - 0.00092	3.1E-04	N/A	3.0E-01 C	1.4E-04	SSL	NO	BSL
	319-86-8	delta-BHC	1.6E-04 L	1.1E-03 J	MG/KG	CAPL-SS61-1112	6/10	0.00073 - 0.00092	1.1E-03	N/A	3.0E-01 C	1.4E-04	SSL	NO	BSL
	60-57-1	Dieldrin	2.6E-04 J	2.7E-02 K	MG/KG	CAPL-SS66-1112	7/10	0.00073 - 0.00092	2.7E-02	N/A	3.3E-02 C	6.9E-05	SSL	NO	BSL
	959-98-8	Endosulfan I	2.6E-04 J	1.1E-03 J	MG/KG	CAPL-SS67-1112	2/10	0.00073 - 0.00092	1.1E-03	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	33213-65-9	Endosulfan II	2.3E-04 J	9.2E-03 L	MG/KG	CAPL-SS63-1112	7/10	0.00073 - 0.00092	9.2E-03	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	1031-07-8	Endosulfan sulfate	3.0E-04 J	6.4E-02 L	MG/KG	CAPL-SS66-1112	7/10	0.00073 - 0.00092	6.4E-02	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	72-20-8	Endrin	4.9E-04 J	1.4E-02 J	MG/KG	CAPL-SS66-1112	5/10	0.00073 - 0.00092	1.4E-02	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	5.2E-04 J	5.3E-03 J	MG/KG	CAPL-SS64-1112	6/10	0.00073 - 0.00092	5.3E-03	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	53494-70-5	Endrin ketone	3.6E-04 L	2.7E-02 J	MG/KG	CAPL-SS66-1112	6/10	0.00073 - 0.00092	2.7E-02	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL

Table 2.20
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	58-89-9	gamma-BHC (Lindane)	1.6E-04 J	4.8E-03 J	MG/KG	CAPL-SS61-1112	3/10	0.00073 - 0.00092	4.8E-03	N/A	5.6E-01 C	2.4E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	2.5E-04 J	1.5E-02	MG/KG	CAPL-SS63-1112	9/10	0.00073 - 0.00092	1.5E-02	N/A	1.8E+00 C	N/A	SSL	NO	BSL
	76-44-8	Heptachlor	1.5E-04 J	4.2E-04 L	MG/KG	CAPL-SS63-1112	2/10	0.00073 - 0.00092	4.2E-04	N/A	1.2E-01 C	1.6E-04	SSL	NO	BSL
	1024-57-3	Heptachlor epoxide	2.7E-04 J	9.3E-03 J	MG/KG	CAPL-SS63-1112	2/10	0.00073 - 0.00092	9.3E-03	N/A	5.9E-02 C	7.8E-05	SSL	NO	BSL
	72-43-5	Methoxychlor	3.2E-04 J	1.0E-02 J	MG/KG	CAPL-SS66-1112	7/10	0.00073 - 0.00092	1.0E-02	N/A	3.1E+01 N	2.0E-01	SSL	NO	BSL
	99-35-4	1,3,5-Trinitrobenzene	1.1E-01 J	1.6E-01 J	MG/KG	CAPL-SS67-1112	2/10	0.32 - 0.388	1.6E-01	N/A	2.2E+02 N	2.1E-01	SSL	NO	BSL
	7429-90-5	**Aluminum**	**4.3E+03**	**2.6E+04**	**MG/KG**	**CAPL-SS68-1112**	**10/10**	**23.5 - 73**	**2.6E+04**	**1.2E+04**	**7.7E+03 N**	**3.0E+03**	**SSL**	**YES**	**ASL**
	7440-36-0	**Antimony**	**1.2E+01**	**1.2E+01**	**MG/KG**	**CAPL-SS65-1112**	**1/10**	**1.18 - 3.65**	**1.2E+01**	**1.1E+01**	**3.1E+00 N**	**3.5E-02**	**SSL**	**YES**	**ASL**
	7440-38-2	**Arsenic**	**2.4E+00 J**	**1.9E+01**	**MG/KG**	**CAPL-SS60-1112**	**10/10**	**1.18 - 3.65**	**1.9E+01**	**6.4E+00**	**6.7E-01 C**	**1.5E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	2.7E+01	1.8E+02	MG/KG	CAPL-SS65-1112	10/10	4.71 - 14.6	1.8E+02	5.3E+01	1.5E+03 N	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	4.4E-01 J	1.4E+00	MG/KG	CAPL-SS68-1112	10/10	0.334 - 1.82	1.4E+00	5.9E-01	1.6E+01 N	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	4.1E-01 J	1.9E+00	MG/KG	CAPL-SS61-1112	6/10	0.589 - 1.82	1.9E+00	1.5E+00	7.0E+00 N	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	5.4E+02 J	1.9E+04	MG/KG	CAPL-SS63-1112	10/10	334 - 1820	1.9E+04	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**8.2E+00**	**7.0E+01**	**MG/KG**	**CAPL-SS61-1112**	**10/10**	**1.18 - 3.65**	**7.0E+01**	**1.8E+01**	**3.0E-01 C**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	Cobalt	2.1E+00 J	6.0E+00	MG/KG	CAPL-SS60-1112	9/10	1.47 - 4.56	6.0E+00	9.9E+00	2.3E+00 N	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	5.1E+00	2.6E+01	MG/KG	CAPL-SS61-1112	10/10	1.18 - 3.65	2.6E+01	4.3E+00	3.1E+02 N	2.8E+00	SSL	NO	BSL
	7439-89-6	**Iron**	**8.3E+03**	**5.3E+04**	**MG/KG**	**CAPL-SS60-1112**	**10/10**	**11.8 - 36.5**	**5.3E+04**	**2.0E+04**	**5.5E+03 N**	**3.5E+01**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	1.5E+01	1.1E+02	MG/KG	CAPL-SS61-1112	10/10	0.353 - 1.09	1.1E+02	1.7E+01	4.0E+02 NL	N/A	SSL	NO	BSL
	7439-95-4	Magnesium	5.8E+02 J	4.4E+03	MG/KG	CAPL-SS68-1112	10/10	589 - 1820	4.4E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	Manganese	7.8E+01	2.6E+02	MG/KG	CAPL-SS65-1112	10/10	1.77 - 5.47	2.6E+02	3.2E+02	1.8E+02 N	2.8E+00	SSL	NO	BBK
	7439-97-6	Mercury	3.3E-02 J	2.5E-01	MG/KG	CAPL-SS66-1112	10/10	0.0417 - 0.0534	2.5E-01	1.1E-01	2.3E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	3.0E+00 J	1.9E+01	MG/KG	CAPL-SS68-1112	10/10	1.18 - 3.65	1.9E+01	9.5E+00	1.5E+02 N	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	4.0E+02 J	4.2E+03	MG/KG	CAPL-SS60-1112	10/10	334 - 1820	4.2E+03	7.1E+02	N/A	N/A		NO	NUT
	7440-62-2	**Vanadium**	**1.1E+01**	**5.6E+01**	**MG/KG**	**CAPL-SS68-1112**	**10/10**	**1.47 - 4.56**	**5.6E+01**	**2.8E+01**	**3.9E+01 N**	**8.6E+00**	**SSL**	**YES**	**ASL**
	7440-66-6	Zinc	3.5E+01	2.4E+02	MG/KG	CAPL-SS61-1112	10/10	2.35 - 7.3	2.4E+02	2.7E+01	2.3E+03 N	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values from Cheatham Annex/Yorktown background surface soil samples; values represent the 95% UTL.

[4] Oak Ridge National Laboratory (ORNL). May 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Residential soil RSL. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for acenaphthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha-chlordane and gamma-chlordane..
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
SSL = Soil Screening Level, Protection of Groundwater, May 2014 RSL table
MG/KG = Milligram per kilogram
NL = Noncarcinogenic lead residential soil RSL based on IEUBK model.

TABLE 2.20a

Step 2 Surface Soil from Group 2c - Updradient Areas to Drainages Screening - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (MG/KG)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL (MG/KG)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL (MG/KG)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)anthracene	8 / 10	1.4E+01	CAPL-SS67-1112	1.5E-01	1E-06	1E-04	N/A		N/A	NA
Benzo(a)pyrene	8 / 10	8.1E+00	CAPL-SS67-1112	1.5E-02	1E-06	5E-04	N/A		N/A	NA
Benzo(b)fluoranthene	10 / 10	1.1E+01	CAPL-SS67-1112	1.5E-01	1E-06	8E-05	N/A		N/A	NA
Benzo(k)fluoranthene	10 / 10	8.8E+00	CAPL-SS67-1112	1.5E+00	1E-06	6E-06	N/A		N/A	NA
Chrysene	9 / 10	1.9E+01	CAPL-SS67-1112	1.5E+01	1E-06	1E-06	N/A		N/A	NA
Dibenz(a,h)anthracene	5 / 10	2.1E+00	CAPL-SS67-1112	1.5E-02	1E-06	1E-04	N/A		N/A	NA
Indeno(1,2,3-cd)pyrene	7 / 10	4.2E+00	CAPL-SS61-1112	1.5E-01	1E-06	3E-05	N/A		N/A	NA
4,4'-DDE	8 / 10	2.6E+00	CAPL-SS63-1112	1.6E+00	1E-06	2E-06	N/A		N/A	NA
Aroclor-1260	6 / 10	2.8E+00 J	CAPL-SS66-1112	2.4E-01	1E-06	1E-05	N/A		N/A	NA
Aluminum	10 / 10	2.6E+04	CAPL-SS68-1112	N/A		N/A	7.7E+04	1	0.3	Neurological
Antimony	1 / 10	1.2E+01	CAPL-SS65-1112	N/A		N/A	3.1E+01	1	0.4	Longevity, Blood
Arsenic	10 / 10	1.9E+01	CAPL-SS60-1112	6.7E-01	1E-06	3E-05	3.4E+01	1	0.6	Skin, Blood
Chromium[e]	10 / 10	7.0E+01	CAPL-SS61-1112	3.0E-01	1E-06	2E-04	2.3E+02	1	0.3	None Reported
Iron	10 / 10	5.3E+04	CAPL-SS60-1112	N/A		N/A	5.5E+04	1	1	Gastrointestinal
Vanadium	10 / 10	5.6E+01	CAPL-SS68-1112	N/A		N/A	3.9E+02	1	0.1	Hair
Cumulative Corresponding Hazard Index[c]									**3**	
Cumulative Corresponding Cancer Risk[d]						**1E-03**				

Total Neurological HI =	0.3
Total Longevity HI =	0.4
Total Blood HI =	0.9
Total Skin HI =	0.6
Total Gastrointestinal HI =	1
Total Hair HI =	0.1

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.20b
Step 3 Surface Soil from Group 2c, Updradient to Drainages Screening - Risk Ratio, 95% UCL Concentration
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	95% UCL (mg/kg)		95% UCL Rationale	Carcinogenic Residential Soil RSL (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-Carcinogenic Residential Soil RSL (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)anthracene	8 / 10	1.4E+01	MAX	1, 5	1.5E-01	1E-06	1E-04	N/A		N/A	N/A
Benzo(a)pyrene	8 / 10	8.1E+00	MAX	1, 5	1.5E-02	1E-06	5E-04	N/A		N/A	N/A
Benzo(b)fluoranthene	10 / 10	1.1E+01	MAX	1, 5	1.5E-01	1E-06	8E-05	N/A		N/A	N/A
Benzo(k)fluoranthene	10 / 10	8.8E+00	MAX	1, 5	1.5E+00	1E-06	6E-06	N/A		N/A	N/A
Chrysene	9 / 10	1.9E+01	MAX	1, 5	1.5E+01	1E-06	1E-06	N/A		N/A	N/A
Dibenz(a,h)anthracene	5 / 10	7.9E-01	95% KM(t)	1, 2, 3	1.5E-02	1E-06	5E-05	N/A		N/A	N/A
Indeno(1,2,3-cd)pyrene	7 / 10	4.2E+00	MAX	1, 3, 5	1.5E-01	1E-06	3E-05	N/A		N/A	N/A
4,4'-DDE	8 / 10	2.6E+00	MAX	1, 5	1.4E+00	1E-06	2E-06	N/A		N/A	N/A
Aroclor-1260	6 / 10	9.3E-01	95% KM(t)	1, 2, 3	2.2E-01	1E-06	4E-06	N/A		N/A	N/A
Antimony	1 / 10	1.2E+01	MAX	6	N/A			3.1E+01	1	0.4	Longevity, Blood
Arsenic	10 / 10	1.1E+01	95% Stud-t	1, 2, 3	6.1E-01	1E-06	2E-05	3.4E+01	1	0.3	Skin, Blood
Chromium[e]	10 / 10	4.7E+01	95% Stud-t	1, 2, 3	2.9E-01	1E-06	2E-04	2.3E+02	1	0.2	None Reported
Iron	10 / 10	3.5E+04	95% Stud-t	1, 2, 3	N/A		N/A	5.5E+04	1	0.6	Gastrointestinal
Cumulative Corresponding Hazard Index[c]										**1.5**	
Cumulative Corresponding Cancer Risk[d]							**1E-03**				

Total Longevity HI =	0.4
Total Blood HI =	0.7
Total Skin HI =	0.3
Total Gastrointestinal HI =	0.6

[a] Corresponding Cancer Risk equals 95% UCL divided by the RSL divided by the acceptable risk level

[b] Corresponding Hazard Index equals 95% UCL divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,

Constituents selected as COPCs are indicated by shading.

mg/kg = milligrams per kilogram

N/A = Not available/not applicable

ProUCL, Version 5.0 used to determine distribution of data and calculate 95% UCL, following recommendations
in users guide (USEPA. May 2013. ProUCL, Version 5.0. Prepared by Lockheed Martin Environmental Services).
Options: Maximum detected concentration (MAX); 95% Kaplan-Meier (t) UCL (95% KM(t)); 95% Student's-t UCL (95% Stud-t).

UCL Rationale:

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.

(3) Statistical Tests indicate data are gamma distributed.

(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

(5) Max value used because 95% UCL greater than max.

6) Max value used because only 1 detected concentration.

Table 2.21
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 2c Upgradient to Drainages	67-64-1	Acetone	5.1E-03 J	5.9E-03 J	MG/KG	CAPL-SB67-1112	2/10	0.0164 - 0.0254	5.9E-03	N/A	6.1E+03 N	2.9E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	1.0E-02	3.6E-02	MG/KG	CAPL-SB63-1112	4/10	0.00741 - 0.0802	3.6E-02	N/A	2.3E+01 N	1.9E-02	SSL	NO	BSL
	120-12-7	Anthracene	6.5E-02	8.4E-02	MG/KG	CAPL-SB62-1112	2/10	0.00741 - 0.0802	8.4E-02	N/A	1.7E+03 N	5.8E+00	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**1.2E-01**	**6.1E-01**	**MG/KG**	**CAPL-SB62-1112**	**2/10**	**0.00741 - 0.0802**	**6.1E-01**	**N/A**	**1.5E-01 C**	**1.2E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**5.0E-03 J**	**8.6E-01**	**MG/KG**	**CAPL-SB62-1112**	**3/10**	**0.00741 - 0.0802**	**8.6E-01**	**N/A**	**1.5E-02 C**	**4.0E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**7.8E-03 J**	**2.1E+00**	**MG/KG**	**CAPL-SB62-1112**	**5/10**	**0.00741 - 0.0802**	**2.1E+00**	**N/A**	**1.5E-01 C**	**4.1E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	5.3E-03 J	1.1E+00	MG/KG	CAPL-SB62-1112	4/10	0.00741 - 0.0802	1.1E+00	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**5.5E-03 J**	**2.2E+00**	**MG/KG**	**CAPL-SB62-1112**	**3/10**	**0.00741 - 0.0802**	**2.2E+00**	**N/A**	**1.5E+00 C**	**4.0E-01**	**SSL**	**YES**	**ASL**
	117-81-7	bis(2-Ethylhexyl)phthalate	1.3E-01 J	5.5E-01	MG/KG	CAPL-SB68-1112	4/10	0.37 - 2	5.5E-01	N/A	3.8E+01 C	1.3E+00	SSL	NO	BSL
	218-01-9	Chrysene	1.5E-02	3.1E+00	MG/KG	CAPL-SB62-1112	5/10	0.00741 - 0.0802	3.1E+00	N/A	1.5E+01 C	1.2E+00	SSL	NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**5.6E-02 J**	**2.5E-01**	**MG/KG**	**CAPL-SB62-1112**	**2/10**	**0.00741 - 0.0802**	**2.5E-01**	**N/A**	**1.5E-02 C**	**1.3E-02**	**SSL**	**YES**	**ASL**
	206-44-0	Fluoranthene	2.3E-03 J	3.4E+00	MG/KG	CAPL-SB62-1112	6/10	0.00741 - 0.0802	3.4E+00	N/A	2.3E+02 N	8.9E+00	SSL	NO	BSL
	86-73-7	Fluorene	8.9E-03	8.9E-03	MG/KG	CAPL-SB63-1112	1/10	0.00741 - 0.0802	8.9E-03	N/A	2.3E+02 N	5.4E-01	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.3E-03 J**	**1.0E+00**	**MG/KG**	**CAPL-SB62-1112**	**3/10**	**0.00741 - 0.0802**	**1.0E+00**	**N/A**	**1.5E-01 C**	**2.4E-01**	**SSL**	**YES**	**ASL**
	91-20-3	Naphthalene	7.2E-03 J	5.3E-02	MG/KG	CAPL-SB63-1112	3/10	0.00741 - 0.0802	5.3E-02	N/A	3.8E+00 C	5.4E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	1.8E-02	4.1E-01	MG/KG	CAPL-SB62-1112	5/10	0.00741 - 0.0802	4.1E-01	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	2.2E-03 J	3.0E+00	MG/KG	CAPL-SB62-1112	6/10	0.00741 - 0.0802	3.0E+00	N/A	1.7E+02 N	1.3E+00	SSL	NO	BSL
	72-54-8	4,4'-DDD	8.1E-04 J	5.6E-03 J	MG/KG	CAPL-SB69-1112	5/10	0.000763 - 0.00087	5.6E-03	N/A	2.2E+00 C	7.2E-03	SSL	NO	BSL
	72-55-9	4,4'-DDE	2.2E-04 J	2.3E-02 K	MG/KG	CAPL-SB62-1112	6/10	0.000763 - 0.00087	2.3E-02	N/A	1.6E+00 C	5.4E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	8.0E-04 J	3.2E-02 L	MG/KG	CAPL-SB62-1112	5/10	0.000763 - 0.00087	3.2E-02	N/A	1.9E+00 C	7.7E-02	SSL	NO	BSL
	309-00-2	Aldrin	5.9E-04 J	9.3E-04 L	MG/KG	CAPL-SB62-1112	2/10	0.000763 - 0.00087	9.3E-04	N/A	3.1E-02 C	7.5E-04	SSL	NO	BSL
	319-84-6	alpha-BHC	2.5E-04 J	3.5E-04 L	MG/KG	CAPL-SB62-1112	2/10	0.000763 - 0.00087	3.5E-04	N/A	8.5E-02 C	4.1E-05	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	5.1E-04 L	1.9E-03 J	MG/KG	CAPL-SB69-1112	2/10	0.000763 - 0.00087	1.9E-03	N/A	1.8E+00 C	1.5E-02	SSL	NO	BSL
	11096-82-5	**Aroclor-1260**	**7.8E-03 J**	**7.0E-01 J**	**MG/KG**	**CAPL-SB62-1112**	**6/10**	**0.0194 - 0.0221**	**7.0E-01**	**N/A**	**2.4E-01 C**	**2.7E-02**	**SSL**	**YES**	**ASL**
	60-57-1	Dieldrin	1.0E-03 J	4.4E-03 L	MG/KG	CAPL-SB68-1112	4/10	0.000763 - 0.00087	4.4E-03	N/A	3.3E-02 C	6.9E-05	SSL	NO	BSL
	33213-65-9	Endosulfan II	7.6E-04 J	2.3E-03 L	MG/KG	CAPL-SB62-1112	4/10	0.000763 - 0.00087	2.3E-03	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	1031-07-8	Endosulfan sulfate	5.4E-04 J	2.0E-02 K	MG/KG	CAPL-SB62-1112	4/10	0.000763 - 0.00087	2.0E-02	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	72-20-8	Endrin	5.3E-04 J	6.1E-03 L	MG/KG	CAPL-SB62-1112	3/10	0.000763 - 0.00087	6.1E-03	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	2.8E-04 J	1.3E-03 K	MG/KG	CAPL-SB62-1112	3/10	0.000763 - 0.00087	1.3E-03	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	53494-70-5	Endrin ketone	1.4E-03 L	7.3E-03 L	MG/KG	CAPL-SB62-1112	3/10	0.000763 - 0.00087	7.3E-03	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	58-89-9	gamma-BHC (Lindane)	1.2E-03 K	1.2E-03 K	MG/KG	CAPL-SB62-1112	1/10	0.000763 - 0.00087	1.2E-03	N/A	5.6E-01 C	2.4E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	2.5E-04 J	3.8E-03 L	MG/KG	CAPL-SB62-1112	7/10	0.000763 - 0.00087	3.8E-03	N/A	1.8E+00 C	N/A	SSL	NO	BSL
	76-44-8	Heptachlor	2.7E-04 L	2.7E-04 L	MG/KG	CAPL-SB62-1112	1/10	0.000763 - 0.00087	2.7E-04	N/A	1.2E-01 C	1.6E-04	SSL	NO	BSL
	1024-57-3	Heptachlor epoxide	1.9E-04 J	1.4E-03 K	MG/KG	CAPL-SB62-1112	2/10	0.000763 - 0.00087	1.4E-03	N/A	5.9E-02 C	7.8E-05	SSL	NO	BSL
	72-43-5	Methoxychlor	2.6E-04 J	4.7E-03 K	MG/KG	CAPL-SB62-1112	4/10	0.000763 - 0.00087	4.7E-03	N/A	3.1E+01 N	2.0E-01	SSL	NO	BSL
	55-63-0	Nitroglycerin	5.7E-01 J	5.7E-01 J	MG/KG	CAPL-SB62-1112	1/10	0.87 - 1	5.7E-01	N/A	6.2E-01 N	8.5E-05	SSL	NO	BSL

Table 2.21
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	7429-90-5	**Aluminum**	**8.5E+03**	**1.8E+04**	**MG/KG**	**CAPL-SB67-1112**	**10/10**	**56.6 - 69.7**	**1.8E+04**	**1.3E+04**	**7.7E+03 N**	**3.0E+03**	**SSL**	**YES**	**ASL**
	7440-38-2	**Arsenic**	**1.9E+00 J**	**2.2E+01 J**	**MG/KG**	**CAPL-SB60P-1112**	**10/10**	**2.83 - 3.49**	**2.2E+01**	**5.5E+00**	**6.7E-01 C**	**1.5E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	3.8E+01	8.9E+01	MG/KG	CAPL-SB66-1112	10/10	11.3 - 13.9	8.9E+01	8.5E+01	1.5E+03 N	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	4.3E-01 J	1.3E+00 J	MG/KG	CAPL-SB60P-1112	10/10	1.42 - 1.74	1.3E+00	5.2E-01	1.6E+01 N	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	3.7E-01 J	1.0E+00 J	MG/KG	CAPL-SB62-1112	2/10	1.42 - 1.74	1.0E+00	ND	7.0E+00 N	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	1.8E+03	1.2E+05 J	MG/KG	CAPL-SB60-1112	10/10	1420 - 1740	1.2E+05	2.4E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**1.9E+01**	**4.2E+01**	**MG/KG**	**CAPL-SB60P-1112**	**10/10**	**2.83 - 3.49**	**4.2E+01**	**3.4E+01**	**3.0E-01 C**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**1.9E+00 J**	**9.1E+00 J**	**MG/KG**	**CAPL-SB60P-1112**	**9/10**	**3.54 - 4.36**	**9.1E+00**	**5.2E+00**	**2.3E+00 N**	**2.7E-02**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	3.0E+00	1.3E+01	MG/KG	CAPL-SB69-1112	10/10	2.83 - 3.49	1.3E+01	3.2E+00	3.1E+02 N	2.8E+00	SSL	NO	BSL
	7439-89-6	**Iron**	**1.3E+04**	**5.1E+04**	**MG/KG**	**CAPL-SB67-1112**	**10/10**	**28.3 - 34.9**	**5.1E+04**	**3.2E+04**	**5.5E+03 N**	**3.5E+01**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	9.0E+00	1.9E+02	MG/KG	CAPL-SB64-1112	10/10	0.85 - 1.05	1.9E+02	8.8E+00	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	9.8E+02 J	8.7E+03	MG/KG	CAPL-SB64-1112	10/10	1420 - 1740	8.7E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**1.8E+01**	**5.2E+02 J**	**MG/KG**	**CAPL-SB60P-1112**	**10/10**	**4.25 - 5.23**	**5.2E+02**	**1.8E+02**	**1.8E+02 N**	**2.8E+00**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	3.0E-02 J	8.0E-02	MG/KG	CAPL-SB63-1112	10/10	0.0346 - 0.05	8.0E-02	1.4E-01	2.3E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	3.5E+00	1.8E+01	MG/KG	CAPL-SB60P-1112	10/10	2.83 - 3.49	1.8E+01	1.8E+01	1.5E+02 N	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	5.3E+02 J	3.6E+03	MG/KG	CAPL-SB68-1112	10/10	1420 - 1740	3.6E+03	9.0E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	2.0E+01	4.5E+01	MG/KG	CAPL-SB67-1112	10/10	3.54 - 4.36	4.5E+01	4.8E+01	3.9E+01 N	8.6E+00	SSL	NO	BBK
	7440-66-6	Zinc	1.6E+01	9.9E+01	MG/KG	CAPL-SB62-1112	10/10	5.66 - 6.97	9.9E+01	2.8E+01	2.3E+03 N	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values from Cheatham Annex/Yorktown background subsurface soil samples; values represent the 95% UTL.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Residential soil RSL. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha-chlordane and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan II and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
ND = Not detected
SSL = Soil Screening Level, Protection of Groundwater, May 2014 RSL table
MG/KG = Milligram per kilogram
NL = Noncarcinogenic lead residential soil RSL based on IEUBK model.

TABLE 2.21a
Step 2 Subsurface Soil from Group 2c, Updradient to Drainages Screening - Risk Ratio, Maximum Detected Concentration
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (MG/KG)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL (MG/KG)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL (MG/KG)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)anthracene	2 / 10	6.1E-01	CAPL-SB62-1112	1.5E-01	1E-06	4E-06	N/A		N/A	N/A
Benzo(a)pyrene	3 / 10	8.6E-01	CAPL-SB62-1112	1.5E-02	1E-06	6E-05	N/A		N/A	N/A
Benzo(b)fluoranthene	5 / 10	2.1E+00	CAPL-SB62-1112	1.5E-01	1E-06	1E-05	N/A		N/A	N/A
Benzo(k)fluoranthene	3 / 10	2.2E+00	CAPL-SB62-1112	1.5E+00	1E-06	1E-06	N/A		N/A	N/A
Dibenz(a,h)anthracene	2 / 10	2.5E-01	CAPL-SB62-1112	1.5E-02	1E-06	2E-05	N/A		N/A	N/A
Indeno(1,2,3-cd)pyrene	3 / 10	1.0E+00	CAPL-SB62-1112	1.5E-01	1E-06	7E-06	N/A		N/A	N/A
Aroclor-1260	6 / 10	7.0E-01 J	CAPL-SB62-1112	2.4E-01	1E-06	3E-06	N/A		N/A	N/A
Aluminum	10 / 10	1.8E+04	CAPL-SB67-1112	N/A		N/A	7.7E+04	1	0.2	Neurological
Arsenic	10 / 10	2.2E+01 J	CAPL-SB60P-1112	6.7E-01	1E-06	3E-05	3.4E+01	1	0.7	Skin, Blood
Chromium[e]	10 / 10	4.2E+01	CAPL-SB60P-1112	3.0E-01	1E-06	1E-04	2.3E+02	1	0.2	None Reported
Cobalt	9 / 10	9.1E+00 J	CAPL-SB60P-1112	N/A		N/A	2.3E+01	1	0.4	Thyroid
Iron	10 / 10	5.1E+04	CAPL-SB67-1112	N/A		N/A	5.5E+04	1	0.9	Gastrointestinal
Manganese	10 / 10	5.2E+02 J	CAPL-SB60P-1112	N/A		N/A	1.8E+03	1	0.3	CNS
Cumulative Corresponding Hazard Index[c]									**3**	
Cumulative Corresponding Cancer Risk[d]						**3E-04**				

Total Neurological/CNS HI =	0.5
Total Skin HI =	0.7
Total Blood HI =	0.7
Total Thyroid HI =	0.4
Total Gastrointestinal HI =	0.9

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

CNS = Central nervous System

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.21b

Step 3 Subsurface Soil from Group 2c, Upgradient to Drainages Screening - Risk Ratio, 95% UCL Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	95% UCL (mg/kg)		95% UCL Rationale	Carcinogenic Residential Soil RSL (mg/kg)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL (mg/kg)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)anthracene	2 / 10	6.1E-01	MAX	6	1.5E-01	1E-06	4E-06	N/A		N/A	N/A
Benzo(a)pyrene	3 / 10	2.9E-01	95% KM(t)	1, 2	1.5E-02	1E-06	2E-05	N/A		N/A	N/A
Benzo(b)fluoranthene	5 / 10	6.6E-01	95% KM-b	1, 2, 3	1.5E-01	1E-06	4E-06	N/A		N/A	N/A
Benzo(k)fluoranthene	3 / 10	7.2E-01	95% KM(t)	1, 2	1.5E+00	1E-06	5E-07	N/A		N/A	N/A
Dibenz(a,h)anthracene	2 / 10	2.5E-01	MAX	6	1.5E-02	1E-06	2E-05	N/A		N/A	N/A
Indeno(1,2,3-cd)pyrene	3 / 10	3.3E-01	95% KM(t)	1, 2	1.5E-01	1E-06	2E-06	N/A		N/A	N/A
Aroclor-1260	6 / 10	2.5E-01	95% KM(t)	1, 2, 3	2.4E-01	1E-06	1E-06	N/A		N/A	N/A
Arsenic	10 / 10	1.3E+01	95% Stud-t	1, 2, 3	6.7E-01	1E-06	2E-05	3.4E+01	1	0.4	Skin, Blood
Chromium[e]	10 / 10	3.5E+01	95% Stud-t	1, 2, 3	3.0E-01	1E-06	1E-04	2.3E+02	1	0.2	None Reported
Iron	10 / 10	3.9E+04	95% Stud-t	1, 2, 3	N/A		N/A	5.5E+04	1	0.7	Gastrointestinal
Cumulative Corresponding Hazard Index[c]										**1.2**	
Cumulative Corresponding Cancer Risk[d]							**2E-04**				

Total Skin HI =	0.4
Total Blood HI =	0.4
Total Gastrointestinal HI =	0.7

[a] Corresponding Cancer Risk equals 95% UCL divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals 95% UCL divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium(VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,

Constituents selected as COPCs are indicated by shading.

mg/kg = milligrams per kilogram

N/A = Not available/not applicable

ProUCL, Version 5.0 used to determine distribution of data and calculate 95% UCL, following recommendations

in users guide (USEPA. May 2013. ProUCL, Version 5.0. Prepared by Lockheed Martin Environmental Services).

Options: Maximum detected concentration (MAX); 95% Kaplan-Meier (t) UCL (95% KM(t)); 95% Kaplan-Meir (percentile bootstrap) UCL (95% KM-b); 95% Student's-t UCL (95% Stud-t).

UCL Rationale:

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.

(3) Statistical Tests indicate data are gamma distributed.

(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

(5) Max value used because 95% UCL greater than max.

6) Max value used because only 2 detected concentrations, not enough to compute meaningful or reliable statistics and estimates.

Table 2.22
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 2d Potential Sprayed Areas	78-93-3	2-Butanone	4.4E-03 J	7.9E-03	MG/KG	CAPL-SS72-1112	3/6	0.00791 - 0.0141	7.9E-03	N/A	2.8E+03 N	1.2E-01	SSL	NO	BSL
	67-64-1	Acetone	1.1E-02 J	5.8E-02 J	MG/KG	CAPL-SS71-1112	4/6	0.0158 - 0.0282	5.8E-02	N/A	6.1E+03 N	2.9E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	2.7E-02 J	3.8E-02 J	MG/KG	CAPL-SS70-1112, CAPL-SS73-1112	4/6	0.0673 - 0.0837	3.8E-02	N/A	2.3E+01 N	1.9E-02	SSL	NO	BSL
	83-32-9	Acenaphthene	1.7E-01	1.7E-01	MG/KG	CAPL-SS74-1112	1/6	0.0673 - 0.0837	1.7E-01	N/A	3.5E+02 N	5.5E-01	SSL	NO	BSL
	120-12-7	Anthracene	5.1E-01	5.1E-01	MG/KG	CAPL-SS74-1112	1/6	0.0673 - 0.0837	5.1E-01	N/A	1.7E+03 N	5.8E+00	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**1.3E-01**	**8.0E-01**	**MG/KG**	**CAPL-SS74-1112**	**2/6**	**0.0673 - 0.0837**	**8.0E-01**	**N/A**	**1.5E-01 C**	**1.2E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**1.2E-01**	**7.2E-01**	**MG/KG**	**CAPL-SS74-1112**	**2/6**	**0.0673 - 0.0837**	**7.2E-01**	**N/A**	**1.5E-02 C**	**4.0E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**4.6E-02 J**	**4.2E-01**	**MG/KG**	**CAPL-SS74-1112**	**3/6**	**0.0673 - 0.0837**	**4.2E-01**	**N/A**	**1.5E-01 C**	**4.1E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	1.1E-01	4.0E-01	MG/KG	CAPL-SS74-1112	2/6	0.0673 - 0.0837	4.0E-01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	1.3E-01	5.1E-01	MG/KG	CAPL-SS74-1112	2/6	0.0673 - 0.0837	5.1E-01	N/A	1.5E+00 C	4.0E-01	SSL	NO	BSL
	218-01-9	Chrysene	4.7E-02 J	9.1E-01	MG/KG	CAPL-SS74-1112	5/6	0.0673 - 0.0837	9.1E-01	N/A	1.5E+01 C	1.2E+00	SSL	NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**1.4E-01**	**1.4E-01**	**MG/KG**	**CAPL-SS74-1112**	**1/6**	**0.0673 - 0.0837**	**1.4E-01**	**N/A**	**1.5E-02 C**	**1.3E-02**	**SSL**	**YES**	**ASL**
	206-44-0	Fluoranthene	3.7E-02 J	1.5E+00	MG/KG	CAPL-SS74-1112	6/6	0.0673 - 0.0837	1.5E+00	N/A	2.3E+02 N	8.9E+00	SSL	NO	BSL
	86-73-7	Fluorene	1.7E-01	1.7E-01	MG/KG	CAPL-SS74-1112	1/6	0.0673 - 0.0837	1.7E-01	N/A	2.3E+02 N	5.4E-01	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**1.0E-01**	**3.2E-01**	**MG/KG**	**CAPL-SS74-1112**	**2/6**	**0.0673 - 0.0837**	**3.2E-01**	**N/A**	**1.5E-01 C**	**2.4E-01**	**SSL**	**YES**	**ASL**
	85-01-8	Phenanthrene	4.4E-02 J	1.9E+00	MG/KG	CAPL-SS74-1112	5/6	0.0673 - 0.0837	1.9E+00	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	4.6E-02 J	2.1E+00	MG/KG	CAPL-SS74-1112	6/6	0.0673 - 0.0837	2.1E+00	N/A	1.7E+02 N	1.3E+00	SSL	NO	BSL
	72-54-8	4,4'-DDD	5.7E-04 J	1.9E-02 J	MG/KG	CAPL-SS73-1112	4/6	0.000691 - 0.000817	1.9E-02	N/A	2.2E+00 C	7.2E-03	SSL	NO	BSL
	72-55-9	4,4'-DDE	2.5E-03 J	1.5E-01 L	MG/KG	CAPL-SS73-1112	4/6	0.000691 - 0.00784	1.5E-01	N/A	1.6E+00 C	5.4E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	3.4E-04 J	3.3E-01 L	MG/KG	CAPL-SS73-1112	5/6	0.000691 - 0.00784	3.3E-01	N/A	1.9E+00 C	7.7E-02	SSL	NO	BSL
	309-00-2	Aldrin	3.6E-04 L	3.6E-04 L	MG/KG	CAPL-SS72-1112	1/6	0.000691 - 0.000817	3.6E-04	N/A	3.1E-02 C	7.5E-04	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	1.4E-03 J	1.3E-02 J	MG/KG	CAPL-SS73-1112	2/6	0.000691 - 0.000817	1.3E-02	N/A	1.8E+00 C	1.5E-02	SSL	NO	BSL
	11096-82-5	**Aroclor-1260**	**1.2E-02 J**	**4.6E+00 J**	**MG/KG**	**CAPL-SS73-1112**	**4/6**	**0.0175 - 0.199**	**4.6E+00**	**N/A**	**2.4E-01 C**	**2.7E-02**	**SSL**	**YES**	**ASL**
	60-57-1	Dieldrin	3.1E-04 J	1.9E-02 J	MG/KG	CAPL-SS73-1112	4/6	0.000691 - 0.000817	1.9E-02	N/A	3.3E-02 C	6.9E-05	SSL	NO	BSL
	33213-65-9	Endosulfan II	2.7E-04 L	3.9E-02 L	MG/KG	CAPL-SS73-1112	2/6	0.000691 - 0.000817	3.9E-02	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	1031-07-8	Endosulfan sulfate	5.6E-04 J	9.9E-03 J	MG/KG	CAPL-SS72-1112	3/6	0.000691 - 0.000817	9.9E-03	N/A	3.7E+01 N	1.4E-01	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	7.6E-04 J	7.8E-03 J	MG/KG	CAPL-SS73-1112	2/6	0.000691 - 0.000817	7.8E-03	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	53494-70-5	Endrin ketone	1.4E-03 J	4.0E-02 J	MG/KG	CAPL-SS73-1112	2/6	0.000691 - 0.000817	4.0E-02	N/A	1.8E+00 N	9.2E-03	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	5.3E-04 J	1.3E-02 L	MG/KG	CAPL-SS73-1112	6/6	0.000691 - 0.000817	1.3E-02	N/A	1.8E+00 C	N/A	SSL	NO	BSL
	1024-57-3	Heptachlor epoxide	4.8E-04 J	4.8E-04 J	MG/KG	CAPL-SS73-1112	1/6	0.000691 - 0.000817	4.8E-04	N/A	5.9E-02 C	7.8E-05	SSL	NO	BSL
	72-43-5	Methoxychlor	2.2E-04 J	2.1E-02 J	MG/KG	CAPL-SS73-1112	3/6	0.000691 - 0.000817	2.1E-02	N/A	3.1E+01 N	2.0E-01	SSL	NO	BSL
	7429-90-5	Aluminum	3.3E+03	9.5E+03	MG/KG	CAPL-SS71-1112	6/6	19.7 - 66.1	9.5E+03	1.2E+04	7.7E+03 N	3.0E+03	SSL	NO	BBK
	7440-38-2	**Arsenic**	**9.4E-01 J**	**7.2E+00**	**MG/KG**	**CAPL-SS75-1112**	**6/6**	**0.983 - 3.31**	**7.2E+00**	**6.4E+00**	**6.7E-01 C**	**1.5E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.1E+01	6.6E+01	MG/KG	CAPL-SS74-1112	6/6	3.93 - 13.2	6.6E+01	5.3E+01	1.5E+03 N	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	3.6E-01 J	1.6E+00	MG/KG	CAPL-SS70-1112	5/6	0.492 - 1.65	1.6E+00	5.9E-01	1.6E+01 N	1.9E+00	SSL	NO	BSL

Table 2.22
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 2d Potential Sprayed Areas (cont'd)	7440-43-9	Cadmium	3.4E-01 J	9.8E-01 J	MG/KG	CAPL-SS73-1112	2/6	0.492 - 1.65	9.8E-01	1.5E+00	7.0E+00 N	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	2.1E+03	5.8E+04	MG/KG	CAPL-SS74-1112	6/6	492 - 1650	5.8E+04	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**5.8E+00**	**2.3E+01**	**MG/KG**	**CAPL-SS74-1112**	**6/6**	**0.983 - 3.31**	**2.3E+01**	**1.8E+01**	**3.0E-01 C**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	Cobalt	2.0E+00 J	3.8E+00	MG/KG	CAPL-SS74-1112	6/6	1.23 - 4.13	3.8E+00	9.9E+00	2.3E+00 N	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	3.3E+00	5.2E+01	MG/KG	CAPL-SS75-1112	6/6	0.983 - 3.31	5.2E+01	4.3E+00	3.1E+02 N	2.8E+00	SSL	NO	BSL
	57-12-5	Cyanide	1.6E-01 J	1.6E-01 J	MG/KG	CAPL-SS75-1112	1/6	0.738 - 0.925	1.6E-01	ND	2.1E+00 N	1.5E-03	SSL	NO	BSL
	7439-89-6	Iron	6.4E+03	1.9E+04	MG/KG	CAPL-SS75-1112	6/6	9.83 - 33.1	1.9E+04	2.0E+04	5.5E+03 N	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	1.0E+01	1.6E+02	MG/KG	CAPL-SS75-1112	6/6	0.295 - 0.992	1.6E+02	1.7E+01	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	1.5E+03	2.3E+04	MG/KG	CAPL-SS72-1112	6/6	492 - 1650	2.3E+04	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**1.2E+02**	**4.1E+02**	**MG/KG**	**CAPL-SS70-1112**	**6/6**	**1.48 - 4.96**	**4.1E+02**	**3.2E+02**	**1.8E+02 N**	**2.8E+00**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	1.9E-02 J	8.6E-02	MG/KG	CAPL-SS73-1112	4/6	0.0379 - 0.0484	8.6E-02	1.1E-01	2.3E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	2.3E+00	1.2E+01	MG/KG	CAPL-SS74-1112	6/6	0.983 - 3.31	1.2E+01	9.5E+00	1.5E+02 N	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	4.1E+02 J	1.3E+03 J	MG/KG	CAPL-SS74-1112	6/6	492 - 1650	1.3E+03	7.1E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	1.3E+01	2.8E+01	MG/KG	CAPL-SS74-1112	6/6	1.23 - 4.13	2.8E+01	2.8E+01	3.9E+01 N	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	2.2E+01	2.0E+02	MG/KG	CAPL-SS75-1112	6/6	1.97 - 6.61	2.0E+02	2.7E+01	2.3E+03 N	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Background values from Cheatham Annex/Yorktown background surface soil samples; values represent the 95% UTL.
[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Residential soil RSL. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha-chlordane and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan II and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.
[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
ND = Not detected
SSL = Soil Screening Level, Protection of Groundwater, May 2014 RSL table
MG/KG = Milligram per kilogram
NL = Noncarcinogenic lead residential soil RSL based on IEUBK model.

TABLE 2.22a

Step 2 Surface Soil from Group 2d, Potential Sprayed Areas Screening - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (MG/KG)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL (MG/KG)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL (MG/KG)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Benzo(a)anthracene	2 / 6	8.0E-01	CAPL-SS74-1112	1.5E-01	1E-06	5E-06	N/A		N/A	N/A
Benzo(a)pyrene	2 / 6	7.2E-01	CAPL-SS74-1112	1.5E-02	1E-06	5E-05	N/A		N/A	N/A
Benzo(b)fluoranthene	3 / 6	4.2E-01	CAPL-SS74-1112	1.5E-01	1E-06	3E-06	N/A		N/A	N/A
Dibenz(a,h)anthracene	1 / 6	1.4E-01	CAPL-SS74-1112	1.5E-02	1E-06	9E-06	N/A		N/A	N/A
Indeno(1,2,3-cd)pyrene	2 / 6	3.2E-01	CAPL-SS74-1112	1.5E-01	1E-06	2E-06	N/A		N/A	N/A
Aroclor-1260	4 / 6	4.6E+00 J	CAPL-SS73-1112	2.4E-01	1E-06	2E-05	N/A		N/A	N/A
Arsenic	6 / 6	7.2E+00	CAPL-SS75-1112	6.7E-01	1E-06	1E-05	3.4E+01	1	0.2	Skin, Blood
Chromium[e]	6 / 6	2.3E+01	CAPL-SS74-1112	3.0E-01	1E-06	8E-05	2.3E+02	1	0.1	None Reported
Manganese	6 / 6	4.1E+02	CAPL-SS70-1112	N/A		N/A	1.8E+03	1	0.2	CNS
Cumulative Corresponding Hazard Index[c]									**0.5**	
Cumulative Corresponding Cancer Risk[d]						**2E-04**				

Total Skin HI =	0.2
Total Blood HI =	0.2
Total Neurological/CNS HI =	0.2

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

CNS = Central nervous System

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Table 2.23
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Group 2d Potential Sprayed Areas	78-93-3	2-Butanone	4.2E-03 J	4.8E-03 J	MG/KG	CAPL-SB72-1112	2/6	0.007 - 0.011	4.8E-03	N/A	2.8E+03 N	1.2E-01	SSL	NO	BSL
	67-64-1	Acetone	6.8E-03 J	2.9E-02 J	MG/KG	CAPL-SB74-1112	3/6	0.014 - 0.022	2.9E-02	N/A	6.1E+03 N	2.9E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	4.4E-03 J	8.9E-03	MG/KG	CAPL-SB75-1112	2/6	0.0071 - 0.035	8.9E-03	N/A	2.3E+01 N	1.9E-02	SSL	NO	BSL
	50-32-8	Benzo(a)pyrene	5.0E-03 J	5.0E-03 J	MG/KG	CAPL-SB75-1112	1/6	0.0071 - 0.035	5.0E-03	N/A	1.5E-02 C	4.0E-03	SSL	NO	BSL
	205-99-2	Benzo(b)fluoranthene	8.2E-03	1.1E-02	MG/KG	CAPL-SB75-1112	2/6	0.0071 - 0.035	1.1E-02	N/A	1.5E-01 C	4.1E-02	SSL	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	4.0E-03 J	5.5E-03 J	MG/KG	CAPL-SB75-1112	2/6	0.0071 - 0.035	5.5E-03	N/A	1.7E+02 N	N/A		NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.1E-01 J	3.0E-01 J	MG/KG	CAPL-SB72-1112	4/6	0.35 - 0.46	3.0E-01	N/A	3.8E+01 C	1.3E+00	SSL	NO	BSL
	218-01-9	Chrysene	1.1E-02	2.4E-02 J	MG/KG	CAPL-SB72-1112	3/6	0.007 - 0.035	2.4E-02	N/A	1.5E+01 C	1.2E+00	SSL	NO	BSL
	206-44-0	Fluoranthene	6.4E-03 J	7.4E-03 J	MG/KG	CAPL-SB75-1112	2/6	0.007 - 0.035	7.4E-03	N/A	2.3E+02 N	8.9E+00	SSL	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	4.3E-03 J	4.3E-03 J	MG/KG	CAPL-SB75-1112	1/6	0.007 - 0.035	4.3E-03	N/A	1.5E-01 C	2.4E-01	SSL	NO	BSL
	91-20-3	Naphthalene	4.5E-03 J	6.6E-03 J	MG/KG	CAPL-SB75-1112	2/6	0.007 - 0.035	6.6E-03	N/A	3.8E+00 C	5.4E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	8.9E-03	2.6E-02 J	MG/KG	CAPL-SB72-1112	3/6	0.007 - 0.035	2.6E-02	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	6.6E-03 J	8.6E-03	MG/KG	CAPL-SB75-1112	2/6	0.007 - 0.035	8.6E-03	N/A	1.7E+02 N	1.3E+00	SSL	NO	BSL
	72-54-8	4,4'-DDD	6.2E-04 J	6.2E-04 J	MG/KG	CAPL-SB73-1112	1/6	0.0007 - 0.00088	6.2E-04	N/A	2.2E+00 C	7.2E-03	SSL	NO	BSL
	72-55-9	4,4'-DDE	8.0E-04 J	4.2E-03 L	MG/KG	CAPL-SB73-1112	3/6	0.0007 - 0.00088	4.2E-03	N/A	1.6E+00 C	5.4E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	3.6E-03 J	3.6E-03 J	MG/KG	CAPL-SB73-1112	1/6	0.0007 - 0.00088	3.6E-03	N/A	1.9E+00 C	7.7E-02	SSL	NO	BSL
	11096-82-5	Aroclor-1260	5.7E-02	5.7E-02	MG/KG	CAPL-SB73-1112	1/6	0.018 - 0.022	5.7E-02	N/A	2.4E-01 C	2.7E-02	SSL	NO	BSL
	60-57-1	Dieldrin	1.0E-03 J	1.0E-03 J	MG/KG	CAPL-SB73-1112	1/6	0.0007 - 0.00088	1.0E-03	N/A	3.3E-02 C	6.9E-05	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	2.2E-04 J	5.7E-04 J	MG/KG	CAPL-SB73-1112	5/6	0.0007 - 0.00088	5.7E-04	N/A	1.8E+00 C	1.5E-02	SSL	NO	BSL
	72-43-5	Methoxychlor	4.6E-04 J	4.6E-04 J	MG/KG	CAPL-SB73-1112	1/6	0.0007 - 0.00088	4.6E-04	N/A	3.1E+01 N	2.0E-01	SSL	NO	BSL
	7429-90-5	**Aluminum**	**5.1E+03**	**1.4E+04**	**MG/KG**	**CAPL-SB71-1112**	**6/6**	**12 - 70.3**	**1.4E+04**	**1.3E+04**	**7.7E+03 N**	**3.0E+03**	**SSL**	**YES**	**ASL**
	7440-38-2	**Arsenic**	**1.5E+00 J**	**1.2E+01**	**MG/KG**	**CAPL-SB74-1112**	**6/6**	**0.60 - 3.52**	**1.2E+01**	**5.5E+00**	**6.7E-01 C**	**1.5E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	2.7E+01	2.1E+02 J	MG/KG	CAPL-SB75-1112	6/6	2.41 - 14.1	2.1E+02	8.5E+01	1.5E+03 N	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	2.5E-01 J	1.2E+00 J	MG/KG	CAPL-SB75-1112	5/6	0.30 - 1.76	1.2E+00	5.2E-01	1.6E+01 N	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	2.0E-01 J	2.0E-01 J	MG/KG	CAPL-SB73-1112	1/6	0.30 - 1.76	2.0E-01	ND	7.0E+00 N	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	9.9E+02	8.7E+03 J	MG/KG	CAPL-SB75-1112	6/6	301 - 1760	8.7E+03	2.4E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**8.4E+00**	**3.7E+01**	**MG/KG**	**CAPL-SB71-1112**	**6/6**	**0.60 - 3.52**	**3.7E+01**	**3.4E+01**	**3.0E-01 C**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	Cobalt	1.3E+00 J	3.0E+00 J	MG/KG	CAPL-SB71-1112	5/6	0.75 - 4.39	3.0E+00	5.2E+00	2.3E+00 N	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	2.8E+00 J	1.2E+01	MG/KG	CAPL-SB75P-1112	5/6	0.60 - 3.52	1.2E+01	3.2E+00	3.1E+02 N	2.8E+00	SSL	NO	BSL
	7439-89-6	**Iron**	**8.1E+03**	**6.5E+04**	**MG/KG**	**CAPL-SB74-1112**	**6/6**	**6.0 - 35.2**	**6.5E+04**	**3.2E+04**	**5.5E+03 N**	**3.5E+01**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	6.5E+00	3.4E+01 L	MG/KG	CAPL-SB73-1112	6/6	0.18 - 1.05	3.4E+01	8.8E+00	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	5.5E+02 J	3.3E+03	MG/KG	CAPL-SB71-1112	6/6	301 - 1760	3.3E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**1.6E+01**	**3.7E+02 J**	**MG/KG**	**CAPL-SB75-1112**	**6/6**	**0.90 - 5.27**	**3.7E+02**	**1.8E+02**	**1.8E+02 N**	**2.8E+00**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	2.5E-02 J	6.6E-02 J	MG/KG	CAPL-SB75-1112	5/6	0.038 - 0.048	6.6E-02	1.4E-01	2.3E+00 N	N/A		NO	BSL
	7440-02-0	Nickel	1.7E+00 J	7.3E+00	MG/KG	CAPL-SB75P-1112	6/6	0.60 - 3.52	7.3E+00	1.8E+01	1.5E+02 N	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	2.8E+02 J	3.5E+03	MG/KG	CAPL-SB71-1112	5/6	301 - 1760	3.5E+03	9.0E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	1.1E+01	4.2E+01	MG/KG	CAPL-SB74-1112	6/6	0.75 - 4.39	4.2E+01	4.8E+01	3.9E+01 N	8.6E+00	SSL	NO	BBK
	7440-66-6	Zinc	6.4E+00	3.9E+01	MG/KG	CAPL-SB75P-1112	6/6	1.2 - 7.03	3.9E+01	2.8E+01	2.3E+03 N	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values from Cheatham Annex/Yorktown background subsurface soil samples; values represent the 95% UTL.

[4] Oak Ridge National Laboratory (ORNL). May, 2014. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Residential soil RSL. RSL based on noncarcinogenic endpoints based on hazard quotient of 0.1. RSL based on carcinogenic endpoints based on cancer risk of 10-6.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha-chlordane and gamma-chlordane.
RSL value for chromium (VI) used as surrogate for chromium.
RSL value for mercuric chloride used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

J = Estimated Value
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = Not available
ND = Not detected
SSL = Soil Screening Level, Protection of Groundwater, May 2014 RSL table
MG/KG = Milligram per kilogram
NL = Noncarcinogenic lead residential soil RSL based on IEUBK model.

TABLE 2.23a

Step 2 Subsurface Soil from Group 2d, Potential Sprayed Areas Screening - Risk Ratio, Maximum Detected Concentration

Penniman Lake, Cheatham Annex, Williamsburg, Virginia

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (MG/KG)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL (MG/KG)	Acceptable Risk Level	Corresponding Cancer Risk[a]	Non-carcinogenic Residential Soil RSL (MG/KG)	Acceptable Hazard Level	Corresponding Hazard Index[b]	Target Organ
Aluminum	6 / 6	1.4E+04	CAPL-SB71-1112	N/A		N/A	7.7E+04	1	0.2	Neurological
Arsenic	6 / 6	1.2E+01	CAPL-SB74-1112	6.7E-01	1E-06	2E-05	3.4E+01	1	0.3	Skin, Blood
Chromium[e]	6 / 6	3.7E+01	CAPL-SB71-1112	3.0E-01	1E-06	1E-04	2.3E+02	1	0.2	None Reported
Iron	6 / 6	6.5E+04	CAPL-SB74-1112	N/A		N/A	5.5E+04	1	1.2	Gastrointestinal
Manganese	6 / 6	3.7E+02 J	CAPL-SB75-1112	N/A		N/A	1.8E+03	1	0.2	CNS
Cumulative Corresponding Hazard Index[c]									**2.1**	
Cumulative Corresponding Cancer Risk[d]						**1E-04**				

Total Neurological/CNS HI =	0.4
Total Skin HI =	0.3
Total Blood HI =	0.3
Total Gastrointestinal HI =	1.2

Notes:

[a] Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[b] Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

[e] RSL value for chromium (VI) used for chromium.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

CNS = Central nervous System

COPC = Constituent of Potential Concern

HI = Hazard Index

L = Biased Low

MG/KG = milligrams per kilogram

N/A = Not available/not applicable

Attachment D
Ecological Risk Screening

ATTACHMENT D

Ecological Risk Screening

An ecological risk screening was performed to determine the potential for ecological risks associated with exposure to surface (0 to 6 inches) and shallow subsurface soil (6 to 24 inches) in upland areas draining to Penniman Lake, and to surface water, surface sediment (0 to 4 inches), subsurface sediment (4 to 8 inches), and fish/frog tissues from Penniman Lake itself, including small lobes where drainages enter the pond. The results of the ecological risk screening provide a preliminary indication of potential risks from exposure to the identified chemicals of potential concern (COPCs) and are used to help determine whether the site requires further evaluation (such as a baseline ecological risk assessment or additional data collection) or if ecological risks are acceptable.

D.1 Ecological Conceptual Site Model (CSM)

The ecological conceptual site model provides a brief summary of site conditions, potential contaminant migration pathways, and exposure pathways to potential ecological receptors. Penniman Lake is a fresh water body located in the southeastern portion of Cheatham Annex. A dam separates the lake from the tidal King Creek, a tributary of the York River. There are no specific source areas associated with Penniman Lake although several IRP sites (e.g., Site 11, AOC 6) occur in close proximity to this lake. Developed areas occur north and west of the lake while the remainder of the lake is bordered by forested habitats. A number of drainages, particularly from the developed areas west of the lake, enter the lake and form small lobes or fingers at the points of entry. Physical parameter measurements from soils in the drainage areas and the upper portion of the drainage ditches are summarized in **Table D-1**.

Maximum water depths (near the dam) are approximately 15 feet and waters are slightly to moderately turbid (**Table D-2**). Substrate type is somewhat variable but is generally composed of medium to fine sand (particularly in the lower portions of the drainage ditches) and silt/clay (**Table D-3**). Total organic carbon (TOC) is also somewhat variable, ranging from less than one percent to almost 20 percent.

A reconnaissance-level biological survey of fish and other aquatic organisms (such as frogs/tadpoles) was conducted in Penniman Lake, as well as in a reference pond (Cheatham Pond) in October 2012. The results of this survey were used to characterize the ecological receptors that are present in Penniman Lake and to guide the collection of fish and frog tissue samples. In addition, a semi-quantitative survey of aquatic/ benthic macroinvertebrates was conducted in Penniman Lake (20 locations), as well as in the reference pond (10 locations) to characterize the type of community that was present. **Table D-4** summarizes the results of the benthic invertebrate surveys. A total of 191 organisms from 17 taxa were found in the 20 Penniman Lake samples. The dominant organisms were chironomids (midges), dragonflies (Anisoptera), and oligochaetes (worms). **Table D-5** compares the results of the benthic invertebrate surveys at the Penniman Lake locations with those from the reference locations. A total of 128 organisms from 15 taxa were found in the five reference pond vegetated area samples, while a total of 52 organisms from 10 taxa were found in the five reference pond open water area samples (**Table D-5**). The dominant organisms (in order of relative abundance) in the reference pond vegetated area samples were chironomids (midges), dragonflies (Anisoptera), beetles (Coleoptera), oligochaetes (worms), and damselflies (Zygoptera). These same groups were the dominant organisms in Penniman Lake but with a slightly different ranking based on relative abundance. The average (per sample) relative abundance and number of taxa, as compared to the reference area for vegetated habitats, were somewhat lower in Penniman Lake (58 and 75 percent of reference). The

dominant organisms in reference pond open water area samples were (in order of relative abundance) chironomids (midges) and oligochaetes (worms), as was the case in Penniman Lake. The average (per sample) relative abundance and number of taxa, as compared to the reference area for open water habitats, were somewhat lower in Penniman Lake (64 and 60 percent of reference).

In Penniman Lake, one species of frog, American bullfrog (*Lithobates catesbeinanus*), was collected (**Tables D-6 and D-7**). All frogs (both adults and tadpoles) were caught in the western drainages and lobes of the lake (**Figure 3** of this TM). Bluegill (*Lepomis macrochirus*) was the most numerous fish species present; American eel (*Anguilla rostrata*), black crappie (*Pomoxis nigromaculatus*), golden shiner (*Notemigonus crysoleucas*), redear sunfish (*Lepomis microlophus*), and largemouth bass (*Micropterus salmoides*) were also collected; almost all of the fish were caught in the northwest portion of the lake. None of the fish and frog specimens had any observed external abnormalities, deformities, or anomalies.

Complete exposure pathways exist to lower trophic level terrestrial receptors (plants, soil invertebrates, and reptiles) from exposure to surface and shallow subsurface soils in the upland areas/drainages. Exposures of upper trophic level terrestrial receptors (such as birds and mammals) from incidental ingestion of surface soil and from food webs are also complete pathways.

Complete exposure pathways exist to lower trophic level aquatic receptors (plants, aquatic/benthic invertebrates, fish, reptiles, and amphibians) from exposure to surface water and surface sediment in the lake. Exposures of upper trophic level aquatic receptors (such as birds and mammals) from incidental ingestion of sediment, ingestion of water, and from food webs are also complete pathways.

Table D-8 shows the assessment endpoints, risk hypotheses, and measurement endpoints used in the risk screening. **Table D-8** also shows the receptors associated with each endpoint.

D.2 Ecological Risk Screening Methodology

The ecological risk screening was conducted on a medium-specific basis. Initially, maximum detected site concentrations were compared to medium-specific ecological screening values (ESVs) and used in food web models; this is comparable to Step 2 of the ERA process (USEPA, 1997a; NAVFAC, 2003; 2012). For chemicals that were retained during this initial comparison, area-specific comparisons utilizing maximum, 95% UCL, and mean concentrations were conducted, as were comparisons to background/reference concentrations; this is comparable to Step 3A of the ERA process. The samples used in the ecological risk screening are listed in **Table D-9** and their locations are shown on **Figure 3** of this TM; **Table D-9** also shows the data groupings used in the area-specific evaluations. **Table D-10** shows the background concentrations for physical media (surface soil, subsurface soil, surface water, surface sediment, and subsurface sediment), and **Tables D-11 through D-13** show the reference fish and frog tissue concentrations.

Site-specific food web modeling was conducted for constituents on the list of bioaccumulative chemicals in USEPA (2000) guidance (**Table D-14**) using the following terrestrial and aquatic receptor species:

- Mourning dove (*Zenaida macroura*) – terrestrial avian herbivore
- American robin (*Turdus migratorius*) – terrestrial avian omnivore/invertivore (modeled as both)
- Red-tailed hawk (*Buteo jamaicensis*) – terrestrial avian carnivore
- Meadow vole (*Microtus pennsylvanicus*) – terrestrial mammalian herbivore
- Short-tailed shrew (*Blarina brevicauda*) – terrestrial mammalian invertivore
- White footed mouse (*Peromyscus leucopus*) – terrestrial mammalian omnivore
- Red fox (*Vulpes vulpes*) – terrestrial mammalian carnivore
- Mallard (*Anas platyrhynchos*) – aquatic/wetland avian omnivore

- Belted kingfisher (*Ceryle alcyon*) – aquatic/wetland avian piscivore/invertivore
- Great blue heron (*Ardea herodias*) – aquatic/wetland avian piscivore
- Osprey (*Pandion haliaetus*) – aquatic/wetland avian piscivore
- Tree swallow (*Tachycineta bicolor*) – avian aerial insectivore
- Muskrat (*Ondatra zibethicus*) – aquatic/wetland mammalian herbivore
- Raccoon (*Procyon lotor*) – aquatic/wetland mammalian omnivore
- Mink (*Mustela vison*) – aquatic/wetland mammalian piscivore

Bioaccumulation factors used in the food web models are contained in **Tables D-15 through D-22**. Dietary items for which tissue concentrations were modeled included terrestrial and aquatic plants, soil and benthic invertebrates, and small mammals. Measured tissue concentrations were available for fish and frogs (adults and tadpoles) for key chemical groups (PCBs, pesticides, and metals). These data are summarized (on a dry-weight basis) in **Tables D-23** (whole-body frogs), **D-24** (whole-body fish), and **D-25** (reconstituted fillet/offal large whole-body fish [largemouth bass]; used for the osprey food web model).

Dietary intakes for each upper trophic level receptor were calculated using the following formula (modified from USEPA [1993]):

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

where:
- DI_x = Dietary intake for chemical x (mg chemical/kg body weight/day)
- FIR = Food ingestion rate (kg/day, dry-weight)
- FC_{xi} = Concentration of chemical x in food item i (mg/kg, dry-weight)
- PDF_i = Proportion of diet composed of food item i (dry-weight basis)
- SC_x = Concentration of chemical x in soil or sediment (mg/kg, dry-weight)
- PDS = Proportion of diet composed of soil or sediment (dry-weight basis)
- WIR = Water ingestion rate (L/day)
- WC_x = Concentration of chemical x in water (mg/L)
- BW = Body weight (kg)

Receptor-specific exposure parameter values are contained in **Tables D-26 and D-27**. For receptors that consume small mammals (red fox and red-tailed hawk), it was assumed that the small mammal portion of the diet was composed of equal parts voles (herbivores), shrews (insectivores), and mice (omnivores). It was assumed that osprey consumed only the large-sized largemouth bass (reconstituted fillet/offal samples) and no frogs. It was assumed that equal proportions of fish and frogs were consumed by the raccoon and great blue heron. It was assumed that the belted kingfisher and mink consumed fish and frogs at a 3:1 ratio.

For direct exposures to fish and frogs (tissue residues) and exposure via food webs, total PCBs in tissue were evaluated as the sum total of the detections in each of the 10 homologue groups. For direct exposures to fish and frogs (tissue residues) and exposure via food webs, dioxin-like PCBs in tissue were evaluated as a single group using the toxicity equivalency quotient (TEQ) approach and the toxicity equivalence factors (TEFs) listed in **Table D-28** (Van den Berg et al., 1998; 2006). Fish TEFs were used to calculate concentrations for comparison to tissue ESVs. Mammalian and bird TEFs were used to calculate the concentrations used in the food web models for mammalian and bird receptors, respectively.

Ingestion-based toxicity reference values (TRVs) are listed in **Tables D-29** (mammals) and **D-30** (birds). The uncertainty factors listed in **Table D-31** were used to derive these TRVs where necessary. In terrestrial

habitats, Step 2 food web COPCs were selected by first comparing the maximum surface soil concentration with the lower of the available bird and mammal Eco-SSLs (**Table D-32**).

Medium-specific ESVs used in the screening, which are based on lower trophic level receptor exposures, are contained in **Tables D-33** (soil), **D-34** (fresh surface water; the hardness values in **Table D-35** were used to adjust several of the metal ESVs), **D-36** (freshwater sediment), and **D-37** (marine sediment, used for the one sample collected on the other side of the dam in King Creek). Where necessary, the uncertainty factors listed in **Table D-31** were used to adjust the ESVs to no-effect level values. Organic chemicals in sediment were screened against both Screening Level Concentration (SLC) based ESVs and Equilibrium Partitioning (EqP) based ESVs (adjusted based on the mean site-specific TOC concentrations, as shown in **Tables D-38** [surface sediment] and **D-39** [subsurface sediment]). Fish and frog tissue-based ESVs were derived for chemicals that were detected in tissue samples collected from Penniman Lake. The fish and frog tissue ESVs (**Tables D-40 and D-41**) were derived using whole-body data (where possible) for freshwater fish and frog species relevant to the habitats present in Penniman Lake (where possible).

D.3 Ecological Risk Screening Results

The ecological risk screening was performed for surface soil, shallow subsurface soil, surface water, surface sediment, subsurface sediment, fish tissue, and frog tissue. Food web exposures were evaluated for both terrestrial and aquatic habitats.

D.3.1 Surface Soil

The maximum, arithmetic mean, and 95% UCL of the arithmetic mean concentrations were compared with ESVs. Initially, the medium-specific comparisons for surface soil and subsurface soil were conducted for the site as a whole using maximum concentrations. Chemicals were excluded from further consideration in this initial step (SERA; ERA Step 2) if the HQ based on the maximum concentration was less than 1. Area-specific comparisons, using the data groupings from **Table D-9**, were then conducted, but only for the chemicals whose maximum concentrations equaled or exceeded ESVs in the initial screen (Step 2) or that were detected but lacked an ESV. This constituted the Step 3A (BERA) screen. Chemicals were generally excluded from further consideration in Step 3A if the HQ based on the 95% UCL was less than 1 and/or if the maximum detected concentration was less than the background UTL.

D.3.1.1 Site-Wide Evaluation

Site-wide maximum surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-42**. **Table D-43** identifies the exceedances of ESVs and background UTLs for each surface soil sample. Eight metals (aluminum, arsenic, chromium, iron, lead, manganese, mercury, and zinc), 10 pesticides (4,4-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, and gamma-chlordane), Aroclor-1260, LMW PAHs, and HMW PAHs equaled or exceeded ESVs based on maximum detected concentrations (**Tables D-42 and D-43**). The ESVs for aluminum and iron were based on soil pH; soil pH data are reported in **Table D-43**. Benzaldehyde, 2-butanone, acetone, methyl acetate, 1,3,5-trinitrobenzene, and nitroglycerin were detected in at least one surface soil sample but ESVs were not available. These 27 chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

D.3.1.2 Group 1A – Northwest Drainage – Northern Tributary

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-44**. Only PCBs were analyzed for in surface soil samples from this area. The 95% UCL HQ exceeded one for Aroclor-1260 and it was identified as a Step 3A COPC.

D.3.1.3 Group 1B – Northwest Drainage – Center Tributary

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-45**. **Table D-45** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Three metals (lead, mercury, and zinc), eight pesticides (4,4-DDE, 4,4-DDT, dieldrin, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, and endrin ketone), and Aroclor-1260 had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). These 12 chemicals were identified as Step 3A COPCs.

2-Butanone and acetone were detected but soil ESVs were not available. Acetone and 2-butanone were detected at maximum concentrations (186 and 14.7 µg/kg, respectively) that were generally less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table D-33**). Thus, these two chemicals were not identified as Step 3A COPCs.

D.3.1.4 Group 1C – Northwest Drainage – Other Tributary

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-46**. Only PCBs were analyzed for in surface soil samples from this area. The 95% UCL HQ did not exceed one for Aroclor-1260; no Step 3A COPCs were identified.

D.3.1.5 Group 1D – Center Drainage

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-47**. Only PCBs were analyzed for in surface soil samples from this area. The 95% UCL HQ did not exceed one for Aroclor-1260; no Step 3A COPCs were identified.

D.3.1.6 Group 1E – Eastern Drainage

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-48**. Only PCBs were analyzed for in surface soil samples from this area. The 95% UCL HQ did not exceed one for Aroclor-1260; no Step 3A COPCs were identified.

D.3.1.7 Group 1F – Northeast Drainage

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-49**. **Table D-49** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. No chemical had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). 2-Butanone, acetone, methyl acetate, and nitroglycerin were detected but soil ESVs were not available. Acetone, 2-butanone, and methyl acetate were detected at maximum concentrations (149, 8.44, and 24.0 µg/kg, respectively) that were less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table D-33**). Nitroglycerin was detected at a maximum concentration (866 µg/kg) that was less than soil ESVs for other, similar explosives, which ranged from 2,260 to 80,000 µg/kg, with a median value of 10,000 µg/kg (**Table D-33**).Thus, no chemicals were identified as Step 3A COPCs.

D.3.1.8 Group 2A – Former Transformer – Pole

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-50**. Only PCBs were analyzed for in surface soil samples from this area. The 95% UCL HQ did not exceed one for Aroclor-1260; no Step 3A COPCs were identified.

D.3.1.9 Group 2B – Former Transformer – Pad

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-51**. Only PCBs were analyzed for in surface soil samples from this area. The 95% UCL HQ did not exceed one for Aroclor-1260; no Step 3A COPCs were identified.

D.3.1.10 Group 2C – Upgradient to Drainages

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-52**. **Table D-52** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Two metals (mercury and zinc), six pesticides (4,4-DDE, 4,4-DDT, endosulfan sulfate, endrin, endrin aldehyde, and endrin ketone), and HMW PAHs had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). These nine chemicals were identified as Step 3A COPCs.

2-Butanone, acetone, benzaldehyde, and 1,3,5-trinitrobenzene were detected but soil ESVs were not available. Acetone and 2-butanone were detected at maximum concentrations (210 and 23.5 µg/kg, respectively) that were generally less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table D-33**). Benzaldehyde was detected at a maximum concentration (517 µg/kg) that was generally less than soil ESVs for other, similar SVOCs, which ranged from 380 to 40,000 µg/kg, with a median value of 1,280 µg/kg (**Table D-33**). 1,3,5-Trinitrobenzene was detected at a maximum concentration (161 µg/kg) that was less than soil ESVs for other, similar explosives, which ranged from 2,260 to 80,000 µg/kg, with a median value of 10,000 µg/kg (**Table D-33**). Thus, these four chemicals were not identified as Step 3A COPCs.

D.3.1.11 Group 2D – Potential Sprayed Areas

Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-53**. **Table D-53** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Two metals (manganese and zinc) and four pesticides (4,4-DDT, endosulfan II, endrin aldehyde, and endrin ketone) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). These six chemicals were identified as Step 3A COPCs.

2-Butanone and acetone were detected but soil ESVs were not available. Acetone and 2-butanone were detected at maximum concentrations (58.1 and 7.92 µg/kg, respectively) that were less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table D-33**). Thus, these two chemicals were not identified as Step 3A COPCs.

D.3.2 Subsurface Soil

D.3.2.1 Site-Wide Evaluation

Site-wide maximum subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-54**. **Table D-55** identifies the exceedances of ESVs and background UTLs for each subsurface soil sample. Six metals (aluminum, arsenic, iron, lead, manganese, and selenium), and four pesticides (4,4-DDE, endosulfan sulfate, endrin, and endrin ketone) equaled or exceeded ESVs based on maximum detected concentrations (**Tables D-54 and D-55**). The ESVs for aluminum and iron were based on soil pH; soil pH data are reported in **Table D-55**. 2-Butanone, acetone, carbon disulfide, and nitroglycerin were detected in at least one subsurface soil sample but ESVs were not available. These 14 chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

D.3.2.2 Group 1B – Northwest Drainage – Center Tributary

Area-specific maximum, mean, and 95% UCL subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-56**. **Table D-56** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. One pesticide (endosulfan sulfate) had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). This chemical was identified as a Step 3A COPC.

Acetone was detected but a soil ESV was not available. Acetone was detected at a maximum concentration (61.0 µg/kg) that was less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table D-33**). Thus, this chemical was not identified as a Step 3A COPC.

D.3.2.3 Group 1F – Northeast Drainage

Area-specific maximum, mean, and 95% UCL subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-57**. **Table D-57** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. No chemical had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). 2-Butanone, acetone, and carbon disulfide were detected but soil ESVs were not available. Acetone, 2-butanone, and carbon disulfide were detected at maximum concentrations (261, 93.1, and 2.89 µg/kg, respectively) that were generally less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table D-33**). Thus, no chemicals were identified as Step 3A COPCs.

D.3.2.4 Group 2B – Former Transformer – Pad

Area-specific maximum, mean, and 95% UCL subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-58**. Only PCBs were analyzed for in subsurface soil samples from this area. They were not detected; no Step 3A COPCs were identified.

D.3.2.5 Group 2C – Upgradient to Drainages

Area-specific maximum, mean, and 95% UCL subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-59**. **Table D-59** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Three pesticides (endosulfan sulfate, endrin, and endrin ketone) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). These three chemicals were identified as Step 3A COPCs.

Acetone and nitroglycerin were detected but soil ESVs were not available. Acetone was detected at a maximum concentration (5.86 µg/kg) that was less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table D-33**). Nitroglycerin was detected at a maximum concentration (566 µg/kg) that was less than soil ESVs for other, similar explosives, which ranged from 2,260 to 80,000 µg/kg, with a median value of 10,000 µg/kg (**Table D-33**). Thus, these two chemicals were not identified as Step 3A COPCs.

D.3.2.6 Group 2D – Potential Sprayed Areas

Area-specific maximum, mean, and 95% UCL subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table D-60**. **Table D-60** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. No chemical had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). 2-Butanone and acetone were detected but soil ESVs were not available. Acetone and 2-butanone were detected at maximum concentrations (28.8 and 4.75 µg/kg,

respectively) that were less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table D-33**). Thus, no chemicals were identified as Step 3A COPCs.

D.3.3 Terrestrial Food Web Exposures

In terrestrial habitats, Step 2 food web COPCs were selected by first comparing maximum surface soil concentrations with the lower of the available bird and mammal Eco-SSLs for the chemicals listed in **Table D-14**. These Eco-SSL values are listed in **Table D-32**. Chemicals that equaled or exceeded the Eco-SSLs based on the maximum surface soil concentration were retained for site-specific food web modeling. Those that did not were not evaluated further for terrestrial food web exposures. Chemicals that were on the bioaccumulative chemicals list (**Table D-14**) and did not have Eco-SSLs were automatically included in site-specific food web modeling. The final Step 2 food web COPCs were selected based on a comparison of maximum exposure doses from site-specific food web modeling with the NOAEL-based ingestion TRV. Those chemicals with an exposure dose equaling or exceeding the NOAEL-based ingestion TRV were identified as Step 2 COPCs. For Step 3A, ingestion-based (food web) COPCs were based on a comparison of mean and 95% UCL exposure doses with ingestion TRVs based on the NOAEL, MATC, and LOAEL. An exceedance of the 95% UCL-based MATC was generally considered an unacceptable risk at Step 3A.

D.3.3.1 Site-Wide Evaluation

Table D-61 shows the results of the initial screening against bird and mammal Eco-SSLs. All of the chemicals evaluated, except arsenic, nickel, and LMW PAHs, equaled or exceeded one or both of the Eco-SSLs based on the maximum detected surface soil concentration and were retained for site-specific food web modeling.

HQs based on maximum exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-62A.** Based on a comparison to NOAELs, five metals (cadmium, chromium, lead, mercury, and zinc), Aroclor-1260, five pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, and endrin), and three PAHs (benzo[a]anthracene, chrysene, and pyrene) had HQs equaling or exceeding 1 for one or more receptors.

HQs based on 95% UCL exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-62B.** Based on a comparison to NOAELs, Aroclor-1260, 4,4'-DDE, and dieldrin had HQs equaling or exceeding 1 for one or more receptors. Based on the MATC and LOAEL, only Aroclor-1260 and dieldrin had HQs that equaled or exceeded 1.

HQs based on the arithmetic mean for each terrestrial upper trophic level receptor are listed in **Table D-62C.** Based on a comparison to NOAELs, Aroclor-1260, 4,4'-DDE, and dieldrin had HQs equaling or exceeding 1 for one or more receptors. Based on the MATC, only Aroclor-1260 had an HQ that equaled or exceeded 1. The LOAEL TRV was only exceeded for Aroclor-1260.

Based on these results, dieldrin and Aroclor-1260 were identified as Step 3A COPCs on a site-wide basis.

D.3.3.2 Group 1A – Northwest Drainage – Northern Tributary

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-63.** Based on a comparison of the 95% UCL dose to the MATC, Aroclor-1260 had HQs equaling or exceeding 1 for one or more receptors and was identified as a Step 3A COPC.

D.3.3.3 Group 1B – Northwest Drainage – Center Tributary

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-64.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-64B**), Aroclor-1260 and dieldrin had HQs equaling or exceeding 1 for one or more receptors and were identified as Step 3A COPCs.

D.3.3.4 Group 1C – Northwest Drainage – Other Tributary

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-65.** Based on a comparison of the maximum dose to the MATC, no chemical had a HQ equaling or exceeding 1; no Step 3A COPCs were identified.

D.3.3.5 Group 1D – Center Drainage

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-66.** Based on a comparison of the 95% UCL dose to the MATC, no chemical had a HQ equaling or exceeding 1; no Step 3A COPCs were identified.

D.3.3.6 Group 1E – Eastern Drainage

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-67.** Based on a comparison of the 95% UCL dose to the MATC, no chemical had a HQ equaling or exceeding 1; no Step 3A COPCs were identified.

D.3.3.7 Group 1F – Northeast Drainage

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-68.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-68B**), no chemical had a HQ equaling or exceeding 1; no Step 3A COPCs were identified.

D.3.3.8 Group 2A – Former Transformer – Pole

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-69.** Based on a comparison of the 95% UCL dose to the MATC, Aroclor-1260 had HQs equaling or exceeding 1 for one or more receptors and was identified as a Step 3A COPC.

D.3.3.9 Group 2B – Former Transformer – Pad

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-70.** Based on a comparison of the 95% UCL dose to the MATC, no chemical had a HQ equaling or exceeding 1; no Step 3A COPCs were identified.

D.3.3.10 Group 2C – Upgradient to Drainages

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-71.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-71B**), 4,4'-DDE had a HQ equaling or exceeding 1 for one or more receptors. However, the LOAEL was not exceeded and the MATC was not exceeded based on the mean concentration. Thus, no Step 3A COPCs were identified.

D.3.3.11 Group 2D – Potential Sprayed Areas

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level terrestrial receptor are listed in **Table D-72.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-72B**), Aroclor-1260 had HQs equaling or exceeding 1 for one or more receptors and was identified as a Step 3A COPC.

D.3.4 Surface Water

Maximum, mean, and 95% UCL surface water concentrations are compared to ESVs in **Table D-73**. **Table D-74** identifies the exceedances of ESVs and background UTLs for each surface water sample. Two PAHs (benzo[a]anthracene and pyrene) equaled or exceeded ESVs based on maximum (and 95% UCL) detected concentrations and also exceeded background UTLs, where available (**Tables D-73 and D-74**).

Chrysene and dibenz(a,h)anthracene were detected in at least one surface water sample but an ESV was not available.

Thirteen PAHs were detected in surface water samples from Penniman Lake and two (benzo[a]anthracene and pyrene) exceeded ESVs in one or more samples (two others, chrysene and dibenz[a,h]anthracene, did not have an ESV). The PAH exceedances were likely the result of turbid samples (see **Table D-2**) since these PAHs have very low water solubility so would typically be associated with particulates. Thus, they would not be expected to be retained in the water column but be deposited to sediments. PAHs were Step 2A COPCs in surface sediments. These PAHs were not, however, retained as Step 3A COPCs in surface water.

D.3.5 Surface Sediment

The maximum, arithmetic mean, and 95% UCL of the arithmetic mean concentrations were compared with ESVs. Initially, the medium-specific comparisons for surface sediment and subsurface sediment were conducted for the site as a whole using maximum concentrations. Chemicals were excluded from further consideration in this initial step (SERA; ERA Step 2) if the HQ based on the maximum concentration was less than 1. Area-specific comparisons, using the data groupings from **Table D-9**, were then conducted, but only for the chemicals whose maximum concentrations equaled or exceeded ESVs in the initial screen (Step 2) or that were detected but lacked an ESV. This constituted the Step 3A (BERA) screen. Chemicals were generally excluded from further consideration in Step 3A if the HQ based on the 95% UCL was less than 1 and/or if the maximum detected concentration was less than the background UTL. The area-specific screening tables include comparisons to both SLC and EqP ESVs and both are considered when selecting COPCs.

D.3.5.1 Site-Wide Evaluation

Site-wide maximum surface sediment concentrations are compared to sediment ESVs in **Table D-75**. **Table D-76** identifies the exceedances of ESVs and background UTLs for each surface sediment sample. Fourteen metals (aluminum, antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, vanadium, and zinc), Aroclor-1260, 16 pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-chlordane, beta-BHC, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, gamma-chlordane, heptachlor epoxide, and methoxychlor), bis(2-ethylhexyl) phthalate, 14 PAHs (plus HMW, LMW, and total PAHs), carbon disulfide, and three explosives (1,3-dinitrobenzene, 4-amino-2,6-dinitrotoluene, and HMX) equaled or exceeded ESVs based on maximum detected concentrations (**Tables D-75 and D-76**). Two inorganics (beryllium and cyanide), three SVOCs (acetophenone, benzaldehyde, and di-n-octylphthalate), four VOCs (acetone, chloromethane, methyl acetate, and methylcyclohexane), and two explosives (nitroglycerin and tetryl) were detected in at least one surface sediment sample but ESVs were not available. These 64 chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

D.3.5.2 Group 1 – Northwest Lobes and Drainages (North of Site 11)

Maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-77**. **Table D-77** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Five metals (barium, copper, lead, nickel, and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Beryllium and cyanide did not have ESVs; the maximum background UTL ratio exceeded 1 for beryllium and cyanide was not detected in background surface sediment. Thus, barium, beryllium, copper, cyanide, lead, nickel, and zinc were identified as Step 3A COPCs.

Aroclor-1260 had SLC and EqP HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and was identified as a Step 3A COPC. Two pesticides (aldrin and endosulfan sulfate) had EqP HQs (or SLC

HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available); both were identified as Step 3A COPCs.

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, LMW PAHs were identified as Step 3A COPCs.

Three SVOCs (acetophenone, benzaldehyde, and di-n-octylphthalate) and one VOC (methylcyclohexane) were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. These four chemicals were identified as Step 3A COPCs.

D.3.5.3 Group 2 – Northwest Lobes and Drainages (South of Site 11)

Maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-78**. **Table D-78** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Eight metals (barium, cadmium, chromium, copper, iron, lead, vanadium, and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Beryllium did not have an ESV; the maximum background UTL ratio exceeded 1 for beryllium. Thus, barium, beryllium, cadmium, chromium, copper, iron, lead, vanadium, and zinc were identified as Step 3A COPCs.

Aroclor-1260 had SLC, but not EqP, HQs that equaled or exceeded 1 based on detected maximum and 95% UCL concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Two SVOCs (benzaldehyde and di-n-octylphthalate) and one VOC (chloromethane) were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. These three chemicals were identified as Step 3A COPCs.

D.3.5.4 Group 3 – Northeast Lobe

Maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-79**. **Table D-79** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. One metal (barium) had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Beryllium and cyanide did not have ESVs; the maximum background UTL ratio was just 1.01 for beryllium but cyanide was not detected in background surface sediment. Thus, barium and cyanide were identified as Step 3A COPCs.

Aroclor-1260 had SLC, but not EqP, HQs that equaled or exceeded 1 based on detected maximum and 95% UCL concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Two explosives (1,3-dinitrobenzene and HMX) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and were identified as Step 3A COPCs.

One SVOC (benzaldehyde), two VOCs (methyl acetate and methylcyclohexane), and one explosive (tetryl) were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. These three chemicals were identified as Step 3A COPCs.

D.3.5.5 Group 4 – Penniman Lake

Maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-80**. **Table D-80** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Four metals (barium, lead, mercury, and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Beryllium and cyanide did not have ESVs; the maximum background UTL ratio exceeded 1 for beryllium and cyanide was not detected in background surface sediment. Thus, barium, beryllium, cyanide, lead, mercury, and zinc were identified as Step 3A COPCs.

Aroclor-1260 had SLC and EqP HQs that equaled or exceeded 1 based on detected maximum, but not 95% UCL, concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Three SVOCs (acetophenone, benzaldehyde, and di-n-octylphthalate) and two explosives (nitroglycerin and tetryl) were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. These five chemicals were identified as Step 3A COPCs.

D.3.5.6 Group 4A – Penniman Lake – Northwest

Maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-81**. **Table D-81** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Five metals (barium, copper, lead, mercury, and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Thus, barium, copper, lead, mercury, and zinc were identified as Step 3A COPCs.

Aroclor-1260 had SLC and EqP HQs that equaled or exceeded 1 based on detected maximum, but not 95% UCL, concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Three SVOCs (acetophenone, benzaldehyde, and di-n-octylphthalate) and two explosives (nitroglycerin and tetryl) were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. These five chemicals were identified as Step 3A COPCs.

D.3.5.7 Group 4B – Penniman Lake – Center

Maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-82**. **Table D-82** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Four metals (barium, copper, lead, and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Thus, barium, copper, lead, and zinc were identified as Step 3A COPCs.

Aroclor-1260 had SLC, but not EqP, HQs that equaled or exceeded 1 based on detected maximum and 95% UCL concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

One explosive (nitroglycerin) was detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. This chemical was identified as a Step 3A COPC.

D.3.5.8 Group 4C – Penniman Lake – East

Maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-83**. **Table D-83** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Two metals (barium and copper) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Cyanide did not have an ESV and cyanide was not detected in background surface sediment. Thus, barium, copper, and cyanide were identified as Step 3A COPCs.

Aroclor-1260 had SLC, but not EqP, HQs that equaled or exceeded 1 based on detected maximum and 95% UCL concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

One SVOC (di-n-octylphthalate) and one explosive (nitroglycerin) were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. These two chemicals were identified as Step 3A COPCs.

D.3.5.9 Group 5 – King Creek

Only a single sample was collected in King Creek on the opposite side of the Penniman Lake dam. This sample is compared with marine ESVs (based on the salinity measured at this location) in **Table D-84**. Only vanadium and heptachlor exceeded ESVs and background UTLs (where available). These two chemicals were identified as Step 3A COPCs.

D.3.6 Subsurface Sediment

D.3.6.1 Site-Wide Evaluation

Site-wide maximum subsurface sediment concentrations are compared to sediment ESVs in **Table D-85**. **Table D-86** identifies the exceedances of ESVs and background UTLs for each subsurface sediment sample. Twelve metals (aluminum, arsenic, barium, chromium, copper, iron, lead, mercury, nickel, selenium,

vanadium, and zinc), Aroclor-1260, 16 pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-chlordane, beta-BHC, delta-BHC, dieldrin, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, gamma-chlordane, heptachlor epoxide, and methoxychlor), dibenzofuran, 15 PAHs (plus HMW, LMW, and total PAHs), carbon disulfide, and one explosive (1,3-dinitrobenzene) equaled or exceeded ESVs based on maximum detected concentrations (**Tables D-85 and D-86**). Two inorganics (beryllium and cyanide), two SVOCs (benzaldehyde and di-n-octylphthalate), one VOC (acetone), and one explosive (nitroglycerin) were detected in at least one subsurface sediment sample but ESVs were not available. These 56 chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

D.3.6.2 Group 1 – Northwest Lobes and Drainages (North of Site 11)

Maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-87**. **Table D-87** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Five metals (barium, copper, lead, nickel, and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Beryllium and cyanide did not have ESVs; the maximum background UTL ratio exceeded 1 for beryllium and cyanide was not detected in background subsurface sediment. Thus, barium, beryllium, copper, cyanide, lead, nickel, and zinc were identified as Step 3A COPCs.

Aroclor-1260 had SLC and EqP HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and was identified as a Step 3A COPC. Four pesticides (aldrin, dieldrin, endosulfan II, and endosulfan sulfate) had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available); all four were identified as Step 3A COPCs.

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, LMW PAHs, HMW PAHs, and total PAHs were identified as Step 3A COPCs.

Dibenzofuran, carbon disulfide, and one explosive (1,3-dinitrobenzene) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and were identified as Step 3A COPCs. Benzaldehyde was detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. This chemical was identified as a Step 3A COPC.

D.3.6.3 Group 2 – Northwest Lobes and Drainages (South of Site 11)

Maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-88**. **Table D-88** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Two metals (iron and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Thus, iron and zinc were identified as Step 3A COPCs.

Aroclor-1260 had SLC, but not EqP, HQs that equaled or exceeded 1 based on detected maximum and 95% UCL concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Two SVOCs (benzaldehyde and di-n-octylphthalate) were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. These two chemicals were identified as Step 3A COPCs.

D.3.6.4 Group 3 – Northeast Lobe

Maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-89**. **Table D-89** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. One metal (barium) had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Thus, barium was identified as a Step 3A COPC.

Aroclor-1260 had SLC and EqP HQs that equaled or exceeded 1 based on detected maximum, but not 95% UCL, concentrations; it was not identified as a Step 3A COPC. Two pesticides (endosulfan II and methoxychlor) had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available); both were identified as Step 3A COPCs.

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Carbon disulfide and one explosive (1,3-dinitrobenzene) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and were identified as Step 3A COPCs.

D.3.6.5 Group 4 – Penniman Lake

Maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-90**. **Table D-90** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Four metals (barium, iron, lead, and mercury) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Beryllium did not have an ESV; the maximum background UTL ratio exceeded 1 for beryllium. Thus, barium, beryllium, iron, lead, and mercury were identified as Step 3A COPCs.

Aroclor-1260 had SLC, but not EqP, HQs that equaled or exceeded 1 based on detected maximum and 95% UCL concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Carbon disulfide had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and was identified as a Step 3A COPC.

Benzaldehyde and nitroglycerin were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. Acetone did not have an ESV but it exceeded its background UTL. These three chemicals were identified as Step 3A COPCs.

D.3.6.6 Group 4A – Penniman Lake – Northwest

Maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-91**. **Table D-91** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Six metals (barium, copper,

iron, lead, mercury, and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Beryllium did not have an ESV; the maximum background UTL ratio exceeded 1 for beryllium. Thus, barium, beryllium, copper, iron, lead, mercury, and zinc were identified as Step 3A COPCs.

Aroclor-1260 had SLC, but not EqP, HQs that equaled or exceeded 1 based on detected maximum and 95% UCL concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Benzaldehyde and nitroglycerin were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. Acetone did not have an ESV but it exceeded its background UTL. These three chemicals were identified as Step 3A COPCs.

D.3.6.7 Group 4B – Penniman Lake – Center

Maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-92**. **Table D-92** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Four metals (barium, copper, iron, and lead) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Four other metals (aluminum, chromium, vanadium, and zinc) had 95% UCL HQs marginally above one but were not identified as Step 3A COPCs because the mean HQs were less than one and the maximum HQs were 1.5 or less. Beryllium did not have an ESV; the maximum background UTL ratio exceeded 1 for beryllium. Thus, barium, beryllium, copper, iron, and lead were identified as Step 3A COPCs.

Aroclor-1260 was not detected in subsurface samples from this area. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Carbon disulfide had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and was identified as a Step 3A COPC. Nitroglycerin was detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. Acetone did not have an ESV but it exceeded its background UTL. These two chemicals were identified as Step 3A COPCs.

D.3.6.8 Group 4C – Penniman Lake – East

Maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table D-93**. **Table D-93** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Two metals (barium and iron) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Three other metals (aluminum, chromium, and vanadium) had 95% UCL HQs marginally above one but were not identified as Step 3A COPCs because the mean HQs were less than one and the maximum HQs were 1.5 or less. Beryllium did not have an ESV; the maximum

background UTL ratio exceeded 1 for beryllium. Thus, barium, beryllium, and iron were identified as Step 3A COPCs.

Aroclor-1260 had SLC, but not EqP, HQs that equaled or exceeded 1 based on detected maximum and 95% UCL concentrations; it was not identified as a Step 3A COPC. No pesticides had EqP HQs (or SLC HQs if the chemical lacked an EqP ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available).

For PAHs, the evaluation used total detected PAHs (plus detected LMW and HMW PAHs) as the basis for COPC selection. Because total detected PAHs were used, the selection was based on the maximum, and not the 95% UCL, concentration. Based on this process, PAHs were not identified as Step 3A COPCs.

Carbon disulfide had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and was identified as a Step 3A COPC. Nitroglycerin was detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. Acetone did not have an ESV but it exceeded its background UTL. These two chemicals were identified as Step 3A COPCs.

D.3.7 Aquatic Food Web Exposures

Site-wide aquatic food web exposures were evaluated first. Aquatic food web exposures were then evaluated using the spatial groupings shown in **Table D-9**. Total PCBs in tissue were included as the sum of the detections in the ten PCB homologue groups and (for surface water and surface sediment) as the sum total of the detected Aroclors. Dioxin-like PCBs in tissue were evaluated as the total TEQ calculated using bird and mammal TEFs. The site-wide and area-specific summary tables include comparisons based on the maximum, 95% UCL, and mean exposure doses and for the NOAEL, MATC, and LOAEL. For each of the spatial evaluations, Step 2 food web COPCs were selected based on a comparison of maximum exposure doses from site-specific food web modeling with the NOAEL-based ingestion TRV. Those chemicals with an exposure dose equaling or exceeding the NOAEL-based ingestion TRV were identified as Step 2 COPCs. For Step 3A, ingestion-based (food web) COPCs were based on a comparison of mean and 95% UCL exposure doses with ingestion TRVs based on the NOAEL, MATC, and LOAEL. An exceedance of the 95% UCL-based MATC was generally considered an unacceptable risk at Step 3A.

D.3.7.1 Site-Wide Evaluation

HQs based on maximum exposure doses for each upper trophic level aquatic receptor are listed in **Table D-94A.** Based on a comparison to NOAELs, five metals (arsenic, copper, lead, mercury, and nickel), Aroclor-1260, total PCBs, dioxin-like PCBs, and one pesticide (dieldrin) had HQs equaling or exceeding 1 for one or more receptors.

HQs based on 95% UCL exposure doses for each upper trophic level aquatic receptor are listed in **Table D-94B.** Based on a comparison to NOAELs, Aroclor-1260 and total PCBs had HQs equaling or exceeding 1 for one or more receptors. Based on the MATC, only total PCBs had a HQ that equaled or exceeded 1. There were no exceedances based on the LOAEL.

HQs based on the arithmetic mean for each aquatic upper trophic level receptor are listed in **Table D-94C.** Based on a comparison to NOAELs, Aroclor-1260 and total PCBs had HQs equaling or exceeding 1 for one or more receptors. There were no exceedances based on the MATC or LOAEL.

Based on these results, total PCBs were identified as Step 3A COPCs on a site-wide basis.

D.3.7.2 Group 1 – Northwest Lobes and Drainages (North of Site 11)

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level aquatic receptor are listed in **Table D-95.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-95B**), copper,

Aroclor-1260, and total PCBs had HQs equaling or exceeding 1 for one or more receptors and were identified as Step 3A COPCs.

D.3.7.3 Group 2 – Northwest Lobes and Drainages (South of Site 11)

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level aquatic receptor are listed in **Table D-96.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-96B**), total PCBs had HQs equaling or exceeding 1 for one or more receptors and was identified as a Step 3A COPC.

D.3.7.4 Group 3 – Northeast Lobe

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level aquatic receptor are listed in **Table D-97.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-97B**), total PCBs had HQs equaling or exceeding 1 for one or more receptors and was identified as a Step 3A COPC.

D.3.7.5 Group 4 – Penniman Lake

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level aquatic receptor are listed in **Table D-98.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-98B**), total PCBs had HQs equaling or exceeding 1 for one or more receptors and was identified as a Step 3A COPC.

D.3.7.6 Group 4A – Penniman Lake – Northwest

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level aquatic receptor are listed in **Table D-99.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-99B**), mercury and total PCBs had HQs equaling or exceeding 1 for one or more receptors and were identified as Step 3A COPCs.

D.3.7.7 Group 4B – Penniman Lake – Center

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level aquatic receptor are listed in **Table D-100.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-100B**), total PCBs had HQs equaling or exceeding 1 for one or more receptors and was identified as a Step 3A COPC.

D.3.7.8 Group 4A – Penniman Lake – East

HQs based on maximum, 95% UCL, and mean exposure doses for each upper trophic level aquatic receptor are listed in **Table D-101.** Based on a comparison of the 95% UCL dose to the MATC (**Table D-101B**), total PCBs had HQs equaling or exceeding 1 for one or more receptors and was identified as a Step 3A COPC.

D.3.8 Tissue

D.3.8.1 Frog Tissue

Maximum, 95% UCL, and mean frog tissue concentrations are compared to ESVs in **Table D-102**.
Table D-103 identifies the exceedances of ESVs and maximum reference concentrations for each frog tissue sample. Two metals (nickel and zinc) equaled or exceeded NOEC ESVs based on detected 95% UCL concentrations and also equaled or exceeded maximum reference concentrations (where available). Arsenic, chromium, mercury, selenium, silver, dioxin-like PCBs, 4,4'-DDE, 4,4'-DDT, alpha-BHC, beta-BHC, dieldrin, endosulfan II, endosulfan sulfate, gamma-BHC (lindane), gamma-chlordane, and heptachlor epoxide were detected in at least one frog tissue sample but an ESV was not available. Where available, each of these 16 chemicals, except for 4,4'-DDE, also exceeded the maximum reference concentration. Thus, all of these chemicals, except 4,4'-DDE, were identified as Step 3A COPCs.

D.3.8.2 Whole-Body Fish Tissue

Maximum, 95% UCL, and mean whole-body fish tissue concentrations are compared to ESVs in **Table D-104**.
Table D-105 identifies the exceedances of ESVs and maximum reference concentrations for each fish tissue

sample. Only total PCBs equaled or exceeded NOEC ESVs based on maximum detected concentrations and also equaled or exceeded maximum reference concentrations (where available). However, the 95% UCL concentration did not exceed the NOEC ESV; thus, no chemicals were identified as Step 3A COPCs.

D.3.8.3 Reconstituted Whole-Body Fish Tissue (Largemouth Bass)

Maximum, 95% UCL, and mean reconstituted whole-body fish tissue (largemouth bass) concentrations are compared to ESVs in **Table D-106**. **Table D-107** identifies the exceedances of ESVs and maximum reference concentrations for each fish tissue sample. Only total PCBs equaled or exceeded NOEC ESVs based on maximum detected concentrations and also equaled or exceeded maximum reference concentrations (where available). The 95% UCL concentration also exceeded the NOEC ESV; thus, total PCBs were identified as Step 3A COPCs.

D.4 Ecological Risk Screening Summary and Conclusions

In terrestrial habitats for direct exposures, PCBs (Aroclor-1260) were the key COPCs in surface soils (**Table D-108**) but only for Groups 1A and 1B (northwest drainage, northern and center tributaries). PCBs (Aroclor-1260) were also key COPCs for terrestrial food web exposures for Groups 1A and 1B, as well as for Groups 2A (former transformer pole locations) and 2D (potential sprayed areas). Pesticides (particularly dieldrin, endrin, and DDE/DDT) in Groups 1B and 2C (areas upgradient of drainages) surface soils, and HMW PAHs in Group 2C surface soils, were also elevated relative to ESVs. Shallow subsurface soils do not appear to be significantly impacted in areas where these samples were collected.

In aquatic habitats, COPCs were not identified for Penniman Lake surface water (**Table D-108**). In both surface and subsurface sediments, four metals (copper, lead, nickel, and zinc) were elevated relative to ESVs in Group 1 (northwest lobes and tributaries north of Site 11). Similarly, mercury was elevated in surface and subsurface sediments in Group 4A (northwest portion of Penniman Lake). However, all five of these are AVS metals, and SEM/AVS ratios, a measure of metal bioavailability in sediments, were almost always less than 1, indicating that bioavailability is limited.

PCBs (Aroclor-1260) were elevated in Group 1 surface and subsurface sediments (which are directly downgradient of Group 1A and 1B drainage ditch soils), and were also key COPCs for aquatic food web exposures (along with total PCBs) in Group 1. Total PCBs were identified as tissue COPCs but only for the large-sized largemouth bass; smaller whole-body fish and frogs did not exceed tissue-based PCB ESVs. Group 1 also had high concentrations of pesticides (particularly dieldrin) and PAHs in subsurface sediment.

D.5 Recommendations

It is recommended that a baseline ERA be completed to further evaluate the Step 3A COPCs identified in this ecological risk screening. Further, it is recommended that sediment toxicity testing be considered as part of the BERA in the northwest portion of the lake (sediment Group 1), including up the drainages (soil Groups 1A and 1B), to determine if actual impacts are occurring to lower trophic level receptors. These tests could also help support any remedy development efforts.

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Table D-1
Physical Parameter Measurements - Soil
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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)				
				mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines
Surface Soil											
CAPL-SO01	CAPL-SS01-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO02	CAPL-SS02-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO03	CAPL-SS03-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO04	CAPL-SS04-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO05	CAPL-SS05-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO06	CAPL-SS06-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO07	CAPL-SS07-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO08	CAPL-SS08-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO09	CAPL-SS09-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO10	CAPL-SS10-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO11	CAPL-SS11-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO12	CAPL-SS12-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO13	CAPL-SS13-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO14	CAPL-SS14-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO15	CAPL-SS15-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO16	CAPL-SS16-0811	8/2/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO17	CAPL-SS17-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO18	CAPL-SS18-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO19	CAPL-SS19-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO21	CAPL-SS21-0811	8/2/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO22	CAPL-SS22-0811	8/2/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO23	CAPL-SS23-0811	8/2/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO24	CAPL-SS24-0811	8/2/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO25	CAPL-SS25-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO26	CAPL-SS26-0811	8/1/2011	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO27	CAPL-SS27-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO28	CAPL-SS28-1112	11/2/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO29	CAPL-SS29-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS

Table D-1
Physical Parameter Measurements - Soil
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Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)				
				mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines
CAPL-SO30	CAPL-SS30-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO31	CAPL-SS31-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO32	CAPL-SS32-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO33	CAPL-SS33-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO34	CAPL-SS34-1112	11/5/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO35	CAPL-SS35-1112	11/6/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO36	CAPL-SS36-1112	11/6/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO37	CAPL-SS37-1112	11/6/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO38	CAPL-SS38-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO39	CAPL-SS39-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO40	CAPL-SS40-1112	11/1/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO41	CAPL-SS41-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO42	CAPL-SS42-1012	10/31/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO43	CAPL-SS43-1112	11/1/2012	0 - 6	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO44	CAPL-SS44-1012	10/26/2012	0 - 6	5,900	0.59	5.99	0.7	0.6	10.5	45.6	42.6
CAPL-SO45	CAPL-SS45-1012	10/26/2012	0 - 6	24,700	2.47	5.25	2.8	0.2	4.4	46.6	46.0
CAPL-SO46	CAPL-SS46-1012	10/26/2012	0 - 6	24,400	2.44	5.79	1.3	0.9	6.5	37.9	53.4
CAPL-SO47	CAPL-SS47-1012	10/26/2012	0 - 6	36,000	3.60	6.46	0.0	0.8	4.1	29.2	65.9
CAPL-SO48	CAPL-SS48-1012	10/24/2012	0 - 6	42,600	4.26	6.25	3.6	1.0	11.9	43.3	40.2
CAPL-SO49	CAPL-SS49-1012	10/24/2012	0 - 6	44,200	4.42	7.65	10.1	5.1	7.8	37.7	39.3
CAPL-SO50	CAPL-SS50-1012	10/24/2012	0 - 6	52,300	5.23	7.55	13.3	3.9	9.4	37.0	36.4
CAPL-SO55	CAPL-SS55-1012	10/26/2012	0 - 6	9,100	0.91	5.48	0.2	0.9	10.4	71.6	16.9
CAPL-SO56	CAPL-SS56-1012	10/26/2012	0 - 6	16,200	1.62	5.71	0.3	0.5	7.4	85.2	6.6
CAPL-SO57	CAPL-SS57-1012	10/26/2012	0 - 6	43,700	4.37	5.99	0.4	0.8	5.7	76.2	16.9
CAPL-SO58	CAPL-SS58-1012	10/26/2012	0 - 6	41,500	4.15	6.38	2.5	1.0	9.6	58.8	28.1
CAPL-SO59	CAPL-SS59-1012	10/26/2012	0 - 6	15,000	1.50	6.50	45.1	4.9	8.9	40.6	0.5
CAPL-SO60	CAPL-SS60-1112	11/1/2012	0 - 6	18,400	1.84	7.66	0.4	0.3	3.5	46.7	49.1
CAPL-SO61	CAPL-SS61-1112	11/1/2012	0 - 6	33,500	3.35	7.74	3.5	3.8	10.0	51.4	31.3
CAPL-SO62	CAPL-SS62-1112	11/1/2012	0 - 6	12,300	1.23	6.06	0.3	1.2	6.6	67.1	24.8

Table D-1
Physical Parameter Measurements - Soil
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Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)				
				mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines
CAPL-SO63	CAPL-SS63-1112	11/1/2012	0 - 6	16,000	1.60	8.25	12.9	5.3	6.8	52.7	22.3
CAPL-SO64	CAPL-SS64-1112	11/1/2012	0 - 6	29,800	2.98	7.96	11.0	1.0	5.3	38.8	43.9
CAPL-SO65	CAPL-SS65-1112	11/1/2012	0 - 6	128,000	12.8	6.25	14.7	7.2	14.7	41.6	21.8
CAPL-SO66	CAPL-SS66-1112	11/1/2012	0 - 6	60,800	6.08	7.50	15.7	6.0	12.8	33.1	32.4
CAPL-SO67	CAPL-SS67-1112	11/1/2012	0 - 6	39,400	3.94	6.70	3.7	2.7	6.7	55.6	31.3
CAPL-SO68	CAPL-SS68-1112	11/1/2012	0 - 6	21,100	2.11	7.77	2.1	0.7	2.3	27.7	67.2
CAPL-SO69	CAPL-SS69-1112	11/1/2012	0 - 6	20,900	2.09	8.19	18.2	5.5	11.2	36.4	28.7
CAPL-SO70	CAPL-SS70-1112	11/2/2012	0 - 6	7,450	0.75	9.11	25.6	18.2	22.4	17.8	16.0
CAPL-SO71	CAPL-SS71-1112	11/2/2012	0 - 6	9,410	0.94	9.12	36.3	11.5	16.9	20.6	14.7
CAPL-SO72	CAPL-SS72-1112	11/2/2012	0 - 6	13,500	1.35	8.15	32.3	10.9	18.6	20.1	18.1
CAPL-SO73	CAPL-SS73-1112	11/5/2012	0 - 6	29,600	2.96	7.00	1.3	4.4	23.8	44.6	25.9
CAPL-SO74	CAPL-SS74-1112	11/5/2012	0 - 6	13,200	1.32	11.9	38.6	20.3	19.0	15.9	6.2
CAPL-SO75	CAPL-SS75-1112	11/5/2012	0 - 6	40,100	4.01	5.85	2.1	2.8	12.0	44.6	38.5
Subsurface Soil											
CAPL-SO34	CAPL-SB34-1112	11/5/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO35	CAPL-SB35-1112	11/6/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO36	CAPL-SB36-1112	11/6/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO37	CAPL-SB37-1112	11/6/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO38	CAPL-SB38-1012	10/31/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO39	CAPL-SB39-1012	10/31/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO40	CAPL-SB40-1112	11/1/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO41	CAPL-SB41-1012	10/31/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO42	CAPL-SB42-1012	10/31/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO43	CAPL-SB43-1112	11/1/2012	6 - 24	NS	NS	NS	NS	NS	NS	NS	NS
CAPL-SO44	CAPL-SB44-1012	10/26/2012	6 - 24	4,100	0.41	5.82	NS	NS	NS	NS	NS
CAPL-SO45	CAPL-SB45-1012	10/26/2012	6 - 24	1,770	0.18	5.06	NS	NS	NS	NS	NS
CAPL-SO46	CAPL-SB46-1012	10/26/2012	6 - 24	3,180	0.32	6.60	NS	NS	NS	NS	NS
CAPL-SO47	CAPL-SB47-1012	10/26/2012	6 - 24	5,670	0.57	5.52	NS	NS	NS	NS	NS
CAPL-SO48	CAPL-SB48-1012	10/24/2012	6 - 24	20,300	2.03	5.88	NS	NS	NS	NS	NS

Table D-1
Physical Parameter Measurements - Soil
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Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)				
				mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines
CAPL-SO49	CAPL-SB49-1012	10/24/2012	6 - 24	3,740	0.37	7.86	NS	NS	NS	NS	NS
CAPL-SO50	CAPL-SB50-1012	10/24/2012	6 - 24	5,900	0.59	8.08	NS	NS	NS	NS	NS
CAPL-SO55	CAPL-SB55-1012	10/26/2012	6 - 24	5,480	0.55	5.70	NS	NS	NS	NS	NS
CAPL-SO56	CAPL-SB56-1012	10/26/2012	6 - 24	13,300	1.33	6.02	NS	NS	NS	NS	NS
CAPL-SO57	CAPL-SB57-1012	10/26/2012	6 - 24	26,000	2.60	6.96	NS	NS	NS	NS	NS
CAPL-SO58	CAPL-SB58-1012	10/26/2012	6 - 24	11,900	1.19	5.82	NS	NS	NS	NS	NS
CAPL-SO59	CAPL-SB59-1012	10/26/2012	6 - 24	8,970	0.90	5.87	NS	NS	NS	NS	NS
CAPL-SO60	CAPL-SB60-1112	11/1/2012	6 - 24	6,880	0.69	8.14	NS	NS	NS	NS	NS
CAPL-SO61	CAPL-SB61-1112	11/1/2012	6 - 24	2,690	0.27	7.93	NS	NS	NS	NS	NS
CAPL-SO62	CAPL-SB62-1112	11/1/2012	6 - 24	27,500	2.75	6.73	NS	NS	NS	NS	NS
CAPL-SO63	CAPL-SB63-1112	11/1/2012	6 - 24	10,900	1.09	8.12	NS	NS	NS	NS	NS
CAPL-SO64	CAPL-SB64-1112	11/1/2012	6 - 24	32,800	3.28	8.12	NS	NS	NS	NS	NS
CAPL-SO65	CAPL-SB65-1112	11/1/2012	6 - 24	3,960	0.40	7.42	NS	NS	NS	NS	NS
CAPL-SO66	CAPL-SB66-1112	11/1/2012	6 - 24	9,110	0.91	7.73	NS	NS	NS	NS	NS
CAPL-SO67	CAPL-SB67-1112	11/1/2012	6 - 24	3,180	0.32	7.20	NS	NS	NS	NS	NS
CAPL-SO68	CAPL-SB68-1112	11/1/2012	6 - 24	1,640	0.16	8.16	NS	NS	NS	NS	NS
CAPL-SO69	CAPL-SB69-1112	11/1/2012	6 - 24	15,600	1.56	8.32	NS	NS	NS	NS	NS
CAPL-SO70	CAPL-SB70-1112	11/2/2012	6 - 24	1,480	0.15	7.35	NS	NS	NS	NS	NS
CAPL-SO71	CAPL-SB71-1112	11/2/2012	6 - 24	1,940	0.19	5.95	NS	NS	NS	NS	NS
CAPL-SO72	CAPL-SB72-1112	11/2/2012	6 - 24	6,290	0.63	8.03	NS	NS	NS	NS	NS
CAPL-SO73	CAPL-SB73-1112	11/5/2012	6 - 24	14,300	1.43	8.05	NS	NS	NS	NS	NS
CAPL-SO74	CAPL-SB74-1112	11/5/2012	6 - 24	2,880	0.29	7.80	NS	NS	NS	NS	NS
CAPL-SO75	CAPL-SB75-1112	11/5/2012	6 - 24	13,800	1.38	8.24	NS	NS	NS	NS	NS

NS - Not Sampled

Table D-2
Water Column Parameter Measurements
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Station ID	Date	Total Depth (feet)	Sample Depth (feet)	Hardness (MG/L)	Turbidity (NTU)	Temperature (^{o}C)	pH	Conductivity (ms/cm)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Oxidation Reduction Potential (mV)
Site Samples													
Penniman Lake	CAPL-SWSD62	10/2/2012	8.0	Top	NS	6.6	22.03	7.87	0.233	0.11	7.04	80.80	18.8
Penniman Lake	CAPL-SWSD62	10/2/2012	8.0	Bottom	NS	7.9	21.98	7.80	0.235	0.11	6.80	77.10	17.6
Penniman Lake	CAPL-SWSD62	10/15/2012	5.1	1.0	91.3	18.2	18.90	7.39	0.273	0.13	7.81	--	216.2
Penniman Lake	CAPL-SWSD62	10/15/2012	5.1	4.1	NS	20.9	18.25	7.48	0.273	0.13	6.69	--	206.6
Penniman Lake	CAPL-SWSD62	10/25/2012	5.1	1.0	NS	25.7	19.74	7.69	0.257	0.10	10.55	--	-28.4
Penniman Lake	CAPL-SWSD62	10/25/2012	5.1	4.1	NS	29.8	18.98	7.34	0.263	0.13	8.99	--	-55.1
Penniman Lake	CAPL-SWSD63	10/2/2012	6.0	Top	NS	13.4	21.97	7.70	0.241	0.11	5.98	68.30	-0.1
Penniman Lake	CAPL-SWSD63	10/2/2012	6.0	Bottom	NS	15.3	21.90	7.68	0.240	0.11	5.80	67.40	-14.1
Penniman Lake	CAPL-SWSD63	10/15/2012	4.2	1.0	90.7	18.5	19.33	7.57	0.270	0.13	8.64	--	225.2
Penniman Lake	CAPL-SWSD63	10/15/2012	4.2	3.2	NS	20.3	19.06	7.71	0.272	0.13	8.27	--	213.9
Penniman Lake	CAPL-SWSD63	10/25/2012	4.2	1.0	NS	23.9	19.77	7.75	0.261	0.12	10.26	--	63.4
Penniman Lake	CAPL-SWSD63	10/25/2012	4.2	3.2	NS	23.7	19.32	7.74	0.261	0.12	10.03	--	36.6
Penniman Lake	CAPL-SWSD64	10/2/2012	5.0	Top	NS	130.7	22.23	7.49	0.262	0.12	5.39	63.00	-114.8
Penniman Lake	CAPL-SWSD64	10/2/2012	5.0	Bottom	NS	111.1	22.18	7.48	0.248	0.12	5.20	58.80	-99.3
Penniman Lake	CAPL-SWSD64	10/15/2012	4.25	1.0	89.9	18.2	19.57	7.96	0.270	0.13	9.27	--	207.9
Penniman Lake	CAPL-SWSD64	10/15/2012	4.25	3.2	NS	20.8	18.67	7.77	0.272	0.13	7.58	--	207.5
Penniman Lake	CAPL-SWSD64	10/25/2012	4.25	1.0	NS	24.6	20.25	8.21	0.255	0.12	11.42	--	54.2
Penniman Lake	CAPL-SWSD64	10/25/2012	4.25	3.2	NS	24.9	20.11	8.20	0.255	0.12	11.27	--	48.3
Penniman Lake	CAPL-SWSD65	10/2/2012	12.0	Top	NS	8.2	22.02	7.47	0.227	0.11	5.81	66.40	45.5
Penniman Lake	CAPL-SWSD65	10/2/2012	12.0	Middle	NS	8.1	21.98	7.40	0.226	0.11	5.77	64.30	43.3
Penniman Lake	CAPL-SWSD65	10/2/2012	12.0	Bottom	NS	6.3	21.90	7.38	0.226	0.11	5.60	62.00	43.0
Penniman Lake	CAPL-SWSD65	10/15/2012	7.8	1.0	86.3	20.5	19.18	8.19	0.260	0.12	9.83	--	149.5
Penniman Lake	CAPL-SWSD65	10/15/2012	7.8	6.8	NS	22.5	18.36	8.02	0.264	0.13	8.65	--	146.5
Penniman Lake	CAPL-SWSD65	10/18/2012	9.0	1.0	NS	10.4	19.72	8.02	0.252	0.12	10.35	--	-58.3
Penniman Lake	CAPL-SWSD65	10/18/2012	9.0	8.0	NS	24.3	17.76	7.06	0.253	0.12	8.82	--	-79.5
Penniman Lake	CAPL-SWSD66	10/2/2012	12.0	Top	NS	7.4	22.03	7.30	0.229	0.11	5.06	57.90	42.8
Penniman Lake	CAPL-SWSD66	10/2/2012	12.0	Middle	NS	6.8	21.91	7.28	0.228	0.11	4.90	55.20	40.1
Penniman Lake	CAPL-SWSD66	10/2/2012	12.0	Bottom	NS	14.3	21.88	7.28	0.221	0.11	4.88	54.80	40.3

Table D-2
Water Column Parameter Measurements
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Station ID	Date	Total Depth (feet)	Sample Depth (feet)	Hardness (MG/L)	Turbidity (NTU)	Temperature (^{o}C)	pH	Conductivity (ms/cm)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Oxidation Reduction Potential (mV)
Penniman Lake	CAPL-SWSD66	10/15/2012	7.9	1.0	86.5	19.8	19.10	7.96	0.261	0.12	9.97	--	118.7
Penniman Lake	CAPL-SWSD66	10/15/2012	7.9	6.9	NS	21.7	19.00	8.02	0.262	0.12	9.82	--	104.0
Penniman Lake	CAPL-SWSD66	10/18/2012	8.9	1.0	NS	8.5	19.11	7.89	0.251	0.12	10.39	--	-29.2
Penniman Lake	CAPL-SWSD66	10/18/2012	8.9	8.0	NS	14.1	17.71	7.49	0.254	0.12	8.74	92.50	-69.0
Penniman Lake	CAPL-SWSD67	10/15/2012	1.5	1.0	86.9	22.1	19.34	8.49	0.259	0.12	11.16	--	202.0
Penniman Lake	CAPL-SWSD67	10/25/2012	1.5	1.0	NS	26.3	18.94	8.31	0.252	0.12	11.14	--	137.7
Penniman Lake	CAPL-SWSD68	10/2/2012	9.0	Top	NS	7.2	21.97	7.73	0.228	0.11	5.70	65.00	45.0
Penniman Lake	CAPL-SWSD68	10/2/2012	9.0	Bottom	NS	7.0	21.90	7.72	0.228	0.11	5.61	63.80	43.3
Penniman Lake	CAPL-SWSD68	10/15/2012	8.5	1.0	87.1	20.5	19.10	8.15	0.261	0.12	9.96	--	126.6
Penniman Lake	CAPL-SWSD68	10/15/2012	8.5	7.5	NS	22.2	18.08	8.00	0.263	0.13	8.82	--	119.5
Penniman Lake	CAPL-SWSD68	10/18/2012	9.5	1.0	NS	7.1	19.09	7.86	0.252	0.12	10.16	109.00	-18.7
Penniman Lake	CAPL-SWSD68	10/18/2012	9.5	5.0	NS	6.8	17.75	7.63	0.255	0.12	9.21	96.90	-52.0
Penniman Lake	CAPL-SWSD68	10/18/2012	9.5	8.5	NS	11.9	17.66	7.46	0.253	0.12	8.07	84.70	-82.4
Penniman Lake	CAPL-SWSD69	10/2/2012	8.0	Top	NS	8.0	22.06	7.85	0.229	0.11	6.16	70.70	52.8
Penniman Lake	CAPL-SWSD69	10/2/2012	8.0	Bottom	NS	8.3	21.99	7.83	0.229	0.11	5.81	67.10	52.2
Penniman Lake	CAPL-SWSD69	10/15/2012	5.8	1.0	88.1	20.1	18.69	7.59	0.265	0.13	8.67	--	220.6
Penniman Lake	CAPL-SWSD69	10/15/2012	5.8	4.8	NS	22.6	17.97	7.23	0.269	0.13	6.48	--	224.3
Penniman Lake	CAPL-SWSD69	10/25/2012	5.8	1.0	NS	24.8	19.88	8.01	0.252	0.12	11.75	--	257.6
Penniman Lake	CAPL-SWSD69	10/25/2012	5.8	4.8	NS	31.3	19.85	7.95	0.252	0.12	11.55	--	258.6
Penniman Lake	CAPL-SD70	10/2/2012	1.2	Top	NS	26.3	22.95	7.74	0.235	0.11	6.05	70.70	-42.2
Penniman Lake	CAPL-SD70	10/17/2012	1.0	Top	NS	16.4	15.60	7.43	0.264	0.13	7.45	--	161.1
Penniman Lake	CAPL-SD70	10/25/2012	1.0	0.5	NS	88.3	20.24	7.02	0.282	0.13	6.65	--	255.9
Penniman Lake	CAPL-SD71	10/2/2012	10.0	Top	NS	8.3	22.04	7.78	0.237	0.11	6.58	75.80	55.7
Penniman Lake	CAPL-SD71	10/2/2012	10.0	Middle	NS	8.8	21.90	7.79	0.234	0.11	6.33	72.80	54.8
Penniman Lake	CAPL-SD71	10/2/2012	10.0	Bottom	NS	8.3	21.88	7.78	0.230	0.11	6.30	72.60	54.8
Penniman Lake	CAPL-SD71	10/17/2012	7.75	1.0	NS	5.6	18.95	8.06	0.246	0.12	9.82	--	60.0
Penniman Lake	CAPL-SD71	10/17/2012	7.75	6.75	NS	7.5	17.50	7.88	0.252	0.12	8.73	--	53.6
Penniman Lake	CAPL-SD71	10/25/2012	7.75	1.0	NS	24.1	20.40	8.17	0.253	0.12	11.52	--	20.2
Penniman Lake	CAPL-SD71	10/25/2012	7.75	6.75	NS	24.2	18.76	7.80	0.262	0.12	9.92	--	125.8

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Water Body	Station ID	Date	Total Depth (feet)	Sample Depth (feet)	Hardness (MG/L)	Turbidity (NTU)	Temperature (^{o}C)	pH	Conductivity (ms/cm)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Oxidation Reduction Potential (mV)
Penniman Lake	CAPL-SD72	10/2/2012	10.0	Top	NS	7.3	22.01	7.81	0.231	0.11	6.39	73.10	55.8
Penniman Lake	CAPL-SD72	10/2/2012	10.0	Middle	NS	8.4	21.89	7.84	0.229	0.11	6.18	70.70	55.1
Penniman Lake	CAPL-SD72	10/2/2012	10.0	Bottom	NS	6.3	21.80	7.82	0.228	0.11	5.98	68.80	53.4
Penniman Lake	CAPL-SD72	10/17/2012	8.5	1.0	NS	6.3	19.06	7.92	0.245	0.12	9.67	--	130.5
Penniman Lake	CAPL-SD72	10/17/2012	8.5	7.5	NS	6.5	17.34	7.70	0.253	0.12	8.04	--	129.6
Penniman Lake	CAPL-SD72	10/25/2012	8.5	1.0	NS	23.6	20.08	8.09	0.251	0.12	11.51	--	-57.6
Penniman Lake	CAPL-SD72	10/25/2012	8.5	7.5	NS	27.3	18.72	7.38	0.263	0.13	8.51	--	-86.2
Penniman Lake	CAPL-SD73	10/2/2012	8.0	Top	NS	6.8	22.02	7.85	0.229	0.11	5.60	64.10	53.7
Penniman Lake	CAPL-SD73	10/2/2012	8.0	Bottom	NS	6.6	21.98	7.81	0.229	0.11	5.50	63.30	53.9
Penniman Lake	CAPL-SD73	10/17/2012	9.3	1.0	NS	5.1	19.42	8.11	0.244	0.12	10.22	--	53.6
Penniman Lake	CAPL-SD73	10/17/2012	9.3	4.6	NS	7.6	17.87	8.07	0.245	0.12	10.02	--	47.9
Penniman Lake	CAPL-SD73	10/17/2012	9.3	8.3	NS	7.2	17.31	7.52	0.256	0.12	7.70	--	40.2
Penniman Lake	CAPL-SD73	10/25/2012	9.3	1.0	NS	24.1	19.03	7.94	0.252	0.12	11.41	--	192.7
Penniman Lake	CAPL-SD73	10/25/2012	9.3	4.6	NS	24.7	18.56	7.89	0.253	0.12	11.01	--	190.5
Penniman Lake	CAPL-SD73	10/25/2012	9.3	8.3	NS	38.2	17.98	7.44	0.263	0.13	8.00	--	176.5
Penniman Lake	CAPL-SD74	10/2/2012	8.0	Top	NS	8.0	21.99	7.78	0.229	0.11	5.47	62.50	50.3
Penniman Lake	CAPL-SD74	10/2/2012	8.0	Bottom	NS	8.0	21.97	7.77	0.228	0.11	5.40	61.80	50.1
Penniman Lake	CAPL-SD74	10/18/2012	9.4	1.0	NS	4.5	17.66	8.06	0.253	0.12	9.11	--	-4.6
Penniman Lake	CAPL-SD74	10/18/2012	9.4	4.5	NS	4.9	17.68	8.04	0.253	0.12	8.71	--	-21.5
Penniman Lake	CAPL-SD74	10/18/2012	9.4	8.3	NS	7.2	17.68	7.98	0.253	0.12	8.70	--	-54.0
Penniman Lake	CAPL-SD75	10/2/2012	8.0	Top	NS	8.1	21.97	7.70	0.228	0.11	4.73	54.10	51.4
Penniman Lake	CAPL-SD75	10/2/2012	8.0	Bottom	NS	7.9	21.95	7.69	0.228	0.11	4.72	54.10	50.1
Penniman Lake	CAPL-SD75	10/18/2012	9.3	1.0	NS	5.6	17.87	8.13	0.253	0.12	9.58	101.10	-17.2
Penniman Lake	CAPL-SD75	10/18/2012	9.3	4.5	NS	6.0	17.64	8.11	0.252	0.12	9.42	98.90	-32.1
Penniman Lake	CAPL-SD75	10/18/2012	9.3	8.3	NS	6.7	17.55	8.08	0.252	0.12	9.21	96.40	-56.1
Penniman Lake	CAPL-SD76	10/16/2012	0.6	Top	NS	22.5	18.27	7.45	0.249	0.12	7.03	--	176.3
Penniman Lake	CAPL-SD77	10/16/2012	2.5	1.0	NS	16.7	20.49	8.32	0.241	0.11	13.23	--	231.4
Penniman Lake	CAPL-SD77	10/25/2012	1.5	Top	NS	62.4	18.54	7.23	0.262	0.12	7.36	--	45.6
Penniman Lake	CAPL-SD78	10/16/2012	<0.5	Top	NS	47.2	18.18	6.77	0.342	0.16	3.56	--	131.5

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Water Body	Station ID	Date	Total Depth (feet)	Sample Depth (feet)	Hardness (MG/L)	Turbidity (NTU)	Temperature (^{o}C)	pH	Conductivity (ms/cm)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Oxidation Reduction Potential (mV)
Penniman Lake	CAPL-SD79	10/2/2012	1.1	Top	NS	0.2	21.91	7.20	0.235	0.11	3.78	43.10	3.3
Penniman Lake	CAPL-SD79	10/16/2012	1.0	Top	NS	17.1	20.71	7.80	0.242	0.10	9.84	--	163.8
Penniman Lake	CAPL-SD79	10/25/2012	NS	Top	NS	41.5	18.54	7.43	0.258	0.12	7.43	--	152.8
Penniman Lake	CAPL-SD80	10/2/2012	8.0	Top	NS	7.2	22.08	7.26	0.228	0.11	5.33	61.10	39.2
Penniman Lake	CAPL-SD80	10/2/2012	8.0	Bottom	NS	6.3	21.90	7.22	0.224	0.11	5.21	60.00	34.4
Penniman Lake	CAPL-SD80	10/16/2012	6.2	1.0	NS	8.6	18.90	7.45	0.242	0.11	9.58	--	221.2
Penniman Lake	CAPL-SD80	10/16/2012	6.2	5.2	NS	10.4	18.67	7.69	0.242	0.12	9.20	--	200.5
Penniman Lake	CAPL-SD80	10/25/2012	6.2	1.0	NS	28.1	18.63	7.85	0.255	0.12	9.56	--	160.0
Penniman Lake	CAPL-SD80	10/25/2012	6.2	5.2	NS	25.6	18.05	7.82	0.256	0.12	8.93	--	156.3
Penniman Lake	CAPL-SD81	10/2/2012	8.0	Top	NS	7.9	21.99	7.62	0.228	0.11	5.30	60.60	40.6
Penniman Lake	CAPL-SD81	10/2/2012	8.0	Bottom	NS	7.7	21.92	7.60	0.227	0.11	5.28	60.10	38.8
Penniman Lake	CAPL-SD81	10/18/2012	9.6	1.0	NS	12.4	18.48	8.12	0.252	0.12	9.30	99.30	-8.2
Penniman Lake	CAPL-SD81	10/18/2012	9.6	4.3	NS	10.4	17.70	8.06	0.252	0.12	8.95	93.70	-42.1
Penniman Lake	CAPL-SD81	10/18/2012	9.6	8.6	NS	15.7	17.61	7.85	0.252	0.12	8.44	87.70	-84.1
Penniman Lake	CAPL-SD82	10/2/2012	13.0	Top	NS	8.2	21.97	7.67	0.228	0.11	4.78	54.60	49.4
Penniman Lake	CAPL-SD82	10/2/2012	13.0	Middle	NS	7.8	21.90	7.70	0.227	0.11	4.60	52.10	48.8
Penniman Lake	CAPL-SD82	10/2/2012	13.0	Bottom	NS	7.7	21.85	7.68	0.228	0.11	4.58	52.00	47.1
Penniman Lake	CAPL-SD82	10/18/2012	8.7	1.0	NS	5.8	17.93	8.11	0.253	0.12	9.71	102.60	0.5
Penniman Lake	CAPL-SD82	10/18/2012	8.7	4.0	NS	6.9	17.64	8.07	0.252	0.12	9.63	101.10	-17.0
Penniman Lake	CAPL-SD82	10/18/2012	8.7	7.7	NS	6.5	17.16	8.07	0.252	0.12	9.50	99.80	-48.1
King Creek	CAPL-SD83	10/16/2012	NS	Top	NS	>1,000	18.05	6.96	17.42	10.35	0.21	--	79.5
NW Cove Ditch	CAPL-SD84	10/24/2012	0.17	NS	NS	NS	NS	NS	NS	NS	NS	--	NS
NW Cove Ditch	CAPL-SD85	10/24/2012	0.5	NS	NS	NS	NS	NS	NS	NS	NS	--	NS
NW Cove Ditch	CAPL-SD86	10/24/2012	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	NS
NW Cove Ditch	CAPL-SD87	10/24/2012	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	NS
Reference Samples													
Cheatham Pond	CAREFS04-SWSD01	10/3/2012	1.5	Top	NS	45.5	23.05	6.98	0.316	0.15	3.68	39.00	-104.8
Cheatham Pond	CAREFS04-SWSD01	10/3/2012	NS	NS	94.0	30.3	26.82	8.56	0.235	0.11	12.66	NS	-92.2
Cheatham Pond	CAREFS04-SWSD02	10/3/2012	0.8	Top	NS	114.3	22.08	6.89	0.372	0.18	3.55	40.10	-142.1

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Water Body	Station ID	Date	Total Depth (feet)	Sample Depth (feet)	Hardness (MG/L)	Turbidity (NTU)	Temperature (^{o}C)	pH	Conductivity (ms/cm)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Oxidation Reduction Potential (mV)
Cheatham Pond	CAREFS04-SWSD02	10/3/2012	0.25	0.25	98.0	77.4	26.42	7.68	0.259	0.12	8.80	NS	-101.4
Cheatham Pond	CAREFS04-SWSD03	10/3/2012	2.3	Top	NS	5.2	22.78	6.85	0.292	0.14	4.35	50.50	-125.9
Cheatham Pond	CAREFS04-SWSD03	10/3/2012	2.0	Top	76.0	46.4	26.40	9.16	0.284	0.13	11.42	NS	97.4
Cheatham Pond	CAREFS04-SWSD04	10/3/2012	1.0	Top	NS	103.4	23.30	7.45	0.431	0.21	2.83	33.20	-179.8
Cheatham Pond	CAREFS04-SWSD04	10/3/2012	0.5	0.5	160	102.7	25.40	7.92	0.434	0.21	7.87	NS	74.7
Cheatham Pond	CAREFS04-SWSD05	10/3/2012	1.5	Top	NS	68.8	23.00	7.35	0.424	0.20	4.35	51.20	-190.1
Cheatham Pond	CAREFS04-SWSD05	10/3/2012	1.0	Top	120	73.8	24.60	7.62	0.364	0.17	6.10	NS	25.0
Cheatham Pond	CAREFPL-SWSD01	10/3/2012	3.0	Top	NS	8.3	21.71	7.32	0.283	0.13	5.12	67.50	-99.0
Cheatham Pond	CAREFPL-SWSD01	10/4/2012	2.5	Top	107	34.0	22.92	6.62	0.501	0.24	4.57	NS	40.7
Cheatham Pond	CAREFPL-SWSD02	10/3/2012	3.0	Top	NS	7.3	21.66	7.35	0.261	0.12	5.44	68.30	-67.6
Cheatham Pond	CAREFPL-SWSD02	10/4/2012	2.0	Top	98.0	27.6	22.99	7.47	0.264	0.13	5.64	NS	145.5
Cheatham Pond	CAREFPL-SWSD03	10/3/2012	3.0	Top	NS	17.8	22.10	7.06	0.252	0.12	5.75	69.80	-75.3
Cheatham Pond	CAREFPL-SWSD03	10/4/2012	2.5 - 3	Top	85.5	34.7	23.40	7.48	0.463	0.22	9.49	NS	16.4
Cheatham Pond	CAREFPL-SWSD04	10/3/2012	3.0	Top	NS	38.5	21.83	7.04	0.318	0.15	5.64	68.90	-78.5
Cheatham Pond	CAREFPL-SWSD04	10/4/2012	2.5 - 3	Top	96.3	30.0	24.20	8.88	0.243	0.11	9.30	NS	130.4
Cheatham Pond	CAREFPL-SWSD05	10/3/2012	2.5	Top	NS	18.7	22.40	7.07	0.273	0.13	5.35	67.30	-66.8
Cheatham Pond	CAREFPL-SWSD05	10/4/2012	2.5 - 3	Top	97.3	38.1	23.96	8.23	0.454	0.22	12.15	NS	5.1

NS - Not Sampled

Table D-3
Physical Sediment Parameter Measurements
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Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines	
Surface Sediment - Site Samples													
Penniman Lake	CAA06-SD01	CAA06-SD01-1008	10/23/2008	0 - 4	69,000	6.90	7.60	4.3	2.3	10.6	34.2	48.6	0.02
Penniman Lake	CAA06-SD01	CAA06-SD01P-1008	10/23/2008	0 - 4	NS	NS	NS	NS	NS	NS	NS	NS	0.04
Penniman Lake	CAA06-SD02	CAA06-SD02-1008	10/23/2008	0 - 4	23,000	2.30	7.80	2.9	1.4	34.0	44.9	16.8	0.53
Drainage Ditch	CAPL-SWSD18	CAPL-SD18-0811	8/2/2011	0 - 4	34,000	3.40	NS	9.0	3.0	16.0	68.5	3.5	NS
Drainage Ditch	CAPL-SWSD19	CAPL-SD19-0811	8/2/2011	0 - 4	3,800	0.38	NS	5.0	4.0	38.0	51.4	1.6	NS
Drainage Ditch	CAPL-SWSD20	CAPL-SD20-0811	8/2/2011	0 - 4	110,000	11.0	NS	14.0	6.0	33.0	43.0	4.0	NS
Drainage Ditch	CAPL-SWSD21	CAPL-SD21-0811	8/2/2011	0 - 4	1,300	0.13	NS	0.0	0.0	4.0	95.2	0.8	NS
Penniman Lake	CAPL-SWSD22	CAPL-SD22-0711	7/28/2011	0 - 4	180,000	18.0	NS	9.0	18.0	49.0	16.0	8.0	NS
Penniman Lake	CAPL-SWSD23	CAPL-SD23-0711	7/28/2011	0 - 4	79,000	7.90	NS	0.0	2.0	34.0	39.0	25.0	NS
Penniman Lake	CAPL-SWSD24	CAPL-SD24-0711	7/28/2011	0 - 4	110,000	11.0	NS	2.0	24.0	48.0	16.8	9.2	NS
Penniman Lake	CAPL-SWSD25	CAPL-SD25-0711	7/28/2011	0 - 4	12,000	1.20	NS	2.0	4.0	18.0	74.5	1.5	NS
Drainage Ditch	CAPL-SWSD26	CAPL-SD26-0811	8/2/2011	0 - 4	15,000	1.50	NS	8.0	3.0	24.0	61.5	3.5	NS
Penniman Lake	CAPL-SWSD27	CAPL-SD27-0711	7/28/2011	0 - 4	98,000	9.80	NS	8.0	20.0	48.0	17.2	6.8	NS
Penniman Lake	CAPL-SWSD28	CAPL-SD28-0711	7/28/2011	0 - 4	87,000	8.70	NS	0.0	10.0	60.0	19.0	11.0	NS
Penniman Lake	CAPL-SWSD29	CAPL-SD29-0711	7/28/2011	0 - 4	78,000	7.80	NS	0.0	6.0	50.0	26.0	18.0	NS
Penniman Lake	CAPL-SWSD30	CAPL-SD30-0711	7/28/2011	0 - 4	75,000	7.50	NS	0.0	11.0	57.0	20.0	12.0	NS
Penniman Lake	CAPL-SWSD31	CAPL-SD31-0711	7/28/2011	0 - 4	68,000	6.80	NS	0.0	8.0	44.0	34.0	14.0	NS
Penniman Lake	CAPL-SWSD32	CAPL-SD32-0711	7/28/2011	0 - 4	110,000	11.0	NS	4.0	9.0	37.0	43.0	7.0	NS
Penniman Lake	CAPL-SWSD33	CAPL-SD33-0711	7/28/2011	0 - 4	80,000	8.00	NS	0.0	8.0	64.0	19.5	8.5	NS
Penniman Lake	CAPL-SWSD34	CAPL-SD34-0711	7/27/2011	0 - 4	78,000	7.80	NS	0.0	6.0	56.0	23.0	15.0	NS
Penniman Lake	CAPL-SWSD35	CAPL-SD35-0711	7/28/2011	0 - 4	110,000	11.0	NS	1.0	1.0	41.0	40.0	17.0	NS
Penniman Lake	CAPL-SWSD36	CAPL-SD36-0711	7/28/2011	0 - 4	64,000	6.40	NS	0.0	18.0	56.0	17.6	8.4	NS
Penniman Lake	CAPL-SWSD37	CAPL-SD37-0711	7/27/2011	0 - 4	72,000	7.20	NS	0.0	3.0	55.0	28.0	14.0	NS
Penniman Lake	CAPL-SWSD38	CAPL-SD38-0711	7/27/2011	0 - 4	85,000	8.50	NS	31.0	12.0	21.0	24.0	12.0	NS
Penniman Lake	CAPL-SWSD39	CAPL-SD39-0711	7/27/2011	0 - 4	68,000	6.80	NS	1.0	3.0	17.0	33.0	46.0	NS
Penniman Lake	CAPL-SWSD40	CAPL-SD40-0711	7/27/2011	0 - 4	47,000	4.70	NS	0.0	4.0	31.0	42.0	23.0	NS
Penniman Lake	CAPL-SWSD41	CAPL-SD41-0711	7/28/2011	0 - 4	81,000	8.10	NS	0.0	13.0	58.0	18.0	11.0	NS
Penniman Lake	CAPL-SWSD42	CAPL-SD42-0711	7/27/2011	0 - 4	80,000	8.00	NS	0.0	16.0	56.0	18.6	9.4	NS

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Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines	
Drainage Ditch	CAPL-SWSD43	CAPL-SD43-0711	7/28/2011	0 - 4	150,000	15.0	NS	11.0	17.0	43.0	23.2	5.8	NS
Penniman Lake	CAPL-SWSD44	CAPL-SD44-0711	7/28/2011	0 - 4	130,000	13.0	NS	12.0	48.0	31.6	7.0	1.4	NS
Penniman Lake	CAPL-SWSD45	CAPL-SD45-0711	7/28/2011	0 - 4	5,500	0.55	NS	2.0	1.0	39.0	51.6	6.4	NS
Penniman Lake	CAPL-SWSD46	CAPL-SD46-0711	7/27/2011	0 - 4	80,000	8.00	NS	0.0	14.0	57.0	18.0	11.0	NS
Penniman Lake	CAPL-SWSD47	CAPL-SD47-0711	7/27/2011	0 - 4	100,000	10.0	NS	0.0	4.0	54.0	24.0	18.0	NS
Penniman Lake	CAPL-SWSD48	CAPL-SD48-0711	7/29/2011	0 - 4	8,200	0.82	NS	2.0	3.0	45.0	45.5	4.5	NS
Penniman Lake	CAPL-SWSD49	CAPL-SD49-0711	7/29/2011	0 - 4	130,000	13.0	NS	0.0	3.0	42.0	37.0	18.0	NS
Penniman Lake	CAPL-SWSD50	CAPL-SD50-0711	7/29/2011	0 - 4	66,000	6.60	NS	0.0	3.0	37.0	34.0	26.0	NS
Penniman Lake	CAPL-SWSD51	CAPL-SD51-0711	7/29/2011	0 - 4	70,000	7.00	NS	0.0	2.0	52.0	28.0	18.0	NS
Penniman Lake	CAPL-SWSD52	CAPL-SD52-0711	7/29/2011	0 - 4	58,000	5.80	NS	0.0	4.0	49.0	27.0	20.0	NS
Penniman Lake	CAPL-SWSD53	CAPL-SD53-0711	7/29/2011	0 - 4	63,000	6.30	NS	0.0	2.0	39.0	37.0	22.0	NS
Penniman Lake	CAPL-SWSD54	CAPL-SD54-0711	7/27/2011	0 - 4	83,000	8.30	NS	1.0	4.0	44.0	31.0	20.0	NS
Penniman Lake	CAPL-SWSD55	CAPL-SD55-0711	7/27/2011	0 - 4	19,000	1.90	NS	0.0	1.0	20.0	73.5	5.5	NS
Penniman Lake	CAPL-SWSD56	CAPL-SD56-0711	7/27/2011	0 - 4	84,000	8.40	NS	0.0	4.0	43.0	31.0	22.0	NS
Penniman Lake	CAPL-SWSD57	CAPL-SD57-0711	7/27/2011	0 - 4	35,000	3.50	NS	1.0	2.0	29.0	63.4	4.6	NS
Penniman Lake	CAPL-SWSD58	CAPL-SD58-0711	7/29/2011	0 - 4	74,000	7.40	NS	0.0	7.0	50.0	25.0	18.0	NS
Penniman Lake	CAPL-SWSD59	CAPL-SD59-0711	7/27/2011	0 - 4	98,000	9.80	NS	0.0	6.0	55.0	23.0	16.0	NS
Penniman Lake	CAPL-SWSD60	CAPL-SD60-0711	7/29/2011	0 - 4	78,000	7.80	NS	1.0	14.0	46.0	22.0	17.0	NS
Drainage Ditch	CAPL-SWSD61	CAPL-SD61-0811	8/2/2011	0 - 4	15,000	1.50	NS	1.0	1.0	15.0	77.2	5.8	NS
Penniman Lake	CAPL-SWSD62	CAPL-SD62-1012	10/17/2012	0 - 4	74,400	7.44	6.81	0.0	0.0	1.1	10.8	88.1	0.24
Penniman Lake	CAPL-SWSD63	CAPL-SD63-1012	10/17/2012	0 - 4	71,400	7.14	6.81	0.0	0.0	1.9	8.5	89.6	0.23
Penniman Lake	CAPL-SWSD64	CAPL-SD64-1012	10/17/2012	0 - 4	75,900	7.59	6.83	0.0	0.0	1.4	18.3	80.3	0.16
Penniman Lake	CAPL-SWSD65	CAPL-SD65-1012	10/18/2012	0 - 4	37,900	3.79	7.24	0.0	0.0	9.6	56.3	34.1	0.10
Penniman Lake	CAPL-SWSD66	CAPL-SD66-1012	10/18/2012	0 - 4	35,000	3.50	7.10	0.1	0.5	7.1	69.4	22.9	0.07
Penniman Lake	CAPL-SWSD67	CAPL-SD67-1012	10/16/2012	0 - 4	106,000	10.6	7.10	14.7	6.4	15.3	44.6	19.0	0.08
Penniman Lake	CAPL-SWSD68	CAPL-SD68-1012	10/18/2012	0 - 4	116,000	11.6	7.10	0.0	0.4	2.1	7.6	89.9	0.08
Penniman Lake	CAPL-SWSD69	CAPL-SD69-1012	10/17/2012	0 - 4	72,200	7.22	6.83	3.3	2.8	2.6	39.2	52.1	0.04
Penniman Lake	CAPL-SD70	CAPL-SD70-1012	10/17/2012	0 - 4	98,300	9.83	7.47	1.9	2.3	6.6	42.5	46.7	0.31
Penniman Lake	CAPL-SD71	CAPL-SD71-1012	10/17/2012	0 - 4	51,800	5.18	6.85	0.0	0.0	0.4	7.4	92.2	0.15

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Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines	
Penniman Lake	CAPL-SD72	CAPL-SD72-1012	10/17/2012	0 - 4	107,000	10.7	6.93	1.1	1.8	3.2	14.2	79.7	0.11
Penniman Lake	CAPL-SD73	CAPL-SD73-1012	10/17/2012	0 - 4	37,100	3.71	7.01	0.0	0.0	0.3	3.1	96.6	0.17
Penniman Lake	CAPL-SD74	CAPL-SD74-1012	10/18/2012	0 - 4	79,300	7.93	7.30	0.0	0.0	0.4	5.0	94.6	0.08
Penniman Lake	CAPL-SD75	CAPL-SD75-1012	10/18/2012	0 - 4	84,300	8.43	7.34	0.0	0.0	0.2	4.0	95.8	0.14
Penniman Lake	CAPL-SD76	CAPL-SD76-1012	10/16/2012	0 - 4	51,400	5.14	6.83	0.9	4.0	7.7	75.0	12.4	0.30
Penniman Lake	CAPL-SD77	CAPL-SD77-1012	10/16/2012	0 - 4	91,100	9.11	6.71	1.7	2.9	13.1	56.3	26.0	0.14
Penniman Lake	CAPL-SD78	CAPL-SD78-1012	10/16/2012	0 - 4	71,500	7.15	6.90	2.3	5.1	8.2	73.8	10.6	2.11
Penniman Lake	CAPL-SD79	CAPL-SD79-1012	10/16/2012	0 - 4	68,400	6.84	6.98	0.3	2.2	8.6	77.8	11.1	0.13
Penniman Lake	CAPL-SD80	CAPL-SD80-1012	10/16/2012	0 - 4	69,200	6.92	7.29	0.3	1.0	6.9	51.2	40.6	0.17
Penniman Lake	CAPL-SD81	CAPL-SD81-1012	10/18/2012	0 - 4	108,000	10.8	7.19	0.0	0.0	0.4	3.7	95.9	0.12
Penniman Lake	CAPL-SD82	CAPL-SD82-1012	10/18/2012	0 - 4	134,000	13.4	7.16	0.4	0.9	0.2	5.7	92.8	0.08
King Creek	CAPL-SD83	CAPL-SD83-1012	10/16/2012	0 - 4	36,100	3.61	7.24	34.1	6.4	15.4	30.4	13.7	0.07
Drainage Ditch	CAPL-SD84	CAPL-SD84-1012	10/24/2012	0 - 4	2,300	0.23	8.28	11.6	6.5	12.6	55.8	13.5	NS
Drainage Ditch	CAPL-SD84	CAPL-SD84-1012-A	10/26/2012	0 - 4	NS	NS	NS	NS	NS	NS	NS	NS	3.08
Drainage Ditch	CAPL-SD85	CAPL-SD85-1012	10/24/2012	0 - 4	3,440	0.34	8.11	5.8	6.9	29.2	56.0	2.1	NS
Drainage Ditch	CAPL-SD85	CAPL-SD85-1012-A	10/26/2012	0 - 4	NS	NS	NS	NS	NS	NS	NS	NS	5.79
Drainage Ditch	CAPL-SD86	CAPL-SD86-1012	10/24/2012	0 - 4	3,210	0.32	7.88	4.1	3.6	14.6	73.3	4.4	NS
Drainage Ditch	CAPL-SD86	CAPL-SD86-1012-A	10/26/2012	0 - 4	NS	NS	NS	NS	NS	NS	NS	NS	0.63
Drainage Ditch	CAPL-SD87	CAPL-SD87-1012	10/24/2012	0 - 4	7,080	0.71	8.04	10.8	3.8	9.3	71.9	4.2	NS
Drainage Ditch	CAPL-SD87	CAPL-SD87-1012-A	10/26/2012	0 - 4	NS	NS	NS	NS	NS	NS	NS	NS	0.34
Drainage Ditch	CAS011-11SD18	CAS011-11SD18-00-0602	6/13/2002	0 - 4	24,000	2.40	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD19	CAS011-11SD19-00-0602	6/13/2002	0 - 4	41,000	4.10	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD20	CAS011-11SD20-00-0602	6/13/2002	0 - 4	9,030	0.90	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD21	CAS011-11SD21-00-0602	6/14/2002	0 - 4	80,800	8.08	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD22	CAS011-11SD22-00-0602	6/14/2002	0 - 4	123,000	12.3	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD23	CAS011-11SD23-00-0602	6/17/2002	0 - 4	90,600	9.06	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD24	CAS011-11SD24-00-0602	6/13/2002	0 - 4	20,500	2.05	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD25	CAS011-11SD25-00-0602	6/13/2002	0 - 4	15,000	1.50	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD26	CAS011-11SD26-00-0602	6/17/2002	0 - 4	51,600	5.16	NS	NS	NS	NS	NS	NS	NS

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Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines	
Penniman Lake	CAS011-11SD27	CAS011-11SD27-00-0602	6/17/2002	0 - 4	71,500	7.15	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD28	CAS011-11SD28-00-0602	6/17/2002	0 - 4	34,300	3.43	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD29	CAS011-11SD29-00-0602	6/17/2002	0 - 4	149,000	14.9	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD30	CAS011-11SD30-00-0602	6/18/2002	0 - 4	53,300	5.33	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD31	CAS011-11SD31-00-0602	6/18/2002	0 - 4	17,100	1.71	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD32	CAS011-11SD32-00-0602	6/18/2002	0 - 4	94,300	9.43	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	Penniman Lake-SD10	PL-00-POND-SD10-0300	3/29/2000	0 - 4	29,700	2.97	7.30	NS	NS	NS	NS	NS	0.13
Penniman Lake	Penniman Lake-SD10	PL-00-POND-SD10D-0300	3/29/2000	0 - 4	26,100	2.61	7.20	NS	NS	NS	NS	NS	0.10
Penniman Lake	Penniman Lake-SD11	PL-00-POND-SD11-0300	3/30/2000	0 - 4	106,000	10.6	7.60	NS	NS	NS	NS	NS	0.17
Penniman Lake	Penniman Lake-SD12	PL-00-POND-SD12-0300	3/29/2000	0 - 4	49,100	4.91	7.30	NS	NS	NS	NS	NS	0.22
Penniman Lake	Penniman Lake-SD13	PL-00-POND-SD13-0300	3/30/2000	0 - 4	88,500	8.85	7.60	NS	NS	NS	NS	NS	0.27
Penniman Lake	Penniman Lake-SD14	PL-00-POND-SD14-0300	3/29/2000	0 - 4	25,300	2.53	7.80	NS	NS	NS	NS	NS	0.32
Penniman Lake	Penniman Lake-SD15	PL-00-POND-SD15-0300	3/29/2000	0 - 4	27,800	2.78	8.00	NS	NS	NS	NS	NS	0.44
Penniman Lake	Penniman Lake-SD16	PL-00-POND-SD16-0300	3/29/2000	0 - 4	30,600	3.06	7.80	NS	NS	NS	NS	NS	0.19
Penniman Lake	Penniman Lake-SD17	PL-00-POND-SD17-0300	3/29/2000	0 - 4	28,600	2.86	7.50	NS	NS	NS	NS	NS	0.17
Surface Sediment - Reference Samples													
Cheatham Pond	CAREFS04-SWSD01	CAREFS04-SD01-1012	10/9/2012	0 - 4	170,000	17.0	6.90	0.0	4.1	18.5	26.5	50.9	0.06
Cheatham Pond	CAREFS04-SWSD02	CAREFS04-SD02-1012	10/9/2012	0 - 4	150,000	15.0	6.60	0.0	5.2	26.7	33.6	34.5	0.01
Cheatham Pond	CAREFS04-SWSD03	CAREFS04-SD03-1012	10/10/2012	0 - 4	57,000	5.70	6.90	0.0	3.2	6.3	74.7	15.8	0.01
Cheatham Pond	CAREFS04-SWSD04	CAREFS04-SD04-1012	10/9/2012	0 - 4	100,000	10.0	6.90	0.0	0.8	3.6	19.5	76.1	0.01
Cheatham Pond	CAREFS04-SWSD05	CAREFS04-SD05-1012	10/9/2012	0 - 4	110,000	11.0	6.90	0.0	1.4	9.3	14.8	74.5	0.004
Cheatham Pond	CAREFPL-SWSD01	CAREFPL-SD01-1012	10/10/2012	0 - 4	56,100	5.61	6.86	0.0	1.8	6.4	81.1	10.7	0.06
Cheatham Pond	CAREFPL-SWSD02	CAREFPL-SD02-1012	10/10/2012	0 - 4	97,200	9.72	6.54	0.0	7.8	10.0	47.0	35.2	0.05
Cheatham Pond	CAREFPL-SWSD03	CAREFPL-SD03-1012	10/10/2012	0 - 4	37,600	3.76	6.91	0.0	3.9	8.1	61.8	26.2	0.02
Cheatham Pond	CAREFPL-SWSD04	CAREFPL-SD04-1012	10/10/2012	0 - 4	51,700	5.17	6.75	1.6	3.9	9.3	69.0	16.2	0.04
Cheatham Pond	CAREFPL-SWSD05	CAREFPL-SD05-1012	10/10/2012	0 - 4	57,100	5.71	6.72	0.0	5.6	8.5	65.3	20.6	0.03
Cheatham Pond	Cheatham Pond-SD02	CP-00-POND-SD02-0300	3/30/2000	0 - 4	43,200	4.32	7.60	NS	NS	NS	NS	NS	0.05
Cheatham Pond	Cheatham Pond-SD02	CP-00-POND-SD02D-0300	3/30/2000	0 - 4	60,800	6.08	7.70	NS	NS	NS	NS	NS	0.03
Cheatham Pond	Cheatham Pond-SD03	CP-00-POND-SD03-0300	3/30/2000	0 - 4	108,000	10.8	8.00	NS	NS	NS	NS	NS	0.07

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Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines	
Cheatham Pond	Cheatham Pond-SD04	CP-00-POND-SD04-0300	3/30/2000	0 - 4	29,500	2.95	7.80	NS	NS	NS	NS	NS	0.11
Cheatham Pond	Cheatham Pond-SD05	CP-00-POND-SD05-0300	3/31/2000	0 - 4	46,700	4.67	7.70	NS	NS	NS	NS	NS	0.06
Cheatham Pond	Cheatham Pond-SD06	CP-00-POND-SD06-0300	3/31/2000	0 - 4	78,300	7.83	7.90	NS	NS	NS	NS	NS	0.06
Cheatham Pond	Cheatham Pond-SD07	CP-00-POND-SD07-0300	3/31/2000	0 - 4	12,700	1.27	7.30	NS	NS	NS	NS	NS	0.03
Cheatham Pond	Cheatham Pond-SD18	CP-00-POND-SD18-0300	3/30/2000	0 - 4	96,500	9.65	7.70	NS	NS	NS	NS	NS	0.09
Cheatham Pond	Cheatham Pond-SD19	CP-00-POND-SD19-0300	3/30/2000	0 - 4	68,500	6.85	7.80	NS	NS	NS	NS	NS	0.06
Subsurface Sediment - Site Samples													
Penniman Lake	CAA06-SD01	CAA06-SSD01-1008	10/23/2008	4 - 8	36,000	3.60	7.40	3.7	2.2	17.2	57.0	19.9	0.02
Penniman Lake	CAA06-SD02	CAA06-SSD02-1008	10/23/2008	4 - 8	31,000	3.10	7.30	6.3	4.7	39.7	48.9	0.4	0.04
Penniman Lake	CAPL-SWSD62	CAPL-SSD62-1012	10/17/2012	4 - 8	45,400	4.54	7.31	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SWSD63	CAPL-SSD63-1012	10/17/2012	4 - 8	103,000	10.3	6.92	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SWSD64	CAPL-SSD64-1012	10/17/2012	4 - 8	124,000	12.4	6.89	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SWSD65	CAPL-SSD65-1012	10/18/2012	4 - 8	63,000	6.30	7.16	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SWSD66	CAPL-SSD66-1012	10/18/2012	4 - 8	10,700	1.07	7.35	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SWSD67	CAPL-SSD67-1012	10/16/2012	4 - 8	30,900	3.09	7.34	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SWSD68	CAPL-SSD68-1012	10/18/2012	4 - 8	88,200	8.82	7.53	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SWSD69	CAPL-SSD69-1012	10/17/2012	4 - 8	28,400	2.84	6.77	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD70	CAPL-SSD70-1012	10/17/2012	4 - 8	33,600	3.36	7.02	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD71	CAPL-SSD71-1012	10/17/2012	4 - 8	44,500	4.45	6.86	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD72	CAPL-SSD72-1012	10/17/2012	4 - 8	165,000	16.5	7.36	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD73	CAPL-SSD73-1012	10/17/2012	4 - 8	57,300	5.73	7.06	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD74	CAPL-SSD74-1012	10/18/2012	4 - 8	124,000	12.4	7.71	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD75	CAPL-SSD75-1012	10/18/2012	4 - 8	74,400	7.44	7.13	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD76	CAPL-SSD76-1012	10/16/2012	4 - 8	7,570	0.76	6.93	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD77	CAPL-SSD77-1012	10/16/2012	4 - 8	15,800	1.58	7.00	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD78	CAPL-SSD78-1012	10/16/2012	4 - 8	63,700	6.37	6.79	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD79	CAPL-SSD79-1012	10/16/2012	4 - 8	25,500	2.55	7.00	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD80	CAPL-SSD80-1012	10/16/2012	4 - 8	37,000	3.70	7.53	NS	NS	NS	NS	NS	NS
Penniman Lake	CAPL-SD81	CAPL-SSD81-1012	10/18/2012	4 - 8	75,400	7.54	7.25	NS	NS	NS	NS	NS	NS

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Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines	
Penniman Lake	CAPL-SD82	CAPL-SSD82-1012	10/18/2012	4 - 8	136,000	13.6	7.26	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAPL-SD84	CAPL-SSD84-1012	10/24/2012	4 - 8	4,950	0.50	8.02	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAPL-SD85	CAPL-SSD85-1012	10/24/2012	4 - 8	2,510	0.25	8.28	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAPL-SD86	CAPL-SSD86-1012	10/24/2012	4 - 8	11,400	1.14	7.91	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAPL-SD87	CAPL-SSD87-1012	10/24/2012	4 - 8	32,400	3.24	7.92	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD18	CAS011-11SD18-01-0602	6/13/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD19	CAS011-11SD19-01-0602	6/13/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD21	CAS011-11SD21-01-0602	6/14/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD22	CAS011-11SD22-01-0602	6/14/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD23	CAS011-11SD23-01-0602	6/17/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD24	CAS011-11SD24-01-0602	6/13/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD25	CAS011-11SD25-01-0602	6/13/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Drainage Ditch	CAS011-11SD26	CAS011-11SD26-01-0602	6/17/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD27	CAS011-11SD27-01-0602	6/17/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD28	CAS011-11SD28-01-0602	6/17/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD29	CAS011-11SD29-01-0602	6/18/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD30	CAS011-11SD30-01-0602	6/18/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD31	CAS011-11SD31-01-0602	6/18/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Penniman Lake	CAS011-11SD32	CAS011-11SD32-01-0602	6/18/2002	4 - 8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Subsurface Sediment - Reference Samples													
Cheatham Pond	CAREFS04-SWSD01	CAREFS04-SSD01-1012	10/9/2012	4 - 8	130,000	13.0	7.20	0.0	1.8	13.0	56.0	29.2	0.05
Cheatham Pond	CAREFS04-SWSD02	CAREFS04-SSD02-1012	10/9/2012	4 - 8	83,000	8.30	6.80	0.0	1.6	8.5	46.9	43.0	0.02
Cheatham Pond	CAREFS04-SWSD03	CAREFS04-SSD03-1012	10/10/2012	4 - 8	72,000	7.20	6.90	0.0	1.4	4.4	64.2	30.0	0.01
Cheatham Pond	CAREFS04-SWSD04	CAREFS04-SSD04-1012	10/9/2012	4 - 8	100,000	10.0	6.90	0.0	1.6	3.8	12.3	82.3	0.01
Cheatham Pond	CAREFS04-SWSD05	CAREFS04-SSD05-1012	10/9/2012	4 - 8	92,000	9.20	6.80	0.0	2.6	3.9	8.3	85.2	0.08
Cheatham Pond	CAREFPL-SWSD01	CAREFPL-SSD01-1012	10/10/2012	4 - 8	26,500	2.65	6.87	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFPL-SWSD02	CAREFPL-SSD02-1012	10/10/2012	4 - 8	42,500	4.25	6.89	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFPL-SWSD03	CAREFPL-SSD03-1012	10/10/2012	4 - 8	19,600	1.96	6.77	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFPL-SWSD04	CAREFPL-SSD04-1012	10/10/2012	4 - 8	67,800	6.78	6.79	NS	NS	NS	NS	NS	NS

Table D-3
Physical Sediment Parameter Measurements
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines	
Cheatham Pond	CAREFPL-SWSD05	CAREFPL-SSD05-1012	10/10/2012	4 - 8	43,400	4.34	6.94	NS	NS	NS	NS	NS	NS

NS - Not Sampled
Gray shaded cells indicate field duplicates
1 - Yellow shaded cells indicate AVS not detected (one-half of the detection limit was used in calculations); bolded values indicate ratios > 1

Table D-4
Sampling Results - 2012 Aquatic Biological Surveys - Penniman Lake
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Sample Location	Date	Qualitative Field Evaluation of Aquatic Biota						Sampling Method		Benthic Macroinvertebrate Counts																																
		Periphyton	Filamentous Algae	Macrophytes	Slimes	Macro-invertebrates	Fish	Ponar (grab)	Dip Net (jabs)	Porifera	Hydrozoa	Platyhelminthes	Turbellaria	Hirudinea	Oligochaeta	Isopoda	Amphipoda	Decapoda	Gastropoda	Bivalvia	Anisoptera	Zygoptera	Hemiptera	Coleoptera	Lepidoptera	Sialidae	Corydalidae	Tipulidae	Empididae	Simuliidae	Tabinidae	Culcidae	Chironomidae	Ephemoptera	Trichoptera	Plecoptera	Total Organisms	Total Taxa
Penniman Lake																																								
SD-62	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	0	0	0	0	0	0	3	0	2	4	0	0	0	0	0	0	0	2	0	0	0	11	4
SD-63	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	1	0	1	3	0	1	1	0	0	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0	12	8
SD-64	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	2	0	1	0	0	1	0	0	4	1	0	0	0	0	0	0	0	0	0	3	1	4	0	17	8
SD-65	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	10	2
SD-66	10/12/2012	Rare	Common	Rare	Absent	Common	Common	3	0	0	0	0	0	0	4	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	11	0	0	0	19	5
SD-67	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	3
SD-68	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	3
SD-69	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	3
SD-70	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-71	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	6	3
SD-72	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	1
SD-73	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	2
SD-74	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	2
SD-75	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	2
SD-76	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	1	0	0	2	0	1	1	0	0	2	0	1	3	0	0	0	0	0	0	0	2	2	0	0	15	9
SD-77	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	0	0	0	0	0	0	2	3	1	0	0	0	0	0	0	0	0	5	1	1	0	13	6
SD-78	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	0	0	0	0	0	0	3	1	0	1	0	0	0	0	0	0	0	6	2	4	0	17	6
SD-79	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	0	0	1	0	0	0	5	3	1	4	0	0	1	0	0	0	0	4	0	0	0	19	7
SD-80	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	6	3
SD-81	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	2
SD-82	10/12/2012	Rare	Common	Rare	Absent	Common	Common	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	13	2
SD-83	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-84	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-85	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-86	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-87	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL		--	--	--	--	--	--	--	--	0	0	2	5	2	20	2	9	3	0	3	21	9	5	15	0	0	1	0	0	0	0	2	79	4	9	0	191	17
								Minimum:		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
								Average:		0	0	0.10	0.25	0.10	1.00	0.10	0.45	0.15	0	0.15	1.05	0.45	0.25	0.75	0	0	0.05	0	0	0	0	0.10	3.95	0.20	0.45	0	9.55	4.05
								Maximum:		0	0	1	2	1	4	2	3	1	0	1	5	3	2	4	0	0	1	0	0	0	0	2	12	2	4	0	19	9

Table D-5
Evaluation of Sampling Results - 2012 Aquatic Biological Surveys
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Sample Location	Date	Qualitative Field Evaluation of Aquatic Biota						Sampling Method		Benthic Macroinvertebrate Counts																															
		Periphyton	Filamentous Algae	Macrophytes	Slimes	Macro-invertebrates	Fish	Ponar (grab)	Dip Net (jabs)	Porifera	Hydrozoa	Platyhelminthes	Turbellaria	Hirudinea	Oligochaeta	Isopoda	Amphipoda	Decapoda	Gastropoda	Bivalvia	Anisoptera	Zygoptera	Hemiptera	Coleoptera	Lepidoptera	Sialidae	Corydalidae	Tipulidae	Empididae	Simuliidae	Tabinidae	Culicidae	Chironomidae	Ephemoptera	Trichoptera	Plecoptera	Total Organisms	Total Taxa
Cheatham Pond (Site 4 Reference) - Vegetated Areas																																							
SD-01	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	2	0	1	1	0	0	4	2	1	1	0	0	0	0	0	0	0	5	0	0	0	17	8
SD-02	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	1	0	3	0	0	1	0	0	4	1	1	3	0	0	0	1	0	0	0	3	2	0	0	0	20	10
SD-03	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	3	0	1	2	0	0	3	2	1	4	0	0	1	0	0	0	0	3	14	0	0	0	34	10
SD-04	10/12/2012	Absent	Common	Common	Absent	Common	Common	0	3	0	0	0	0	1	2	0	3	0	0	0	5	3	2	6	0	0	0	0	0	0	0	2	0	7	0	0	0	31	9
SD-05	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	1	0	0	0	0	0	1	0	0	3	1	2	4	0	0	0	0	0	0	0	1	3	10	0	0	0	26	9
TOTAL		--	--	--	--	--	--	--	--	0	0	1	1	1	10	0	5	5	0	0	19	9	7	18	0	0	1	1	0	0	3	9	38	0	0	0	128	15
								Minimum:		0	0	0	0	0	0	0	0	0	0	0	3	1	1	1	0	0	0	0	0	0	0	0	2	0	0	0	17	8
								Average:		0	0	0.20	0.20	0.20	2.00	0	1.00	1.00	0	0	3.80	1.80	1.40	3.60	0	0	0.20	0.20	0	0	0.60	1.80	7.60	0	0	0	25.6	9.20
								Maximum:		0	0	1	1	1	3	0	3	2	0	0	5	3	2	6	0	0	1	1	0	0	2	3	14	0	0	0	34	10
Penniman Lake - Vegetated Areas																																							
SD-62	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	0	0	0	0	0	0	3	0	2	4	0	0	0	0	0	0	0	2	0	0	0	11	4
SD-63	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	1	0	1	3	0	1	1	0	0	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0	12	8
SD-64	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	2	0	1	0	0	1	0	0	4	1	0	0	0	0	0	0	0	0	0	3	1	4	0	17	8
SD-76	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	1	0	0	2	0	1	1	0	0	2	0	1	3	0	0	0	0	0	0	0	2	2	0	0	15	9
SD-77	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	0	0	0	0	0	0	2	3	1	0	0	0	0	0	0	0	0	5	1	1	0	13	6
SD-78	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	0	0	0	0	0	0	3	1	0	1	0	0	0	0	0	0	0	6	2	4	0	17	6
SD-79	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	0	0	1	0	0	0	5	3	1	4	0	0	1	0	0	0	0	4	0	0	0	19	7
TOTAL		--	--	--	--	--	--	--	--	0	0	2	2	1	6	0	3	3	0	0	20	9	5	15	0	0	1	0	0	0	0	2	22	4	9	0	104	15
								Minimum:		0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	4
								Average:		0	0	0.29	0.29	0.14	0.86	0	0.43	0.43	0	0	2.86	1.29	0.71	2.14	0	0	0.14	0	0	0	0	0.29	3.14	0.57	1.29	0	14.9	6.86
								Maximum:		0	0	1	2	1	3	0	1	1	0	0	5	3	2	4	0	0	1	0	0	0	0	2	6	2	4	0	19	9
						Percent of Reference		Minimum:		--	--	--	--	--	--	--	--	--	--	--	0.33	0.00	0.00	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--	0.65	0.50
								Average:		--	--	1.43	1.43	0.71	0.43	--	0.43	0.43	--	--	0.75	0.71	0.51	0.60	--	--	0.71	0.00	--	--	0.00	0.16	0.41	>1	>1	--	0.58	0.75
								Maximum:		--	--	1.00	2.00	1.00	1.00	--	0.33	0.50	--	--	1.00	1.00	1.00	0.67	--	--	1.00	0.00	--	--	0.00	0.67	0.43	>1	>1	--	0.56	0.90
Cheatham Pond (Penniman Lake Reference) - Open Water Areas																																							
SD-01	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	3
SD-02	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	7	3
SD-03	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	7	3
SD-04	10/12/2012	Rare	Common	Common	Absent	Rare	Common	3	0	0	0	0	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	4
SD-05	10/12/2012	Rare	Common	Common	Absent	Common	Common	2	1	0	0	0	0	1	4	0	0	1	0	0	4	1	2	3	0	0	0	0	0	0	0	11	0	0	0	27	8
TOTAL		--	--	--	--	--	--	--	--	0	0	0	2	1	12	0	2	1	0	0	5	1	2	4	0	0	0	0	0	0	0	22	0	0	0	52	10
								Minimum:		0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	3
								Average:		0	0	0	0.40	0.20	2.40	0	0.40	0.20	0	0	1.00	0.20	0.40	0.80	0	0	0	0	0	0	0	0	4.40	0	0	0	10.4	4.20
								Maximum:		0	0	0	2	1	4	0	1	1	0	0	4	1	2	3	0	0	0	0	0	0	0	0	11	0	0	0	27	8
Penniman Lake - Open Water Areas																																							
SD-65	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	10	2
SD-66	10/12/2012	Rare	Common	Rare	Absent	Common	Common	3	0	0	0	0	0	0	4	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	11	0	0	0	19	5
SD-67	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	3

Table D-5
Evaluation of Sampling Results - 2012 Aquatic Biological Surveys
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Sample Location	Date	Qualitative Field Evaluation of Aquatic Biota						Sampling Method		Benthic Macroinvertebrate Counts																															
		Periphyton	Filamentous Algae	Macrophytes	Slimes	Macro-invertebrates	Fish	Ponar (grab)	Dip Net (jabs)	Porifera	Hydrozoa	Platyhelminthes	Turbellaria	Hirudinea	Oligochaeta	Isopoda	Amphipoda	Decapoda	Gastropoda	Bivalvia	Anisoptera	Zygoptera	Hemiptera	Coleoptera	Lepidoptera	Sialidae	Corydalidae	Tipulidae	Empididae	Simuliidae	Tabinidae	Culcidae	Chironomidae	Ephemoptera	Trichoptera	Plecoptera	Total Organisms	Total Taxa
SD-68	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	3
SD-69	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	3
SD-71	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	6	3
SD-72	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	1
SD-73	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	2
SD-74	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	2
SD-75	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	2
SD-80	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	6	3
SD-81	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	2
SD-82	10/12/2012	Rare	Common	Rare	Absent	Common	Common	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	13	2
TOTAL		--	--	--	--	--	--	--	--	0	0	0	3	1	14	2	6	0	0	3	1	0	0	0	0	0	0	0	0	0	0	57	0	0	0	87	8
								Minimum:		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	1
								Average:		0	0	0	0.23	0.08	1.08	0.15	0.46	0	0	0.23	0.08	0	0	0	0	0	0	0	0	0	0	0	4.38	0	0	0	6.69	2.54
								Maximum:		0	0	0	1	1	4	2	3	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	19	5
								Minimum:		--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.00	--	--	--	0.60	0.33
								Maximum:		0	0	0	1	1	4	2	3	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	19	5
							Percent of Reference	Minimum:		--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.00	--	--	--	0.60	0.33
								Average:		--	--	--	0.58	0.38	0.45	>1	1.15	0.00	--	--	0.08	0.00	0.00	0.00	--	--	--	--	--	--	--	1.00	--	--	--	0.64	0.60
								Maximum:		--	--	--	0.50	1.00	1.00	>1	3.00	0.00	--	--	0.25	0.00	0.00	0.00	--	--	--	--	--	--	--	1.09	--	--	--	0.70	0.63

Table D-6
Fish and Amphibian Species Collected During 2012 Biological Surveys
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort	Total Length (mm)	Weight (grams)	Count
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	Adult	105 - 290	6 - 155	29
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	Tadpole	30 - 60	-- - --	36
Penniman Lake	American eel	*Anguilla rostrata*	--	245 - 350	20 - 72	6
Penniman Lake	black crappie	*Pomoxis nigromaculatus*	--	100 - 130	7 - 8	2
Penniman Lake	bluegill	*Lepomis macrochirus*	--	40 - 185	-- - 137	147
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	--	80 - 120	4 - 15	18
Penniman Lake	largemouth bass	*Micropterus salmoides*	--	110 - 405	15 - 755	15
Penniman Lake	redear sunfish	*Lepomis microlophus*	--	80 - 150	5 - 66	5

Table D-7
Composition of Tissue Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	190	54	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	180	36	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	200	51	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	3	--	141	CAPL-TS01-1012	whole body	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	170	26	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	265	122	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	2	--	148	CAPL-TS02-1012	whole body	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	290	155	CAPL-TS03-1012	whole body	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	200	66	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	200	45	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	150	20	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	110	8	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	140	14	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	5	--	153	CAPL-TS04-1012	whole body	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	175	35	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	180	44	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	145	18	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	140	16	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	150	19	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	145	16	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	6	--	148	CAPL-TS05-1012	whole body	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	255	110	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	180	37	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	105	6	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	3	--	153	CAPL-TS06-1012	whole body	10/24/2012

Table D-7
Composition of Tissue Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	170	47	--	--	10/24/2012
Penniman Lake	American bullfrog	Lithobates catesbeinanus	adult	1	160	30	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	180	38	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	190	44	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	4	--	159	CAPL-TS07-1012	whole body	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	165	26	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	180	35	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	185	43	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	160	25	--	--	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	adult	1	160	24	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	5	--	153	CAPL-TS08-1012	whole body	10/24/2012
Penniman Lake	American bullfrog	*Lithobates catesbeinanus*	tadpole	36	30-60	55	CAPL-TS09-1012	whole body	10/24/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	90	7	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	95	7	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	100	8	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	90	6	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	85	7	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	105	10	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	80	4	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	95	8	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	105	9	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	85	6	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	90	6	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	95	7	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	120	15	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	95	7	--	--	10/10/2012

Table D-7
Composition of Tissue Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	85	4	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	95	8	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	105	10	--	--	10/10/2012
Penniman Lake	golden shiner	*Notemigonus crysoleucas*	medium	1	90	5	--	--	10/10/2012
Total	golden shiner	*Notemigonus crysoleucas*	medium	18	--	134	CAPL-TS10-WB-1012	whole body	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	medium	1	110	15	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	medium	1	145	34	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	medium	1	140	30	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	medium	1	135	27	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	medium	1	145	34	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	medium	1	145	35	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	medium	1	150	39	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	medium	1	160	49	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	medium	1	130	27	--	--	10/10/2012
Total	largemouth bass	*Micropterus salmoides*	medium	9	--	290	CAPL-TS11-WB-1012	whole body	10/10/2012
Penniman Lake	bluegill	*Lepomis macrochirus*	small	144	40-85	202	CAPL-TS12-WB-1012	whole body	10/10/2012
Penniman Lake	bluegill	*Lepomis macrochirus*	medium	1	160	88	--	--	10/10/2012
Penniman Lake	bluegill	*Lepomis macrochirus*	medium	1	170	99	--	--	10/10/2012
Penniman Lake	bluegill	*Lepomis macrochirus*	medium	1	185	137	--	--	10/10/2012
Total	bluegill	*Lepomis macrochirus*	medium	3	--	324	CAPL-TS13-WB-1012	whole body	10/10/2012
Penniman Lake	redear sunfish	*Lepomis microlophus*	medium	1	130	42	--	--	10/10/2012
Penniman Lake	redear sunfish	*Lepomis microlophus*	medium	1	145	57	--	--	10/10/2012
Penniman Lake	redear sunfish	*Lepomis microlophus*	medium	1	150	66	--	--	10/10/2012
Penniman Lake	redear sunfish	*Lepomis microlophus*	medium	1	95	5	--	--	10/10/2012
Penniman Lake	redear sunfish	*Lepomis microlophus*	medium	1	80	6	--	--	10/10/2012
Total	redear sunfish	*Lepomis microlophus*	medium	5	--	176	CAPL-TS14-WB-1012	whole body	10/10/2012

Table D-7
Composition of Tissue Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Penniman Lake	American eel	*Anguilla rostrata*	small	1	300	47	--	--	10/10/2012
Penniman Lake	American eel	*Anguilla rostrata*	small	1	285	38	--	--	10/10/2012
Penniman Lake	American eel	*Anguilla rostrata*	small	1	310	53	--	--	10/10/2012
Penniman Lake	American eel	*Anguilla rostrata*	small	1	245	20	--	--	10/10/2012
Total	American eel	*Anguilla rostrata*	small	4	--	158	CAPL-TS15-WB-1012	whole body	10/10/2012
Penniman Lake	American eel	*Anguilla rostrata*	medium	1	345	72	Released	--	10/10/2012
Penniman Lake	American eel	*Anguilla rostrata*	medium	1	350	72	Released	--	10/10/2012
Penniman Lake	black crappie	*Pomoxis nigromaculatus*	small	1	130	8	Released	--	10/10/2012
Penniman Lake	black crappie	*Pomoxis nigromaculatus*	small	1	100	7	Released	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	large	1	270	195	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	large	1	265	203	--	--	10/10/2012
Total	largemouth bass	*Micropterus salmoides*	large	2	--	398	CAPL-TS16-F-1012 & CAPL-TS16-O-1012	fillet/offal	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	large	1	405	755	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	large	1	345	570	--	--	10/10/2012
Total	largemouth bass	*Micropterus salmoides*	large	2	--	1,325	CAPL-TS17-F-1012 & CAPL-TS17-O-1012	fillet/offal	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	large	1	350	508	--	--	10/10/2012
Penniman Lake	largemouth bass	*Micropterus salmoides*	large	1	340	515	--	--	10/10/2012
Total	largemouth bass	*Micropterus salmoides*	large	2	--	1,023	CAPL-TS18-F-1012 & CAPL-TS18-O-1012	fillet/offal	10/10/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	170	27	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	170	26	--	--	10/24/2012

Table D-7
Composition of Tissue Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	220	64	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	175	30	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	4	--	147	CAPLREF-TS01-1012	whole body	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	200	44	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	180	44	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	205	51	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	135	11	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	4	--	150	CAPLREF-TS02-1012	whole body	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	200	41	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	170	26	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	180	42	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	185	35	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	95	4	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	5	--	148	CAPLREF-TS03-1012	whole body	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	200	53	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	170	30	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	190	43	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	135	16	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	110	7	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	105	4	--	--	10/24/2012
Total	American bullfrog	*Lithobates catesbeinanus*	adult	6	--	153	CAPLREF-TS04-1012	whole body	10/24/2012
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	240	38	--	--	10/23/2012
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	220	34	--	--	10/23/2012
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	160	7	--	--	10/23/2012
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	180	8	--	--	10/23/2012
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	250	42	--	--	10/23/2012

Table D-7
Composition of Tissue Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	205	12	--	--	10/23/2012
Total	American eel	*Anguilla rostrata*	small	6	--	141	CAPLREF-TS05-WB-1012	whole body	10/23/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	110	22	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	110	22	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	110	23	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	105	20	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	120	30	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	105	22	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	110	27	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	135	44	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	130	35	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	105	16	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	130	35	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	100	17	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	105	23	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	125	30	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	135	48	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	110	23	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	135	46	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	135	41	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	125	28	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	130	37	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	130	33	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	115	25	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	135	49	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	110	23	--	--	10/22/2012
Cheatham Pond	redear sunfish	*Lepomis microlophus*	medium	1	110	24	--	--	10/22/2012
Total	redear sunfish	*Lepomis microlophus*	medium	25	--	743	CAPLREF-TS06-WB-1012	whole body	10/22/2012

Table D-7
Composition of Tissue Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	17	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	17	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	18	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	16	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	90	10	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	14	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	18	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	19	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	14	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	22	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	16	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	16	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	15	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	90	11	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	90	10	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	9	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	10	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	8	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	8	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	8	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	110	21	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	13	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	9	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	19	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	90	11	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	17	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	7	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	15	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	10	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	24	--	--	10/22/2012

Table D-7
Composition of Tissue Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	90	11	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	13	--	--	10/22/2012
Total	bluegill	*Lepomis macrochirus*	medium	32	--	446	CAPLREF-TS07-WB-1012	whole body	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	small	57	40-75	167	CAPLREF-TS08-WB-1012	whole body	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	165	86	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	165	79	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	165	67	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	165	71	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	155	55	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	150	48	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	145	47	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	140	42	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	135	38	--	--	10/22/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	large	1	165	72	--	--	10/22/2012
Total	bluegill	*Lepomis macrochirus*	large	10	--	605	CAPLREF-TS09-WB-1012	whole body	10/22/2012
Cheatham Pond	largemouth bass	*Micropterus salmoides*	large	1	370	635	CAPLREF-TS10-F-1012 & CAPLREF-TS10-O-1012	fillet/offal	10/22/2012
Cheatham Pond	largemouth bass	*Micropterus salmoides*	large	1	475	1,686	--	--	10/22/2012
Cheatham Pond	largemouth bass	*Micropterus salmoides*	large	1	435	1,471	--	--	10/22/2012
Total	largemouth bass	*Micropterus salmoides*	large	2	--	3,157	CAPLREF-TS11-F-1012 & CAPLREF-TS11-O-1012	fillet/offal	10/22/2012

Table D-8
Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Terrestrial Habitats			
Survival, growth, and reproduction of terrestrial soil invertebrate communities	Are site-related chemical concentrations in surface soil sufficient to adversely affect soil invertebrate communities?	Comparison of maximum (Step 2) and mean (Step 3A) chemical concentrations in surface soil with soil ESVs	Soil invertebrates
Survival, growth, and reproduction of terrestrial plant communities	Are site-related chemical concentrations in surface soil sufficient to adversely affect terrestrial plant communities?	Comparison of maximum (Step 2) and mean (Step 3A) chemical concentrations in surface soil with soil ESVs	Terrestrial plants
Survival, growth, and reproduction of terrestrial reptile populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to terrestrial reptile populations?	Comparison of maximum (Step 2) and mean (Step 3A) chemical concentrations in surface soil with soil ESVs Evidence of potential risk to other upper trophic level terrestrial receptors evaluated in the ERA (birds and mammals used as surrogates)	Reptiles
Survival, growth, and reproduction of avian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants (seeds) from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Mourning dove
Survival, growth, and reproduction of avian terrestrial invertivore/omnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	American robin
Survival, growth, and reproduction of avian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Red-tailed hawk
Survival, growth, and reproduction of mammalian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume plants from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Meadow vole
Survival, growth, and reproduction of mammalian terrestrial invertivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Short-tailed shrew

Table D-8
Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of mammalian terrestrial omnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	White-footed mouse
Survival, growth, and reproduction of mammalian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Red fox
Aquatic Habitats			
Survival, growth, and reproduction of aquatic and wetland plant communities	Are site-related chemical concentrations in surface water and surface sediment sufficient to adversely affect aquatic or wetland plant communities?	Comparison of maximum (Step 2) and mean (Step 3A) chemical concentrations in surface water and sediment with medium-specific ESVs	Aquatic and wetland plants
Survival, growth, and reproduction of aquatic and benthic invertebrate communities	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to adversely affect aquatic and benthic invertebrate communities?	Comparison of maximum (Step 2) and mean (Step 3A) chemical concentrations in surface water and sediment with medium-specific ESVs	Aquatic and benthic invertebrates
		Comparison of invertebrate field survey results in site water bodies with a reference water body	
Survival, growth, and reproduction of fish communities	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to adversely affect fish communities?	Comparison of maximum (Step 2) and mean (Step 3A) chemical concentrations in surface water and sediment with medium-specific ESVs	Fish
		Comparison of fish tissue residue analysis results with literature-based tissue ESVs	
Survival, growth, and reproduction of amphibian populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to amphibian populations?	Comparison of maximum (Step 2) and mean (Step 3A) chemical concentrations in surface water and sediment with medium-specific ESVs	Amphibians
		Comparison of tissue residue analysis results with literature-based tissue ESVs	
		Evidence of potential risk to other upper trophic level aquatic receptors evaluated in the ERA (birds and mammals used as surrogates)	

Table D-8
Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of wetland/aquatic reptile populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to aquatic/wetland reptile populations?	Comparison of maximum (Step 2) and mean (Step 3A) chemical concentrations in surface water and sediment with medium-specific ESVs Evidence of potential risk to other upper trophic level aquatic receptors evaluated in the ERA (birds and mammals used as surrogates)	Reptiles
Survival, growth, and reproduction of avian aquatic/wetland omnivore populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume aquatic/wetland prey from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface water and surface sediment concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Mallard
Survival, growth, and reproduction of avian aquatic/wetland piscivore populations	Are site-related chemical concentrations in surface water, surface sediment, and/or fish/frog tissue sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume fish from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface water, surface sediment, and field-collected fish/frog (tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Belted kingfisher Great blue heron Osprey
Survival, growth, and reproduction of avian aerial insectivore populations	Are site-related constituent concentrations in surface water and/or sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to avian insectivore populations that may consume emergent aquatic invertebrates from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface water and surface sediment concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Tree swallow
Survival, growth, and reproduction of mammalian aquatic/wetland herbivore populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume aquatic/wetland plants from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface water and surface sediment concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Muskrat
Survival, growth, and reproduction of mammalian aquatic/wetland omnivore populations	Are site-related chemical concentrations in surface water, surface sediment, and/or fish/frog tissue sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume aquatic/wetland prey from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface water, surface sediment, and field-collected fish/frog (tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Raccoon

Table D-8
Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of mammalian semi-aquatic piscivore populations	Are site-related chemical concentrations in surface water, surface sediment, and/or fish/frog tissue sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume fish from the site?	Comparison of modeled dietary intakes using maximum (Step 2) and mean (Step 3A) surface water, surface sediment, and field-collected fish/frog (tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Mink

Table D-9
Samples Used in the Ecological Risk Screening
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Group	Group Name	Comment
Surface Soil							
CAPL-SO01	CAPL-SS01-0811	8/1/2011	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO01	CAPL-SS01P-0811	8/1/2011	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO02	CAPL-SS02-0811	8/1/2011	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO03	CAPL-SS03-0811	8/1/2011	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO04	CAPL-SS04-0811	8/1/2011	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO05	CAPL-SS05-0811	8/1/2011	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO06	CAPL-SS06-0811	8/1/2011	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO07	CAPL-SS07-0811	8/1/2011	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO08	CAPL-SS08-0811	8/1/2011	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO09	CAPL-SS09-0811	8/1/2011	0 - 6	Drainages	1a	Northwest Drainage - Northern Tributary	
CAPL-SO10	CAPL-SS10-0811	8/1/2011	0 - 6	Drainages	1a	Northwest Drainage - Northern Tributary	
CAPL-SO10	CAPL-SS10P-0811	8/1/2011	0 - 6	Drainages	1a	Northwest Drainage - Northern Tributary	
CAPL-SO11	CAPL-SS11-0811	8/1/2011	0 - 6	Drainages	1a	Northwest Drainage - Northern Tributary	
CAPL-SO12	CAPL-SS12-0811	8/1/2011	0 - 6	Drainages	1a	Northwest Drainage - Northern Tributary	
CAPL-SO13	CAPL-SS13-0811	8/1/2011	0 - 6	Drainages	1a	Northwest Drainage - Northern Tributary	
CAPL-SO14	CAPL-SS14-0811	8/1/2011	0 - 6	Drainages	1a	Northwest Drainage - Northern Tributary	
CAPL-SO15	CAPL-SS15-0811	8/1/2011	0 - 6	Drainages	1c	Northwest Drainage - Other Tributary	
CAPL-SO16	CAPL-SS16-0811	8/2/2011	0 - 6	Drainages	1c	Northwest Drainage - Other Tributary	
CAPL-SO17	CAPL-SS17-0811	8/1/2011	0 - 6	Drainages	1d	Center Drainage	
CAPL-SO18	CAPL-SS18-0811	8/1/2011	0 - 6	Drainages	1d	Center Drainage	
CAPL-SO18	CAPL-SS18P-0811	8/1/2011	0 - 6	Drainages	1d	Center Drainage	
CAPL-SO19	CAPL-SS19-0811	8/1/2011	0 - 6	Drainages	1d	Center Drainage	
CAPL-SO21	CAPL-SS21-0811	8/2/2011	0 - 6	Drainages	1d	Center Drainage	
CAPL-SO22	CAPL-SS22-0811	8/2/2011	0 - 6	Drainages	1e	Eastern Drainage	
CAPL-SO23	CAPL-SS23-0811	8/2/2011	0 - 6	Drainages	1e	Eastern Drainage	
CAPL-SO24	CAPL-SS24-0811	8/2/2011	0 - 6	Drainages	1e	Eastern Drainage	
CAPL-SO25	CAPL-SS25-0811	8/1/2011	0 - 6	Drainages	1e	Eastern Drainage	
CAPL-SO26	CAPL-SS26-0811	8/1/2011	0 - 6	Drainages	1e	Eastern Drainage	
CAPL-SO27	CAPL-SS27-1012	10/31/2012	0 - 6	Upland Areas	2a	Former Transformer - Pole	3 point composite
CAPL-SO28	CAPL-SS28-1112	11/2/2012	0 - 6	Upland Areas	2a	Former Transformer - Pole	3 point composite
CAPL-SO29	CAPL-SS29-1012	10/31/2012	0 - 6	Upland Areas	2a	Former Transformer - Pole	3 point composite
CAPL-SO29	CAPL-SS29P-1012	10/31/2012	0 - 6	Upland Areas	2a	Former Transformer - Pole	3 point composite
CAPL-SO30	CAPL-SS30-1012	10/31/2012	0 - 6	Upland Areas	2a	Former Transformer - Pole	3 point composite
CAPL-SO31	CAPL-SS31-1012	10/31/2012	0 - 6	Upland Areas	2a	Former Transformer - Pole	3 point composite
CAPL-SO32	CAPL-SS32-1012	10/31/2012	0 - 6	Upland Areas	2a	Former Transformer - Pole	3 point composite
CAPL-SO33	CAPL-SS33-1012	10/31/2012	0 - 6	Upland Areas	2a	Former Transformer - Pole	3 point composite
CAPL-SO34	CAPL-SS34-1112	11/5/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO35	CAPL-SS35-1112	11/6/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO36	CAPL-SS36-1112	11/6/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO37	CAPL-SS37-1112	11/6/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO38	CAPL-SS38-1012	10/31/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO39	CAPL-SS39-1012	10/31/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO39	CAPL-SS39P-1012	10/31/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite

Table D-9
Samples Used in the Ecological Risk Screening
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Group	Group Name	Comment
CAPL-SO40	CAPL-SS40-1112	11/1/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO41	CAPL-SS41-1012	10/31/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO42	CAPL-SS42-1012	10/31/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO43	CAPL-SS43-1112	11/1/2012	0 - 6	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO44	CAPL-SS44-1012	10/26/2012	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO45	CAPL-SS45-1012	10/26/2012	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO45	CAPL-SS45P-1012	10/26/2012	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO46	CAPL-SS46-1012	10/26/2012	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO47	CAPL-SS47-1012	10/26/2012	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO48	CAPL-SS48-1012	10/24/2012	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO49	CAPL-SS49-1012	10/24/2012	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO49	CAPL-SS49P-1012	10/24/2012	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO50	CAPL-SS50-1012	10/24/2012	0 - 6	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO55	CAPL-SS55-1012	10/26/2012	0 - 6	Drainages	1f	Northeast Drainage	
CAPL-SO56	CAPL-SS56-1012	10/26/2012	0 - 6	Drainages	1f	Northeast Drainage	
CAPL-SO57	CAPL-SS57-1012	10/26/2012	0 - 6	Drainages	1f	Northeast Drainage	
CAPL-SO58	CAPL-SS58-1012	10/26/2012	0 - 6	Drainages	1f	Northeast Drainage	
CAPL-SO59	CAPL-SS59-1012	10/26/2012	0 - 6	Drainages	1f	Northeast Drainage	
CAPL-SO59	CAPL-SS59P-1012	10/26/2012	0 - 6	Drainages	1f	Northeast Drainage	
CAPL-SO60	CAPL-SS60-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO61	CAPL-SS61-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO62	CAPL-SS62-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO63	CAPL-SS63-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO64	CAPL-SS64-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO65	CAPL-SS65-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO66	CAPL-SS66-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO67	CAPL-SS67-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO68	CAPL-SS68-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO69	CAPL-SS69-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO69	CAPL-SS69P-1112	11/1/2012	0 - 6	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO70	CAPL-SS70-1112	11/2/2012	0 - 6	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO71	CAPL-SS71-1112	11/2/2012	0 - 6	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO72	CAPL-SS72-1112	11/2/2012	0 - 6	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO73	CAPL-SS73-1112	11/5/2012	0 - 6	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO74	CAPL-SS74-1112	11/5/2012	0 - 6	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO75	CAPL-SS75-1112	11/5/2012	0 - 6	Upland Areas	2d	Potential Sprayed Areas	
Subsurface Soil							
CAPL-SO34	CAPL-SB34-1112	11/5/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO35	CAPL-SB35-1112	11/6/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO36	CAPL-SB36-1112	11/6/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO37	CAPL-SB37-1112	11/6/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO38	CAPL-SB38-1012	10/31/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO39	CAPL-SB39-1012	10/31/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO40	CAPL-SB40-1112	11/1/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite

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Station ID	Sample ID	Date	Depth (inches)	Area	Group	Group Name	Comment
CAPL-SO40	CAPL-SB40P-1112	11/1/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO41	CAPL-SB41-1012	10/31/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO42	CAPL-SB42-1012	10/31/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO43	CAPL-SB43-1112	11/1/2012	6 - 24	Upland Areas	2b	Former Transformer - Pad	3 point composite
CAPL-SO44	CAPL-SB44-1012	10/26/2012	6 - 24	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO45	CAPL-SB45-1012	10/26/2012	6 - 24	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO46	CAPL-SB46-1012	10/26/2012	6 - 24	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO47	CAPL-SB47-1012	10/26/2012	6 - 24	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO48	CAPL-SB48-1012	10/24/2012	6 - 24	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO49	CAPL-SB49-1012	10/24/2012	6 - 24	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO50	CAPL-SB50-1012	10/24/2012	6 - 24	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO50	CAPL-SB50P-1012	10/24/2012	6 - 24	Drainages	1b	Northwest Drainage - Center Tributary	
CAPL-SO55	CAPL-SB55-1012	10/26/2012	6 - 24	Drainages	1f	Northeast Drainage	
CAPL-SO56	CAPL-SB56-1012	10/26/2012	6 - 24	Drainages	1f	Northeast Drainage	
CAPL-SO57	CAPL-SB57-1012	10/26/2012	6 - 24	Drainages	1f	Northeast Drainage	
CAPL-SO58	CAPL-SB58-1012	10/26/2012	6 - 24	Drainages	1f	Northeast Drainage	
CAPL-SO59	CAPL-SB59-1012	10/26/2012	6 - 24	Drainages	1f	Northeast Drainage	
CAPL-SO60	CAPL-SB60-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO60	CAPL-SB60P-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO61	CAPL-SB61-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO62	CAPL-SB62-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO63	CAPL-SB63-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO64	CAPL-SB64-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO65	CAPL-SB65-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO66	CAPL-SB66-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO67	CAPL-SB67-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO68	CAPL-SB68-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO69	CAPL-SB69-1112	11/1/2012	6 - 24	Upland Areas	2c	Upgradient to Drainages	
CAPL-SO70	CAPL-SB70-1112	11/2/2012	6 - 24	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO71	CAPL-SB71-1112	11/2/2012	6 - 24	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO72	CAPL-SB72-1112	11/2/2012	6 - 24	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO73	CAPL-SB73-1112	11/5/2012	6 - 24	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO74	CAPL-SB74-1112	11/5/2012	6 - 24	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO75	CAPL-SB75-1112	11/5/2012	6 - 24	Upland Areas	2d	Potential Sprayed Areas	
CAPL-SO75	CAPL-SB75P-1112	11/5/2012	6 - 24	Upland Areas	2d	Potential Sprayed Areas	
Surface Water - Site Samples							
CAPL-SWSD62	CAPL-SW62-1012	10/15/2012	Surface	Penniman Lake - Northwest	1	Penniman Lake	
CAPL-SWSD63	CAPL-SW63-1012	10/15/2012	Surface	Penniman Lake - Northwest	1	Penniman Lake	
CAPL-SWSD63	CAPL-SW63P-1012	10/15/2012	Surface	Penniman Lake - Northwest	1	Penniman Lake	
CAPL-SWSD64	CAPL-SW64-1012	10/15/2012	Surface	Penniman Lake - Northwest	1	Penniman Lake	
CAPL-SWSD65	CAPL-SW65-1012	10/15/2012	Surface	Penniman Lake - East	1	Penniman Lake	
CAPL-SWSD66	CAPL-SW66-1012	10/15/2012	Surface	Penniman Lake - Northeast	1	Penniman Lake	
CAPL-SWSD67	CAPL-SW67-1012	10/15/2012	Surface	Penniman Lake - East	1	Penniman Lake	
CAPL-SWSD68	CAPL-SW68-1012	10/15/2012	Surface	Penniman Lake - East	1	Penniman Lake	

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Station ID	Sample ID	Date	Depth (inches)	Area	Group	Group Name	Comment
CAPL-SWSD69	CAPL-SW69-1012	10/15/2012	Surface	Penniman Lake - Center	1	Penniman Lake	
Surface Water - Reference Samples							
CAREFS04-SWSD01	CAREFS04-SW01-1012	10/3/2012	Surface	Cheatham Pond	Reference	--	
CAREFS04-SWSD02	CAREFS04-SW02-1012	10/3/2012	Surface	Cheatham Pond	Reference	--	
CAREFS04-SWSD02	CAREFS04-SW02P-1012	10/3/2012	Surface	Cheatham Pond	Reference	--	
CAREFS04-SWSD03	CAREFS04-SW03-1012	10/3/2012	Surface	Cheatham Pond	Reference	--	
CAREFS04-SWSD04	CAREFS04-SW04-1012	10/3/2012	Surface	Cheatham Pond	Reference	--	
CAREFS04-SWSD05	CAREFS04-SW05-1012	10/3/2012	Surface	Cheatham Pond	Reference	--	
CAREFPL-SWSD01	CAREFPL-SW01-1012	10/4/2012	Surface	Cheatham Pond	Reference	--	
CAREFPL-SWSD02	CAREFPL-SW02-1012	10/4/2012	Surface	Cheatham Pond	Reference	--	
CAREFPL-SWSD03	CAREFPL-SW03-1012	10/4/2012	Surface	Cheatham Pond	Reference	--	
CAREFPL-SWSD03	CAREFPL-SW03P-1012	10/4/2012	Surface	Cheatham Pond	Reference	--	
CAREFPL-SWSD04	CAREFPL-SW04-1012	10/4/2012	Surface	Cheatham Pond	Reference	--	
CAREFPL-SWSD05	CAREFPL-SW05-1012	10/4/2012	Surface	Cheatham Pond	Reference	--	
Surface Sediment - Site Samples							
CAA06-SD01	CAA06-SD01-1008	10/23/2008	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAA06-SD01	CAA06-SD01P-1008	10/23/2008	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAA06-SD02	CAA06-SD02-1008	10/23/2008	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD18	CAPL-SD18-0811	8/2/2011	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SWSD19	CAPL-SD19-0811	8/2/2011	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SWSD20	CAPL-SD20-0811	8/2/2011	0 - 4	Northwest Drainage - Other Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SWSD20	CAPL-SD20P-0811	8/2/2011	0 - 4	Northwest Drainage - Other Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SWSD21	CAPL-SD21-0811	8/2/2011	0 - 4	Northwest Drainage - Other Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SWSD22	CAPL-SD22-0711	7/28/2011	0 - 4	Penniman Lake - Northwest - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SWSD23	CAPL-SD23-0711	7/28/2011	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD24	CAPL-SD24-0711	7/28/2011	0 - 4	Penniman Lake - Northwest - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SWSD25	CAPL-SD25-0711	7/28/2011	0 - 4	Penniman Lake - Northwest - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
CAPL-SWSD26	CAPL-SD26-0811	8/2/2011	0 - 4	Northwest Drainage - Other Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SWSD27	CAPL-SD27-0711	7/28/2011	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD28	CAPL-SD28-0711	7/28/2011	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD28	CAPL-SD28P-0711	7/28/2011	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD29	CAPL-SD29-0711	7/28/2011	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD30	CAPL-SD30-0711	7/28/2011	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD31	CAPL-SD31-0711	7/28/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD32	CAPL-SD32-0711	7/28/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD33	CAPL-SD33-0711	7/28/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD33	CAPL-SD33P-0711	7/28/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD34	CAPL-SD34-0711	7/27/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD35	CAPL-SD35-0711	7/28/2011	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD36	CAPL-SD36-0711	7/28/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD37	CAPL-SD37-0711	7/27/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD38	CAPL-SD38-0711	7/27/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD38	CAPL-SD38P-0711	7/27/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD39	CAPL-SD39-0711	7/27/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	

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Station ID	Sample ID	Date	Depth (inches)	Area	Group	Group Name	Comment
CAPL-SWSD40	CAPL-SD40-0711	7/27/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD41	CAPL-SD41-0711	7/28/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD42	CAPL-SD42-0711	7/27/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD43	CAPL-SD43-0711	7/28/2011	0 - 4	Center Drainage	4b	Penniman Lake - Center	
CAPL-SWSD44	CAPL-SD44-0711	7/28/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD45	CAPL-SD45-0711	7/28/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD46	CAPL-SD46-0711	7/27/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD47	CAPL-SD47-0711	7/27/2011	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD48	CAPL-SD48-0711	7/29/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD49	CAPL-SD49-0711	7/29/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD50	CAPL-SD50-0711	7/29/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD50	CAPL-SD50P-0711	7/29/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD51	CAPL-SD51-0711	7/29/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD52	CAPL-SD52-0711	7/29/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD53	CAPL-SD53-0711	7/29/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD54	CAPL-SD54-0711	7/27/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD55	CAPL-SD55-0711	7/27/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD56	CAPL-SD56-0711	7/27/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD57	CAPL-SD57-0711	7/27/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD58	CAPL-SD58-0711	7/29/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD58	CAPL-SD58P-0711	7/29/2011	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD59	CAPL-SD59-0711	7/27/2011	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SWSD60	CAPL-SD60-0711	7/29/2011	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SWSD61	CAPL-SD61-0811	8/2/2011	0 - 4	Eastern Drainage	4c	Penniman Lake - East	
CAPL-SWSD62	CAPL-SD62-1012	10/17/2012	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD62	CAPL-SD62-1012-V	10/25/2012	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD63	CAPL-SD63-1012	10/17/2012	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD63	CAPL-SD63-1012-V	10/25/2012	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD64	CAPL-SD64-1012	10/17/2012	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD64	CAPL-SD64P-1012	10/17/2012	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD64	CAPL-SD64-1012-V	10/25/2012	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD64	CAPL-SD64P-1012-V	10/25/2012	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD65	CAPL-SD65-1012	10/18/2012	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD66	CAPL-SD66-1012	10/18/2012	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SWSD67	CAPL-SD67-1012	10/16/2012	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD68	CAPL-SD68-1012	10/18/2012	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD69	CAPL-SD69-1012	10/17/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD70	CAPL-SD70-1012	10/17/2012	0 - 4	Penniman Lake - Northwest - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD70	CAPL-SD70-1012-V	10/25/2012	0 - 4	Penniman Lake - Northwest - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD71	CAPL-SD71-1012	10/17/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD71	CAPL-SD71-1012-V	10/25/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD72	CAPL-SD72-1012	10/17/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD72	CAPL-SD72-1012-V	10/25/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD73	CAPL-SD73-1012	10/17/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	

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Station ID	Sample ID	Date	Depth (inches)	Area	Group	Group Name	Comment
CAPL-SD73	CAPL-SD73P-1012	10/17/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD73	CAPL-SD73-1012-V	10/25/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD73	CAPL-SD73P-1012-V	10/25/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD74	CAPL-SD74-1012	10/18/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD75	CAPL-SD75-1012	10/18/2012	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD76	CAPL-SD76-1012	10/16/2012	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD77	CAPL-SD77-1012	10/16/2012	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD77	CAPL-SD77-1012-V	10/25/2012	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD78	CAPL-SD78-1012	10/16/2012	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD79	CAPL-SD79-1012	10/16/2012	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD79	CAPL-SD79P-1012	10/16/2012	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD80	CAPL-SD80-1012	10/16/2012	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD81	CAPL-SD81-1012	10/18/2012	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SD82	CAPL-SD82-1012	10/18/2012	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SD83	CAPL-SD83-1012	10/16/2012	0 - 4	King Creek	5	King Creek	
CAPL-SD83	CAPL-SD83-1012-V	10/25/2012	0 - 4	King Creek	5	King Creek	
CAPL-SD84	CAPL-SD84-1012	10/24/2012	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD84	CAPL-SD84-1012-A	10/26/2012	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD85	CAPL-SD85-1012	10/24/2012	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD85	CAPL-SD85-1012-A	10/26/2012	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD86	CAPL-SD86-1012	10/24/2012	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD86	CAPL-SD86-1012-A	10/26/2012	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD87	CAPL-SD87-1012	10/24/2012	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD87	CAPL-SD87-1012-A	10/26/2012	0 - 4	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD18	CAS011-11SD18-00-0602	6/13/2002	0 - 4	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD18	CAS011-11SD18-00D-0602	6/13/2002	0 - 4	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD19	CAS011-11SD19-00-0602	6/13/2002	0 - 4	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD20	CAS011-11SD20-00-0602	6/13/2002	0 - 4	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD21	CAS011-11SD21-00-0602	6/14/2002	0 - 4	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD21	CAS011-11SD21-00D-0602	6/14/2002	0 - 4	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD22	CAS011-11SD22-00-0602	6/14/2002	0 - 4	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD23	CAS011-11SD23-00-0602	6/17/2002	0 - 4	Penniman Lake - Northwest - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD24	CAS011-11SD24-00-0602	6/13/2002	0 - 4	Northwest Drainage - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
CAS011-11SD25	CAS011-11SD25-00-0602	6/13/2002	0 - 4	Northwest Drainage - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
CAS011-11SD26	CAS011-11SD26-00-0602	6/17/2002	0 - 4	Northwest Drainage - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
CAS011-11SD27	CAS011-11SD27-00-0602	6/17/2002	0 - 4	Penniman Lake - Northwest - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
CAS011-11SD28	CAS011-11SD28-00-0602	6/17/2002	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAS011-11SD29	CAS011-11SD29-00-0602	6/17/2002	0 - 4	Penniman Lake - Northwest - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD30	CAS011-11SD30-00-0602	6/18/2002	0 - 4	Penniman Lake - Northwest - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD31	CAS011-11SD31-00-0602	6/18/2002	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAS011-11SD32	CAS011-11SD32-00-0602	6/18/2002	0 - 4	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
Penniman Lake-SD10	PL-00-POND-SD10-0300	3/29/2000	0 - 4	Penniman Lake - Northwest - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
Penniman Lake-SD10	PL-00-POND-SD10D-0300	3/29/2000	0 - 4	Penniman Lake - Northwest - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
Penniman Lake-SD11	PL-00-POND-SD11-0300	3/30/2000	0 - 4	Penniman Lake - Northwest - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	

Table D-9
Samples Used in the Ecological Risk Screening
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Group	Group Name	Comment
Penniman Lake-SD12	PL-00-POND-SD12-0300	3/29/2000	0 - 4	Penniman Lake - Northwest - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
Penniman Lake-SD13	PL-00-POND-SD13-0300	3/30/2000	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
Penniman Lake-SD14	PL-00-POND-SD14-0300	3/29/2000	0 - 4	Penniman Lake - Center	4b	Penniman Lake - Center	
Penniman Lake-SD15	PL-00-POND-SD15-0300	3/29/2000	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
Penniman Lake-SD16	PL-00-POND-SD16-0300	3/29/2000	0 - 4	Penniman Lake - East	4c	Penniman Lake - East	
Penniman Lake-SD17	PL-00-POND-SD17-0300	3/29/2000	0 - 4	Penniman Lake - Northeast	3	Northeast Lobe	
Surface Sediment - Reference Samples							
CAREFS04-SWSD01	CAREFS04-SD01-1012	10/9/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFS04-SWSD01	CAREFS04-SD01P-1012	10/9/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFS04-SWSD02	CAREFS04-SD02-1012	10/9/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFS04-SWSD03	CAREFS04-SD03-1012	10/10/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFS04-SWSD04	CAREFS04-SD04-1012	10/9/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFS04-SWSD05	CAREFS04-SD05-1012	10/9/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFPL-SWSD01	CAREFPL-SD01-1012	10/10/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFPL-SWSD02	CAREFPL-SD02-1012	10/10/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFPL-SWSD02	CAREFPL-SD02P-1012	10/10/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFPL-SWSD03	CAREFPL-SD03-1012	10/10/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFPL-SWSD04	CAREFPL-SD04-1012	10/10/2012	0 - 4	Cheatham Pond	Reference	--	
CAREFPL-SWSD05	CAREFPL-SD05-1012	10/10/2012	0 - 4	Cheatham Pond	Reference	--	
Cheatham Pond-SD02	CP-00-POND-SD02-0300	3/30/2000	0 - 4	Cheatham Pond	Reference	--	
Cheatham Pond-SD02	CP-00-POND-SD02D-0300	3/30/2000	0 - 4	Cheatham Pond	Reference	--	
Cheatham Pond-SD03	CP-00-POND-SD03-0300	3/30/2000	0 - 4	Cheatham Pond	Reference	--	
Cheatham Pond-SD04	CP-00-POND-SD04-0300	3/30/2000	0 - 4	Cheatham Pond	Reference	--	
Cheatham Pond-SD05	CP-00-POND-SD05-0300	3/31/2000	0 - 4	Cheatham Pond	Reference	--	
Cheatham Pond-SD06	CP-00-POND-SD06-0300	3/31/2000	0 - 4	Cheatham Pond	Reference	--	
Cheatham Pond-SD07	CP-00-POND-SD07-0300	3/31/2000	0 - 4	Cheatham Pond	Reference	--	
Cheatham Pond-SD18	CP-00-POND-SD18-0300	3/30/2000	0 - 4	Cheatham Pond	Reference	--	
Cheatham Pond-SD19	CP-00-POND-SD19-0300	3/30/2000	0 - 4	Cheatham Pond	Reference	--	
Subsurface Sediment - Site Samples							
CAA06-SD01	CAA06-SSD01-1008	10/23/2008	4 - 8	Penniman Lake - East	4c	Penniman Lake - East	
CAA06-SD02	CAA06-SSD02-1008	10/23/2008	4 - 8	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD62	CAPL-SSD62-1012	10/17/2012	4 - 8	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD63	CAPL-SSD63-1012	10/17/2012	4 - 8	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD64	CAPL-SSD64-1012	10/17/2012	4 - 8	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAPL-SWSD65	CAPL-SSD65-1012	10/18/2012	4 - 8	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD66	CAPL-SSD66-1012	10/18/2012	4 - 8	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SWSD66	CAPL-SSD66P-1012	10/18/2012	4 - 8	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SWSD67	CAPL-SSD67-1012	10/16/2012	4 - 8	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD67	CAPL-SSD67-1012-V	10/25/2012	4 - 8	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD68	CAPL-SSD68-1012	10/18/2012	4 - 8	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SWSD69	CAPL-SSD69-1012	10/17/2012	4 - 8	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SWSD69	CAPL-SSD69-1012-V	10/25/2012	4 - 8	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD70	CAPL-SSD70-1012	10/17/2012	4 - 8	Penniman Lake - Northwest - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD71	CAPL-SSD71-1012	10/17/2012	4 - 8	Penniman Lake - Center	4b	Penniman Lake - Center	

Table D-9
Samples Used in the Ecological Risk Screening
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Group	Group Name	Comment
CAPL-SD72	CAPL-SSD72-1012	10/17/2012	4 - 8	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD73	CAPL-SSD73-1012	10/17/2012	4 - 8	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD74	CAPL-SSD74-1012	10/18/2012	4 - 8	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD74	CAPL-SSD74P-1012	10/18/2012	4 - 8	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD75	CAPL-SSD75-1012	10/18/2012	4 - 8	Penniman Lake - Center	4b	Penniman Lake - Center	
CAPL-SD76	CAPL-SSD76-1012	10/16/2012	4 - 8	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD77	CAPL-SSD77-1012	10/16/2012	4 - 8	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD78	CAPL-SSD78-1012	10/16/2012	4 - 8	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD79	CAPL-SSD79-1012	10/16/2012	4 - 8	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD79	CAPL-SSD79-1012-V	10/25/2012	4 - 8	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD80	CAPL-SSD80-1012	10/16/2012	4 - 8	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD80	CAPL-SSD80-1012-V	10/25/2012	4 - 8	Penniman Lake - Northeast	3	Northeast Lobe	
CAPL-SD81	CAPL-SSD81-1012	10/18/2012	4 - 8	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SD82	CAPL-SSD82-1012	10/18/2012	4 - 8	Penniman Lake - East	4c	Penniman Lake - East	
CAPL-SD84	CAPL-SSD84-1012	10/24/2012	4 - 8	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD85	CAPL-SSD85-1012	10/24/2012	4 - 8	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD86	CAPL-SSD86-1012	10/24/2012	4 - 8	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAPL-SD87	CAPL-SSD87-1012	10/24/2012	4 - 8	Northwest Drainage - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD18	CAS011-11SD18-01-0602	6/13/2002	4 - 8	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD18	CAS011-11SD18-01D-0602	6/13/2002	4 - 8	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD19	CAS011-11SD19-01-0602	6/13/2002	4 - 8	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD21	CAS011-11SD21-01-0602	6/14/2002	4 - 8	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD21	CAS011-11SD21-01D-0602	6/14/2002	4 - 8	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD22	CAS011-11SD22-01-0602	6/14/2002	4 - 8	Northwest Drainage - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD23	CAS011-11SD23-01-0602	6/17/2002	4 - 8	Penniman Lake - Northwest - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD24	CAS011-11SD24-01-0602	6/13/2002	4 - 8	Northwest Drainage - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
CAS011-11SD25	CAS011-11SD25-01-0602	6/13/2002	4 - 8	Northwest Drainage - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
CAS011-11SD26	CAS011-11SD26-01-0602	6/17/2002	4 - 8	Northwest Drainage - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
CAS011-11SD27	CAS011-11SD27-01-0602	6/17/2002	4 - 8	Penniman Lake - Northwest - Southern Tributary	2	Northwest Lobes and Drainages (South of Site 11)	
CAS011-11SD28	CAS011-11SD28-01-0602	6/17/2002	4 - 8	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAS011-11SD29	CAS011-11SD29-01-0602	6/18/2002	4 - 8	Penniman Lake - Northwest - Center Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD30	CAS011-11SD30-01-0602	6/18/2002	4 - 8	Penniman Lake - Northwest - Northern Tributary	1	Northwest Lobes and Drainages (North of Site 11)	
CAS011-11SD31	CAS011-11SD31-01-0602	6/18/2002	4 - 8	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
CAS011-11SD32	CAS011-11SD32-01-0602	6/18/2002	4 - 8	Penniman Lake - Northwest	4a	Penniman Lake - Northwest	
Subsurface Sediment - Reference Samples							
CAREFS04-SWSD01	CAREFS04-SSD01-1012	10/9/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFS04-SWSD01	CAREFS04-SSD01P-1012	10/9/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFS04-SWSD02	CAREFS04-SSD02-1012	10/9/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFS04-SWSD03	CAREFS04-SSD03-1012	10/10/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFS04-SWSD04	CAREFS04-SSD04-1012	10/9/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFS04-SWSD05	CAREFS04-SSD05-1012	10/9/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFPL-SWSD01	CAREFPL-SSD01-1012	10/10/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFPL-SWSD02	CAREFPL-SSD02-1012	10/10/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFPL-SWSD03	CAREFPL-SSD03-1012	10/10/2012	4 - 8	Cheatham Pond	Reference	--	

Table D-9
Samples Used in the Ecological Risk Screening
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Group	Group Name	Comment
CAREFPL-SWSD04	CAREFPL-SSD04-1012	10/10/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFPL-SWSD05	CAREFPL-SSD05-1012	10/10/2012	4 - 8	Cheatham Pond	Reference	--	
CAREFPL-SWSD05	CAREFPL-SSD05P-1012	10/10/2012	4 - 8	Cheatham Pond	Reference	--	
Tissue - Site Samples							
CAPL-TS01	CAPL-TS01-1012	10/24/2012	--	Drainage south of Site 11	1	Frog	Bullfrog (adult)
CAPL-TS02	CAPL-TS02-1012	10/24/2012	--	Drainage south of Site 11	1	Frog	Bullfrog (adult)
CAPL-TS03	CAPL-TS03-1012	10/24/2012	--	Drainage south of Site 11	1	Frog	Bullfrog (adult)
CAPL-TS04	CAPL-TS04-1012	10/24/2012	--	Drainage south of Site 11	1	Frog	Bullfrog (adult)
CAPL-TS05	CAPL-TS05-1012	10/24/2012	--	Drainage south of Site 11	1	Frog	Bullfrog (adult)
CAPL-TS06	CAPL-TS06-1012	10/24/2012	--	Drainage to NW Cove	1	Frog	Bullfrog (adult)
CAPL-TS07	CAPL-TS07-1012	10/24/2012	--	Drainage to NW Cove	1	Frog	Bullfrog (adult)
CAPL-TS08	CAPL-TS08-1012	10/24/2012	--	Drainage to NW Cove	1	Frog	Bullfrog (adult)
CAPL-TS09	CAPL-TS09-1012	10/24/2012	--	Drainage to NW Cove	1	Frog	Bullfrog (tadpole)
CAPL-TS10	CAPL-TS10-WB-1012	10/10/2012	--	Penniman Lake - Near Site 11	2	Whole-Body Fish	Golden shiner
CAPL-TS11	CAPL-TS11-WB-1012	10/10/2012	--	Penniman Lake - Northwest	2	Whole-Body Fish	Largemouth bass
CAPL-TS12	CAPL-TS12-WB-1012	10/10/2012	--	Penniman Lake - Near Site 11	2	Whole-Body Fish	Bluegill
CAPL-TS13	CAPL-TS13-WB-1012	10/10/2012	--	Penniman Lake - Near Site 11	2	Whole-Body Fish	Bluegill
CAPL-TS14	CAPL-TS14-WB-1012	10/10/2012	--	Penniman Lake - Near Site 11	2	Whole-Body Fish	Redear sunfish
CAPL-TS15	CAPL-TS15-WB-1012	10/10/2012	--	Penniman Lake - Northwest	2	Whole-Body Fish	American eel
CAPL-TS16	CAPL-TS16-WB-1012[a]	10/10/2012	--	Penniman Lake - Northeast	3	Reconstituted Whole-Body Fish	Largemouth bass
CAPL-TS17	CAPL-TS17-WB-1012[a]	10/10/2012	--	Penniman Lake - Northwest	3	Reconstituted Whole-Body Fish	Largemouth bass
CAPL-TS18	CAPL-TS18-WB-1012[a]	10/10/2012	--	Penniman Lake - Northwest	3	Reconstituted Whole-Body Fish	Largemouth bass
Tissue - Reference Samples							
CAREFPL-TS01	CAREFPL-TS01-1012	10/24/2012	--	Cheatham Pond	Reference - 1	Frog	Bullfrog (adult)
CAREFPL-TS02	CAREFPL-TS02-1012	10/24/2012	--	Cheatham Pond	Reference - 1	Frog	Bullfrog (adult)
CAREFPL-TS03	CAREFPL-TS03-1012	10/24/2012	--	Cheatham Pond	Reference - 1	Frog	Bullfrog (adult)
CAREFPL-TS04	CAREFPL-TS04-1012	10/24/2012	--	Cheatham Pond	Reference - 1	Frog	Bullfrog (adult)
CAREFPL-TS05	CAREFPL-TS05-WB-1012	10/23/2012	--	Cheatham Pond	Reference - 2	Whole-Body Fish	American eel
CAREFPL-TS06	CAREFPL-TS06-WB-1012	10/22/2012	--	Cheatham Pond	Reference - 2	Whole-Body Fish	Redear sunfish
CAREFPL-TS07	CAREFPL-TS07-WB-1012	10/23/2012	--	Cheatham Pond	Reference - 2	Whole-Body Fish	Bluegill
CAREFPL-TS08	CAREFPL-TS08-WB-1012	10/22/2012	--	Cheatham Pond	Reference - 2	Whole-Body Fish	Bluegill
CAREFPL-TS10	CAREFPL-TS10-WB-1012[a]	10/22/2012	--	Cheatham Pond	Reference - 3	Reconstituted Whole-Body Fish	Largemouth bass
CAREFPL-TS11	CAREFPL-TS11-WB-1012[a]	10/22/2012	--	Cheatham Pond	Reference - 3	Reconstituted Whole-Body Fish	Largemouth bass

Shaded cells indicate field duplicates
a - Whole body concentration mathematically calculated from fillet and offal subsample concentrations and weights

Table D-10
Background Data and Upper Tolerance Limits (UTLs) for Physical Media
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Soil		Subsurface Soil		Surface Water		Surface Sediment		Subsurface Sediment	
	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL
Inorganics (mg/kg; ug/L)										
Aluminum	12,900	12,200	12,600	13,000	149	228	24,200	23,200	10,200	10,200
Antimony	11.0	11.0	--	--	--	--	1.70	1.70	--	--
Arsenic	6.00	6.36	6.80	5.54	7.90	8.81	106	108	57.2	57.2
Barium	62.0	52.9	58.0	84.5	24.6	26.6	75.0	75.0	36.5	36.5
Beryllium	0.790	0.587	0.52	0.52	--	--	1.39	1.39	0.60	0.60
Cadmium	1.50	1.50	--	--	0.080	0.080	0.450	0.571	--	--
Chromium	18.3	18.2	26.4	33.7	0.570	0.713	46.2	52.0	15.9	15.9
Cobalt	6.70	9.93	6.00	5.18	--	--	9.40	9.45	2.47	2.47
Copper	5.30	4.25	3.20	3.17	--	--	20.8	25.6	3.67	3.67
Cyanide	--	--	2.70	2.70	--	--	--	--	--	--
Iron	20,300	19,900	30,000	32,000	2,050	2,620	38,900	45,600	11,300	11,300
Lead	22.7	17.4	8.30	8.79	--	--	31.3	41.6	12.1	12.1
Manganese	340	324	154	176	142	161	300	368	28.9	28.9
Mercury	0.240	0.111	0.14	0.14	--	--	0.240	0.255	0.052	0.052
Nickel	11.9	9.52	11.0	17.6	--	--	13.4	17.1	5.63	5.63
Selenium	0.69	0.51	0.64	0.64	2.50	2.50	2.20	2.69	--	--
Silver	2.10	2.10	1.10	1.10	--	--	--	--	--	--
Thallium	--	--	--	--	--	--	6.50	6.50	--	--
Vanadium	29.8	27.9	37.8	48.3	1.10	1.46	58.3	62.5	20.4	20.4
Zinc	30.0	26.5	20.9	28.0	1.64	1.81	91.1	110	22.6	22.6
Dissolved Metals (ug/L)										
Aluminum	--	--	--	--	158	193	--	--	--	--
Arsenic	--	--	--	--	6.10	6.47	--	--	--	--
Barium	--	--	--	--	24.5	27.7	--	--	--	--
Cadmium	--	--	--	--	0.050	0.050	--	--	--	--
Chromium	--	--	--	--	0.65	0.65	--	--	--	--
Iron	--	--	--	--	1,800	2,410	--	--	--	--
Lead	--	--	--	--	0.523	0.523	--	--	--	--
Manganese	--	--	--	--	116	165	--	--	--	--

Table D-10
Background Data and Upper Tolerance Limits (UTLs) for Physical Media
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Soil		Subsurface Soil		Surface Water		Surface Sediment		Subsurface Sediment	
	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL
Mercury	--	--	--	--	0.040	0.067	--	--	--	--
Selenium	--	--	--	--	2.80	2.80	--	--	--	--
Thallium	--	--	--	--	1.40	1.43	--	--	--	--
Vanadium	--	--	--	--	0.96	1.27	--	--	--	--
Pesticides (ug/kg; ug/L)										
4,4'-DDD	--	--	--	--	--	--	7.97	10.1	18.4	18.4
4,4'-DDE	--	--	--	--	--	--	28.0	44.1	8.98	8.98
4,4'-DDT	--	--	--	--	--	--	1.45	1.45	--	--
Aldrin	--	--	--	--	--	--	--	--	0.91	0.91
alpha-BHC	--	--	--	--	0.00432	0.00432	0.813	0.813	0.322	0.322
alpha-Chlordane	--	--	--	--	0.01720	0.02050	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	--	2.21	2.21
delta-BHC	--	--	--	--	--	--	--	--	0.294	0.294
Dieldrin	--	--	--	--	--	--	0.948	0.948	--	--
Endosulfan I	--	--	--	--	--	--	--	--	0.805	0.805
Endrin	--	--	--	--	--	--	7.36	8.64	0.64	0.64
gamma-BHC (Lindane)	--	--	--	--	0.01240	0.01550	2.22	2.92	0.48	0.48
gamma-Chlordane	--	--	--	--	0.02130	0.02130	1.10	1.10	--	--
Heptachlor epoxide	--	--	--	--	0.00746	0.00746	--	--	--	--
Other Chemicals (ug/kg; ug/L)										
2-Methylnaphthalene	--	--	--	--	--	--	--	--	3.26	3.26
Benzo(a)anthracene	--	--	--	--	0.0515	0.0515	16.0	18.2	--	--
Benzo(a)pyrene	--	--	--	--	--	--	--	--	14.5	14.5
Benzo(b)fluoranthene	--	--	--	--	--	--	28.0	30.3	17.7	17.7
Benzo(g,h,i)perylene	--	--	--	--	--	--	25.0	25.0	--	--
Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	12.6	12.6
Chrysene	--	--	--	--	--	--	17.3	21.7	19.6	19.6
Fluoranthene	--	--	--	--	0.0901	0.0948	19.0	24.3	21.2	21.2
Fluorene	--	--	--	--	--	--	--	--	3.18	3.18
Naphthalene	--	--	--	--	--	--	--	--	4.78	4.78

Table D-10
Background Data and Upper Tolerance Limits (UTLs) for Physical Media
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Soil		Subsurface Soil		Surface Water		Surface Sediment		Subsurface Sediment	
	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL
PAH (HMW)	--	--	--	--	--	--	294	381	95.9	95.9
PAH (LMW)	--	--	--	--	--	--	1,080	1,670	316	316
PAH (total)	--	--	--	--	--	--	1,374	2,110	369	369
Phenanthrene	--	--	--	--	0.124	0.144	27.5	33.0	16.7	16.7
Pyrene	--	--	--	--	0.0591	0.0591	27.4	35.3	21.5	21.5
2-Butanone	--	--	--	--	--	--	430	591	43.9	43.9
Acetone	--	--	--	--	--	--	1,700	2,500	157	157
Carbon disulfide	--	--	--	--	--	--	18.0	25.8	--	--

Table D-11
Reference Tissue Concentrations (wet weight) - Whole-Body Frogs
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Pesticides (UG/KG)								
4,4'-DDD	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
4,4'-DDE	-- - --	4 / 4	4.50	74.0	CAREFPL-TS04-1012	25.6	32.6	63.9
4,4'-DDT	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Aldrin	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
alpha-BHC	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
alpha-Chlordane	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
beta-BHC	1.80 - 12.0	1 / 4	1.00	1.00	CAREFPL-TS03-1012	2.21	2.53	5.18
delta-BHC	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Dieldrin	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Endosulfan I	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Endosulfan II	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Endosulfan sulfate	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Endrin	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Endrin aldehyde	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Endrin ketone	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
gamma-BHC (Lindane)	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
gamma-Chlordane	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Heptachlor	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Heptachlor epoxide	1.80 - 12.0	0 / 4	--	--	--	2.20	2.53	5.18
Methoxychlor	9.20 - 58.0	0 / 4	--	--	--	10.8	12.2	25.1
Toxaphene	92.0 - 580	0 / 4	--	--	--	108	122	251
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	4 / 4	7.79	17.4	CAREFPL-TS03-1012	11.5	4.51	16.8
3,4,4',5-Tetrachlorobiphenyl (81)	14.1 - 14.1	3 / 4	2.53	5.42	CAREFPL-TS03-1012	4.48	2.14	7.00
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	4 / 4	76.5	186	CAREFPL-TS04-1012	134	55.4	199
2,3,4,4',5-Pentachlorobiphenyl (114)	14.1 - 14.1	3 / 4	11.2	18.0	CAREFPL-TS03-1012	12.7	4.70	18.3
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	4 / 4	867	1,820	CAREFPL-TS03-1012	1,324	391	1,784
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	4 / 4	18.3	29.1	CAREFPL-TS03-1012	22.6	4.63	28.1

Table D-11
Reference Tissue Concentrations (wet weight) - Whole-Body Frogs
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	4 / 4	70.1	105	CAREFPL-TS03-1012	80.8	16.2	99.9
Congeners (156/157)	-- - --	4 / 4	1,120	2,170	CAREFPL-TS03-1012	1,610	502	2,200
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	4 / 4	969	1,750	CAREFPL-TS03-1012	1,385	337	1,782
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	13.5 - 14.3	1 / 4	28.6	28.6	CAREFPL-TS02-1012	12.4	10.8	25.1
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	4 / 4	376	780	CAREFPL-TS03-1012	598	184	814
TEQ (Bird)	-- - --	4 / 4	7.85	12.2	CAREFPL-TS03-1012	9.14	2.04	11.5
TEQ (Mammal)	-- - --	4 / 4	7.13	10.7	CAREFPL-TS03-1012	8.45	1.59	10.3
TEQ (Fish)	-- - --	4 / 4	0.37	0.57	CAREFPL-TS03-1012	0.44	0.089	0.54
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	1.02 - 1.70	0 / 4	--	--	--	0.66	0.16	0.85
Total Dichlorobiphenyls	-- - --	4 / 4	24.1	73.3	CAREFPL-TS04-1012	43.9	21.6	69.3
Total Trichlorobiphenyls	-- - --	4 / 4	4.13	180	CAREFPL-TS04-1012	92.9	75.2	181
Total Tetrachlorobiphenyls	-- - --	4 / 4	189	4,280	CAREFPL-TS04-1012	2,432	1,734	4,473
Total Pentachlorobiphenyls	-- - --	4 / 4	3,220	8,910	CAREFPL-TS03-1012	6,623	2,723	9,826
Total Hexachlorobiphenyls	-- - --	4 / 4	55,600	96,000	CAREFPL-TS03-1012	72,500	16,933	92,424
Total Heptachlorobiphenyls	-- - --	4 / 4	44,500	74,900	CAREFPL-TS03-1012	57,450	13,593	73,445
Total Octachlorobiphenyls	-- - --	4 / 4	10,200	19,400	CAREFPL-TS03-1012	13,475	4,090	18,288
Total Nonachlorobiphenyls	-- - --	4 / 4	687	1,360	CAREFPL-TS03-1012	1,025	293	1,369
Decachlorobiphenyl (209)	33.3 - 33.3	3 / 4	31.6	49.9	CAREFPL-TS03-1012	33.8	13.8	50.0
PCBs (total)	-- - --	4 / 4	125,052	203,917	CAREFPL-TS03-1012	153,671	34,821	194,644
Metals (MG/KG)								
Arsenic	-- - --	4 / 4	0.095	0.130	CAREFPL-TS02-1012	0.12	0.018	0.14
Cadmium	-- - --	4 / 4	0.046	0.084	CAREFPL-TS02-1012	0.062	0.018	0.083
Chromium	0.93 - 0.99	0 / 4	--	--	--	0.48	0.013	0.50
Copper	-- - --	4 / 4	1.00	2.20	CAREFPL-TS02-1012	1.73	0.59	2.41
Lead	0.039 - 0.059	0 / 4	--	--	--	0.025	0.0051	0.031
Mercury	-- - --	4 / 4	0.0052	0.015	CAREFPL-TS02-1012	0.0100	0.0041	0.015
Nickel	0.46 - 0.49	0 / 4	--	--	--	0.24	0.0065	0.25
Selenium	-- - --	4 / 4	0.21	0.43	CAREFPL-TS04-1012	0.33	0.093	0.44

Table D-11
Reference Tissue Concentrations (wet weight) - Whole-Body Frogs
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Silver	-- - --	4 / 4	0.0030	0.0095	CAREFPL-TS02-1012	0.0053	0.0029	0.0087
Zinc	-- - --	4 / 4	18.0	23.0	CAREFPL-TS04-1012	19.3	2.50	22.2
Other Parameters								
Percent Moisture	-- - --	4 / 4	75.0	78.0	CAREFPL-TS01-1012	76.8	1.50	78.5
Percent Lipids	-- - --	4 / 4	1.30	2.80	CAREFPL-TS04-1012	1.88	0.69	2.69

Table D-12
Reference Tissue Concentrations (wet weight) - Whole-Body Fish
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Pesticides (UG/KG)								
4,4'-DDD	-- - --	4 / 4	0.72	2.30	CAREFPL-TS05-WB-1012	1.38	0.72	2.23
4,4'-DDE	-- - --	4 / 4	6.40	15.0	CAREFPL-TS06-WB-1012	11.9	3.75	16.3
4,4'-DDT	1.80 - 1.90	1 / 4	1.80	1.80	CAREFPL-TS06-WB-1012	1.14	0.44	1.66
Aldrin	1.80 - 1.90	1 / 4	1.30	1.30	CAREFPL-TS08-WB-1012	1.03	0.18	1.24
alpha-BHC	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
alpha-Chlordane	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
beta-BHC	1.80 - 1.90	1 / 4	2.30	2.30	CAREFPL-TS08-WB-1012	1.28	0.68	2.08
delta-BHC	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
Dieldrin	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
Endosulfan I	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
Endosulfan II	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
Endosulfan sulfate	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
Endrin	1.80 - 1.90	1 / 4	0.70	0.70	CAREFPL-TS06-WB-1012	0.86	0.11	0.99
Endrin aldehyde	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
Endrin ketone	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
gamma-BHC (Lindane)	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
gamma-Chlordane	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
Heptachlor	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
Heptachlor epoxide	1.80 - 1.90	0 / 4	--	--	--	0.93	0.029	0.96
Methoxychlor	8.80 - 9.70	0 / 4	--	--	--	4.65	0.21	4.90
Toxaphene	88.0 - 97.0	0 / 4	--	--	--	46.5	2.12	49.0
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	4 / 4	12.3	24.9	CAREFPL-TS05-WB-1012	20.1	5.46	26.5
3,4,4',5-Tetrachlorobiphenyl (81)	13.5 - 13.8	2 / 4	5.52	7.64	CAREFPL-TS05-WB-1012	6.70	0.88	7.74
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	4 / 4	112	470	CAREFPL-TS05-WB-1012	240	159	427
2,3,4,4',5-Pentachlorobiphenyl (114)	13.0 - 14.2	0 / 4	--	--	--	6.81	0.25	7.11
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	4 / 4	480	2,550	CAREFPL-TS05-WB-1012	1,273	899	2,331
2,3',4,4',5'-Pentachlorobiphenyl (123)	13.8 - 14.1	2 / 4	13.7	35.3	CAREFPL-TS05-WB-1012	15.7	13.4	31.5

Table D-12
Reference Tissue Concentrations (wet weight) - Whole-Body Fish
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
3,3',4,4',5-Pentachlorobiphenyl (126)	13.0 - 15.1	0 / 4	--	--	--	7.01	0.44	7.53
Congeners (156/157)	-- - --	4 / 4	206	754	CAREFPL-TS05-WB-1012	423	233	698
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	4 / 4	137	496	CAREFPL-TS05-WB-1012	286	151	464
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	13.0 - 14.2	0 / 4	--	--	--	6.81	0.25	7.11
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	4 / 4	48.0	130	CAREFPL-TS05-WB-1012	79.8	36.5	123
TEQ (Bird)	-- - --	4 / 4	0.65	2.16	CAREFPL-TS05-WB-1012	1.42	0.64	2.17
TEQ (Mammal)	-- - --	4 / 4	0.031	0.14	CAREFPL-TS05-WB-1012	0.072	0.046	0.13
TEQ (Fish)	-- - --	4 / 4	0.011	0.035	CAREFPL-TS05-WB-1012	0.022	0.010	0.034
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	0.92 - 1.39	0 / 4	--	--	--	0.59	0.098	0.70
Total Dichlorobiphenyls	-- - --	4 / 4	30.5	142	CAREFPL-TS05-WB-1012	68.0	50.3	127
Total Trichlorobiphenyls	-- - --	4 / 4	102	491	CAREFPL-TS05-WB-1012	232	178	442
Total Tetrachlorobiphenyls	-- - --	4 / 4	685	14,300	CAREFPL-TS05-WB-1012	6,041	5,854	12,929
Total Pentachlorobiphenyls	-- - --	4 / 4	3,430	33,400	CAREFPL-TS05-WB-1012	15,308	12,926	30,517
Total Hexachlorobiphenyls	-- - --	4 / 4	19,400	121,000	CAREFPL-TS05-WB-1012	60,025	44,349	112,210
Total Heptachlorobiphenyls	-- - --	4 / 4	9,320	43,500	CAREFPL-TS05-WB-1012	23,205	14,470	40,231
Total Octachlorobiphenyls	-- - --	4 / 4	2,260	7,200	CAREFPL-TS05-WB-1012	4,275	2,101	6,748
Total Nonachlorobiphenyls	-- - --	4 / 4	146	401	CAREFPL-TS05-WB-1012	252	118	390
Decachlorobiphenyl (209)	17.3 - 36.2	1 / 4	16.2	16.2	CAREFPL-TS08-WB-1012	14.8	4.17	19.7
PCBs (total)	-- - --	4 / 4	35,390	220,434	CAREFPL-TS05-WB-1012	109,410	79,742	203,240
Metals (MG/KG)								
Arsenic	-- - --	4 / 4	0.067	0.38	CAREFPL-TS07-WB-1012	0.19	0.13	0.35
Cadmium	0.028 - 0.028	0 / 4	--	--	--	0.014	0.0	0.014
Chromium	0.92 - 0.94	0 / 4	--	--	--	0.47	0.0048	0.47
Copper	0.92 - 0.94	1 / 4	0.30	0.30	CAREFPL-TS05-WB-1012	0.42	0.083	0.52
Lead	0.017 - 0.047	0 / 4	--	--	--	0.020	0.0073	0.028
Mercury	-- - --	4 / 4	0.0072	0.014	CAREFPL-TS05-WB-1012	0.011	0.0038	0.015
Nickel	0.46 - 0.47	0 / 4	--	--	--	0.23	0.0029	0.24
Selenium	-- - --	4 / 4	0.092	0.14	CAREFPL-TS05-WB-1012	0.12	0.020	0.14

Table D-12
Reference Tissue Concentrations (wet weight) - Whole-Body Fish
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Silver	0.0092 - 0.0094	0 / 4	--	--	--	0.0047	0.00005	0.0047
Zinc	-- - --	4 / 4	21.0	36.0	CAREFPL-TS08-WB-1012	28.3	6.95	36.4
Other Parameters								
Percent Moisture	-- - --	4 / 4	71.0	74.0	CAREFPL-TS07-WB-1012	73.0	1.41	74.7
Percent Lipids	-- - --	4 / 4	2.30	8.90	CAREFPL-TS05-WB-1012	4.13	3.19	7.88

Table D-13
Reference Tissue Concentrations (wet weight) - Reconstituted Whole-Body Fish (Largemouth Bass)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Pesticides (UG/KG)								
4,4'-DDD	-- - --	2 / 2	1.70	3.86	CAREFPL-TS11-WB-1012	2.78	1.53	9.59
4,4'-DDE	-- - --	2 / 2	5.76	31.5	CAREFPL-TS11-WB-1012	18.6	18.2	100
4,4'-DDT	-- - --	2 / 2	1.70	2.78	CAREFPL-TS11-WB-1012	2.24	0.76	5.65
Aldrin	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
alpha-BHC	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
alpha-Chlordane	6.01 - 6.01	1 / 2	1.58	1.58	CAREFPL-TS10-WB-1012	2.29	1.01	6.81
beta-BHC	-- - --	2 / 2	2.54	6.74	CAREFPL-TS11-WB-1012	4.64	2.97	17.9
delta-BHC	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
Dieldrin	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
Endosulfan I	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
Endosulfan II	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
Endosulfan sulfate	-- - --	2 / 2	1.72	2.78	CAREFPL-TS11-WB-1012	2.25	0.75	5.58
Endrin	6.01 - 6.01	1 / 2	1.63	1.63	CAREFPL-TS10-WB-1012	2.32	0.97	6.65
Endrin aldehyde	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
Endrin ketone	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
gamma-BHC (Lindane)	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
gamma-Chlordane	6.01 - 6.01	1 / 2	1.59	1.59	CAREFPL-TS10-WB-1012	2.30	1.00	6.78
Heptachlor	6.01 - 6.01	1 / 2	2.05	2.05	CAREFPL-TS10-WB-1012	2.53	0.67	5.54
Heptachlor epoxide	1.87 - 6.01	0 / 2	--	--	--	1.97	1.46	8.51
Methoxychlor	9.52 - 30.2	0 / 2	--	--	--	9.92	7.30	42.5
Toxaphene	95.2 - 302	0 / 2	--	--	--	99.2	73.0	425
Polychlorinated Biphenyls (UG/KG)								
Aroclor-1260	-- - --	2 / 2	33.8	135	CAREFPL-TS11-WB-1012	84.7	71.9	406
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	2 / 2	10.9	44.4	CAREFPL-TS11-WB-1012	27.7	23.6	133
3,4,4',5-Tetrachlorobiphenyl (81)	14.3 - 14.3	1 / 2	14.1	14.1	CAREFPL-TS11-WB-1012	10.6	4.90	32.5
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	2 / 2	115	553	CAREFPL-TS11-WB-1012	334	310	1,718
2,3,4,4',5-Pentachlorobiphenyl (114)	14.3 - 14.5	0 / 2	--	--	--	7.20	0.041	7.39

Table D-13
Reference Tissue Concentrations (wet weight) - Reconstituted Whole-Body Fish (Largemouth Bass)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	2 / 2	678	2,839	CAREFPL-TS11-WB-1012	1,759	1,528	8,581
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	2 / 2	20.6	35.6	CAREFPL-TS11-WB-1012	28.1	10.6	75.4
3,3',4,4',5-Pentachlorobiphenyl (126)	14.3 - 14.5	0 / 2	--	--	--	7.20	0.041	7.39
Congeners (156/157)	-- - --	2 / 2	317	1,573	CAREFPL-TS11-WB-1012	945	888	4,911
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	2 / 2	221	1,064	CAREFPL-TS11-WB-1012	643	596	3,303
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	14.5 - 15.8	0 / 2	--	--	--	7.56	0.46	9.63
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	2 / 2	72.9	407	CAREFPL-TS11-WB-1012	240	236	1,295
TEQ (Bird)	-- - --	2 / 2	0.60	3.89	CAREFPL-TS11-WB-1012	2.24	2.32	12.6
TEQ (Mammal)	-- - --	2 / 2	0.044	0.20	CAREFPL-TS11-WB-1012	0.12	0.11	0.63
TEQ (Fish)	-- - --	2 / 2	0.013	0.056	CAREFPL-TS11-WB-1012	0.034	0.031	0.17
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	1.62 - 1.70	0 / 2	--	--	--	0.83	0.028	0.95
Total Dichlorobiphenyls	-- - --	2 / 2	36.5	75.1	CAREFPL-TS11-WB-1012	55.8	27.3	178
Total Trichlorobiphenyls	-- - --	2 / 2	82.3	214	CAREFPL-TS11-WB-1012	148	93.0	563
Total Tetrachlorobiphenyls	-- - --	2 / 2	2,004	7,076	CAREFPL-TS11-WB-1012	4,540	3,586	20,552
Total Pentachlorobiphenyls	-- - --	2 / 2	6,472	22,494	CAREFPL-TS11-WB-1012	14,483	11,329	65,060
Total Hexachlorobiphenyls	-- - --	2 / 2	29,310	120,920	CAREFPL-TS11-WB-1012	75,115	64,778	364,317
Total Heptachlorobiphenyls	-- - --	2 / 2	15,963	71,770	CAREFPL-TS11-WB-1012	43,866	39,462	220,043
Total Octachlorobiphenyls	-- - --	2 / 2	3,336	19,089	CAREFPL-TS11-WB-1012	11,212	11,139	60,941
Total Nonachlorobiphenyls	-- - --	2 / 2	189	1,120	CAREFPL-TS11-WB-1012	655	659	3,595
Decachlorobiphenyl (209)	-- - --	2 / 2	27.5	89.4	CAREFPL-TS11-WB-1012	58.4	43.8	254
PCBs (total)	-- - --	2 / 2	57,420	242,847	CAREFPL-TS11-WB-1012	150,134	131,117	735,503
Metals (MG/KG)								
Arsenic	0.19 - 0.19	0 / 2	--	--	--	0.095	0.0	0.095
Cadmium	0.028 - 0.028	0 / 2	--	--	--	0.014	0.0	0.014
Chromium	0.94 - 0.95	0 / 2	--	--	--	0.47	0.0018	0.48
Copper	0.94 - 0.95	0 / 2	--	--	--	0.47	0.0018	0.48
Lead	0.047 - 0.047	0 / 2	--	--	--	0.024	0.0	0.024
Mercury	-- - --	2 / 2	0.11	0.23	CAREFPL-TS11-WB-1012	0.17	0.082	0.54

Table D-13
Reference Tissue Concentrations (wet weight) - Reconstituted Whole-Body Fish (Largemouth Bass)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Nickel	0.47 - 0.47	0 / 2	--	--	--	0.24	0.0	0.24
Selenium	-- - --	2 / 2	0.095	0.10	CAREFPL-TS11-WB-1012	0.097	0.0042	0.12
Silver	0.0094 - 0.0095	0 / 2	--	--	--	0.0047	0.00002	0.0048
Zinc	-- - --	2 / 2	8.06	9.87	CAREFPL-TS11-WB-1012	8.97	1.28	14.7
Other Parameters								
Percent Moisture	-- - --	2 / 2	74.4	77.4	CAREFPL-TS10-WB-1012	75.9	2.15	85.5
Percent Lipids	-- - --	2 / 2	0.87	4.01	CAREFPL-TS11-WB-1012	2.44	2.22	12.4

Table D-14
Bioaccumulative Chemicals List and Log K_{ow} Values
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	CAS Number	"Standard" Facility Analyte?	Log K_{ow} Range	Selected log K_{ow}	Reference
Metals					
Arsenic	7440-38-2	Yes	-- - --	--	--
Cadmium	7440-43-9	Yes	-- - --	--	--
Chromium[1]	7440-47-3	Yes	-- - --	--	--
Copper	7440-50-8	Yes	-- - --	--	--
Lead	7439-92-1	Yes	-- - --	--	--
Mercury[2]	7439-97-6	Yes	-- - --	--	--
Nickel	7440-02-0	Yes	-- - --	--	--
Selenium	7782-49-2	Yes	-- - --	--	--
Silver	7440-22-4	Yes	-- - --	--	--
Tributyltin	56-35-9	No	-- - --	--	--
Zinc	7440-66-6	Yes	-- - --	--	--
Polychlorinated Biphenyls[3]					
Aroclor-1016	12674-11-2	Yes	Not reported	5.60	Sample et al. 1996
Aroclor-1221	11104-28-2	Yes	Not reported	4.70	Jones et al. 1997
Aroclor-1232	11141-16-5	Yes	Not reported	5.10	Jones et al. 1997
Aroclor-1242	53469-21-9	Yes	Not reported	5.60	Jones et al. 1997
Aroclor-1248	12672-29-6	Yes	Not reported	6.20	Jones et al. 1997
Aroclor-1254	11097-69-1	Yes	Not reported	6.50	Jones et al. 1997
Aroclor-1260	11096-82-5	Yes	Not reported	6.80	Jones et al. 1997
Aroclor-1262	37384-23-5	No	-- - --	--	--
Aroclor-1268	11100-14-4	No	-- - --	--	--
Pesticides					
4,4'-DDD	72-54-8	Yes	5.90 - 6.65	6.10	USEPA 1995a
4,4'-DDE	72-55-9	Yes	5.63 - 6.96	6.76	USEPA 1995a
4,4'-DDT	50-29-3	Yes	5.56 - 7.01	6.53	USEPA 1995a
Aldrin	309-00-2	Yes	5.11 - 7.50	6.50	USEPA 1995a
alpha-BHC	319-84-6	Yes	3.75 - 3.81	3.80	USEPA 1995a
alpha-Chlordane[4]	5103-71-9	Yes	5.80 - 6.41	6.32	USEPA 1995a

Table D-14
Bioaccumulative Chemicals List and Log K_{ow} Values
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	CAS Number	"Standard" Facility Analyte?	Log K_{ow} Range	Selected log K_{ow}	Reference
beta-BHC	319-85-7	Yes	3.75 - 3.84	3.81	USEPA 1995a
Chlorpyrifos	2921-88-2	No	-- - --	--	--
delta-BHC	319-86-8	Yes	Not reported	4.10	USEPA 1996a
Diazinon	333-41-5	No	-- - --	--	--
Dicofol	115-32-2	No	-- - --	--	--
Dieldrin	60-57-1	Yes	3.63 - 6.20	5.37	USEPA 1995a
Disulfoton	298-04-4	No	-- - --	--	--
Endosulfan I	959-98-8	Yes	3.55 - 3.85	3.83	USEPA 1995a
Endosulfan II	33213-65-9	Yes	3.62 - 4.52	4.52	USEPA 1995a
Endrin	72-20-8	Yes	2.92 - 5.20	5.06	USEPA 1995a
Ethion	563-12-2	No	-- - --	--	--
Ethalfluralin	55283-68-6	No	-- - --	--	--
gamma-BHC (Lindane)	58-89-9	Yes	3.61 - 3.90	3.73	USEPA 1995a
gamma-Chlordane[4]	5103-74-2	Yes	5.80 - 6.41	6.32	USEPA 1995a
Heptachlor	76-44-8	Yes	4.93 - 6.26	6.26	USEPA 1995a
Heptachlor epoxide	1024-57-3	Yes	3.50 - 5.40	5.00	USEPA 1995a
Methoxychlor	72-43-5	Yes	4.20 - 5.60	5.08	USEPA 1995a
Mirex	2385-85-5	No	-- - --	--	--
Nitrofen	1836-75-5	No	-- - --	--	--
Oxyfluorfen	42874-03-3	No	-- - --	--	--
Pentachloronitrobenzene	82-68-8	No	-- - --	--	--
Permethrin	52645-53-1	No	-- - --	--	--
S-Fenvalerate	66230-04-4	No	-- - --	--	--
Terbufos	13071-79-9	No	-- - --	--	--
Toxaphene	8001-35-2	Yes	4.33 - 5.56	5.50	USEPA 1995a
Trifluralin	1582-09-8	No	-- - --	--	--
Volatile and Semivolatile Organic Compounds					
1,1,1,2-Tetrachloroethane[5]	630-20-6	No	-- - --	--	--
1,1,2,2-Tetrachloroethane[5]	79-34-5	Yes	2.31 - 2.64	2.39	USEPA 1995a

Table D-14
Bioaccumulative Chemicals List and Log K_{ow} Values
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	CAS Number	"Standard" Facility Analyte?	Log K_{ow} Range	Selected log K_{ow}	Reference
1,2,3,4-Tetrachlorobenzene	634-66-2	No	-- - --	--	--
1,2,4,5-Tetrachlorobenzene	95-94-3	Yes	4.51 - 4.83	4.64	USEPA 1995a
1,2,4-Trichlorobenzene	120-82-1	Yes	3.89 - 4.23	4.01	USEPA 1995a
1,2-Dichlorobenzene	95-50-1	Yes	3.20 - 3.61	3.43	USEPA 1995a
1,3-Dichlorobenzene	541-73-1	Yes	Not reported	3.50	USEPA 1996a
1,4-Dichlorobenzene	106-46-7	Yes	3.26 - 3.62	3.42	USEPA 1995a
4-Bromophenyl-phenylether	101-55-3	Yes	4.89 - 5.24	5.00	USEPA 1995a
4-Chlorophenyl-phenylether	7005-72-3	Yes	4.08 - 5.09	4.95	USEPA 1995a
Acenaphthene	83-32-9	Yes	3.77 - 4.49	3.92	USEPA 1995a
Acenaphthylene	208-96-8	Yes	Not reported	4.10	USEPA 1996a
Anthracene	120-12-7	Yes	4.44 - 4.80	4.55	USEPA 1995a
Benzo(a)anthracene	56-55-3	Yes	5.61 - 5.79	5.70	USEPA 1995a
Benzo(a)pyrene	50-32-8	Yes	5.98 - 6.34	6.11	USEPA 1995a
Benzo(b)fluoranthene	205-99-2	Yes	5.79 - 6.40	6.20	USEPA 1995a
Benzo(g,h,i)perylene	191-24-2	Yes	6.58 - 7.05	6.70	USEPA 1995a
Benzo(k)fluoranthene	207-08-9	Yes	6.12 - 6.27	6.20	USEPA 1995a
Chrysene	218-01-9	Yes	5.41 - 5.79	5.70	USEPA 1995a
Dibenz(a,h)anthracene	53-70-3	Yes	6.50 - 6.88	6.69	USEPA 1995a
Fluoranthene	206-44-0	Yes	4.84 - 5.39	5.12	USEPA 1995a
Fluorene	86-73-7	Yes	4.04 - 4.40	4.21	USEPA 1995a
Hexachlorobenzene	118-74-1	Yes	5.23 - 6.92	5.89	USEPA 1995a
Hexachlorobutadiene	87-68-3	Yes	4.74 - 5.16	4.81	USEPA 1995a
Hexachlorocyclopentadiene	77-47-4	Yes	5.05 - 5.51	5.39	USEPA 1995a
Hexachloroethane	67-72-1	Yes	3.82 - 4.14	4.00	USEPA 1995a
Indeno(1,2,3-cd)pyrene	193-39-5	Yes	6.58 - 6.72	6.65	USEPA 1995a
Octachlorostyrene	29082-74-4	No	-- - --	--	--
Pentachloroanisole	1825-21-4	No	-- - --	--	--
Pentachlorobenzene	608-93-5	No	-- - --	--	--
Pentachlorophenol	87-86-5	Yes	5.01 - 5.24	5.09	USEPA 1995a
Phenanthrene	85-01-8	Yes	4.37 - 4.57	4.55	USEPA 1995a

Table D-14
Bioaccumulative Chemicals List and Log K_{ow} Values
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	CAS Number	"Standard" Facility Analyte?	Log K_{ow} Range	Selected log K_{ow}	Reference
Pyrene	129-00-0	Yes	4.76 - 5.52	5.11	USEPA 1995a
Dioxins/Furans					
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	No	-- - --	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	No	-- - --	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	No	-- - --	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	No	-- - --	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	No	-- - --	--	--
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	No	-- - --	--	--
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	No	-- - --	--	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	No	6.42 - 7.02	6.53	USEPA 1995a
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	No	-- - --	--	--

[1] Listed as chromium VI but applied to total chromium

[2] Listed as methylmercury but applied to total mercury

[3] PCB congeners 8, 18, 28, 44, 52, 66, 77, 81, 101, 105, 118, 126, 128, 138, 153, 156, 169, 170, 180, 187, 195, 206, and 209 are also listed in USEPA (2000)

[4] Listed as "chlordane"

[5] Listed as "tetrachloroethane"

Table D-15
Soil Bioccumulation Factors For Terrestrial Plants (Also Extrapolated to Sediments and Aquatic Plants)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table D-16	--	--	See Table D-16	--
Cadmium	--	See Table D-16	--	--	See Table D-16	--
Chromium	0.084	90th percentile	Bechtel Jacobs 1998a	0.041	Median	Bechtel Jacobs 1998a; USEPA 2007j
Copper	--	See Table D-16	--	--	See Table D-16	--
Lead	--	See Table D-16	--	--	See Table D-16	--
Mercury	--	See Table D-16	--	--	See Table D-16	--
Nickel	--	See Table D-16	--	--	See Table D-16	--
Selenium	--	See Table D-16	--	--	See Table D-16	--
Silver	0.037	90th percentile	Bechtel Jacobs 1998a	0.014	Median	Bechtel Jacobs 1998a; USEPA 2007j
Zinc	--	See Table D-16	--	--	See Table D-16	--
Polychlorinated Biphenyls						
Aroclor-1016	0.323	Calculated[1]	USEPA 2007j	0.323	Calculated[1]	USEPA 2007j
Aroclor-1221	0.749	Calculated	USEPA 2007j	0.749	Calculated	USEPA 2007j
Aroclor-1232	0.515	Calculated	USEPA 2007j	0.515	Calculated	USEPA 2007j
Aroclor-1242	0.323	Calculated	USEPA 2007j	0.323	Calculated	USEPA 2007j
Aroclor-1248	0.184	Calculated	USEPA 2007j	0.184	Calculated	USEPA 2007j
Aroclor-1254	0.139	Calculated	USEPA 2007j	0.139	Calculated	USEPA 2007j
Aroclor-1260	0.105	Calculated	USEPA 2007j	0.105	Calculated	USEPA 2007j
Pesticides						
4,4'-DDD	--	See Table D-16	--	--	See Table D-16	--
4,4'-DDE	--	See Table D-16	--	--	See Table D-16	--
4,4'-DDT	--	See Table D-16	--	--	See Table D-16	--
Aldrin	0.139	Calculated	USEPA 2007j	0.139	Calculated	USEPA 2007j
alpha-BHC	1.735	Calculated	USEPA 2007j	1.735	Calculated	USEPA 2007j
alpha-Chlordane	0.165	Calculated	USEPA 2007j	0.165	Calculated	USEPA 2007j
beta-BHC	1.719	Calculated	USEPA 2007j	1.719	Calculated	USEPA 2007j
delta-BHC	1.311	Calculated	USEPA 2007j	1.311	Calculated	USEPA 2007j

Table D-15
Soil Bioccumulation Factors For Terrestrial Plants (Also Extrapolated to Sediments and Aquatic Plants)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Dieldrin	1.500	90th percentile	USEPA 2007j	0.410	Median	USEPA 2007j
Endosulfan I	1.687	Calculated	USEPA 2007j	1.687	Calculated	USEPA 2007j
Endosulfan II	0.886	Calculated	USEPA 2007j	0.886	Calculated	USEPA 2007j
Endrin	0.535	Calculated	USEPA 2007j	0.535	Calculated	USEPA 2007j
gamma-BHC (Lindane)	1.852	Calculated	USEPA 2007j	1.852	Calculated	USEPA 2007j
gamma-Chlordane	0.165	Calculated	USEPA 2007j	0.165	Calculated	USEPA 2007j
Heptachlor	0.174	Calculated	USEPA 2007j	0.174	Calculated	USEPA 2007j
Heptachlor epoxide	0.566	Calculated	USEPA 2007j	0.566	Calculated	USEPA 2007j
Methoxychlor	0.525	Calculated	USEPA 2007j	0.525	Calculated	USEPA 2007j
Toxaphene	0.355	Calculated	USEPA 2007j	0.355	Calculated	USEPA 2007j
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	1.000	Assumed	--	1.000	Assumed	--
1,2,4,5-Tetrachlorobenzene	0.792	Calculated	USEPA 2007j	0.792	Calculated	USEPA 2007j
1,2,4-Trichlorobenzene	1.426	Calculated	USEPA 2007j	1.426	Calculated	USEPA 2007j
1,2-Dichlorobenzene	2.452	Calculated	USEPA 2007j	2.452	Calculated	USEPA 2007j
1,3-Dichlorobenzene	2.296	Calculated	USEPA 2007j	2.296	Calculated	USEPA 2007j
1,4-Dichlorobenzene	2.475	Calculated	USEPA 2007j	2.475	Calculated	USEPA 2007j
4-Bromophenyl-phenylether	0.566	Calculated	USEPA 2007j	0.566	Calculated	USEPA 2007j
4-Chlorophenyl-phenylether	0.593	Calculated	USEPA 2007j	0.593	Calculated	USEPA 2007j
Acenaphthene	--	See Table D-16	--	--	See Table D-16	--
Acenaphthylene	--	See Table D-16	--	--	See Table D-16	--
Anthracene	--	See Table D-16	--	--	See Table D-16	--
Benzo(a)anthracene	--	See Table D-16	--	--	See Table D-16	--
Benzo(a)pyrene	--	See Table D-16	--	--	See Table D-16	--
Benzo(b)fluoranthene	0.480	Maximum	USEPA 2007j	0.310	Median	USEPA 2007j
Benzo(g,h,i)perylene	--	See Table D-16	--	--	See Table D-16	--
Benzo(k)fluoranthene	--	See Table D-16	--	--	See Table D-16	--
Chrysene	--	See Table D-16	--	--	See Table D-16	--
Dibenz(a,h)anthracene	0.230	Maximum	USEPA 2007j	0.130	Median	USEPA 2007j
Fluoranthene	4.700	90th percentile	USEPA 2007j	0.500	Median	USEPA 2007j

Table D-15
Soil Bioccumulation Factors For Terrestrial Plants (Also Extrapolated to Sediments and Aquatic Plants)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Fluorene	--	See Table D-16	--	--	See Table D-16	--
Hexachlorobenzene	0.246	Calculated	USEPA 2007j	0.246	Calculated	USEPA 2007j
Hexachlorobutadiene	0.675	Calculated	USEPA 2007j	0.675	Calculated	USEPA 2007j
Hexachlorocyclopentadiene	0.393	Calculated	USEPA 2007j	0.393	Calculated	USEPA 2007j
Hexachloroethane	1.439	Calculated	USEPA 2007j	1.439	Calculated	USEPA 2007j
Indeno(1,2,3-cd)pyrene	0.150	Maximum	USEPA 2007j	0.110	Median	USEPA 2007j
Pentachlorophenol	30.10	90th percentile	USEPA 2007j	5.930	Median	USEPA 2007j
Phenanthrene	--	See Table D-16	--	--	See Table D-16	--
Pyrene	2.400	90th percentile	USEPA 2007j	0.720	Median	USEPA 2007j
Dioxin/Furans						
2,3,7,8-TCDD	0.135	Calculated	USEPA 2007j	0.135	Calculated	USEPA 2007j

[1] Calculated as described in the text using the "selected" log K_{ow} from Table D-14

Table D-16
Bioconcentration/Bioaccumulation Factor Models (Dry Weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Plants[1]	Reference	Soil Invertebrates[2]	Reference	Benthic Invertebrates[3]	Reference
Metals						
Arsenic	$C_p = e^{(-1.992 + 0.564(\ln Cs))}$	Bechtel Jacobs 1998a	$C_w = e^{(-1.421 + 0.706(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_i = 10^{(-0.292 + 0.754(\log Csd))}$	Bechtel Jacobs 1998b
Cadmium	$C_p = e^{(-0.476 + 0.546(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(2.114 + 0.795(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_i = 10^{(-0.314 + 0.513(\log Csd))}$	Bechtel Jacobs 1998b
Chromium	--	--	--	--	$C_i = 10^{(0.2092 + 0.365(\log Csd))}$	Bechtel Jacobs 1998b
Copper	$C_p = e^{(0.669 + 0.394(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(1.675 + 0.264(\ln Cs))}$	Sample et al. 1998a	--	--
Lead	$C_p = e^{(-1.328 + 0.561(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(-0.218 + 0.807(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_i = 10^{(-0.515 + 0.653(\log Csd))}$	Bechtel Jacobs 1998b
Mercury	$C_p = e^{(-0.996 + 0.544(\ln Cs))}$	Bechtel Jacobs 1998a	--	--	--	--
Nickel	$C_p = e^{(-2.224 + 0.748(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	--	--	$C_i = 10^{(-0.440 + 0.695(\log Csd))}$	Bechtel Jacobs 1998b
Selenium	$C_p = e^{(-0.678 + 1.104(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(-0.075 + 0.733(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	--	--
Zinc	$C_p = e^{(1.575 + 0.555(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(4.449 + 0.328(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_i = 10^{(1.89 + 0.126(\log Csd))}$	Bechtel Jacobs 1998b
Polychlorinated Biphenyls						
Aroclor-1016	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1221	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)

Table D-16
Bioconcentration/Bioaccumulation Factor Models (Dry Weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Plants[1]	Reference	Soil Invertebrates[2]	Reference	Benthic Invertebrates[3]	Reference
Aroclor-1232	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1242	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1248	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1254	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1260	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Pesticides						
4,4'-DDD	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	USEPA 2007j	$C_w = e^{(1.1613 + 0.6975(\ln Cs))}$	USEPA 2007j	--	--
4,4'-DDE	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	USEPA 2007j	$C_w = e^{(2.4771 + 0.8804(\ln Cs))}$	USEPA 2007j	--	--
4,4'-DDT	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	USEPA 2007j	$C_w = e^{(2.1247 + 0.8689(\ln Cs))}$	USEPA 2007j	--	--
PAHs						
Acenaphthene	$C_p = e^{(-5.562 - 0.8556(\ln Cs))}$	USEPA 2007j	--	--	--	--
Acenaphthylene	$C_p = e^{(-1.144 + 0.791(\ln Cs))}$	USEPA 2007j	--	--	--	--
Anthracene	$C_p = e^{(-0.9887 + 0.7784(\ln Cs))}$	USEPA 2007j	--	--	--	--

Table D-16
Bioconcentration/Bioaccumulation Factor Models (Dry Weight)
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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Plants[1]	Reference	Soil Invertebrates[2]	Reference	Benthic Invertebrates[3]	Reference
Benzo(a)anthracene	$C_p = e^{(-2.7078 + 0.5944(\ln Cs))}$	USEPA 2007j	--	--	--	--
Benzo(a)pyrene	$C_p = e^{(-2.0615 + 0.9750(\ln Cs))}$	USEPA 2007j	--	--	--	--
Benzo(g,h,i)perylene	$C_p = e^{(-0.9313 + 1.1829(\ln Cs))}$	USEPA 2007j	--	--	--	--
Benzo(k)fluoranthene	$C_p = e^{(-2.1579 + 0.8595(\ln Cs))}$	USEPA 2007j	--	--	--	--
Chrysene	$C_p = e^{(-2.7078 + 0.5944(\ln Cs))}$	USEPA 2007j	--	--	--	--
Fluorene	$C_p = e^{(-5.562 - 0.8556(\ln Cs))}$	USEPA 2007j	--	--	--	--
Phenanthrene	$C_p = e^{(-0.1665 + 0.6203(\ln Cs))}$	USEPA 2007j	--	--	--	--
Dioxin/Furans						
2,3,7,8-TCDD	--	--	$C_w = e^{(3.533 + 1.182(\ln Cs))}$	Sample et al. 1998a	--	--

[1] Where C_p = Concentration in aboveground portion of plant (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)

[2] Where C_w = Concentration in earthworm (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)

Table D-16
Bioconcentration/Bioaccumulation Factor Models (Dry Weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Small Mammal Omnivores[4]	Reference	Small Mammal Herbivores[4]	Reference	Small Mammal Insectivores[4]	Reference
Metals						
Arsenic	$C_m = e^{(-4.5796 + 0.7354(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(-5.6531 + 1.1382(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(-4.8471 + 0.8188(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Cadmium	$C_m = e^{(-1.5383 + 0.5660(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(-1.2571 + 0.4723(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(0.8150 + 0.9638(\ln Cs))}$	Sample et al. 1998b
Chromium	$C_m = e^{(-1.4945 + 0.7326(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(-1.4599 + 0.7338(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-1.4599 + 0.7338(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Copper	$C_m = e^{(1.4592 + 0.2681(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(2.0420 + 0.1444(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(2.1042 + 0.1783(\ln Cs))}$	Sample et al. 1998b
Lead	$C_m = e^{(0.0761 + 0.4422(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.6114 + 0.5181(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(0.4819 + 0.4869(\ln Cs))}$	Sample et al. 1998b
Mercury	--	--	--	--	--	--
Nickel	$C_m = e^{(-0.2462 + 0.4658(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.2462 + 0.4658(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.2462 + 0.4658(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Selenium	$C_m = e^{(-0.4158 + 0.3764(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.4158 + 0.3764(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.4158 + 0.3764(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Zinc	$C_m = e^{(4.4713 + 0.0738(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(4.3632 + 0.0706(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(4.2479 + 0.1324(\ln Cs))}$	Sample et al. 1998b
PCBs						
Aroclor-1016	--	--	--	--	--	--
Aroclor-1221	--	--	--	--	--	--

Table D-16
Bioconcentration/Bioaccumulation Factor Models (Dry Weight)
Step 2 Technical Memorandum - Penniman Lake
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Chemical	Small Mammal Omnivores[4]	Reference	Small Mammal Herbivores[4]	Reference	Small Mammal Insectivores[4]	Reference
Aroclor-1232	--	--	--	--	--	--
Aroclor-1242	--	--	--	--	--	--
Aroclor-1248	--	--	--	--	--	--
Aroclor-1254	--	--	--	--	--	--
Aroclor-1260	--	--	--	--	--	--
Pesticides						
4,4'-DDD	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--
PAHs						
Acenaphthene	--	--	--	--	--	--
Acenaphthylene	--	--	--	--	--	--
Anthracene	--	--	--	--	--	--

Table D-16
Bioconcentration/Bioaccumulation Factor Models (Dry Weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Small Mammal Omnivores[4]	Reference	Small Mammal Herbivores[4]	Reference	Small Mammal Insectivores[4]	Reference
Benzo(a)anthracene	--	--	--	--	--	--
Benzo(a)pyrene	--	--	--	--	--	--
Benzo(g,h,i)perylene	--	--	--	--	--	--
Benzo(k)fluoranthene	--	--	--	--	--	--
Chrysene	--	--	--	--	--	--
Fluorene	--	--	--	--	--	--
Phenanthrene	--	--	--	--	--	--
Dioxin/Furans						
2,3,7,8-TCDD	$C_m = e^{(0.8113 + 1.0993(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(0.8113 + 1.0993(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(0.8113 + 1.0993(\ln Cs))}$	Sample et al. 1998b

[3] Where C_i = Concentration in benthic invertebrate (mg/kg dry wt) and C_{sd} = Concentration in sediment (mg/kg dry wt)

[4] Where C_m = Concentration in whole-body small mammal (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)

Table D-17
Soil Bioaccumulation Factors For Soil Invertebrates (Dry Weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table D-16	--	--	See Table D-16	--
Cadmium	--	See Table D-16	--	--	See Table D-16	--
Chromium	3.162	90th percentile	Sample et al. 1998a	0.320	Geometric mean	Sample et al. 1998a
Copper	--	See Table D-16	--	--	See Table D-16	--
Lead	--	See Table D-16	--	--	See Table D-16	--
Mercury	20.63	90th percentile	Sample et al. 1998a	1.186	Geometric mean	Sample et al. 1998a
Nickel	4.730	90th percentile	Sample et al. 1998a	1.656	Arithmetic mean	Sample et al. 1998a
Selenium	--	See Table D-16	--	--	See Table D-16	--
Silver	15.34	90th percentile	Sample et al. 1998a	2.045	Median	Sample et al. 1998a
Zinc	--	See Table D-16	--	--	See Table D-16	--
Polychlorinated Biphenyls						
Aroclor-1016	--	See Table D-16	--	--	See Table D-16	--
Aroclor-1221	--	See Table D-16	--	--	See Table D-16	--
Aroclor-1232	--	See Table D-16	--	--	See Table D-16	--
Aroclor-1242	--	See Table D-16	--	--	See Table D-16	--
Aroclor-1248	--	See Table D-16	--	--	See Table D-16	--
Aroclor-1254	--	See Table D-16	--	--	See Table D-16	--
Aroclor-1260	--	See Table D-16	--	--	See Table D-16	--
Pesticides						
4,4'-DDD	--	See Table D-16	--	--	See Table D-16	--
4,4'-DDE	--	See Table D-16	--	--	See Table D-16	--
4,4'-DDT	--	See Table D-16	--	--	See Table D-16	--
Aldrin	3.300	Mean	Edwards and Bohlen 1992	3.300	Mean	Edwards and Bohlen 1992
alpha-BHC	1.000	Assumed	--	1.000	Assumed	--
alpha-Chlordane	4.000	Mean	Edwards and Bohlen 1992	4.000	Mean	Edwards and Bohlen 1992
beta-BHC	1.000	Assumed	--	1.000	Assumed	--
delta-BHC	1.000	Assumed	--	1.000	Assumed	--
Dieldrin	52.10	90th percentile	USEPA 2007j	14.70	Median	USEPA 2007j
Endosulfan I	1.000	Assumed	--	1.000	Assumed	--

Table D-17
Soil Bioaccumulation Factors For Soil Invertebrates (Dry Weight)
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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Endosulfan II	1.000	Assumed	--	1.000	Assumed	--
Endrin	3.600	Mean	Edwards and Bohlen 1992	3.600	Mean	Edwards and Bohlen 1992
gamma-BHC (Lindane)	26.60	Maximum	Romijn et al. 1994	13.70	Mean	Romijn et al. 1994
gamma-Chlordane	4.000	Mean	Edwards and Bohlen 1992	4.000	Mean	Edwards and Bohlen 1992
Heptachlor	3.000	Mean	Edwards and Bohlen 1992	3.000	Mean	Edwards and Bohlen 1992
Heptachlor epoxide	10.00	Mean	Beyer and Gish 1980	10.00	Mean	Beyer and Gish 1980
Methoxychlor	1.000	Assumed	--	1.000	Assumed	--
Toxaphene	1.000	Assumed	--	1.000	Assumed	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	1.000	Assumed	--	1.000	Assumed	--
1,2,4,5-Tetrachlorobenzene	0.500	Mean	Beyer 1996	0.500	Mean	Beyer 1996
1,2,4-Trichlorobenzene	0.560	Mean	Beyer 1996	0.560	Mean	Beyer 1996
1,2-Dichlorobenzene	1.000	Assumed	--	1.000	Assumed	--
1,3-Dichlorobenzene	1.000	Assumed	--	1.000	Assumed	--
1,4-Dichlorobenzene	1.000	Assumed	--	1.000	Assumed	--
4-Bromophenyl-phenylether	1.000	Assumed	--	1.000	Assumed	--
4-Chlorophenyl-phenylether	1.000	Assumed	--	1.000	Assumed	--
Acenaphthene	0.300	Median	Beyer and Stafford 1993	0.300	Median	Beyer and Stafford 1993
Acenaphthylene	0.220	Median	Beyer and Stafford 1993	0.220	Median	Beyer and Stafford 1993
Anthracene	0.320	Median	Beyer and Stafford 1993	0.320	Median	Beyer and Stafford 1993
Benzo(a)anthracene	0.270	Median	Beyer and Stafford 1993	0.270	Median	Beyer and Stafford 1993
Benzo(a)pyrene	0.340	Median	Beyer and Stafford 1993	0.340	Median	Beyer and Stafford 1993
Benzo(b)fluoranthene	0.210	Median	Beyer and Stafford 1993	0.210	Median	Beyer and Stafford 1993
Benzo(g,h,i)perylene	0.150	Median	Beyer and Stafford 1993	0.150	Median	Beyer and Stafford 1993
Benzo(k)fluoranthene	0.210	Median	Beyer and Stafford 1993	0.210	Median	Beyer and Stafford 1993
Chrysene	0.440	Median	Beyer and Stafford 1993	0.440	Median	Beyer and Stafford 1993
Dibenz(a,h)anthracene	0.490	Median	Beyer and Stafford 1993	0.490	Median	Beyer and Stafford 1993
Fluoranthene	0.370	Median	Beyer and Stafford 1993	0.370	Median	Beyer and Stafford 1993
Fluorene	0.200	Median	Beyer and Stafford 1993	0.200	Median	Beyer and Stafford 1993
Hexachlorobenzene	1.690	Mean	Beyer 1996	1.690	Mean	Beyer 1996

Table D-17
Soil Bioaccumulation Factors For Soil Invertebrates (Dry Weight)
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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Hexachlorobutadiene	1.000	Assumed	--	1.000	Assumed	--
Hexachlorocyclopentadiene	1.000	Assumed	--	1.000	Assumed	--
Hexachloroethane	1.000	Assumed	--	1.000	Assumed	--
Indeno(1,2,3-cd)pyrene	0.410	Median	Beyer and Stafford 1993	0.410	Median	Beyer and Stafford 1993
Pentachlorophenol	88.10	90th percentile	USEPA 2007j	14.63	Median	USEPA 2007j
Phenanthrene	0.280	Median	Beyer and Stafford 1993	0.280	Median	Beyer and Stafford 1993
Pyrene	0.390	Median	Beyer and Stafford 1993	0.390	Median	Beyer and Stafford 1993
Dioxin/Furans						
2,3,7,8-TCDD	--	See Table D-16	--	--	See Table D-16	--

Table D-18
Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Omnivores
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table D-16	--	--	See Table D-16	--
Cadmium	--	See Table D-16	--	--	See Table D-16	--
Chromium	--	See Table D-16	--	--	See Table D-16	--
Copper	--	See Table D-16	--	--	See Table D-16	--
Lead	--	See Table D-16	--	--	See Table D-16	--
Mercury	0.130	90th percentile	Sample et al. 1998b	0.054	Median	Sample et al. 1998b
Nickel	--	See Table D-16	--	--	See Table D-16	--
Selenium	--	See Table D-16	--	--	See Table D-16	--
Silver	0.810	90th percentile	Sample et al. 1998b	0.151	Median	Sample et al. 1998b
Zinc	--	See Table D-16	--	--	See Table D-16	--
Polychlorinated Biphenyls						
Aroclor-1016	NA	--	--	NA	--	--
Aroclor-1221	NA	--	--	NA	--	--
Aroclor-1232	NA	--	--	NA	--	--
Aroclor-1242	NA	--	--	NA	--	--
Aroclor-1248	NA	--	--	NA	--	--
Aroclor-1254	NA	--	--	NA	--	--
Aroclor-1260	NA	--	--	NA	--	--
Pesticides						
4,4'-DDD	NA	--	--	NA	--	--
4,4'-DDE	NA	--	--	NA	--	--
4,4'-DDT	NA	--	--	NA	--	--
Aldrin	NA	--	--	NA	--	--
alpha-BHC	NA	--	--	NA	--	--
alpha-Chlordane	NA	--	--	NA	--	--
beta-BHC	NA	--	--	NA	--	--
delta-BHC	NA	--	--	NA	--	--
Dieldrin	NA	--	--	NA	--	--
Endosulfan I	NA	--	--	NA	--	--

Table D-18
Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Omnivores
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Endosulfan II	NA	--	--	NA	--	--
Endrin	NA	--	--	NA	--	--
gamma-BHC (Lindane)	NA	--	--	NA	--	--
gamma-Chlordane	NA	--	--	NA	--	--
Heptachlor	NA	--	--	NA	--	--
Heptachlor epoxide	NA	--	--	NA	--	--
Methoxychlor	NA	--	--	NA	--	--
Toxaphene	NA	--	--	NA	--	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	NA	--	--	NA	--	--
1,2,4,5-Tetrachlorobenzene	NA	--	--	NA	--	--
1,2,4-Trichlorobenzene	NA	--	--	NA	--	--
1,2-Dichlorobenzene	NA	--	--	NA	--	--
1,3-Dichlorobenzene	NA	--	--	NA	--	--
1,4-Dichlorobenzene	NA	--	--	NA	--	--
4-Bromophenyl-phenylether	NA	--	--	NA	--	--
4-Chlorophenyl-phenylether	NA	--	--	NA	--	--
Acenaphthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Acenaphthylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(b)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(g,h,i)perylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(k)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Chrysene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dibenz(a,h)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluorene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Hexachlorobenzene	NA	--	--	NA	--	--

Table D-18
Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Omnivores
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Hexachlorobutadiene	NA	--	--	NA	--	--
Hexachlorocyclopentadiene	NA	--	--	NA	--	--
Hexachloroethane	NA	--	--	NA	--	--
Indeno(1,2,3-cd)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pentachlorophenol	NA	--	--	NA	--	--
Phenanthrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dioxin/Furans						
2,3,7,8-TCDD	--	See Table D-16	--	--	See Table D-16	--

NA - Not Available

Table D-19
Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Herbivores
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table D-16	--	--	See Table D-16	--
Cadmium	--	See Table D-16	--	--	See Table D-16	--
Chromium	--	See Table D-16	--	--	See Table D-16	--
Copper	--	See Table D-16	--	--	See Table D-16	--
Lead	--	See Table D-16	--	--	See Table D-16	--
Mercury	0.192	90th percentile	Sample et al. 1998b	0.067	Geometric mean	Sample et al. 1998b
Nickel	--	See Table D-16	--	--	See Table D-16	--
Selenium	--	See Table D-16	--	--	See Table D-16	--
Silver	0.007	90th percentile	Sample et al. 1998b	0.006	Geometric mean	Sample et al. 1998b
Zinc	--	See Table D-16	--	--	See Table D-16	--
Polychlorinated Biphenyls						
Aroclor-1016	NA	--	--	NA	--	--
Aroclor-1221	NA	--	--	NA	--	--
Aroclor-1232	NA	--	--	NA	--	--
Aroclor-1242	NA	--	--	NA	--	--
Aroclor-1248	NA	--	--	NA	--	--
Aroclor-1254	NA	--	--	NA	--	--
Aroclor-1260	NA	--	--	NA	--	--
Pesticides						
4,4'-DDD	NA	--	--	NA	--	--
4,4'-DDE	NA	--	--	NA	--	--
4,4'-DDT	NA	--	--	NA	--	--
Aldrin	NA	--	--	NA	--	--
alpha-BHC	NA	--	--	NA	--	--
alpha-Chlordane	NA	--	--	NA	--	--
beta-BHC	NA	--	--	NA	--	--
delta-BHC	NA	--	--	NA	--	--
Dieldrin	NA	--	--	NA	--	--
Endosulfan I	NA	--	--	NA	--	--

Table D-19
Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Herbivores
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Endosulfan II	NA	--	--	NA	--	--
Endrin	NA	--	--	NA	--	--
gamma-BHC (Lindane)	NA	--	--	NA	--	--
gamma-Chlordane	NA	--	--	NA	--	--
Heptachlor	NA	--	--	NA	--	--
Heptachlor epoxide	NA	--	--	NA	--	--
Methoxychlor	NA	--	--	NA	--	--
Toxaphene	NA	--	--	NA	--	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	NA	--	--	NA	--	--
1,2,4,5-Tetrachlorobenzene	NA	--	--	NA	--	--
1,2,4-Trichlorobenzene	NA	--	--	NA	--	--
1,2-Dichlorobenzene	NA	--	--	NA	--	--
1,3-Dichlorobenzene	NA	--	--	NA	--	--
1,4-Dichlorobenzene	NA	--	--	NA	--	--
4-Bromophenyl-phenylether	NA	--	--	NA	--	--
4-Chlorophenyl-phenylether	NA	--	--	NA	--	--
Acenaphthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Acenaphthylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(b)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(g,h,i)perylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(k)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Chrysene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dibenz(a,h)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluorene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Hexachlorobenzene	NA	--	--	NA	--	--

Table D-19
Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Herbivores
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Hexachlorobutadiene	NA	--	--	NA	--	--
Hexachlorocyclopentadiene	NA	--	--	NA	--	--
Hexachloroethane	NA	--	--	NA	--	--
Indeno(1,2,3-cd)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pentachlorophenol	NA	--	--	NA	--	--
Phenanthrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dioxin/Furans						
2,3,7,8-TCDD	--	See Table D-16	--	--	See Table D-16	--

NA - Not Available

Table D-20
Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Insectivores
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table D-16	--	--	See Table D-16	--
Cadmium	--	See Table D-16	--	--	See Table D-16	--
Chromium	--	See Table D-16	--	--	See Table D-16	--
Copper	--	See Table D-16	--	--	See Table D-16	--
Lead	--	See Table D-16	--	--	See Table D-16	--
Mercury	0.192	90th percentile	Sample et al. 1998b	0.067	Geometric mean	Sample et al. 1998b
Nickel	--	See Table D-16	--	--	See Table D-16	--
Selenium	--	See Table D-16	--	--	See Table D-16	--
Silver	0.501	90th percentile	Sample et al. 1998b	0.036	Geometric mean	Sample et al. 1998b
Zinc	--	See Table D-16	--	--	See Table D-16	--
Polychlorinated Biphenyls						
Aroclor-1016	NA	--	--	NA	--	--
Aroclor-1221	NA	--	--	NA	--	--
Aroclor-1232	NA	--	--	NA	--	--
Aroclor-1242	NA	--	--	NA	--	--
Aroclor-1248	NA	--	--	NA	--	--
Aroclor-1254	NA	--	--	NA	--	--
Aroclor-1260	NA	--	--	NA	--	--
Pesticides						
4,4'-DDD	NA	--	--	NA	--	--
4,4'-DDE	NA	--	--	NA	--	--
4,4'-DDT	NA	--	--	NA	--	--
Aldrin	NA	--	--	NA	--	--
alpha-BHC	NA	--	--	NA	--	--
alpha-Chlordane	NA	--	--	NA	--	--
beta-BHC	NA	--	--	NA	--	--
delta-BHC	NA	--	--	NA	--	--
Dieldrin	NA	--	--	NA	--	--
Endosulfan I	NA	--	--	NA	--	--

Table D-20
Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Insectivores
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Endosulfan II	NA	--	--	NA	--	--
Endrin	NA	--	--	NA	--	--
gamma-BHC (Lindane)	NA	--	--	NA	--	--
gamma-Chlordane	NA	--	--	NA	--	--
Heptachlor	NA	--	--	NA	--	--
Heptachlor epoxide	NA	--	--	NA	--	--
Methoxychlor	NA	--	--	NA	--	--
Toxaphene	NA	--	--	NA	--	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	NA	--	--	NA	--	--
1,2,4,5-Tetrachlorobenzene	NA	--	--	NA	--	--
1,2,4-Trichlorobenzene	NA	--	--	NA	--	--
1,2-Dichlorobenzene	NA	--	--	NA	--	--
1,3-Dichlorobenzene	NA	--	--	NA	--	--
1,4-Dichlorobenzene	NA	--	--	NA	--	--
4-Bromophenyl-phenylether	NA	--	--	NA	--	--
4-Chlorophenyl-phenylether	NA	--	--	NA	--	--
Acenaphthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Acenaphthylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(b)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(g,h,i)perylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(k)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Chrysene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dibenz(a,h)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluorene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Hexachlorobenzene	NA	--	--	NA	--	--

Table D-20
Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Insectivores
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Hexachlorobutadiene	NA	--	--	NA	--	--
Hexachlorocyclopentadiene	NA	--	--	NA	--	--
Hexachloroethane	NA	--	--	NA	--	--
Indeno(1,2,3-cd)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pentachlorophenol	NA	--	--	NA	--	--
Phenanthrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dioxin/Furans						
2,3,7,8-TCDD	--	See Table D-16	--	--	See Table D-16	--

NA - Not Available

Table D-21
Biota Sediment Accumulation Factors (Wet Weight) and Sediment Bioaccumulation Factors (Dry Weight) for Benthic Invertebrates
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)						Baseline (Step 3A)					
	BSAF (ww)	BAF (dw)[1]	Type	Principal Organisms	Basis	Reference	BSAF (ww)	BAF (dw)[1]	Type	Principal Organisms	Basis	Reference
Metals												
Arsenic	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Cadmium	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Chromium	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Copper	--	7.957	Fresh	Invertebrate infauna	90th percentile	Bechtel Jacobs 1998b	--	0.824	Fresh	Invertebrate infauna	Geometric mean	Bechtel Jacobs 1998b
Lead	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Mercury	--	2.868	Fresh	Invertebrate infauna	90th percentile	Bechtel Jacobs 1998b	--	1.186	Fresh	Invertebrate infauna	Geometric mean	Bechtel Jacobs 1998b
Nickel	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Selenium	--	1.000	--	--	Assumed	--	--	1.000	--	--	Assumed	--
Silver	--	0.180	Fresh	Oligochaete	Mean	Hirsch 1998	--	0.180	Fresh	Oligochaete	Mean	Hirsch 1998
Zinc	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Polychlorinated Biphenyls												
Aroclor-1016	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Aroclor-1221	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Aroclor-1232	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Aroclor-1242	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Aroclor-1248	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Aroclor-1254	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Aroclor-1260	--	--	--	--	See Table D-16	--	--	--	--	--	See Table D-16	--
Pesticides												
4,4'-DDD	0.88	1.635	Marine/Estuarine	Worms	Single value	USACOE 2010	0.88	1.635	Marine/Estuarine	Worms	Single value	USACOE 2010
4,4'-DDE	0.88	1.635	Marine/Estuarine	Worms	Single value	DDD value	0.88	1.635	Marine/Estuarine	Worms	Single value	DDD value
4,4'-DDT	0.16	0.298	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.12	0.216	Marine/Estuarine	Worms	Median	USACOE 2010
Aldrin	0.42	0.450	Marine/Estuarine	Molluscs	Single value	USACOE 2010	0.42	0.450	Marine/Estuarine	Molluscs	Single value	USACOE 2010
alpha-BHC	0.74	0.793	Marine/Estuarine	Molluscs	Single value	USACOE 2010	0.74	0.793	Marine/Estuarine	Molluscs	Single value	USACOE 2010
alpha-Chlordane	0.88	1.635	Marine/Estuarine	Worms	Single value	USACOE 2010	0.88	1.635	Marine/Estuarine	Worms	Single value	USACOE 2010
beta-BHC	0.74	0.793	Marine/Estuarine	Molluscs	Single value	alpha-BHC value	0.74	0.793	Marine/Estuarine	Molluscs	Single value	alpha-BHC value
delta-BHC	0.74	0.793	Marine/Estuarine	Molluscs	Single value	alpha-BHC value	0.74	0.793	Marine/Estuarine	Molluscs	Single value	alpha-BHC value
Dieldrin	--	4.920	Fresh	Lumbriculus	Geometric mean	Standley 1997	--	4.920	Fresh	Lumbriculus	Geometric mean	Standley 1997
Endosulfan I	0.059	0.063	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endosulfan sulfate)	0.059	0.063	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endosulfan sulfate)
Endosulfan II	0.059	0.063	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endosulfan sulfate)	0.059	0.063	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endosulfan sulfate)
Endrin	0.49	0.522	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endrin aldehyde)	0.49	0.522	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endrin aldehyde)
gamma-BHC (Lindane)	0.91	1.698	Marine/Estuarine	Crustaceans/worms	90th percentile	USACOE 2010	0.20	0.373	Marine/Estuarine	Crustaceans/worms	Median	USACOE 2010
gamma-Chlordane	1.23	2.306	Marine/Estuarine	Worms	Single value	USACOE 2010	1.23	2.306	Marine/Estuarine	Worms	Single value	USACOE 2010
Heptachlor	0.061	0.065	Fresh/Marine	Molluscs	90th percentile	USACOE 2010	0.046	0.049	Fresh/Marine	Molluscs	Median	USACOE 2010
Heptachlor Epoxide	0.302	0.323	Marine/Estuarine	Molluscs	Single value	USACOE 2010	0.302	0.323	Marine/Estuarine	Molluscs	Single value	USACOE 2010
Methoxychlor	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Toxaphene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Volatile and Semivolatile Organic Compounds												
1,1,2,2-Tetrachloroethane	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
1,2,4,5-Tetrachlorobenzene	--	0.624	Fresh	Amphipods/oligochaetes	Maximum	Oliver and Niimi 1988	--	0.397	Fresh	Amphipods/oligochaetes	Mean	Oliver and Niimi 1988
1,2,4-Trichlorobenzene	--	0.482	Fresh	Amphipods/oligochaetes	Maximum	Oliver and Niimi 1988	--	0.257	Fresh	Amphipods/oligochaetes	Mean	Oliver and Niimi 1988
1,2-Dichlorobenzene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
1,3-Dichlorobenzene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--

Table D-21
Biota Sediment Accumulation Factors (Wet Weight) and Sediment Bioaccumulation Factors (Dry Weight) for Benthic Invertebrates
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

	Screening (Step 2)						Baseline (Step 3A)					
Chemical	BSAF (ww)	BAF (dw)[1]	Type	Principal Organisms	Basis	Reference	BSAF (ww)	BAF (dw)[1]	Type	Principal Organisms	Basis	Reference
1,4-Dichlorobenzene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
4-Bromophenyl-phenylether	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
4-Chlorophenyl-phenylether	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Acenaphthene	0.76	0.816	Fresh/Marine	Molluscs/bivalves	90th percentile	USEPA 2009b; USACOE 2010	0.052	0.056	Fresh/Marine	Molluscs/bivalves	Median	USEPA 2009b; USACOE 2010
Acenaphthylene	1.05	1.121	Marine/Estuarine	Molluscs/bivalves	90th percentile	USEPA 2009b; USACOE 2010	0.128	0.137	Marine/Estuarine	Molluscs/bivalves	Median	USEPA 2009b; USACOE 2010
Anthracene	0.614	1.147	Marine/Estuarine	Crustaceans/worms	90th percentile	USACOE 2010	0.326	0.608	Marine/Estuarine	Crustaceans/worms	Median	USACOE 2010
Benzo(a)anthracene	0.209	0.390	Fresh/Marine	Crustaceans/worms/insects	90th percentile	USACOE 2010	0.092	0.173	Fresh/Marine	Crustaceans/worms/insects	Median	USACOE 2010
Benzo(a)pyrene	0.70	1.315	Fresh/Marine	Crustaceans/worms	90th percentile	USACOE 2010	0.035	0.065	Fresh/Marine	Crustaceans/worms	Median	USACOE 2010
Benzo(b)fluoranthene	0.250	0.467	Marine/Estuarine	Crustaceans/worms	90th percentile	USACOE 2010	0.002	0.004	Marine/Estuarine	Crustaceans/worms	Median	USACOE 2010
Benzo(g,h,i)perylene	0.151	0.282	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.002	0.003	Marine/Estuarine	Worms	Median	USACOE 2010
Benzo(k)fluoranthene	0.214	0.399	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.141	0.264	Marine/Estuarine	Worms	Median	USACOE 2010
Chrysene	0.249	0.465	Marine/Estuarine	Crustaceans/worms	90th percentile	USACOE 2010	0.106	0.199	Marine/Estuarine	Crustaceans/worms	Median	USACOE 2010
Dibenz(a,h)anthracene	0.188	0.201	Marine/Estuarine	Molluscs/bivalves	90th percentile	USEPA 2009b; USACOE 2010	0.033	0.036	Marine/Estuarine	Molluscs/bivalves	Median	USEPA 2009b; USACOE 2010
Fluoranthene	0.172	0.322	Fresh/Marine	Crustaceans/worms	90th percentile	USACOE 2010	0.089	0.166	Fresh/Marine	Crustaceans/worms	Median	USACOE 2010
Fluorene	0.88	1.652	Estuarine	Polychaetes	90th percentile	Maruya et al. 1997	0.299	0.558	Estuarine	Polychaetes	Median	Maruya et al. 1997
Hexachlorobenzene	--	0.857	Fresh	Amphipods/oligochaetes	Maximum	Oliver and Niimi 1988	--	0.512	Fresh	Amphipods/oligochaetes	Mean	Oliver and Niimi 1988
Hexachlorobutadiene	--	0.612	Fresh	Amphipods/oligochaetes	Maximum	Oliver and Niimi 1988	--	0.385	Fresh	Amphipods/oligochaetes	Mean	Oliver and Niimi 1988
Hexachlorocyclopentadiene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Hexachloroethane	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Indeno(1,2,3-cd)pyrene	0.122	0.227	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.002	0.003	Marine/Estuarine	Worms	Median	USACOE 2010
Pentachlorophenol	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Phenanthrene	0.285	0.531	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.247	0.461	Marine/Estuarine	Worms	Median	USACOE 2010
Pyrene	1.52	2.846	Fresh/Marine	Crustaceans/worms	90th percentile	USEPA 2009b; USACOE 2010	0.290	0.541	Fresh/Marine	Crustaceans/worms	Median	USEPA 2009b; USACOE 2010
Dioxin/Furans												
2,3,7,8-TCDD	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--

[1] Wet-weight (ww) BSAFs are converted to dry-weight (dw) using the following values:

Lipids (%):	1.48	bivalves	2.58	macroinvertebrates	USACOE 2010
TOC (%):	6.58	Mean measured value (site-wide)			
Percent soilds:	0.21	USEPA 1993			

Table D-22
Biota Sediment Accumulation Factors (Wet Weight) and Sediment Bioaccumulation Factors (Dry Weight) for Fish
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)					Baseline (Step 3A)				
	BSAF (ww)	BAF (dw)[1]	Type	Basis	Reference	BSAF (ww)	BAF (dw)[1]	Type	Basis	Reference
Metals										
Arsenic	--	0.126	Fresh	Mean	Pascoe et al. 1996	--	0.126	Fresh	Mean	Pascoe et al. 1996
Cadmium	--	0.164	Fresh	Mean	Pascoe et al. 1996	--	0.164	Fresh	Mean	Pascoe et al. 1996
Chromium	--	0.038	Fresh	Mean	Krantzberg and Boyd 1992	--	0.038	Fresh	Mean	Krantzberg and Boyd 1992
Copper	--	0.100	Fresh	Mean	Krantzberg and Boyd 1992	--	0.100	Fresh	Mean	Krantzberg and Boyd 1992
Lead	--	0.070	Fresh	Mean	Krantzberg and Boyd 1992	--	0.070	Fresh	Mean	Krantzberg and Boyd 1992
Mercury	--	4.580	Fresh	Maximum	Cope et al. 1990	--	3.250	Fresh	Mean	Cope et al. 1990
Nickel	--	1.000	--	Assumed	--	--	1.000	--	Assumed	--
Selenium	--	1.000	--	Assumed	--	--	1.000	--	Assumed	--
Silver	--	1.000	--	Assumed	--	--	1.000	--	Assumed	--
Zinc	--	0.147	Fresh	Mean	Pascoe et al. 1996	--	0.147	Fresh	Mean	Pascoe et al. 1996
Polychlorinated Biphenyls										
Aroclor-1016	1.85	4.08	Fresh/Marine	Median	USEPA 1997c	1.85	4.08	Fresh/Marine	Median	USEPA 1997c
Aroclor-1221	1.85	4.08	Fresh/Marine	Median	USEPA 1997c	1.85	4.08	Fresh/Marine	Median	USEPA 1997c
Aroclor-1232	1.85	4.08	Fresh/Marine	Median	USEPA 1997c	1.85	4.08	Fresh/Marine	Median	USEPA 1997c
Aroclor-1242	1.85	4.08	Fresh/Marine	Median	USEPA 1997c	1.85	4.08	Fresh/Marine	Median	USEPA 1997c
Aroclor-1248	1.85	4.08	Fresh/Marine	Median	USEPA 1997c	1.85	4.08	Fresh/Marine	Median	USEPA 1997c
Aroclor-1254	1.85	4.08	Fresh/Marine	Median	USEPA 1997c	1.85	4.08	Fresh/Marine	Median	USEPA 1997c
Aroclor-1260	1.85	4.08	Fresh/Marine	Median	USEPA 1997c	1.85	4.08	Fresh/Marine	Median	USEPA 1997c
Pesticides										
4,4'-DDD	1.54	3.39	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.74	1.63	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
4,4'-DDE	17.3	38.1	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	1.22	2.68	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
4,4'-DDT	1.75	3.86	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.80	1.76	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Aldrin	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
alpha-BHC	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
alpha-Chlordane	2.61	5.76	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	1.02	2.24	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
beta-BHC	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
delta-BHC	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
Dieldrin	5.40	11.9	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.77	1.69	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Endosulfan I	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
Endosulfan II	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
Endrin	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
gamma-BHC (Lindane)	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
gamma-Chlordane	2.00	4.42	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	1.14	2.51	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Heptachlor	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
Heptachlor Epoxide	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
Methoxychlor	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
Toxaphene	1.80	3.97	Fresh/Marine	Median	USEPA 1997c	1.80	3.97	Fresh/Marine	Median	USEPA 1997c
Volatile and Semivolatile Organic Compounds										
1,1,2,2-Tetrachloroethane	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
1,2,4,5-Tetrachlorobenzene	0.036	0.079	Marine	Median	Parkerton et al. 1993	0.036	0.079	Marine	Median	Parkerton et al. 1993
1,2,4-Trichlorobenzene	0.175	0.386	Marine	90th percentile	USEPA 2009b	0.132	0.291	Marine	Median	USEPA 2009b
1,2-Dichlorobenzene	0.112	0.247	Marine	Single value	USEPA 2009b	0.112	0.247	Marine	Single value	USEPA 2009b
1,3-Dichlorobenzene	0.020	0.044	Marine	Single value	USEPA 2009b	0.020	0.044	Marine	Single value	USEPA 2009b

Table D-22
Biota Sediment Accumulation Factors (Wet Weight) and Sediment Bioaccumulation Factors (Dry Weight) for Fish
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)					Baseline (Step 3A)				
	BSAF (ww)	BAF (dw)[1]	Type	Basis	Reference	BSAF (ww)	BAF (dw)[1]	Type	Basis	Reference
1,4-Dichlorobenzene	0.014	0.031	Marine	Single value	USEPA 2009b	0.014	0.031	Marine	Single value	USEPA 2009b
4-Bromophenyl-phenylether	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
4-Chlorophenyl-phenylether	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
Acenaphthene	0.043	0.095	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.035	0.077	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Acenaphthylene	0.027	0.059	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.014	0.030	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Anthracene	0.013	0.029	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.008	0.018	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Benzo(a)anthracene	0.031	0.068	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.005	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Benzo(a)pyrene	0.004	0.008	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.005	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Benzo(b)fluoranthene	0.004	0.009	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.003	0.006	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Benzo(g,h,i)perylene	0.057	0.125	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.004	0.009	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Benzo(k)fluoranthene	0.004	0.008	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.005	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Chrysene	0.022	0.049	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.003	0.006	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Dibenz(a,h)anthracene	0.004	0.008	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.005	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Fluoranthene	0.010	0.021	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.003	0.006	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Fluorene	0.124	0.274	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.024	0.052	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Hexachlorobenzene	0.090	0.199	Fresh/Marine	Median	USEPA 1997c	0.090	0.199	Fresh/Marine	Median	USEPA 1997c
Hexachlorobutadiene	0.036	0.079	Marine	Median	Parkerton et al. 1993	0.036	0.079	Marine	Median	Parkerton et al. 1993
Hexachlorocyclopentadiene	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
Hexachloroethane	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
Indeno(1,2,3-cd)pyrene	0.040	0.088	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.005	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Pentachlorophenol	0.41	0.904	Marine	Median	Parkerton et al. 1993	0.41	0.904	Marine	Median	Parkerton et al. 1993
Phenanthrene	0.062	0.138	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.008	0.018	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Pyrene	0.046	0.102	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.003	0.008	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Dioxin/Furans										
2,3,7,8-TCDD	0.059	0.130	Fresh/Marine	Median	USEPA 1997c	0.059	0.130	Fresh/Marine	Median	USEPA 1997c

[1] Wet-weight (ww) BSAFs are converted to dry-weight (dw) using the following values:

Lipids (%):	3.73	Mean measured value (site-wide)
TOC (%):	6.58	Mean measured value (site-wide)
Percent soilds:	0.26	Mean measured value (site-wide)

Table D-23
Tissue Concentrations (dry weight) - Whole-Body Frogs - All Site Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Pesticides (UG/KG)								
4,4'-DDD	7.60 - 10.0	0 / 8	--	--	--	4.32	0.45	4.62
4,4'-DDE	8.00 - 10.0	5 / 8	5.79	40.0	CAPL-TS05-1012	12.3	12.5	20.7
4,4'-DDT	8.00 - 10.0	4 / 8	6.80	29.5	CAPL-TS06-1012	12.9	11.2	20.4
Aldrin	7.60 - 10.0	0 / 8	--	--	--	4.32	0.45	4.62
alpha-BHC	7.60 - 10.0	1 / 8	4.40	4.40	CAPL-TS03-1012	4.37	0.43	4.65
alpha-Chlordane	7.60 - 10.0	0 / 8	--	--	--	4.32	0.45	4.62
beta-BHC	7.60 - 8.64	3 / 8	4.35	12.6	CAPL-TS06-1012	5.55	3.04	7.58
delta-BHC	7.60 - 10.0	0 / 8	--	--	--	4.32	0.45	4.62
Dieldrin	7.60 - 10.0	2 / 8	6.96	9.55	CAPL-TS04-1012	5.32	1.98	6.65
Endosulfan I	7.60 - 10.0	0 / 8	--	--	--	4.32	0.45	4.62
Endosulfan II	7.60 - 10.0	1 / 8	4.58	4.58	CAPL-TS01-1012	4.37	0.45	4.67
Endosulfan sulfate	8.00 - 10.0	5 / 8	3.52	31.8	CAPL-TS04-1012	13.7	10.9	20.9
Endrin	8.00 - 10.0	1 / 8	6.00	6.00	CAPL-TS05-1012	4.59	0.69	5.06
Endrin aldehyde	7.60 - 10.0	1 / 8	3.32	3.32	CAPL-TS03-1012	4.23	0.56	4.61
Endrin ketone	7.60 - 10.0	0 / 8	--	--	--	4.32	0.45	4.62
gamma-BHC (Lindane)	7.60 - 10.0	2 / 8	4.41	5.42	CAPL-TS01-1012	4.49	0.58	4.87
gamma-Chlordane	7.60 - 10.0	3 / 8	8.70	10.9	CAPL-TS04-1012	6.21	2.84	8.11
Heptachlor	7.60 - 10.0	0 / 8	--	--	--	4.32	0.45	4.62
Heptachlor epoxide	7.60 - 10.0	1 / 8	5.45	5.45	CAPL-TS04-1012	4.46	0.60	4.86
Methoxychlor	37.6 - 51.1	0 / 8	--	--	--	21.6	2.35	23.2
Toxaphene	376 - 511	0 / 8	--	--	--	216	23.5	232
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	48.0 - 48.0	8 / 9	17.4	134	CAPL-TS07-1012	64.6	47.0	93.7
3,4,4',5-Tetrachlorobiphenyl (81)	48.0 - 67.0	5 / 9	10.2	58.4	CAPL-TS06-1012	33.6	13.4	41.9
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	9 / 9	149	2,984	CAPL-TS06-1012	1,092	1,009	1,718
2,3,4,4',5-Pentachlorobiphenyl (114)	55.7 - 370	3 / 9	29.0	874	CAPL-TS06-1012	186	276	357
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	9 / 9	1,500	100,526	CAPL-TS06-1012	22,450	32,499	42,594

Table D-23
Tissue Concentrations (dry weight) - Whole-Body Frogs - All Site Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
2,3',4,4',5'-Pentachlorobiphenyl (123)	319 - 397	7 / 9	36.6	419	CAPL-TS06-1012	146	139	232
3,3',4,4',5-Pentachlorobiphenyl (126)	57.1 - 67.0	7 / 9	50.0	2,263	CAPL-TS06-1012	633	782	1,118
Congeners (156/157)	-- - --	9 / 9	1,008	134,211	CAPL-TS06-1012	33,572	45,439	61,737
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	9 / 9	878	62,632	CAPL-TS06-1012	17,415	21,847	30,957
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	48.0 - 638	0 / 9	--	--	--	65.6	95.5	125
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	9 / 9	360	33,421	CAPL-TS06-1012	10,677	12,789	18,604
TEQ (Bird)	-- - --	9 / 9	1.03	251	CAPL-TS06-1012	71.8	87.5	126
TEQ (Mammal)	-- - --	9 / 9	0.13	236	CAPL-TS06-1012	65.2	82.2	116
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	3.96 - 10.3	0 / 9	--	--	--	3.48	0.93	4.06
Total Dichlorobiphenyls	-- - --	9 / 9	94.8	270	CAPL-TS09-1012	160	49.8	190
Total Trichlorobiphenyls	-- - --	9 / 9	337	2,348	CAPL-TS07-1012	1,189	681	1,611
Total Tetrachlorobiphenyls	-- - --	9 / 9	8,120	49,583	CAPL-TS01-1012	30,439	15,118	39,811
Total Pentachlorobiphenyls	-- - --	9 / 9	7,040	165,789	CAPL-TS06-1012	63,378	55,247	97,623
Total Hexachlorobiphenyls	-- - --	9 / 9	39,320	5,421,053	CAPL-TS06-1012	1,312,427	1,809,178	2,433,845
Total Heptachlorobiphenyls	-- - --	9 / 9	51,500	6,052,632	CAPL-TS06-1012	1,665,577	2,131,922	2,987,048
Total Octachlorobiphenyls	-- - --	9 / 9	10,480	1,447,368	CAPL-TS06-1012	462,413	557,914	808,236
Total Nonachlorobiphenyls	-- - --	9 / 9	984	104,211	CAPL-TS06-1012	37,906	44,106	65,245
Decachlorobiphenyl (209)	103 - 184	5 / 9	347	1,532	CAPL-TS04-1012	653	664	1,064
PCBs (total)	-- - --	9 / 9	178,565	13,216,411	CAPL-TS06-1012	3,574,112	4,564,477	6,403,400
Metals (MG/KG)								
Arsenic	0.76 - 0.76	8 / 9	0.28	7.92	CAPL-TS09-1012	1.33	2.49	2.87
Cadmium	-- - --	9 / 9	0.13	0.79	CAPL-TS09-1012	0.36	0.20	0.49
Chromium	3.39 - 5.16	1 / 9	12.9	12.9	CAPL-TS09-1012	3.31	3.61	5.55
Copper	-- - --	9 / 9	1.60	11.1	CAPL-TS06-1012	7.06	2.83	8.82
Lead	0.13 - 16.7	0 / 9	--	--	--	1.61	2.76	3.32
Mercury	-- - --	9 / 9	0.10	0.18	CAPL-TS01-1012	0.13	0.025	0.14
Nickel	1.88 - 2.40	4 / 9	1.17	4.58	CAPL-TS09-1012	1.66	1.22	2.42

Table D-23
Tissue Concentrations (dry weight) - Whole-Body Frogs - All Site Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Selenium	-- - --	9 / 9	0.80	2.00	CAPL-TS09-1012	1.41	0.36	1.63
Silver	-- - --	9 / 9	0.015	0.048	CAPL-TS02-1012	0.031	0.011	0.038
Zinc	-- - --	9 / 9	56.5	138	CAPL-TS01-1012	102	25.6	118

Table D-24
Tissue Concentrations (dry weight) - Whole-Body Fish - All Site Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Pesticides (UG/KG)								
4,4'-DDD	-- - --	6 / 6	13.0	62.1	CAPL-TS15-WB-1012	28.9	19.0	44.6
4,4'-DDE	-- - --	6 / 6	75.0	277	CAPL-TS14-WB-1012	166	79.8	232
4,4'-DDT	-- - --	6 / 6	9.58	142	CAPL-TS14-WB-1012	41.1	50.3	82.5
Aldrin	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
alpha-BHC	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
alpha-Chlordane	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
beta-BHC	26.1 - 38.5	3 / 6	6.52	8.33	CAPL-TS10-WB-1012	12.3	5.68	17.0
delta-BHC	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
Dieldrin	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
Endosulfan I	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
Endosulfan II	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
Endosulfan sulfate	-- - --	6 / 6	25.8	462	CAPL-TS14-WB-1012	113	172	254
Endrin	7.92 - 37.9	3 / 6	10.4	19.2	CAPL-TS14-WB-1012	12.2	6.17	17.3
Endrin aldehyde	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
Endrin ketone	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
gamma-BHC (Lindane)	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
gamma-Chlordane	-- - --	6 / 6	15.0	138	CAPL-TS14-WB-1012	47.0	46.6	85.3
Heptachlor	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
Heptachlor epoxide	7.92 - 38.5	0 / 6	--	--	--	11.7	6.44	17.0
Methoxychlor	39.2 - 196	0 / 6	--	--	--	58.5	32.4	85.2
Toxaphene	392 - 1,962	0 / 6	--	--	--	585	324	852
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	6 / 6	57.2	1,496	CAPL-TS14-WB-1012	528	517	953
3,4,4',5-Tetrachlorobiphenyl (81)	45.2 - 211	1 / 6	14.5	14.5	CAPL-TS10-WB-1012	41.3	32.8	68.3
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	6 / 6	2,571	16,423	CAPL-TS14-WB-1012	6,415	5,091	10,602
2,3,4,4',5-Pentachlorobiphenyl (114)	45.2 - 370	0 / 6	--	--	--	60.2	63.6	113
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	6 / 6	12,667	113,462	CAPL-TS14-WB-1012	38,281	37,550	69,171

Table D-24
Tissue Concentrations (dry weight) - Whole-Body Fish - All Site Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
2,3',4,4',5'-Pentachlorobiphenyl (123)	386 - 386	5 / 6	121	1,562	CAPL-TS14-WB-1012	455	549	906
3,3',4,4',5-Pentachlorobiphenyl (126)	45.2 - 426	2 / 6	654	1,193	CAPL-TS13-WB-1012	365	470	752
Congeners (156/157)	-- - --	6 / 6	5,375	88,462	CAPL-TS14-WB-1012	25,245	31,278	50,976
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	6 / 6	3,350	46,923	CAPL-TS14-WB-1012	14,161	16,264	27,540
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	45.2 - 1,146	0 / 6	--	--	--	147	220	328
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	6 / 6	1,292	26,038	CAPL-TS14-WB-1012	6,924	9,426	14,678
TEQ (Bird)	-- - --	6 / 6	5.66	156	CAPL-TS13-WB-1012	61.2	58.9	110
TEQ (Mammal)	-- - --	6 / 6	0.80	121	CAPL-TS13-WB-1012	33.6	49.9	74.7
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	3.17 - 13.1	0 / 6	--	--	--	3.47	1.85	5.00
Total Dichlorobiphenyls	-- - --	6 / 6	128	282	CAPL-TS15-WB-1012	208	63.7	261
Total Trichlorobiphenyls	-- - --	6 / 6	3,304	14,769	CAPL-TS14-WB-1012	6,199	4,468	9,874
Total Tetrachlorobiphenyls	-- - --	6 / 6	97,083	1,150,000	CAPL-TS14-WB-1012	297,461	418,741	641,934
Total Pentachlorobiphenyls	-- - --	6 / 6	159,583	1,900,000	CAPL-TS14-WB-1012	527,627	675,871	1,083,625
Total Hexachlorobiphenyls	-- - --	6 / 6	662,500	6,461,538	CAPL-TS14-WB-1012	2,135,866	2,156,081	3,909,544
Total Heptachlorobiphenyls	-- - --	6 / 6	359,167	5,307,692	CAPL-TS14-WB-1012	1,579,665	1,849,423	3,101,075
Total Octachlorobiphenyls	-- - --	6 / 6	88,333	1,961,538	CAPL-TS14-WB-1012	481,257	727,905	1,080,061
Total Nonachlorobiphenyls	-- - --	6 / 6	5,333	163,846	CAPL-TS14-WB-1012	36,641	62,470	88,032
Decachlorobiphenyl (209)	178 - 389	1 / 6	2,350	2,350	CAPL-TS14-WB-1012	513	901	1,254
PCBs (total)	-- - --	6 / 6	1,375,448	16,961,863	CAPL-TS14-WB-1012	5,065,315	5,888,414	9,909,361
Metals (MG/KG)								
Arsenic	0.62 - 0.83	4 / 6	0.20	0.41	CAPL-TS10-WB-1012	0.35	0.085	0.42
Cadmium	0.093 - 0.12	1 / 6	0.046	0.046	CAPL-TS10-WB-1012	0.053	0.0066	0.058
Chromium	3.14 - 4.04	0 / 6	--	--	--	1.82	0.19	1.98
Copper	3.14 - 4.04	0 / 6	--	--	--	1.82	0.19	1.98
Lead	0.066 - 0.20	0 / 6	--	--	--	0.072	0.027	0.094
Mercury	-- - --	6 / 6	0.042	0.10	CAPL-TS13-WB-1012	0.068	0.024	0.087
Nickel	1.59 - 2.00	0 / 6	--	--	--	0.91	0.093	0.99

Table D-24
Tissue Concentrations (dry weight) - Whole-Body Fish - All Site Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Selenium	-- - --	6 / 6	0.54	0.97	CAPL-TS15-WB-1012	0.77	0.15	0.89
Silver	0.031 - 0.040	0 / 6	--	--	--	0.018	0.0019	0.020
Zinc	-- - --	6 / 6	76.9	175	CAPL-TS12-WB-1012	109	36.9	139

Table D-25
Tissue Concentrations (dry weight) - Largemouth Bass (Fillet/Offal) Reconstituted Whole-Body - All Site Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Pesticides (UG/KG)								
4,4'-DDD	-- - --	3 / 3	14.2	33.1	CAPL-TS17-WB-1012	24.9	9.72	41.3
4,4'-DDE	-- - --	3 / 3	98.3	354	CAPL-TS17-WB-1012	229	128	445
4,4'-DDT	-- - --	3 / 3	29.3	98.5	CAPL-TS17-WB-1012	67.2	35.1	126
Aldrin	22.4 - 65.3	0 / 3	--	--	--	23.0	10.9	41.3
alpha-BHC	22.4 - 65.3	0 / 3	--	--	--	23.0	10.9	41.3
alpha-Chlordane	-- - --	3 / 3	24.0	64.9	CAPL-TS17-WB-1012	46.4	20.7	81.3
beta-BHC	-- - --	3 / 3	16.5	65.1	CAPL-TS17-WB-1012	43.8	24.8	85.6
delta-BHC	22.4 - 50.1	1 / 3	64.9	64.9	CAPL-TS17-WB-1012	33.7	27.9	80.8
Dieldrin	22.4 - 65.3	0 / 3	--	--	--	23.0	10.9	41.3
Endosulfan I	22.4 - 65.3	0 / 3	--	--	--	23.0	10.9	41.3
Endosulfan II	22.4 - 65.3	0 / 3	--	--	--	23.0	10.9	41.3
Endosulfan sulfate	-- - --	3 / 3	50.9	176	CAPL-TS17-WB-1012	132	70.0	250
Endrin	-- - --	3 / 3	13.7	27.7	CAPL-TS17-WB-1012	20.5	7.01	32.3
Endrin aldehyde	22.4 - 65.3	0 / 3	--	--	--	23.0	10.9	41.3
Endrin ketone	22.4 - 65.3	0 / 3	--	--	--	23.0	10.9	41.3
gamma-BHC (Lindane)	-- - --	3 / 3	21.5	64.7	CAPL-TS17-WB-1012	45.1	21.9	82.0
gamma-Chlordane	22.4 - 22.4	2 / 3	107	122	CAPL-TS17-WB-1012	80.0	60.1	181
Heptachlor	22.4 - 65.3	0 / 3	--	--	--	23.0	10.9	41.3
Heptachlor epoxide	22.4 - 50.1	1 / 3	35.8	35.8	CAPL-TS17-WB-1012	24.0	12.3	44.8
Methoxychlor	114 - 326	0 / 3	--	--	--	115	53.9	206
Toxaphene	1,135 - 3,263	0 / 3	--	--	--	1,150	539	2,060
Polychlorinated Biphenyls (UG/KG)								
Aroclor-1260	-- - --	3 / 3	1,705	11,314	CAPL-TS17-WB-1012	7,035	4,890	15,279
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	3 / 3	185	2,094	CAPL-TS17-WB-1012	972	997	2,653
3,4,4',5-Tetrachlorobiphenyl (81)	47.7 - 248	0 / 3	--	--	--	58.4	56.7	154
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	3 / 3	3,474	41,824	CAPL-TS17-WB-1012	18,727	20,343	53,022

Table D-25
Tissue Concentrations (dry weight) - Largemouth Bass (Fillet/Offal) Reconstituted Whole-Body - All Site Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
2,3,4,4',5-Pentachlorobiphenyl (114)	55.3 - 729	0 / 3	--	--	--	149	188	465
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	3 / 3	18,589	338,208	CAPL-TS17-WB-1012	138,777	173,921	431,983
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	3 / 3	246	2,615	CAPL-TS17-WB-1012	1,204	1,248	3,307
3,3',4,4',5-Pentachlorobiphenyl (126)	55.3 - 838	0 / 3	--	--	--	167	218	536
Congeners (156/157)	-- - --	3 / 3	12,818	148,019	CAPL-TS17-WB-1012	67,316	71,308	187,531
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	3 / 3	7,898	87,855	CAPL-TS17-WB-1012	40,202	42,130	111,228
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	169 - 914	0 / 3	--	--	--	245	192	568
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	3 / 3	3,091	41,108	CAPL-TS17-WB-1012	18,503	20,004	52,226
TEQ (Bird)	-- - --	3 / 3	11.2	128	CAPL-TS17-WB-1012	59.2	61.4	163
TEQ (Mammal)	-- - --	3 / 3	1.40	20.0	CAPL-TS17-WB-1012	8.64	9.96	25.4
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	6.86 - 7.10	1 / 3	10.0	10.0	CAPL-TS17-WB-1012	5.67	3.78	12.1
Total Dichlorobiphenyls	-- - --	3 / 3	109	269	CAPL-TS17-WB-1012	177	82.4	316
Total Trichlorobiphenyls	-- - --	3 / 3	1,955	11,723	CAPL-TS17-WB-1012	5,886	5,155	14,577
Total Tetrachlorobiphenyls	-- - --	3 / 3	50,321	439,293	CAPL-TS17-WB-1012	231,136	195,922	561,432
Total Pentachlorobiphenyls	-- - --	3 / 3	185,495	2,237,371	CAPL-TS17-WB-1012	1,066,851	1,056,059	2,847,213
Total Hexachlorobiphenyls	-- - --	3 / 3	1,233,225	7,721,199	CAPL-TS17-WB-1012	4,525,345	3,245,058	9,996,041
Total Heptachlorobiphenyls	-- - --	3 / 3	812,864	4,978,538	CAPL-TS17-WB-1012	2,826,938	2,086,240	6,344,034
Total Octachlorobiphenyls	-- - --	3 / 3	185,166	2,341,183	CAPL-TS17-WB-1012	1,076,490	1,125,457	2,973,848
Total Nonachlorobiphenyls	-- - --	3 / 3	9,586	150,104	CAPL-TS17-WB-1012	68,317	73,041	191,454
Decachlorobiphenyl (209)	221 - 221	2 / 3	794	2,986	CAPL-TS17-WB-1012	1,297	1,502	3,830
PCBs (total)	-- - --	3 / 3	2,478,721	17,882,675	CAPL-TS17-WB-1012	9,802,404	7,729,798	22,833,718
Metals (MG/KG)								
Arsenic	0.59 - 0.63	1 / 3	0.59	0.59	CAPL-TS16-WB-1012	0.40	0.16	0.67
Cadmium	0.087 - 0.11	0 / 3	--	--	--	0.049	0.0055	0.058
Chromium	2.95 - 3.65	0 / 3	--	--	--	1.63	0.18	1.93
Copper	2.95 - 3.65	0 / 3	--	--	--	1.63	0.18	1.93
Lead	0.15 - 0.18	0 / 3	--	--	--	0.081	0.0089	0.096

Table D-25
Tissue Concentrations (dry weight) - Largemouth Bass (Fillet/Offal) Reconstituted Whole-Body - All Site Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Mercury	-- - --	3 / 3	0.15	0.20	CAPL-TS18-WB-1012	0.18	0.025	0.22
Nickel	1.47 - 1.82	0 / 3	--	--	--	0.81	0.089	0.96
Selenium	-- - --	3 / 3	0.45	0.61	CAPL-TS16-WB-1012	0.51	0.083	0.65
Silver	0.030 - 0.037	0 / 3	--	--	--	0.016	0.0018	0.019
Zinc	-- - --	3 / 3	46.2	86.1	CAPL-TS16-WB-1012	63.7	20.4	98.1

Table D-26
Exposure Parameters for Upper Trophic Level Ecological Receptors - Screening (Step 2)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Minimum Body Weight (kg)		Maximum Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)		Dietary Composition (percent)									Soil/ Sediment Ingestion (percent)	
	Value	Reference	Value	Reference	Value	Reference	Value	Reference	Terr Plants	Terr Invert	Mouse	Vole	Shrew	Aq Plants	Aq Invert	Fish/ Frogs	Reference	Value	Reference
Mammals																			
Meadow vole	0.0300	Silva and Downing 1995	0.0635	Silva and Downing 1995	0.01334	USEPA 1993	0.00310	USEPA 1993	95.6	2.0	0.0	0.0	0.0	0.0	0.0	0.0	USEPA 1993	2.4	Beyer et al. 1994
Mink	0.7260	Silva and Downing 1995	1.0200	Silva and Downing 1995	0.02856	USEPA 1993	0.03494	USEPA 1993	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993	0.0	Sample and Suter 1994
Muskrat	0.7500	USEPA 1993	1.5000	USEPA 1993	0.14260	allometric equation (USEPA 1993)[1]	0.07650	USEPA 1993	0.0	0.0	0.0	0.0	0.0	90.6	0.0	0.0	USEPA 1993	9.4	Beyer et al. 1994 (raccoon)
Raccoon	4.2300	Silva and Downing 1995	7.5300	Silva and Downing 1995	0.60919	allometric equation (USEPA 1993)[1]	0.13067	Conover 1989	0.0	0.0	0.0	0.0	0.0	40.0	43.6	7.0	USEPA 1993	9.4	Beyer et al. 1994
Red fox	3.1700	Silva and Downing 1995	4.8700	Silva and Downing 1995	0.41154	allometric equation (USEPA 1993)[1]	0.14763	Sample and Suter 1994	7.0	2.8	29.2	29.1	29.1	0.0	0.0	0.0	USEPA 1993	2.8	Beyer et al. 1994
Short-tailed shrew	0.0133	USEPA 1993	0.02131	USEPA 1993	0.00475	USEPA 1993	0.00189	USEPA 1993	4.7	82.3	0.0	0.0	0.0	0.0	0.0	0.0	USEPA 1993; Sample and Suter 1994	13.0	Sample and Suter 1994
White-footed mouse	0.0141	Silva and Downing 1995	0.0305	Silva and Downing 1995	0.00915	Sample and Suter 1994	0.00073	Sample and Suter 1994	51.0	47.0	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951; Sample and Suter 1994	2.0	Beyer et al. 1994
Birds																			
American robin (omnivore)	0.0635	USEPA 1993	0.1030	USEPA 1993	0.01287	allometric equation (USEPA 1993)[2]	0.00736	Levey and Karasov 1989	51.9	43.5	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951	4.6	Sample and Suter 1994
American robin (invertivore)	0.0635	USEPA 1993	0.1030	USEPA 1993	0.01287	allometric equation (USEPA 1993)[2]	0.00511	Levey and Karasov 1989	0.0	95.4	0.0	0.0	0.0	0.0	0.0	0.0	exclusive diet	4.6	Sample and Suter 1994
Belted kingfisher	0.1250	Dunning 2008	0.2150	Dunning 2008	0.02107	allometric equation (USEPA 1993)[2]	0.02619	USEPA 1993	0.0	0.0	0.0	0.0	0.0	0.0	16.0	84.0	USEPA 1993	0.0	Sample and Suter 1994
Great blue heron	2.1000	Butler 1992	2.5000	Butler 1992	0.10901	allometric equation (USEPA 1993)[2]	0.13565	allometric equation (Nagy 2001)[3]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993; Quinney and Smith 1980	0.0	Sample and Suter 1994
Mallard	0.6120	Bellrose 1980	1.7240	Bellrose 1980	0.08498	allometric equation (USEPA 1993)[2]	0.07168	allometric equation (Nagy 2001)[4]	0.0	0.0	0.0	0.0	0.0	86.7	10.0	0.0	Palmer 1976	3.3	Beyer et al. 1994
Marsh wren	0.0098	Dunning 2008	0.0135	Dunning 2008	0.00330	allometric equation (USEPA 1993)[2]	0.00298	USEPA 1993	0.0	0.0	0.0	0.0	0.0	0.0	95.0	0.0	USEPA 1993	5.0	Assumed based on diet
Mourning dove	0.1050	Tomlinson et al. 1994	0.1630	Tomlinson et al. 1994	0.01750	allometric equation (USEPA 1993)[2]	0.02090	allometric equation (Nagy 2001)[3]	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Tomlinson et al. 1994	5.0	Assumed based on diet
Osprey	1.2350	Dunning 2008	1.7500	Dunning 2008	0.08584	allometric equation (USEPA 1993)[2]	0.09188	USEPA 1993	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993	0.0	Assumed based on diet
Red-tailed hawk	0.9570	USEPA 1993	1.2350	USEPA 1993	0.06796	allometric equation (USEPA 1993)[2]	0.03952	Sample and Suter 1994	0.0	0.0	34.0	33.0	33.0	0.0	0.0	0.0	USEPA 1993; Sample and Suter 1994	0.0	Sample and Suter 1994
Tree swallow	0.0156	Dunning 2008	0.0254	Dunning 2008	0.00504	allometric equation (USEPA 1993)[2]	0.00119	Sample et al. 1997	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	Sample et al. 1997	0.0	Sample et al. 1997

1 - All mammals equation: 0.099 $(BW)^{0.90}$ (maximum body weight used)
2 - All birds equation: 0.059 $(BW)^{0.67}$ (maximum body weight used)
3 - All birds equation: $(0.638*((BW*1000)^{0.685}))/1000$ (maximum body weight used)
4 - Omnivorous birds equation: $(0.67*((BW*1000)^{0.627}))/1000$ (maximum body weight used)

Table D-27
Exposure Parameters for Upper Trophic Level Ecological Receptors - Baseline (Step 7)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)		Home Range (ha)		Dietary Composition (percent)									Soil/ Sediment Ingestion (percent)	
	Value	Reference	Value	Reference	Value	Reference	Value	Reference	Terr Plants	Terr Invert	Mouse	Vole	Shrew	Aq Plants	Aq Invert	Fish/ Frogs	Reference	Value	Reference
Mammals																			
Meadow vole	0.0428	Silva and Downing 1995	0.00899	USEPA 1993	0.00209	USEPA 1993	0.013	USEPA 1993	95.6	2.0	0.0	0.0	0.0	0.0	0.0	0.0	USEPA 1993	2.4	Beyer et al. 1994
Mink	0.7770	Silva and Downing 1995	0.02176	USEPA 1993	0.02661	USEPA 1993	770	USEPA 1993	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993	0.0	Sample and Suter 1994
Muskrat	1.1690	Silva and Downing 1995	0.11394	allometric equation (USEPA 1993)[1]	0.05962	USEPA 1993	0.170	USEPA 1993	0.0	0.0	0.0	0.0	0.0	90.6	0.0	0.0	USEPA 1993	9.4	Beyer et al. 1994 (raccoon)
Raccoon	5.9400	Silva and Downing 1995	0.49209	allometric equation (USEPA 1993)[1]	0.10308	Conover 1989	289	USEPA 1993	0.0	0.0	0.0	0.0	0.0	40.0	43.6	7.0	USEPA 1993	9.4	Beyer et al. 1994
Red fox	4.0600	Silva and Downing 1995	0.34939	allometric equation (USEPA 1993)[1]	0.12308	Sample and Suter 1994	400	USEPA 1993	7.0	2.8	29.2	29.1	29.1	0.0	0.0	0.0	USEPA 1993	2.8	Beyer et al. 1994
Short-tailed shrew	0.0169	USEPA 1993	0.00376	USEPA 1993	0.00149	USEPA 1993	0.390	Sample and Suter 1994	4.7	82.3	0.0	0.0	0.0	0.0	0.0	0.0	USEPA 1993; Sample and Suter 1994	13.0	Sample and Suter 1994
White-footed mouse	0.0208	Silva and Downing 1995	0.00624	Sample and Suter 1994	0.00050	Sample and Suter 1994	0.059	Sample and Suter 1994	51.0	47.0	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951; Sample and Suter 1994	2.0	Beyer et al. 1994
Birds																			
American robin (omnivore)	0.0773	USEPA 1993	0.01062	allometric equation (USEPA 1993)[2]	0.00552	Levey and Karasov 1989	0.500	USEPA 1993 (foraging)	51.9	43.5	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951	4.6	Sample and Suter 1994
American robin (invertivore)	0.0773	USEPA 1993	0.01062	allometric equation (USEPA 1993)[2]	0.00383	Levey and Karasov 1989	0.500	USEPA 1993 (foraging)	0.0	95.4	0.0	0.0	0.0	0.0	0.0	0.0	exclusive diet	4.6	Sample and Suter 1994
Belted kingfisher	0.1480	Dunning 2008	0.01640	allometric equation (USEPA 1993)[2]	0.01803	USEPA 1993	800	Cornwell 1963 (foraging)	0.0	0.0	0.0	0.0	0.0	0.0	16.0	84.0	USEPA 1993	0.0	Sample and Suter 1994
Great blue heron	2.2300	Quinney 1982	0.10098	allometric equation (USEPA 1993)[2]	0.12543	allometric equation (Nagy 2001)[3]	4.50	USEPA 1993 (foraging)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993; Quinney and Smith 1980	0.0	Sample and Suter 1994
Mallard	1.1770	Bellrose 1980	0.06581	allometric equation (USEPA 1993)[2]	0.05642	allometric equation (Nagy 2001)[4]	435	USEPA 1993	0.0	0.0	0.0	0.0	0.0	86.7	10.0	0.0	Palmer 1976	3.3	Beyer et al. 1994
Marsh wren	0.0113	Dunning 2008	0.00292	allometric equation (USEPA 1993)[2]	0.00249	USEPA 1993	0.050	USEPA 1993	0.0	0.0	0.0	0.0	0.0	0.0	95.0	0.0	USEPA 1993	5.0	Assumed based on diet
Mourning dove	0.1265	Tomlinson et al. 1994	0.01477	allometric equation (USEPA 1993)[2]	0.01757	allometric equation (Nagy 2001)[3]	956	Losito and Mirarchi 1991	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Tomlinson et al. 1994	5.0	Assumed based on diet
Osprey	1.4860	Dunning 2008	0.07693	allometric equation (USEPA 1993)[2]	0.07802	USEPA 1993	9,500	USEPA 1993 (foraging)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993	0.0	Assumed based on diet
Red-tailed hawk	1.1260	Sample and Suter 1994	0.06388	allometric equation (USEPA 1993)[2]	0.03603	Sample and Suter 1994	233	Sample and Suter 1994	0.0	0.0	34.0	33.0	33.0	0.0	0.0	0.0	USEPA 1993; Sample and Suter 1994	0.0	Sample and Suter 1994
Tree swallow	0.0201	Dunning 2008	0.00431	allometric equation (USEPA 1993)[2]	0.00094	Sample et al. 1997	3,850	Robertson et al. 1992 (foraging)	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	Sample et al. 1997	0.0	Sample et al. 1997

1 - All mammals equation: 0.099 $(BW)^{0.90}$ (maximum body weight used)
2 - All birds equation: 0.059 $(BW)^{0.67}$ (maximum body weight used)
3 - All birds equation: $(0.638*((BW*1000)^{0.685}))/1000$ (maximum body weight used)
4 - Omnivorous birds equation: $(0.67*((BW*1000)^{0.627}))/1000$ (maximum body weight used)

Table D-28
Toxicity Equivalence Factors (TEFs) for Dioxin-Like PCB Congeners
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Congener	Fish TEF	Mammal TEF	Bird TEF
Non-ortho PCBs			
3,3',4,4'-TetraCB (PCB-77)	0.0005	0.0001	0.05
3,4,4',5-TetraCB (PCB-81)	0.0001	0.0003	0.1
3,3',4,4',5-PentaCB (PCB-126)	0.005	0.1	0.1
3,3',4,4',5,5'-HexaCB (PCB-169)	0.00005	0.03	0.001
Mono-ortho PCBs			
2,3,3',4,4'-PentaCB (PCB-105)	<0.000005	0.00003	0.0001
2,3,4,4',5-PentaCB (PCB-114)	<0.000005	0.00003	0.0001
2,3',4,4',5-PentaCB (PCB-118)	<0.000005	0.00003	0.00001
2',3,4,4',5-PentaCB (PCB-123)	<0.000005	0.00003	0.00001
2,3,3',4,4',5-HexaCB (PCB-156)	<0.000005	0.00003	0.0001
2,3,3',4,4',5'-HexaCB (PCB-157)	<0.000005	0.00003	0.0001
2,3',4,4',5,5'-HexaCB (PCB-167)	<0.000005	0.00003	0.00001
2,3,3',4,4',5,5'-HeptaCB (PCB-189)	<0.000005	0.00003	0.00001

From Van den Berg et al. (1998; 2006)

Table D-29
Ingestion-Based Toxicity Reference Values (TRVs) for Mammals
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	Meadow vole	Mink	Muskrat	Raccoon	Red fox	Short-tailed shrew	White-footed mouse
Metals																		
Arsenic	Arsenite (As+3)	mouse	3 generations	Yes	oral in water/food	reproduction	1.26	Sample et al. 1996	0.252 a	--	0.56	X		X			X	X
Arsenic	--	dog	chronic	--	oral	survival, growth, reproduction	1.66	USEPA 2005b	1.04	USEPA 2005b	1.31		X		X	X		
Cadmium	--	rat	chronic	--	oral	survival, growth, reproduction	7.70	USEPA 2005e	0.77	USEPA 2005e	2.43	X	X	X	X	X	X	X
Chromium	Cr+3	multiple	chronic	--	oral	survival, growth, reproduction	12.0 b	--	2.40	USEPA 2008a	5.37	X	X	X	X	X	X	X
Copper	--	pig	chronic	--	oral	survival, growth, reproduction	9.34	USEPA 2007a	5.60	USEPA 2007a	7.23	X		X			X	X
Copper	Copper sulfate	mink	357 days	Yes	oral in diet	reproduction	15.1	Sample et al. 1996	11.7	Sample et al. 1996	13.3		X		X	X		
Lead	--	rat	chronic	--	oral	survival, growth, reproduction	8.90	USEPA 2005g	4.70	USEPA 2005g	6.47	X	X	X	X	X	X	X
Mercury	Methyl mercury chloride	rat	3 generations	Yes	oral in diet	reproduction	0.160	Sample et al. 1996	0.032	Sample et al. 1996	0.072	X		X			X	X
Mercury	Methyl mercury chloride	mink	93 days	No	oral in diet	survival/weight loss/ataxia	0.247 c	Sample et al. 1996	0.150 c	Sample et al. 1996	0.192		X		X	X		
Nickel	--	multiple	chronic	--	oral	survival, growth, reproduction	3.40	USEPA 2007c	1.70	USEPA 2007c	2.40	X	X	X	X	X	X	X
Selenium	Potassium selenate (SeO4)	rat	1 year	Yes	oral in water	reproduction	0.33	Sample et al. 1996	0.20	Sample et al. 1996	0.26	X	X	X	X	X	X	X
Silver	--	pig	chronic	--	oral	survival, growth, reproduction	60.2	USEPA 2006c	12.0 a	--	26.9	X	X	X	X	X	X	X
Zinc	--	multiple	chronic	--	oral	survival, growth, reproduction	377 b	--	75.4	USEPA 2007e	169	X	X	X	X	X	X	X
Polychlorinated Biphenyls																		
Aroclor-1016	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1016	--	mink	18 months	Yes	oral in diet	reproduction	3.43	Sample et al. 1996	1.37	Sample et al. 1996	2.17		X		X	X		
Aroclor-1221	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1221	--	mink	7 months	Yes	oral in diet	reproduction	0.685	Aroclor-1242 value	0.137 a	Aroclor-1242 value	0.306		X		X	X		
Aroclor-1232	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1232	--	mink	7 months	Yes	oral in diet	reproduction	0.685	Aroclor-1242 value	0.137 a	Aroclor-1242 value	0.306		X		X	X		
Aroclor-1242	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1242	--	mink	7 months	Yes	oral in diet	reproduction	0.685	Sample et al. 1996	0.137 a	--	0.306		X		X	X		
Aroclor-1248	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1248	--	mink	4.5 months	Yes	oral in diet	reproduction	0.685	Aroclor-1254 value	0.137	Aroclor-1254 value	0.306		X		X	X		
Aroclor-1254	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Sample et al. 1996	0.136 a	--	0.304	X		X			X	X
Aroclor-1254	--	mink	4.5 months	Yes	oral in diet	reproduction	0.685	Sample et al. 1996	0.137	Sample et al. 1996	0.306		X		X	X		
Aroclor-1260	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1260	--	mink	4.5 months	Yes	oral in diet	reproduction	0.685	Aroclor-1254 value	0.137	Aroclor-1254 value	0.306		X		X	X		
Pesticides																		
4,4'-DDD	--	rat	chronic	--	oral	survival, growth, reproduction	0.735	USEPA 2007f	0.147	USEPA 2007f	0.329	X	X	X	X	X	X	X
4,4'-DDE	--	rat	chronic	--	oral	survival, growth, reproduction	0.735	USEPA 2007f	0.147	USEPA 2007f	0.329	X	X	X	X	X	X	X
4,4'-DDT	--	rat	chronic	--	oral	survival, growth, reproduction	0.735	USEPA 2007f	0.147	USEPA 2007f	0.329	X	X	X	X	X	X	X
Aldrin	--	rat	3 generations	Yes	oral in diet	reproduction	1.00	Sample et al. 1996	0.20	Sample et al. 1996	0.45	X	X	X	X	X	X	X
alpha-BHC	BHC - mixed isomers	rat	4 generations	Yes	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26	X	X	X	X	X	X	X
alpha-Chlordane	Chlordane	mouse	6 generations	Yes	oral in diet	reproduction	9.16	Sample et al. 1996	4.58	Sample et al. 1996	6.48	X	X	X	X	X	X	X
beta-BHC	BHC - mixed isomers	rat	4 generations	Yes	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26	X	X	X	X	X	X	X
delta-BHC	BHC - mixed isomers	rat	4 generations	Yes	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26	X	X	X	X	X	X	X
Dieldrin	--	rat	chronic	--	oral	survival, growth, reproduction	0.030	USEPA 2007g	0.015	USEPA 2007g	0.021	X	X	X	X	X	X	X
Endosulfan I	Endosulfan	rat	30 days	No	oral (gavage)	reproduction	0.75 b	--	0.15	Sample et al. 1996	0.34	X	X	X	X	X	X	X
Endosulfan II	Endosulfan	rat	30 days	No	oral (gavage)	reproduction	0.75 b	--	0.15	Sample et al. 1996	0.34	X	X	X	X	X	X	X
Endrin	--	mouse	120 days	Yes	oral in diet	reproduction	0.920	Sample et al. 1996	0.184 a	--	0.411	X	X	X	X	X	X	X
gamma-BHC (Lindane)	--	rat	3 generations	Yes	oral in diet	reproduction	40.0 b	--	8.00	Sample et al. 1996	17.9	X	X	X	X	X	X	X
gamma-Chlordane	Chlordane	mouse	6 generations	Yes	oral in diet	reproduction	9.16	Sample et al. 1996	4.58	Sample et al. 1996	6.48	X	X	X	X	X	X	X
Heptachlor	--	mink	181 days	Yes	oral in diet	reproduction	1.00	Sample et al. 1996	0.20 a	--	0.45	X	X	X	X	X	X	X
Heptachlor epoxide	--	mink	181 days	Yes	oral in diet	reproduction	1.00	Heptachlor value	0.20 a	--	0.45	X	X	X	X	X	X	X
Methoxychlor	--	rat	11 months	Yes	oral in diet	reproduction	8.00	Sample et al. 1996	4.00	Sample et al. 1996	5.66	X	X	X	X	X	X	X
Toxaphene	--	rat	3 generations	Yes	oral in diet	reproduction	40.0 b	--	8.00	Sample et al. 1996	17.9	X	X	X	X	X	X	X
Volatile and Semivolatile Organic Compounds																		
1,1,2,2-Tetrachloroethane	--	rat	78 weeks	Yes	oral (gavage)	reproduction	380 b	--	76.0	ATSDR 2008	170	X	X	X	X	X	X	X
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X
1,2,4-Trichlorobenzene	--	rat	3 generations	Yes	oral in water	reproduction	106	Coulston and Kolbye 1994	53.0	Coulston and Kolbye 1994	75.0	X	X	X	X	X	X	X
1,2-Dichlorobenzene	--	rat	chronic	No	oral (gavage)	liver/kidney	429 b	--	85.7	Coulston and Kolbye 1994	192	X	X	X	X	X	X	X
1,3-Dichlorobenzene	--	rat	chronic	No	oral (gavage)	liver/kidney	429 b	--	85.7	Value for 1,2-Dichlorobenzene	192	X	X	X	X	X	X	X
1,4-Dichlorobenzene	--	rat	2 generations	Yes	oral (gavage)	developmental	90.0	ATSDR 2006	30.0	ATSDR 2006	52.0	X	X	X	X	X	X	X
4-Bromophenyl-phenylether	--	--	--		--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X
4-Chlorophenyl-phenylether	--	--	--		--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X

Table D-29
Ingestion-Based Toxicity Reference Values (TRVs) for Mammals
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	Meadow vole	Mink	Muskrat	Raccoon	Red fox	Short-tailed shrew	White-footed mouse
Acenaphthene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Acenaphthylene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Anthracene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Benzo(a)anthracene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Benzo(a)pyrene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Benzo(b)fluoranthene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Benzo(g,h,i)perylene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Benzo(k)fluoranthene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Chrysene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Dibenz(a,h)anthracene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Fluoranthene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Fluorene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Hexachlorobenzene	--	rat	4 generations	Yes	oral in diet	reproduction	4.00	ATSDR 2002	2.00	ATSDR 2002	2.83	X	X	X	X	X	X	X
Hexachlorobutadiene	--	rat	GD 1-22; LD 1-21	Yes	oral in diet	developmental	20.0	ATSDR 1994	2.00	ATSDR 1994	6.32	X	X	X	X	X	X	X
Hexachlorocyclopentadiene	--	mouse	GD 6-15	Yes	oral (gavage)	developmental	375 b	--	75.0	ATSDR 1999	168	X	X	X	X	X	X	X
Hexachloroethane	--	rat	GD 6-16	Yes	oral (gavage)	reproduction	500	ATSDR 1997	100	ATSDR 1997	224	X	X	X	X	X	X	X
Indeno(1,2,3-cd)pyrene	--	mouse	65 weeks	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Pentachlorophenol	--	multiple	chronic	--	oral	survival, growth, reproduction	42.1 b	--	8.42	USEPA 2007i	18.8	X	X	X	X	X	X	X
Phenanthrene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Pyrene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Dioxin/Furans																		
2,3,7,8-TCDD	--	rat	3 generations	Yes	oral in diet	reproduction	0.00001	Sample et al. 1996	0.000001	Sample et al. 1996	0.000003	X	X	X	X	X	X	X

NA - Not Available

[a] Uncertainty factor of 5 applied to LOAEL

[b] Uncertainty factor of 5 applied to NOAEL

[c] Does not include subchronic uncertainty factor of 10 applied by Sample et al (1996) since the study duration meets the criteria for a chronic study in Table L-36

[d] Uncertainty factor of 100 applied to LD50

Table D-30
Ingestion-Based Toxicity Reference Values (TRVs) for Birds
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)		Reference	NOAEL (mg/kg/d)		Reference	MATC (mg/kg/d)	American robin	Belted kingfisher	Great blue heron	Mallard	Mourning dove	Osprey	Red-tailed hawk	Tree swallow
Metals																					
Arsenic	Copper acetoarsenite	brown-headed cowbird	7 months	No	oral in diet	survival	7.38		Sample et al. 1996	2.46		Sample et al. 1996	4.26	X						X	X
Arsenic	--	chicken	chronic	--	oral	survival, growth,reproduction	11.2	b	--	2.24		USEPA 2005b	5.01					X			
Arsenic	Sodium arsenite	mallard	128 days	No	oral in diet	survival	12.8		Sample et al. 1996	5.14		Sample et al. 1996	8.12		X	X	X		X		
Cadmium	--	multiple	chronic	--	oral	survival, growth,reproduction	7.35	b	--	1.47		USEPA 2005e	3.29	X	X	X	X	X	X	X	X
Chromium	Cr+3	multiple	chronic	--	oral	survival, growth,reproduction	13.3	b	--	2.66		USEPA 2008a	5.95	X	X	X	X	X	X	X	X
Copper	--	chicken	chronic	--	oral	survival, growth,reproduction	12.1		USEPA 2007a	4.05		USEPA 2007a	7.00	X	X	X	X	X	X	X	X
Lead	--	chicken	chronic	--	oral	survival, growth,reproduction	3.26		USEPA 2005g	1.63		USEPA 2005g	2.31				X	X			
Lead	Metallic	American kestrel	7 months	Yes	oral in diet	reproduction	19.3	b	--	3.85		Sample et al. 1996	8.61	X	X	X			X	X	X
Mercury	Mercury chloride	Japanese quail	1 year	Yes	oral in diet	reproduction	0.90		Sample et al. 1996	0.45		Sample et al. 1996	0.64					X			
Mercury	--	red-tailed hawk	12 weeks	Yes	oral in diet	survival/neurological	1.20		USEPA 1995b	0.49		USEPA 1995b	0.77	X					X	X	
Mercury	Methyl mercury	mallard	3 generations	Yes	oral in diet	reproduction	0.078		USEPA 1997b	0.026		USEPA 1997b	0.045		X	X	X				X
Nickel	--	multiple	chronic	--	oral	survival, growth,reproduction	33.6	b	--	6.71		USEPA 2007c	15.0	X	X	X	X	X	X	X	X
Selenium	Selanomethionine	mallard	100 days	Yes	oral in diet	reproduction	0.80		Sample et al. 1996	0.40		Sample et al. 1996	0.57				X				X
Selenium	Selanomethionine	black-crowned night-heron	94 days	Yes	oral in diet	reproduction	9.00	b	--	1.80		Sample et al. 1996	4.02		X	X			X		
Selenium	Selanomethionine	screech owl	13.7 weeks	Yes	oral in diet	reproduction	1.50		Sample et al. 1996	0.44		Sample et al. 1996	0.81	X						X	
Selenium	--	chicken	chronic	--	oral	survival, growth,reproduction	0.58		USEPA 2007d	0.29		USEPA 2007d	0.41					X			
Silver	--	turkey	chronic	--	oral	survival, growth	20.2		USEPA 2006c	4.04	a	--	9.03	X	X	X	X	X	X	X	X
Zinc	--	multiple	chronic	--	oral	survival, growth,reproduction	331	b	--	66.1		USEPA 2007e	148	X	X	X	X	X	X	X	X
Polychlorinated Biphenyls																					
Aroclor-1016	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80					X			
Aroclor-1016	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92	X					X	X	
Aroclor-1016	--	mallard	1 month	Yes	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1221	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80					X			
Aroclor-1221	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92	X					X	X	
Aroclor-1221	--	mallard	1 month	Yes	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1232	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80					X			
Aroclor-1232	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92	X					X	X	
Aroclor-1232	--	mallard	1 month	Yes	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1242	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80					X			
Aroclor-1242	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05	b	--	0.41		Sample et al. 1996	0.92	X					X	X	
Aroclor-1242	--	mallard	1 month	Yes	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1248	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80					X			
Aroclor-1248	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92	X					X	X	
Aroclor-1248	--	mallard	1 month	Yes	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1254	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80		Sample et al. 1996	0.36	a	--	0.80					X			
Aroclor-1254	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92	X					X	X	
Aroclor-1254	--	mallard	1 month	Yes	oral in diet	reproduction	7.50	b	--	1.50		USEPA 1995b	3.35		X	X	X				X
Aroclor-1260	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80					X			
Aroclor-1260	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92	X					X	X	
Aroclor-1260	--	mallard	1 month	Yes	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35		X	X	X				X
Pesticides																					
4,4'-DDD	--	Japanese quail	3 generations	Yes	oral in diet	reproduction	5.00		DDT value	0.50		DDT value	1.58	X				X			
4,4'-DDD	--	barn owl	2 years	Yes	oral in diet	reproduction	0.40	b	DDE value	0.08		DDE value	0.18							X	
4,4'-DDD	--	mallard	2 years	Yes	oral in diet	reproduction	0.60		DDE value	0.12		DDE value	0.27				X				X
4,4'-DDD	--	bald eagle	112 days	No	oral in diet	survival	3.00		DDT value	0.30		DDT value	0.95		X	X			X		
4,4'-DDE	--	Japanese quail	3 generations	Yes	oral in diet	reproduction	5.00		DDT value	0.50		DDT value	1.58	X				X			
4,4'-DDE	--	barn owl	2 years	Yes	oral in diet	reproduction	0.40	b	--	0.08		Blus 1996	0.18							X	
4,4'-DDE	--	mallard	2 years	Yes	oral in diet	reproduction	0.60		USEPA 1995b	0.12		USEPA 1995b	0.27				X				X
4,4'-DDE	--	bald eagle	112 days	No	oral in diet	survival	3.00		DDT value	0.30		DDT value	0.95		X	X			X		
4,4'-DDT	--	Japanese quail	3 generations	Yes	oral in diet	reproduction	5.00		USEPA 1995b	0.50		USEPA 1995b	1.58	X				X			
4,4'-DDT	--	barn owl	2 years	Yes	oral in diet	reproduction	0.40	b	DDE value	0.08		DDE value	0.18							X	
4,4'-DDT	--	mallard	2 years	Yes	oral in diet	reproduction	1.50		USEPA 1995b	0.60		USEPA 1995b	0.95				X				X
4,4'-DDT	--	bald eagle	112 days	No	oral in diet	survival	3.00		USEPA 1995b	0.30		USEPA 1995b	0.95		X	X			X		
Aldrin	--	ring-necked pheasant	5 days	No	oral in diet	survival	0.351	b	--	0.070	e	Hill et al. 1975	0.157	X				X		X	
Aldrin	--	mallard	5 days	No	oral in diet	survival	0.775	b	--	0.155	e	Hill et al. 1975	0.347		X	X	X		X		X
alpha-BHC	BHC - mixed isomers	Japanese quail	90 days	Yes	oral in diet	reproduction	2.25		Sample et al. 1996	0.56		Sample et al. 1996	1.13	X	X	X	X	X	X	X	X
alpha-Chlordane	Chlordane	red-winged blackbird	84 days	Yes	oral in diet	survival	10.7		Sample et al. 1996	2.14		Sample et al. 1996	4.79	X						X	X
alpha-Chlordane	--	northern bobwhite	not specified	Yes	oral in diet	reproduction	5.95	b	--	1.19		Wiemeyer 1996	2.66					X			
alpha-Chlordane	--	mallard	not specified	Yes	oral in diet	reproduction	4.00	b	--	0.80		Wiemeyer 1996	1.79		X	X	X		X		
beta-BHC	BHC - mixed isomers	Japanese quail	90 days	Yes	oral in diet	reproduction	2.25		Sample et al. 1996	0.56		Sample et al. 1996	1.13	X	X	X	X	X	X	X	X

Table D-30
Ingestion-Based Toxicity Reference Values (TRVs) for Birds
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)		Reference	NOAEL (mg/kg/d)		Reference	MATC (mg/kg/d)	American robin	Belted kingfisher	Great blue heron	Mallard	Mourning dove	Osprey	Red-tailed hawk	Tree swallow
delta-BHC	BHC - mixed isomers	Japanese quail	90 days	Yes	oral in diet	reproduction	2.25		Sample et al. 1996	0.56		Sample et al. 1996	1.13	X	X	X	X	X	X	X	X
Dieldrin	--	mallard	chronic	--	oral	survival, growth,reproduction	3.78		USEPA 2007g	0.071		USEPA 2007g	0.52	X	X	X	X	X	X	X	X
Endosulfan I	--	gray partridge	4 weeks	Yes	oral in diet	reproduction	50.0	b	--	10.0		Sample et al. 1996	22.4	X	X	X	X	X	X	X	X
Endosulfan II	--	gray partridge	4 weeks	Yes	oral in diet	reproduction	50.0	b	--	10.0		Sample et al. 1996	22.4	X	X	X	X	X	X	X	X
Endrin	--	mallard	>200 days	Yes	oral in diet	reproduction	1.50	b	--	0.30		Sample et al. 1996	0.67		X	X	X	X			X
Endrin	--	screech owl	>83 days	Yes	oral in diet	reproduction	0.104		Sample et al. 1996	0.021	a	--	0.046	X					X	X	
gamma-BHC (Lindane)	--	mallard	8 weeks	Yes	oral (gavage)	reproduction	20.0		Sample et al. 1996	4.00	a	--	8.94	X	X	X	X	X	X	X	X
gamma-Chlordane	Chlordane	red-winged blackbird	84 days	Yes	oral in diet	survival	10.7		Sample et al. 1996	2.14		Sample et al. 1996	4.79	X						X	X
gamma-Chlordane	--	northern bobwhite	not specified	Yes	oral in diet	reproduction	5.95	b	--	1.19		Wiemeyer 1996	2.66					X			
gamma-Chlordane	--	mallard	not specified	Yes	oral in diet	reproduction	4.00	b	--	0.80		Wiemeyer 1996	1.79		X	X	X		X		
Heptachlor	--	ring-necked pheasant	5 days	No	oral in diet	survival	1.38	b	--	0.28	e	Hill et al. 1975	0.62	X				X		X	
Heptachlor	--	mallard	5 days	No	oral in diet	survival	2.40	b	--	0.48	e	Hill et al. 1975	1.07		X	X	X		X		X
Heptachlor epoxide	--	ring-necked pheasant	5 days	No	oral in diet	survival	1.38	b	--	0.28	e	Heptachlor value	0.62	X				X		X	
Heptachlor epoxide	--	mallard	5 days	No	oral in diet	survival	2.40	b	--	0.48	e	Heptachlor value	1.07		X	X	X		X		X
Methoxychlor	--	chicken	16 weeks	Yes	oral in diet	reproduction	1,775	b	--	355		Wiemeyer 1996	794	X	X	X	X	X	X	X	X
Toxaphene	--	American black duck	2 seasons	Yes	oral in diet	reproduction	5.00		Wiemeyer 1996	1.00		Wiemeyer 1996	2.24	X	X	X	X	X	X	X	X
Volatile and Semivolatile Organic Compounds																					
1,1,2,2-Tetrachloroethane	--	--	--	--	--	--	NA		--	NA		--	NA	X	X	X	X	X	X	X	X
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	NA		--	NA		--	NA	X	X	X	X	X	X	X	X
1,2,4-Trichlorobenzene	--	northern bobwhite	14 days	No	oral	survival	402	b	1,4-Dichlorobenzene value	80.4	d	1,4-Dichlorobenzene value	180	X	X	X	X	X	X	X	X
1,2-Dichlorobenzene	--	northern bobwhite	14 days	No	oral	survival	402	b	1,4-Dichlorobenzene value	80.4	d	1,4-Dichlorobenzene value	180	X	X	X	X	X	X	X	X
1,3-Dichlorobenzene	--	northern bobwhite	14 days	No	oral	survival	402	b	1,4-Dichlorobenzene value	80.4	d	1,4-Dichlorobenzene value	180	X	X	X	X	X	X	X	X
1,4-Dichlorobenzene	--	northern bobwhite	14 days	No	oral	survival	402	b	--	80.4	d	TERRETOX 2002	180	X	X	X	X	X	X	X	X
4-Bromophenyl-phenylether	--	--	--	--	--	--	NA		--	NA		--	NA	X	X	X	X	X	X	X	X
4-Chlorophenyl-phenylether	--	--	--	--	--	--	NA		--	NA		--	NA	X	X	X	X	X	X	X	X
Acenaphthene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Acenaphthylene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Anthracene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Benzo(a)anthracene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Benzo(a)pyrene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Rigdon and Neal 1963	15.9	X	X	X	X	X	X	X	X
Benzo(b)fluoranthene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Benzo(g,h,i)perylene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Benzo(k)fluoranthene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Chrysene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Dibenz(a,h)anthracene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Fluoranthene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Fluorene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Hexachlorobenzene	--	Japanese quail	90 days	Yes	oral in diet	reproduction	0.565		Coulston and Kolbye 1994; TERRETOX 2002	0.113		Coulston and Kolbye 1994; TERRETOX 2002	0.253	X	X	X	X	X	X	X	X
Hexachlorobutadiene	--	Japanese quail	90 days	Yes	oral in diet	reproduction	17.0	b	--	3.39		Coulston and Kolbye 1994; TERRETOX 2002	7.58	X	X	X	X	X	X	X	X
Hexachlorocyclopentadiene	--	--	--	--	--	--	NA		--	NA		--	NA	X	X	X	X	X	X	X	X
Hexachloroethane	--	--	--	--	--	--	NA		--	NA		--	NA	X	X	X	X	X	X	X	X
Indeno(1,2,3-cd)pyrene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Pentachlorophenol	--	chicken	chronic	--	oral	survival, growth,reproduction	67.3		USEPA 2007h	6.73		USEPA 2007i	21.3	X	X	X	X	X	X	X	X
Phenanthrene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Pyrene	--	chicken	35 days	No	oral in diet	reproduction	35.5	b	--	7.10	c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Dioxin/Furans																					
2,3,7,8-TCDD	--	ring-necked pheasant	10 weeks	Yes	injection	reproduction	0.00014		Sample et al. 1996	0.000014		Sample et al. 1996	0.000044	X	X	X	X	X	X	X	X

NA - Not Available
[a] Uncertainty factor of 5 applied to LOAEL
[b] Uncertainty factor of 5 applied to NOAEL
[c] Subchronic to chronic uncertainty factor of 10 applied
[d] Subchronic to chronic uncertainty factor of 20 applied
[e] Uncertainty factor of 100 applied to LD50

Table D-31
Uncertainty Factors
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Convert From	Convert To	Uncertainty Factor
Chronic NOAEL or NOEC	Chronic NOAEL or NOEC	1
Chronic LOAEL or LOEC	Chronic NOAEL or NOEC	5
Chronic NOAEL or NOEC	Chronic LOAEL or LOEC	5
Subchronic NOAEL or NOEC	Chronic NOAEL or NOEC	10
Subchronic LOAEL or LOEC	Chronic NOAEL or NOEC	20
Acute NOAEL or NOEC	Chronic NOAEL or NOEC	30
Acute LOAEL or LOEC	Chronic NOAEL or NOEC	50
LD50 or LC50	Chronic NOAEL or NOEC	100

Uncertainty factors from Wentsel et al. (1996)
Durations are defined as follows (USEPA 1999; Sample et al. 1996):
- Acute: <3 days (plants, invertebrates) and <14 days (fish, birds, mammals)
- Subchronic: 3 - 6 days (plants, invertebrates) and 14 - 90 days (fish, birds, mammals)
- Chronic: >7 days (plants, invertebrates) and >90 days or during critical life stage (fish, birds, mammals)

Table D-32
Eco-SSL Values for Birds and Mammals
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Bird	Mammal	Units	Reference
Metals				
Arsenic	43.0	46.0	mg/kg	USEPA 2005b
Cadmium	0.77	0.36	mg/kg	USEPA 2005e
Chromium	26.0	34.0	mg/kg	USEPA 2008a
Copper	28.0	49.0	mg/kg	USEPA 2007a
Lead	11.0	56.0	mg/kg	USEPA 2005g
Nickel	210	130	mg/kg	USEPA 2007c
Selenium	1.20	0.63	mg/kg	USEPA 2007d
Silver	4.20	14.0	mg/kg	USEPA 2006c
Zinc	46.0	79.0	mg/kg	USEPA 2007e
Organics				
4,4'-DDT (and metabolites)	0.093	0.021	mg/kg	USEPA 2007f
Dieldrin	0.022	0.0049	mg/kg	USEPA 2007g
Pentachlorophenol	2.10	2.80	mg/kg	USEPA 2007i
PAHs - LMW	--	100	mg/kg	USEPA 2007h
PAHs - HMW	--	1.10	mg/kg	USEPA 2007h

Table D-33
Ecological Screening Values (ESVs) for Soils - Plants and Soil Invertebrates
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
Inorganics	Aluminum	pH < 5.5	--	Eco-SSL	USEPA 2003a	
Inorganics	Antimony	78.0	mg/kg	Eco-SSL - Invertebrate	USEPA 2005a	
Inorganics	Arsenic	18.0	mg/kg	Eco-SSL - Plant	USEPA 2005b	
Inorganics	Barium	330	mg/kg	Eco-SSL - Invertebrate	USEPA 2005c	
Inorganics	Beryllium	40.0	mg/kg	Eco-SSL - Invertebrate	USEPA 2005d	
Inorganics	Cadmium	32.0	mg/kg	Eco-SSL - Plant	USEPA 2005e	
Inorganics	Chromium (total)	64.0	mg/kg	Soil Quality Guideline	CCME 2007	
Inorganics	Chromium (hexavalent)	0.40	mg/kg	Soil Quality Guideline	CCME 2007	
Inorganics	Cobalt	13.0	mg/kg	Eco-SSL - Plant	USEPA 2005f	
Inorganics	Copper	70.0	mg/kg	Eco-SSL - Plant	USEPA 2007a	
Inorganics	Cyanide	15.8	mg/kg		MHSPE 2000	Geometric mean of target and intervention values (complex)
Inorganics	Iron	5 < pH > 8	--	Eco-SSL	USEPA 2003b	
Inorganics	Lead	120	mg/kg	Eco-SSL - Plant	USEPA 2005g	
Inorganics	Manganese	220	mg/kg	Eco-SSL - Plant	USEPA 2007b	
Inorganics	Mercury	0.10	mg/kg	Invertebrate	Efroymson et al. 1997b	
Inorganics	Nickel	38.0	mg/kg	Eco-SSL - Plant	USEPA 2007c	
Inorganics	Selenium	0.52	mg/kg	Eco-SSL - Plant	USEPA 2007d	
Inorganics	Silver	560	mg/kg	Eco-SSL - Plant	USEPA 2006c	
Inorganics	Thallium	1.00	mg/kg	Plant	Efroymson et al. 1997a	
Inorganics	Vanadium	130	mg/kg	Soil Quality Guideline	CCME 2007	
Inorganics	Zinc	120	mg/kg	Eco-SSL - Invertebrate	USEPA 2007e	
Pesticides	4,4'-DDD	583	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	4,4'-DDE	114	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	4,4'-DDT	100	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	Aldrin	3.63	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	alpha-BHC	226	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	alpha-Chlordane	11.0	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	beta-BHC	342	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	delta-BHC	226	ug/kg		alpha-BHC value	
Pesticides	Dieldrin	10.5	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	Endosulfan I	6.32	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	Endosulfan II	6.32	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	Endosulfan sulfate	6.32	ug/kg		Endosulfan value	

Table D-33
Ecological Screening Values (ESVs) for Soils - Plants and Soil Invertebrates
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
Pesticides	Endrin	1.95	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	Endrin aldehyde	1.95	ug/kg		Endrin value	
Pesticides	Endrin ketone	1.95	ug/kg		Endrin value	
Pesticides	gamma-BHC (Lindane)	7.75	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	gamma-Chlordane	11.0	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	Heptachlor	52.9	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	Heptachlor epoxide	52.9	ug/kg		Heptachlor value	
Pesticides	Methoxychlor	500	ug/kg		Beyer 1990	B value ("moderate soil contamination")
Pesticides	Toxaphene	500	ug/kg		Beyer 1990	B value ("moderate soil contamination")
PCBs	Aroclor-1016	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1221	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1232	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1242	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1248	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1254	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1260	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
SVOCs	1,1-Biphenyl	13,600	ug/kg	Plant	Efroymson et al. 1997a	EC50 (68,000); UF of 5
SVOCs	1,2,3-Trichlorobenzene	1,150	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 115,000; UF of 100
SVOCs	1,2,4-Trichlorobenzene	1,270	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 127,000; UF of 100
SVOCs	1,2,4,5-Tetrachlorobenzene	1,000	ug/kg		Beyer 1990	B value ("moderate soil contamination")
SVOCs	1,2-Dichlorobenzene	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	1,3-Dichlorobenzene	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	1,4-Dichlorobenzene	1,280	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 128,000; UF of 100
SVOCs	1,4-Dioxane	2,050	ug/kg		USEPA 2003c	
SVOCs	2,2'-Oxybis(1-chloropropane)	NSV	--		--	
SVOCs	2,3,4,6-Tetrachlorophenol	500	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	2,4,5-Trichlorophenol	1,350	ug/kg	Plant	Efroymson et al. 1997a	NOEC
SVOCs	2,4,6-Trichlorophenol	580	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 58,000; UF of 100
SVOCs	2,4-Dichlorophenol	500	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")

Table D-33
Ecological Screening Values (ESVs) for Soils - Plants and Soil Invertebrates
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
SVOCs	2,4-Dimethylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	2,4-Dinitrophenol	20,000	ug/kg	Plant	Efroymson et al. 1997a	NOEC
SVOCs	2,4-Dinitrotoluene	11,000	ug/kg	Plant/Invertebrate	NRCC 2006	
SVOCs	2,6-Dinitrotoluene	8,500	ug/kg	Plant/Invertebrate	NRCC 2006	
SVOCs	2-Chloronaphthalene	LMW PAH	--		--	
SVOCs	2-Chlorophenol	500	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	2-Methylnaphthalene	LMW PAH	--		--	
SVOCs	2-Methylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	2-Nitroaniline	NSV	--		--	
SVOCs	2-Nitrophenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	3- and 4-Methylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	3,3'-Dichlorobenzidine	NSV	--		--	
SVOCs	3-Nitroaniline	NSV	--		--	
SVOCs	4,6-Dinitro-2-methylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	4-Bromophenyl-phenylether	NSV	--		--	
SVOCs	4-Chloro-3-methylphenol	500	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	4-Chloroaniline	500	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
SVOCs	4-Chlorophenyl-phenylether	NSV	--		--	
SVOCs	4-Methylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	4-Nitroaniline	NSV	--		--	
SVOCs	4-Nitrophenol	380	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 38,000; UF of 100
SVOCs	Acenaphthene	LMW PAH	--		--	
SVOCs	Acenaphthylene	LMW PAH	--		--	
SVOCs	Acetophenone	NSV	--		--	
SVOCs	Anthracene	LMW PAH	--		--	

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Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
SVOCs	Atrazine	11.9	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
SVOCs	Benzaldehyde	NSV	--		--	
SVOCs	Benzo(a)anthracene	HMW PAH	--		--	
SVOCs	Benzo(a)pyrene	HMW PAH	--		--	
SVOCs	Benzo(b)fluoranthene	HMW PAH	--		--	
SVOCs	Benzo(g,h,i)perylene	HMW PAH	--		--	
SVOCs	Benzo(k)fluoranthene	HMW PAH	--		--	
SVOCs	Benzoic acid	NSV	--		--	
SVOCs	Benzyl alcohol	NSV	--		--	
SVOCs	bis(2-Chloroethoxy)methane	NSV	--		--	
SVOCs	bis(2-Chloroethyl)ether	NSV	--		--	
SVOCs	bis(2-Chloroisopropyl)ether	NSV	--		--	
SVOCs	bis(2-Ethylhexyl)phthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
SVOCs	Butylbenzylphthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
SVOCs	Caprolactam	NSV	--		--	
SVOCs	Carbazole	7,000	ug/kg	Invertebrate	Sverdrup 2001; 2002	EC50 of 35,000; UF of 5
SVOCs	Chrysene	HMW PAH	--		--	
SVOCs	Dibenz(a,h)anthracene	HMW PAH	--		--	
SVOCs	Dibenzofuran	4,600	ug/kg	Invertebrate	Sverdrup 2001; 2002	EC50 of 23,000; UF of 5
SVOCs	Diethylphthalate	26,800	ug/kg	Plant	Efroymson et al. 1997a	EC50 (134,000); UF of 5
SVOCs	Dimethyl phthalate	10,640	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 1,064,000; UF of 100
SVOCs	Di-n-butylphthalate	40,000	ug/kg	Plant	Efroymson et al. 1997a	LOEC (200,000); UF of 5
SVOCs	Di-n-octylphthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
SVOCs	Fluoranthene	LMW PAH	--		--	
SVOCs	Fluorene	LMW PAH	--		--	
SVOCs	Hexachlorobenzene	1,000	ug/kg		Beyer 1990	B value ("moderate soil contamination")
SVOCs	Hexachlorobutadiene	NSV	--		--	
SVOCs	Hexachlorocyclopentadiene	2,000	ug/kg	Plant	Efroymson et al. 1997a	LOEC (10,000); UF of 5
SVOCs	Hexachloroethane	NSV	--		--	
SVOCs	Indeno(1,2,3-cd)pyrene	HMW PAH	--		--	
SVOCs	Isophorone	NSV	--		--	
SVOCs	Naphthalene	LMW PAH	--		--	
SVOCs	Nitrobenzene	2,260	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 226,000; UF of 100

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Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
SVOCs	n-Nitroso-di-n-propylamine	NSV	--		--	
SVOCs	n-Nitrosodiphenylamine	1,090	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 109,000; UF of 100
SVOCs	PAH (HMW)	18,000	ug/kg	Eco-SSL - Invertebrate	USEPA 2007h	
SVOCs	PAH (LMW)	29,000	ug/kg	Eco-SSL - Invertebrate	USEPA 2007h	
SVOCs	Pentachlorophenol	5,000	ug/kg	Eco-SSL - Plant	USEPA 2007i	
SVOCs	Phenanthrene	LMW PAH	--		--	
SVOCs	Phenol	1,880	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 188,000; UF of 100
SVOCs	Pyrene	HMW PAH	--		--	
VOCs	1,1,1-Trichloroethane	1,025	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,1,2,2-Tetrachloroethane	5,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NSV	--		--	
VOCs	1,1,2-Trichloroethane	2,000	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,1-Dichloroethane	548	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,1-Dichloroethene	173	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,2,3-Trichlorobenzene	1,150	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 115,000; UF of 100
VOCs	1,2,4-Trichlorobenzene	1,270	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 127,000; UF of 100
VOCs	1,2-Dibromo-3-chloropropane	NSV	--		--	
VOCs	1,2-Dibromoethane	300	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
VOCs	1,2-Dichlorobenzene	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	1,2-Dichloroethane	2,190	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	1,2-Dichloroethene (total)	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,2-Dichloropropane	38,800	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 3,880,000; UF of 100
VOCs	1,3-Dichlorobenzene	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	1,4-Dichlorobenzene	1,280	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 128,000; UF of 100
VOCs	2-Butanone	NSV	--		--	
VOCs	2-Hexanone	NSV	--		--	
VOCs	4-Methyl-2-pentanone	NSV	--		--	
VOCs	Acetone	NSV	--		--	
VOCs	Benzene	1,140	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Bromochloromethane	NSV	--		--	

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Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
VOCs	Bromodichloromethane	NSV	--		--	
VOCs	Bromoform	300	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
VOCs	Bromomethane	NSV	--		--	
VOCs	Carbon disulfide	NSV	--		--	
VOCs	Carbon tetrachloride	3,400	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Chlorobenzene	2,400	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 240,000; UF of 100
VOCs	Chloroethane	5,000	ug/kg		CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
VOCs	Chloroform	1,844	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Chloromethane	5,000	ug/kg		CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
VOCs	cis-1,2-Dichloroethene	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	cis-1,3-Dichloropropene	5,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	Cyclohexane	6,000	ug/kg		Beyer 1990	B value ("moderate soil contamination")
VOCs	Dibromochloromethane	NSV	--		--	
VOCs	Dichlorodifluoromethane(Freon-12)	NSV	--		--	
VOCs	Ethylbenzene	1,815	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Isopropylbenzene	NSV	--		--	
VOCs	m- and p-Xylene	1,300	ug/kg		Total xylenes	
VOCs	Methyl acetate	NSV	--		--	
VOCs	Methylcyclohexane	NSV	--		--	
VOCs	Methylene chloride	1,250	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Methyl-tert-butyl ether (MTBE)	NSV	--		--	
VOCs	o-Xylene	1,300	ug/kg		Total xylenes	
VOCs	Styrene	64,000	ug/kg	Plant	Efroymson et al. 1997a	EC50 (320,000); UF of 5
VOCs	Tetrachloroethene	179	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Toluene	40,000	ug/kg	Plant	Efroymson et al. 1997a	EC50 (200,000); UF of 5
VOCs	trans-1,2-Dichloroethene	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	trans-1,3-Dichloropropene	5,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	Trichloroethene	500	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Trichlorofluoromethane(Freon-11)	NSV	--		--	
VOCs	Vinyl chloride	412	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Xylene, total	1,300	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values

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Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
Explosives	1,3,5-Trinitrobenzene	NSV	--		--	
Explosives	1,3-Dinitrobenzene	NSV	--		--	
Explosives	2,4,6-Trinitrotoluene	10,000	ug/kg	Plant	Talmage et al. 1999	
Explosives	2,4-Dinitrotoluene	11,000	ug/kg	Plant/Invertebrate	NRCC 2006	
Explosives	2,6-Dinitrotoluene	8,500	ug/kg	Plant/Invertebrate	NRCC 2006	
Explosives	2-Amino-4,6-dinitrotoluene	80,000	ug/kg	Plant	Talmage et al. 1999	
Explosives	2-Nitrotoluene	NSV	--		--	
Explosives	3-Nitrotoluene	NSV	--		--	
Explosives	4-Amino-2,6-dinitrotoluene	80,000	ug/kg	Plant	2-Amino-4,6-dinitrotoluene	
Explosives	4-Nitrotoluene	NSV	--		--	
Explosives	HMX	10,000	ug/kg	Invertebrate	Talmage et al. 1999	
Explosives	Nitrobenzene	2,260	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 226,000; UF of 100
Explosives	RDX	10,000	ug/kg	Invertebrate	Talmage et al. 1999	
Explosives	Tetryl	10,000	ug/kg	Plant	Talmage et al. 1999	

NSV - No Screening Value

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Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
Filtered Metals	Aluminum	Freshwater	AWQC	87.0	ug/L			USEPA 2009a	
Filtered Metals	Antimony	Freshwater	FCV	30.0	ug/L			Suter and Tsao 1996	
Filtered Metals	Arsenic	Freshwater	AWQC	150	ug/L			USEPA 2009a	
Filtered Metals	Barium	Freshwater	SCV	4.00	ug/L			Suter and Tsao 1996	
Filtered Metals	Beryllium	Freshwater	SCV	0.66	ug/L			Suter and Tsao 1996	
Filtered Metals	Cadmium	Freshwater	AWQC	0.23	ug/L	88.4		USEPA 2009a	
Filtered Metals	Chromium (total)	Freshwater	AWQC	11.0	ug/L			USEPA 2009a	
Filtered Metals	Chromium (hexavalent)	Freshwater	AWQC	11.0	ug/L			USEPA 2009a	
Filtered Metals	Cobalt	Freshwater	SCV	23.0	ug/L			Suter and Tsao 1996	
Filtered Metals	Copper	Freshwater	AWQC	8.06	ug/L	88.4		USEPA 2006a	
Filtered Metals	Iron	Freshwater	AWQC	1,000	ug/L			USEPA 2009a	
Filtered Metals	Lead	Freshwater	AWQC	2.20	ug/L	88.4		USEPA 2009a	
Filtered Metals	Manganese	Freshwater	SCV	120	ug/L			Suter and Tsao 1996	
Filtered Metals	Mercury	Freshwater	AWQC	0.77	ug/L			USEPA 2009a	
Filtered Metals	Nickel	Freshwater	AWQC	46.9	ug/L	88.4		USEPA 2009a	
Filtered Metals	Selenium	Freshwater	AWQC	4.61	ug/L			USEPA 2009a	
Filtered Metals	Silver	Freshwater	SCV	0.36	ug/L			Suter and Tsao 1996	
Filtered Metals	Thallium	Freshwater	SCV	12.0	ug/L			Suter and Tsao 1996	
Filtered Metals	Vanadium	Freshwater	SCV	20.0	ug/L			Suter and Tsao 1996	
Filtered Metals	Zinc	Freshwater	AWQC	106	ug/L	88.4		USEPA 2009a	
Inorganics	Aluminum	Freshwater	AWQC	87.0	ug/L			USEPA 2009a	
Inorganics	Antimony	Freshwater	FCV	30.0	ug/L			Suter and Tsao 1996	
Inorganics	Arsenic	Freshwater	AWQC	150	ug/L			USEPA 2009a	
Inorganics	Barium	Freshwater	SCV	4.00	ug/L			Suter and Tsao 1996	
Inorganics	Beryllium	Freshwater	SCV	0.66	ug/L			Suter and Tsao 1996	
Inorganics	Cadmium	Freshwater	AWQC	0.25	ug/L	88.4		USEPA 2009a	
Inorganics	Chromium (total)	Freshwater	AWQC	11.4	ug/L			USEPA 2009a	
Inorganics	Chromium (hexavalent)	Freshwater	AWQC	11.4	ug/L			USEPA 2009a	
Inorganics	Cobalt	Freshwater	SCV	23.0	ug/L			Suter and Tsao 1996	
Inorganics	Copper	Freshwater	AWQC	8.40	ug/L	88.4		USEPA 2006a	

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Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
Inorganics	Cyanide	Freshwater	AWQC	5.20	ug/L			USEPA 2009a	
Inorganics	Iron	Freshwater	AWQC	1,000	ug/L			USEPA 2009a	
Inorganics	Lead	Freshwater	AWQC	2.72	ug/L	88.4		USEPA 2009a	
Inorganics	Manganese	Freshwater	SCV	120	ug/L			Suter and Tsao 1996	
Inorganics	Mercury	Freshwater	AWQC	0.91	ug/L			USEPA 2009a	
Inorganics	Nickel	Freshwater	AWQC	47.0	ug/L	88.4		USEPA 2009a	
Inorganics	Selenium	Freshwater	AWQC	5.00	ug/L			USEPA 2009a	
Inorganics	Silver	Freshwater	SCV	0.36	ug/L			Suter and Tsao 1996	
Inorganics	Thallium	Freshwater	SCV	12.0	ug/L			Suter and Tsao 1996	
Inorganics	Vanadium	Freshwater	SCV	20.0	ug/L			Suter and Tsao 1996	
Inorganics	Zinc	Freshwater	AWQC	108	ug/L	88.4		USEPA 2009a	
Pesticides	4,4'-DDD	Freshwater	SCV	0.011	ug/L			Suter and Tsao 1996	
Pesticides	4,4'-DDE	Freshwater	SCV	0.013	ug/L			DDT value	
Pesticides	4,4'-DDT	Freshwater	SCV	0.013	ug/L			USEPA 1996b	
Pesticides	Aldrin	Freshwater		0.30	ug/L			USEPA 2001	Acute AWQC/10
Pesticides	alpha-BHC	Freshwater	SCV	2.20	ug/L			Suter and Tsao 1996	
Pesticides	alpha-Chlordane	Freshwater	SCV	0.17	ug/L			Suter and Tsao 1996	
Pesticides	beta-BHC	Freshwater	SCV	2.20	ug/L			Suter and Tsao 1996	
Pesticides	delta-BHC	Freshwater	SCV	2.20	ug/L			Suter and Tsao 1996	
Pesticides	Dieldrin	Freshwater	AWQC - FCV	0.056	ug/L			USEPA 2009a	
Pesticides	Endosulfan I	Freshwater	AWQC	0.056	ug/L			USEPA 2009a	
Pesticides	Endosulfan II	Freshwater	AWQC	0.056	ug/L			USEPA 2009a	
Pesticides	Endosulfan sulfate	Freshwater	AWQC	0.056	ug/L			Endosulfan value	
Pesticides	Endrin	Freshwater	AWQC - FCV	0.036	ug/L			USEPA 2009a	
Pesticides	Endrin aldehyde	Freshwater		0.15	ug/L			Buchman 2008	
Pesticides	Endrin ketone	Freshwater		0.15	ug/L			Endrin aldehyde value	
Pesticides	gamma-BHC (Lindane)	Freshwater	FCV	0.08	ug/L			USEPA 1996b	
Pesticides	gamma-Chlordane	Freshwater	SCV	0.17	ug/L			Suter and Tsao 1996	
Pesticides	Heptachlor	Freshwater	SCV	0.0069	ug/L			USEPA 1996b	
Pesticides	Heptachlor epoxide	Freshwater	SCV	0.0069	ug/L			Heptachlor value	

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Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
Pesticides	Methoxychlor	Freshwater	AWQC	0.03	ug/L			USEPA 2009a	
Pesticides	Toxaphene	Freshwater	SCV	0.011	ug/L			USEPA 1996b	
PCBs	Aroclor-1016	Freshwater	SCV	0.14	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1221	Freshwater	SCV	0.28	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1232	Freshwater	SCV	0.58	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1242	Freshwater	SCV	0.053	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1248	Freshwater	SCV	0.081	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1254	Freshwater	SCV	0.033	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1260	Freshwater	SCV	0.14	ug/L			Suter and Tsao 1996	
SVOCs	1,1-Biphenyl	Freshwater	SCV	14.0	ug/L			USEPA 1996b	
SVOCs	1,2,3-Trichlorobenzene	Freshwater		8.00	ug/L			USEPA 2006b	
SVOCs	1,2,4-Trichlorobenzene	Freshwater	SCV	110	ug/L			Suter and Tsao 1996	
SVOCs	1,2,4,5-Tetrachlorobenzene	Freshwater	Tier II SCV	3.00	ug/L			USEPA 2003c	
SVOCs	1,2-Dichlorobenzene	Freshwater	SCV	14.0	ug/L			USEPA 1996b	
SVOCs	1,3-Dichlorobenzene	Freshwater	SCV	71.0	ug/L			USEPA 1996b	
SVOCs	1,4-Dichlorobenzene	Freshwater	SCV	15.0	ug/L			USEPA 1996b	
SVOCs	1,4-Dioxane	Freshwater	Tier II SCV	22,000	ug/L			USEPA 2003c	
SVOCs	2,2'-Oxybis(1-chloropropane)	Freshwater		NSV	--			--	
SVOCs	2,3,4,6-Tetrachlorophenol	Freshwater	Tier II SCV	1.20	ug/L			USEPA 2003c	
SVOCs	2,4,5-Trichlorophenol	Freshwater		63.0	ug/L			Buchman 2008	
SVOCs	2,4,6-Trichlorophenol	Freshwater		4.90	ug/L			Buchman 2008	
SVOCs	2,4-Dichlorophenol	Freshwater	SCV	11.0	ug/L			USEPA 2006b	
SVOCs	2,4-Dimethylphenol	Freshwater		100	ug/L			Buchman 2008	
SVOCs	2,4-Dinitrophenol	Freshwater		19.0	ug/L			Buchman 2008	
SVOCs	2,4-Dinitrotoluene	Freshwater	SCV	44.0	ug/L			USEPA 2006b	
SVOCs	2,6-Dinitrotoluene	Freshwater	SCV	81.0	ug/L			USEPA 2006b	
SVOCs	2-Chloronaphthalene	Freshwater		0.40	ug/L			Buchman 2008	
SVOCs	2-Chlorophenol	Freshwater	FCV	24.0	ug/L			USEPA 2006b	
SVOCs	2-Methylnaphthalene	Freshwater		330	ug/L			Buchman 2008	
SVOCs	2-Methylphenol	Freshwater	SCV	13.0	ug/L			Suter and Tsao 1996	

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Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
SVOCs	2-Nitroaniline	Freshwater		NSV	--			--	
SVOCs	2-Nitrophenol	Freshwater		1,920	ug/L			USEPA 2006b	
SVOCs	3- and 4-Methylphenol	Freshwater		543	ug/L			USEPA 2006b	4-Methylphenol
SVOCs	3,3'-Dichlorobenzidine	Freshwater	FCV	4.50	ug/L			USEPA 2006b	
SVOCs	3-Nitroaniline	Freshwater		NSV	--			--	
SVOCs	4,6-Dinitro-2-methylphenol	Freshwater		2.30	ug/L			USEPA 2001	
SVOCs	4-Bromophenyl-phenylether	Freshwater	SCV	1.50	ug/L			USEPA 1996b	
SVOCs	4-Chloro-3-methylphenol	Freshwater		0.30	ug/L			USEPA 2001	
SVOCs	4-Chloroaniline	Freshwater		232	ug/L			USEPA 2006b	
SVOCs	4-Chlorophenyl-phenylether	Freshwater		NSV	--			--	
SVOCs	4-Methylphenol	Freshwater		543	ug/L			USEPA 2006b	
SVOCs	4-Nitroaniline	Freshwater		NSV	--			--	
SVOCs	4-Nitrophenol	Freshwater	SCV	300	ug/L			Suter and Tsao 1996	
SVOCs	Acenaphthene	Freshwater	FCV	23.0	ug/L			USEPA 1996b	
SVOCs	Acenaphthylene	Freshwater		4,840	ug/L			Buchman 2008	
SVOCs	Acetophenone	Freshwater		NSV	--			--	
SVOCs	Anthracene	Freshwater	SCV	0.73	ug/L			Suter and Tsao 1996	
SVOCs	Atrazine	Freshwater		1.80	ug/L			USEPA 2006b	
SVOCs	Benzaldehyde	Freshwater		NSV	--			--	
SVOCs	Benzo(a)anthracene	Freshwater	SCV	0.027	ug/L			Suter and Tsao 1996	
SVOCs	Benzo(a)pyrene	Freshwater	SCV	0.014	ug/L			Suter and Tsao 1996	
SVOCs	Benzo(b)fluoranthene	Freshwater		9.07	ug/L			Buchman 2008	
SVOCs	Benzo(g,h,i)perylene	Freshwater		7.64	ug/L			Buchman 2008	
SVOCs	Benzo(k)fluoranthene	Freshwater		9.07	ug/L			Benzo(b)fluoranthene value	
SVOCs	Benzoic acid	Freshwater	SCV	42.0	ug/L			Suter and Tsao 1996	
SVOCs	Benzyl alcohol	Freshwater	SCV	8.60	ug/L			Suter and Tsao 1996	
SVOCs	bis(2-Chloroethoxy)methane	Freshwater		NSV	--			--	
SVOCs	bis(2-Chloroethyl)ether	Freshwater		1,900	ug/L			Buchman 2008	
SVOCs	bis(2-Chloroisopropyl)ether	Freshwater		NSV	--			--	
SVOCs	bis(2-Ethylhexyl)phthalate	Freshwater	SCV	32.0	ug/L			USEPA 1996b	

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Ecological Screening Values (ESVs) for Freshwater
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Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
SVOCs	Butylbenzylphthalate	Freshwater	SCV	19.0	ug/L			USEPA 1996b	
SVOCs	Caprolactam	Freshwater		NSV	--			--	
SVOCs	Carbazole	Freshwater		NSV	--			--	
SVOCs	Chrysene	Freshwater		NSV	--			--	
SVOCs	Dibenz(a,h)anthracene	Freshwater		NSV	--			--	
SVOCs	Dibenzofuran	Freshwater	SCV	3.70	ug/L			Suter and Tsao 1996	
SVOCs	Diethylphthalate	Freshwater	SCV	270	ug/L			USEPA 2008b	
SVOCs	Dimethyl phthalate	Freshwater		330	ug/L			USEPA 2001	
SVOCs	Di-n-butylphthalate	Freshwater	SCV	35.0	ug/L			Suter and Tsao 1996	
SVOCs	Di-n-octylphthalate	Freshwater		22.0	ug/L			USEPA 2006b	
SVOCs	Fluoranthene	Freshwater	FCV	8.10	ug/L			USEPA 1996b	
SVOCs	Fluorene	Freshwater	SCV	3.90	ug/L			USEPA 1996b	
SVOCs	Hexachlorobenzene	Freshwater		3.68	ug/L			Buchman 2008	Proposed AWQC
SVOCs	Hexachlorobutadiene	Freshwater		1.30	ug/L			USEPA 2006b	
SVOCs	Hexachlorocyclopentadiene	Freshwater		1.04	ug/L			Buchman 2008	LOEL/5
SVOCs	Hexachloroethane	Freshwater	SCV	12.0	ug/L			USEPA 1996b	
SVOCs	Indeno(1,2,3-cd)pyrene	Freshwater		4.31	ug/L			Buchman 2008	
SVOCs	Isophorone	Freshwater		1,170	ug/L			USEPA 2001	
SVOCs	Naphthalene	Freshwater	SCV	12.0	ug/L			Suter and Tsao 1996	
SVOCs	Nitrobenzene	Freshwater		270	ug/L			USEPA 2001	Acute/10
SVOCs	n-Nitroso-di-n-propylamine	Freshwater		NSV	--			--	
SVOCs	n-Nitrosodiphenylamine	Freshwater	SCV	210	ug/L			Suter and Tsao 1996	
SVOCs	Pentachlorophenol	Freshwater	AWQC	15.0	ug/L		7.8	USEPA 2009a	
SVOCs	Phenanthrene	Freshwater	FCV	6.30	ug/L			USEPA 1996b	
SVOCs	Phenol	Freshwater	SCV	110	ug/L			Suter and Tsao 1996	
SVOCs	Pyrene	Freshwater		0.025	ug/L			USEPA 2006b	
VOCs	1,1,1-Trichloroethane	Freshwater	SCV	11.0	ug/L			Suter and Tsao 1996	
VOCs	1,1,2,2-Tetrachloroethane	Freshwater	SCV	610	ug/L			Suter and Tsao 1996	
VOCs	1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	Freshwater		NSV	--			--	
VOCs	1,1,2-Trichloroethane	Freshwater	SCV	1,200	ug/L			Suter and Tsao 1996	

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Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
VOCs	1,1-Dichloroethane	Freshwater	SCV	47.0	ug/L			Suter and Tsao 1996	
VOCs	1,1-Dichloroethene	Freshwater	SCV	25.0	ug/L			Suter and Tsao 1996	
VOCs	1,2,3-Trichlorobenzene	Freshwater		8.00	ug/L			USEPA 2006b	
VOCs	1,2,4-Trichlorobenzene	Freshwater	SCV	110	ug/L			Suter and Tsao 1996	
VOCs	1,2-Dibromo-3-chloropropane	Freshwater		NSV	--			--	
VOCs	1,2-Dibromoethane	Freshwater		NSV	--			--	
VOCs	1,2-Dichlorobenzene	Freshwater	SCV	14.0	ug/L			USEPA 1996b	
VOCs	1,2-Dichloroethane	Freshwater	SCV	910	ug/L			Suter and Tsao 1996	
VOCs	1,2-Dichloroethene (total)	Freshwater	SCV	590	ug/L			Suter and Tsao 1996	
VOCs	1,2-Dichloropropane	Freshwater		525	ug/L			USEPA 2001	
VOCs	1,3-Dichlorobenzene	Freshwater	SCV	71.0	ug/L			USEPA 1996b	
VOCs	1,4-Dichlorobenzene	Freshwater	SCV	15.0	ug/L			USEPA 1996b	
VOCs	2-Butanone	Freshwater	SCV	14,000	ug/L			Suter and Tsao 1996	
VOCs	2-Hexanone	Freshwater	SCV	99.0	ug/L			Suter and Tsao 1996	
VOCs	4-Methyl-2-pentanone	Freshwater	SCV	170	ug/L			Suter and Tsao 1996	
VOCs	Acetone	Freshwater	SCV	1,500	ug/L			Suter and Tsao 1996	
VOCs	Benzene	Freshwater	SCV	130	ug/L			Suter and Tsao 1996	
VOCs	Bromochloromethane	Freshwater		NSV	--			--	
VOCs	Bromodichloromethane	Freshwater		NSV	--			--	
VOCs	Bromoform	Freshwater	SCV	320	ug/L			USEPA 1996b	
VOCs	Bromomethane	Freshwater		110	ug/L			USEPA 2001	
VOCs	Carbon disulfide	Freshwater	SCV	0.92	ug/L			Suter and Tsao 1996	
VOCs	Carbon tetrachloride	Freshwater	SCV	240	ug/L			USEPA 1996b	
VOCs	Chlorobenzene	Freshwater	SCV	64.0	ug/L			Suter and Tsao 1996	
VOCs	Chloroethane	Freshwater		NSV	--			--	
VOCs	Chloroform	Freshwater	SCV	28.0	ug/L			Suter and Tsao 1996	
VOCs	Chloromethane	Freshwater		5,500	ug/L			USEPA 2001	
VOCs	cis-1,2-Dichloroethene	Freshwater	SCV	590	ug/L			Suter and Tsao 1996	
VOCs	cis-1,3-Dichloropropene	Freshwater		24.4	ug/L			USEPA 2001	
VOCs	Cyclohexane	Freshwater		NSV	--			--	

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Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
VOCs	Dibromochloromethane	Freshwater		NSV	--			--	
VOCs	Dichlorodifluoromethane(Freon-12)	Freshwater		NSV	--			--	
VOCs	Ethylbenzene	Freshwater	SCV	290	ug/L			USEPA 1996b	
VOCs	Isopropylbenzene	Freshwater		2.60	ug/L			USEPA 2006b	
VOCs	m- and p-Xylene	Freshwater		13.0	ug/L			Suter and Tsao 1996	Total xylenes
VOCs	Methyl acetate	Freshwater		NSV	--			--	
VOCs	Methylcyclohexane	Freshwater		NSV	--			--	
VOCs	Methylene chloride	Freshwater	SCV	2,200	ug/L			Suter and Tsao 1996	
VOCs	Methyl-tert-butyl ether (MTBE)	Freshwater		11,070	ug/L			USEPA 2006b	
VOCs	o-Xylene	Freshwater		13.0	ug/L			Suter and Tsao 1996	Total xylenes
VOCs	Styrene	Freshwater		72.0	ug/L			USEPA 2006b	
VOCs	Tetrachloroethene	Freshwater	SCV	98.0	ug/L			Suter and Tsao 1996	
VOCs	Toluene	Freshwater	SCV	9.80	ug/L			Suter and Tsao 1996	
VOCs	trans-1,2-Dichloroethene	Freshwater	SCV	590	ug/L			Suter and Tsao 1996	
VOCs	trans-1,3-Dichloropropene	Freshwater		24.4	ug/L			USEPA 2001	
VOCs	Trichloroethene	Freshwater	SCV	47.0	ug/L			Suter and Tsao 1996	
VOCs	Trichlorofluoromethane(Freon-11)	Freshwater		NSV	--			--	
VOCs	Vinyl chloride	Freshwater	FCV	930	ug/L			USEPA 2006b	
VOCs	Xylene, total	Freshwater	SCV	13.0	ug/L			Suter and Tsao 1996	
Explosives	1,3,5-Trinitrobenzene	Freshwater	SCV	11.0	ug/L			Talmage et al. 1999	
Explosives	1,3-Dinitrobenzene	Freshwater	SCV	17.0	ug/L			Talmage et al. 1999	
Explosives	2,4,6-Trinitrotoluene	Freshwater	SCV	93.0	ug/L			Talmage et al. 1999	
Explosives	2,4-Dinitrotoluene	Freshwater	SCV	44.0	ug/L			USEPA 2006b	
Explosives	2,6-Dinitrotoluene	Freshwater	SCV	81.0	ug/L			USEPA 2006b	
Explosives	2-Amino-4,6-dinitrotoluene	Freshwater	SCV	19.0	ug/L			Talmage et al. 1999	
Explosives	2-Nitrotoluene	Freshwater		3,400	ug/L			NAVFAC 2007	
Explosives	3-Nitrotoluene	Freshwater		750	ug/L			USEPA 2006b	
Explosives	4-Amino-2,6-dinitrotoluene	Freshwater		19.0	ug/L			2-Amino-4,6-dinitrotoluene	
Explosives	4-Nitrotoluene	Freshwater		1,900	ug/L			USEPA 2006b	
Explosives	HMX	Freshwater	SCV	330	ug/L			Talmage et al. 1999	

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Ecological Screening Values (ESVs) for Freshwater
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Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
Explosives	Nitrobenzene	Freshwater		270	ug/L			USEPA 2001	Acute/10
Explosives	RDX	Freshwater	SCV	186	ug/L			Talmage et al. 1999	
Explosives	Tetryl	Freshwater		--	--			--	

NSV - No Screening Value
1 - AWQC: Ambient Water Quality Criterion; FCV: Final Chronic Value; FRV: Final Residue Value; NOEC: No Observed Effect Concentration; SCV: Secondary Chronic Value;

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Hardness Values
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Station ID	Sample ID	Date	Hardness (MG/L)
CAPL-SWSD62	CAPL-SW62-1012	10/15/2012	91.3
CAPL-SWSD63	CAPL-SW63-1012	10/15/2012	90.7
CAPL-SWSD64	CAPL-SW64-1012	10/15/2012	89.9
CAPL-SWSD65	CAPL-SW65-1012	10/15/2012	86.3
CAPL-SWSD66	CAPL-SW66-1012	10/15/2012	86.5
CAPL-SWSD67	CAPL-SW67-1012	10/15/2012	86.9
CAPL-SWSD68	CAPL-SW68-1012	10/15/2012	87.1
CAPL-SWSD69	CAPL-SW69-1012	10/15/2012	88.1
		Mean:	88.4

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Ecological Screening Values (ESVs) for Freshwater Sediment
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Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
Inorganics	Aluminum	Freshwater	ARCS TEL	25,500	mg/kg	Buchman 2008		--	--	--	--	--
Inorganics	Antimony	Freshwater	UET	3.00	mg/kg	Buchman 2008	Microtox	--	--	--	--	--
Inorganics	Arsenic	Freshwater	TEC	9.79	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Barium	Freshwater	TEC	20.0	mg/kg	MacDonald et al. 2003		--	--	--	--	--
Inorganics	Beryllium	Freshwater		NSV	--	--		--	--	--	--	--
Inorganics	Cadmium	Freshwater	TEC	0.99	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Chromium (total)	Freshwater	TEC	43.4	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Chromium (hexavalent)	Freshwater		NSV	--	--		--	--	--	--	--
Inorganics	Cobalt	Freshwater	TEC	50.0	mg/kg	MacDonald et al. 2003		--	--	--	--	--
Inorganics	Copper	Freshwater	TEC	31.6	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Cyanide	Freshwater		NSV	--	--		--	--	--	--	--
Inorganics	Iron	Freshwater	LEL	20,000	mg/kg	Persuad et al. 1993		--	--	--	--	--
Inorganics	Lead	Freshwater	TEC	35.8	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Manganese	Freshwater	LEL	460	mg/kg	Persuad et al. 1993		--	--	--	--	--
Inorganics	Mercury	Freshwater	TEC	0.18	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Nickel	Freshwater	TEC	22.7	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Selenium	Freshwater		2.00	mg/kg	USEPA 2006b		--	--	--	--	--
Inorganics	Silver	Freshwater	TEC	1.00	mg/kg	MacDonald et al. 2003		--	--	--	--	--
Inorganics	Thallium	Freshwater		NSV	--	--		--	--	--	--	--
Inorganics	Vanadium	Marine	AET	57.0	mg/kg	Buchman 2008	Neanthes	--	--	--	--	--
Inorganics	Zinc	Freshwater	TEC	121	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Pesticides	4,4'-DDD	Freshwater	TEC	4.88	ug/kg	MacDonald et al. 2000a		110	ug/kg	1	Jones et al. 1997	
Pesticides	4,4'-DDE	Freshwater	TEC	3.16	ug/kg	MacDonald et al. 2000a		340	ug/kg	1	DDT value	
Pesticides	4,4'-DDT	Freshwater	TEC	4.16	ug/kg	MacDonald et al. 2000a		340	ug/kg	1	Jones et al. 1997	
Pesticides	Aldrin	Freshwater	LEL	2.00	ug/kg	Persuad et al. 1993		NSV	--		--	
Pesticides	alpha-BHC	Freshwater	LEL	6.00	ug/kg	Persuad et al. 1993		120	ug/kg	1	Jones et al. 1997	
Pesticides	alpha-Chlordane	Freshwater	TEC	3.24	ug/kg	MacDonald et al. 2000a		2,800	ug/kg	1	Jones et al. 1997	
Pesticides	beta-BHC	Freshwater	LEL	5.00	ug/kg	Persuad et al. 1993		120	ug/kg	1	Jones et al. 1997	
Pesticides	delta-BHC	Freshwater	LEL	3.00	ug/kg	Persuad et al. 1993	HCH-technical	120	ug/kg	1	Jones et al. 1997	
Pesticides	Dieldrin	Freshwater	TEC	1.90	ug/kg	MacDonald et al. 2000a		52.0	ug/kg	1	USEPA 1996b	
Pesticides	Endosulfan I	Freshwater		NSV	--	--		2.90	ug/kg	1	USEPA 1996b	
Pesticides	Endosulfan II	Freshwater		NSV	--	--		14.0	ug/kg	1	USEPA 1996b	
Pesticides	Endosulfan sulfate	Freshwater		NSV	--	--		5.40	ug/kg	1	USEPA 1996b	
Pesticides	Endrin	Freshwater	TEC	2.22	ug/kg	MacDonald et al. 2000a		20.0	ug/kg	1	USEPA 1996b	
Pesticides	Endrin aldehyde	Freshwater	TEC	2.22	ug/kg	Endrin value		20.0	ug/kg	1	Endrin value	
Pesticides	Endrin ketone	Freshwater	TEC	2.22	ug/kg	Endrin value		20.0	ug/kg	1	Endrin value	
Pesticides	gamma-BHC (Lindane)	Freshwater	TEC	2.37	ug/kg	MacDonald et al. 2000a		3.70	ug/kg	1	USEPA 1996b	
Pesticides	gamma-Chlordane	Freshwater	TEC	3.24	ug/kg	MacDonald et al. 2000a		2,800	ug/kg	1	Jones et al. 1997	
Pesticides	Heptachlor	Freshwater		NSV	--	--		68.0	ug/kg	1	Jones et al. 1997	
Pesticides	Heptachlor epoxide	Freshwater	TEC	2.47	ug/kg	MacDonald et al. 2000a		68.0	ug/kg	1	Heptachlor value	
Pesticides	Methoxychlor	Freshwater		NSV	--	--		19.0	ug/kg	1	USEPA 1996b	
Pesticides	Toxaphene	Freshwater		NSV	--	--		28.0	ug/kg	1	USEPA 1996b	
PCBs	Aroclor-1016	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Aroclor-1221 value	
PCBs	Aroclor-1221	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Jones et al. 1997	

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Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
PCBs	Aroclor-1232	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		600	ug/kg	1	Jones et al. 1997	
PCBs	Aroclor-1242	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		170	ug/kg	1	Jones et al. 1997	
PCBs	Aroclor-1248	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		1,000	ug/kg	1	Jones et al. 1997	
PCBs	Aroclor-1254	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		810	ug/kg	1	Jones et al. 1997	
PCBs	Aroclor-1260	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		810	ug/kg	1	Aroclor-1254 value	
SVOCs	1,1-Biphenyl	Freshwater		NSV	--	--		1,100	ug/kg	1	USEPA 1996b	
SVOCs	1,2,3-Trichlorobenzene	Freshwater		NSV	--	--		858	ug/kg	1	USEPA 2006b	
SVOCs	1,2,4-Trichlorobenzene	Freshwater		NSV	--	--		9,200	ug/kg	1	USEPA 1996b	
SVOCs	1,2,4,5-Tetrachlorobenzene	Freshwater		NSV	--	--		1,093	ug/kg	1	USEPA 2006b	
SVOCs	1,2-Dichlorobenzene	Freshwater		NSV	--	--		340	ug/kg	1	USEPA 1996b	
SVOCs	1,3-Dichlorobenzene	Freshwater		NSV	--	--		1,700	ug/kg	1	USEPA 1996b	
SVOCs	1,4-Dichlorobenzene	Freshwater		NSV	--	--		350	ug/kg	1	USEPA 1996b	
SVOCs	1,4-Dioxane	Freshwater		NSV	--	--		119	ug/kg	1	USEPA 2003c	
SVOCs	2,2'-Oxybis(1-chloropropane)	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2,3,4,6-Tetrachlorophenol	Freshwater		NSV	--	--		284	ug/kg	1	USEPA 2006b	
SVOCs	2,4,5-Trichlorophenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2,4,6-Trichlorophenol	Freshwater		NSV	--	--		213	ug/kg	1	USEPA 2006b	
SVOCs	2,4-Dichlorophenol	Freshwater		NSV	--	--		117	ug/kg	1	USEPA 2006b	
SVOCs	2,4-Dimethylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2,4-Dinitrophenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2,4-Dinitrotoluene	Freshwater		NSV	--	--		41.6	ug/kg	1	USEPA 2006b	
SVOCs	2,6-Dinitrotoluene	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2-Chloronaphthalene	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2-Chlorophenol	Freshwater		NSV	--	--		31.2	ug/kg	1	USEPA 2006b	
SVOCs	2-Methylnaphthalene	Marine	ER-L	70.0	ug/kg	Long et al. 1995		NSV	--		--	
SVOCs	2-Methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2-Nitroaniline	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2-Nitrophenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	3- and 4-Methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	3,3'-Dichlorobenzidine	Freshwater		NSV	--	--		127	ug/kg	1	USEPA 2006b	
SVOCs	3-Nitroaniline	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4,6-Dinitro-2-methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Bromophenyl-phenylether	Freshwater		NSV	--	--		1,300	ug/kg	1	USEPA 1996b	
SVOCs	4-Chloro-3-methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Chloroaniline	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Chlorophenyl-phenylether	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Nitroaniline	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Nitrophenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Acenaphthene	Freshwater	UET	290	ug/kg	Buchman 2008	Microtox (at 1% TOC)	620	ug/kg	1	USEPA 1996b	
SVOCs	Acenaphthylene	Freshwater	UET	160	ug/kg	Buchman 2008	Microtox (at 1% TOC)	NSV	--		--	
SVOCs	Acetophenone	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Anthracene	Freshwater	TEC	57.2	ug/kg	MacDonald et al. 2000a		220	ug/kg	1	Jones et al. 1997	
SVOCs	Atrazine	Freshwater		NSV	--	--		6.62	ug/kg	1	USEPA 2006b	

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Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
SVOCs	Benzaldehyde	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Benzo(a)anthracene	Freshwater	TEC	108	ug/kg	MacDonald et al. 2000a		110	ug/kg	1	Jones et al. 1997	
SVOCs	Benzo(a)pyrene	Freshwater	TEC	150	ug/kg	MacDonald et al. 2000a		140	ug/kg	1	Jones et al. 1997	
SVOCs	Benzo(b)fluoranthene	Freshwater		240	ug/kg	Benzo(k)fluoanthene value		NSV	--		--	
SVOCs	Benzo(g,h,i)perylene	Freshwater	LEL	170	ug/kg	Persuad et al. 1993		NSV	--		--	
SVOCs	Benzo(k)fluoranthene	Freshwater	LEL	240	ug/kg	Persuad et al. 1993		NSV	--		--	
SVOCs	Benzoic acid	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Benzyl alcohol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Chloroethoxy)methane	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Chloroethyl)ether	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Chloroisopropyl)ether	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Ethylhexyl)phthalate	Freshwater	UET	750	ug/kg	Buchman 2008	Microtox (at 1% TOC)	890,000	ug/kg	1	Jones et al. 1997	
SVOCs	Butylbenzylphthalate	Freshwater		NSV	--	--		11,000	ug/kg	1	USEPA 1996b	
SVOCs	Caprolactam	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Carbazole	Freshwater	AET	140	ug/kg	Cubbage et al. 1997		NSV	--		--	
SVOCs	Chrysene	Freshwater	TEC	166	ug/kg	MacDonald et al. 2000a		NSV	--		--	
SVOCs	Dibenz(a,h)anthracene	Freshwater	TEC	33.0	ug/kg	MacDonald et al. 2000a		NSV	--		--	
SVOCs	Dibenzofuran	Freshwater	UET	5,100	ug/kg	Buchman 2008	Hyalella (at 1% TOC)	2,000	ug/kg	1	USEPA 1996b	
SVOCs	Diethylphthalate	Freshwater	TEC	630	ug/kg	MacDonald et al. 2003		770	ug/kg	1	USEPA 2008b	
SVOCs	Dimethyl phthalate	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Di-n-butylphthalate	Freshwater	UET	110	ug/kg	Buchman 2008	Hyalella (at 1% TOC)	11,000	ug/kg	1	USEPA 1996b	
SVOCs	Di-n-octylphthalate	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Fluoranthene	Freshwater	TEC	423	ug/kg	MacDonald et al. 2000a		2,900	ug/kg	1	USEPA 1996b	
SVOCs	Fluorene	Freshwater	TEC	77.4	ug/kg	MacDonald et al. 2000a		540	ug/kg	1	USEPA 1996b	
SVOCs	Hexachlorobenzene	Freshwater	LEL	20.0	ug/kg	Persuad et al. 1993		NSV	--		--	
SVOCs	Hexachlorobutadiene	Freshwater		NSV	--	--		550	ug/kg	1	MacDonald et al. 2003	
SVOCs	Hexachlorocyclopentadiene	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Hexachloroethane	Freshwater		NSV	--	--		1,000	ug/kg	1	USEPA 1996b	
SVOCs	Indeno(1,2,3-cd)pyrene	Freshwater	LEL	200	ug/kg	Persuad et al. 1993		NSV	--		--	
SVOCs	Isophorone	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Naphthalene	Freshwater	TEC	176	ug/kg	MacDonald et al. 2000a		480	ug/kg	1	USEPA 1996b	
SVOCs	Nitrobenzene	Freshwater		NSV	--	--		1,779	ug/kg	1	NAVFAC 2007	
SVOCs	n-Nitroso-di-n-propylamine	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	n-Nitrosodiphenylamine	Freshwater		NSV	--	--		2,684	ug/kg	1	USEPA 2006b	
SVOCs	PAH (total)	Freshwater	ARCS TEC	3,553	ug/kg	Jones et al. 1997		NSV	--		--	
SVOCs	PAH (HMW)	Freshwater	ARCS TEC	2,900	ug/kg	Jones et al. 1997		NSV	--		--	
SVOCs	PAH (LMW)	Freshwater	ARCS TEC	786	ug/kg	Jones et al. 1997		NSV	--		--	
SVOCs	Pentachlorophenol	Freshwater		NSV	--	--		504	ug/kg	1	USEPA 2006b	
SVOCs	Phenanthrene	Freshwater	TEC	204	ug/kg	MacDonald et al. 2000a		850	ug/kg	1	USEPA 1996b	
SVOCs	Phenol	Freshwater	UET	48.0	ug/kg	Buchman 2008	Hyalella (at 1% TOC)	31.0	ug/kg	1	Jones et al. 1997	
SVOCs	Pyrene	Freshwater	TEC	195	ug/kg	MacDonald et al. 2000a		NSV	--		--	
VOCs	1,1,1-Trichloroethane	Freshwater		NSV	--	--		170	ug/kg	1	USEPA 1996b	
VOCs	1,1,2,2-Tetrachloroethane	Freshwater		NSV	--	--		940	ug/kg	1	USEPA 1996b	
VOCs	1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	Freshwater		NSV	--	--		NSV	--		--	

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Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
VOCs	1,1,2-Trichloroethane	Freshwater		NSV	--	--		1,200	ug/kg	1	Jones et al. 1997	
VOCs	1,1-Dichloroethane	Freshwater		NSV	--	--		27.0	ug/kg	1	Jones et al. 1997	
VOCs	1,1-Dichloroethene	Freshwater		NSV	--	--		31.0	ug/kg	1	Jones et al. 1997	
VOCs	1,2,3-Trichlorobenzene	Freshwater		NSV	--	--		858	ug/kg	1	USEPA 2006b	
VOCs	1,2,4-Trichlorobenzene	Freshwater		NSV	--	--		9,200	ug/kg	1	USEPA 1996b	
VOCs	1,2-Dibromo-3-chloropropane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	1,2-Dibromoethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	1,2-Dichlorobenzene	Freshwater		NSV	--	--		340	ug/kg	1	USEPA 1996b	
VOCs	1,2-Dichloroethane	Freshwater		NSV	--	--		250	ug/kg	1	Jones et al. 1997	
VOCs	1,2-Dichloroethene (total)	Freshwater		NSV	--	--		400	ug/kg	1	Jones et al. 1997	
VOCs	1,2-Dichloropropane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	1,3-Dichlorobenzene	Freshwater		NSV	--	--		1,700	ug/kg	1	USEPA 1996b	
VOCs	1,4-Dichlorobenzene	Freshwater		NSV	--	--		350	ug/kg	1	USEPA 1996b	
VOCs	2-Butanone	Freshwater		NSV	--	--		270	ug/kg	1	Jones et al. 1997	Polar
VOCs	2-Hexanone	Freshwater		NSV	--	--		NSV	--		--	
VOCs	4-Methyl-2-pentanone	Freshwater		NSV	--	--		33.0	ug/kg	1	Jones et al. 1997	Polar
VOCs	Acetone	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Benzene	Freshwater		NSV	--	--		57.0	ug/kg	1	USEPA 1996b	
VOCs	Bromochloromethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Bromodichloromethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Bromoform	Freshwater		NSV	--	--		650	ug/kg	1	USEPA 1996b	
VOCs	Bromomethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Carbon disulfide	Freshwater		NSV	--	--		0.85	ug/kg	1	Jones et al. 1997	
VOCs	Carbon tetrachloride	Freshwater		NSV	--	--		1,200	ug/kg	1	USEPA 1996b	
VOCs	Chlorobenzene	Freshwater		NSV	--	--		820	ug/kg	1	USEPA 1996b	
VOCs	Chloroethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Chloroform	Freshwater		NSV	--	--		22.0	ug/kg	1	Jones et al. 1997	
VOCs	Chloromethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	cis-1,2-Dichloroethene	Freshwater		NSV	--	--		400	ug/kg	1	Jones et al. 1997	
VOCs	cis-1,3-Dichloropropene	Freshwater		NSV	--	--		0.051	ug/kg	1	Jones et al. 1997	
VOCs	Cyclohexane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Dibromochloromethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Dichlorodifluoromethane(Freon-12)	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Ethylbenzene	Freshwater		NSV	--	--		3,600	ug/kg	1	USEPA 1996b	
VOCs	Isopropylbenzene (Cumene)	Freshwater		NSV	--	--		86.0	ug/kg	1	USEPA 2006b	
VOCs	m- and p-Xylene	Freshwater		NSV	--	--		160	ug/kg	1	Jones et al. 1997	Total xylenes
VOCs	Methyl acetate	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Methylcyclohexane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Methylene chloride	Freshwater		NSV	--	--		370	ug/kg	1	Jones et al. 1997	
VOCs	Methyl-tert-butyl ether (MTBE)	Freshwater		NSV	--	--		NSV	--		--	
VOCs	o-Xylene	Freshwater		NSV	--	--		160	ug/kg	1	Jones et al. 1997	Total xylenes
VOCs	Styrene	Freshwater		NSV	--	--		559	ug/kg	1	USEPA 2006b	
VOCs	Tetrachloroethene	Freshwater		NSV	--	--		530	ug/kg	1	USEPA 1996b	
VOCs	Toluene	Freshwater		NSV	--	--		670	ug/kg	1	USEPA 1996b	

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Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
VOCs	trans-1,2-Dichloroethene	Freshwater		NSV	--	--		400	ug/kg	1	Jones et al. 1997	
VOCs	trans-1,3-Dichloropropene	Freshwater		NSV	--	--		0.051	ug/kg	1	Jones et al. 1997	
VOCs	Trichloroethene	Freshwater		NSV	--	--		1,600	ug/kg	1	USEPA 1996b	
VOCs	Trichlorofluoromethane(Freon-11)	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Vinyl chloride	Freshwater		NSV	--	--		278	ug/kg	1	Calculated	
VOCs	Xylene, total	Freshwater		NSV	--	--		160	ug/kg	1	Jones et al. 1997	
Explosives	1,3,5-Trinitrobenzene	Freshwater		NSV	--	--		2.40	ug/kg	1	Talmage et al. 1999	
Explosives	1,3-Dinitrobenzene	Freshwater		NSV	--	--		6.70	ug/kg	1	Talmage et al. 1999	
Explosives	2,4,6-Trinitrotoluene	Freshwater		NSV	--	--		92.0	ug/kg	1	Talmage et al. 1999	
Explosives	2,4-Dinitrotoluene	Freshwater		NSV	--	--		41.6	ug/kg	1	USEPA 2006b	
Explosives	2,6-Dinitrotoluene	Freshwater		NSV	--	--		NSV	--		--	
Explosives	2-Amino-4,6-dinitrotoluene	Freshwater		NSV	--	--		13.2	ug/kg	1	NAVFAC 2007	
Explosives	2-Nitrotoluene	Freshwater		NSV	--	--		6,204	ug/kg	1	NAVFAC 2007	
Explosives	3-Nitrotoluene	Freshwater		NSV	--	--		1,922	ug/kg	1	NAVFAC 2007	
Explosives	4-Amino-2,6-dinitrotoluene	Freshwater		NSV	--	--		23.2	ug/kg	1	NAVFAC 2007	
Explosives	4-Nitrotoluene	Freshwater		NSV	--	--		4,062	ug/kg	1	USEPA 2006b	
Explosives	HMX	Freshwater		NSV	--	--		4.74	ug/kg	1	Talmage et al. 1999	
Explosives	Nitrobenzene	Freshwater		NSV	--	--		1,779	ug/kg	1	NAVFAC 2007	
Explosives	RDX	Freshwater		NSV	--	--		12.7	ug/kg	1	Talmage et al. 1999	
Explosives	Tetryl	Freshwater		NSV	--	--		NSV	--		--	

1 - AET: Apparent Effects Threshold; ER-L: Effects Range-Low; LEL: Lowest Effect Level; TEC: Threshold Effect Concentration; TEL: Threshold Effect Level; UET: Upper Effects Threshold

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Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
Inorganics	Aluminum	Marine	AET	18,000	mg/kg	Buchman 2008		--	--	--	--	--
Inorganics	Antimony	Marine	ER-L	2.00	mg/kg	Long and Morgan 1990		--	--	--	--	--
Inorganics	Arsenic	Marine	ER-L	8.20	mg/kg	Long et al. 1995		--	--	--	--	--
Inorganics	Barium	Marine	AET	48.0	mg/kg	Buchman 2008		--	--	--	--	--
Inorganics	Beryllium	Marine		NSV	--	--		--	--	--	--	--
Inorganics	Cadmium	Marine	ER-L	1.20	mg/kg	Long et al. 1995		--	--	--	--	--
Inorganics	Chromium	Marine	ER-L	81.0	mg/kg	Long et al. 1995		--	--	--	--	--
Inorganics	Cobalt	Marine	AET	10.0	mg/kg	Buchman 2008		--	--	--	--	--
Inorganics	Copper	Marine	ER-L	34.0	mg/kg	Long et al. 1995		--	--	--	--	--
Inorganics	Cyanide	Marine		NSV	--	--		--	--	--	--	--
Inorganics	Iron	Marine	AET	220,000	mg/kg	Buchman 2008		--	--	--	--	--
Inorganics	Lead	Marine	ER-L	46.7	mg/kg	Long et al. 1995		--	--	--	--	--
Inorganics	Manganese	Marine	AET	260	mg/kg	Buchman 2008		--	--	--	--	--
Inorganics	Mercury	Marine	ER-L	0.15	mg/kg	Long et al. 1995		--	--	--	--	--
Inorganics	Nickel	Marine	ER-L	20.9	mg/kg	Long et al. 1995		--	--	--	--	--
Inorganics	Selenium	Marine	AET	1.00	mg/kg	Buchman 2008		--	--	--	--	--
Inorganics	Silver	Marine	ER-L	1.00	mg/kg	Long et al. 1995		--	--	--	--	--
Inorganics	Thallium	Marine		NSV	--	--		--	--	--	--	--
Inorganics	Vanadium	Marine	AET	57.0	mg/kg	Buchman 2008		--	--	--	--	--
Inorganics	Zinc	Marine	ER-L	150	mg/kg	Long et al. 1995		--	--	--	--	--
Pesticides	4,4'-DDD	Marine	TEL	1.22	ug/kg	MacDonald 1994		NSV	--		--	
Pesticides	4,4'-DDE	Marine	ER-L	2.20	ug/kg	Long et al. 1995		NSV	--		--	
Pesticides	4,4'-DDT	Marine	TEL	1.19	ug/kg	MacDonald 1994		NSV	--		--	
Pesticides	Aldrin	Marine	AET	9.50	ug/kg	Buchman 2008		NSV	--		--	
Pesticides	alpha-BHC	Marine		NSV	--	--		1,360	ug/kg	1	USEPA 2006b	
Pesticides	alpha-Chlordane	Marine	TEL	2.26	ug/kg	MacDonald 1994		NSV	--		--	
Pesticides	beta-BHC	Marine		NSV	--	--		1,360	ug/kg	1	alpha-BHC	
Pesticides	delta-BHC	Marine		NSV	--	--		1,360	ug/kg	1	alpha-BHC	
Pesticides	Dieldrin	Marine	TEL	0.72	ug/kg	MacDonald 1994		95.0	ug/kg	1	USEPA 1996b	
Pesticides	Endosulfan I	Marine		NSV	--	--		0.51	ug/kg	1	USEPA 2008b	
Pesticides	Endosulfan II	Marine		NSV	--	--		2.40	ug/kg	1	USEPA 2008b	
Pesticides	Endosulfan sulfate	Marine		NSV	--	--		0.36	ug/kg	1	USEPA 2006b	
Pesticides	Endrin	Marine		2.67	ug/kg	USEPA 2006b		3.50	ug/kg	1	USEPA 1996b	
Pesticides	Endrin aldehyde	Marine		NSV	--	--		3.50	ug/kg	1	Endrin	
Pesticides	Endrin ketone	Marine		NSV	--	--		3.50	ug/kg	1	Endrin	
Pesticides	gamma-BHC (Lindane)	Marine	TEL	0.32	ug/kg	MacDonald 1994		1,360	ug/kg	1	alpha-BHC	
Pesticides	gamma-Chlordane	Marine	TEL	2.26	ug/kg	MacDonald 1994		NSV	--		--	
Pesticides	Heptachlor	Marine	AET	0.30	ug/kg	Buchman 2008		NSV	--		--	
Pesticides	Heptachlor epoxide	Marine		NSV	--	--		NSV	--		--	
Pesticides	Methoxychlor	Marine		NSV	--	--		29.6	ug/kg	1	USEPA 2006b	
Pesticides	Toxaphene	Marine		NSV	--	--		540	ug/kg	1	USEPA 2008b	
PCBs	Aroclor-1016	Marine	TEC	48.0	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Washington State 1995	
PCBs	Aroclor-1221	Marine	TEC	48.0	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Washington State 1995	
PCBs	Aroclor-1232	Marine	TEC	48.0	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Washington State 1995	

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		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
PCBs	Aroclor-1242	Marine	TEC	48.0	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Washington State 1995	
PCBs	Aroclor-1248	Marine	TEC	48.0	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Washington State 1995	
PCBs	Aroclor-1254	Marine	ISQG	63.3	ug/kg	CCME 2002		120	ug/kg	1	Washington State 1995	
PCBs	Aroclor-1260	Marine	TEC	48.0	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Washington State 1995	
SVOCs	1,1-Biphenyl	Marine		NSV	--	--		NSV	--		--	
SVOCs	1,2,3-Trichlorobenzene	Marine		NSV	--	--		NSV	--		--	
SVOCs	1,2,4-Trichlorobenzene	Marine		NSV	--	--		473	ug/kg	1	USEPA 2006b	
SVOCs	1,2,4,5-Tetrachlorobenzene	Marine		NSV	--	--		46,988	ug/kg	1	USEPA 2006b	
SVOCs	1,2-Dichlorobenzene	Marine		NSV	--	--		989	ug/kg	1	USEPA 2006b	
SVOCs	1,3-Dichlorobenzene	Marine		NSV	--	--		842	ug/kg	1	USEPA 2006b	
SVOCs	1,4-Dichlorobenzene	Marine	AET	110	ug/kg	Buchman 2008		458	ug/kg	1	USEPA 2006b	
SVOCs	2,2'-Oxybis(1-chloropropane)	Marine		NSV	--	--		NSV	--		--	
SVOCs	2,3,4,6-Tetrachlorophenol	Marine		NSV	--	--		NSV	--		--	
SVOCs	2,4,5-Trichlorophenol	Marine		NSV	--	--		819	ug/kg	1	USEPA 2006b	
SVOCs	2,4,6-Trichlorophenol	Marine		NSV	--	--		2,647	ug/kg	1	USEPA 2006b	
SVOCs	2,4-Dichlorophenol	Marine		NSV	--	--		NSV	--		--	
SVOCs	2,4-Dimethylphenol	Marine	AET	29.0	ug/kg	Washington State 1995		NSV	--		--	
SVOCs	2,4-Dinitrophenol	Marine		NSV	--	--		NSV	--		--	
SVOCs	2,4-Dinitrotoluene	Marine		NSV	--	--		3,184	ug/kg	1	NAVFAC 2007	
SVOCs	2,6-Dinitrotoluene	Marine	NOEC	549	ug/kg	Nipper et al. 2002		5,802	ug/kg	1	NAVFAC 2007	
SVOCs	2-Chloronaphthalene	Marine		NSV	--	--		NSV	--		--	
SVOCs	2-Chlorophenol	Marine		NSV	--	--		344	ug/kg	1	USEPA 2006b	
SVOCs	2-Methylnaphthalene	Marine	ER-L	70.0	ug/kg	Long et al. 1995		380	ug/kg	1	Washington State 1995	
SVOCs	2-Methylphenol	Marine	AET	63.0	ug/kg	Washington State 1995		NSV	--		--	
SVOCs	2-Nitroaniline	Marine		NSV	--	--		NSV	--		--	
SVOCs	2-Nitrophenol	Marine		NSV	--	--		NSV	--		--	
SVOCs	3- and 4-Methylphenol	Marine	AET	670	ug/kg	Washington State 1995		NSV	--		--	
SVOCs	3,3'-Dichlorobenzidine	Marine		NSV	--	--		2,060	ug/kg	1	USEPA 2006b	
SVOCs	3-Nitroaniline	Marine		NSV	--	--		NSV	--		--	
SVOCs	4,6-Dinitro-2-methylphenol	Marine		NSV	--	--		NSV	--		--	
SVOCs	4-Bromophenyl-phenylether	Marine		NSV	--	--		NSV	--		--	
SVOCs	4-Chloro-3-methylphenol	Marine		NSV	--	--		NSV	--		--	
SVOCs	4-Chloroaniline	Marine		NSV	--	--		NSV	--		--	
SVOCs	4-Chlorophenyl-phenylether	Marine		NSV	--	--		NSV	--		--	
SVOCs	4-Methylphenol	Marine	AET	670	ug/kg	Washington State 1995		NSV	--		--	
SVOCs	4-Nitroaniline	Marine		NSV	--	--		NSV	--		--	
SVOCs	4-Nitrophenol	Marine		NSV	--	--		NSV	--		--	
SVOCs	Acenaphthene	Marine	ER-L	16.0	ug/kg	Long et al. 1995		1,100	ug/kg	1	USEPA 1996b	
SVOCs	Acenaphthylene	Marine	ER-L	44.0	ug/kg	Long et al. 1995		660	ug/kg	1	Washington State 1995	
SVOCs	Acetophenone	Marine		NSV	--	--		NSV	--		--	
SVOCs	Anthracene	Marine	ER-L	85.3	ug/kg	Long et al. 1995		2,200	ug/kg	1	Washington State 1995	
SVOCs	Atrazine	Marine		NSV	--	--		NSV	--		--	
SVOCs	Benzaldehyde	Marine		NSV	--	--		NSV	--		--	
SVOCs	Benzo(a)anthracene	Marine	ER-L	261	ug/kg	Long et al. 1995		1,100	ug/kg	1	Washington State 1995	

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Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
SVOCs	Benzo(a)pyrene	Marine	ER-L	430	ug/kg	Long et al. 1995		990	ug/kg	1	Washington State 1995	
SVOCs	Benzo(b)fluoranthene	Marine	AET	1,800	ug/kg	Buchman 2008		2,300	ug/kg	1	Washington State 1995	
SVOCs	Benzo(g,h,i)perylene	Marine	AET	670	ug/kg	Buchman 2008		310	ug/kg	1	Washington State 1995	
SVOCs	Benzo(k)fluoranthene	Marine	AET	1,800	ug/kg	Buchman 2008		2,300	ug/kg	1	Washington State 1995	
SVOCs	Benzoic acid	Marine	AET	650	ug/kg	Washington State 1995		NSV	--		--	
SVOCs	Benzyl alcohol	Marine	AET	57.0	ug/kg	Washington State 1995		NSV	--		--	
SVOCs	bis(2-Chloroethoxy)methane	Marine		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Chloroethyl)ether	Marine		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Chloroisopropyl)ether	Marine		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Ethylhexyl)phthalate	Marine	TEL	182	ug/kg	MacDonald 1994		470	ug/kg	1	Washington State 1995	
SVOCs	Butylbenzylphthalate	Marine	AET	63.0	ug/kg	Buchman 2008		16,840	ug/kg	1	USEPA 2006b	
SVOCs	Caprolactam	Marine		NSV	--	--		NSV	--		--	
SVOCs	Carbazole	Marine		NSV	--	--		NSV	--		--	
SVOCs	Chrysene	Marine	ER-L	384	ug/kg	Long et al. 1995		1,100	ug/kg	1	Washington State 1995	
SVOCs	Dibenz(a,h)anthracene	Marine	ER-L	63.4	ug/kg	Long et al. 1995		120	ug/kg	1	Washington State 1995	
SVOCs	Dibenzofuran	Marine	AET	110	ug/kg	Buchman 2008		7,297	ug/kg	1	USEPA 2006b	
SVOCs	Diethylphthalate	Marine		NSV	--	--		218	ug/kg	1	USEPA 2006b	
SVOCs	Dimethyl phthalate	Marine		NSV	--	--		530	ug/kg	1	Washington State 1995	
SVOCs	Di-n-butylphthalate	Marine	AET	58.0	ug/kg	Buchman 2008		1,157	ug/kg	1	USEPA 2006b	
SVOCs	Di-n-octylphthalate	Marine	AET	61.0	ug/kg	Buchman 2008		580	ug/kg	1	Washington State 1995	
SVOCs	Fluoranthene	Marine	ER-L	600	ug/kg	Long et al. 1995		1,400	ug/kg	1	USEPA 1996b	
SVOCs	Fluorene	Marine	ER-L	19.0	ug/kg	Long et al. 1995		230	ug/kg	1	Washington State 1995	
SVOCs	Hexachlorobenzene	Marine		NSV	--	--		3.80	ug/kg	1	Washington State 1995	
SVOCs	Hexachlorobutadiene	Marine		NSV	--	--		39.0	ug/kg	1	Washington State 1995	
SVOCs	Hexachlorocyclopentadiene	Marine		NSV	--	--		139	ug/kg	1	USEPA 2006b	
SVOCs	Hexachloroethane	Marine	AET	73.0	ug/kg	Buchman 2008		804	ug/kg	1	USEPA 2006b	
SVOCs	Indeno(1,2,3-cd)pyrene	Marine	AET	600	ug/kg	Buchman 2008		340	ug/kg	1	Washington State 1995	
SVOCs	Isophorone	Marine		NSV	--	--		NSV	--		--	
SVOCs	Naphthalene	Marine	ER-L	160	ug/kg	Long et al. 1995		990	ug/kg	1	Washington State 1995	
SVOCs	Nitrobenzene	Marine	AET	21.0	ug/kg	Buchman 2008		NSV	--		--	
SVOCs	n-Nitroso-di-n-propylamine	Marine		NSV	--	--		NSV	--		--	
SVOCs	n-Nitrosodiphenylamine	Marine	AET	28.0	ug/kg	Buchman 2008		421,768	ug/kg	1	USEPA 2006b	
SVOCs	PAH (total)	Marine	ER-L	4,022	ug/kg	Long et al. 1995		2,900	ug/kg	1	USEPA 2006b	
SVOCs	PAH (HMW)	Marine	ER-L	1,700	ug/kg	Long et al. 1995		9,600	ug/kg	1	Washington State 1995	
SVOCs	PAH (LMW)	Marine	ER-L	552	ug/kg	Long et al. 1995		3,700	ug/kg	1	Washington State 1995	
SVOCs	Pentachlorophenol	Marine	AET	360	ug/kg	Washington State 1995		7,969	ug/kg	1	USEPA 2006b	
SVOCs	Phenanthrene	Marine	ER-L	240	ug/kg	Long et al. 1995		1,100	ug/kg	1	USEPA 1996b	
SVOCs	Phenol	Marine	AET	420	ug/kg	Washington State 1995		NSV	--		--	
SVOCs	Pyrene	Marine	ER-L	665	ug/kg	Long et al. 1995		10,000	ug/kg	1	Washington State 1995	
VOCs	1,1,1-Trichloroethane	Marine		NSV	--	--		856	ug/kg	1	USEPA 2006b	
VOCs	1,1,2,2-Tetrachloroethane	Marine		NSV	--	--		202	ug/kg	1	USEPA 2006b	
VOCs	1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	Marine		NSV	--	--		NSV	--		--	
VOCs	1,1,2-Trichloroethane	Marine		NSV	--	--		570	ug/kg	1	USEPA 2006b	
VOCs	1,1-Dichloroethane	Marine		NSV	--	--		NSV	--		--	

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Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
VOCs	1,1-Dichloroethene	Marine		NSV	--	--		2,782	ug/kg	1	USEPA 2006b	
VOCs	1,2,3-Trichlorobenzene	Marine		NSV	--	--		NSV	--		--	
VOCs	1,2,4-Trichlorobenzene	Marine		NSV	--	--		473	ug/kg	1	USEPA 2006b	
VOCs	1,2-Dibromo-3-chloropropane	Marine		NSV	--	--		NSV	--		--	
VOCs	1,2-Dibromoethane	Marine		NSV	--	--		NSV	--		--	
VOCs	1,2-Dichlorobenzene	Marine		NSV	--	--		989	ug/kg	1	USEPA 2006b	
VOCs	1,2-Dichloroethane	Marine		NSV	--	--		NSV	--		--	
VOCs	1,2-Dichloroethene (total)	Marine		NSV	--	--		NSV	--		--	
VOCs	1,2-Dichloropropane	Marine		NSV	--	--		NSV	--		--	
VOCs	1,3-Dichlorobenzene	Marine		NSV	--	--		842	ug/kg	1	USEPA 2006b	
VOCs	1,4-Dichlorobenzene	Marine	AET	110	ug/kg	Buchman 2008		458	ug/kg	1	USEPA 2006b	
VOCs	1,4-Dioxane	Marine		NSV	--	--		NSV	--		--	
VOCs	2-Butanone	Marine		NSV	--	--		NSV	--		--	
VOCs	2-Hexanone	Marine		NSV	--	--		NSV	--		--	
VOCs	4-Methyl-2-pentanone	Marine		NSV	--	--		NSV	--		--	
VOCs	Acetone	Marine		NSV	--	--		NSV	--		--	
VOCs	Benzene	Marine		NSV	--	--		137	ug/kg	1	USEPA 2006b	
VOCs	Bromochloromethane	Marine		NSV	--	--		NSV	--		--	
VOCs	Bromodichloromethane	Marine		NSV	--	--		NSV	--		--	
VOCs	Bromoform	Marine		NSV	--	--		1,308	ug/kg	1	USEPA 2006b	
VOCs	Bromomethane	Marine		NSV	--	--		NSV	--		--	
VOCs	Carbon disulfide	Marine		NSV	--	--		NSV	--		--	
VOCs	Carbon tetrachloride	Marine		NSV	--	--		7,244	ug/kg	1	USEPA 2006b	
VOCs	Chlorobenzene	Marine		NSV	--	--		162	ug/kg	1	USEPA 2006b	
VOCs	Chloroethane	Marine		NSV	--	--		NSV	--		--	
VOCs	Chloroform	Marine		NSV	--	--		NSV	--		--	
VOCs	Chloromethane	Marine		NSV	--	--		NSV	--		--	
VOCs	cis-1,2-Dichloroethene	Marine		NSV	--	--		NSV	--		--	
VOCs	cis-1,3-Dichloropropene	Marine		NSV	--	--		7.31	ug/kg	1	USEPA 2006b	
VOCs	Cyclohexane	Marine		NSV	--	--		NSV	--		--	
VOCs	Dibromochloromethane	Marine		NSV	--	--		NSV	--		--	
VOCs	Dichlorodifluoromethane(Freon-12)	Marine		NSV	--	--		NSV	--		--	
VOCs	Ethylbenzene	Marine		NSV	--	--		305	ug/kg	1	USEPA 2006b	
VOCs	Isopropylbenzene (Cumene)	Marine		NSV	--	--		NSV	--		--	
VOCs	m- and p-Xylene	Marine		NSV	--	--		NSV	--		--	
VOCs	Methyl acetate	Marine		NSV	--	--		NSV	--		--	
VOCs	Methylcyclohexane	Marine		NSV	--	--		NSV	--		--	
VOCs	Methylene chloride	Marine		NSV	--	--		NSV	--		--	
VOCs	Methyl-tert-butyl ether (MTBE)	Marine		NSV	--	--		NSV	--		--	
VOCs	o-Xylene	Marine		NSV	--	--		NSV	--		--	
VOCs	Styrene	Marine		NSV	--	--		7,069	ug/kg	1	USEPA 2006b	
VOCs	Tetrachloroethene	Marine	AET	57.0	ug/kg	Buchman 2008		190	ug/kg	1	USEPA 2006b	
VOCs	Toluene	Marine		NSV	--	--		1,086	ug/kg	1	USEPA 2006b	
VOCs	trans-1,2-Dichloroethene	Marine		NSV	--	--		NSV	--		--	

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Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
VOCs	trans-1,3-Dichloropropene	Marine		NSV	--	--		7.31	ug/kg	1	USEPA 2006b	
VOCs	Trichloroethene	Marine	AET	41.0	ug/kg	Buchman 2008		8,954	ug/kg	1	USEPA 2006b	
VOCs	Trichlorofluoromethane(Freon-11)	Marine		NSV	--	--		NSV	--		--	
VOCs	Vinyl chloride	Marine		NSV	--	--		NSV	--		--	
VOCs	Xylene, total	Marine		NSV	--	--		NSV	--		--	
Explosives	1,3,5-Trinitrobenzene	Marine	NOEC	7,000	ug/kg	NAVFAC 2007		NSV	--		--	
Explosives	1,3-Dinitrobenzene	Marine		NSV	--	--		NSV	--		--	
Explosives	2,4,6-Trinitrotoluene	Marine	NOEC	20,000	ug/kg	NAVFAC 2007		NSV	--		--	
Explosives	2,4-Dinitrotoluene	Marine		NSV	--	--		3,184	ug/kg	1	NAVFAC 2007	
Explosives	2,6-Dinitrotoluene	Marine	NOEC	549	ug/kg	Nipper et al. 2002		5,802	ug/kg	1	NAVFAC 2007	
Explosives	2-Amino-4,6-dinitrotoluene	Marine		NSV	--	--		NSV	--		--	
Explosives	2-Nitrotoluene	Marine		NSV	--	--		NSV	--		--	
Explosives	3,5-Dinitroaniline	Marine		NSV	--	--		NSV	--		--	
Explosives	3-Nitrotoluene	Marine		NSV	--	--		NSV	--		--	
Explosives	4-Amino-2,6-dinitrotoluene	Marine		NSV	--	--		NSV	--		--	
Explosives	4-Nitrotoluene	Marine		NSV	--	--		NSV	--		--	
Explosives	HMX	Marine	NOEC	115,000	ug/kg	NAVFAC 2007		NSV	--		--	
Explosives	Nitrobenzene	Marine	AET	21.0	ug/kg	Buchman 2008		NSV	--		--	
Explosives	Nitroglycerine	Marine		NSV	--	--		NSV	--		--	
Explosives	Nitroguanidine	Marine		NSV	--	--		NSV	--		--	
Explosives	Perchlorate	Marine		NSV	--	--		NSV	--		--	
Explosives	PETN	Marine		NSV	--	--		NSV	--		--	
Explosives	RDX	Marine	NOEC	891,000	ug/kg	NAVFAC 2007		NSV	--		--	
Explosives	Tetryl	Marine	NOEC	72.0	ug/kg	Nipper et al. 2002		10.7	ug/kg	1	NAVFAC 2007	

1 - AET: Apparent Effects Threshold; ER-L: Effects Range-Low; ISQG - Interim Sediment Quality Guideline; NOEC - No Observed Effect Concentration; TEC: Threshold Effect Concentration; TEL: Threshold Effect Level

Table D-38
Area-Specific Total Organic Carbon Values - Surface Sediment
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Station ID	Sample ID	Depth (inches)	Date	Group	Total Organic Carbon (mg/kg)
CAPL-SD70	CAPL-SD70-1012	0 - 4	10/17/2012	1	98,300
CAPL-SD84	CAPL-SD84-1012	0 - 4	10/24/2012	1	2,300
CAPL-SD85	CAPL-SD85-1012	0 - 4	10/24/2012	1	3,440
CAPL-SD86	CAPL-SD86-1012	0 - 4	10/24/2012	1	3,210
CAPL-SD87	CAPL-SD87-1012	0 - 4	10/24/2012	1	7,080
CAPL-SWSD18	CAPL-SD18-0811	0 - 4	8/2/2011	1	34,000
CAPL-SWSD19	CAPL-SD19-0811	0 - 4	8/2/2011	1	3,800
CAPL-SWSD20	CAPL-SD20-0811	0 - 4	8/2/2011	1	110,000
CAPL-SWSD21	CAPL-SD21-0811	0 - 4	8/2/2011	1	1,300
CAPL-SWSD22	CAPL-SD22-0711	0 - 4	7/28/2011	1	180,000
CAPL-SWSD24	CAPL-SD24-0711	0 - 4	7/28/2011	1	110,000
CAPL-SWSD26	CAPL-SD26-0811	0 - 4	8/2/2011	1	15,000
CAS011-11SD18	CAS011-11SD18-00-0602	0 - 4	6/13/2002	1	24,000
CAS011-11SD19	CAS011-11SD19-00-0602	0 - 4	6/13/2002	1	41,000
CAS011-11SD20	CAS011-11SD20-00-0602	0 - 4	6/13/2002	1	9,030
CAS011-11SD21	CAS011-11SD21-00-0602	0 - 4	6/14/2002	1	80,800
CAS011-11SD22	CAS011-11SD22-00-0602	0 - 4	6/14/2002	1	123,000
CAS011-11SD23	CAS011-11SD23-00-0602	0 - 4	6/17/2002	1	90,600
CAS011-11SD29	CAS011-11SD29-00-0602	0 - 4	6/17/2002	1	149,000
CAS011-11SD30	CAS011-11SD30-00-0602	0 - 4	6/18/2002	1	53,300
Penniman Lake-SD10	PL-00-POND-SD10-0300	0 - 4	3/29/2000	1	29,700
Penniman Lake-SD11	PL-00-POND-SD11-0300	0 - 4	3/30/2000	1	106,000
				Mean:	57,948
				%	5.79
CAPL-SWSD25	CAPL-SD25-0711	0 - 4	7/28/2011	2	12,000
CAS011-11SD24	CAS011-11SD24-00-0602	0 - 4	6/13/2002	2	20,500
CAS011-11SD25	CAS011-11SD25-00-0602	0 - 4	6/13/2002	2	15,000
CAS011-11SD26	CAS011-11SD26-00-0602	0 - 4	6/17/2002	2	51,600
CAS011-11SD27	CAS011-11SD27-00-0602	0 - 4	6/17/2002	2	71,500
Penniman Lake-SD12	PL-00-POND-SD12-0300	0 - 4	3/29/2000	2	49,100
				Mean:	36,617
				%	3.66
CAPL-SD76	CAPL-SD76-1012	0 - 4	10/16/2012	3	51,400
CAPL-SD77	CAPL-SD77-1012	0 - 4	10/16/2012	3	91,100
CAPL-SD78	CAPL-SD78-1012	0 - 4	10/16/2012	3	71,500
CAPL-SD79	CAPL-SD79-1012	0 - 4	10/16/2012	3	68,400
CAPL-SD80	CAPL-SD80-1012	0 - 4	10/16/2012	3	69,200
CAPL-SWSD59	CAPL-SD59-0711	0 - 4	7/27/2011	3	98,000
CAPL-SWSD60	CAPL-SD60-0711	0 - 4	7/29/2011	3	78,000
CAPL-SWSD66	CAPL-SD66-1012	0 - 4	10/18/2012	3	35,000
Penniman Lake-SD17	PL-00-POND-SD17-0300	0 - 4	3/29/2000	3	28,600
				Mean:	65,689
				%	6.57

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Area-Specific Total Organic Carbon Values - Surface Sediment
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Station ID	Sample ID	Depth (inches)	Date	Group	Total Organic Carbon (mg/kg)
CAPL-SWSD23	CAPL-SD23-0711	0 - 4	7/28/2011	4a	79,000
CAPL-SWSD27	CAPL-SD27-0711	0 - 4	7/28/2011	4a	98,000
CAPL-SWSD28	CAPL-SD28-0711	0 - 4	7/28/2011	4a	87,000
CAPL-SWSD29	CAPL-SD29-0711	0 - 4	7/28/2011	4a	78,000
CAPL-SWSD30	CAPL-SD30-0711	0 - 4	7/28/2011	4a	75,000
CAPL-SWSD35	CAPL-SD35-0711	0 - 4	7/28/2011	4a	110,000
CAPL-SWSD62	CAPL-SD62-1012	0 - 4	10/17/2012	4a	74,400
CAPL-SWSD63	CAPL-SD63-1012	0 - 4	10/17/2012	4a	71,400
CAPL-SWSD64	CAPL-SD64-1012	0 - 4	10/17/2012	4a	75,900
CAS011-11SD28	CAS011-11SD28-00-0602	0 - 4	6/17/2002	4a	34,300
CAS011-11SD31	CAS011-11SD31-00-0602	0 - 4	6/18/2002	4a	17,100
CAS011-11SD32	CAS011-11SD32-00-0602	0 - 4	6/18/2002	4a	94,300
				Mean:	74,533
				%	7.45
CAPL-SD71	CAPL-SD71-1012	0 - 4	10/17/2012	4b	51,800
CAPL-SD72	CAPL-SD72-1012	0 - 4	10/17/2012	4b	107,000
CAPL-SD73	CAPL-SD73-1012	0 - 4	10/17/2012	4b	37,100
CAPL-SD74	CAPL-SD74-1012	0 - 4	10/18/2012	4b	79,300
CAPL-SD75	CAPL-SD75-1012	0 - 4	10/18/2012	4b	84,300
CAPL-SWSD31	CAPL-SD31-0711	0 - 4	7/28/2011	4b	68,000
CAPL-SWSD32	CAPL-SD32-0711	0 - 4	7/28/2011	4b	110,000
CAPL-SWSD33	CAPL-SD33-0711	0 - 4	7/28/2011	4b	80,000
CAPL-SWSD34	CAPL-SD34-0711	0 - 4	7/27/2011	4b	78,000
CAPL-SWSD36	CAPL-SD36-0711	0 - 4	7/28/2011	4b	64,000
CAPL-SWSD37	CAPL-SD37-0711	0 - 4	7/27/2011	4b	72,000
CAPL-SWSD38	CAPL-SD38-0711	0 - 4	7/27/2011	4b	85,000
CAPL-SWSD39	CAPL-SD39-0711	0 - 4	7/27/2011	4b	68,000
CAPL-SWSD40	CAPL-SD40-0711	0 - 4	7/27/2011	4b	47,000
CAPL-SWSD41	CAPL-SD41-0711	0 - 4	7/28/2011	4b	81,000
CAPL-SWSD42	CAPL-SD42-0711	0 - 4	7/27/2011	4b	80,000
CAPL-SWSD43	CAPL-SD43-0711	0 - 4	7/28/2011	4b	150,000
CAPL-SWSD44	CAPL-SD44-0711	0 - 4	7/28/2011	4b	130,000
CAPL-SWSD45	CAPL-SD45-0711	0 - 4	7/28/2011	4b	5,500
CAPL-SWSD46	CAPL-SD46-0711	0 - 4	7/27/2011	4b	80,000
CAPL-SWSD47	CAPL-SD47-0711	0 - 4	7/27/2011	4b	100,000
CAPL-SWSD69	CAPL-SD69-1012	0 - 4	10/17/2012	4b	72,200
Penniman Lake-SD13	PL-00-POND-SD13-0300	0 - 4	3/30/2000	4b	88,500
Penniman Lake-SD14	PL-00-POND-SD14-0300	0 - 4	3/29/2000	4b	25,300
				Mean:	76,833
				%	7.68
CAA06-SD01	CAA06-SD01-1008	0 - 4	10/23/2008	4c	69,000
CAA06-SD02	CAA06-SD02-1008	0 - 4	10/23/2008	4c	23,000
CAPL-SD81	CAPL-SD81-1012	0 - 4	10/18/2012	4c	108,000
CAPL-SD82	CAPL-SD82-1012	0 - 4	10/18/2012	4c	134,000

Table D-38
Area-Specific Total Organic Carbon Values - Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Depth (inches)	Date	Group	Total Organic Carbon (mg/kg)
CAPL-SWSD48	CAPL-SD48-0711	0 - 4	7/29/2011	4c	8,200
CAPL-SWSD49	CAPL-SD49-0711	0 - 4	7/29/2011	4c	130,000
CAPL-SWSD50	CAPL-SD50-0711	0 - 4	7/29/2011	4c	66,000
CAPL-SWSD51	CAPL-SD51-0711	0 - 4	7/29/2011	4c	70,000
CAPL-SWSD52	CAPL-SD52-0711	0 - 4	7/29/2011	4c	58,000
CAPL-SWSD53	CAPL-SD53-0711	0 - 4	7/29/2011	4c	63,000
CAPL-SWSD54	CAPL-SD54-0711	0 - 4	7/27/2011	4c	83,000
CAPL-SWSD55	CAPL-SD55-0711	0 - 4	7/27/2011	4c	19,000
CAPL-SWSD56	CAPL-SD56-0711	0 - 4	7/27/2011	4c	84,000
CAPL-SWSD57	CAPL-SD57-0711	0 - 4	7/27/2011	4c	35,000
CAPL-SWSD58	CAPL-SD58-0711	0 - 4	7/29/2011	4c	74,000
CAPL-SWSD61	CAPL-SD61-0811	0 - 4	8/2/2011	4c	15,000
CAPL-SWSD65	CAPL-SD65-1012	0 - 4	10/18/2012	4c	37,900
CAPL-SWSD67	CAPL-SD67-1012	0 - 4	10/16/2012	4c	106,000
CAPL-SWSD68	CAPL-SD68-1012	0 - 4	10/18/2012	4c	116,000
Penniman Lake-SD15	PL-00-POND-SD15-0300	0 - 4	3/29/2000	4c	27,800
Penniman Lake-SD16	PL-00-POND-SD16-0300	0 - 4	3/29/2000	4c	30,600
				Mean:	64,643
				%	6.46
				Group 4 Mean:	71,858
				%	7.19
				Groups 1-4 Mean:	65,762
				%	6.58
CAPL-SD83	CAPL-SD83-1012	0 - 4	10/16/2012	5	36,100
				Mean:	36,100
				%	3.61

Table D-39
Area-Specific Total Organic Carbon Values - Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Depth (inches)	Date	Group	Total Organic Carbon (mg/kg)
CAPL-SD70	CAPL-SSD70-1012	4 - 8	10/17/2012	1	33,600
CAPL-SD84	CAPL-SSD84-1012	4 - 8	10/24/2012	1	4,950
CAPL-SD85	CAPL-SSD85-1012	4 - 8	10/24/2012	1	2,510
CAPL-SD86	CAPL-SSD86-1012	4 - 8	10/24/2012	1	11,400
CAPL-SD87	CAPL-SSD87-1012	4 - 8	10/24/2012	1	32,400
CAS011-11SD18	CAS011-11SD18-01-0602	4 - 8	6/13/2002	1	NS
CAS011-11SD19	CAS011-11SD19-01-0602	4 - 8	6/13/2002	1	NS
CAS011-11SD21	CAS011-11SD21-01-0602	4 - 8	6/14/2002	1	NS
CAS011-11SD22	CAS011-11SD22-01-0602	4 - 8	6/14/2002	1	NS
CAS011-11SD23	CAS011-11SD23-01-0602	4 - 8	6/17/2002	1	NS
CAS011-11SD29	CAS011-11SD29-01-0602	4 - 8	6/18/2002	1	NS
CAS011-11SD30	CAS011-11SD30-01-0602	4 - 8	6/18/2002	1	NS
				Mean:	16,972
				%	1.70
CAS011-11SD24	CAS011-11SD24-01-0602	4 - 8	6/13/2002	2	NS
CAS011-11SD25	CAS011-11SD25-01-0602	4 - 8	6/13/2002	2	NS
CAS011-11SD26	CAS011-11SD26-01-0602	4 - 8	6/17/2002	2	NS
CAS011-11SD27	CAS011-11SD27-01-0602	4 - 8	6/17/2002	2	NS
				Mean:	--
				%	--
CAPL-SD76	CAPL-SSD76-1012	4 - 8	10/16/2012	3	7,570
CAPL-SD77	CAPL-SSD77-1012	4 - 8	10/16/2012	3	15,800
CAPL-SD78	CAPL-SSD78-1012	4 - 8	10/16/2012	3	63,700
CAPL-SD79	CAPL-SSD79-1012	4 - 8	10/16/2012	3	25,500
CAPL-SD80	CAPL-SSD80-1012	4 - 8	10/16/2012	3	37,000
CAPL-SWSD66	CAPL-SSD66-1012	4 - 8	10/18/2012	3	10,700
				Mean:	26,712
				%	2.67
CAPL-SWSD62	CAPL-SSD62-1012	4 - 8	10/17/2012	4a	45,400
CAPL-SWSD63	CAPL-SSD63-1012	4 - 8	10/17/2012	4a	103,000
CAPL-SWSD64	CAPL-SSD64-1012	4 - 8	10/17/2012	4a	124,000
CAS011-11SD28	CAS011-11SD28-01-0602	4 - 8	6/17/2002	4a	NS
CAS011-11SD31	CAS011-11SD31-01-0602	4 - 8	6/18/2002	4a	NS
CAS011-11SD32	CAS011-11SD32-01-0602	4 - 8	6/18/2002	4a	NS
				Mean:	90,800
				%	9.08
CAPL-SD71	CAPL-SSD71-1012	4 - 8	10/17/2012	4b	44,500
CAPL-SD72	CAPL-SSD72-1012	4 - 8	10/17/2012	4b	165,000
CAPL-SD73	CAPL-SSD73-1012	4 - 8	10/17/2012	4b	57,300
CAPL-SD74	CAPL-SSD74-1012	4 - 8	10/18/2012	4b	124,000
CAPL-SD75	CAPL-SSD75-1012	4 - 8	10/18/2012	4b	74,400
CAPL-SWSD69	CAPL-SSD69-1012	4 - 8	10/17/2012	4b	28,400
				Mean:	82,267
				%	8.23

Table D-39
Area-Specific Total Organic Carbon Values - Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Depth (inches)	Date	Group	Total Organic Carbon (mg/kg)
CAA06-SD01	CAA06-SSD01-1008	4 - 8	10/23/2008	4c	36,000
CAA06-SD02	CAA06-SSD02-1008	4 - 8	10/23/2008	4c	31,000
CAPL-SD81	CAPL-SSD81-1012	4 - 8	10/18/2012	4c	75,400
CAPL-SD82	CAPL-SSD82-1012	4 - 8	10/18/2012	4c	136,000
CAPL-SWSD65	CAPL-SSD65-1012	4 - 8	10/18/2012	4c	63,000
CAPL-SWSD67	CAPL-SSD67-1012	4 - 8	10/16/2012	4c	30,900
CAPL-SWSD68	CAPL-SSD68-1012	4 - 8	10/18/2012	4c	88,200
				Mean:	65,786
				%	6.58
				Group 4 Mean:	76,656
				%	7.67
				Groups 1-4 Mean:	54,505
				%	5.45

Table D-40
Fish Tissue-Based Ecological Screening Values (wet weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Type	Organism	Life Stage	NOEC (wet-weight)	Basis[1]	LOEC (wet-weight)	Basis[1]	Comment	Reference
Metals (MG/KG)									
Arsenic	Whole body	Bluegill	juvenile	1.80	NOEC - S,G	2.24	LOEC - S,G	Sodium arsenite	Jarvinen and Ankley 1999
Cadmium	Whole body	Bluegill	juvenile	0.036	NOEC - S	0.35	LOEC - S	Cadmium sulfate	Jarvinen and Ankley 1999
Chromium	Whole body	Mummichog; killifish	adult	0.263	NOEC - G	1.32	NOEC x 5	--	USACOE ERED 2013
Copper	Whole body	Mosquitofish	juvenile	1.51	NOEC - S,G,R	7.55	NOEC x 5	--	USACOE ERED 2013
Lead	Whole body	Brook trout	embryo-juvenile	2.50	NOEC - G	4.00	LOEC - G	Lead nitrate	Jarvinen and Ankley 1999
Mercury	Whole body	Multiple	--	0.21	t-TEL - G,R	0.21	t-TEL - G,R	--	Bechvar et al. 2005
Nickel	Muscle	Rainbow trout	150-200g	0.82	NOEC - S	4.10	NOEC x 5	Nickel chloride	Jarvinen and Ankley 1999
Selenium	Whole body	Bluegill	juvenile	0.80	NOEC - S	1.08	LOEC - S	selenate/selenite (6:1)	Jarvinen and Ankley 1999
Silver	Whole body	Bluegill	juvenile	0.12	NOEC - S	0.60	NOEC x 5	--	USACOE ERED 2013
Zinc	Whole body	Atlantic salmon	juvenile	60.0	NOEC - S,G	300	NOEC x 5	Zinc sulfate	Jarvinen and Ankley 1999
Pesticides (MG/KG)									
4,4'-DDD	Whole body	Multiple	--	0.600	t-TEL - S,G,R	0.600	t-TEL - S,G,R	DDT + metabolites	Bechvar et al. 2005
4,4'-DDE	Whole body	Multiple	--	0.600	t-TEL - S,G,R	0.600	t-TEL - S,G,R	DDT + metabolites	Bechvar et al. 2005
4,4'-DDT	Whole body	Multiple	--	0.600	t-TEL - S,G,R	0.600	t-TEL - S,G,R	DDT + metabolites	Bechvar et al. 2005
Aldrin	Whole body	Mosquitofish	--	0.157	NOEC - S	0.785	NOEC x 5	--	USACOE ERED 2014
alpha-BHC	Muscle	Rainbow trout	juvenile	42.0	NOEC - S,G	210	NOEC x 5	--	Jarvinen and Ankley 1999
alpha-Chlordane	Whole body	Sheepshead minnow	adult	1.38	NOEC - R	3.81	LOEC - R	--	USACOE ERED 2014
beta-BHC	Muscle	Rainbow trout	juvenile	42.0	NOEC - S,G	210	NOEC x 5	alpha-BHC	Jarvinen and Ankley 1999
delta-BHC	Muscle	Rainbow trout	juvenile	42.0	NOEC - S,G	210	NOEC x 5	alpha-BHC	Jarvinen and Ankley 1999
Dieldrin	Whole body	Rainbow trout	juvenile	2.13	NOEC - S,G	10.7	NOEC x 5	--	Jarvinen and Ankley 1999
Endosulfan I	Whole body	Zebrafish	--	0.038	NOEC - P	0.37	LOEC - P	--	USACOE ERED 2014
Endosulfan II	Whole body	Zebrafish	--	0.038	NOEC - P	0.37	LOEC - P	--	USACOE ERED 2014
Endosulfan sulfate	Whole body	Zebrafish	--	0.210	NOEC - P	4.60	LOEC - P	--	USACOE ERED 2014
Endrin	Whole body	Channel catfish	fingerling	0.310	NOEC - S,G	0.70	LOEC - S	--	Jarvinen and Ankley 1999
Endrin aldehyde	Whole body	Channel catfish	fingerling	0.310	NOEC - S,G	0.70	LOEC - S	Endrin	Jarvinen and Ankley 1999
Endrin ketone	Whole body	Channel catfish	fingerling	0.310	NOEC - S,G	0.70	LOEC - S	Endrin	Jarvinen and Ankley 1999
gamma-BHC (Lindane)	Muscle	Bluegill	juvenile-adult	0.297	NOEC - S,G	1.49	NOEC x 5	--	Jarvinen and Ankley 1999
gamma-Chlordane	Whole body	Sheepshead minnow	adult	1.38	NOEC - R	3.81	LOEC - R	--	USACOE ERED 2014
Heptachlor	Whole body	Spot	juvenile	5.30	NOEC - S	26.5	NOEC x 5	--	Jarvinen and Ankley 1999
Heptachlor epoxide	Whole body	Spot	juvenile	3.70	NOEC - S	18.5	NOEC x 5	--	Jarvinen and Ankley 1999
Methoxychlor	Whole body	Brook trout	yearling	2.50	NOEC - S,G	12.5	NOEC x 5	--	Jarvinen and Ankley 1999
Toxaphene	Whole body	Brook trout	adult	0.20	NOEC - S,G,R	0.40	LOEC - R	--	Jarvinen and Ankley 1999

Table D-40
Fish Tissue-Based Ecological Screening Values (wet weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Type	Organism	Life Stage	NOEC (wet-weight)	Basis[1]	LOEC (wet-weight)	Basis[1]	Comment	Reference
Polychlorinated Biphenyls (MG/KG)									
Aroclor-1016	Whole body	Sheepshead minnow	adult	110	NOEC - S	550	NOEC x 5		Jarvinen and Ankley 1999
Aroclor-1221	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1232	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1242	Whole body	Channel catfish	fingerling	14.3	NOEC - S,G	71.5	NOEC x 5	--	Jarvinen and Ankley 1999
Aroclor-1248	Whole body	Fathead minnow	embryo-adult	2.80	NOEC - S,G,R	11.0	LOEC - G	--	Jarvinen and Ankley 1999
Aroclor-1254	Whole body	Channel catfish	fingerling	21.0	NOEC - S,G	105	NOEC x 5	--	Jarvinen and Ankley 1999
Aroclor-1260	Whole body	Channel catfish	fingerling	32.0	NOEC - S,G	160	NOEC x 5	--	Jarvinen and Ankley 1999
Total PCBs	Whole body	--	--	2.80	--	11.0	--	Lowest Aroclor value	
Dioxin-Like PCB Congeners (MG/KG)									
2,3,7,8-TCDD	Whole body	Mosquitofish	adult	0.0235	LOEC / 5	0.1174	LOEC - S	--	Jarvinen and Ankley 1999

[1] NOEC - No Observed Effect Concentration; LOEC - Lowest Observed Effect Concentration; TEL - Threshold Effect Level. S - Survival; G - Growth; R - Reproduction; P - Physiological/Behavior

Table D-41
Frog Tissue-Based Ecological Screening Values (wet-weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Type	Organism	Life Stage	NOEC (wet-weight)	Basis[1]	LOEC (wet-weight)	Basis[1]	Comment	Reference
Metals (MG/KG)									
Arsenic	--	--	--	NSV	--	NSV	--	--	--
Cadmium	Whole body	*Xenopus laevis*	larval	3.80	NOEC - S,G	19.0	NOEC x 5	Cadmium chloride	Jarvinen and Ankley 1999
Chromium	--	--	--	NSV	--	NSV	--	--	--
Copper	Whole body	Green frog	adult	13.0	NOEC - P	65.0	NOEC x 5	--	USACOE ERED 2013
Lead	Whole body	Green frog	juvenile	0.78	NOEC - P	3.90	NOEC x 5	--	USACOE ERED 2013
Mercury	--	--	--	NSV	--	NSV	--	--	--
Nickel	Whole body	Green frog	adult	0.122	NOEC - P	0.61	NOEC x 5	--	USACOE ERED 2013
Selenium	--	--	--	NSV	--	NSV	--	--	--
Silver	--	--	--	NSV	--	NSV	--	--	--
Zinc	Whole body	Green frog	juvenile	9.80	NOEC - P	49.0	NOEC x 5	--	USACOE ERED 2013
Pesticides (MG/KG)									
4,4'-DDD	--	--	--	NSV	--	NSV	--	--	--
4,4'-DDE	--	--	--	NSV	--	NSV	--	--	--
4,4'-DDT	--	--	--	NSV	--	NSV	--	--	--
Aldrin	--	--	--	NSV	--	NSV	--	--	--
alpha-BHC	--	--	--	NSV	--	NSV	--	--	--
alpha-Chlordane	--	--	--	NSV	--	NSV	--	--	--
beta-BHC	--	--	--	NSV	--	NSV	--	--	--
delta-BHC	--	--	--	NSV	--	NSV	--	--	--
Dieldrin	--	--	--	NSV	--	NSV	--	--	--
Endosulfan I	--	--	--	NSV	--	NSV	--	--	--
Endosulfan II	--	--	--	NSV	--	NSV	--	--	--
Endosulfan sulfate	--	--	--	NSV	--	NSV	--	--	--
Endrin	Whole body	Southern leopard frog	juvenile	0.06	NOEC - S	0.43	LOEC - S	--	Jarvinen and Ankley 1999
Endrin aldehyde	Whole body	Southern leopard frog	juvenile	0.06	NOEC - S	0.43	LOEC - S	Endrin	Jarvinen and Ankley 1999
Endrin ketone	Whole body	Southern leopard frog	juvenile	0.06	NOEC - S	0.43	LOEC - S	Endrin	Jarvinen and Ankley 1999
gamma-BHC (Lindane)	--	--	--	NSV	--	NSV	--	--	--
gamma-Chlordane	--	--	--	NSV	--	NSV	--	--	--
Heptachlor	--	--	--	NSV	--	NSV	--	--	--
Heptachlor epoxide	--	--	--	NSV	--	NSV	--	--	--
Methoxychlor	--	--	--	NSV	--	NSV	--	--	--
Toxaphene	--	--	--	NSV	--	NSV	--	--	--

Table D-41
Frog Tissue-Based Ecological Screening Values (wet-weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Type	Organism	Life Stage	NOEC (wet-weight)	Basis[1]	LOEC (wet-weight)	Basis[1]	Comment	Reference
Polychlorinated Biphenyls (MG/KG)									
Aroclor-1016	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1221	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1232	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1242	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1248	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1254	Whole body	*Xenopus laevis*	larval	22.8	LOEC / 5	114	LOEC - G	--	USACOE ERED 2013
Aroclor-1260	--	--	--	NSV	--	NSV	--	--	--
Total PCBs	Whole body	--	--	22.8	--	114	--	Aroclor-1254 value	
Dioxin-Like PCB Congeners (MG/KG)									
2,3,7,8-TCDD	--	--	--	NSV	--	NSV	--	--	--

[1] NOEC - No Observed Effect Concentration; LOEC - Lowest Observed Effect Concentration; TEL - Threshold Effect Level. S - Survival; G - Growth; R - Reproduction; P - Physiological/Behavior

Table D-42
Initial Screening Statistics for Plants and Soil Invertebrates - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
Volatile Organic Compounds (UG/KG)									
2-Butanone	4.14 - 15.4	8 / 28	3.06	23.5	CAPL-SS64-1112	NSV	-- / --	NSV	YES
Acetone	9.22 - 16.1	15 / 28	7.77	210	CAPL-SS65-1112	NSV	-- / --	NSV	YES
Methyl acetate	3.95 - 15.4	1 / 28	24.0	24.0	CAPL-SS59-1012	NSV	-- / --	NSV	YES
Styrene	1.98 - 7.68	2 / 28	15.2	38.2	CAPL-SS44-1012	64,000	0 / 28	0.001	NO
Semivolatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	3.61 - 190	17 / 28	3.51	117	CAPL-SS65-1112	LMW PAH	-- / --	--	--
Acenaphthene	3.61 - 190	2 / 28	75.6	166	CAPL-SS74-1112	LMW PAH	-- / --	--	--
Acenaphthylene	3.61 - 190	2 / 28	15.0	144	CAPL-SS67-1112	LMW PAH	-- / --	--	--
Anthracene	3.61 - 42.7	3 / 28	271	1,690	CAPL-SS67-1112	LMW PAH	-- / --	--	--
Benzaldehyde	22.6 - 2,090	1 / 28	517	517	CAPL-SS65-1112	NSV	-- / --	NSV	YES
Benzo(a)anthracene	4.10 - 41.8	18 / 28	4.19	14,400	CAPL-SS67-1112	HMW PAH	-- / --	--	--
Benzo(a)pyrene	3.61 - 41.8	18 / 28	5.61	8,120	CAPL-SS67-1112	HMW PAH	-- / --	--	--
Benzo(b)fluoranthene	5.33 - 39.2	24 / 28	4.31	11,300	CAPL-SS67-1112	HMW PAH	-- / --	--	--
Benzo(g,h,i)perylene	4.10 - 41.8	18 / 28	3.98	4,730	CAPL-SS61-1112	HMW PAH	-- / --	--	--
Benzo(k)fluoranthene	3.61 - 41.8	20 / 28	4.52	8,830	CAPL-SS67-1112	HMW PAH	-- / --	--	--
bis(2-Ethylhexyl)phthalate	22.6 - 2,090	5 / 28	137	1,000	CAPL-SS68-1112	30,000	0 / 28	0.03	NO
Carbazole	22.6 - 2,090	2 / 28	968	1,450	CAPL-SS67-1112	7,000	0 / 28	0.21	NO
Chrysene	3.61 - 39.2	23 / 28	4.79	19,200	CAPL-SS67-1112	HMW PAH	-- / --	--	--
Dibenz(a,h)anthracene	3.61 - 42.7	8 / 28	1.98	2,080	CAPL-SS67-1112	HMW PAH	-- / --	--	--
Fluoranthene	17.4 - 17.4	27 / 28	3.57	72,300	CAPL-SS67-1112	LMW PAH	-- / --	--	--
Fluorene	3.61 - 190	1 / 28	169	169	CAPL-SS74-1112	LMW PAH	-- / --	--	--
Indeno(1,2,3-cd)pyrene	4.10 - 41.8	19 / 28	4.87	4,200	CAPL-SS61-1112	HMW PAH	-- / --	--	--
Naphthalene	3.61 - 190	8 / 28	7.72	423	CAPL-SS65-1112	LMW PAH	-- / --	--	--
PAH (HMW)	-- - --	28 / 28	24.7	125,650	CAPL-SS67-1112	18,000	2 / 28	6.98	YES
PAH (LMW)	148 - 148	27 / 28	31.9	81,278	CAPL-SS67-1112	29,000	1 / 28	2.80	YES
Phenanthrene	3.61 - 39.2	23 / 28	4.25	6,370	CAPL-SS67-1112	LMW PAH	-- / --	--	--
Pyrene	16.6 - 16.6	27 / 28	3.25	54,600	CAPL-SS67-1112	HMW PAH	-- / --	--	--

Table D-42
Initial Screening Statistics for Plants and Soil Invertebrates - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
Pesticides (UG/KG)									
4,4'-DDD	0.35 - 0.44	23 / 28	0.38	353	CAPL-SS63-1112	583	0 / 28	0.61	NO
4,4'-DDE	0.35 - 0.46	24 / 28	0.32	2,640	CAPL-SS63-1112	114	7 / 28	23.2	YES
4,4'-DDT	0.37 - 0.44	25 / 28	0.26	808	CAPL-SS63-1112	100	6 / 28	8.08	YES
Aldrin	0.35 - 0.53	3 / 28	0.36	2.56	CAPL-SS58-1012	3.63	0 / 28	0.71	NO
alpha-BHC	0.35 - 0.47	5 / 28	0.21	1.05	CAPL-SS59-1012	226	0 / 28	0.005	NO
alpha-Chlordane	0.35 - 0.53	12 / 28	0.26	13.3	CAPL-SS73-1112	11.0	1 / 28	1.21	YES
beta-BHC	0.35 - 0.54	2 / 28	0.21	0.31	CAPL-SS67-1112	342	0 / 28	0.001	NO
delta-BHC	0.35 - 0.53	10 / 28	0.16	1.07	CAPL-SS61-1112	226	0 / 28	0.005	NO
Dieldrin	0.35 - 0.53	19 / 28	0.26	253	CAPL-SS46-1012	10.5	8 / 28	24.1	YES
Endosulfan I	0.35 - 0.54	5 / 28	0.26	1.14	CAPL-SS67-1112	6.32	0 / 28	0.18	NO
Endosulfan II	0.35 - 0.54	16 / 28	0.23	42.8	CAPL-SS46-1012	6.32	6 / 28	6.77	YES
Endosulfan sulfate	0.35 - 0.53	19 / 28	0.30	694	CAPL-SS46-1012	6.32	7 / 28	110	YES
Endrin	0.35 - 0.54	12 / 28	0.28	77.7	CAPL-SS46-1012	1.95	8 / 28	39.8	YES
Endrin aldehyde	0.35 - 0.54	14 / 28	0.52	22.9	CAPL-SS46-1012	1.95	6 / 28	11.7	YES
Endrin ketone	0.35 - 0.53	16 / 28	0.27	83.3	CAPL-SS47-1012	1.95	9 / 28	42.7	YES
gamma-BHC (Lindane)	0.35 - 0.53	8 / 28	0.14	4.76	CAPL-SS61-1112	7.75	0 / 28	0.61	NO
gamma-Chlordane	0.40 - 3.82	26 / 28	0.25	15.5	CAPL-SS47-1012	11.0	3 / 28	1.41	YES
Heptachlor	0.35 - 0.53	4 / 28	0.15	3.53	CAPL-SS58-1012	52.9	0 / 28	0.07	NO
Heptachlor epoxide	0.35 - 0.54	9 / 28	0.16	9.28	CAPL-SS63-1112	52.9	0 / 28	0.18	NO
Methoxychlor	0.35 - 0.46	22 / 28	0.20	74.9	CAPL-SS46-1012	500	0 / 28	0.15	NO
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1260	8.59 - 18.0	53 / 70	12.1	63,000	CAPL-SS09-0811	8,000	7 / 70	7.88	YES
Explosives (UG/KG)									
1,3,5-Trinitrobenzene	156 - 200	2 / 28	110	161	CAPL-SS67-1112	NSV	-- / --	NSV	YES
Nitroglycerin	391 - 500	1 / 28	866	866	CAPL-SS58-1012	NSV	-- / --	NSV	YES
Inorganics (MG/KG)									
Aluminum	-- - --	28 / 28	2,100	25,800	CAPL-SS68-1112	pH < 5.5	2 / 28	--	YES
Antimony	0.79 - 2.73	2 / 28	1.09	11.6	CAPL-SS65-1112	78.0	0 / 28	0.15	NO

Table D-42
Initial Screening Statistics for Plants and Soil Invertebrates - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
Arsenic	-- - --	28 / 28	0.94	19.3	CAPL-SS60-1112	18.0	1 / 28	1.07	YES
Barium	-- - --	28 / 28	10.9	175	CAPL-SS65-1112	330	0 / 28	0.53	NO
Beryllium	0.27 - 0.54	25 / 28	0.17	1.64	CAPL-SS45-1012	40.0	0 / 28	0.04	NO
Cadmium	0.20 - 0.67	15 / 28	0.21	2.32	CAPL-SS47-1012	32.0	0 / 28	0.07	NO
Calcium [2]	-- - --	28 / 28	368	58,200	CAPL-SS74-1112	NSV	-- / --	NSV	NO
Chromium	-- - --	28 / 28	3.54	69.7	CAPL-SS61-1112	64.0	2 / 28	1.09	YES
Cobalt	1.37 - 3.03	26 / 28	0.86	6.04	CAPL-SS60-1112	13.0	0 / 28	0.46	NO
Copper	-- - --	28 / 28	1.97	51.5	CAPL-SS75-1112	70.0	0 / 28	0.74	NO
Cyanide	0.25 - 0.38	1 / 28	0.16	0.16	CAPL-SS75-1112	15.8	0 / 28	0.01	NO
Iron	-- - --	28 / 28	2,310	53,300	CAPL-SS60-1112	5 < pH > 8	6 / 28	--	YES
Lead	-- - --	28 / 28	9.10	211	CAPL-SS47-1012	120	4 / 28	1.76	YES
Magnesium [2]	-- - --	28 / 28	232	22,800	CAPL-SS72-1112	NSV	-- / --	NSV	NO
Manganese	-- - --	28 / 28	7.46	405	CAPL-SS70-1112	220	8 / 28	1.84	YES
Mercury	0.029 - 0.064	19 / 28	0.019	0.25	CAPL-SS66-1112	0.10	5 / 28	2.47	YES
Nickel	-- - --	28 / 28	1.35	18.5	CAPL-SS68-1112	38.0	0 / 28	0.49	NO
Potassium [2]	-- - --	28 / 28	275	4,240	CAPL-SS60-1112	NSV	-- / --	NSV	NO
Vanadium	-- - --	28 / 28	5.28	67.3	CAPL-SS45-1012	130	0 / 28	0.52	NO
Zinc	-- - --	28 / 28	10.9	428	CAPL-SS47-1012	120	8 / 28	3.57	YES
Other Parameters									
pH	-- - --	28 / 28	5.25	11.9	CAPL-SS74-1112	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	28 / 28	5,900	128,000	CAPL-SS65-1112	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Macronutrient - Not considered to be a COPC

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO01		CAPL-SO02	CAPL-SO03	CAPL-SO04	CAPL-SO05	CAPL-SO06	CAPL-SO07	CAPL-SO08	CAPL-SO09
			CAPL-SS01-0811	CAPL-SS01P-0811	CAPL-SS02-0811	CAPL-SS03-0811	CAPL-SS04-0811	CAPL-SS05-0811	CAPL-SS06-0811	CAPL-SS07-0811	CAPL-SS08-0811	CAPL-SS09-0811
			8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011
Volatile Organic Compounds (UG/KG)												
2-Butanone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	64,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	30,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	7,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW)	18,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW)	29,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)												
4,4'-DDD	583	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	114	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	100	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	3.63	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	342	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	10.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO01		CAPL-SO02	CAPL-SO03	CAPL-SO04	CAPL-SO05	CAPL-SO06	CAPL-SO07	CAPL-SO08	CAPL-SO09
			CAPL-SS01-0811	CAPL-SS01P-0811	CAPL-SS02-0811	CAPL-SS03-0811	CAPL-SS04-0811	CAPL-SS05-0811	CAPL-SS06-0811	CAPL-SS07-0811	CAPL-SS08-0811	CAPL-SS09-0811
			8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011
Endrin ketone	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	7.75	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	500	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	8,000	--	5,600	4,300	23,000	590	17,000	4,400	2,000	73	94	63,000
Explosives (UG/KG)												
1,3,5-Trinitrobenzene	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)												
Aluminum	pH < 5.5	12,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	78.0	11.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	18.0	6.36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	330	52.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	40.0	0.587	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	32.0	1.50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	64.0	18.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	13.0	9.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	70.0	4.25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	15.8	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5 < pH > 8	19,900	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	120	17.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	220	324	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.10	0.111	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	38.0	9.52	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	130	27.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	120	26.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters												
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO10		CAPL-SO11	CAPL-SO12	CAPL-SO13	CAPL-SO14	CAPL-SO15	CAPL-SO16	CAPL-SO17
			CAPL-SS10-0811	CAPL-SS10P-0811	CAPL-SS11-0811	CAPL-SS12-0811	CAPL-SS13-0811	CAPL-SS14-0811	CAPL-SS15-0811	CAPL-SS16-0811	CAPL-SS17-0811
			8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/2/2011	8/1/2011
Volatile Organic Compounds (UG/KG)											
2-Butanone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	64,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)											
2-Methylnaphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	30,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	7,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW)	18,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW)	29,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)											
4,4'-DDD	583	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	114	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	100	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	3.63	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	342	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	10.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO10		CAPL-SO11	CAPL-SO12	CAPL-SO13	CAPL-SO14	CAPL-SO15	CAPL-SO16	CAPL-SO17
			CAPL-SS10-0811	CAPL-SS10P-0811	CAPL-SS11-0811	CAPL-SS12-0811	CAPL-SS13-0811	CAPL-SS14-0811	CAPL-SS15-0811	CAPL-SS16-0811	CAPL-SS17-0811
			8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/1/2011	8/2/2011	8/1/2011
Endrin ketone	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	7.75	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	500	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)											
Aroclor-1260	8,000	--	13,000	17,000	38,000	1,000	560	340	290	18 U	140
Explosives (UG/KG)											
1,3,5-Trinitrobenzene	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)											
Aluminum	pH < 5.5	12,200	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	78.0	11.0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	18.0	6.36	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	330	52.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	40.0	0.587	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	32.0	1.50	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	64.0	18.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	13.0	9.93	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	70.0	4.25	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	15.8	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5 < pH > 8	19,900	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	120	17.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	220	324	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.10	0.111	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	38.0	9.52	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	130	27.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	120	26.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters											
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO18		CAPL-SO19	CAPL-SO21	CAPL-SO22	CAPL-SO23	CAPL-SO24	CAPL-SO25	CAPL-SO26	CAPL-SO27
			CAPL-SS18-0811	CAPL-SS18P-0811	CAPL-SS19-0811	CAPL-SS21-0811	CAPL-SS22-0811	CAPL-SS23-0811	CAPL-SS24-0811	CAPL-SS25-0811	CAPL-SS26-0811	CAPL-SS27-1012
			8/1/2011	8/1/2011	8/1/2011	8/2/2011	8/2/2011	8/2/2011	8/2/2011	8/1/2011	8/1/2011	10/31/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	64,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	30,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	7,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW)	18,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW)	29,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)												
4,4'-DDD	583	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	114	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	100	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	3.63	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	342	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	10.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO18		CAPL-SO19	CAPL-SO21	CAPL-SO22	CAPL-SO23	CAPL-SO24	CAPL-SO25	CAPL-SO26	CAPL-SO27
			CAPL-SS18-0811	CAPL-SS18P-0811	CAPL-SS19-0811	CAPL-SS21-0811	CAPL-SS22-0811	CAPL-SS23-0811	CAPL-SS24-0811	CAPL-SS25-0811	CAPL-SS26-0811	CAPL-SS27-1012
			8/1/2011	8/1/2011	8/1/2011	8/2/2011	8/2/2011	8/2/2011	8/2/2011	8/1/2011	8/1/2011	10/31/2012
Endrin ketone	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	7.75	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	500	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	8,000	--	17 U	17 U	450	49	150	30	22	390	30	4,350 J
Explosives (UG/KG)												
1,3,5-Trinitrobenzene	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)												
Aluminum	pH < 5.5	12,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	78.0	11.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	18.0	6.36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	330	52.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	40.0	0.587	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	32.0	1.50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	64.0	18.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	13.0	9.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	70.0	4.25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	15.8	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5 < pH > 8	19,900	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	120	17.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	220	324	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.10	0.111	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	38.0	9.52	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	130	27.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	120	26.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters												
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-43
Exceedances - Surface Soil
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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO28 CAPL-SS28-1112 11/2/2012	CAPL-SO29 CAPL-SS29-1012 10/31/2012	CAPL-SO29 CAPL-SS29P-1012 10/31/2012	CAPL-SO30 CAPL-SS30-1012 10/31/2012	CAPL-SO31 CAPL-SS31-1012 10/31/2012	CAPL-SO32 CAPL-SS32-1012 10/31/2012	CAPL-SO33 CAPL-SS33-1012 10/31/2012	CAPL-SO34 CAPL-SS34-1112 11/5/2012	CAPL-SO35 CAPL-SS35-1112 11/6/2012	CAPL-SO36 CAPL-SS36-1112 11/6/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	64,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	30,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	7,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW)	18,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW)	29,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)												
4,4'-DDD	583	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	114	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	100	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	3.63	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	342	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	10.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Chemical	Soil ESV	Background UTL	CAPL-SO28	CAPL-SO29		CAPL-SO30	CAPL-SO31	CAPL-SO32	CAPL-SO33	CAPL-SO34	CAPL-SO35	CAPL-SO36
			CAPL-SS28-1112	CAPL-SS29-1012	CAPL-SS29P-1012	CAPL-SS30-1012	CAPL-SS31-1012	CAPL-SS32-1012	CAPL-SS33-1012	CAPL-SS34-1112	CAPL-SS35-1112	CAPL-SS36-1112
			11/2/2012	10/31/2012	10/31/2012	10/31/2012	10/31/2012	10/31/2012	10/31/2012	11/5/2012	11/6/2012	11/6/2012
Endrin ketone	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	7.75	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	500	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	8,000	--	117 J	94.2	150	26.6	627	34.9	10.6 U	44.6 J	10.4 UL	30.4 K
Explosives (UG/KG)												
1,3,5-Trinitrobenzene	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)												
Aluminum	pH < 5.5	12,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	78.0	11.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	18.0	6.36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	330	52.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	40.0	0.587	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	32.0	1.50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	64.0	18.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	13.0	9.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	70.0	4.25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	15.8	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5 < pH > 8	19,900	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	120	17.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	220	324	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.10	0.111	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	38.0	9.52	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	130	27.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	120	26.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters												
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

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Exceedances - Surface Soil
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Chemical	Soil ESV	Background UTL	CAPL-SO37 CAPL-SS37-1112 11/6/2012	CAPL-SO38 CAPL-SS38-1012 10/31/2012	CAPL-SO39 CAPL-SS39-1012 10/31/2012	CAPL-SO39 CAPL-SS39P-1012 10/31/2012	CAPL-SO40 CAPL-SS40-1112 11/1/2012	CAPL-SO41 CAPL-SS41-1012 10/31/2012	CAPL-SO42 CAPL-SS42-1012 10/31/2012	CAPL-SO43 CAPL-SS43-1112 11/1/2012	CAPL-SO44 CAPL-SS44-1012 10/26/2012
Volatile Organic Compounds (UG/KG)											
2-Butanone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	6.35 UJ
Acetone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	7.77 J
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	6.35 U
Styrene	64,000	--	NA	NA	NA	NA	NA	NA	NA	NA	38.2
Semivolatile Organic Compounds (UG/KG)											
2-Methylnaphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	9.42
Acenaphthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	3.83 U
Acenaphthylene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	3.83 U
Anthracene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	3.83 U
Benzaldehyde	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	192 U
Benzo(a)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	5.75 J
Benzo(a)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	6.85 J
Benzo(b)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	11.5
Benzo(g,h,i)perylene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	7.69
Benzo(k)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	7.66 J
bis(2-Ethylhexyl)phthalate	30,000	--	NA	NA	NA	NA	NA	NA	NA	NA	192 U
Carbazole	7,000	--	NA	NA	NA	NA	NA	NA	NA	NA	192 U
Chrysene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	13.4
Dibenz(a,h)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	1.98 J
Fluoranthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	10.3
Fluorene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	3.83 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	6.99 J
Naphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	13.5
PAH (HMW)	18,000	--	NA	NA	NA	NA	NA	NA	NA	NA	72.7 J
PAH (LMW)	29,000	--	NA	NA	NA	NA	NA	NA	NA	NA	143 J
Phenanthrene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	5.93 J
Pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	10.9
Pesticides (UG/KG)											
4,4'-DDD	583	--	NA	NA	NA	NA	NA	NA	NA	NA	0.566 J
4,4'-DDE	114	--	NA	NA	NA	NA	NA	NA	NA	NA	1.92 L
4,4'-DDT	100	--	NA	NA	NA	NA	NA	NA	NA	NA	2.15 J
Aldrin	3.63	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL
alpha-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL
alpha-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL
beta-BHC	342	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL
delta-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL
Dieldrin	10.5	--	NA	NA	NA	NA	NA	NA	NA	NA	2.25 L
Endosulfan I	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL
Endosulfan II	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	1.64 J
Endosulfan sulfate	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	4.63 J
Endrin	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	0.432 J
Endrin aldehyde	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL

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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO37 CAPL-SS37-1112 11/6/2012	CAPL-SO38 CAPL-SS38-1012 10/31/2012	CAPL-SO39 CAPL-SS39-1012 10/31/2012	CAPL-SO39 CAPL-SS39P-1012 10/31/2012	CAPL-SO40 CAPL-SS40-1112 11/1/2012	CAPL-SO41 CAPL-SS41-1012 10/31/2012	CAPL-SO42 CAPL-SS42-1012 10/31/2012	CAPL-SO43 CAPL-SS43-1112 11/1/2012	CAPL-SO44 CAPL-SS44-1012 10/26/2012
Endrin ketone	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	0.756 J
gamma-BHC (Lindane)	7.75	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL
gamma-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	2.59 J
Heptachlor	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL
Heptachlor epoxide	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	0.394 UL
Methoxychlor	500	--	NA	NA	NA	NA	NA	NA	NA	NA	0.367 J
Polychlorinated Biphenyls (UG/KG)											
Aroclor-1260	8,000	--	21.9 K	9.71 U	10.8 U	8.76 UL	9.22 U	16.2 J	10.3 UL	9.52 UL	177 J
Explosives (UG/KG)											
1,3,5-Trinitrobenzene	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	174 U
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	435 U
Inorganics (MG/KG)											
Aluminum	pH < 5.5	12,200	NA	NA	NA	NA	NA	NA	NA	NA	10,100
Antimony	78.0	11.0	NA	NA	NA	NA	NA	NA	NA	NA	0.914 U
Arsenic	18.0	6.36	NA	NA	NA	NA	NA	NA	NA	NA	2.54
Barium	330	52.9	NA	NA	NA	NA	NA	NA	NA	NA	36.1
Beryllium	40.0	0.587	NA	NA	NA	NA	NA	NA	NA	NA	0.397 J
Cadmium	32.0	1.50	NA	NA	NA	NA	NA	NA	NA	NA	0.228 U
Chromium	64.0	18.2	NA	NA	NA	NA	NA	NA	NA	NA	14
Cobalt	13.0	9.93	NA	NA	NA	NA	NA	NA	NA	NA	1.71
Copper	70.0	4.25	NA	NA	NA	NA	NA	NA	NA	NA	6.4
Cyanide	15.8	--	NA	NA	NA	NA	NA	NA	NA	NA	0.284 U
Iron	5 < pH > 8	19,900	NA	NA	NA	NA	NA	NA	NA	NA	10,100
Lead	120	17.4	NA	NA	NA	NA	NA	NA	NA	NA	17.6
Manganese	220	324	NA	NA	NA	NA	NA	NA	NA	NA	51.1
Mercury	0.10	0.111	NA	NA	NA	NA	NA	NA	NA	NA	0.0491 B
Nickel	38.0	9.52	NA	NA	NA	NA	NA	NA	NA	NA	3.72
Vanadium	130	27.9	NA	NA	NA	NA	NA	NA	NA	NA	19.6
Zinc	120	26.5	NA	NA	NA	NA	NA	NA	NA	NA	36.7
Other Parameters											
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	5.99 H3
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	5,900

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO45		CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49		CAPL-SO50	CAPL-SO55	CAPL-SO56
			CAPL-SS45-1012	CAPL-SS45P-1012	CAPL-SS46-1012	CAPL-SS47-1012	CAPL-SS48-1012	CAPL-SS49-1012	CAPL-SS49P-1012	CAPL-SS50-1012	CAPL-SS55-1012	CAPL-SS56-1012
			10/26/2012	10/26/2012	10/26/2012	10/26/2012	10/24/2012	10/24/2012	10/24/2012	10/24/2012	10/26/2012	10/26/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	NSV	--	6.8 UJ	6.82 UJ	7.34 UJ	5.35 UJ	14.7 J	6.52 U	6.39 U	8.07 U	3.06 J	7.16 U
Acetone	NSV	--	8.33 J	13.6 UJ	14.7 UJ	10.7 UJ	186 L	13 UJ	12.8 UJ	16.1 UJ	96.8 J	14.3 UJ
Methyl acetate	NSV	--	6.8 U	6.82 U	7.34 U	5.35 U	11.1 U	6.52 U	6.39 U	8.07 U	5.65 U	7.16 U
Styrene	64,000	--	3.4 U	3.41 U	3.67 U	2.67 U	5.54 UL	3.26 U	3.2 U	4.04 U	2.82 U	3.58 U
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	LMW PAH	--	3.96 U	4.1 U	69.7 J	71.6 J	59 K	46 K	91.3	45.9 K	3.61 U	4.53 U
Acenaphthene	LMW PAH	--	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	4 U	20.4 U	3.61 U	4.53 U
Acenaphthylene	LMW PAH	--	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	15	20.4 U	3.61 U	4.53 U
Anthracene	LMW PAH	--	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	4 U	20.4 U	3.61 U	4.53 U
Benzaldehyde	NSV	--	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U
Benzo(a)anthracene	HMW PAH	--	3.96 U	4.1 U	86.6	72.4 J	56.1 J	23.5	47.3	92.3	4.19 J	6.82 J
Benzo(a)pyrene	HMW PAH	--	3.96 U	4.1 U	122	78.4 J	86.6 K	23.6 K	51.5	90.9 K	3.61 U	4.53 U
Benzo(b)fluoranthene	HMW PAH	--	4.78 J	4.97 J	197	187	137 K	50.5 K	75.9	135 K	4.31 J	9.95
Benzo(g,h,i)perylene	HMW PAH	--	3.96 U	4.1 U	133	125	40.9 U	31.3 K	58.8	76.1 K	3.98 J	4.53 U
Benzo(k)fluoranthene	HMW PAH	--	3.96 U	4.1 U	139	83.9 J	40.9 U	33	48.7	90.7	3.61 U	7.61 J
bis(2-Ethylhexyl)phthalate	30,000	--	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U
Carbazole	7,000	--	199 U	205 U	1,000 U	1,070 U	1,030 U	198 U	201 U	204 U	181 U	22.6 U
Chrysene	HMW PAH	--	4.79 J	4.1 U	200	189	109 K	50.1 K	102	211 K	3.61 U	9.62
Dibenz(a,h)anthracene	HMW PAH	--	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	9.61 K	4 U	20.4 U	3.61 U	4.53 U
Fluoranthene	LMW PAH	--	3.57 J	2.84 J	246	211	145	63.8	107	298	5.6 J	4.77 J
Fluorene	LMW PAH	--	3.96 U	4.1 U	40.1 U	42.5 U	40.9 U	3.96 U	4 U	20.4 U	3.61 U	4.53 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	3.96 U	4.1 U	114	97.7	70 J	29.1	39.3	71.5	4.87 J	8.28 J
Naphthalene	LMW PAH	--	3.96 U	4.1 U	62.3 J	49.3 J	40.9 U	30.3 K	51.3	20.4 U	3.61 U	4.53 U
PAH (HMW)	18,000	--	24.7 J	21.8 J	1,225	1,038 J	654 K	309 K	523	1,041 K	30.3 J	54.0 J
PAH (LMW)	29,000	--	117 J	120 J	1,066 J	1,095 J	914 K	303 K	477	566 K	109 J	31.9 J
Phenanthrene	LMW PAH	--	3.96 U	4.1 U	108	143	92.8	55.7	106	69.5	3.61 U	4.53 U
Pyrene	HMW PAH	--	3.25 J	2.44 J	213	183	134 K	58.5 K	97.2	263 K	5.68 J	4.95 J
Pesticides (UG/KG)												
4,4'-DDD	583	--	0.295 J	0.398 J	22.6 J	17 J	26.8 J	44 J	78.5 J	27.3 J	0.356 UL	1.5 J
4,4'-DDE	114	--	2.14 L	1.89 L	179	53.6 J	206	186 J	254 J	285 K	0.32 L	2.92 L
4,4'-DDT	100	--	1.76 J	1.6 J	194 J	70.4 J	214 J	30.8 J	40.8	132 K	0.363 L	0.264 J
Aldrin	3.63	--	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.424 UL	0.401 U	0.406 U	0.395 U	0.356 UL	0.452 UL
alpha-BHC	226	--	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.418 J	0.401 U	0.406 U	0.395 U	0.356 UL	0.496 J
alpha-Chlordane	11.0	--	0.409 UL	0.407 UL	8.46 J	4.38 J	1.72 J	0.401 U	0.609 J	1.33 J	0.356 UL	0.452 UL
beta-BHC	342	--	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.211 J	0.401 U	0.406 U	0.395 U	0.356 UL	0.452 UL
delta-BHC	226	--	0.409 UL	0.407 UL	0.209 J	0.438 UL	0.424 UL	0.401 UL	0.258 J	0.395 UL	0.356 UL	0.452 UL
Dieldrin	10.5	--	1.19 L	1.48 J	253 J	140 L	16.8 J	1.49 J	13.7 J	18.8 J	0.356 UL	0.452 UL
Endosulfan I	6.32	--	0.409 UL	0.407 UL	0.385 L	0.438 UL	1.06 L	0.401 U	0.406 U	0.395 UJ	0.356 UL	0.452 UL
Endosulfan II	6.32	--	1.17 J	0.876 J	42.8 J	19.7 J	10.8 J	4.18 J	5.33 J	8.16 J	0.356 UL	0.452 UL
Endosulfan sulfate	6.32	--	2.99 J	2.32 J	694 J	365 L	4.23 J	0.401 U	20.5	0.395 U	0.356 UL	0.399 L
Endrin	1.95	--	0.279 J	0.205 J	77.7 J	43 J	3.25 J	4.55 J	1.65 J	3.09 J	0.356 UL	0.452 UL
Endrin aldehyde	1.95	--	0.409 UL	0.407 UL	22.9 J	16.5 J	1.34 J	0.597 J	0.746 J	1.59 J	0.356 UL	0.452 UL

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO45		CAPL-SO46	CAPL-SO47	CAPL-SO48	CAPL-SO49		CAPL-SO50	CAPL-SO55	CAPL-SO56
			CAPL-SS45-1012	CAPL-SS45P-1012	CAPL-SS46-1012	CAPL-SS47-1012	CAPL-SS48-1012	CAPL-SS49-1012	CAPL-SS49P-1012	CAPL-SS50-1012	CAPL-SS55-1012	CAPL-SS56-1012
			10/26/2012	10/26/2012	10/26/2012	10/26/2012	10/24/2012	10/24/2012	10/24/2012	10/24/2012	10/26/2012	10/26/2012
Endrin ketone	1.95	--	0.558 J	0.452 J	45.9 J	83.3 J	5.46 J	1.18 J	1.81 J	2.62 J	0.356 UL	0.452 UL
gamma-BHC (Lindane)	7.75	--	0.409 UL	0.407 UL	0.411 UL	0.149 J	0.297 J	0.137 J	0.406 U	0.395 U	0.356 UL	0.452 UL
gamma-Chlordane	11.0	--	1.33 J	3.55 L	9.77 J	15.5 J	4.79 J	3.82 B	0.874 B	4.04 J	1.29 J	2.1 J
Heptachlor	52.9	--	0.409 UL	0.407 UL	0.411 UL	0.438 UL	0.424 UL	0.401 U	0.406 U	0.395 UL	0.356 UL	0.452 UL
Heptachlor epoxide	52.9	--	0.409 UL	0.407 UL	0.176 J	0.164 J	0.528 J	0.401 UL	0.517 J	0.258 J	0.356 UL	0.452 UL
Methoxychlor	500	--	0.649 J	0.375 J	74.9 J	29.9 J	13.3 J	1.74 J	0.873 J	5.18 J	0.199 L	0.438 J
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	8,000	--	134 L	103 L	16,500 J	9,980 J	1,600 J	386	589 J	1,170 J	8.72 UL	14.9 J
Explosives (UG/KG)												
1,3,5-Trinitrobenzene	NSV	--	182 U	190 U	200 U	183 U	182 U	182 U	182 U	190 U	198 U	187 U
Nitroglycerin	NSV	--	455 U	476 U	500 U	459 U	455 U	455 U	455 U	476 U	495 U	467 U
Inorganics (MG/KG)												
Aluminum	pH < 5.5	12,200	25,200	24,000	20,500	19,500	9,730	9,410	11,000	9,410	4,920	2,100
Antimony	78.0	11.0	2.45 U	2.46 U	2.46 U	2.7 U	2.55 U	2.48 U	2.59 U	2.38 U	0.901 U	1.09 J
Arsenic	18.0	6.36	7.03	6.21	6.07	6.69	6.35	5.54	5.69	5.48	1.64	1.55
Barium	330	52.9	43.5	39	73.7	84.5	46.6	76.1	60.6	50.5	23.2	13.9
Beryllium	40.0	0.587	1.64	1.46 J	0.97 J	1.24 J	0.491 J	0.749 J	0.718 J	0.854 J	0.199 J	0.274 U
Cadmium	32.0	1.50	0.612 U	0.615 U	1.14 J	2.32	0.639 U	0.333 J	0.648 U	0.387 J	0.225 U	0.274 U
Chromium	64.0	18.2	45.9	46.3	41.4	35.3	17.2	16.1	17.7	19.9	5.46	3.54
Cobalt	13.0	9.93	4.96	4.78	3.76 J	4.71	2.38 J	3.09 J	3.02 J	2.94 J	0.861 J	1.37 U
Copper	70.0	4.25	6.59	5.42	24.9	39.3	11.9	18.1 J	12.7 J	19.8	2.07	3.12
Cyanide	15.8	--	0.296 U	0.312 U	0.306 U	0.302 U	0.315 U	0.307 U	0.305 U	0.298 U	0.272 U	0.336 U
Iron	5 < pH > 8	19,900	48,000	43,400	26,000	25,100	13,400	14,500 J	22,500 J	15,300	6,440	2,780
Lead	120	17.4	16.5	14.4	141	211	65	61.6 J	40.7 J	81	12.5	9.1
Manganese	220	324	30.2	25.9	213	308	212	170	141	297	59	7.46
Mercury	0.10	0.111	0.0603 B	0.0473 B	0.138	0.134	0.0712	0.061	0.0734	0.0472	0.0348 B	0.0421 B
Nickel	38.0	9.52	13.2	11.3	9.03	11.1	5.96	6.9	6.44	7.18	2.47	1.35 J
Vanadium	130	27.9	67.3	64.5	45.8	43.9	28.9	22.8	23.4	22	9.48	5.28
Zinc	120	26.5	41	33.7	315	428	139	71	55.4	85.2	10.9	31.7
Other Parameters												
pH	--	--	5.25 H3	NA	5.79 H3	6.46 H3	6.25 H3	7.65 H3	NA	7.55 H3	5.48 H3	5.71 H3
Total organic carbon (MG/KG)	--	--	24,700	NA	24,400	36,000	42,600	44,200	NA	52,300	9,100	16,200

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO57	CAPL-SO58	CAPL-SO59		CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65
			CAPL-SS57-1012	CAPL-SS58-1012	CAPL-SS59-1012	CAPL-SS59P-1012	CAPL-SS60-1112	CAPL-SS61-1112	CAPL-SS62-1112	CAPL-SS63-1112	CAPL-SS64-1112	CAPL-SS65-1112
			10/26/2012	10/26/2012	10/26/2012	10/26/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	NSV	--	8.91 U	15.4 U	8.44 J	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	23.5	5.38 J
Acetone	NSV	--	15.2 J	30.2 J	149 J	20.5 J	10.4 UJ	13.1 UJ	17.2 J	10.4 UJ	24.3 J	210 J
Methyl acetate	NSV	--	8.91 U	15.4 U	24.0	8.47 U	5.22 U	6.56 U	4.14 U	5.2 U	4.66 U	6.67 U
Styrene	64,000	--	4.45 U	7.68 U	3.82 U	4.23 U	2.61 U	3.28 U	2.07 U	2.6 U	2.33 U	15.2
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	LMW PAH	--	5.33 U	4.84 J	4.25 U	4.85 U	3.51 J	190 U	3.9 U	23.2 J	12.4	117
Acenaphthene	LMW PAH	--	5.33 U	5.34 U	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	4.18 U	4.72 U
Acenaphthylene	LMW PAH	--	5.33 U	5.34 U	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	4.18 U	4.72 U
Anthracene	LMW PAH	--	5.33 U	5.34 U	4.25 U	4.85 U	4.43 U	271 J	3.9 U	19.5 U	4.18 U	4.72 U
Benzaldehyde	NSV	--	267 U	268 U	213 U	243 U	222 U	1,910 U	195 U	195 U	210 U	517
Benzo(a)anthracene	HMW PAH	--	5.33 U	5.34 U	4.25 U	4.85 U	4.43 U	3,570	30.5	34.1 J	9.99	142
Benzo(a)pyrene	HMW PAH	--	5.33 U	6.2 J	5.61 J	4.85 U	4.43 U	4,780	54.6	23.9 J	11.8	195
Benzo(b)fluoranthene	HMW PAH	--	5.33 U	8.22 J	9.68	8.38 J	5.97 J	8,910	150	40.4	15.9	242
Benzo(g,h,i)perylene	HMW PAH	--	5.33 U	7.84 J	5.93 J	4.85 U	4.43 U	4,730	73.4	47.8	11	153
Benzo(k)fluoranthene	HMW PAH	--	5.33 U	9.57 J	6.64 J	8.49 J	4.52 J	7,950	85.2	40	7.92 J	289
bis(2-Ethylhexyl)phthalate	30,000	--	267 U	268 U	186 J	131 J	141 J	1,910 U	195 U	205 J	210 U	137 J
Carbazole	7,000	--	267 U	268 U	213 U	243 U	222 U	968 J	195 U	195 U	210 U	237 U
Chrysene	HMW PAH	--	5.33 U	13.9	4.25 U	4.85 U	4.43 U	8,790	143	67	18.5	373
Dibenz(a,h)anthracene	HMW PAH	--	5.33 U	5.34 U	4.25 U	4.85 U	4.43 U	1,260	17.6	19.5 U	4.18 U	62.6
Fluoranthene	LMW PAH	--	6.21 J	11.3	16.2 B	17.4 B	5.38 J	12,200	118	62.9	17.1	115
Fluorene	LMW PAH	--	5.33 U	5.34 U	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	4.18 U	4.72 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	5.33 U	7.83 J	5.82 J	4.85 U	4.43 U	4,200	65.6	19.5 U	9.11	134
Naphthalene	LMW PAH	--	5.33 U	5.34 U	4.25 U	4.85 U	4.43 U	190 U	3.9 U	19.5 U	7.72 J	423
PAH (HMW)	18,000	--	25.7 J	69.2 J	47.0 J	39.7 J	29.9 J	57,490	739	340 J	103 J	1,726
PAH (LMW)	29,000	--	160 J	169 J	131 U	148 U	141 J	17,091 J	245	266 J	170 J	996
Phenanthrene	LMW PAH	--	4.25 J	5.95 J	6.9 B	5.98 B	10.2	3,190	17.4	33.9 J	19.7	213
Pyrene	HMW PAH	--	4.37 J	10.3 J	13.8 B	16.6 B	6.11 J	13,300	119	67.7	17	135
Pesticides (UG/KG)												
4,4'-DDD	583	--	1.26 J	0.813 J	0.747 J	0.36 J	0.442 U	10.9 J	0.386 UL	353	0.519 J	0.381 J
4,4'-DDE	114	--	1.93	3.76 L	2.44 J	4.52 J	0.442 UJ	127 K	1.28 L	2,640	1.68 L	4.44 J
4,4'-DDT	100	--	0.331 J	7.79 J	0.324 J	0.491 U	0.442 UJ	122 K	1 J	808	0.433 UJ	0.605 J
Aldrin	3.63	--	0.528 U	2.56 L	0.432 UL	0.397 J	0.442 U	0.397 U	0.386 U	0.415 U	0.433 U	0.467 U
alpha-BHC	226	--	0.211 J	0.722 J	0.514 J	1.05 J	0.442 U	0.397 U	0.386 U	0.415 U	0.433 U	0.467 U
alpha-Chlordane	11.0	--	0.528 U	0.929 J	0.432 UL	0.491 UL	0.442 U	0.518 J	0.386 UL	8.88 L	0.433 UL	0.467 UL
beta-BHC	342	--	0.528 U	0.536 UL	0.432 UL	0.491 U	0.442 U	0.397 U	0.386 U	0.415 U	0.433 U	0.467 U
delta-BHC	226	--	0.528 U	0.213 J	0.432 UL	0.907 J	0.442 U	1.07 J	0.386 U	0.156 L	0.424 J	0.455 J
Dieldrin	10.5	--	0.528 U	0.565 J	0.432 UL	0.491 U	0.442 U	13.3 J	0.462 J	7.09 L	0.433 U	0.344 J
Endosulfan I	6.32	--	0.528 U	0.536 UL	0.432 UL	0.275 J	0.442 U	0.397 U	0.386 U	0.263 J	0.433 U	0.467 U
Endosulfan II	6.32	--	0.528 U	0.536 UL	0.432 UL	0.491 UL	0.442 U	4.69 J	0.386 UL	9.2 L	0.231 J	0.467 U
Endosulfan sulfate	6.32	--	0.528 U	0.648 J	0.432 UL	1.48 J	0.442 U	4.08 J	0.303 J	12.4 J	1.68 J	0.467 UL
Endrin	1.95	--	0.528 U	0.536 UL	0.432 UL	0.491 UL	0.442 U	1.75 J	0.492 J	13.3 J	0.433 U	0.467 UL
Endrin aldehyde	1.95	--	0.528 U	0.536 UL	0.432 UL	0.953 J	0.442 U	0.397 U	0.386 U	0.9 J	5.31 J	3.16 J

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO57	CAPL-SO58	CAPL-SO59		CAPL-SO60	CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64	CAPL-SO65
			CAPL-SS57-1012	CAPL-SS58-1012	CAPL-SS59-1012	CAPL-SS59P-1012	CAPL-SS60-1112	CAPL-SS61-1112	CAPL-SS62-1112	CAPL-SS63-1112	CAPL-SS64-1112	CAPL-SS65-1112
			10/26/2012	10/26/2012	10/26/2012	10/26/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012
Endrin ketone	1.95	--	0.528 U	0.273 J	0.432 UL	0.491 U	0.442 UJ	4.97 J	0.359 L	4.05 L	0.433 UL	1.65 K
gamma-BHC (Lindane)	7.75	--	0.528 U	1.47 J	0.523 J	1.84 J	0.442 U	4.76 J	0.386 U	0.415 U	0.433 U	0.467 U
gamma-Chlordane	11.0	--	2.61 J	3.76 L	2.51 L	0.491 U	0.484 J	1.62 K	0.428 J	14.5	0.251 J	0.253 J
Heptachlor	52.9	--	0.528 U	3.53 J	1.16 J	0.372 J	0.442 U	0.397 U	0.386 UL	0.417 L	0.433 UL	0.467 UL
Heptachlor epoxide	52.9	--	0.528 U	0.536 UL	0.363 L	0.491 UL	0.442 U	0.397 UL	0.386 U	9.28 J	0.433 UL	0.467 U
Methoxychlor	500	--	2.38 J	5.53 J	0.392 J	6.65 J	0.442 UJ	3.55 J	0.316 J	2.8 J	0.433 UL	2.72 K
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	8,000	--	12.9 U	39.8 J	13.5 L	12 U	10.8 U	627 J	42.3	397	10.6 U	11.4 U
Explosives (UG/KG)												
1,3,5-Trinitrobenzene	NSV	--	156 U	182 U	192 U	181 U	162 U	110 J	160 U	193 U	183 U	194 U
Nitroglycerin	NSV	--	391 U	866 J	481 U	452 U	405 U	446 U	400 U	483 U	457 U	485 U
Inorganics (MG/KG)												
Aluminum	pH < 5.5	12,200	2,480	2,910	4,720	4,380	14,800	11,100	5,400	6,090	13,700	6,660
Antimony	78.0	11.0	1.28 U	1.34 U	1.03 U	1.16 U	2.73 U	2.33 U	0.942 U	2.51 U	2.69 U	11.6
Arsenic	18.0	6.36	1.17 J	1.12 J	1.45	1.73	19.3	8.12	3.47	8.93	10	2.44 J
Barium	330	52.9	16.8	17	16.4	14.9	80.8	50.2	44.8	27.4	48.2	175
Beryllium	40.0	0.587	0.166 J	0.335 U	0.257 J	0.238 J	1.4 J	0.838 J	0.571 J	1.3 J	0.866 J	0.887 J
Cadmium	32.0	1.50	0.213 J	1.89	0.724	0.538 J	0.412 J	1.94	0.413 J	1.21 J	0.674 U	0.989 J
Chromium	64.0	18.2	4.76	4.26	6.91	6.69	40.3	69.7	10.9	66.7	29.9	8.21
Cobalt	13.0	9.93	1.07 J	0.938 J	1.23 J	1.24 J	6.04	4.6	2.53	2.73 J	3.28 J	2.91 J
Copper	70.0	4.25	1.97	4.16	7.11	5.67	5.81	26.1	6.24	12	8.2	10.7
Cyanide	15.8	--	0.383 U	0.383 U	0.314 U	0.358 U	0.322 U	0.279 U	0.286 U	0.291 U	0.317 U	0.354 U
Iron	5 < pH > 8	19,900	2,310	3,990	7,050	7,610	53,300	22,300	8,330	32,800	33,300	8,680
Lead	120	17.4	29.3 J	13.1 J	12 J	11.7 J	14.5	107	25.3	46.8	21.3	42.5
Manganese	220	324	11.7	58.8	78.4	90.4	259	151	256	140	77.7	264
Mercury	0.10	0.111	0.0488 B	0.064 B	0.0204 B	0.0291 B	0.0327 J	0.0835	0.11	0.145	0.0672	0.0499
Nickel	38.0	9.52	2.31	2.43	2.87	3	15.8	11.4	4.59	8.33	8.8	5.9
Vanadium	130	27.9	7.73	7.3	11.4	11.1	40.3	29.1	10.6	26.7	33.3	10.9
Zinc	120	26.5	16.1	74.4	60.2	56.4	63.4	235	45.5	83.9	59.6	190
Other Parameters												
pH	--	--	5.99 H3	6.38 H3	6.50 H3	NA	7.66 H3	7.74 H3	6.06 H3	8.25 H3	7.96 H3	6.25 H3
Total organic carbon (MG/KG)	--	--	43,700	41,500	15,000	NA	18,400	33,500 N	12,300 N	16,000 N	29,800	128,000

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69		CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75
			CAPL-SS66-1112	CAPL-SS67-1112	CAPL-SS68-1112	CAPL-SS69-1112	CAPL-SS69P-1112	CAPL-SS70-1112	CAPL-SS71-1112	CAPL-SS72-1112	CAPL-SS73-1112	CAPL-SS74-1112	CAPL-SS75-1112
			11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/2/2012	11/2/2012	11/2/2012	11/5/2012	11/5/2012	11/5/2012
Volatile Organic Compounds (UG/KG)													
2-Butanone	NSV	--	5.34 U	4.79 U	5.06 UJ	4.61 U	4.44 U	7.37 J	4.40 J	7.92	4.61 U	5.79 U	7.06 U
Acetone	NSV	--	10.7 UJ	34.9 J	10.1 UJ	9.22 UJ	8.88 UJ	25.3 J	58.1 J	40.7 J	9.23 UJ	10.6 J	14.1 UJ
Methyl acetate	NSV	--	5.34 U	4.79 U	5.06 UL	4.61 U	4.44 U	4.14 UJ	4.09 UJ	3.95 UJ	4.61 U	5.79 U	7.06 U
Styrene	64,000	--	2.67 U	2.39 U	2.53 UL	2.31 U	2.22 U	2.07 U	2.04 U	1.98 U	2.31 U	2.9 U	3.53 U
Semivolatile Organic Compounds (UG/KG)													
2-Methylnaphthalene	LMW PAH	--	45.9 J	69.5 J	4.49 U	37.9 U	37 U	37.7 J	39.2 U	26.6 J	37.7 J	28.7 J	41.8 U
Acenaphthene	LMW PAH	--	42.7 U	75.6 J	4.49 U	37.9 U	37 U	33.6 U	39.2 U	34.5 U	39.8 U	166	41.8 U
Acenaphthylene	LMW PAH	--	42.7 U	144	4.49 U	37.9 U	37 U	33.6 U	39.2 U	34.5 U	39.8 U	35.5 U	41.8 U
Anthracene	LMW PAH	--	42.7 U	1,690	4.49 U	37.9 U	37 U	33.6 U	39.2 U	34.5 U	39.8 U	512	41.8 U
Benzaldehyde	NSV	--	1,070 U	1,010 U	225 U	951 U	1,850 U	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Benzo(a)anthracene	HMW PAH	--	182	14,400	55.8	37.9 U	37 U	33.6 U	39.2 U	34.5 U	128	797	41.8 U
Benzo(a)pyrene	HMW PAH	--	192	8,120	54.3	37.9 U	37 U	33.6 U	39.2 U	34.5 U	119	722	41.8 U
Benzo(b)fluoranthene	HMW PAH	--	335	11,300	116	37.9 U	78.9	33.6 U	39.2 U	34.5 U	157	418	46.3 J
Benzo(g,h,i)perylene	HMW PAH	--	172	3,320	45.5	37.9 U	37 U	33.6 U	39.2 U	34.5 U	114	399	41.8 U
Benzo(k)fluoranthene	HMW PAH	--	330	8,830	70.6	40.3 J	37 U	33.6 U	39.2 U	34.5 U	128	506	41.8 U
bis(2-Ethylhexyl)phthalate	30,000	--	1,070 U	1,010 U	1,000 J	951 U	1,850 U	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Carbazole	7,000	--	1,070 U	1,450 J	225 U	951 U	1,850 U	1,680 U	1,970 U	1,730 U	2,000 U	1,780 U	2,090 U
Chrysene	HMW PAH	--	386	19,200	104	91.7	52.7 J	46.5 J	39.2 U	65.7 J	192	906	82.8 J
Dibenz(a,h)anthracene	HMW PAH	--	42.7 U	2,080	15.8	37.9 U	37 U	33.6 U	39.2 U	34.5 U	39.8 U	137	41.8 U
Fluoranthene	LMW PAH	--	384	72,300	112	64.4 J	43.7 J	36.7 J	40.5 J	30.6 J	260	1,510	69.7 J
Fluorene	LMW PAH	--	42.7 U	40.4 U	4.49 U	37.9 U	37 U	33.6 U	39.2 U	34.5 U	39.8 U	169	41.8 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	175	3,800	44.5	37.9 U	37 U	33.6 U	39.2 U	34.5 U	102	321	41.8 U
Naphthalene	LMW PAH	--	31.4 J	104	4.49 U	37.9 U	37 U	33.6 U	39.2 U	34.5 U	39.8 U	35.5 U	41.8 U
PAH (HMW)	18,000	--	2,167	125,650	625	307 J	282 J	216 J	203 J	234 J	1,191	6,286	309 J
PAH (LMW)	29,000	--	1,203 J	81,278 J	255	696 J	1,098 J	1,043 J	1,163 J	1,082 J	1,569 J	5,221 J	1,293 J
Phenanthrene	LMW PAH	--	121	6,370	17.1	42.1 J	37 U	44.2 J	39.2 U	73.8	172	1,910	53.3 J
Pyrene	HMW PAH	--	374	54,600	118	60.8 J	38.9 J	51.6 J	46.1 J	47.8 J	231	2,080	54 J
Pesticides (UG/KG)													
4,4'-DDD	583	--	6.28 J	1.89 J	0.68 J	2 J	1.08 J	0.351 UJ	0.394 UJ	0.718 J	19.3 J	0.565 J	1.84 J
4,4'-DDE	114	--	91.1 K	4.92 J	0.459 UJ	4.22 J	3.34 J	0.351 UJ	0.394 UJ	4.42 J	146 L	2.46 J	16.4 J
4,4'-DDT	100	--	31.9 J	7.1 J	0.595 J	17.6 J	3.97 J	0.337 J	0.525 J	4.85 J	334 L	0.373 UJ	5.95 J
Aldrin	3.63	--	0.441 U	0.399 UL	0.459 U	0.392 U	0.37 U	0.351 U	0.394 UJ	0.358 L	0.398 UL	0.373 U	0.415 UL
alpha-BHC	226	--	0.441 U	0.399 U	0.459 U	0.392 U	0.37 U	0.351 U	0.394 U	0.362 UL	0.398 UL	0.373 U	0.415 UL
alpha-Chlordane	11.0	--	0.441 UL	0.259 J	0.459 U	1.78 J	1.52 J	0.351 U	0.394 U	0.362 UJ	13.3 J	1.42 J	0.415 UJ
beta-BHC	342	--	0.441 U	0.305 J	0.459 U	0.392 U	0.37 U	0.351 U	0.394 U	0.362 UL	0.398 UL	0.373 U	0.415 UL
delta-BHC	226	--	0.377 J	0.681 J	0.459 U	0.392 UL	0.37 UL	0.351 UJ	0.394 UJ	0.362 UL	0.398 UJ	0.373 U	0.415 UL
Dieldrin	10.5	--	26.5 K	0.399 U	0.264 J	5.69 L	5.53	0.351 U	0.394 U	0.453 J	19.1 J	0.306 J	0.704 J
Endosulfan I	6.32	--	0.441 U	1.14 J	0.459 U	0.392 UL	0.37 U	0.351 U	0.394 U	0.362 UJ	0.398 UL	0.373 U	0.415 UL
Endosulfan II	6.32	--	6.04 J	2.5 J	0.387 J	2.99 J	3.26 J	0.351 U	0.394 U	0.273 L	39.2 L	0.373 U	0.415 UJ
Endosulfan sulfate	6.32	--	64.2 L	0.347 J	0.459 U	9.13 L	10.1 L	0.351 U	0.394 U	9.86 J	0.559 J	0.373 U	2.3 L
Endrin	1.95	--	13.6 J	0.399 U	0.459 U	2.62 J	2.5 J	0.351 UJ	0.394 UJ	0.362 UL	0.398 UJ	0.373 U	0.415 UJ
Endrin aldehyde	1.95	--	2.19 J	1.73 J	0.459 U	0.518 J	0.397 J	0.351 U	0.394 UJ	0.362 UL	7.81 J	0.373 U	0.759 J

Table D-43
Exceedances - Surface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO66	CAPL-SO67	CAPL-SO68	CAPL-SO69		CAPL-SO70	CAPL-SO71	CAPL-SO72	CAPL-SO73	CAPL-SO74	CAPL-SO75
			CAPL-SS66-1112	CAPL-SS67-1112	CAPL-SS68-1112	CAPL-SS69-1112	CAPL-SS69P-1112	CAPL-SS70-1112	CAPL-SS71-1112	CAPL-SS72-1112	CAPL-SS73-1112	CAPL-SS74-1112	CAPL-SS75-1112
			11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/2/2012	11/2/2012	11/2/2012	11/5/2012	11/5/2012	11/5/2012
Endrin ketone	1.95	--	26.5 J	0.399 UL	0.459 U	3.04 J	0.834 J	0.351 U	0.394 U	0.362 UL	40.2 J	0.373 U	1.36 J
gamma-BHC (Lindane)	7.75	--	0.159 J	0.399 UL	0.205 J	0.392 U	0.37 U	0.351 U	0.394 U	0.362 UL	0.398 UL	0.373 UJ	0.415 UL
gamma-Chlordane	11.0	--	1.81 J	0.399 UL	0.402 J	1.55 J	1.24 J	0.642 J	0.916 L	0.53 J	12.7 L	3.31 J	0.765 L
Heptachlor	52.9	--	0.148 J	0.399 UL	0.459 U	0.392 UL	0.37 U	0.351 U	0.394 U	0.362 UL	0.398 UJ	0.373 UJ	0.415 UL
Heptachlor epoxide	52.9	--	0.272 J	0.399 UL	0.459 U	0.392 UL	0.37 UL	0.351 UJ	0.394 UJ	0.362 UL	0.483 J	0.373 UJ	0.415 UJ
Methoxychlor	500	--	10 J	1.91 J	0.459 UJ	0.712 J	0.206 J	0.351 UJ	0.394 UJ	0.215 J	21.2 J	0.373 UJ	1.52 J
Polychlorinated Biphenyls (UG/KG)													
Aroclor-1260	8,000	--	2,770 J	9.77 U	36.9 J	266 J	283 J	8.59 U	12.1 J	34.9 L	4,630 J	9.13 U	357 J
Explosives (UG/KG)													
1,3,5-Trinitrobenzene	NSV	--	176 U	161 J	173 U	160 U	175 U	186 U	191 U	191 U	170 U	174 U	173 U
Nitroglycerin	NSV	--	441 U	478 U	433 U	400 U	439 U	465 U	478 U	478 U	426 U	435 U	433 U
Inorganics (MG/KG)													
Aluminum	pH < 5.5	12,200	8,330	4,340	25,800	10,300	10,000	6,070	9,460	3,260	5,380	7,640	9,110
Antimony	78.0	11.0	2.53 U	2.42 U	2.67 UL	2.46 U	2.28 U	0.787 U	2.3 U	2.14 U	2.33 U	2.27 U	2.65 U
Arsenic	18.0	6.36	6.5	2.69 J	14.4	5.74 J	7.9 J	1.19	2.1 J	0.941 J	2.6 J	5.29	7.22
Barium	330	52.9	66.3	39.9	81.8	52.6 J	37.1 J	10.9	14	46	34.1	66.4	61.1
Beryllium	40.0	0.587	0.677 J	0.441 J	1.44	0.537 J	0.418 J	1.63	1.35 J	0.535 U	0.363 J	0.521 J	0.759 J
Cadmium	32.0	1.50	0.613 J	0.606 U	0.668 U	0.615 U	0.57 U	0.197 U	0.575 U	0.535 U	0.984 J	0.568 U	0.339 J
Chromium	64.0	18.2	18.5	8.3	56.1	19.4	21.1	5.78	10.5	7.84	16.7	23.3	19.3
Cobalt	13.0	9.93	3.75 J	3.03 U	5.81	2.12 J	1.61 J	2.09	2.05 J	2.01 J	2.02 J	3.8	3.66 J
Copper	70.0	4.25	20.1	5.05	9.67	12.4 J	7.95 J	3.29	4.57	6.47	44.8	28.3	51.5
Cyanide	15.8	--	0.323 U	0.289 U	0.334 U	0.281 U	0.261 U	0.246 U	0.29 U	0.265 U	0.297 U	0.272 U	0.155 J
Iron	5 < pH > 8	19,900	17,500	9,300	49,100	18,400	16,800	10,400	15,100	6,370	11,100	10,900	18,500
Lead	120	17.4	77.7	28.8	14.7	29.9	22.7	12.9	10.3	15.1	127	14.7	159
Manganese	220	324	216	86.5	133 L	123 J	90.1 J	405	331	117	140	161	351
Mercury	0.10	0.111	0.247	0.034 J	0.0784	0.0476	0.0465	0.031 U	0.0355 U	0.0242 J	0.0861	0.0188 J	0.0835
Nickel	38.0	9.52	7.21	2.99 J	18.5	4.96 J	3.4 J	2.28	2.64 J	3.24	6.27	11.8	6.5
Vanadium	130	27.9	24.1	11.1	55.6	24.7	26.5	13.7	19.7	12.8	19.4	28.3	25.6
Zinc	120	26.5	142	35.2	73.9 K	58.6 J	40.2 J	44.6	33.3	21.7	175	47.5	196
Other Parameters													
pH	--	--	7.50 H3	6.70 H3	7.77 H3	8.19 H3	NA	9.11 H3	9.12 H3	8.15 H3	7.00 H3	11.9 H3	5.85 H3
Total organic carbon (MG/KG)	--	--	60,800	39,400	21,100 N	20,900 N	NA	7,450	9,410	13,500	29,600	13,200	40,100

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-44
Screening Statistics - Surface Soil - Group 1A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	-- - --	6 / 6	340	63,000	CAPL-SS09-0811	19,983	25,719	41,141	8,000	3 / 6	7.88	5.14	2.50	YES

1 - Count of detected samples exceeding or equaling ESV

Table D-45
Screening Statistics - Surface Soil - Group 1B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																	
2-Butanone	5.35 - 8.07	1 / 7	14.7	14.7	CAPL-SS48-1012	4.99	4.30	8.15	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	10.7 - 16.1	3 / 7	7.77	186	CAPL-SS48-1012	32.8	67.6	82.4	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methyl acetate	5.35 - 11.1	0 / 7	--	--	--	3.68	0.93	4.36	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
Benzaldehyde	192 - 1,070	0 / 7	--	--	--	279	223	442	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (HMW)	-- - --	7 / 7	24.7	1,225	CAPL-SS46-1012	654	478	1,005	18,000	0 / 7	0.07	--	--	--	-- / --	--	NO
PAH (LMW)	-- - --	7 / 7	120	1,095	CAPL-SS47-1012	626	411	928	29,000	0 / 7	0.04	--	--	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDE	-- - --	7 / 7	1.92	285	CAPL-SS50-1012	140	119	228	114	4 / 7	2.50	2.00	1.23	--	-- / --	--	YES
4,4'-DDT	-- - --	7 / 7	1.76	214	CAPL-SS48-1012	93.6	87.7	158	100	3 / 7	2.14	1.58	0.94	--	-- / --	--	YES
alpha-Chlordane	0.39 - 0.41	5 / 7	0.61	8.46	CAPL-SS46-1012	2.41	3.03	4.64	11.0	0 / 7	0.77	--	--	--	-- / --	--	NO
Dieldrin	-- - --	7 / 7	1.48	253	CAPL-SS46-1012	63.7	96.6	135	10.5	5 / 7	24.1	12.8	6.07	--	-- / --	--	YES
Endosulfan II	-- - --	7 / 7	1.17	42.8	CAPL-SS46-1012	12.8	14.7	23.6	6.32	4 / 7	6.77	3.73	2.03	--	-- / --	--	YES
Endosulfan sulfate	0.40 - 0.40	6 / 7	2.99	694	CAPL-SS46-1012	156	272	356	6.32	3 / 7	110	56.3	24.7	--	-- / --	--	YES
Endrin	-- - --	7 / 7	0.28	77.7	CAPL-SS46-1012	18.9	30.1	41.0	1.95	5 / 7	39.8	21.0	9.69	--	-- / --	--	YES
Endrin aldehyde	0.39 - 0.41	5 / 7	0.75	22.9	CAPL-SS46-1012	6.21	9.41	13.1	1.95	2 / 7	11.7	6.73	3.19	--	-- / --	--	YES
Endrin ketone	-- - --	7 / 7	0.56	83.3	CAPL-SS47-1012	20.1	32.3	43.8	1.95	4 / 7	42.7	22.5	10.3	--	-- / --	--	YES
gamma-Chlordane	3.82 - 3.82	6 / 7	2.59	15.5	CAPL-SS47-1012	6.02	4.90	9.62	11.0	1 / 7	1.41	0.87	0.55	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																	
Aroclor-1260	-- - --	15 / 15	73.0	23,000	CAPL-SS02-0811	5,527	7,517	8,946	8,000	4 / 15	2.88	1.12	0.69	--	-- / --	--	YES
Explosives (UG/KG)																	
1,3,5-Trinitrobenzene	174 - 200	0 / 7	--	--	--	92.9	4.15	96.0	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Nitroglycerin	435 - 500	0 / 7	--	--	--	233	10.4	240	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Inorganics (MG/KG)																	
Aluminum	-- - --	7 / 7	9,410	25,200	CAPL-SS45-1012	15,063	6,501	19,837	pH < 5.5	1 / 7	--	mean pH in range		--	-- / --	--	NO
Arsenic	-- - --	7 / 7	2.54	7.03	CAPL-SS45-1012	5.69	1.49	6.79	18.0	0 / 7	0.39	--	--	--	-- / --	--	NO
Chromium	-- - --	7 / 7	14.0	46.3	CAPL-SS45-1012	27.4	13.2	37.1	64.0	0 / 7	0.72	--	--	--	-- / --	--	NO
Iron	-- - --	7 / 7	10,100	48,000	CAPL-SS45-1012	22,914	12,626	32,187	5 < pH > 8	0 / 7	--	--	--	--	-- / --	--	NO
Lead	-- - --	7 / 7	16.5	211	CAPL-SS47-1012	84.8	69.8	136	120	2 / 7	1.76	1.13	0.71	17.4	6 / 7	12.1	YES
Manganese	-- - --	7 / 7	30.2	308	CAPL-SS47-1012	183	109	263	220	2 / 7	1.40	1.20	0.83	324	0 / 7	0.95	NO
Mercury	0.049 - 0.060	5 / 7	0.047	0.14	CAPL-SS46-1012	0.074	0.046	0.11	0.10	2 / 7	1.38	1.08	0.74	0.111	2 / 7	1.24	YES
Zinc	-- - --	7 / 7	36.7	428	CAPL-SS47-1012	159	152	271	120	3 / 7	3.57	2.26	1.33	26.5	7 / 7	16.2	YES
Other Parameters																	
pH	-- - --	7 / 7	5.25	7.65	CAPL-SS49-1012	6.42	0.89	7.07	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	7 / 7	5,900	52,300	CAPL-SS50-1012	32,871	15,686	44,392	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV

Table D-46
Screening Statistics - Surface Soil - Group 1C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	18.0 - 18.0	1 / 2	290	290	CAPL-SS15-0811	150	199	1,037	8,000	0 / 2	0.04	--	--	NO

1 - Count of detected samples exceeding or equaling ESV

Table D-47
Screening Statistics - Surface Soil - Group 1D
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	17.0 - 17.0	3 / 4	49.0	450	CAPL-SS19-0811	162	200	397	8,000	0 / 4	0.06	--	--	NO

1 - Count of detected samples exceeding or equaling ESV

Table D-48
Screening Statistics - Surface Soil - Group 1E
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	-- - --	5 / 5	22.0	390	CAPL-SS25-0811	124	158	275	8,000	0 / 5	0.05	--	--	NO

1 - Count of detected samples exceeding or equaling ESV

Table D-49
Screening Statistics - Surface Soil - Group 1F
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																	
2-Butanone	7.16 - 15.4	2 / 5	3.06	8.44	CAPL-SS59-1012	5.45	2.46	7.79	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	14.3 - 14.3	4 / 5	15.2	149	CAPL-SS59-1012	59.7	61.2	118	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methyl acetate	5.65 - 15.4	1 / 5	24.0	24.0	CAPL-SS59-1012	8.51	8.86	17.0	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
Benzaldehyde	22.6 - 268	0 / 5	--	--	--	98.2	51.7	147	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (HMW)	-- - --	5 / 5	25.7	69.2	CAPL-SS58-1012	45.2	17.8	62.2	18,000	0 / 5	0.004	--	--	--	-- / --	--	NO
PAH (LMW)	148 - 148	4 / 5	31.9	169	CAPL-SS58-1012	109	57.9	164	29,000	0 / 5	0.006	--	--	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDE	-- - --	5 / 5	0.32	4.52	CAPL-SS59-1012	2.69	1.64	4.25	114	0 / 5	0.04	--	--	--	-- / --	--	NO
4,4'-DDT	-- - --	5 / 5	0.26	7.79	CAPL-SS58-1012	1.81	3.34	5.00	100	0 / 5	0.08	--	--	--	-- / --	--	NO
alpha-Chlordane	0.36 - 0.53	1 / 5	0.93	0.93	CAPL-SS58-1012	0.37	0.31	0.67	11.0	0 / 5	0.08	--	--	--	-- / --	--	NO
Dieldrin	0.36 - 0.53	1 / 5	0.57	0.57	CAPL-SS58-1012	0.30	0.15	0.44	10.5	0 / 5	0.05	--	--	--	-- / --	--	NO
Endosulfan II	0.36 - 0.54	0 / 5	--	--	--	0.24	0.037	0.27	6.32	-- / --	0.08	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.36 - 0.53	3 / 5	0.40	1.48	CAPL-SS59-1012	0.59	0.53	1.10	6.32	0 / 5	0.23	--	--	--	-- / --	--	NO
Endrin	0.36 - 0.54	0 / 5	--	--	--	0.24	0.037	0.27	1.95	-- / --	0.27	--	--	--	-- / --	--	NO
Endrin aldehyde	0.36 - 0.54	1 / 5	0.95	0.95	CAPL-SS59-1012	0.38	0.32	0.69	1.95	0 / 5	0.49	--	--	--	-- / --	--	NO
Endrin ketone	0.36 - 0.53	1 / 5	0.27	0.27	CAPL-SS58-1012	0.24	0.038	0.27	1.95	0 / 5	0.14	--	--	--	-- / --	--	NO
gamma-Chlordane	-- - --	5 / 5	1.29	3.76	CAPL-SS58-1012	2.45	0.90	3.31	11.0	0 / 5	0.34	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																	
Aroclor-1260	8.72 - 12.9	3 / 5	13.5	39.8	CAPL-SS58-1012	15.8	14.1	29.3	8,000	0 / 5	0.005	--	--	--	-- / --	--	NO
Explosives (UG/KG)																	
1,3,5-Trinitrobenzene	156 - 198	0 / 5	--	--	--	91.5	8.11	99.2	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Nitroglycerin	391 - 495	1 / 5	866	866	CAPL-SS58-1012	357	285	629	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Inorganics (MG/KG)																	
Aluminum	-- - --	5 / 5	2,100	4,920	CAPL-SS55-1012	3,426	1,306	4,671	pH < 5.5	-- / --	--	mean pH in range		--	-- / --	--	NO
Arsenic	-- - --	5 / 5	1.12	1.73	CAPL-SS59-1012	1.44	0.28	1.71	18.0	0 / 5	0.10	--	--	--	-- / --	--	NO
Chromium	-- - --	5 / 5	3.54	6.91	CAPL-SS59-1012	4.99	1.28	6.21	64.0	0 / 5	0.11	--	--	--	-- / --	--	NO
Iron	-- - --	5 / 5	2,310	7,610	CAPL-SS59-1012	4,626	2,311	6,830	5 < pH > 8	0 / 5	--	--	--	--	-- / --	--	NO
Lead	-- - --	5 / 5	9.10	29.3	CAPL-SS57-1012	15.2	8.03	22.9	120	0 / 5	0.24	--	--	--	-- / --	--	NO
Manganese	-- - --	5 / 5	7.46	90.4	CAPL-SS59-1012	45.5	35.2	79.1	220	0 / 5	0.41	--	--	--	-- / --	--	NO
Mercury	0.029 - 0.064	0 / 5	--	--	--	0.022	0.0068	0.028	0.10	-- / --	0.64	--	--	--	-- / --	--	NO
Zinc	-- - --	5 / 5	10.9	74.4	CAPL-SS58-1012	38.7	27.7	65.1	120	0 / 5	0.62	--	--	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	5 / 5	5.48	6.50	CAPL-SS59-1012	6.01	0.43	6.42	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	5 / 5	9,100	43,700	CAPL-SS57-1012	25,100	16,218	40,562	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-50
Screening Statistics - Surface Soil - Group 2A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	10.6 - 10.6	6 / 7	26.6	4,350	CAPL-SS27-1012	759	1,598	1,932	8,000	0 / 7	0.54	--	--	NO

1 - Count of detected samples exceeding or equaling ESV

Table D-51
Screening Statistics - Surface Soil - Group 2B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	9.22 - 10.8	4 / 10	16.2	44.6	CAPL-SS34-1112	14.3	14.0	22.4	8,000	0 / 10	0.01	--	--	NO

1 - Count of detected samples exceeding or equaling ESV

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Table D-52
Screening Statistics - Surface Soil - Group 2C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																	
2-Butanone	4.14 - 6.56	2 / 10	5.38	23.5	CAPL-SS64-1112	4.93	6.59	8.75	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	9.22 - 13.1	4 / 10	17.2	210	CAPL-SS65-1112	31.8	63.5	68.6	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methyl acetate	4.14 - 6.67	0 / 10	--	--	--	2.61	0.41	2.85	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
Benzaldehyde	195 - 1,910	1 / 10	517	517	CAPL-SS65-1112	396	344	595	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (HMW)	-- - --	10 / 10	29.9	125,650	CAPL-SS67-1112	18,918	41,531	42,992	18,000	2 / 10	6.98	2.39	1.05	--	-- / --	--	YES
PAH (LMW)	-- - --	10 / 10	141	81,278	CAPL-SS67-1112	10,274	25,488	25,049	29,000	1 / 10	2.80	0.86	0.35	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDE	0.44 - 0.46	8 / 10	1.28	2,640	CAPL-SS63-1112	288	828	767	114	2 / 10	23.2	6.73	2.52	--	-- / --	--	YES
4,4'-DDT	0.43 - 0.44	8 / 10	0.60	808	CAPL-SS63-1112	98.9	252	245	100	2 / 10	8.08	2.45	0.99	--	-- / --	--	YES
alpha-Chlordane	0.39 - 0.47	4 / 10	0.26	8.88	CAPL-SS63-1112	1.28	2.72	2.85	11.0	0 / 10	0.81	--	--	--	-- / --	--	NO
Dieldrin	0.40 - 0.44	7 / 10	0.26	26.5	CAPL-SS66-1112	5.43	8.61	10.4	10.5	2 / 10	2.52	0.99	0.52	--	-- / --	--	NO
Endosulfan II	0.39 - 0.47	7 / 10	0.23	9.20	CAPL-SS63-1112	2.70	3.12	4.50	6.32	1 / 10	1.46	0.71	0.43	--	-- / --	--	NO
Endosulfan sulfate	0.44 - 0.47	7 / 10	0.30	64.2	CAPL-SS66-1112	9.38	19.8	20.8	6.32	3 / 10	10.2	3.30	1.48	--	-- / --	--	YES
Endrin	0.40 - 0.47	5 / 10	0.49	13.6	CAPL-SS66-1112	3.29	5.42	6.43	1.95	3 / 10	6.97	3.30	1.69	--	-- / --	--	YES
Endrin aldehyde	0.39 - 0.46	6 / 10	0.52	5.31	CAPL-SS64-1112	1.47	1.69	2.45	1.95	3 / 10	2.72	1.25	0.75	--	-- / --	--	YES
Endrin ketone	0.40 - 0.46	6 / 10	0.36	26.5	CAPL-SS66-1112	4.14	8.05	8.81	1.95	4 / 10	13.6	4.52	2.12	--	-- / --	--	YES
gamma-Chlordane	0.40 - 0.40	9 / 10	0.25	14.5	CAPL-SS63-1112	2.15	4.39	4.69	11.0	1 / 10	1.32	0.43	0.20	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																	
Aroclor-1260	9.77 - 11.4	6 / 10	36.9	2,770	CAPL-SS66-1112	418	854	913	8,000	0 / 10	0.35	--	--	--	-- / --	--	NO
Explosives (UG/KG)																	
1,3,5-Trinitrobenzene	160 - 194	2 / 10	110	161	CAPL-SS67-1112	97.9	23.8	112	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Nitroglycerin	400 - 485	0 / 10	--	--	--	223	15.0	232	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Inorganics (MG/KG)																	
Aluminum	-- - --	10 / 10	4,340	25,800	CAPL-SS68-1112	10,652	6,376	14,348	pH < 5.5	0 / 10	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	10 / 10	2.44	19.3	CAPL-SS60-1112	8.38	5.31	11.5	18.0	1 / 10	1.07	0.64	0.47	--	-- / --	--	NO
Chromium	-- - --	10 / 10	8.21	69.7	CAPL-SS61-1112	33.0	23.9	46.8	64.0	2 / 10	1.09	0.73	0.52	--	-- / --	--	NO
Iron	-- - --	10 / 10	8,330	53,300	CAPL-SS60-1112	25,301	16,358	34,784	5 < pH > 8	2 / 10	--	mean pH in range		--	-- / --	--	NO
Lead	-- - --	10 / 10	14.5	107	CAPL-SS61-1112	40.9	29.9	58.2	120	0 / 10	0.89	--	--	--	-- / --	--	NO
Manganese	-- - --	10 / 10	77.7	264	CAPL-SS65-1112	171	72.0	212	220	3 / 10	1.20	0.97	0.78	--	-- / --	--	NO
Mercury	-- - --	10 / 10	0.033	0.25	CAPL-SS66-1112	0.090	0.065	0.13	0.10	3 / 10	2.47	1.27	0.90	0.111	2 / 10	2.23	YES
Zinc	-- - --	10 / 10	35.2	235	CAPL-SS61-1112	98.7	67.4	138	120	3 / 10	1.96	1.15	0.82	26.5	10 / 10	8.87	YES
Other Parameters																	
pH	-- - --	10 / 10	6.06	8.25	CAPL-SS63-1112	7.41	0.79	7.87	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	10 / 10	12,300	128,000	CAPL-SS65-1112	38,020	34,667	58,116	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV

Table D-53
Screening Statistics - Surface Soil - Group 2D
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																	
2-Butanone	4.61 - 7.06	3 / 6	4.40	7.92	CAPL-SS72-1112	4.74	2.36	6.68	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	9.23 - 14.1	4 / 6	10.6	58.1	CAPL-SS71-1112	24.4	21.4	42.0	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methyl acetate	3.95 - 7.06	0 / 6	--	--	--	2.47	0.62	2.98	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
Benzaldehyde	1,680 - 2,090	0 / 6	--	--	--	938	83.4	1,006	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (HMW)	-- - --	6 / 6	203	6,286	CAPL-SS74-1112	1,406	2,421	3,398	18,000	0 / 6	0.35	--	--	--	-- / --	--	NO
PAH (LMW)	-- - --	6 / 6	1,043	5,221	CAPL-SS74-1112	1,895	1,640	3,245	29,000	0 / 6	0.18	--	--	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDE	0.35 - 0.39	4 / 6	2.46	146	CAPL-SS73-1112	28.3	58.0	76.0	114	1 / 6	1.28	0.67	0.25	--	-- / --	--	NO
4,4'-DDT	0.37 - 0.37	5 / 6	0.34	334	CAPL-SS73-1112	57.6	135	169	100	1 / 6	3.34	1.69	0.58	--	-- / --	--	YES
alpha-Chlordane	0.35 - 0.42	2 / 6	1.42	13.3	CAPL-SS73-1112	2.58	5.27	6.92	11.0	1 / 6	1.21	0.63	0.23	--	-- / --	--	NO
Dieldrin	0.35 - 0.39	4 / 6	0.31	19.1	CAPL-SS73-1112	3.49	7.65	9.78	10.5	1 / 6	1.82	0.93	0.33	--	-- / --	--	NO
Endosulfan II	0.35 - 0.42	2 / 6	0.27	39.2	CAPL-SS73-1112	6.71	15.9	19.8	6.32	1 / 6	6.20	3.13	1.06	--	-- / --	--	YES
Endosulfan sulfate	0.35 - 0.39	3 / 6	0.56	9.86	CAPL-SS72-1112	2.21	3.84	5.37	6.32	1 / 6	1.56	0.85	0.35	--	-- / --	--	NO
Endrin	0.35 - 0.42	0 / 6	--	--	--	0.19	0.012	0.20	1.95	-- / --	0.21	--	--	--	-- / --	--	NO
Endrin aldehyde	0.35 - 0.39	2 / 6	0.76	7.81	CAPL-SS73-1112	1.55	3.07	4.08	1.95	1 / 6	4.01	2.09	0.80	--	-- / --	--	YES
Endrin ketone	0.35 - 0.39	2 / 6	1.36	40.2	CAPL-SS73-1112	7.05	16.2	20.4	1.95	1 / 6	20.6	10.5	3.62	--	-- / --	--	YES
gamma-Chlordane	-- - --	6 / 6	0.53	12.7	CAPL-SS73-1112	3.14	4.80	7.09	11.0	1 / 6	1.15	0.64	0.29	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																	
Aroclor-1260	8.59 - 9.13	4 / 6	12.1	4,630	CAPL-SS73-1112	840	1,862	2,372	8,000	0 / 6	0.58	--	--	--	-- / --	--	NO
Explosives (UG/KG)																	
1,3,5-Trinitrobenzene	170 - 191	0 / 6	--	--	--	90.4	4.79	94.4	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Nitroglycerin	426 - 478	0 / 6	--	--	--	226	11.9	236	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Inorganics (MG/KG)																	
Aluminum	-- - --	6 / 6	3,260	9,460	CAPL-SS71-1112	6,820	2,375	8,774	pH < 5.5	0 / 6	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	6 / 6	0.94	7.22	CAPL-SS75-1112	3.22	2.50	5.28	18.0	0 / 6	0.40	--	--	--	-- / --	--	NO
Chromium	-- - --	6 / 6	5.78	23.3	CAPL-SS74-1112	13.9	6.92	19.6	64.0	0 / 6	0.36	--	--	--	-- / --	--	NO
Iron	-- - --	6 / 6	6,370	18,500	CAPL-SS75-1112	12,062	4,198	15,515	5 < pH > 8	4 / 6	--	--	--	19,900	0 / 6	0.93	NO
Lead	-- - --	6 / 6	10.3	159	CAPL-SS75-1112	56.5	67.8	112	120	2 / 6	1.33	0.94	0.47	--	-- / --	--	NO
Manganese	-- - --	6 / 6	117	405	CAPL-SS70-1112	251	125	354	220	3 / 6	1.84	1.61	1.14	324	3 / 6	1.25	YES
Mercury	0.031 - 0.036	4 / 6	0.019	0.086	CAPL-SS73-1112	0.041	0.034	0.069	0.10	0 / 6	0.86	0.69	0.41	--	-- / --	--	NO
Zinc	-- - --	6 / 6	21.7	196	CAPL-SS75-1112	86.4	77.6	150	120	2 / 6	1.63	1.25	0.72	26.5	5 / 6	7.40	YES
Other Parameters																	
pH	-- - --	6 / 6	5.85	11.9	CAPL-SS74-1112	8.52	2.08	10.2	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	6 / 6	7,450	40,100	CAPL-SS75-1112	18,877	13,013	29,582	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-54
Initial Screening Statistics for Plants and Soil Invertebrates - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
Volatile Organic Compounds (UG/KG)									
2-Butanone	4.09 - 7.61	4 / 28	3.88	93.1	CAPL-SB56-1012	NSV	-- / --	NSV	YES
Acetone	8.32 - 15.2	11 / 28	5.13	261	CAPL-SB56-1012	NSV	-- / --	NSV	YES
Carbon disulfide	1.78 - 3.80	2 / 28	1.93	2.89	CAPL-SB56-1012	NSV	-- / --	NSV	YES
Semivolatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	3.52 - 39.2	8 / 28	3.04	35.5	CAPL-SB63-1112	LMW PAH	-- / --	--	--
Anthracene	3.52 - 40.1	2 / 28	65.4	83.6	CAPL-SB62-1112	LMW PAH	-- / --	--	--
Benzo(a)anthracene	3.52 - 17.6	3 / 28	23.8	610	CAPL-SB62-1112	HMW PAH	-- / --	--	--
Benzo(a)pyrene	3.52 - 17.6	6 / 28	4.99	859	CAPL-SB62-1112	HMW PAH	-- / --	--	--
Benzo(b)fluoranthene	3.52 - 17.6	10 / 28	5.56	2,100	CAPL-SB62-1112	HMW PAH	-- / --	--	--
Benzo(g,h,i)perylene	3.52 - 18.5	7 / 28	3.96	1,140	CAPL-SB62-1112	HMW PAH	-- / --	--	--
Benzo(k)fluoranthene	3.52 - 18.5	5 / 28	5.51	2,210	CAPL-SB62-1112	HMW PAH	-- / --	--	--
bis(2-Ethylhexyl)phthalate	177 - 1,000	8 / 28	109	553	CAPL-SB68-1112	30,000	0 / 28	0.02	NO
Chrysene	3.52 - 4.50	10 / 28	10.5	3,070	CAPL-SB62-1112	HMW PAH	-- / --	--	--
Dibenz(a,h)anthracene	3.52 - 18.5	2 / 28	56.2	250	CAPL-SB62-1112	HMW PAH	-- / --	--	--
Fluoranthene	3.52 - 17.6	15 / 28	2.31	3,360	CAPL-SB62-1112	LMW PAH	-- / --	--	--
Fluorene	3.52 - 40.1	1 / 28	8.88	8.88	CAPL-SB63-1112	LMW PAH	-- / --	--	--
Indeno(1,2,3-cd)pyrene	3.52 - 17.6	6 / 28	4.28	1,000	CAPL-SB62-1112	HMW PAH	-- / --	--	--
Naphthalene	3.52 - 40.1	5 / 28	4.46	53.0	CAPL-SB63-1112	LMW PAH	-- / --	--	--
PAH (HMW)	15.8 - 19.8	16 / 28	17.0	14,219	CAPL-SB62-1112	18,000	0 / 28	0.79	NO
PAH (LMW)	103 - 128	16 / 28	108	4,438	CAPL-SB62-1112	29,000	0 / 28	0.15	NO
Phenanthrene	3.52 - 4.50	12 / 28	6.01	405	CAPL-SB62-1112	LMW PAH	-- / --	--	--
Pyrene	3.52 - 17.6	15 / 28	2.21	2,980	CAPL-SB62-1112	HMW PAH	-- / --	--	--
Pesticides (UG/KG)									
4,4'-DDD	0.36 - 0.47	16 / 28	0.23	19.7	CAPL-SB57-1012	583	0 / 28	0.03	NO
4,4'-DDE	0.36 - 0.47	20 / 28	0.22	143	CAPL-SB48-1012	114	1 / 28	1.25	YES
4,4'-DDT	0.36 - 0.47	16 / 28	0.35	60.0	CAPL-SB48-1012	100	0 / 28	0.60	NO
Aldrin	0.36 - 0.47	3 / 28	0.33	0.93	CAPL-SB62-1112	3.63	0 / 28	0.26	NO
alpha-BHC	0.36 - 0.47	4 / 28	0.25	0.59	CAPL-SB59-1012	226	0 / 28	0.003	NO

Table D-54
Initial Screening Statistics for Plants and Soil Invertebrates - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
alpha-Chlordane	0.36 - 0.47	4 / 28	0.51	1.90	CAPL-SB69-1112	11.0	0 / 28	0.17	NO
beta-BHC	0.36 - 0.47	1 / 28	0.25	0.25	CAPL-SB57-1012	342	0 / 28	0.001	NO
Dieldrin	0.36 - 0.47	11 / 28	0.60	8.16	CAPL-SB48-1012	10.5	0 / 28	0.78	NO
Endosulfan II	0.36 - 0.47	7 / 28	0.76	4.18	CAPL-SB46-1012	6.32	0 / 28	0.66	NO
Endosulfan sulfate	0.36 - 0.45	11 / 28	0.23	29.3	CAPL-SB46-1012	6.32	4 / 28	4.64	YES
Endrin	0.36 - 0.47	9 / 28	0.40	6.12	CAPL-SB62-1112	1.95	2 / 28	3.14	YES
Endrin aldehyde	0.36 - 0.47	8 / 28	0.28	1.27	CAPL-SB62-1112	1.95	0 / 28	0.65	NO
Endrin ketone	0.36 - 0.47	6 / 28	0.81	7.34	CAPL-SB62-1112	1.95	2 / 28	3.76	YES
gamma-BHC (Lindane)	0.36 - 0.47	1 / 28	1.17	1.17	CAPL-SB62-1112	7.75	0 / 28	0.15	NO
gamma-Chlordane	0.36 - 3.66	21 / 28	0.22	3.76	CAPL-SB62-1112	11.0	0 / 28	0.34	NO
Heptachlor	0.36 - 0.47	4 / 28	0.19	1.97	CAPL-SB59-1012	52.9	0 / 28	0.04	NO
Heptachlor epoxide	0.36 - 0.47	4 / 28	0.19	1.44	CAPL-SB62-1112	52.9	0 / 28	0.03	NO
Methoxychlor	0.36 - 0.47	12 / 28	0.26	4.95	CAPL-SB48-1012	500	0 / 28	0.01	NO
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1260	8.72 - 11.3	18 / 38	7.83	704	CAPL-SB62-1112	8,000	0 / 38	0.09	NO
Explosives (UG/KG)									
Nitroglycerin	403 - 500	1 / 28	566	566	CAPL-SB62-1112	NSV	-- / --	NSV	YES
Inorganics (MG/KG)									
Aluminum	-- - --	28 / 28	1,600	27,600	CAPL-SB45-1012	pH < 5.5	1 / 28	--	YES
Arsenic	-- - --	28 / 28	1.11	22.4	CAPL-SB60-1112	18.0	1 / 28	1.24	YES
Barium	-- - --	28 / 28	7.04	212	CAPL-SB75-1112	330	0 / 28	0.64	NO
Beryllium	0.25 - 0.57	26 / 28	0.21	1.89	CAPL-SB45-1012	40.0	0 / 28	0.05	NO
Cadmium	0.22 - 0.70	5 / 28	0.20	1.64	CAPL-SB58-1012	32.0	0 / 28	0.05	NO
Calcium [2]	-- - --	28 / 28	283	116,000	CAPL-SB60-1112	NSV	-- / --	NSV	NO
Chromium	-- - --	28 / 28	3.67	58.5	CAPL-SB45-1012	64.0	0 / 28	0.91	NO
Cobalt	1.27 - 3.05	25 / 28	0.95	9.11	CAPL-SB60-1112	13.0	0 / 28	0.70	NO
Copper	2.57 - 2.57	27 / 28	1.26	12.6	CAPL-SB69-1112	70.0	0 / 28	0.18	NO
Iron	-- - --	28 / 28	2,470	64,700	CAPL-SB74-1112	5 < pH > 8	9 / 28	--	YES
Lead	-- - --	28 / 28	4.59	190	CAPL-SB64-1112	120	1 / 28	1.58	YES

Table D-54
Initial Screening Statistics for Plants and Soil Invertebrates - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
Magnesium [2]	-- - --	28 / 28	268	8,710	CAPL-SB64-1112	NSV	-- / --	NSV	NO
Manganese	-- - --	28 / 28	7.12	520	CAPL-SB60-1112	220	2 / 28	2.36	YES
Mercury	0.032 - 0.036	26 / 28	0.023	0.095	CAPL-SB45-1012	0.10	0 / 28	0.95	NO
Nickel	1.15 - 3.17	23 / 28	1.69	18.2	CAPL-SB60-1112	38.0	0 / 28	0.48	NO
Potassium [2]	860 - 860	27 / 28	276	4,420	CAPL-SB45-1012	NSV	-- / --	NSV	NO
Selenium	0.30 - 1.76	1 / 28	0.54	0.54	CAPL-SB57-1012	0.52	1 / 28	1.04	YES
Vanadium	-- - --	28 / 28	4.81	66.7	CAPL-SB45-1012	130	0 / 28	0.51	NO
Zinc	-- - --	28 / 28	6.44	98.6	CAPL-SB62-1112	120	0 / 28	0.82	NO
Other Parameters									
pH	-- - --	28 / 28	5.06	8.32	CAPL-SB69-1112	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	28 / 28	1,480	32,800	CAPL-SB64-1112	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Macronutrient - Not considered to be a COPC

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO34 CAPL-SB34-1112 11/5/2012	CAPL-SO35 CAPL-SB35-1112 11/6/2012	CAPL-SO36 CAPL-SB36-1112 11/6/2012	CAPL-SO37 CAPL-SB37-1112 11/6/2012	CAPL-SO38 CAPL-SB38-1012 10/31/2012	CAPL-SO39 CAPL-SB39-1012 10/31/2012	CAPL-SO40 CAPL-SB40-1112 11/1/2012	CAPL-SO40 CAPL-SB40P-1112 11/1/2012	CAPL-SO41 CAPL-SB41-1012 10/31/2012	CAPL-SO42 CAPL-SB42-1012 10/31/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	30,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW)	18,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW)	29,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	LMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	HMW PAH	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)												
4,4'-DDD	583	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	114	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	100	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	3.63	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	226	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	342	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	10.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	6.32	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	1.95	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	7.75	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	11.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	52.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	500	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO34 CAPL-SB34-1112 11/5/2012	CAPL-SO35 CAPL-SB35-1112 11/6/2012	CAPL-SO36 CAPL-SB36-1112 11/6/2012	CAPL-SO37 CAPL-SB37-1112 11/6/2012	CAPL-SO38 CAPL-SB38-1012 10/31/2012	CAPL-SO39 CAPL-SB39-1012 10/31/2012	CAPL-SO40 CAPL-SB40-1112 11/1/2012	CAPL-SO40 CAPL-SB40P-1112 11/1/2012	CAPL-SO41 CAPL-SB41-1012 10/31/2012	CAPL-SO42 CAPL-SB42-1012 10/31/2012
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	8,000	--	10.2 U	10.8 U	10.4 U	10.4 U	10.4 U	9.44 U	10.8 U	11.3 U	8.89 U	9.15 U
Explosives (UG/KG)												
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)												
Aluminum	pH < 5.5	13,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	18.0	5.54	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	330	84.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	40.0	0.52	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	32.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	64.0	33.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	13.0	5.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	70.0	3.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5 < pH > 8	32,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	120	8.79	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	220	176	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.10	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	38.0	17.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	0.52	0.64	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	130	48.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	120	28.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters												
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO43 CAPL-SB43-1112 11/1/2012	CAPL-SO44 CAPL-SB44-1012 10/26/2012	CAPL-SO45 CAPL-SB45-1012 10/26/2012	CAPL-SO46 CAPL-SB46-1012 10/26/2012	CAPL-SO47 CAPL-SB47-1012 10/26/2012	CAPL-SO48 CAPL-SB48-1012 10/24/2012	CAPL-SO49 CAPL-SB49-1012 10/24/2012	CAPL-SO50 CAPL-SB50-1012 10/24/2012	CAPL-SO50 CAPL-SB50P-1012 10/24/2012	CAPL-SO55 CAPL-SB55-1012 10/26/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	NSV	--	NA	5.16 UJ	6.99 UJ	7.61 UJ	5.95 UJ	6.28 U	5.28 U	7.55 U	6.9 U	5.05 UJ
Acetone	NSV	--	NA	10.3 UJ	14 UJ	15.2 UJ	6.84 J	61.0 J	10.6 UJ	15.1 UJ	13.8 UJ	7.89 J
Carbon disulfide	NSV	--	NA	2.58 U	3.5 U	3.8 U	2.97 U	3.14 U	2.64 U	3.78 U	3.45 U	2.53 U
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	LMW PAH	--	NA	3.66 U	4.36 U	3.04 J	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U
Anthracene	LMW PAH	--	NA	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U
Benzo(a)anthracene	HMW PAH	--	NA	3.66 U	4.36 U	3.94 U	3.93 U	23.8 J	4 U	4.26 U	4.01 U	4.03 U
Benzo(a)pyrene	HMW PAH	--	NA	3.66 U	4.36 U	5.81 J	3.93 U	23.2 K	4 U	4.26 U	4.01 U	4.03 U
Benzo(b)fluoranthene	HMW PAH	--	NA	3.66 U	4.36 U	22.4	3.93 U	57 K	4 U	4.26 U	5.56 K	4.03 U
Benzo(g,h,i)perylene	HMW PAH	--	NA	3.66 U	4.36 U	11.9	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U
Benzo(k)fluoranthene	HMW PAH	--	NA	3.66 U	4.36 U	9.43	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U
bis(2-Ethylhexyl)phthalate	30,000	--	NA	183 U	219 U	198 U	197 U	185 U	201 U	214 U	201 U	202 U
Chrysene	HMW PAH	--	NA	3.66 U	4.36 U	17.3	3.93 U	31.6 K	4 U	4.26 U	4.01 U	4.03 U
Dibenz(a,h)anthracene	HMW PAH	--	NA	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U
Fluoranthene	LMW PAH	--	NA	3.66 U	4.36 U	17.5	3.93 U	49	4 U	4.26 U	5.42 J	4.57 J
Fluorene	LMW PAH	--	NA	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	NA	3.66 U	4.36 U	9.69	3.93 U	23.3 J	4 U	4.26 U	4.01 U	4.03 U
Naphthalene	LMW PAH	--	NA	3.66 U	4.36 U	3.94 U	3.93 U	18.5 U	4 U	4.26 U	4.01 U	4.03 U
PAH (HMW)	18,000	--	NA	16.5 U	19.6 U	97.0 J	17.7 U	230 K	18.0 U	19.2 U	25.8 K	20.3 J
PAH (LMW)	29,000	--	NA	106 U	127 U	135 J	114 U	227 J	117 U	124 U	125 J	120 J
Phenanthrene	LMW PAH	--	NA	3.66 U	4.36 U	6.01 J	3.93 U	30.2 J	4 U	4.26 U	7.26 J	4.03 U
Pyrene	HMW PAH	--	NA	3.66 U	4.36 U	16.5	3.93 U	43.5 K	4 U	4.26 U	6.22 K	4.22 J
Pesticides (UG/KG)												
4,4'-DDD	583	--	NA	0.23 J	0.47 UL	0.851 J	3.08 J	13 J	1.69 J	2.68 J	0.675 J	0.396 UL
4,4'-DDE	114	--	NA	0.456 L	0.47 UL	7.49 J	3.01 J	143 J	9.02	7.1	4.78	0.346 J
4,4'-DDT	100	--	NA	0.353 J	0.47 UL	2.96 J	2.11 J	60 J	0.467 J	3.71 J	2.88 J	0.396 U
Aldrin	3.63	--	NA	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U
alpha-BHC	226	--	NA	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U
alpha-Chlordane	11.0	--	NA	0.367 UL	0.47 UL	0.768 J	0.394 UL	0.656 J	0.412 U	0.441 U	0.398 U	0.396 U
beta-BHC	342	--	NA	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U
Dieldrin	10.5	--	NA	0.602 L	0.47 UL	6.49 L	3.65 L	8.16 J	0.412 U	0.613 J	0.449 J	0.396 U
Endosulfan II	6.32	--	NA	0.367 UL	0.47 UL	4.18 J	0.81 J	4.07 J	0.412 U	0.441 U	0.398 UL	0.396 U
Endosulfan sulfate	6.32	--	NA	0.937 J	0.484 J	29.3 J	9.05 L	0.367 UL	0.412 U	0.441 U	1.45 J	0.396 U
Endrin	1.95	--	NA	0.367 UL	0.47 UL	1.1 J	1.54 J	1.25 J	0.412 U	0.441 U	0.398 U	0.396 U
Endrin aldehyde	1.95	--	NA	0.367 UL	0.47 UL	0.452 J	0.441 J	0.646 J	0.412 U	0.441 U	0.398 U	0.396 U
Endrin ketone	1.95	--	NA	0.367 UL	0.47 UL	1.84 J	0.81 J	1.73 J	0.412 U	0.441 U	0.398 U	0.396 U
gamma-BHC (Lindane)	7.75	--	NA	0.367 UL	0.47 UL	0.411 U	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U
gamma-Chlordane	11.0	--	NA	2.17 J	1.76 J	2.1 J	1.88 L	3.66 B	0.412 UJ	0.366 B	0.411 B	1.45 J
Heptachlor	52.9	--	NA	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U
Heptachlor epoxide	52.9	--	NA	0.367 UL	0.47 UL	0.411 UL	0.394 UL	0.367 UL	0.412 U	0.441 U	0.398 U	0.396 U
Methoxychlor	500	--	NA	0.367 UL	0.47 UL	3.49 J	0.85 J	4.95 J	0.412 UJ	0.441 U	0.398 U	0.396 U

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO43 CAPL-SB43-1112 11/1/2012	CAPL-SO44 CAPL-SB44-1012 10/26/2012	CAPL-SO45 CAPL-SB45-1012 10/26/2012	CAPL-SO46 CAPL-SB46-1012 10/26/2012	CAPL-SO47 CAPL-SB47-1012 10/26/2012	CAPL-SO48 CAPL-SB48-1012 10/24/2012	CAPL-SO49 CAPL-SB49-1012 10/24/2012	CAPL-SO50 CAPL-SB50-1012 10/24/2012	CAPL-SO50 CAPL-SB50P-1012 10/24/2012	CAPL-SO55 CAPL-SB55-1012 10/26/2012
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	8,000	--	9.44 UL	35.6 J	23.2 L	414 L	284 J	428 L	13.9 J	39.7	31.7	9.7 U
Explosives (UG/KG)												
Nitroglycerin	NSV	--	NA	455 U	493 U	498 U	478 U	455 U	500 U	500 U	455 U	478 U
Inorganics (MG/KG)												
Aluminum	pH < 5.5	13,000	NA	11,600	27,600	22,400	24,000	11,500	10,900	23,400	24,500	6,480
Arsenic	18.0	5.54	NA	2.12	16.3	4.87	4.01	4.51	2.91	11.5 J	7.98 J	1.9
Barium	330	84.5	NA	33.4	52.8	39.6	46.8	26.2	47.3	55.7 J	87.3 J	29.4
Beryllium	40.0	0.52	NA	0.421 J	1.89	0.786 J	0.552 J	0.323 J	0.52 J	1.1 J	1.07 J	0.263 J
Cadmium	32.0	--	NA	0.218 U	0.697 U	0.61 U	0.627 U	0.57 U	0.246 U	0.626 U	0.622 U	0.252 U
Chromium	64.0	33.7	NA	15.1	58.5	44.9	42.6	19.1 K	15.2	41.8	37.7	6.74
Cobalt	13.0	5.18	NA	2.54	6.45	2.62 J	1.97 J	1.51 J	2.69	4.1	4.62	1.27 J
Copper	70.0	3.17	NA	3.59	8.05	4.26	8.85	5.1	3.71	5.35	4.65	3.02
Iron	5 < pH > 8	32,000	NA	10,300	63,500	33,600	27,100	14,200	13,400	52,600	38,700	5,460
Lead	120	8.79	NA	7.96	16	11.9	9.33	23.6	9.17	15	12.4	13.3
Manganese	220	176	NA	35.2	65.1	28.3	16.2	59.4	50.6	78.7 J	45 J	22.8
Mercury	0.10	0.14	NA	0.0354 J	0.0947	0.0344 J	0.0446 J	0.0462	0.0298 J	0.0671	0.0642	0.0354 J
Nickel	38.0	17.6	NA	3.96	16.1	7.25	5.86	4.06	4.37	9.19	8.36	3.06 B
Selenium	0.52	0.64	NA	0.546 U	1.74 U	1.52 U	1.57 U	1.42 U	0.616 U	1.56 U	1.55 U	0.631 U
Vanadium	130	48.3	NA	20.2	66.7	51.4	54.3	27.9 K	17.7	47.7	43.8	11.3
Zinc	120	28.0	NA	14.1	48.8	43	20.2	42.3	16.8	29.5	25.7	11.7
Other Parameters												
pH	--	--	NA	5.82 H3	5.06 H3	6.60 H3	5.52 H3	5.88 H3	7.86 H3	8.08 H3	NA	5.70 H3
Total organic carbon (MG/KG)	--	--	NA	4,100	1,770	3,180	5,670	20,300	3,740	5,900	NA	5,480

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO56	CAPL-SO57	CAPL-SO58	CAPL-SO59	CAPL-SO60		CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64
			CAPL-SB56-1012	CAPL-SB57-1012	CAPL-SB58-1012	CAPL-SB59-1012	CAPL-SB60-1112	CAPL-SB60P-1112	CAPL-SB61-1112	CAPL-SB62-1112	CAPL-SB63-1112	CAPL-SB64-1112
			10/26/2012	10/26/2012	10/26/2012	10/26/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	NSV	--	93.1	6.83 U	6.44 UJ	3.88 J	5.79 U	6.35 U	4.29 U	4.09 U	4.72 U	4.76 U
Acetone	NSV	--	261 J	13.7 UJ	9.05 J	14.8 J	11.6 UJ	12.7 UJ	8.57 UJ	5.13 J	9.44 UJ	9.53 UJ
Carbon disulfide	NSV	--	2.89 J	3.42 U	3.22 U	1.93 J	2.89 U	3.18 U	2.14 U	2.04 U	2.36 U	2.38 U
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	LMW PAH	--	4.56 J	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	39.2 U	35.5	9.96
Anthracene	LMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	83.6	65.4	3.91 U
Benzo(a)anthracene	HMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	610	3.99 U	3.91 U
Benzo(a)pyrene	HMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	859	3.99 U	4.99 J
Benzo(b)fluoranthene	HMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	2,100	7.82 J	9.11
Benzo(g,h,i)perylene	HMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	1,140	3.99 U	6.09 J
Benzo(k)fluoranthene	HMW PAH	--	6.87 J	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	2,210	3.99 U	5.51 J
bis(2-Ethylhexyl)phthalate	30,000	--	220 U	226 U	212 U	205 U	211 U	221 U	167 J	512 J	200 U	196 U
Chrysene	HMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	3,070	14.8	22.8
Dibenz(a,h)anthracene	HMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	250	3.99 U	3.91 U
Fluoranthene	LMW PAH	--	10.7	3.62 J	3.52 J	4.1 U	4.2 U	4.4 U	3.85 U	3,360	6.05 J	6.26 J
Fluorene	LMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	39.2 U	8.88	3.91 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	1,000	3.99 U	4.3 J
Naphthalene	LMW PAH	--	4.39 U	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	39.2 U	53	7.17 J
PAH (HMW)	18,000	--	32.9 J	21.5 J	20.1 J	18.5 U	18.9 U	19.8 U	17.3 U	14,219	44.8 J	64.2 J
PAH (LMW)	29,000	--	145 J	132 J	124 J	119 U	122 U	128 U	112 U	4,438	320 J	147 J
Phenanthrene	LMW PAH	--	8.77 J	4.5 U	4.23 U	4.1 U	4.2 U	4.4 U	3.85 U	405	46.7	17.7
Pyrene	HMW PAH	--	10.7	3.46 J	3.17 J	4.1 U	4.2 U	4.4 U	3.85 U	2,980	10.2	7.48 J
Pesticides (UG/KG)												
4,4'-DDD	583	--	11.3 J	19.7 J	0.243 J	2.7 J	0.43 U	0.442 U	0.399 U	3.36 L	0.837	0.957 J
4,4'-DDE	114	--	9.67	11.5 L	3.53 L	14.3 L	0.43 UJ	0.442 UJ	0.399 UJ	23.1 K	8.29 J	3.66
4,4'-DDT	100	--	0.663 J	2.53 J	1.28 J	1.54 L	0.43 U	0.442 U	0.399 U	32.1 L	1.13 J	0.801 J
Aldrin	3.63	--	0.449 U	0.451 UL	0.333 J	0.429 UL	0.43 U	0.442 U	0.399 U	0.929 L	0.403 U	0.401 U
alpha-BHC	226	--	0.449 U	0.307 J	0.444 UL	0.594 J	0.43 U	0.442 U	0.399 U	0.352 L	0.403 U	0.401 U
alpha-Chlordane	11.0	--	0.449 UL	0.451 UL	0.444 UL	0.429 UL	0.43 U	0.442 U	0.399 U	0.512 L	0.403 U	0.401 U
beta-BHC	342	--	0.449 U	0.252 J	0.444 UL	0.429 UL	0.43 U	0.442 U	0.399 U	0.403 U	0.403 U	0.401 U
Dieldrin	10.5	--	1.66 J	0.451 UL	0.444 UL	0.429 UL	0.43 U	0.442 U	0.399 U	2.91 L	0.403 U	1.02 J
Endosulfan II	6.32	--	0.449 UL	0.451 UL	0.444 UL	0.429 UL	0.43 U	0.442 U	0.399 U	2.32 L	0.403 U	0.757 J
Endosulfan sulfate	6.32	--	0.449 U	0.681 J	0.444 UL	0.227 J	0.43 U	0.442 U	0.399 U	19.7 K	0.403 U	0.401 U
Endrin	1.95	--	0.905 J	0.403 L	0.519 J	0.429 UL	0.43 U	0.442 U	0.399 U	6.12 L	0.403 U	0.401 U
Endrin aldehyde	1.95	--	1.15 J	0.429 J	0.444 UL	0.429 UL	0.43 U	0.442 U	0.399 U	1.27 K	0.403 U	0.523 J
Endrin ketone	1.95	--	0.449 U	0.451 UL	0.444 UL	0.429 UL	0.43 U	0.442 U	0.399 UL	7.34 L	0.403 U	0.401 U
gamma-BHC (Lindane)	7.75	--	0.449 U	0.451 UL	0.444 UL	0.429 UL	0.43 U	0.442 U	0.399 U	1.17 K	0.403 U	0.401 U
gamma-Chlordane	11.0	--	0.296 J	0.303 J	3.23 L	2.5 L	0.301 J	0.538 J	0.399 U	3.76 L	0.403 U	0.394 J
Heptachlor	52.9	--	0.449 U	0.185 J	0.246 J	1.97 J	0.43 U	0.442 U	0.399 U	0.27 L	0.403 U	0.401 U
Heptachlor epoxide	52.9	--	0.449 U	0.451 UL	0.201 L	0.437 J	0.43 U	0.442 U	0.399 U	1.44 K	0.403 U	0.401 U
Methoxychlor	500	--	1.63 J	3.61 J	0.52 J	1.28 J	0.43 U	0.442 U	0.399 UJ	4.71 K	0.403 UJ	0.545 J

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO56	CAPL-SO57	CAPL-SO58	CAPL-SO59	CAPL-SO60		CAPL-SO61	CAPL-SO62	CAPL-SO63	CAPL-SO64
			CAPL-SB56-1012	CAPL-SB57-1012	CAPL-SB58-1012	CAPL-SB59-1012	CAPL-SB60-1112	CAPL-SB60P-1112	CAPL-SB61-1112	CAPL-SB62-1112	CAPL-SB63-1112	CAPL-SB64-1112
			10/26/2012	10/26/2012	10/26/2012	10/26/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	8,000	--	54.3 J	19.9 L	35.2 L	9.07 L	10.5 U	7.83 J	9.77 U	704 J	9.88 U	75.9 J
Explosives (UG/KG)												
Nitroglycerin	NSV	--	465 U	469 U	493 U	452 U	446 U	500 U	435 U	566 J	441 U	448 U
Inorganics (MG/KG)												
Aluminum	pH < 5.5	13,000	3,590	2,580	4,220	1,600	12,100	15,800	16,400	8,930	11,600	13,600
Arsenic	18.0	5.54	2.76	1.44 J	1.5	1.11 J	14.2 J	22.4 J	1.9 J	2.64 J	3.41	10.7
Barium	330	84.5	18.4	12.2	24.3	7.04	49.2 J	77.2 J	38.2	48.8	40.5	49
Beryllium	40.0	0.52	0.21 J	0.228 J	0.25 J	0.254 U	0.95 J	1.32 J	0.45 J	0.495 J	0.431 J	0.821 J
Cadmium	32.0	--	0.268 U	0.204 J	1.64 K	0.254 U	0.668 U	0.365 J	0.609 U	1.02 J	0.613 U	0.628 U
Chromium	64.0	33.7	5.6	5.41	5.56	3.67	30.9	41.8	34.6	20	19.7	31.7
Cobalt	13.0	5.18	1.07 J	2.16	0.947	1.27 U	4.52 J	9.11 J	3.05 U	1.88 J	1.89 J	3.4 J
Copper	70.0	3.17	3.17	2.37	3.54	1.26 J	4.48	5.19	4.89	10.1	5.31	6.64
Iron	5 < pH > 8	32,000	5,560	2,570	4,220	2,470	42,300	51,100	26,600	12,700	19,300	38,600
Lead	120	8.79	8.58	22 J	16.8 K	4.59 J	9.66 J	14 J	14.4	66.5	11.2	190
Manganese	220	176	11.3	7.37	34.4 K	7.12	208 J	520 J	17.8	90.6	36.4	75.4
Mercury	0.10	0.14	0.0226 J	0.0437	0.0454 L	0.036 U	0.0227 J	0.0316 J	0.0511	0.0674	0.0795	0.0789
Nickel	38.0	17.6	2.19 B	3.17 B	2.63 B	1.15 B	14	18.2	3.49	4.5	3.95	9.1
Selenium	0.52	0.64	0.669 U	0.54 J	0.349 U	0.636 U	1.67 U	1.74 U	1.52 U	1.5 U	1.53 U	1.57 U
Vanadium	130	48.3	8.95	6.94	8.78 K	4.81	30.3	40	34	20.4	22.7	33.5
Zinc	120	28.0	48.2	13.2	72.7 K	52.7	44.8	51.5	24.3	98.6	16.2	32.2
Other Parameters												
pH	--	--	6.02 H3	6.96 H3	5.82 H3	5.87 H3	8.14 H3	NA	7.93 H3	6.73 H3	8.12 H3	8.12 H3
Total organic carbon (MG/KG)	--	--	13,300	26,000	11,900	8,970	6,880	NA	2,690 N	27,500 N	10,900 N*	32,800

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO65 CAPL-SB65-1112 11/1/2012	CAPL-SO66 CAPL-SB66-1112 11/1/2012	CAPL-SO67 CAPL-SB67-1112 11/1/2012	CAPL-SO68 CAPL-SB68-1112 11/1/2012	CAPL-SO69 CAPL-SB69-1112 11/1/2012	CAPL-SO70 CAPL-SB70-1112 11/2/2012	CAPL-SO71 CAPL-SB71-1112 11/2/2012	CAPL-SO72 CAPL-SB72-1112 11/2/2012	CAPL-SO73 CAPL-SB73-1112 11/5/2012	CAPL-SO74 CAPL-SB74-1112 11/5/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	NSV	--	4.62 U	5.84 U	5.72 U	6.15 U	4.55 U	5.54 U	4.84 U	4.75 J	4.16 U	4.24 J
Acetone	NSV	--	9.24 UJ	11.7 UJ	5.86 J	12.3 UJ	9.1 UJ	11.1 UJ	6.84 J	25.8 J	8.32 UJ	28.8 J
Carbon disulfide	NSV	--	2.31 U	2.92 U	2.86 U	3.07 U	2.28 U	2.77 U	2.42 U	1.78 U	2.08 U	2.01 U
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	LMW PAH	--	3.89 U	16.4	3.7 U	4.21 U	23.1 J	3.86 U	4.28 U	17.6 U	4.41 J	3.52 U
Anthracene	LMW PAH	--	3.89 U	3.93 U	3.7 U	4.21 U	40.1 U	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U
Benzo(a)anthracene	HMW PAH	--	3.89 U	3.93 U	3.7 U	4.21 U	122	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U
Benzo(a)pyrene	HMW PAH	--	3.89 U	3.93 U	3.7 U	4.21 U	213	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U
Benzo(b)fluoranthene	HMW PAH	--	3.89 U	8	3.7 U	4.21 U	292	3.86 U	4.28 U	17.6 U	8.24	3.52 U
Benzo(g,h,i)perylene	HMW PAH	--	3.89 U	5.27 J	3.7 U	4.21 U	186	3.86 U	4.28 U	17.6 U	3.96 J	3.52 U
Benzo(k)fluoranthene	HMW PAH	--	3.89 U	3.93 U	3.7 U	4.21 U	274	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U
bis(2-Ethylhexyl)phthalate	30,000	--	130 J	197 U	186 U	553	1,000 U	109 J	167 J	302 J	185 U	177 U
Chrysene	HMW PAH	--	3.89 U	16.4	3.7 U	4.21 U	346	3.86 U	4.28 U	24.1 J	10.5	3.52 U
Dibenz(a,h)anthracene	HMW PAH	--	3.89 U	3.93 U	3.7 U	4.21 U	56.2 J	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U
Fluoranthene	LMW PAH	--	3.89 U	5.35 J	2.31 J	4.21 U	343	3.86 U	4.28 U	17.6 U	6.38 J	3.52 U
Fluorene	LMW PAH	--	3.89 U	3.93 U	3.7 U	4.21 U	40.1 U	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	3.89 U	3.93 U	3.7 U	4.21 U	161	3.86 U	4.28 U	17.6 U	3.68 U	3.52 U
Naphthalene	LMW PAH	--	3.89 U	16.7	3.7 U	4.21 U	40.1 U	3.86 U	4.28 U	17.6 U	4.46 J	3.52 U
PAH (HMW)	18,000	--	17.5 U	46.5 J	17.0 J	18.9 U	2,011 J	17.4 U	19.3 U	94.5 J	38.5 J	15.8 U
PAH (LMW)	29,000	--	113 U	162 J	108 J	122 U	1,054 J	112 U	124 U	176 J	124 J	103 U
Phenanthrene	LMW PAH	--	3.89 U	17.5	3.7 U	4.21 U	88	3.86 U	4.28 U	26.1 J	8.88	3.52 U
Pyrene	HMW PAH	--	3.89 U	7.02 J	2.21 J	4.21 U	361	3.86 U	4.28 U	17.6 U	6.56 J	3.52 U
Pesticides (UG/KG)												
4,4'-DDD	583	--	0.387 U	0.811 J	0.392 U	0.425 UL	5.6 J	0.407 U	0.421 U	0.356 UL	0.616 J	0.37 U
4,4'-DDE	114	--	0.387 UJ	0.347 J	0.392 UJ	0.217 J	5.45 J	0.407 U	0.421 U	0.356 UL	4.16 L	3.78 J
4,4'-DDT	100	--	0.387 UJ	0.401 U	0.392 UJ	1.41 J	19.6 L	0.407 UJ	0.421 UJ	0.356 UJ	3.63 J	0.37 UJ
Aldrin	3.63	--	0.387 U	0.401 U	0.392 U	0.594 J	0.409 U	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U
alpha-BHC	226	--	0.387 U	0.401 U	0.392 U	0.251 J	0.409 U	0.407 UJ	0.421 U	0.356 UL	0.375 U	0.37 U
alpha-Chlordane	11.0	--	0.387 U	0.401 U	0.392 U	0.425 U	1.9 J	0.407 U	0.421 U	0.356 UL	0.375 UJ	0.37 U
beta-BHC	342	--	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U
Dieldrin	10.5	--	0.387 U	0.401 U	0.392 U	4.4 L	4.36	0.407 U	0.421 U	0.356 UL	1 J	0.37 U
Endosulfan II	6.32	--	0.387 U	0.401 U	0.392 U	2.31 J	2.29 J	0.407 U	0.421 U	0.356 UL	0.375 UJ	0.37 U
Endosulfan sulfate	6.32	--	0.387 U	0.54 J	0.392 U	4.43 L	7.50 L	0.407 U	0.421 U	0.356 UJ	0.375 U	0.37 U
Endrin	1.95	--	0.387 U	0.401 U	0.392 U	4.14 J	0.529 J	0.407 UJ	0.421 U	0.356 UL	0.375 UJ	0.37 U
Endrin aldehyde	1.95	--	0.387 U	0.401 U	0.392 U	0.276 J	0.409 U	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U
Endrin ketone	1.95	--	0.387 U	0.401 UJ	0.392 U	1.36 L	2.52 J	0.407 U	0.421 U	0.356 UL	0.375 UL	0.37 U
gamma-BHC (Lindane)	7.75	--	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U
gamma-Chlordane	11.0	--	0.252 J	0.283 J	0.392 U	1.86	1.79	0.332 J	0.219 J	0.356 UJ	0.565 J	0.316 J
Heptachlor	52.9	--	0.387 U	0.401 U	0.392 U	0.425 U	0.409 U	0.407 U	0.421 U	0.356 UL	0.375 U	0.37 U
Heptachlor epoxide	52.9	--	0.387 U	0.401 U	0.392 U	0.187 J	0.409 UL	0.407 UJ	0.421 U	0.356 UL	0.375 UL	0.37 UJ
Methoxychlor	500	--	0.387 UJ	0.401 UJ	0.392 UJ	0.327 J	0.257 J	0.407 UJ	0.421 UJ	0.356 UJ	0.456 J	0.37 UJ

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO65 CAPL-SB65-1112 11/1/2012	CAPL-SO66 CAPL-SB66-1112 11/1/2012	CAPL-SO67 CAPL-SB67-1112 11/1/2012	CAPL-SO68 CAPL-SB68-1112 11/1/2012	CAPL-SO69 CAPL-SB69-1112 11/1/2012	CAPL-SO70 CAPL-SB70-1112 11/2/2012	CAPL-SO71 CAPL-SB71-1112 11/2/2012	CAPL-SO72 CAPL-SB72-1112 11/2/2012	CAPL-SO73 CAPL-SB73-1112 11/5/2012	CAPL-SO74 CAPL-SB74-1112 11/5/2012
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	8,000	--	9.49 U	13.5 J	9.61 U	141	211 J	9.97 U	10.3 U	8.72 UL	56.9	9.06 U
Explosives (UG/KG)												
Nitroglycerin	NSV	--	467 U	485 U	457 U	488 U	493 U	444 U	403 U	410 U	488 U	433 U
Inorganics (MG/KG)												
Aluminum	pH < 5.5	13,000	16,800	8,500	18,100	15,300	10,300	8,670	13,700	5,140	8,690	13,400
Arsenic	18.0	5.54	6.91	6.85	11.9	17.1	7.05	1.82	7.08	1.51 J	2.69	11.6
Barium	330	84.5	71	89.3	64.7	61.8	37.7	26.9	70.6	44	62.8	31.7
Beryllium	40.0	0.52	0.908 J	0.737 J	1.21 J	1.14 J	0.555 J	0.251 J	0.965 J	0.573 U	0.454	0.88 J
Cadmium	32.0	--	0.566 U	0.574 U	0.592 U	0.647 U	0.61 U	0.242 U	0.642 U	0.573 U	0.196 J	0.535 U
Chromium	64.0	33.7	33	19.2	39.6	39.4	22.2	13.9	37.3	8.4	16.5 K	33.3
Cobalt	13.0	5.18	3.27 J	2.13 J	3.67 J	5.26	2.12 J	1.28 J	3 J	2.87 U	1.52	2.71 J
Copper	70.0	3.17	2.95	5.04	4.57	4.12	12.6	3.48	2.57 U	2.77 J	10.9 L	3.96
Iron	5 < pH > 8	32,000	37,200	22,500	51,400	34,400	23,800	10,200	37,600	8,050	14,700	64,700
Lead	120	8.79	8.99	14.8	10.7	10.8	23.2	6.49	8.19	6.53	34.4 L	10.6
Manganese	220	176	40.4	92.3	67.5	155	111	15.8	32.5	33.2	82 L	100
Mercury	0.10	0.14	0.0311 J	0.049	0.0358 J	0.0299 J	0.0432	0.053	0.0261 J	0.0251 J	0.0578	0.0324 U
Nickel	38.0	17.6	6.12	4.95	7.82	15.9	4.85	2.46	6	1.69 J	3.11	7.28
Selenium	0.52	0.64	1.42 U	1.43 U	1.48 U	1.62 U	1.53 U	0.606 U	1.61 U	1.43 U	0.301 U	1.34 U
Vanadium	130	48.3	34.5	20.4	45.1	34.4	24.5	18.9	34	10.7	20.4	42.3
Zinc	120	28.0	17.1	27.4	22.9	49.9	53.8	6.44	24.6	29.9	36.5 L	21.2
Other Parameters												
pH	--	--	7.42 H3	7.73 H3	7.20 H3	8.16 H3	8.32 H3	7.35 H3	5.95 H3	8.03 H3	8.05 H3	7.80 H3
Total organic carbon (MG/KG)	--	--	3,960	9,110	3,180	1,640 J	15,600 N	1,480	1,940	6,290	14,300	2,880

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO75	
			CAPL-SB75-1112	CAPL-SB75P-1112
			11/5/2012	11/5/2012
Volatile Organic Compounds (UG/KG)				
2-Butanone	NSV	--	4.76 U	4.9 U
Acetone	NSV	--	9.51 UJ	9.8 UJ
Carbon disulfide	NSV	--	2.38 U	2.45 U
Semivolatile Organic Compounds (UG/KG)				
2-Methylnaphthalene	LMW PAH	--	8.87	7.32 J
Anthracene	LMW PAH	--	4.04 U	4.58 U
Benzo(a)anthracene	HMW PAH	--	4.04 U	4.58 U
Benzo(a)pyrene	HMW PAH	--	5.02 J	4.58 U
Benzo(b)fluoranthene	HMW PAH	--	10.8	5.39 J
Benzo(g,h,i)perylene	HMW PAH	--	5.46 J	4.58 U
Benzo(k)fluoranthene	HMW PAH	--	4.04 U	4.58 U
bis(2-Ethylhexyl)phthalate	30,000	--	202 U	164 J
Chrysene	HMW PAH	--	20.4	11.8
Dibenz(a,h)anthracene	HMW PAH	--	4.04 U	4.58 U
Fluoranthene	LMW PAH	--	7.37 J	4.58 U
Fluorene	LMW PAH	--	4.04 U	4.58 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	4.28 J	4.58 U
Naphthalene	LMW PAH	--	6.63 J	6.05 J
PAH (HMW)	18,000	--	60.6 J	35.6 J
PAH (LMW)	29,000	--	151 J	152 J
Phenanthrene	LMW PAH	--	19.4	12.6
Pyrene	HMW PAH	--	8.55	4.67 J
Pesticides (UG/KG)				
4,4'-DDD	583	--	0.406 UJ	0.447 U
4,4'-DDE	114	--	0.561 J	0.795 J
4,4'-DDT	100	--	0.406 U	0.447 U
Aldrin	3.63	--	0.406 U	0.447 U
alpha-BHC	226	--	0.406 U	0.447 U
alpha-Chlordane	11.0	--	0.406 U	0.447 U
beta-BHC	342	--	0.406 U	0.447 U
Dieldrin	10.5	--	0.406 U	0.447 U
Endosulfan II	6.32	--	0.406 U	0.447 U
Endosulfan sulfate	6.32	--	0.406 U	0.447 UL
Endrin	1.95	--	0.406 U	0.447 U
Endrin aldehyde	1.95	--	0.406 U	0.447 U
Endrin ketone	1.95	--	0.406 U	0.447 UL
gamma-BHC (Lindane)	7.75	--	0.406 U	0.447 U
gamma-Chlordane	11.0	--	0.312 J	0.364 J
Heptachlor	52.9	--	0.406 U	0.447 U
Heptachlor epoxide	52.9	--	0.406 U	0.447 U
Methoxychlor	500	--	0.406 UJ	0.447 UL

Table D-55
Exceedances - Subsurface Soil
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAPL-SO75	
			CAPL-SB75-1112	CAPL-SB75P-1112
			11/5/2012	11/5/2012
Polychlorinated Biphenyls (UG/KG)				
Aroclor-1260	8,000	--	9.95 UL	11 UL
Explosives (UG/KG)				
Nitroglycerin	NSV	--	413 U	441 U
Inorganics (MG/KG)				
Aluminum	pH < 5.5	13,000	12,900	11,400
Arsenic	18.0	5.54	6.7	7.79
Barium	330	84.5	212 J	99.8 J
Beryllium	40.0	0.52	1.24 J	0.858 J
Cadmium	32.0	--	0.616 U	0.703 U
Chromium	64.0	33.7	22.6	25.8
Cobalt	13.0	5.18	2.63 J	2.9 J
Copper	70.0	3.17	11.5	11.7
Iron	5 < pH > 8	32,000	25,900	34,200
Lead	120	8.79	18.4	21.7
Manganese	220	176	373 J	126 J
Mercury	0.10	0.14	0.0661 J	0.0387 UJ
Nickel	38.0	17.6	6.42	7.29
Selenium	0.52	0.64	1.54 U	1.76 U
Vanadium	130	48.3	26.4	31.1
Zinc	120	28.0	37.4	38.8
Other Parameters				
pH	--	--	8.24 H3	NA
Total organic carbon (MG/KG)	--	--	13,800	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-56
Screening Statistics - Subsurface Soil - Group 1B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																	
2-Butanone	5.16 - 7.61	0 / 7	--	--	--	3.20	0.51	3.57	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	10.3 - 15.2	2 / 7	6.84	61.0	CAPL-SB48-1012	14.3	20.6	29.5	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Carbon disulfide	2.58 - 3.80	0 / 7	--	--	--	1.60	0.25	1.79	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDE	0.47 - 0.47	6 / 7	0.46	143	CAPL-SB48-1012	24.3	52.4	62.8	114	1 / 7	1.25	0.55	0.21	--	-- / --	--	NO
Endosulfan sulfate	0.37 - 0.41	5 / 7	0.48	29.3	CAPL-SB46-1012	5.94	10.8	13.9	6.32	2 / 7	4.64	2.19	0.94	--	-- / --	--	YES
Endrin	0.37 - 0.47	3 / 7	1.10	1.54	CAPL-SB47-1012	0.68	0.59	1.11	1.95	0 / 7	0.79	--	--	--	-- / --	--	NO
Endrin ketone	0.37 - 0.47	3 / 7	0.81	1.84	CAPL-SB46-1012	0.75	0.74	1.29	1.95	0 / 7	0.94	--	--	--	-- / --	--	NO
Explosives (UG/KG)																	
Nitroglycerin	455 - 500	0 / 7	--	--	--	241	10.2	249	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Inorganics (MG/KG)																	
Aluminum	-- - --	7 / 7	10,900	27,600	CAPL-SB45-1012	18,929	7,273	24,270	pH < 5.5	1 / 7	--	mean pH in range		--	-- / --	--	NO
Arsenic	-- - --	7 / 7	2.12	16.3	CAPL-SB45-1012	6.60	5.26	10.5	18.0	0 / 7	0.91	--	--	--	-- / --	--	NO
Iron	-- - --	7 / 7	10,300	63,500	CAPL-SB45-1012	30,671	20,674	45,856	5 < pH > 8	1 / 7	--	mean pH in range		--	-- / --	--	NO
Lead	-- - --	7 / 7	7.96	23.6	CAPL-SB48-1012	13.3	5.47	17.3	120	0 / 7	0.20	--	--	--	-- / --	--	NO
Manganese	-- - --	7 / 7	16.2	78.7	CAPL-SB50-1012	47.6	22.1	63.9	220	0 / 7	0.36	--	--	--	-- / --	--	NO
Selenium	0.55 - 1.74	0 / 7	--	--	--	0.64	0.24	0.82	0.52	-- / --	3.35	2.19	1.23	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	7 / 7	5.06	8.08	CAPL-SB50-1012	6.40	1.17	7.26	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	7 / 7	1,770	20,300	CAPL-SB48-1012	6,380	6,300	11,007	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-57
Screening Statistics - Subsurface Soil - Group 1F
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																	
2-Butanone	5.05 - 6.83	2 / 5	3.88	93.1	CAPL-SB56-1012	21.2	40.2	59.5	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	13.7 - 13.7	4 / 5	7.89	261	CAPL-SB56-1012	59.9	112	167	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Carbon disulfide	2.53 - 3.42	2 / 5	1.93	2.89	CAPL-SB56-1012	1.88	0.61	2.47	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDE	-- - --	5 / 5	0.35	14.3	CAPL-SB59-1012	7.87	5.77	13.4	114	0 / 5	0.13	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.40 - 0.45	2 / 5	0.23	0.68	CAPL-SB57-1012	0.31	0.21	0.51	6.32	0 / 5	0.11	--	--	--	-- / --	--	NO
Endrin	0.40 - 0.43	3 / 5	0.40	0.91	CAPL-SB56-1012	0.45	0.29	0.72	1.95	0 / 5	0.46	--	--	--	-- / --	--	NO
Endrin ketone	0.40 - 0.45	0 / 5	--	--	--	0.22	0.011	0.23	1.95	-- / --	0.23	--	--	--	-- / --	--	NO
Explosives (UG/KG)																	
Nitroglycerin	452 - 493	0 / 5	--	--	--	236	7.64	243	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Inorganics (MG/KG)																	
Aluminum	-- - --	5 / 5	1,600	6,480	CAPL-SB55-1012	3,694	1,849	5,457	pH < 5.5	0 / 5	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	5 / 5	1.11	2.76	CAPL-SB56-1012	1.74	0.63	2.35	18.0	0 / 5	0.15	--	--	--	-- / --	--	NO
Iron	-- - --	5 / 5	2,470	5,560	CAPL-SB56-1012	4,056	1,499	5,485	5 < pH > 8	0 / 5	--	--	--	--	-- / --	--	NO
Lead	-- - --	5 / 5	4.59	22.0	CAPL-SB57-1012	13.1	6.82	19.6	120	0 / 5	0.18	--	--	--	-- / --	--	NO
Manganese	-- - --	5 / 5	7.12	34.4	CAPL-SB58-1012	16.6	11.8	27.9	220	0 / 5	0.16	--	--	--	-- / --	--	NO
Selenium	0.35 - 0.67	1 / 5	0.54	0.54	CAPL-SB57-1012	0.34	0.13	0.46	0.52	1 / 5	1.04	0.89	0.65	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	5 / 5	5.70	6.96	CAPL-SB57-1012	6.07	0.51	6.56	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	5 / 5	5,480	26,000	CAPL-SB57-1012	13,130	7,794	20,561	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-58
Screening Statistics - Subsurface Soil - Group 2B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Polychlorinated Biphenyls (UG/KG)														
Aroclor-1260	8.89 - 11.3	0 / 10	--	--	--	5.02	0.39	5.25	8,000	-- / --	0.001	--	--	NO

1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-59
Screening Statistics - Subsurface Soil - Group 2C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																	
2-Butanone	4.09 - 6.35	0 / 10	--	--	--	2.55	0.41	2.79	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	8.57 - 12.7	2 / 10	5.13	5.86	CAPL-SB67-1112	5.23	0.75	5.66	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	YES
Carbon disulfide	2.04 - 3.18	0 / 10	--	--	--	1.28	0.21	1.40	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDE	0.39 - 0.44	6 / 10	0.22	23.1	CAPL-SB62-1112	4.19	7.23	8.38	114	0 / 10	0.20	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.39 - 0.44	4 / 10	0.54	19.7	CAPL-SB62-1112	3.34	6.26	6.97	6.32	2 / 10	3.12	1.10	0.53	--	-- / --	--	YES
Endrin	0.39 - 0.44	3 / 10	0.53	6.12	CAPL-SB62-1112	1.22	2.12	2.45	1.95	2 / 10	3.14	1.25	0.63	--	-- / --	--	YES
Endrin ketone	0.39 - 0.44	3 / 10	1.36	7.34	CAPL-SB62-1112	1.26	2.27	2.58	1.95	2 / 10	3.76	1.32	0.65	--	-- / --	--	YES
Explosives (UG/KG)																	
Nitroglycerin	435 - 500	1 / 10	566	566	CAPL-SB62-1112	267	106	328	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	YES
Inorganics (MG/KG)																	
Aluminum	-- - --	10 / 10	8,500	18,100	CAPL-SB67-1112	13,533	3,476	15,548	pH < 5.5	0 / 10	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	10 / 10	1.90	22.4	CAPL-SB60-1112	9.09	6.59	12.9	18.0	1 / 10	1.24	0.72	0.50	--	-- / --	--	NO
Iron	-- - --	10 / 10	12,700	51,400	CAPL-SB67-1112	31,760	13,070	39,336	5 < pH > 8	5 / 10	--	mean pH in range		--	-- / --	--	NO
Lead	-- - --	10 / 10	8.99	190	CAPL-SB64-1112	36.5	56.6	69.3	120	1 / 10	1.58	0.58	0.30	--	-- / --	--	NO
Manganese	-- - --	10 / 10	17.8	520	CAPL-SB60-1112	121	146	205	220	1 / 10	2.36	0.93	0.55	--	-- / --	--	NO
Selenium	1.42 - 1.74	0 / 10	--	--	--	0.77	0.047	0.79	0.52	-- / --	3.35	1.53	1.48	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	10 / 10	6.73	8.32	CAPL-SB69-1112	7.79	0.52	8.09	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	10 / 10	1,640	32,800	CAPL-SB64-1112	11,426	10,826	17,701	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-60
Screening Statistics - Subsurface Soil - Group 2D
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																	
2-Butanone	4.16 - 5.54	2 / 6	4.24	4.75	CAPL-SB72-1112	3.12	1.10	4.02	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	8.32 - 11.1	3 / 6	6.84	28.8	CAPL-SB74-1112	12.7	11.4	22.1	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Carbon disulfide	1.78 - 2.77	0 / 6	--	--	--	1.13	0.18	1.27	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDE	0.36 - 0.42	3 / 6	0.80	4.16	CAPL-SB73-1112	1.55	1.89	3.11	114	0 / 6	0.04	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.36 - 0.45	0 / 6	--	--	--	0.20	0.017	0.21	6.32	-- / --	0.07	--	--	--	-- / --	--	NO
Endrin	0.36 - 0.45	0 / 6	--	--	--	0.20	0.017	0.21	1.95	-- / --	0.23	--	--	--	-- / --	--	NO
Endrin ketone	0.36 - 0.45	0 / 6	--	--	--	0.20	0.017	0.21	1.95	-- / --	0.23	--	--	--	-- / --	--	NO
Explosives (UG/KG)																	
Nitroglycerin	403 - 488	0 / 6	--	--	--	218	15.1	231	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Inorganics (MG/KG)																	
Aluminum	-- - --	6 / 6	5,140	13,700	CAPL-SB71-1112	10,417	3,456	13,260	pH < 5.5	0 / 6	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	6 / 6	1.51	11.6	CAPL-SB74-1112	5.42	4.06	8.75	18.0	0 / 6	0.64	--	--	--	-- / --	--	NO
Iron	-- - --	6 / 6	8,050	64,700	CAPL-SB74-1112	28,242	21,766	46,148	5 < pH > 8	3 / 6	NSV	mean pH in range		--	-- / --	--	NO
Lead	-- - --	6 / 6	6.49	34.4	CAPL-SB73-1112	14.7	11.2	23.9	120	0 / 6	0.29	--	--	--	-- / --	--	NO
Manganese	-- - --	6 / 6	15.8	373	CAPL-SB75-1112	106	135	217	220	1 / 6	1.70	0.99	0.48	--	-- / --	--	NO
Selenium	0.30 - 1.76	0 / 6	--	--	--	0.59	0.29	0.83	0.52	-- / --	3.38	1.59	1.13	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	6 / 6	5.95	8.24	CAPL-SB75-1112	7.57	0.85	8.27	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	6 / 6	1,480	14,300	CAPL-SB73-1112	6,782	5,879	11,618	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-61
Screening Statistics - Surface Soil - Mammal/Bird Eco-SSLs - All Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	95% UCL (Norm)	Arithmetic Mean	Mammal Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Bird Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient
Metals (MG/KG)															
Arsenic	-- - --	28 / 28	19.3	6.74	5.36	46.0	0 / 28	0.42	0.15	0.12	43.0	0 / 28	0.45	0.16	0.12
Cadmium	0.20 - 0.67	15 / 28	2.32	0.80	0.61	0.36	12 / 28	6.44	2.23	1.70	0.77	7 / 28	3.01	1.04	0.79
Chromium	-- - --	28 / 28	69.7	28.6	22.5	34.0	7 / 28	2.05	0.84	0.66	26.0	8 / 28	2.68	1.10	0.87
Copper	-- - --	28 / 28	51.5	18.6	14.3	49.0	1 / 28	1.05	0.38	0.29	28.0	4 / 28	1.84	0.66	0.51
Lead	-- - --	28 / 28	211	67.7	50.6	56.0	9 / 28	3.77	1.21	0.90	11.0	26 / 28	19.2	6.15	4.60
Nickel	-- - --	28 / 28	18.5	8.20	6.78	130	0 / 28	0.14	0.06	0.05	210	0 / 28	0.09	0.04	0.03
Zinc	-- - --	28 / 28	428	132	101	79.0	10 / 28	5.42	1.67	1.27	46.0	18 / 28	9.30	2.87	2.19
Pesticides (UG/KG)															
4,4'-DDD	0.35 - 0.44	23 / 28	353	42.2	20.6	21.0	5 / 28	16.8	2.01	0.98	93.0	1 / 28	3.80	0.45	0.22
4,4'-DDE	0.35 - 0.46	24 / 28	2,640	304	144	21.0	9 / 28	126	14.5	6.87	93.0	7 / 28	28.4	3.27	1.55
4,4'-DDT	0.37 - 0.44	25 / 28	808	125	71.4	21.0	9 / 28	38.5	5.95	3.40	93.0	6 / 28	8.69	1.34	0.77
Dieldrin	0.35 - 0.53	19 / 28	253	35.7	18.7	4.90	10 / 28	51.6	7.30	3.81	22.0	3 / 28	11.5	1.62	0.85
Semivolatile Organic Compounds (UG/KG)															
PAH (HMW)	-- - --	28 / 28	125,650	15,467	7,229	1,100	7 / 28	114	14.1	6.57	--	-- - --	--	--	--
PAH (LMW)	148 - 148	27 / 28	81,278	9,221	4,251	100,000	0 / 28	0.81	0.09	0.04	--	-- - --	--	--	--

Shaded cells indicate HQ ≥ 1

Table D-62A
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum - All Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	1.77E-01	5.60E-02	1.77E-02	2.51E+00	7.95E-01	2.51E-01	5.50E-01	1.74E-01	5.50E-02	1.81E-01	5.73E-02	1.81E-02	6.03E-01	2.70E-01	1.21E-01	8.50E-01	3.80E-01	1.70E-01	1.42E-01	6.36E-02	2.85E-02	7.74E-02	3.46E-02	1.55E-02
Chromium	5.02E-01	2.24E-01	1.00E-01	1.13E+01	5.04E+00	2.25E+00	2.33E+00	1.04E+00	4.67E-01	2.54E-01	1.14E-01	5.09E-02	4.45E+00	1.99E+00	8.90E-01	6.46E+00	2.89E+00	1.29E+00	6.77E-01	3.03E-01	1.35E-01	8.12E-02	3.63E-02	1.62E-02
Copper	1.91E-01	1.48E-01	1.15E-01	4.95E-01	3.84E-01	2.97E-01	1.19E-01	9.23E-02	7.15E-02	6.25E-02	5.50E-02	4.84E-02	3.93E-01	2.27E-01	1.32E-01	3.34E-01	1.93E-01	1.12E-01	5.57E-01	3.22E-01	1.87E-01	1.54E-01	8.90E-02	5.15E-02
Lead	2.50E-01	1.81E-01	1.32E-01	2.33E+00	1.70E+00	1.23E+00	3.90E-01	2.84E-01	2.06E-01	2.12E-01	1.54E-01	1.12E-01	1.17E+00	5.22E-01	2.33E-01	1.41E+00	6.29E-01	2.81E-01	1.91E+00	1.35E+00	9.54E-01	1.64E-01	7.34E-02	3.28E-02
Mercury	8.82E-01	3.94E-01	1.76E-01	1.87E+01	8.38E+00	3.75E+00	4.04E+00	1.81E+00	8.07E-01	6.32E-02	4.89E-02	3.79E-02	5.48E-01	3.50E-01	2.24E-01	8.00E-01	5.11E-01	3.27E-01	7.81E-02	5.52E-02	3.90E-02	4.02E-03	2.57E-03	1.64E-03
Zinc	2.14E-01	9.55E-02	4.27E-02	1.08E+00	4.84E-01	2.16E-01	2.57E-01	1.15E-01	5.14E-02	9.88E-02	4.42E-02	1.98E-02	6.38E-01	2.85E-01	1.28E-01	7.49E-01	3.35E-01	1.50E-01	4.63E-01	2.07E-01	9.27E-02	8.64E-02	3.86E-02	1.73E-02
Polychlorinated Biphenyls																								
Aroclor-1260	2.34E+01	1.05E+01	4.69E+00	9.96E+02	4.46E+02	1.99E+02	2.08E+02	9.32E+01	4.17E+01	1.58E+02	7.08E+01	3.17E+01	1.43E+02	6.41E+01	2.87E+01	2.16E+02	9.67E+01	4.32E+01	5.23E+00	2.34E+00	1.05E+00	4.97E+01	2.22E+01	9.94E+00
Pesticides																								
4,4'-DDD	5.25E-02	2.35E-02	1.05E-02	1.27E+00	5.69E-01	2.54E-01	2.66E-01	1.19E-01	5.31E-02	2.11E-01	9.42E-02	4.21E-02	1.64E-01	5.19E-02	1.64E-02	2.40E-01	7.58E-02	2.40E-02	2.10E-02	6.65E-03	2.10E-03	3.60E-01	1.61E-01	7.20E-02
4,4'-DDE	5.50E-01	2.46E-01	1.10E-01	2.25E+01	1.01E+01	4.51E+00	4.69E+00	2.10E+00	9.39E-01	3.62E+00	1.62E+00	7.24E-01	2.87E+00	9.08E-01	2.87E-01	4.32E+00	1.36E+00	4.32E-01	1.16E-01	3.68E-02	1.16E-02	6.24E+00	2.79E+00	1.25E+00
4,4'-DDT	1.58E-01	7.05E-02	3.15E-02	5.62E+00	2.51E+00	1.12E+00	1.17E+00	5.24E-01	2.34E-01	9.09E-01	4.06E-01	1.82E-01	7.18E-01	2.27E-01	7.18E-02	1.07E+00	3.40E-01	1.07E-01	4.22E-02	1.34E-02	4.22E-03	1.56E+00	6.99E-01	3.13E-01
Aldrin	3.17E-04	1.42E-04	6.34E-05	5.19E-03	2.32E-03	1.04E-03	1.12E-03	5.02E-04	2.25E-04	8.85E-04	3.96E-04	1.77E-04	6.61E-03	2.95E-03	1.32E-03	9.41E-03	4.21E-03	1.88E-03	1.35E-03	6.03E-04	2.70E-04	2.33E-03	1.04E-03	4.66E-04
alpha-BHC	1.18E-04	8.35E-05	5.90E-05	9.85E-05	6.96E-05	4.92E-05	5.09E-05	3.60E-05	2.54E-05	4.28E-05	3.03E-05	2.14E-05	3.04E-04	1.52E-04	7.56E-05	1.54E-04	7.71E-05	3.84E-05	6.37E-04	3.18E-04	1.59E-04	1.07E-04	5.35E-05	2.67E-05
alpha-Chlordane	7.93E-05	5.61E-05	3.97E-05	1.41E-03	9.99E-04	7.06E-04	3.00E-04	2.12E-04	1.50E-04	2.39E-04	1.69E-04	1.19E-04	1.35E-03	6.03E-04	2.70E-04	1.93E-03	8.64E-04	3.86E-04	4.61E-04	2.06E-04	9.22E-05	4.74E-04	2.12E-04	9.48E-05
beta-BHC	3.60E-05	2.54E-05	1.80E-05	3.02E-05	2.13E-05	1.51E-05	1.76E-05	1.24E-05	8.79E-06	1.29E-05	9.14E-06	6.47E-06	9.03E-05	4.51E-05	2.25E-05	4.74E-05	2.37E-05	1.18E-05	1.85E-04	9.25E-05	4.62E-05	3.19E-05	1.59E-05	7.93E-06
delta-BHC	9.23E-05	6.53E-05	4.62E-05	9.84E-05	6.96E-05	4.92E-05	4.43E-05	3.13E-05	2.21E-05	3.69E-05	2.61E-05	1.84E-05	2.61E-04	1.30E-04	6.49E-05	1.57E-04	7.85E-05	3.92E-05	4.96E-04	2.47E-04	1.23E-04	9.25E-05	4.61E-05	2.30E-05
Dieldrin	4.35E+00	3.08E+00	2.18E+00	1.03E+02	7.28E+01	5.15E+01	2.21E+01	1.56E+01	1.11E+01	1.69E+01	1.19E+01	8.45E+00	9.71E+00	1.33E+00	1.82E-01	1.43E+01	1.96E+00	2.68E-01	1.05E+00	1.43E-01	1.97E-02	3.36E+00	4.60E-01	6.30E-02
Endosulfan I	1.33E-03	5.94E-04	2.66E-04	1.14E-03	5.08E-04	2.27E-04	5.76E-04	2.58E-04	1.15E-04	4.86E-04	2.17E-04	9.72E-05	1.81E-05	8.11E-06	3.63E-06	9.37E-06	4.19E-06	1.87E-06	3.77E-05	1.68E-05	7.53E-06	6.40E-06	2.86E-06	1.28E-06
Endosulfan II	2.63E-02	1.17E-02	5.25E-03	4.02E-02	1.80E-02	8.05E-03	1.40E-02	6.26E-03	2.80E-03	1.25E-02	5.60E-03	2.50E-03	4.67E-04	2.09E-04	9.34E-05	3.45E-04	1.54E-04	6.89E-05	7.60E-04	3.40E-04	1.52E-04	1.67E-04	7.45E-05	3.33E-05
Endrin	2.65E-02	1.18E-02	5.30E-03	1.87E-01	8.35E-02	3.73E-02	4.35E-02	1.95E-02	8.71E-03	3.53E-02	1.58E-02	7.06E-03	8.18E-01	3.66E-01	1.64E-01	1.05E+00	4.68E-01	2.09E-01	2.88E-02	1.29E-02	5.75E-03	2.87E-01	1.29E-01	5.75E-02
gamma-BHC (Lindane)	1.43E-04	6.41E-05	2.87E-05	1.86E-03	8.34E-04	3.73E-04	4.17E-04	1.86E-04	8.33E-05	3.21E-04	1.44E-04	6.42E-05	1.74E-03	7.76E-04	3.47E-04	2.43E-03	1.09E-03	4.87E-04	4.29E-04	1.92E-04	8.58E-05	6.01E-04	2.69E-04	1.20E-04
gamma-Chlordane	9.34E-05	6.60E-05	4.67E-05	1.65E-03	1.16E-03	8.23E-04	3.51E-04	2.49E-04	1.76E-04	2.79E-04	1.97E-04	1.39E-04	1.57E-03	7.04E-04	3.15E-04	2.25E-03	1.01E-03	4.50E-04	5.39E-04	2.41E-04	1.08E-04	5.53E-04	2.47E-04	1.11E-04
Heptachlor	4.68E-04	2.09E-04	9.37E-05	6.53E-03	2.92E-03	1.31E-03	1.41E-03	6.30E-04	2.82E-04	1.13E-03	5.06E-04	2.26E-04	2.15E-03	9.60E-04	4.29E-04	3.00E-03	1.34E-03	6.01E-04	5.54E-04	2.48E-04	1.11E-04	7.58E-04	3.39E-04	1.52E-04
Heptachlor epoxide	3.68E-03	1.65E-03	7.37E-04	5.52E-02	2.47E-02	1.10E-02	1.21E-02	5.41E-03	2.42E-03	9.40E-03	4.20E-03	1.88E-03	1.83E-02	8.20E-03	3.67E-03	2.60E-02	1.16E-02	5.20E-03	3.95E-03	1.77E-03	7.89E-04	6.37E-03	2.85E-03	1.27E-03
Methoxychlor	1.06E-03	7.46E-04	5.28E-04	2.60E-03	1.84E-03	1.30E-03	7.38E-04	5.22E-04	3.69E-04	6.62E-04	4.68E-04	3.31E-04	1.84E-05	8.24E-06	3.69E-06	1.70E-05	7.59E-06	3.40E-06	2.30E-05	1.03E-05	4.61E-06	6.64E-06	2.97E-06	1.33E-06
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	1.23E-01	5.52E-02	2.47E-02	1.17E+00	5.25E-01	2.35E-01	1.93E-01	8.62E-02	3.86E-02	4.05E-02	1.81E-02	8.12E-03	4.12E-02	1.84E-02	8.24E-03	4.95E-02	2.22E-02	9.91E-03	2.89E-02	1.29E-02	5.77E-03	7.07E-07	3.16E-07	1.41E-07
Benzo(a)pyrene	1.99E-01	8.92E-02	3.99E-02	7.78E-01	3.48E-01	1.56E-01	1.66E-01	7.41E-02	3.32E-02	2.83E-02	1.27E-02	5.67E-03	3.40E-02	1.52E-02	6.80E-03	3.41E-02	1.52E-02	6.82E-03	3.75E-02	1.68E-02	7.50E-03	9.80E-07	4.38E-07	1.96E-07
Benzo(b)fluoranthene	9.24E-01	4.13E-01	1.85E-01	8.47E-01	3.79E-01	1.70E-01	3.47E-01	1.55E-01	6.95E-02	5.77E-02	2.58E-02	1.16E-02	7.13E-02	3.19E-02	1.43E-02	3.15E-02	1.41E-02	6.31E-03	1.60E-01	7.17E-02	3.21E-02	5.49E-07	2.46E-07	1.10E-07
Benzo(g,h,i)perylene	4.19E-01	1.87E-01	8.39E-02	3.03E-01	1.36E-01	6.07E-02	1.43E-01	6.39E-02	2.86E-02	2.47E-02	1.10E-02	4.94E-03	2.96E-02	1.32E-02	5.91E-03	1.01E-02	4.53E-03	2.03E-03	7.26E-02	3.25E-02	1.45E-02	6.84E-07	3.06E-07	1.37E-07
Benzo(k)fluoranthene	1.62E-01	7.27E-02	3.25E-02	6.24E-01	2.79E-01	1.25E-01	1.21E-01	5.41E-02	2.42E-02	2.66E-02	1.19E-02	5.34E-03	2.62E-02	1.17E-02	5.23E-03	2.46E-02	1.10E-02	4.93E-03	3.24E-02	1.45E-02	6.48E-03	6.15E-07	2.75E-07	1.23E-07
Chrysene	1.68E-01	7.50E-02	3.36E-02	2.18E+00	9.76E-01	4.37E-01	3.84E-01	1.72E-01	7.70E-02	6.07E-02	2.72E-02	1.22E-02	7.77E-02	3.47E-02	1.55E-02	1.01E-01	4.53E-02	2.03E-02	3.72E-02	1.66E-02	7.44E-03	7.83E-07	3.50E-07	1.57E-07
Dibenz(a,h)anthracene	8.86E-02	3.97E-02	1.77E-02	2.61E-01	1.17E-01	5.23E-02	6.46E-02	2.89E-02	1.29E-02	9.12E-03	4.08E-03	1.83E-03	1.29E-02	5.75E-03	2.57E-03	1.21E-02	5.41E-03	2.42E-03	1.57E-02	7.00E-03	3.13E-03	7.82E-07	3.50E-07	1.56E-07
Indeno(1,2,3-cd)pyrene	1.24E-01	5.54E-02	2.48E-02	4.59E-01	2.06E-01	9.20E-02	1.03E-01	4.59E-02	2.06E-02	1.59E-02	7.12E-03	3.19E-03	2.07E-02	9.27E-03	4.14E-03	2.08E-02	9.31E-03	4.16E-03	2.27E-02	1.01E-02	4.53E-03	7.60E-07	3.40E-07	1.52E-07
Pyrene	2.13E+01	9.54E+00	4.27E+00	7.09E+00	3.18E+00	1.42E+00	6.58E+00	2.94E+00	1.32E+00	8.55E-01	3.83E-01	1.71E-01	1.30E+00	5.82E-01	2.60E-01	2.59E-01	1.16E-01	5.17E-02	3.57E+00	1.60E+00	7.13E-01	1.90E-06	8.50E-07	3.80E-07

Shaded cells indicate HQ ≥ 1

Table D-62B
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - 95% UCL - All Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	4.35E-02	1.38E-02	4.35E-03	6.73E-01	2.13E-01	6.73E-02	1.11E-01	3.52E-02	1.11E-02	4.59E-02	1.45E-02	4.59E-03	1.63E-01	7.28E-02	3.25E-02	2.25E-01	1.01E-01	4.50E-02	5.33E-02	2.38E-02	1.07E-02	2.27E-02	1.01E-02	4.54E-03
Chromium	4.05E-02	1.81E-02	8.10E-03	4.17E-01	1.86E-01	8.34E-02	5.48E-02	2.45E-02	1.10E-02	4.44E-02	1.99E-02	8.89E-03	1.59E-01	7.10E-02	3.17E-02	1.87E-01	8.38E-02	3.75E-02	1.33E-01	5.94E-02	2.66E-02	3.27E-02	1.46E-02	6.55E-03
Lead	4.99E-02	3.63E-02	2.64E-02	5.42E-01	3.94E-01	2.86E-01	7.22E-02	5.25E-02	3.81E-02	6.70E-02	4.87E-02	3.54E-02	2.80E-01	1.25E-01	5.60E-02	3.37E-01	1.51E-01	6.74E-02	5.17E-01	3.65E-01	2.58E-01	7.24E-02	3.24E-02	1.45E-02
Mercury	1.43E-01	6.40E-02	2.86E-02	2.59E-01	1.16E-01	5.17E-02	7.14E-02	3.19E-02	1.43E-02	3.32E-03	2.57E-03	1.99E-03	1.37E-02	8.75E-03	5.59E-03	9.60E-03	6.13E-03	3.92E-03	2.87E-02	2.03E-02	1.44E-02	3.62E-04	2.31E-04	1.48E-04
Zinc	5.25E-02	2.35E-02	1.05E-02	4.34E-01	1.94E-01	8.68E-02	7.61E-02	3.40E-02	1.52E-02	5.12E-02	2.29E-02	1.02E-02	2.47E-01	1.10E-01	4.94E-02	3.08E-01	1.38E-01	6.17E-02	1.59E-01	7.10E-02	3.18E-02	5.91E-02	2.65E-02	1.18E-02
Polychlorinated Biphenyls																								
Aroclor-1260	4.91E-01	2.20E-01	9.82E-02	2.02E+01	9.06E+00	4.05E+00	3.13E+00	1.40E+00	6.26E-01	3.41E+00	1.52E+00	6.82E-01	2.89E+00	1.29E+00	5.78E-01	4.30E+00	1.92E+00	8.59E-01	2.92E-01	1.30E-01	5.83E-02	1.27E+00	5.67E-01	2.54E-01
Pesticides																								
4,4'-DDD	5.06E-03	2.26E-03	1.01E-03	1.78E-01	7.94E-02	3.55E-02	2.77E-02	1.24E-02	5.54E-03	3.03E-02	1.36E-02	6.06E-03	2.27E-02	7.17E-03	2.27E-03	3.34E-02	1.06E-02	3.34E-03	2.57E-03	8.11E-04	2.57E-04	6.20E-02	2.77E-02	1.24E-02
4,4'-DDE	4.07E-02	1.82E-02	8.13E-03	2.09E+00	9.36E-01	4.19E-01	3.24E-01	1.45E-01	6.48E-02	3.51E-01	1.57E-01	7.01E-02	2.64E-01	8.35E-02	2.64E-02	3.96E-01	1.25E-01	3.96E-02	1.30E-02	4.10E-03	1.30E-03	7.20E-01	3.22E-01	1.44E-01
4,4'-DDT	1.55E-02	6.93E-03	3.10E-03	6.91E-01	3.09E-01	1.38E-01	1.07E-01	4.79E-02	2.14E-02	1.16E-01	5.21E-02	2.33E-02	8.74E-02	2.77E-02	8.74E-03	1.31E-01	4.13E-02	1.31E-02	6.21E-03	1.96E-03	6.21E-04	2.39E-01	1.07E-01	4.78E-02
Dieldrin	8.27E-02	5.85E-02	4.13E-02	2.58E+00	1.83E+00	1.29E+00	4.08E-01	2.89E-01	2.04E-01	4.43E-01	3.13E-01	2.21E-01	2.40E-01	3.28E-02	4.50E-03	3.52E-01	4.82E-02	6.60E-03	3.08E-02	4.22E-03	5.77E-04	1.05E-01	1.43E-02	1.96E-03
Endrin	1.82E-03	8.15E-04	3.64E-04	1.69E-02	7.56E-03	3.38E-03	2.93E-03	1.31E-03	5.85E-04	3.33E-03	1.49E-03	6.67E-04	7.32E-02	3.27E-02	1.46E-02	9.36E-02	4.19E-02	1.87E-02	2.91E-03	1.30E-03	5.83E-04	3.23E-02	1.45E-02	6.46E-03
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	1.04E-02	4.67E-03	2.09E-03	8.17E-02	3.65E-02	1.64E-02	1.09E-02	4.90E-03	2.19E-03	3.11E-03	1.39E-03	6.24E-04	3.09E-03	1.38E-03	6.18E-04	3.39E-03	1.52E-03	6.78E-04	3.20E-03	1.43E-03	6.41E-04	4.56E-07	2.04E-07	9.13E-08
Chrysene	1.47E-02	6.57E-03	2.94E-03	1.69E-01	7.57E-02	3.39E-02	2.33E-02	1.04E-02	4.66E-03	5.12E-03	2.29E-03	1.03E-03	6.26E-03	2.80E-03	1.25E-03	7.74E-03	3.46E-03	1.55E-03	4.40E-03	1.97E-03	8.80E-04	4.99E-07	2.23E-07	9.97E-08
Pyrene	3.41E-01	1.52E-01	6.83E-02	4.16E-01	1.86E-01	8.33E-02	1.33E-01	5.94E-02	2.66E-02	2.63E-02	1.18E-02	5.26E-03	3.54E-02	1.58E-02	7.07E-03	1.74E-02	7.79E-03	3.48E-03	8.56E-02	3.83E-02	1.71E-02	7.91E-07	3.54E-07	1.58E-07

Shaded cells indicate HQ ≥ 1

Table D-62C
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - Mean - All Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	3.69E-02	1.17E-02	3.69E-03	5.41E-01	1.71E-01	5.41E-02	9.00E-02	2.85E-02	9.00E-03	3.63E-02	1.15E-02	3.63E-03	1.32E-01	5.89E-02	2.64E-02	1.81E-01	8.10E-02	3.62E-02	4.55E-02	2.04E-02	9.11E-03	1.78E-02	7.95E-03	3.55E-03
Chromium	3.19E-02	1.43E-02	6.38E-03	3.28E-01	1.47E-01	6.56E-02	4.31E-02	1.93E-02	8.62E-03	3.65E-02	1.63E-02	7.30E-03	1.25E-01	5.58E-02	2.50E-02	1.47E-01	6.59E-02	2.95E-02	1.04E-01	4.67E-02	2.09E-02	2.75E-02	1.23E-02	5.49E-03
Lead	4.04E-02	2.93E-02	2.13E-02	4.22E-01	3.07E-01	2.23E-01	5.72E-02	4.16E-02	3.02E-02	5.62E-02	4.08E-02	2.97E-02	2.20E-01	9.86E-02	4.41E-02	2.65E-01	1.18E-01	5.29E-02	4.10E-01	2.90E-01	2.05E-01	6.27E-02	2.80E-02	1.25E-02
Mercury	1.25E-01	5.59E-02	2.50E-02	2.05E-01	9.15E-02	4.09E-02	5.96E-02	2.66E-02	1.19E-02	2.74E-03	2.12E-03	1.64E-03	1.14E-02	7.30E-03	4.66E-03	7.56E-03	4.83E-03	3.09E-03	2.51E-02	1.77E-02	1.26E-02	2.86E-04	1.83E-04	1.17E-04
Zinc	4.52E-02	2.02E-02	9.04E-03	3.94E-01	1.76E-01	7.87E-02	6.88E-02	3.08E-02	1.38E-02	4.90E-02	2.19E-02	9.80E-03	2.23E-01	9.95E-02	4.45E-02	2.81E-01	1.26E-01	5.63E-02	1.35E-01	6.04E-02	2.70E-02	5.75E-02	2.57E-02	1.15E-02
Polychlorinated Biphenyls																								
Aroclor-1260	2.79E-01	1.25E-01	5.58E-02	1.06E+01	4.76E+00	2.13E+00	1.65E+00	7.36E-01	3.29E-01	1.80E+00	8.05E-01	3.60E-01	1.52E+00	6.81E-01	3.05E-01	2.25E+00	1.01E+00	4.50E-01	1.81E-01	8.10E-02	3.62E-02	6.69E-01	2.99E-01	1.34E-01
Pesticides																								
4,4'-DDD	2.97E-03	1.33E-03	5.94E-04	1.07E-01	4.79E-02	2.14E-02	1.68E-02	7.50E-03	3.35E-03	1.83E-02	8.17E-03	3.65E-03	1.37E-02	4.33E-03	1.37E-03	2.02E-02	6.40E-03	2.02E-03	1.44E-03	4.55E-04	1.44E-04	3.74E-02	1.67E-02	7.48E-03
4,4'-DDE	2.15E-02	9.63E-03	4.31E-03	1.08E+00	4.85E-01	2.17E-01	1.68E-01	7.52E-02	3.36E-02	1.82E-01	8.13E-02	3.64E-02	1.37E-01	4.33E-02	1.37E-02	2.06E-01	6.50E-02	2.06E-02	6.99E-03	2.21E-03	6.99E-04	3.73E-01	1.67E-01	7.47E-02
4,4'-DDT	9.72E-03	4.35E-03	1.94E-03	4.24E-01	1.90E-01	8.49E-02	6.60E-02	2.95E-02	1.32E-02	7.16E-02	3.20E-02	1.43E-02	5.38E-02	1.70E-02	5.38E-03	8.03E-02	2.54E-02	8.03E-03	3.93E-03	1.24E-03	3.93E-04	1.47E-01	6.57E-02	2.94E-02
Dieldrin	4.32E-02	3.05E-02	2.16E-02	1.35E+00	9.54E-01	6.75E-01	2.13E-01	1.51E-01	1.07E-01	2.31E-01	1.64E-01	1.16E-01	1.25E-01	1.71E-02	2.35E-03	1.84E-01	2.52E-02	3.45E-03	1.61E-02	2.20E-03	3.02E-04	5.46E-02	7.48E-03	1.02E-03
Endrin	9.69E-04	4.33E-04	1.94E-04	8.98E-03	4.01E-03	1.80E-03	1.56E-03	6.96E-04	3.11E-04	1.77E-03	7.92E-04	3.54E-04	3.89E-02	1.74E-02	7.77E-03	4.97E-02	2.22E-02	9.94E-03	1.55E-03	6.92E-04	3.09E-04	1.72E-02	7.67E-03	3.43E-03
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	5.79E-03	2.59E-03	1.16E-03	3.63E-02	1.62E-02	7.27E-03	5.16E-03	2.31E-03	1.03E-03	1.44E-03	6.43E-04	2.88E-04	1.45E-03	6.48E-04	2.90E-04	1.50E-03	6.72E-04	3.01E-04	1.70E-03	7.61E-04	3.41E-04	4.11E-07	1.84E-07	8.23E-08
Chrysene	8.34E-03	3.73E-03	1.67E-03	7.98E-02	3.57E-02	1.60E-02	1.14E-02	5.08E-03	2.27E-03	2.48E-03	1.11E-03	4.97E-04	3.05E-03	1.36E-03	6.10E-04	3.64E-03	1.63E-03	7.29E-04	2.42E-03	1.08E-03	4.84E-04	4.32E-07	1.93E-07	8.64E-08
Pyrene	1.48E-01	6.60E-02	2.95E-02	1.80E-01	8.06E-02	3.61E-02	5.75E-02	2.57E-02	1.15E-02	1.14E-02	5.09E-03	2.28E-03	1.53E-02	6.84E-03	3.06E-03	7.54E-03	3.37E-03	1.51E-03	3.70E-02	1.66E-02	7.41E-03	5.21E-07	2.33E-07	1.04E-07

Shaded cells indicate HQ ≥ 1

Table D-63
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Group 1A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Screening (Step 2) - Maximum																								
Aroclor-1260	2.34E+01	1.05E+01	4.69E+00	9.96E+02	4.46E+02	1.99E+02	2.08E+02	9.32E+01	4.17E+01	1.58E+02	7.08E+01	3.17E+01	1.43E+02	6.41E+01	2.87E+01	2.16E+02	9.67E+01	4.32E+01	5.23E+00	2.34E+00	1.05E+00	4.97E+01	2.22E+01	9.94E+00
Baseline (Step 3A) - 95% UCL																								
Aroclor-1260	6.47E+00	2.89E+00	1.29E+00	3.49E+02	1.56E+02	6.98E+01	5.40E+01	2.41E+01	1.08E+01	5.79E+01	2.59E+01	1.16E+01	4.96E+01	2.22E+01	9.92E+00	7.46E+01	3.34E+01	1.49E+01	2.38E+00	1.06E+00	4.76E-01	2.16E+01	9.67E+00	4.33E+00
Baseline (Step 3A) - Mean																								
Aroclor-1260	2.63E+00	1.17E+00	5.25E-01	1.31E+02	5.86E+01	2.62E+01	2.03E+01	9.06E+00	4.05E+00	2.18E+01	9.76E+00	4.36E+00	1.86E+01	8.34E+00	3.73E+00	2.80E+01	1.25E+01	5.59E+00	1.16E+00	5.17E-01	2.31E-01	8.14E+00	3.64E+00	1.63E+00

Shaded cells indicate HQ ≥ 1

Table D-64A
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum - Group 1B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	1.77E-01	5.60E-02	1.77E-02	2.51E+00	7.95E-01	2.51E-01	5.50E-01	1.74E-01	5.50E-02	1.81E-01	5.73E-02	1.81E-02	6.03E-01	2.70E-01	1.21E-01	8.50E-01	3.80E-01	1.70E-01	1.42E-01	6.36E-02	2.85E-02	7.74E-02	3.46E-02	1.55E-02
Chromium	3.34E-01	1.49E-01	6.67E-02	7.48E+00	3.35E+00	1.50E+00	1.55E+00	6.94E-01	3.10E-01	1.76E-01	7.86E-02	3.51E-02	2.96E+00	1.32E+00	5.91E-01	4.29E+00	1.92E+00	8.58E-01	4.49E-01	2.01E-01	8.99E-02	6.02E-02	2.69E-02	1.20E-02
Lead	2.50E-01	1.81E-01	1.32E-01	2.33E+00	1.70E+00	1.23E+00	3.90E-01	2.84E-01	2.06E-01	2.12E-01	1.54E-01	1.12E-01	1.17E+00	5.22E-01	2.33E-01	1.41E+00	6.29E-01	2.81E-01	1.91E+00	1.35E+00	9.54E-01	1.64E-01	7.34E-02	3.28E-02
Mercury	5.84E-01	2.61E-01	1.17E-01	1.05E+01	4.69E+00	2.10E+00	2.28E+00	1.02E+00	4.56E-01	3.60E-02	2.79E-02	2.16E-02	3.10E-01	1.98E-01	1.27E-01	4.47E-01	2.86E-01	1.83E-01	5.60E-02	3.96E-02	2.80E-02	2.26E-03	1.44E-03	9.21E-04
Zinc	2.14E-01	9.55E-02	4.27E-02	1.08E+00	4.84E-01	2.16E-01	2.57E-01	1.15E-01	5.14E-02	9.88E-02	4.42E-02	1.98E-02	6.38E-01	2.85E-01	1.28E-01	7.49E-01	3.35E-01	1.50E-01	4.63E-01	2.07E-01	9.27E-02	8.64E-02	3.86E-02	1.73E-02
Polychlorinated Biphenyls																								
Aroclor-1260	6.61E+00	2.96E+00	1.32E+00	2.54E+02	1.14E+02	5.08E+01	5.31E+01	2.37E+01	1.06E+01	4.05E+01	1.81E+01	8.11E+00	3.66E+01	1.64E+01	7.32E+00	5.49E+01	2.46E+01	1.10E+01	1.91E+00	8.53E-01	3.82E-01	1.27E+01	5.68E+00	2.54E+00
Pesticides																								
4,4'-DDD	1.70E-02	7.59E-03	3.40E-03	4.40E-01	1.97E-01	8.80E-02	9.26E-02	4.14E-02	1.85E-02	7.23E-02	3.23E-02	1.45E-02	5.69E-02	1.80E-02	5.69E-03	8.37E-02	2.65E-02	8.37E-03	6.09E-03	1.93E-03	6.09E-04	1.24E-01	5.55E-02	2.48E-02
4,4'-DDE	8.14E-02	3.64E-02	1.63E-02	3.17E+00	1.42E+00	6.33E-01	6.62E-01	2.96E-01	1.32E-01	5.09E-01	2.28E-01	1.02E-01	4.04E-01	1.28E-01	4.04E-02	6.07E-01	1.92E-01	6.07E-02	1.76E-02	5.57E-03	1.76E-03	8.77E-01	3.92E-01	1.75E-01
4,4'-DDT	5.15E-02	2.30E-02	1.03E-02	1.77E+00	7.91E-01	3.54E-01	3.70E-01	1.65E-01	7.40E-02	2.86E-01	1.28E-01	5.72E-02	2.26E-01	7.16E-02	2.26E-02	3.38E-01	1.07E-01	3.38E-02	1.39E-02	4.39E-03	1.39E-03	4.92E-01	2.20E-01	9.84E-02
Dieldrin	4.35E+00	3.08E+00	2.18E+00	1.03E+02	7.28E+01	5.15E+01	2.21E+01	1.56E+01	1.11E+01	1.69E+01	1.19E+01	8.45E+00	9.71E+00	1.33E+00	1.82E-01	1.43E+01	1.96E+00	2.68E-01	1.05E+00	1.43E-01	1.97E-02	3.36E+00	4.60E-01	6.30E-02
Endrin	2.65E-02	1.18E-02	5.30E-03	1.87E-01	8.35E-02	3.73E-02	4.35E-02	1.95E-02	8.71E-03	3.53E-02	1.58E-02	7.06E-03	8.18E-01	3.66E-01	1.64E-01	1.05E+00	4.68E-01	2.09E-01	2.88E-02	1.29E-02	5.75E-03	2.87E-01	1.29E-01	5.75E-02
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	3.10E-03	1.39E-03	6.21E-04	7.71E-03	3.45E-03	1.54E-03	1.92E-03	8.57E-04	3.84E-04	3.49E-04	1.56E-04	6.99E-05	3.85E-04	1.72E-04	7.71E-05	3.20E-04	1.43E-04	6.39E-05	5.62E-04	2.51E-04	1.12E-04	7.07E-07	3.16E-07	1.41E-07
Chrysene	5.46E-03	2.44E-03	1.09E-03	2.43E-02	1.09E-02	4.86E-03	5.26E-03	2.35E-03	1.05E-03	8.01E-04	3.58E-04	1.60E-04	1.04E-03	4.67E-04	2.09E-04	1.12E-03	4.99E-04	2.23E-04	1.00E-03	4.48E-04	2.00E-04	7.83E-07	3.50E-07	1.57E-07
Pyrene	1.03E-01	4.60E-02	2.06E-02	3.43E-02	1.53E-02	6.87E-03	3.19E-02	1.43E-02	6.39E-03	4.16E-03	1.86E-03	8.33E-04	6.28E-03	2.81E-03	1.26E-03	1.25E-03	5.60E-04	2.50E-04	1.72E-02	7.69E-03	3.44E-03	1.90E-06	8.50E-07	3.80E-07

Shaded cells indicate HQ ≥ 1

Table D-64B
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 1B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	5.79E-02	1.83E-02	5.79E-03	9.76E-01	3.09E-01	9.76E-02	1.60E-01	5.05E-02	1.60E-02	6.93E-02	2.19E-02	6.93E-03	2.34E-01	1.05E-01	4.68E-02	3.26E-01	1.46E-01	6.52E-02	6.98E-02	3.12E-02	1.40E-02	3.47E-02	1.55E-02	6.93E-03
Chromium	5.26E-02	2.35E-02	1.05E-02	5.41E-01	2.42E-01	1.08E-01	7.11E-02	3.18E-02	1.42E-02	5.51E-02	2.46E-02	1.10E-02	2.06E-01	9.21E-02	4.12E-02	2.43E-01	1.09E-01	4.86E-02	1.72E-01	7.71E-02	3.45E-02	3.96E-02	1.77E-02	7.93E-03
Lead	8.42E-02	6.12E-02	4.44E-02	9.94E-01	7.22E-01	5.25E-01	1.26E-01	9.19E-02	6.68E-02	1.04E-01	7.52E-02	5.47E-02	4.99E-01	2.23E-01	9.97E-02	6.02E-01	2.69E-01	1.20E-01	9.17E-01	6.49E-01	4.59E-01	1.02E-01	4.58E-02	2.05E-02
Mercury	1.69E-01	7.55E-02	3.38E-02	3.45E-01	1.54E-01	6.91E-02	8.96E-02	4.01E-02	1.79E-02	4.22E-03	3.27E-03	2.53E-03	1.72E-02	1.10E-02	7.02E-03	1.29E-02	8.24E-03	5.27E-03	3.40E-02	2.40E-02	1.70E-02	4.83E-04	3.09E-04	1.97E-04
Zinc	7.82E-02	3.50E-02	1.56E-02	5.67E-01	2.53E-01	1.13E-01	9.97E-02	4.46E-02	1.99E-02	5.84E-02	2.61E-02	1.17E-02	3.27E-01	1.46E-01	6.54E-02	3.94E-01	1.76E-01	7.88E-02	2.45E-01	1.09E-01	4.89E-02	6.38E-02	2.85E-02	1.28E-02
Polychlorinated Biphenyls																								
Aroclor-1260	9.81E-01	4.38E-01	1.96E-01	4.41E+01	1.97E+01	8.81E+00	6.82E+00	3.05E+00	1.36E+00	7.38E+00	3.30E+00	1.48E+00	6.28E+00	2.81E+00	1.26E+00	9.38E+00	4.19E+00	1.88E+00	5.18E-01	2.32E-01	1.04E-01	2.75E+00	1.23E+00	5.50E-01
Pesticides																								
4,4'-DDD	5.22E-03	2.33E-03	1.04E-03	1.83E-01	8.18E-02	3.66E-02	2.85E-02	1.28E-02	5.71E-03	3.13E-02	1.40E-02	6.25E-03	2.34E-02	7.39E-03	2.34E-03	3.44E-02	1.09E-02	3.44E-03	2.66E-03	8.40E-04	2.66E-04	6.39E-02	2.86E-02	1.28E-02
4,4'-DDE	3.18E-02	1.42E-02	6.36E-03	1.62E+00	7.26E-01	3.25E-01	2.51E-01	1.12E-01	5.03E-02	2.72E-01	1.22E-01	5.44E-02	2.05E-01	6.48E-02	2.05E-02	3.07E-01	9.72E-02	3.07E-02	1.02E-02	3.23E-03	1.02E-03	5.58E-01	2.50E-01	1.12E-01
4,4'-DDT	1.89E-02	8.44E-03	3.78E-03	8.48E-01	3.79E-01	1.70E-01	1.31E-01	5.88E-02	2.63E-02	1.43E-01	6.39E-02	2.86E-02	1.07E-01	3.39E-02	1.07E-02	1.60E-01	5.06E-02	1.60E-02	7.54E-03	2.38E-03	7.54E-04	2.93E-01	1.31E-01	5.86E-02
Dieldrin	3.11E-01	2.20E-01	1.56E-01	9.73E+00	6.88E+00	4.87E+00	1.54E+00	1.09E+00	7.69E-01	1.67E+00	1.18E+00	8.34E-01	9.03E-01	1.24E-01	1.69E-02	1.33E+00	1.82E-01	2.49E-02	1.16E-01	1.59E-02	2.18E-03	3.94E-01	5.39E-02	7.39E-03
Endrin	6.61E-03	2.96E-03	1.32E-03	6.15E-02	2.75E-02	1.23E-02	1.06E-02	4.75E-03	2.12E-03	1.21E-02	5.42E-03	2.42E-03	2.66E-01	1.19E-01	5.32E-02	3.40E-01	1.52E-01	6.80E-02	1.06E-02	4.74E-03	2.12E-03	1.17E-01	5.25E-02	2.35E-02
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	1.32E-03	5.90E-04	2.64E-04	4.10E-03	1.83E-03	8.21E-04	7.70E-04	3.45E-04	1.54E-04	1.96E-04	8.78E-05	3.93E-05	2.07E-04	9.25E-05	4.14E-05	1.67E-04	7.49E-05	3.35E-05	3.51E-04	1.57E-04	7.01E-05	4.56E-07	2.04E-07	9.13E-08
Chrysene	2.33E-03	1.04E-03	4.67E-04	1.31E-02	5.84E-03	2.62E-03	2.12E-03	9.49E-04	4.25E-04	4.53E-04	2.03E-04	9.08E-05	5.62E-04	2.51E-04	1.12E-04	5.92E-04	2.65E-04	1.18E-04	6.28E-04	2.81E-04	1.26E-04	4.99E-07	2.23E-07	9.97E-08
Pyrene	1.16E-02	5.18E-03	2.32E-03	1.41E-02	6.32E-03	2.83E-03	4.54E-03	2.03E-03	9.10E-04	9.03E-04	4.04E-04	1.81E-04	1.20E-03	5.36E-04	2.40E-04	5.91E-04	2.64E-04	1.18E-04	2.90E-03	1.30E-03	5.80E-04	7.91E-07	3.54E-07	1.58E-07

Shaded cells indicate HQ ≥ 1

Table D-64C
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - Mean - Group 1B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	4.01E-02	1.27E-02	4.01E-03	6.05E-01	1.91E-01	6.05E-02	1.00E-01	3.17E-02	1.00E-02	4.09E-02	1.29E-02	4.09E-03	1.47E-01	6.57E-02	2.94E-02	2.03E-01	9.06E-02	4.05E-02	4.93E-02	2.21E-02	9.87E-03	2.01E-02	9.01E-03	4.03E-03
Chromium	3.88E-02	1.74E-02	7.77E-03	4.00E-01	1.79E-01	7.99E-02	5.25E-02	2.35E-02	1.05E-02	4.29E-02	1.92E-02	8.58E-03	1.52E-01	6.80E-02	3.04E-02	1.80E-01	8.03E-02	3.59E-02	1.27E-01	5.69E-02	2.55E-02	3.17E-02	1.42E-02	6.35E-03
Lead	5.89E-02	4.28E-02	3.11E-02	6.59E-01	4.79E-01	3.48E-01	8.65E-02	6.28E-02	4.57E-02	7.69E-02	5.59E-02	4.06E-02	3.37E-01	1.51E-01	6.74E-02	4.06E-01	1.82E-01	8.12E-02	6.20E-01	4.39E-01	3.10E-01	8.10E-02	3.62E-02	1.62E-02
Mercury	1.37E-01	6.11E-02	2.73E-02	2.39E-01	1.07E-01	4.78E-02	6.71E-02	3.00E-02	1.34E-02	3.11E-03	2.41E-03	1.87E-03	1.29E-02	8.23E-03	5.26E-03	8.85E-03	5.66E-03	3.62E-03	2.74E-02	1.94E-02	1.37E-02	3.34E-04	2.14E-04	1.36E-04
Zinc	5.82E-02	2.60E-02	1.16E-02	4.65E-01	2.08E-01	9.30E-02	8.16E-02	3.65E-02	1.63E-02	5.29E-02	2.37E-02	1.06E-02	2.65E-01	1.19E-01	5.31E-02	3.29E-01	1.47E-01	6.57E-02	1.78E-01	7.95E-02	3.55E-02	6.03E-02	2.70E-02	1.21E-02
Polychlorinated Biphenyls																								
Aroclor-1260	5.49E-01	2.45E-01	1.10E-01	2.30E+01	1.03E+01	4.59E+00	3.55E+00	1.59E+00	7.10E-01	3.86E+00	1.73E+00	7.73E-01	3.28E+00	1.47E+00	6.56E-01	4.87E+00	2.18E+00	9.75E-01	3.20E-01	1.43E-01	6.40E-02	1.44E+00	6.42E-01	2.87E-01
Pesticides																								
4,4'-DDD	3.40E-03	1.52E-03	6.81E-04	1.22E-01	5.45E-02	2.44E-02	1.91E-02	8.53E-03	3.81E-03	2.08E-02	9.30E-03	4.16E-03	1.56E-02	4.93E-03	1.56E-03	2.30E-02	7.28E-03	2.30E-03	1.67E-03	5.27E-04	1.67E-04	4.26E-02	1.90E-02	8.51E-03
4,4'-DDE	2.10E-02	9.40E-03	4.21E-03	1.06E+00	4.73E-01	2.12E-01	1.64E-01	7.34E-02	3.28E-02	1.77E-01	7.93E-02	3.55E-02	1.34E-01	4.22E-02	1.34E-02	2.01E-01	6.34E-02	2.01E-02	6.83E-03	2.16E-03	6.83E-04	3.64E-01	1.63E-01	7.28E-02
4,4'-DDT	1.22E-02	5.45E-03	2.44E-03	5.37E-01	2.40E-01	1.07E-01	8.34E-02	3.73E-02	1.67E-02	9.06E-02	4.05E-02	1.81E-02	6.81E-02	2.15E-02	6.81E-03	1.02E-01	3.21E-02	1.02E-02	4.90E-03	1.55E-03	4.90E-04	1.86E-01	8.31E-02	3.72E-02
Dieldrin	1.47E-01	1.04E-01	7.36E-02	4.60E+00	3.26E+00	2.30E+00	7.28E-01	5.15E-01	3.64E-01	7.89E-01	5.58E-01	3.95E-01	4.27E-01	5.85E-02	8.01E-03	6.27E-01	8.59E-02	1.18E-02	5.49E-02	7.51E-03	1.03E-03	1.86E-01	2.55E-02	3.49E-03
Endrin	3.05E-03	1.36E-03	6.10E-04	2.83E-02	1.27E-02	5.67E-03	4.90E-03	2.19E-03	9.80E-04	5.59E-03	2.50E-03	1.12E-03	1.23E-01	5.49E-02	2.45E-02	1.57E-01	7.02E-02	3.14E-02	4.88E-03	2.18E-03	9.77E-04	5.42E-02	2.42E-02	1.08E-02
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	1.01E-03	4.52E-04	2.02E-04	2.72E-03	1.22E-03	5.45E-04	5.50E-04	2.46E-04	1.10E-04	1.38E-04	6.16E-05	2.76E-05	1.46E-04	6.53E-05	2.92E-05	1.11E-04	4.96E-05	2.22E-05	2.65E-04	1.18E-04	5.29E-05	4.11E-07	1.84E-07	8.23E-08
Chrysene	1.75E-03	7.84E-04	3.51E-04	8.54E-03	3.82E-03	1.71E-03	1.45E-03	6.48E-04	2.90E-04	3.08E-04	1.38E-04	6.16E-05	3.82E-04	1.71E-04	7.64E-05	3.86E-04	1.73E-04	7.73E-05	4.65E-04	2.08E-04	9.31E-05	4.32E-07	1.93E-07	8.64E-08
Pyrene	7.41E-03	3.32E-03	1.48E-03	9.04E-03	4.04E-03	1.81E-03	2.91E-03	1.30E-03	5.82E-04	5.78E-04	2.59E-04	1.16E-04	7.68E-04	3.43E-04	1.54E-04	3.79E-04	1.69E-04	7.57E-05	1.86E-03	8.30E-04	3.71E-04	5.21E-07	2.33E-07	1.04E-07

Shaded cells indicate HQ ≥ 1

Table D-65
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum - Group 1C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Polychlorinated Biphenyls																								
Aroclor-1260	3.98E-02	1.78E-02	7.95E-03	6.93E-01	3.10E-01	1.39E-01	1.46E-01	6.51E-02	2.91E-02	1.17E-01	5.24E-02	2.35E-02	1.02E-01	4.55E-02	2.04E-02	1.45E-01	6.48E-02	2.90E-02	2.42E-02	1.08E-02	4.83E-03	3.61E-02	1.61E-02	7.22E-03

Shaded cells indicate HQ ≥ 1

Table D-66
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Group 1D
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Screening (Step 2) - Maximum																								
Aroclor-1260	6.43E-02	2.88E-02	1.29E-02	1.25E+00	5.59E-01	2.50E-01	2.62E-01	1.17E-01	5.23E-02	2.09E-01	9.35E-02	4.18E-02	1.83E-01	8.18E-02	3.66E-02	2.63E-01	1.18E-01	5.26E-02	3.74E-02	1.67E-02	7.49E-03	6.46E-02	2.89E-02	1.29E-02
Baseline (Step 3A) - 95% UCL																								
Aroclor-1260	2.63E-02	1.18E-02	5.26E-03	6.59E-01	2.95E-01	1.32E-01	1.02E-01	4.56E-02	2.04E-02	1.15E-01	5.16E-02	2.31E-02	9.53E-02	4.26E-02	1.91E-02	1.37E-01	6.11E-02	2.73E-02	2.30E-02	1.03E-02	4.60E-03	4.24E-02	1.89E-02	8.47E-03
Baseline (Step 3A) - Mean																								
Aroclor-1260	9.89E-03	4.43E-03	1.98E-03	1.98E-01	8.87E-02	3.97E-02	3.09E-02	1.38E-02	6.17E-03	3.55E-02	1.59E-02	7.11E-03	2.89E-02	1.29E-02	5.79E-03	4.06E-02	1.82E-02	8.12E-03	9.41E-03	4.21E-03	1.88E-03	1.30E-02	5.80E-03	2.59E-03

Shaded cells indicate HQ ≥ 1

Table D-67
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Group 1E
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Screening (Step 2) - Maximum																								
Aroclor-1260	5.49E-02	2.46E-02	1.10E-02	1.03E+00	4.61E-01	2.06E-01	2.16E-01	9.66E-02	4.32E-02	1.73E-01	7.74E-02	3.46E-02	1.51E-01	6.76E-02	3.02E-02	2.17E-01	9.68E-02	4.33E-02	3.25E-02	1.45E-02	6.49E-03	5.34E-02	2.39E-02	1.07E-02
Baseline (Step 3A) - 95% UCL																								
Aroclor-1260	1.75E-02	7.85E-03	3.51E-03	4.02E-01	1.80E-01	8.05E-02	6.24E-02	2.79E-02	1.25E-02	7.10E-02	3.18E-02	1.42E-02	5.84E-02	2.61E-02	1.17E-02	8.30E-02	3.71E-02	1.66E-02	1.59E-02	7.13E-03	3.19E-03	2.60E-02	1.16E-02	5.21E-03
Baseline (Step 3A) - Mean																								
Aroclor-1260	7.48E-03	3.34E-03	1.50E-03	1.40E-01	6.25E-02	2.79E-02	2.18E-02	9.75E-03	4.36E-03	2.52E-02	1.13E-02	5.05E-03	2.04E-02	9.13E-03	4.09E-03	2.84E-02	1.27E-02	5.69E-03	7.24E-03	3.24E-03	1.45E-03	9.18E-03	4.10E-03	1.84E-03

Shaded cells indicate HQ ≥ 1

Table D-68A
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum - Group 1F
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	1.56E-01	4.93E-02	1.56E-02	2.13E+00	6.75E-01	2.13E-01	4.68E-01	1.48E-01	4.68E-02	1.51E-01	4.77E-02	1.51E-02	5.14E-01	2.30E-01	1.03E-01	7.22E-01	3.23E-01	1.44E-01	1.26E-01	5.63E-02	2.52E-02	6.40E-02	2.86E-02	1.28E-02
Chromium	4.99E-02	2.23E-02	9.99E-03	1.12E+00	4.99E-01	2.23E-01	2.32E-01	1.04E-01	4.63E-02	3.27E-02	1.46E-02	6.55E-03	4.41E-01	1.97E-01	8.82E-02	6.40E-01	2.86E-01	1.28E-01	6.71E-02	3.00E-02	1.34E-02	1.49E-02	6.67E-03	2.98E-03
Lead	5.79E-02	4.21E-02	3.06E-02	4.22E-01	3.07E-01	2.23E-01	8.02E-02	5.83E-02	4.24E-02	6.26E-02	4.55E-02	3.31E-02	2.29E-01	1.02E-01	4.58E-02	2.73E-01	1.22E-01	5.46E-02	3.83E-01	2.71E-01	1.92E-01	6.17E-02	2.76E-02	1.23E-02
Mercury	3.48E-01	1.55E-01	6.95E-02	4.87E+00	2.18E+00	9.73E-01	1.08E+00	4.83E-01	2.16E-01	1.73E-02	1.34E-02	1.04E-02	1.47E-01	9.38E-02	5.99E-02	2.07E-01	1.32E-01	8.47E-02	3.63E-02	2.56E-02	1.81E-02	1.06E-03	6.77E-04	4.32E-04
Zinc	8.12E-02	3.63E-02	1.62E-02	5.67E-01	2.53E-01	1.13E-01	1.33E-01	5.96E-02	2.67E-02	7.18E-02	3.21E-02	1.44E-02	3.22E-01	1.44E-01	6.45E-02	4.12E-01	1.84E-01	8.25E-02	1.62E-01	7.26E-02	3.25E-02	7.19E-02	3.22E-02	1.44E-02
Polychlorinated Biphenyls																								
Aroclor-1260	5.35E-03	2.39E-03	1.07E-03	4.99E-02	2.23E-02	9.98E-03	1.14E-02	5.12E-03	2.29E-03	9.11E-03	4.07E-03	1.82E-03	7.52E-03	3.36E-03	1.50E-03	1.00E-02	4.48E-03	2.00E-03	3.42E-03	1.53E-03	6.83E-04	2.72E-03	1.22E-03	5.45E-04
Pesticides																								
4,4'-DDD	9.45E-04	4.23E-04	1.89E-04	2.74E-02	1.23E-02	5.48E-03	5.85E-03	2.62E-03	1.17E-03	4.45E-03	1.99E-03	8.91E-04	3.55E-03	1.12E-03	3.55E-04	5.27E-03	1.67E-03	5.27E-04	2.63E-04	8.33E-05	2.63E-05	7.68E-03	3.43E-03	1.54E-03
4,4'-DDE	2.48E-03	1.11E-03	4.97E-04	8.21E-02	3.67E-02	1.64E-02	1.74E-02	7.76E-03	3.47E-03	1.33E-02	5.93E-03	2.65E-03	1.06E-02	3.34E-03	1.06E-03	1.58E-02	4.99E-03	1.58E-03	6.21E-04	1.96E-04	6.21E-05	2.29E-02	1.02E-02	4.58E-03
4,4'-DDT	3.30E-03	1.48E-03	6.60E-04	9.89E-02	4.42E-02	1.98E-02	2.09E-02	9.36E-03	4.19E-03	1.61E-02	7.18E-03	3.21E-03	1.28E-02	4.04E-03	1.28E-03	1.90E-02	6.00E-03	1.90E-03	9.53E-04	3.02E-04	9.53E-05	2.77E-02	1.24E-02	5.53E-03
Dieldrin	1.00E-02	7.08E-03	5.01E-03	2.30E-01	1.63E-01	1.15E-01	4.98E-02	3.52E-02	2.49E-02	3.78E-02	2.67E-02	1.89E-02	2.17E-02	2.98E-03	4.07E-04	3.19E-02	4.37E-03	5.99E-04	2.36E-03	3.24E-04	4.43E-05	7.51E-03	1.03E-03	1.41E-04
Endrin	2.07E-04	9.24E-05	4.13E-05	1.31E-03	5.84E-04	2.61E-04	3.35E-04	1.50E-04	6.71E-05	2.50E-04	1.12E-04	5.01E-05	5.74E-03	2.57E-03	1.15E-03	7.31E-03	3.27E-03	1.46E-03	2.04E-04	9.12E-05	4.08E-05	2.02E-03	9.02E-04	4.03E-04
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	6.36E-04	2.85E-04	1.27E-04	6.32E-04	2.83E-04	1.27E-04	3.07E-04	1.37E-04	6.15E-05	5.15E-05	2.31E-05	1.03E-05	4.94E-05	2.21E-05	9.87E-06	2.55E-05	1.14E-05	5.10E-06	1.03E-04	4.60E-05	2.06E-05	7.07E-07	3.16E-07	1.41E-07
Chrysene	9.75E-04	4.37E-04	1.95E-04	1.68E-03	7.51E-04	3.36E-04	5.75E-04	2.57E-04	1.15E-04	8.68E-05	3.88E-05	1.74E-05	1.01E-04	4.50E-05	2.01E-05	7.56E-05	3.38E-05	1.51E-05	1.61E-04	7.21E-05	3.22E-05	7.83E-07	3.50E-07	1.57E-07
Pyrene	4.16E-03	1.86E-03	8.33E-04	1.45E-03	6.48E-04	2.90E-04	1.44E-03	6.45E-04	2.89E-04	2.01E-04	9.02E-05	4.04E-05	2.51E-04	1.12E-04	5.02E-05	5.42E-05	2.42E-05	1.08E-05	6.77E-04	3.03E-04	1.35E-04	1.90E-06	8.50E-07	3.80E-07

Shaded cells indicate HQ ≥ 1

Table D-68B
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 1F
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	5.94E-02	1.88E-02	5.94E-03	1.01E+00	3.19E-01	1.01E-01	1.65E-01	5.22E-02	1.65E-02	7.20E-02	2.28E-02	7.20E-03	2.42E-01	1.08E-01	4.83E-02	3.38E-01	1.51E-01	6.75E-02	7.16E-02	3.20E-02	1.43E-02	3.60E-02	1.61E-02	7.21E-03
Chromium	8.84E-03	3.95E-03	1.77E-03	9.06E-02	4.05E-02	1.81E-02	1.19E-02	5.34E-03	2.39E-03	1.29E-02	5.78E-03	2.59E-03	3.45E-02	1.54E-02	6.90E-03	4.07E-02	1.82E-02	8.14E-03	2.89E-02	1.29E-02	5.77E-03	1.07E-02	4.78E-03	2.14E-03
Lead	2.30E-02	1.67E-02	1.22E-02	2.13E-01	1.55E-01	1.12E-01	3.05E-02	2.21E-02	1.61E-02	3.53E-02	2.57E-02	1.87E-02	1.15E-01	5.16E-02	2.31E-02	1.37E-01	6.13E-02	2.74E-02	2.22E-01	1.57E-01	1.11E-01	4.23E-02	1.89E-02	8.46E-03
Mercury	8.01E-02	3.58E-02	1.60E-02	9.42E-02	4.21E-02	1.88E-02	3.33E-02	1.49E-02	6.67E-03	1.48E-03	1.15E-03	8.91E-04	6.37E-03	4.07E-03	2.60E-03	3.40E-03	2.17E-03	1.39E-03	1.60E-02	1.13E-02	8.02E-03	1.34E-04	8.53E-05	5.45E-05
Zinc	3.57E-02	1.60E-02	7.14E-03	3.38E-01	1.51E-01	6.75E-02	5.87E-02	2.63E-02	1.17E-02	4.58E-02	2.05E-02	9.16E-03	1.89E-01	8.45E-02	3.78E-02	2.43E-01	1.09E-01	4.86E-02	1.05E-01	4.68E-02	2.09E-02	5.50E-02	2.46E-02	1.10E-02
Polychlorinated Biphenyls																								
Aroclor-1260	1.74E-03	7.78E-04	3.48E-04	2.07E-02	9.27E-03	4.15E-03	3.43E-03	1.54E-03	6.87E-04	3.98E-03	1.78E-03	7.97E-04	3.10E-03	1.39E-03	6.19E-04	4.07E-03	1.82E-03	8.15E-04	1.73E-03	7.76E-04	3.47E-04	1.42E-03	6.34E-04	2.83E-04
Pesticides																								
4,4'-DDD	4.15E-04	1.86E-04	8.31E-05	1.62E-02	7.24E-03	3.24E-03	2.55E-03	1.14E-03	5.10E-04	2.74E-03	1.23E-03	5.48E-04	2.07E-03	6.54E-04	2.07E-04	3.08E-03	9.73E-04	3.08E-04	1.72E-04	5.43E-05	1.72E-05	5.63E-03	2.52E-03	1.13E-03
4,4'-DDE	1.11E-03	4.97E-04	2.22E-04	4.86E-02	2.17E-02	9.72E-03	7.60E-03	3.40E-03	1.52E-03	8.18E-03	3.66E-03	1.64E-03	6.18E-03	1.95E-03	6.18E-04	9.23E-03	2.92E-03	9.23E-04	4.12E-04	1.30E-04	4.12E-05	1.68E-02	7.51E-03	3.36E-03
4,4'-DDT	1.08E-03	4.84E-04	2.16E-04	4.20E-02	1.88E-02	8.39E-03	6.58E-03	2.94E-03	1.32E-03	7.11E-03	3.18E-03	1.42E-03	5.36E-03	1.69E-03	5.36E-04	7.96E-03	2.52E-03	7.96E-04	4.68E-04	1.48E-04	4.68E-05	1.46E-02	6.53E-03	2.92E-03
Dieldrin	1.09E-03	7.72E-04	5.46E-04	3.20E-02	2.27E-02	1.60E-02	5.15E-03	3.64E-03	2.58E-03	5.51E-03	3.90E-03	2.76E-03	2.98E-03	4.08E-04	5.58E-05	4.36E-03	5.98E-04	8.19E-05	3.89E-04	5.33E-05	7.30E-06	1.30E-03	1.78E-04	2.43E-05
Endrin	4.93E-05	2.21E-05	9.86E-06	4.13E-04	1.85E-04	8.25E-05	7.82E-05	3.50E-05	1.56E-05	8.25E-05	3.69E-05	1.65E-05	1.79E-03	8.02E-04	3.59E-04	2.28E-03	1.02E-03	4.57E-04	7.20E-05	3.22E-05	1.44E-05	7.91E-04	3.54E-04	1.58E-04
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	2.63E-04	1.17E-04	5.26E-05	3.21E-04	1.44E-04	6.43E-05	1.20E-04	5.36E-05	2.40E-05	2.81E-05	1.26E-05	5.63E-06	2.60E-05	1.16E-05	5.20E-06	1.28E-05	5.73E-06	2.56E-06	6.27E-05	2.80E-05	1.25E-05	4.56E-07	2.04E-07	9.13E-08
Chrysene	4.02E-04	1.80E-04	8.05E-05	8.50E-04	3.80E-04	1.70E-04	2.22E-04	9.93E-05	4.45E-05	4.70E-05	2.11E-05	9.42E-06	5.22E-05	2.34E-05	1.04E-05	3.78E-05	1.69E-05	7.56E-06	9.80E-05	4.38E-05	1.96E-05	4.99E-07	2.23E-07	9.97E-08
Pyrene	5.54E-04	2.48E-04	1.11E-04	6.71E-04	3.00E-04	1.34E-04	2.51E-04	1.12E-04	5.03E-05	5.39E-05	2.41E-05	1.08E-05	5.59E-05	2.50E-05	1.12E-05	2.85E-05	1.27E-05	5.70E-06	1.32E-04	5.92E-05	2.65E-05	7.91E-07	3.54E-07	1.58E-07

Shaded cells indicate HQ ≥ 1

Table D-68C
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - Mean - Group 1F
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	3.70E-02	1.17E-02	3.70E-03	5.44E-01	1.72E-01	5.44E-02	9.05E-02	2.86E-02	9.05E-03	3.65E-02	1.15E-02	3.65E-03	1.32E-01	5.92E-02	2.65E-02	1.82E-01	8.15E-02	3.64E-02	4.57E-02	2.04E-02	9.14E-03	1.79E-02	7.99E-03	3.57E-03
Chromium	7.10E-03	3.18E-03	1.42E-03	7.27E-02	3.25E-02	1.45E-02	9.60E-03	4.29E-03	1.92E-03	1.09E-02	4.86E-03	2.17E-03	2.77E-02	1.24E-02	5.54E-03	3.27E-02	1.46E-02	6.54E-03	2.32E-02	1.04E-02	4.64E-03	9.09E-03	4.07E-03	1.82E-03
Lead	1.74E-02	1.27E-02	9.20E-03	1.50E-01	1.09E-01	7.94E-02	2.21E-02	1.61E-02	1.17E-02	2.80E-02	2.04E-02	1.48E-02	8.31E-02	3.72E-02	1.66E-02	9.79E-02	4.38E-02	1.96E-02	1.64E-01	1.16E-01	8.18E-02	3.46E-02	1.55E-02	6.91E-03
Mercury	6.95E-02	3.11E-02	1.39E-02	7.35E-02	3.29E-02	1.47E-02	2.79E-02	1.25E-02	5.58E-03	1.23E-03	9.52E-04	7.38E-04	5.31E-03	3.39E-03	2.17E-03	2.63E-03	1.68E-03	1.07E-03	1.39E-02	9.83E-03	6.95E-03	1.05E-04	6.72E-05	4.30E-05
Zinc	2.70E-02	1.21E-02	5.40E-03	2.82E-01	1.26E-01	5.64E-02	4.86E-02	2.18E-02	9.73E-03	4.25E-02	1.90E-02	8.49E-03	1.56E-01	6.97E-02	3.12E-02	2.04E-01	9.14E-02	4.09E-02	7.74E-02	3.46E-02	1.55E-02	5.21E-02	2.33E-02	1.04E-02
Polychlorinated Biphenyls																								
Aroclor-1260	9.98E-04	4.46E-04	2.00E-04	9.34E-03	4.18E-03	1.87E-03	1.67E-03	7.48E-04	3.35E-04	1.87E-03	8.35E-04	3.73E-04	1.42E-03	6.33E-04	2.83E-04	1.80E-03	8.05E-04	3.60E-04	9.54E-04	4.26E-04	1.91E-04	6.53E-04	2.92E-04	1.31E-04
Pesticides																								
4,4'-DDD	3.05E-04	1.36E-04	6.10E-05	1.20E-02	5.35E-03	2.39E-03	1.89E-03	8.44E-04	3.77E-04	2.02E-03	9.05E-04	4.05E-04	1.53E-03	4.83E-04	1.53E-04	2.27E-03	7.19E-04	2.27E-04	1.23E-04	3.89E-05	1.23E-05	4.16E-03	1.86E-03	8.31E-04
4,4'-DDE	7.60E-04	3.40E-04	1.52E-04	3.25E-02	1.45E-02	6.49E-03	5.08E-03	2.27E-03	1.02E-03	5.47E-03	2.45E-03	1.09E-03	4.13E-03	1.31E-03	4.13E-04	6.17E-03	1.95E-03	6.17E-04	2.88E-04	9.10E-05	2.88E-05	1.12E-02	5.02E-03	2.25E-03
4,4'-DDT	4.75E-04	2.12E-04	9.50E-05	1.74E-02	7.77E-03	3.48E-03	2.74E-03	1.23E-03	5.48E-04	2.95E-03	1.32E-03	5.90E-04	2.23E-03	7.04E-04	2.23E-04	3.30E-03	1.04E-03	3.30E-04	2.12E-04	6.69E-05	2.12E-05	6.06E-03	2.71E-03	1.21E-03
Dieldrin	7.51E-04	5.31E-04	3.76E-04	2.14E-02	1.52E-02	1.07E-02	3.47E-03	2.46E-03	1.74E-03	3.69E-03	2.61E-03	1.85E-03	1.99E-03	2.73E-04	3.74E-05	2.92E-03	4.00E-04	5.48E-05	2.63E-04	3.60E-05	4.92E-06	8.69E-04	1.19E-04	1.63E-05
Endrin	4.36E-05	1.95E-05	8.72E-06	3.60E-04	1.61E-04	7.20E-05	6.91E-05	3.09E-05	1.38E-05	7.21E-05	3.23E-05	1.44E-05	1.57E-03	7.00E-04	3.13E-04	1.99E-03	8.91E-04	3.99E-04	6.29E-05	2.81E-05	1.26E-05	6.90E-04	3.09E-04	1.38E-04
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	2.09E-04	9.37E-05	4.19E-05	2.25E-04	1.01E-04	4.51E-05	9.46E-05	4.23E-05	1.90E-05	2.21E-05	9.89E-06	4.43E-06	1.98E-05	8.84E-06	3.95E-06	8.96E-06	4.01E-06	1.79E-06	4.93E-05	2.21E-05	9.87E-06	4.11E-07	1.84E-07	8.23E-08
Chrysene	2.78E-04	1.24E-04	5.57E-05	4.72E-04	2.11E-04	9.46E-05	1.44E-04	6.45E-05	2.89E-05	3.07E-05	1.38E-05	6.16E-06	3.24E-05	1.45E-05	6.47E-06	2.08E-05	9.32E-06	4.17E-06	6.65E-05	2.98E-05	1.33E-05	4.32E-07	1.93E-07	8.64E-08
Pyrene	4.06E-04	1.82E-04	8.14E-05	4.92E-04	2.20E-04	9.87E-05	1.81E-04	8.12E-05	3.63E-05	3.87E-05	1.73E-05	7.76E-06	4.11E-05	1.84E-05	8.22E-06	2.09E-05	9.34E-06	4.18E-06	9.76E-05	4.36E-05	1.95E-05	5.21E-07	2.33E-07	1.04E-07

Shaded cells indicate HQ ≥ 1

Table D-69
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Group 2A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Screening (Step 2) - Maximum																								
Aroclor-1260	8.72E-01	3.90E-01	1.74E-01	2.66E+01	1.19E+01	5.32E+00	5.56E+00	2.49E+00	1.11E+00	4.30E+00	1.92E+00	8.60E-01	3.85E+00	1.72E+00	7.70E-01	5.71E+00	2.55E+00	1.14E+00	3.61E-01	1.61E-01	7.22E-02	1.34E+00	6.01E-01	2.69E-01
Baseline (Step 3A) - 95% UCL																								
Aroclor-1260	1.59E-01	7.10E-02	3.17E-02	5.55E+00	2.48E+00	1.11E+00	8.58E-01	3.84E-01	1.72E-01	9.44E-01	4.22E-01	1.89E-01	7.95E-01	3.56E-01	1.59E-01	1.17E+00	5.23E-01	2.34E-01	1.12E-01	5.00E-02	2.24E-02	3.50E-01	1.56E-01	7.00E-02
Baseline (Step 3A) - Mean																								
Aroclor-1260	5.43E-02	2.43E-02	1.09E-02	1.57E+00	7.04E-01	3.15E-01	2.43E-01	1.09E-01	4.87E-02	2.72E-01	1.22E-01	5.44E-02	2.27E-01	1.01E-01	4.53E-02	3.29E-01	1.47E-01	6.58E-02	4.39E-02	1.97E-02	8.79E-03	1.00E-01	4.48E-02	2.00E-02

Shaded cells indicate HQ ≥ 1

Table D-70
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum - Group 2B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Polychlorinated Biphenyls																								
Aroclor-1260	5.94E-03	2.65E-03	1.19E-03	5.79E-02	2.59E-02	1.16E-02	1.31E-02	5.86E-03	2.62E-03	1.05E-02	4.70E-03	2.10E-03	8.70E-03	3.89E-03	1.74E-03	1.17E-02	5.21E-03	2.33E-03	3.81E-03	1.71E-03	7.63E-04	3.15E-03	1.41E-03	6.30E-04

Shaded cells indicate HQ ≥ 1

Table D-71A
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum - Group 2C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	1.58E-01	5.01E-02	1.58E-02	2.18E+00	6.89E-01	2.18E-01	4.78E-01	1.51E-01	4.78E-02	1.54E-01	4.88E-02	1.54E-02	5.25E-01	2.35E-01	1.05E-01	7.37E-01	3.30E-01	1.47E-01	1.28E-01	5.72E-02	2.56E-02	6.56E-02	2.93E-02	1.31E-02
Chromium	5.02E-01	2.24E-01	1.00E-01	1.13E+01	5.04E+00	2.25E+00	2.33E+00	1.04E+00	4.67E-01	2.54E-01	1.14E-01	5.09E-02	4.45E+00	1.99E+00	8.90E-01	6.46E+00	2.89E+00	1.29E+00	6.77E-01	3.03E-01	1.35E-01	8.12E-02	3.63E-02	1.62E-02
Lead	1.48E-01	1.08E-01	7.83E-02	1.29E+00	9.38E-01	6.82E-01	2.25E-01	1.64E-01	1.19E-01	1.37E-01	9.92E-02	7.21E-02	6.62E-01	2.96E-01	1.32E-01	7.99E-01	3.57E-01	1.60E-01	1.08E+00	7.61E-01	5.38E-01	1.17E-01	5.24E-02	2.35E-02
Mercury	8.82E-01	3.94E-01	1.76E-01	1.87E+01	8.38E+00	3.75E+00	4.04E+00	1.81E+00	8.07E-01	6.32E-02	4.89E-02	3.79E-02	5.48E-01	3.50E-01	2.24E-01	8.00E-01	5.11E-01	3.27E-01	7.81E-02	5.52E-02	3.90E-02	4.02E-03	2.57E-03	1.64E-03
Zinc	1.53E-01	6.82E-02	3.05E-02	8.59E-01	3.84E-01	1.72E-01	2.04E-01	9.13E-02	4.08E-02	8.73E-02	3.90E-02	1.75E-02	5.01E-01	2.24E-01	1.00E-01	6.09E-01	2.72E-01	1.22E-01	3.21E-01	1.44E-01	6.43E-02	8.11E-02	3.63E-02	1.62E-02
Polychlorinated Biphenyls																								
Aroclor-1260	5.11E-01	2.29E-01	1.02E-01	1.44E+01	6.46E+00	2.89E+00	3.02E+00	1.35E+00	6.04E-01	2.35E+00	1.05E+00	4.70E-01	2.09E+00	9.37E-01	4.19E-01	3.09E+00	1.38E+00	6.19E-01	2.30E-01	1.03E-01	4.60E-02	7.32E-01	3.27E-01	1.46E-01
Pesticides																								
4,4'-DDD	5.25E-02	2.35E-02	1.05E-02	1.27E+00	5.69E-01	2.54E-01	2.66E-01	1.19E-01	5.31E-02	2.11E-01	9.42E-02	4.21E-02	1.64E-01	5.19E-02	1.64E-02	2.40E-01	7.58E-02	2.40E-02	2.10E-02	6.65E-03	2.10E-03	3.60E-01	1.61E-01	7.20E-02
4,4'-DDE	5.50E-01	2.46E-01	1.10E-01	2.25E+01	1.01E+01	4.51E+00	4.69E+00	2.10E+00	9.39E-01	3.62E+00	1.62E+00	7.24E-01	2.87E+00	9.08E-01	2.87E-01	4.32E+00	1.36E+00	4.32E-01	1.16E-01	3.68E-02	1.16E-02	6.24E+00	2.79E+00	1.25E+00
4,4'-DDT	1.58E-01	7.05E-02	3.15E-02	5.62E+00	2.51E+00	1.12E+00	1.17E+00	5.24E-01	2.34E-01	9.09E-01	4.06E-01	1.82E-01	7.18E-01	2.27E-01	7.18E-02	1.07E+00	3.40E-01	1.07E-01	4.22E-02	1.34E-02	4.22E-03	1.56E+00	6.99E-01	3.13E-01
Dieldrin	4.56E-01	3.22E-01	2.28E-01	1.08E+01	7.63E+00	5.39E+00	2.32E+00	1.64E+00	1.16E+00	1.77E+00	1.25E+00	8.85E-01	1.02E+00	1.39E-01	1.91E-02	1.50E+00	2.05E-01	2.81E-02	1.10E-01	1.50E-02	2.06E-03	3.52E-01	4.82E-02	6.60E-03
Endrin	4.66E-03	2.08E-03	9.31E-04	3.27E-02	1.46E-02	6.54E-03	7.65E-03	3.42E-03	1.53E-03	6.18E-03	2.76E-03	1.24E-03	1.43E-01	6.41E-02	2.87E-02	1.83E-01	8.19E-02	3.66E-02	5.04E-03	2.25E-03	1.01E-03	5.03E-02	2.25E-02	1.01E-02
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	1.23E-01	5.52E-02	2.47E-02	1.17E+00	5.25E-01	2.35E-01	1.93E-01	8.62E-02	3.86E-02	4.05E-02	1.81E-02	8.12E-03	4.12E-02	1.84E-02	8.24E-03	4.95E-02	2.22E-02	9.91E-03	2.89E-02	1.29E-02	5.77E-03	7.07E-07	3.16E-07	1.41E-07
Chrysene	1.68E-01	7.50E-02	3.36E-02	2.18E+00	9.76E-01	4.37E-01	3.84E-01	1.72E-01	7.70E-02	6.07E-02	2.72E-02	1.22E-02	7.77E-02	3.47E-02	1.55E-02	1.01E-01	4.53E-02	2.03E-02	3.72E-02	1.66E-02	7.44E-03	7.83E-07	3.50E-07	1.57E-07
Pyrene	2.13E+01	9.54E+00	4.27E+00	7.09E+00	3.18E+00	1.42E+00	6.58E+00	2.94E+00	1.32E+00	8.55E-01	3.83E-01	1.71E-01	1.30E+00	5.82E-01	2.60E-01	2.59E-01	1.16E-01	5.17E-02	3.57E+00	1.60E+00	7.13E-01	1.90E-06	8.50E-07	3.80E-07

Shaded cells indicate HQ ≥ 1

Table D-71B
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 2C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	4.97E-02	1.57E-02	4.97E-03	8.01E-01	2.53E-01	8.01E-02	1.32E-01	4.17E-02	1.32E-02	5.57E-02	1.76E-02	5.57E-03	1.93E-01	8.63E-02	3.86E-02	2.68E-01	1.20E-01	5.36E-02	6.05E-02	2.70E-02	1.21E-02	2.77E-02	1.24E-02	5.54E-03
Chromium	6.63E-02	2.97E-02	1.33E-02	6.83E-01	3.05E-01	1.37E-01	8.97E-02	4.01E-02	1.79E-02	6.67E-02	2.98E-02	1.33E-02	2.60E-01	1.16E-01	5.20E-02	3.07E-01	1.37E-01	6.14E-02	2.18E-01	9.73E-02	4.35E-02	4.70E-02	2.10E-02	9.40E-03
Lead	4.47E-02	3.25E-02	2.36E-02	4.76E-01	3.46E-01	2.51E-01	6.39E-02	4.65E-02	3.38E-02	6.11E-02	4.44E-02	3.23E-02	2.47E-01	1.10E-01	4.94E-02	2.97E-01	1.33E-01	5.94E-02	4.58E-01	3.24E-01	2.29E-01	6.72E-02	3.00E-02	1.34E-02
Mercury	1.85E-01	8.29E-02	3.71E-02	4.06E-01	1.82E-01	8.13E-02	1.02E-01	4.56E-02	2.04E-02	4.84E-03	3.75E-03	2.90E-03	1.96E-02	1.25E-02	8.00E-03	1.52E-02	9.73E-03	6.22E-03	3.73E-02	2.64E-02	1.87E-02	5.68E-04	3.63E-04	2.32E-04
Zinc	5.37E-02	2.40E-02	1.07E-02	4.41E-01	1.97E-01	8.82E-02	7.73E-02	3.46E-02	1.55E-02	5.16E-02	2.31E-02	1.03E-02	2.51E-01	1.12E-01	5.02E-02	3.13E-01	1.40E-01	6.26E-02	1.63E-01	7.28E-02	3.26E-02	5.94E-02	2.66E-02	1.19E-02
Polychlorinated Biphenyls																								
Aroclor-1260	6.70E-02	3.00E-02	1.34E-02	2.02E+00	9.02E-01	4.04E-01	3.12E-01	1.40E-01	6.24E-02	3.47E-01	1.55E-01	6.95E-02	2.90E-01	1.30E-01	5.81E-02	4.23E-01	1.89E-01	8.45E-02	5.29E-02	2.36E-02	1.06E-02	1.28E-01	5.74E-02	2.57E-02
Pesticides																								
4,4'-DDD	9.75E-03	4.36E-03	1.95E-03	3.30E-01	1.48E-01	6.60E-02	5.14E-02	2.30E-02	1.03E-02	5.66E-02	2.53E-02	1.13E-02	4.21E-02	1.33E-02	4.21E-03	6.19E-02	1.96E-02	6.19E-03	5.25E-03	1.66E-03	5.25E-04	1.16E-01	5.17E-02	2.31E-02
4,4'-DDE	8.99E-02	4.02E-02	1.80E-02	4.73E+00	2.12E+00	9.47E-01	7.32E-01	3.27E-01	1.46E-01	7.93E-01	3.55E-01	1.59E-01	5.96E-01	1.89E-01	5.96E-02	8.96E-01	2.83E-01	8.96E-02	2.82E-02	8.92E-03	2.82E-03	1.63E+00	7.28E-01	3.25E-01
4,4'-DDT	2.73E-02	1.22E-02	5.45E-03	1.24E+00	5.55E-01	2.48E-01	1.92E-01	8.60E-02	3.85E-02	2.09E-01	9.36E-02	4.19E-02	1.57E-01	4.96E-02	1.57E-02	2.34E-01	7.41E-02	2.34E-02	1.08E-02	3.43E-03	1.08E-03	4.29E-01	1.92E-01	8.58E-02
Dieldrin	2.41E-02	1.71E-02	1.21E-02	7.53E-01	5.33E-01	3.77E-01	1.19E-01	8.42E-02	5.95E-02	1.29E-01	9.13E-02	6.46E-02	6.99E-02	9.57E-03	1.31E-03	1.03E-01	1.40E-02	1.92E-03	8.98E-03	1.23E-03	1.68E-04	3.05E-02	4.17E-03	5.72E-04
Endrin	1.04E-03	4.66E-04	2.08E-04	9.64E-03	4.31E-03	1.93E-03	1.67E-03	7.48E-04	3.34E-04	1.90E-03	8.51E-04	3.80E-04	4.18E-02	1.87E-02	8.35E-03	5.34E-02	2.39E-02	1.07E-02	1.66E-03	7.43E-04	3.32E-04	1.84E-02	8.24E-03	3.69E-03
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	2.28E-02	1.02E-02	4.57E-03	2.28E-01	1.02E-01	4.57E-02	2.89E-02	1.30E-02	5.80E-03	8.42E-03	3.77E-03	1.69E-03	8.22E-03	3.68E-03	1.64E-03	9.50E-03	4.25E-03	1.90E-03	7.41E-03	3.31E-03	1.48E-03	4.56E-07	2.04E-07	9.13E-08
Chrysene	3.27E-02	1.46E-02	6.55E-03	4.68E-01	2.09E-01	9.38E-02	6.24E-02	2.79E-02	1.25E-02	1.38E-02	6.18E-03	2.77E-03	1.68E-02	7.52E-03	3.36E-03	2.14E-02	9.59E-03	4.29E-03	1.02E-02	4.58E-03	2.05E-03	4.99E-07	2.23E-07	9.97E-08
Pyrene	9.66E-01	4.32E-01	1.93E-01	1.18E+00	5.27E-01	2.36E-01	3.76E-01	1.68E-01	7.53E-02	7.44E-02	3.33E-02	1.49E-02	1.00E-01	4.48E-02	2.00E-02	4.93E-02	2.21E-02	9.87E-03	2.43E-01	1.08E-01	4.85E-02	7.91E-07	3.54E-07	1.58E-07

Shaded cells indicate HQ ≥ 1

Table D-71C
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - Mean - Group 2C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	3.95E-02	1.25E-02	3.95E-03	5.93E-01	1.88E-01	5.93E-02	9.84E-02	3.11E-02	9.84E-03	4.01E-02	1.27E-02	4.01E-03	1.44E-01	6.44E-02	2.88E-02	1.99E-01	8.88E-02	3.97E-02	4.86E-02	2.18E-02	9.73E-03	1.97E-02	8.81E-03	3.94E-03
Chromium	4.67E-02	2.09E-02	9.34E-03	4.81E-01	2.15E-01	9.62E-02	6.31E-02	2.82E-02	1.26E-02	4.99E-02	2.23E-02	9.99E-03	1.83E-01	8.18E-02	3.66E-02	2.16E-01	9.66E-02	4.32E-02	1.53E-01	6.85E-02	3.06E-02	3.63E-02	1.63E-02	7.27E-03
Lead	3.46E-02	2.52E-02	1.83E-02	3.51E-01	2.55E-01	1.85E-01	4.82E-02	3.51E-02	2.55E-02	4.95E-02	3.60E-02	2.61E-02	1.85E-01	8.27E-02	3.70E-02	2.22E-01	9.91E-02	4.43E-02	3.46E-01	2.45E-01	1.73E-01	5.64E-02	2.52E-02	1.13E-02
Mercury	1.52E-01	6.80E-02	3.04E-02	2.87E-01	1.29E-01	5.75E-02	7.75E-02	3.47E-02	1.55E-02	3.62E-03	2.81E-03	2.17E-03	1.49E-02	9.51E-03	6.08E-03	1.07E-02	6.84E-03	4.37E-03	3.05E-02	2.16E-02	1.53E-02	4.02E-04	2.57E-04	1.64E-04
Zinc	4.48E-02	2.00E-02	8.95E-03	3.91E-01	1.75E-01	7.82E-02	6.84E-02	3.06E-02	1.37E-02	4.88E-02	2.18E-02	9.77E-03	2.21E-01	9.88E-02	4.42E-02	2.80E-01	1.25E-01	5.59E-02	1.34E-01	5.98E-02	2.67E-02	5.74E-02	2.57E-02	1.15E-02
Polychlorinated Biphenyls																								
Aroclor-1260	2.78E-02	1.24E-02	5.57E-03	7.06E-01	3.16E-01	1.41E-01	1.09E-01	4.88E-02	2.18E-02	1.23E-01	5.52E-02	2.47E-02	1.02E-01	4.56E-02	2.04E-02	1.46E-01	6.55E-02	2.93E-02	2.42E-02	1.08E-02	4.84E-03	4.53E-02	2.03E-02	9.06E-03
Pesticides																								
4,4'-DDD	4.64E-03	2.08E-03	9.28E-04	1.64E-01	7.32E-02	3.27E-02	2.56E-02	1.14E-02	5.11E-03	2.80E-02	1.25E-02	5.59E-03	2.09E-02	6.61E-03	2.09E-03	3.08E-02	9.75E-03	3.08E-03	2.34E-03	7.39E-04	2.34E-04	5.72E-02	2.56E-02	1.14E-02
4,4'-DDE	3.88E-02	1.73E-02	7.75E-03	1.99E+00	8.91E-01	3.98E-01	3.08E-01	1.38E-01	6.17E-02	3.34E-01	1.49E-01	6.68E-02	2.51E-01	7.95E-02	2.51E-02	3.77E-01	1.19E-01	3.77E-02	1.24E-02	3.91E-03	1.24E-03	6.85E-01	3.06E-01	1.37E-01
4,4'-DDT	1.28E-02	5.71E-03	2.55E-03	5.64E-01	2.52E-01	1.13E-01	8.75E-02	3.92E-02	1.75E-02	9.51E-02	4.25E-02	1.90E-02	7.14E-02	2.26E-02	7.14E-03	1.07E-01	3.37E-02	1.07E-02	5.13E-03	1.62E-03	5.13E-04	1.95E-01	8.72E-02	3.90E-02
Dieldrin	1.26E-02	8.92E-03	6.31E-03	3.92E-01	2.77E-01	1.96E-01	6.21E-02	4.39E-02	3.10E-02	6.73E-02	4.76E-02	3.36E-02	3.64E-02	4.99E-03	6.83E-04	5.34E-02	7.32E-03	1.00E-03	4.68E-03	6.41E-04	8.78E-05	1.59E-02	2.17E-03	2.98E-04
Endrin	5.35E-04	2.39E-04	1.07E-04	4.93E-03	2.21E-03	9.87E-04	8.58E-04	3.84E-04	1.72E-04	9.74E-04	4.35E-04	1.95E-04	2.14E-02	9.55E-03	4.27E-03	2.73E-02	1.22E-02	5.46E-03	8.51E-04	3.81E-04	1.70E-04	9.43E-03	4.22E-03	1.89E-03
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	1.16E-02	5.19E-03	2.32E-03	9.42E-02	4.21E-02	1.89E-02	1.25E-02	5.60E-03	2.51E-03	3.57E-03	1.60E-03	7.15E-04	3.54E-03	1.58E-03	7.07E-04	3.91E-03	1.75E-03	7.83E-04	3.59E-03	1.60E-03	7.18E-04	4.11E-07	1.84E-07	8.23E-08
Chrysene	1.72E-02	7.69E-03	3.44E-03	2.07E-01	9.29E-02	4.16E-02	2.83E-02	1.27E-02	5.68E-03	6.24E-03	2.79E-03	1.25E-03	7.63E-03	3.41E-03	1.53E-03	9.49E-03	4.25E-03	1.90E-03	5.20E-03	2.32E-03	1.04E-03	4.32E-07	1.93E-07	8.64E-08
Pyrene	3.93E-01	1.76E-01	7.88E-02	4.80E-01	2.15E-01	9.62E-02	1.53E-01	6.85E-02	3.07E-02	3.03E-02	1.36E-02	6.07E-03	4.08E-02	1.82E-02	8.16E-03	2.01E-02	8.99E-03	4.02E-03	9.88E-02	4.42E-02	1.98E-02	5.21E-07	2.33E-07	1.04E-07

Shaded cells indicate HQ ≥ 1

Table D-72A
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum - Group 2D
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	1.04E-01	3.30E-02	1.04E-02	1.27E+00	4.01E-01	1.27E-01	2.82E-01	8.92E-02	2.82E-02	8.44E-02	2.67E-02	8.44E-03	3.09E-01	1.38E-01	6.19E-02	4.29E-01	1.92E-01	8.59E-02	8.59E-02	3.84E-02	1.72E-02	3.52E-02	1.58E-02	7.05E-03
Chromium	1.68E-01	7.51E-02	3.36E-02	3.77E+00	1.68E+00	7.53E-01	7.81E-01	3.49E-01	1.56E-01	9.51E-02	4.25E-02	1.90E-02	1.49E+00	6.65E-01	2.97E-01	2.16E+00	9.65E-01	4.32E-01	2.26E-01	1.01E-01	4.52E-02	3.64E-02	1.63E-02	7.27E-03
Lead	2.01E-01	1.46E-01	1.06E-01	1.82E+00	1.32E+00	9.63E-01	3.10E-01	2.26E-01	1.64E-01	1.76E-01	1.28E-01	9.28E-02	9.21E-01	4.12E-01	1.84E-01	1.11E+00	4.97E-01	2.22E-01	1.50E+00	1.06E+00	7.50E-01	1.43E-01	6.38E-02	2.85E-02
Mercury	4.23E-01	1.89E-01	8.47E-02	6.54E+00	2.93E+00	1.31E+00	1.44E+00	6.44E-01	2.88E-01	2.29E-02	1.78E-02	1.38E-02	1.96E-01	1.25E-01	7.99E-02	2.79E-01	1.78E-01	1.14E-01	4.28E-02	3.03E-02	2.14E-02	1.42E-03	9.05E-04	5.78E-04
Zinc	1.38E-01	6.17E-02	2.76E-02	8.03E-01	3.59E-01	1.61E-01	1.91E-01	8.53E-02	3.81E-02	8.44E-02	3.77E-02	1.69E-02	4.67E-01	2.09E-01	9.33E-02	5.72E-01	2.56E-01	1.14E-01	2.88E-01	1.29E-01	5.76E-02	7.96E-02	3.56E-02	1.59E-02
Polychlorinated Biphenyls																								
Aroclor-1260	9.39E-01	4.20E-01	1.88E-01	2.89E+01	1.29E+01	5.79E+00	6.05E+00	2.70E+00	1.21E+00	4.68E+00	2.09E+00	9.35E-01	4.19E+00	1.87E+00	8.37E-01	6.22E+00	2.78E+00	1.24E+00	3.84E-01	1.72E-01	7.68E-02	1.46E+00	6.53E-01	2.92E-01
Pesticides																								
4,4'-DDD	6.00E-03	2.69E-03	1.20E-03	1.64E-01	7.34E-02	3.28E-02	3.47E-02	1.55E-02	6.94E-03	2.68E-02	1.20E-02	5.36E-03	2.12E-02	6.71E-03	2.12E-03	3.14E-02	9.92E-03	3.14E-03	1.96E-03	6.20E-04	1.96E-04	4.61E-02	2.06E-02	9.23E-03
4,4'-DDE	4.60E-02	2.06E-02	9.20E-03	1.76E+00	7.85E-01	3.51E-01	3.68E-01	1.64E-01	7.35E-02	2.82E-01	1.26E-01	5.64E-02	2.25E-01	7.10E-02	2.25E-02	3.37E-01	1.07E-01	3.37E-02	1.01E-02	3.20E-03	1.01E-03	4.87E-01	2.18E-01	9.74E-02
4,4'-DDT	7.48E-02	3.35E-02	1.50E-02	2.60E+00	1.16E+00	5.21E-01	5.44E-01	2.43E-01	1.09E-01	4.21E-01	1.88E-01	8.42E-02	3.33E-01	1.05E-01	3.33E-02	4.98E-01	1.57E-01	4.98E-02	2.01E-02	6.35E-03	2.01E-03	7.25E-01	3.24E-01	1.45E-01
Dieldrin	3.29E-01	2.32E-01	1.64E-01	7.77E+00	5.50E+00	3.89E+00	1.67E+00	1.18E+00	8.35E-01	1.28E+00	9.02E-01	6.38E-01	7.33E-01	1.00E-01	1.38E-02	1.08E+00	1.48E-01	2.02E-02	7.91E-02	1.08E-02	1.48E-03	2.54E-01	3.47E-02	4.76E-03
Endrin	1.65E-04	7.40E-05	3.31E-05	1.02E-03	4.54E-04	2.03E-04	2.68E-04	1.20E-04	5.35E-05	1.95E-04	8.74E-05	3.91E-05	4.47E-03	2.00E-03	8.93E-04	5.68E-03	2.54E-03	1.14E-03	1.59E-04	7.12E-05	3.18E-05	1.57E-03	7.02E-04	3.14E-04
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	1.33E-02	5.97E-03	2.67E-03	6.54E-02	2.93E-02	1.31E-02	1.25E-02	5.58E-03	2.50E-03	2.47E-03	1.11E-03	4.95E-04	2.62E-03	1.17E-03	5.24E-04	2.74E-03	1.23E-03	5.49E-04	2.67E-03	1.19E-03	5.34E-04	7.07E-07	3.16E-07	1.41E-07
Chrysene	1.51E-02	6.77E-03	3.03E-03	1.03E-01	4.63E-02	2.07E-02	2.01E-02	9.01E-03	4.03E-03	3.12E-03	1.39E-03	6.24E-04	4.05E-03	1.81E-03	8.09E-04	4.78E-03	2.14E-03	9.57E-04	2.95E-03	1.32E-03	5.89E-04	7.83E-07	3.50E-07	1.57E-07
Pyrene	8.12E-01	3.63E-01	1.63E-01	2.70E-01	1.21E-01	5.42E-02	2.51E-01	1.12E-01	5.02E-02	3.26E-02	1.46E-02	6.54E-03	4.96E-02	2.22E-02	9.92E-03	9.86E-03	4.41E-03	1.97E-03	1.36E-01	6.08E-02	2.72E-02	1.90E-06	8.50E-07	3.80E-07

Shaded cells indicate HQ ≥ 1

Table D-72B
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 2D
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	3.76E-02	1.19E-02	3.76E-03	5.55E-01	1.76E-01	5.55E-02	9.22E-02	2.92E-02	9.22E-03	3.72E-02	1.18E-02	3.72E-03	1.35E-01	6.04E-02	2.70E-02	1.86E-01	8.31E-02	3.72E-02	4.64E-02	2.07E-02	9.27E-03	1.83E-02	8.17E-03	3.65E-03
Chromium	2.78E-02	1.24E-02	5.56E-03	2.86E-01	1.28E-01	5.72E-02	3.76E-02	1.68E-02	7.51E-03	3.26E-02	1.46E-02	6.53E-03	1.09E-01	4.86E-02	2.18E-02	1.28E-01	5.74E-02	2.57E-02	9.10E-02	4.07E-02	1.82E-02	2.48E-02	1.11E-02	4.96E-03
Lead	7.27E-02	5.28E-02	3.84E-02	8.41E-01	6.11E-01	4.44E-01	1.08E-01	7.87E-02	5.72E-02	9.16E-02	6.66E-02	4.84E-02	4.25E-01	1.90E-01	8.50E-02	5.13E-01	2.29E-01	1.03E-01	7.81E-01	5.53E-01	3.91E-01	9.30E-02	4.16E-02	1.86E-02
Mercury	1.31E-01	5.87E-02	2.63E-02	2.23E-01	9.97E-02	4.46E-02	6.36E-02	2.85E-02	1.27E-02	2.94E-03	2.28E-03	1.76E-03	1.22E-02	7.80E-03	4.98E-03	8.25E-03	5.27E-03	3.37E-03	2.64E-02	1.87E-02	1.32E-02	3.12E-04	1.99E-04	1.27E-04
Zinc	5.63E-02	2.52E-02	1.13E-02	4.55E-01	2.03E-01	9.10E-02	7.98E-02	3.57E-02	1.60E-02	5.24E-02	2.34E-02	1.05E-02	2.59E-01	1.16E-01	5.19E-02	3.22E-01	1.44E-01	6.44E-02	1.71E-01	7.67E-02	3.43E-02	6.00E-02	2.68E-02	1.20E-02
Polychlorinated Biphenyls																								
Aroclor-1260	2.02E-01	9.01E-02	4.03E-02	7.32E+00	3.27E+00	1.46E+00	1.13E+00	5.06E-01	2.26E-01	1.24E+00	5.55E-01	2.48E-01	1.05E+00	4.69E-01	2.10E-01	1.54E+00	6.91E-01	3.09E-01	1.37E-01	6.14E-02	2.75E-02	4.61E-01	2.06E-01	9.21E-02
Pesticides																								
4,4'-DDD	1.75E-03	7.85E-04	3.51E-04	6.49E-02	2.90E-02	1.30E-02	1.02E-02	4.55E-03	2.03E-03	1.10E-02	4.93E-03	2.21E-03	8.29E-03	2.62E-03	8.29E-04	1.23E-02	3.88E-03	1.23E-03	8.14E-04	2.57E-04	8.14E-05	2.26E-02	1.01E-02	4.52E-03
4,4'-DDE	1.25E-02	5.59E-03	2.50E-03	6.16E-01	2.76E-01	1.23E-01	9.57E-02	4.28E-02	1.91E-02	1.03E-01	4.62E-02	2.07E-02	7.79E-02	2.46E-02	7.79E-03	1.17E-01	3.70E-02	1.17E-02	4.13E-03	1.31E-03	4.13E-04	2.12E-01	9.49E-02	4.25E-02
4,4'-DDT	2.00E-02	8.93E-03	4.00E-03	8.99E-01	4.02E-01	1.80E-01	1.39E-01	6.23E-02	2.79E-02	1.52E-01	6.78E-02	3.03E-02	1.14E-01	3.60E-02	1.14E-02	1.70E-01	5.37E-02	1.70E-02	7.97E-03	2.52E-03	7.97E-04	3.11E-01	1.39E-01	6.21E-02
Dieldrin	2.27E-02	1.60E-02	1.13E-02	7.07E-01	5.00E-01	3.53E-01	1.12E-01	7.91E-02	5.59E-02	1.21E-01	8.57E-02	6.06E-02	6.56E-02	8.99E-03	1.23E-03	9.63E-02	1.32E-02	1.81E-03	8.43E-03	1.15E-03	1.58E-04	2.86E-02	3.92E-03	5.37E-04
Endrin	3.80E-05	1.70E-05	7.60E-06	3.07E-04	1.37E-04	6.15E-05	6.01E-05	2.69E-05	1.20E-05	6.17E-05	2.76E-05	1.23E-05	1.34E-03	5.98E-04	2.68E-04	1.70E-03	7.61E-04	3.40E-04	5.39E-05	2.41E-05	1.08E-05	5.90E-04	2.64E-04	1.18E-04
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	4.04E-03	1.81E-03	8.10E-04	2.17E-02	9.73E-03	4.36E-03	3.25E-03	1.45E-03	6.51E-04	8.88E-04	3.97E-04	1.78E-04	9.06E-04	4.05E-04	1.81E-04	8.99E-04	4.02E-04	1.80E-04	1.16E-03	5.18E-04	2.32E-04	4.56E-07	2.04E-07	9.13E-08
Chrysene	4.67E-03	2.09E-03	9.36E-04	3.57E-02	1.60E-02	7.16E-03	5.33E-03	2.39E-03	1.07E-03	1.15E-03	5.17E-04	2.31E-04	1.43E-03	6.38E-04	2.85E-04	1.63E-03	7.28E-04	3.26E-04	1.31E-03	5.86E-04	2.62E-04	4.99E-07	2.23E-07	9.97E-08
Pyrene	6.24E-02	2.79E-02	1.25E-02	7.61E-02	3.41E-02	1.53E-02	2.43E-02	1.09E-02	4.87E-03	4.82E-03	2.16E-03	9.65E-04	6.47E-03	2.89E-03	1.29E-03	3.19E-03	1.43E-03	6.37E-04	1.57E-02	7.00E-03	3.13E-03	7.91E-07	3.54E-07	1.58E-07

Shaded cells indicate HQ ≥ 1

Table D-72C
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - Mean - Group 2D
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (Omnivore)			American Robin (Invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Cadmium	2.76E-02	8.72E-03	2.76E-03	3.68E-01	1.16E-01	3.68E-02	6.19E-02	1.96E-02	6.19E-03	2.39E-02	7.56E-03	2.39E-03	9.07E-02	4.05E-02	1.81E-02	1.23E-01	5.51E-02	2.47E-02	3.45E-02	1.54E-02	6.90E-03	1.16E-02	5.17E-03	2.31E-03
Chromium	1.97E-02	8.82E-03	3.95E-03	2.03E-01	9.07E-02	4.06E-02	2.67E-02	1.19E-02	5.33E-03	2.47E-02	1.10E-02	4.94E-03	7.72E-02	3.45E-02	1.54E-02	9.11E-02	4.08E-02	1.82E-02	6.46E-02	2.89E-02	1.29E-02	1.93E-02	8.63E-03	3.86E-03
Lead	4.37E-02	3.18E-02	2.31E-02	4.64E-01	3.37E-01	2.45E-01	6.25E-02	4.54E-02	3.30E-02	6.00E-02	4.36E-02	3.17E-02	2.41E-01	1.08E-01	4.82E-02	2.90E-01	1.30E-01	5.80E-02	4.47E-01	3.16E-01	2.23E-01	6.62E-02	2.96E-02	1.32E-02
Mercury	9.82E-02	4.39E-02	1.96E-02	1.34E-01	6.01E-02	2.69E-02	4.33E-02	1.94E-02	8.67E-03	1.96E-03	1.52E-03	1.17E-03	8.30E-03	5.30E-03	3.39E-03	4.91E-03	3.14E-03	2.00E-03	1.97E-02	1.39E-02	9.85E-03	1.89E-04	1.21E-04	7.72E-05
Zinc	4.16E-02	1.86E-02	8.33E-03	3.73E-01	1.67E-01	7.46E-02	6.51E-02	2.91E-02	1.30E-02	4.78E-02	2.14E-02	9.56E-03	2.10E-01	9.40E-02	4.20E-02	2.67E-01	1.20E-01	5.35E-02	1.24E-01	5.53E-02	2.47E-02	5.66E-02	2.53E-02	1.13E-02
Polychlorinated Biphenyls																								
Aroclor-1260	6.10E-02	2.73E-02	1.22E-02	1.81E+00	8.07E-01	3.61E-01	2.79E-01	1.25E-01	5.59E-02	3.11E-01	1.39E-01	6.23E-02	2.60E-01	1.16E-01	5.20E-02	3.78E-01	1.69E-01	7.56E-02	4.87E-02	2.18E-02	9.73E-03	1.15E-01	5.14E-02	2.30E-02
Pesticides																								
4,4'-DDD	8.61E-04	3.85E-04	1.72E-04	3.28E-02	1.47E-02	6.56E-03	5.15E-03	2.30E-03	1.03E-03	5.56E-03	2.49E-03	1.11E-03	4.19E-03	1.32E-03	4.19E-04	6.22E-03	1.97E-03	6.22E-04	3.77E-04	1.19E-04	3.77E-05	1.14E-02	5.10E-03	2.28E-03
4,4'-DDE	5.42E-03	2.42E-03	1.08E-03	2.58E-01	1.15E-01	5.16E-02	4.01E-02	1.79E-02	8.03E-03	4.33E-02	1.94E-02	8.66E-03	3.27E-02	1.03E-02	3.27E-03	4.89E-02	1.55E-02	4.89E-03	1.86E-03	5.87E-04	1.86E-04	8.89E-02	3.98E-02	1.78E-02
4,4'-DDT	8.13E-03	3.64E-03	1.63E-03	3.52E-01	1.58E-01	7.05E-02	5.48E-02	2.45E-02	1.10E-02	5.95E-02	2.66E-02	1.19E-02	4.47E-02	1.41E-02	4.47E-03	6.66E-02	2.11E-02	6.66E-03	3.30E-03	1.04E-03	3.30E-04	1.22E-01	5.45E-02	2.44E-02
Dieldrin	8.13E-03	5.75E-03	4.06E-03	2.52E-01	1.78E-01	1.26E-01	3.99E-02	2.82E-02	2.00E-02	4.33E-02	3.06E-02	2.16E-02	2.34E-02	3.21E-03	4.39E-04	3.44E-02	4.70E-03	6.44E-04	3.01E-03	4.13E-04	5.65E-05	1.02E-02	1.40E-03	1.91E-04
Endrin	3.63E-05	1.62E-05	7.26E-06	2.92E-04	1.31E-04	5.85E-05	5.74E-05	2.56E-05	1.15E-05	5.87E-05	2.63E-05	1.17E-05	1.27E-03	5.69E-04	2.54E-04	1.62E-03	7.24E-04	3.24E-04	5.12E-05	2.29E-05	1.02E-05	5.61E-04	2.51E-04	1.12E-04
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	2.15E-03	9.62E-04	4.31E-04	8.62E-03	3.86E-03	1.73E-03	1.44E-03	6.43E-04	2.88E-04	3.79E-04	1.69E-04	7.58E-05	3.95E-04	1.77E-04	7.90E-05	3.54E-04	1.58E-04	7.09E-05	5.91E-04	2.64E-04	1.18E-04	4.11E-07	1.84E-07	8.23E-08
Chrysene	2.64E-03	1.18E-03	5.29E-04	1.57E-02	7.02E-03	3.14E-03	2.50E-03	1.12E-03	5.01E-04	5.36E-04	2.40E-04	1.07E-04	6.65E-04	2.97E-04	1.33E-04	7.13E-04	3.19E-04	1.43E-04	7.17E-04	3.21E-04	1.43E-04	4.32E-07	1.93E-07	8.64E-08
Pyrene	2.39E-02	1.07E-02	4.80E-03	2.92E-02	1.31E-02	5.85E-03	9.34E-03	4.18E-03	1.87E-03	1.85E-03	8.29E-04	3.71E-04	2.48E-03	1.11E-03	4.97E-04	1.22E-03	5.47E-04	2.45E-04	6.01E-03	2.69E-03	1.20E-03	5.21E-07	2.33E-07	1.04E-07

Shaded cells indicate HQ ≥ 1

Table D-73
Screening Statistics - Penniman Lake Surface Water
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/L)																		
Acetone	5.00 - 5.00	3 / 8	2.51	63.7	CAPL-SW62-1012	12.6	21.7	27.2	1,500	0 / 8	0.04	NO	--	--	--	-- / --	--	NO
Chloromethane	0.50 - 0.50	7 / 8	1.86	6.88	CAPL-SW63-1012	4.91	2.49	6.58	5,500	0 / 8	0.001	NO	--	--	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/L)																		
Acenaphthene	0.093 - 0.098	1 / 8	0.13	0.13	CAPL-SW66-1012	0.058	0.031	0.079	23.0	0 / 8	0.01	NO	--	--	--	-- / --	--	NO
Anthracene	0.093 - 0.098	1 / 8	0.13	0.13	CAPL-SW66-1012	0.057	0.028	0.076	0.73	0 / 8	0.17	NO	--	--	--	-- / --	--	NO
Benzo(a)anthracene	0.093 - 0.098	2 / 8	0.056	0.071	CAPL-SW66-1012	0.051	0.0084	0.057	0.027	2 / 8	2.62	YES	2.11	1.91	0.0515	2 / 8	1.37	YES
Benzo(b)fluoranthene	0.093 - 0.098	1 / 8	0.055	0.055	CAPL-SW69-1012	0.048	0.0028	0.050	9.07	0 / 8	0.01	NO	--	--	--	-- / --	--	NO
Benzo(g,h,i)perylene	0.093 - 0.098	1 / 8	0.068	0.068	CAPL-SW69-1012	0.050	0.0075	0.055	7.64	0 / 8	0.01	NO	--	--	--	-- / --	--	NO
Benzo(k)fluoranthene	0.093 - 0.098	1 / 8	0.062	0.062	CAPL-SW69-1012	0.049	0.0050	0.053	9.07	0 / 8	0.01	NO	--	--	--	-- / --	--	NO
Chrysene	0.093 - 0.098	2 / 8	0.069	0.078	CAPL-SW69-1012	0.054	0.012	0.062	NSV	-- / --	NSV	YES	NSV	NSV	--	-- / --	--	YES
Dibenz(a,h)anthracene	0.093 - 0.098	1 / 8	0.078	0.078	CAPL-SW69-1012	0.051	0.011	0.059	NSV	-- / --	NSV	YES	NSV	NSV	--	-- / --	--	YES
Fluoranthene	0.093 - 0.098	4 / 8	0.049	0.17	CAPL-SW66-1012	0.067	0.043	0.096	8.10	0 / 8	0.02	NO	--	--	--	-- / --	--	NO
Fluorene	0.093 - 0.098	1 / 8	0.13	0.13	CAPL-SW66-1012	0.058	0.030	0.078	3.90	0 / 8	0.03	NO	--	--	--	-- / --	--	NO
Indeno(1,2,3-cd)pyrene	0.093 - 0.098	1 / 8	0.076	0.076	CAPL-SW69-1012	0.051	0.010	0.058	4.31	0 / 8	0.02	NO	--	--	--	-- / --	--	NO
Phenanthrene	0.19 - 0.20	1 / 8	0.46	0.46	CAPL-SW66-1012	0.14	0.13	0.23	6.30	0 / 8	0.07	NO	--	--	--	-- / --	--	NO
Pyrene	0.093 - 0.098	1 / 8	0.19	0.19	CAPL-SW66-1012	0.065	0.050	0.099	0.025	1 / 8	7.60	YES	3.96	2.61	0.0591	1 / 8	3.21	YES
Pesticides (UG/L)																		
Heptachlor	0.0094 - 0.010	1 / 8	0.0054	0.0054	CAPL-SW69-1012	0.0049	0.0002	0.0051	0.0069	0 / 8	0.78	NO	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/L)																		
Not Detected																		
Explosives (UG/L)																		
4-Amino-2,6-dinitrotoluene	0.16 - 0.19	1 / 8	0.11	0.11	CAPL-SW67-1012	0.087	0.010	0.094	19.0	0 / 8	0.01	NO	--	--	--	-- / --	--	NO
Inorganics (UG/L)																		
Arsenic	-- - --	8 / 8	1.37	2.01	CAPL-SW65-1012	1.64	0.21	1.78	150	0 / 8	0.01	NO	--	--	--	-- / --	--	NO
Barium	-- - --	8 / 8	19.1	21.6	CAPL-SW65-1012	20.4	0.82	20.9	4.00	8 / 8	5.40	YES	5.23	5.10	26.6	0 / 8	0.81	NO
Calcium [2]	-- - --	8 / 8	33,800	38,000	CAPL-SW63-1012	36,450	1,297	37,319	NSV	-- / --	NSV	NO	--	--	--	-- / --	--	NO
Iron	-- - --	8 / 8	301	390	CAPL-SW64-1012	340	30.3	361	1,000	0 / 8	0.39	NO	--	--	--	-- / --	--	NO
Magnesium [2]	-- - --	8 / 8	1,380	1,590	CAPL-SW65-1012	1,513	82.6	1,568	NSV	-- / --	NSV	NO	--	--	--	-- / --	--	NO
Manganese	-- - --	8 / 8	40.3	53.5	CAPL-SW64-1012	47.3	4.42	50.2	120	0 / 8	0.45	NO	--	--	--	-- / --	--	NO
Potassium [2]	-- - --	8 / 8	2,640	2,840	CAPL-SW67-1012	2,755	72.9	2,804	NSV	-- / --	NSV	NO	--	--	--	-- / --	--	NO
Sodium [2]	-- - --	8 / 8	8,330	9,410	CAPL-SW67-1012	8,973	414	9,250	NSV	-- / --	NSV	NO	--	--	--	-- / --	--	NO
Dissolved Metals (UG/L)																		
Arsenic	-- - --	8 / 8	1.15	1.42	CAPL-SW69-1012	1.26	0.090	1.32	150	0 / 8	0.01	NO	--	--	--	-- / --	--	NO
Barium	-- - --	8 / 8	18.4	20.1	CAPL-SW68-1012	19.2	0.56	19.5	4.00	8 / 8	5.03	YES	4.88	4.79	27.7	0 / 8	0.73	NO
Calcium [2]	-- - --	8 / 8	33,800	41,600	CAPL-SW63-1012	36,550	2,506	38,229	NSV	-- / --	NSV	NO	--	--	--	-- / --	--	NO
Iron	-- - --	8 / 8	62.4	97.6	CAPL-SW69-1012	77.8	10.5	84.8	1,000	0 / 8	0.10	NO	--	--	--	-- / --	--	NO
Magnesium [2]	-- - --	8 / 8	1,360	1,680	CAPL-SW63-1012	1,494	107	1,565	NSV	-- / --	NSV	NO	--	--	--	-- / --	--	NO
Manganese	-- - --	8 / 8	9.86	16.1	CAPL-SW63-1012	12.2	2.45	13.9	120	0 / 8	0.13	NO	--	--	--	-- / --	--	NO
Nickel	1.50 - 1.50	1 / 8	1.96	1.96	CAPL-SW65-1012	0.90	0.43	1.19	46.9	0 / 8	0.04	NO	--	--	--	-- / --	--	NO
Potassium [2]	-- - --	8 / 8	2,600	2,930	CAPL-SW63-1012	2,726	103	2,795	NSV	-- / --	NSV	NO	--	--	--	-- / --	--	NO
Sodium [2]	-- - --	8 / 8	8,250	9,650	CAPL-SW63-1012	8,879	477	9,198	NSV	-- / --	NSV	NO	--	--	--	-- / --	--	NO

Table D-73
Screening Statistics - Penniman Lake Surface Water
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Zinc	2.50 - 2.50	1 / 8	1.33	1.33	CAPL-SW63-1012	1.26	0.028	1.28	106	0 / 8	0.01	NO	--	--	--	-- / --	--	NO
Other Parameters																		
Hardness (MG/L)	-- - --	8 / 8	86.3	91.3	CAPL-SW62-1012	88.4	2.00	89.7	--	-- / --	--	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Macronutrient - Not considered to be a COPC

Table D-74
Exceedances - Penniman Lake Surface Water
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Water ESV	Background UTL	CAPL-SWSD62 CAPL-SW62-1012 10/15/2012	CAPL-SWSD63 CAPL-SW63-1012 10/15/2012	CAPL-SWSD63 CAPL-SW63P-1012 10/15/2012	CAPL-SWSD64 CAPL-SW64-1012 10/15/2012	CAPL-SWSD65 CAPL-SW65-1012 10/15/2012	CAPL-SWSD66 CAPL-SW66-1012 10/15/2012	CAPL-SWSD67 CAPL-SW67-1012 10/15/2012	CAPL-SWSD68 CAPL-SW68-1012 10/15/2012	CAPL-SWSD69 CAPL-SW69-1012 10/15/2012
Volatile Organic Compounds (UG/L)											
Acetone	1,500	--	63.7 J	22.0	5.00 U	5.00 U	2.51 J	5.00 U	5.00 U	5.00 U	5.00 U
Chloromethane	5,500	--	1.86	3.08	6.88	0.50 U	4.84	6.48	6.01	6.69	6.25
Semivolatile Organic Compounds (UG/L)											
Acenaphthene	23.0	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.134 J	0.0943 U	0.098 U	0.0943 U
Anthracene	0.73	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.126 J	0.0943 U	0.098 U	0.0943 U
Benzo(a)anthracene	0.027	0.0515	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0707 J	0.0943 U	0.098 U	0.0563 J
Benzo(b)fluoranthene	9.07	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0549 J
Benzo(g,h,i)perylene	7.64	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0684 J
Benzo(k)fluoranthene	9.07	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0615 J
Chrysene	NSV	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0693 J	0.0943 U	0.098 U	0.0783 J
Dibenz(a,h)anthracene	NSV	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.0782 J
Fluoranthene	8.10	0.0948	0.0604 J	0.0962 U	0.0668 J	0.0488 J	0.0926 U	0.173 J	0.0943 U	0.098 U	0.0943 U
Fluorene	3.90	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.131 J	0.0943 U	0.098 U	0.0943 U
Indeno(1,2,3-cd)pyrene	4.31	--	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.0943 U	0.0943 U	0.098 U	0.076 J
Phenanthrene	6.30	0.1440	0.189 U	0.192 U	0.192 U	0.189 U	0.185 U	0.455	0.189 U	0.196 U	0.189 U
Pyrene	0.025	0.0591	0.0943 U	0.0962 U	0.0962 U	0.0943 U	0.0926 U	0.19	0.0943 U	0.098 U	0.0943 U
Pesticide/Polychlorinated Biphenyls (UG/L)											
Heptachlor	0.0069	--	0.01000 U	0.01000 U	0.01000 U	0.00962 U	0.00962 U	0.00980 U	0.00943 U	0.00962 U	0.00538 J
Explosives (UG/L)											
4-Amino-2,6-dinitrotoluene	19.0	--	0.178 U	0.157 U	0.157 U	0.178 U	0.158 U	0.188 U	0.108 L	0.157 UL	0.160 UL
Inorganics (UG/L)											
Arsenic	150	8.81	1.50 J	1.54 J	1.64 J	1.44 J	2.01 J	1.37 J	1.85 J	1.62 J	1.70 J
Barium	4.00	26.6	20.1	19.4	19.5	19.1	21.6	20.4	21.0	21.0	20.4
Iron	1,000	2,620	361	328	321	390	337	302	359	301	344
Manganese	120	161	41.3	39.9	40.3	53.5	49.4	47.2	49.0	49.8	47.5
Dissolved Metals (UG/L)											
Arsenic	150	6.47	1.31 J	1.20 J	1.32 J	1.17 J	1.19 J	1.26 J	1.24 J	1.15 J	1.42 J
Barium	4.00	27.7	18.5	19.5	18.1	18.4	19.5	19.1	19.2	20.1	19.0
Iron	1,000	2,410	62.4	83.1	73.4	71.7	73.5	73.2	83.8	76.7	97.6
Manganese	120	165	14.9	16.1	14.4	13.6	9.88	9.86	12.6	10.4	10.4
Nickel	46.9	--	1.50 U	1.50 U	1.50 U	1.50 U	1.96 J	1.50 U	1.50 U	1.50 U	1.50 U
Zinc	106	--	2.50 U	1.33 J	2.50 U	2.50 U	2.50 U	2.50 U	2.50 U	2.50 U	2.50 U
Other Parameters											
Hardness (MG/L)	--	--	91.3	90.7	NA	89.9	86.3	86.5	86.9	87.1	88.1

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-75
Initial Screening Statistics - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
Volatile Organic Compounds (UG/KG)									
2-Butanone	4.80 - 91.0	33 / 48	3.93	156	CAPL-SD64-1012-V	988	0 / 48	0.16	NO
Acetone	2.00 - 460	31 / 48	21.3	730	PL-00-POND-SD17-0300	NSV	-- / --	NSV	YES
Carbon disulfide	2.40 - 91.0	16 / 48	0.70	29.9	CAPL-SD73-1012-V	3.11	13 / 48	9.61	YES
Chloromethane	4.80 - 91.0	1 / 48	2.00	2.00	CAS011-11SD27-00-0602	NSV	-- / --	NSV	YES
cis-1,2-Dichloroethene	2.40 - 42.0	1 / 40	13.0	13.0	CAS011-11SD24-00-0602	1,464	0 / 40	0.01	NO
Methyl acetate	4.80 - 42.0	1 / 40	8.47	8.47	CAPL-SD79-1012	NSV	-- / --	NSV	YES
Methylcyclohexane	2.40 - 42.0	2 / 40	5.00	26.4	CAPL-SD77-1012-V	NSV	-- / --	NSV	YES
Methylene chloride	3.00 - 39.8	6 / 48	0.80	4.00	CAS011-11SD20-00-0602	1,354	0 / 48	0.003	NO
Trichloroethene	2.40 - 91.0	1 / 48	5.00	5.00	CAS011-11SD24-00-0602	5,856	0 / 48	0.001	NO
Semivolatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	6.29 - 3,000	3 / 50	25.6	39.2	CAPL-SD78-1012	70.0	0 / 50	0.56	NO
Acenaphthene	6.29 - 3,000	3 / 50	29.0	336	CAPL-SD87-1012	290	1 / 50	1.16	YES
Acenaphthylene	6.29 - 3,000	2 / 50	17.0	22.2	CAPL-SD67-1012	160	0 / 50	0.14	NO
Acetophenone	196 - 4,860	5 / 42	16.0	47.0	CAS011-11SD32-00-0602	NSV	-- / --	NSV	YES
Anthracene	6.29 - 3,000	5 / 50	27.0	265	CAPL-SD87-1012	57.2	1 / 50	4.63	YES
Benzaldehyde	196 - 4,860	18 / 42	15.0	384	CAPL-SD63-1012	NSV	-- / --	NSV	YES
Benzo(a)anthracene	6.29 - 3,000	7 / 50	21.0	230	PL-00-POND-SD10-0300	108	3 / 50	2.13	YES
Benzo(a)pyrene	6.29 - 3,000	11 / 50	9.18	303	CAPL-SD67-1012	150	2 / 50	2.02	YES
Benzo(b)fluoranthene	6.29 - 3,000	21 / 50	10.5	590	PL-00-POND-SD10-0300	240	3 / 50	2.46	YES
Benzo(g,h,i)perylene	7.52 - 3,000	6 / 50	7.31	208	CAPL-SD67-1012	170	2 / 50	1.22	YES
Benzo(k)fluoranthene	6.29 - 3,000	10 / 50	8.89	335	CAPL-SD67-1012	240	2 / 50	1.40	YES
bis(2-Ethylhexyl)phthalate	22.0 - 4,860	1 / 50	3,300	3,300	CAA06-SD01-1008	750	1 / 50	4.40	YES
Carbazole	196 - 4,860	1 / 50	33.0	33.0	CAS011-11SD18-00-0602	140	0 / 50	0.24	NO
Chrysene	6.71 - 3,000	17 / 50	9.23	430	PL-00-POND-SD10-0300	166	5 / 50	2.59	YES
Dibenz(a,h)anthracene	6.29 - 3,000	2 / 50	29.0	74.1	CAPL-SD67-1012	33.0	1 / 50	2.25	YES
Dibenzofuran	196 - 4,860	1 / 50	125	125	CAPL-SD87-1012	5,100	0 / 50	0.02	NO
Di-n-butylphthalate	196 - 4,860	2 / 50	15.0	20.0	CAS011-11SD21-00-0602	110	0 / 50	0.18	NO
Di-n-octylphthalate	196 - 4,860	6 / 50	19.0	2,500	CAA06-SD01-1008	NSV	-- / --	NSV	YES

Table D-75
Initial Screening Statistics - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
Fluoranthene	8.37 - 3,000	33 / 50	12.2	490	PL-00-POND-SD10-0300	423	2 / 50	1.16	YES
Fluorene	6.29 - 3,000	3 / 50	70.7	285	CAPL-SD87-1012	77.4	2 / 50	3.68	YES
Indeno(1,2,3-cd)pyrene	6.29 - 3,000	12 / 50	12.0	238	CAPL-SD67-1012	200	2 / 50	1.19	YES
Naphthalene	6.29 - 3,000	2 / 50	24.4	34.5	CAPL-SD79-1012	176	0 / 50	0.20	NO
PAH (HMW) - Detects	-- - --	31 / 50	12.2	2,570	PL-00-POND-SD10-0300	2,900	0 / 50	0.89	NO
PAH (LMW) - Detects	-- - --	33 / 50	13.4	2,275	CAPL-SD87-1012	786	1 / 50	2.89	YES
PAH (total) - Detects	-- - --	33 / 50	25.6	3,250	PL-00-POND-SD10-0300	3,553	0 / 50	0.91	NO
PAH (HMW)	37.7 - 13,500	31 / 50	48.7	7,740	PL-00-POND-SD12-0300	2,900	5 / 50	2.67	YES
PAH (LMW)	176 - 13,500	33 / 50	199	9,770	PL-00-POND-SD11-0300	786	18 / 50	12.4	YES
PAH (total)	265 - 27,000	33 / 50	248	17,490	PL-00-POND-SD12-0300	3,553	11 / 50	4.92	YES
Phenanthrene	8.37 - 3,000	21 / 50	10.5	949	CAPL-SD87-1012	204	1 / 50	4.65	YES
Pyrene	8.37 - 3,000	31 / 50	12.2	620	PL-00-POND-SD10-0300	195	5 / 50	3.18	YES
Pesticides (UG/KG)									
4,4'-DDD	0.63 - 30.3	16 / 48	1.39	43.9	CAPL-SD70-1012	4.88	10 / 48	9.00	YES
4,4'-DDE	0.84 - 5.00	43 / 48	1.22	190	CAS011-11SD30-00-0602	3.16	41 / 48	60.1	YES
4,4'-DDT	0.63 - 30.3	16 / 48	0.70	920	PL-00-POND-SD10-0300	4.16	11 / 48	221	YES
Aldrin	0.63 - 15.2	8 / 48	0.33	3.54	CAPL-SD84-1012	2.00	1 / 48	1.77	YES
alpha-BHC	0.41 - 15.2	6 / 48	0.43	3.50	CAS011-11SD23-00-0602	6.00	0 / 48	0.58	NO
alpha-Chlordane	0.63 - 15.2	14 / 48	0.91	29.6	CAPL-SD70-1012	3.24	9 / 48	9.14	YES
beta-BHC	0.41 - 15.2	5 / 48	0.29	7.30	CAS011-11SD23-00-0602	5.00	1 / 48	1.46	YES
delta-BHC	0.62 - 15.2	8 / 48	0.21	2.71	CAPL-SD63-1012	3.00	0 / 48	0.90	NO
Dieldrin	0.63 - 30.3	18 / 48	0.38	364	CAPL-SD84-1012	1.90	15 / 48	192	YES
Endosulfan I	0.41 - 15.2	6 / 48	0.33	56.0	CAS011-11SD30-00-0602	10.6	1 / 48	5.28	YES
Endosulfan II	0.63 - 30.3	11 / 48	1.32	56.1	CAPL-SD84-1012	51.2	1 / 48	1.09	YES
Endosulfan sulfate	0.41 - 30.3	11 / 48	2.13	681	CAPL-SD84-1012	19.8	5 / 48	34.5	YES
Endrin	0.62 - 30.3	10 / 48	0.58	143	CAPL-SD84-1012	2.22	8 / 48	64.4	YES
Endrin aldehyde	0.80 - 30.3	20 / 48	0.37	17.4	CAPL-SD84-1012	2.22	14 / 48	7.84	YES
Endrin ketone	0.63 - 30.3	17 / 48	1.66	49.4	CAPL-SD84-1012	2.22	15 / 48	22.3	YES
gamma-BHC (Lindane)	0.41 - 15.2	8 / 48	0.14	1.00	CAPL-SD78-1012	2.37	0 / 48	0.42	NO

Table D-75
Initial Screening Statistics - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
gamma-Chlordane	2.10 - 15.2	27 / 48	0.74	94.2	CAPL-SD70-1012	3.24	17 / 48	29.1	YES
Heptachlor	0.18 - 15.2	6 / 48	0.74	1.97	CAPL-SD77-1012	249	0 / 48	0.01	NO
Heptachlor epoxide	0.63 - 15.2	9 / 48	0.71	9.10	PL-00-POND-SD10-0300	2.47	3 / 48	3.68	YES
Methoxychlor	0.63 - 152	11 / 48	0.58	82.2	CAPL-SD70-1012	69.5	1 / 48	1.18	YES
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1260	18.0 - 94.0	81 / 92	15.0	16,200	CAPL-SD84-1012	59.8	69 / 92	271	YES
Explosives (UG/KG)									
1,3-Dinitrobenzene	100 - 250	4 / 35	151	469	CAPL-SD76-1012	24.5	4 / 35	19.1	YES
2,4,6-Trinitrotoluene	100 - 250	1 / 35	125	125	CAPL-SD69-1012	337	0 / 35	0.37	NO
3-Nitrotoluene	174 - 250	1 / 35	882	882	CAPL-SD76-1012	7,035	0 / 35	0.13	NO
4-Amino-2,6-dinitrotoluene	100 - 250	1 / 35	110	110	CAA06-SD01-1008	84.9	1 / 35	1.30	YES
4-Nitrotoluene	174 - 250	2 / 35	104	330	CAPL-SD75-1012	14,867	0 / 35	0.02	NO
HMX	174 - 500	1 / 35	464	464	CAPL-SD79-1012	17.3	1 / 35	26.7	YES
Nitroglycerin	435 - 2,500	8 / 26	328	1,410	CAPL-SD64-1012	NSV	-- / --	NSV	YES
Tetryl	174 - 650	2 / 34	211	245	CAPL-SD76-1012	NSV	-- / --	NSV	YES
Inorganics (MG/KG)									
Aluminum	-- - --	50 / 50	832	34,200	PL-00-POND-SD12-0300	25,500	4 / 50	1.34	YES
Antimony	0.38 - 17.2	5 / 50	0.17	3.89	CAPL-SD85-1012	3.00	1 / 50	1.30	YES
Arsenic	1.22 - 1.22	49 / 50	1.20	56.7	CAPL-SD68-1012	9.79	28 / 50	5.79	YES
Barium	-- - --	50 / 50	4.10	163	PL-00-POND-SD12-0300	20.0	37 / 50	8.15	YES
Beryllium	0.17 - 4.30	28 / 50	0.070	5.98	CAPL-SD85-1012	NSV	-- / --	NSV	YES
Cadmium	0.020 - 4.30	10 / 50	0.11	5.90	PL-00-POND-SD12-0300	0.99	2 / 50	5.96	YES
Calcium [2]	-- - --	50 / 50	614	222,000	PL-00-POND-SD12-0300	NSV	-- / --	NSV	NO
Chromium	-- - --	50 / 50	2.90	91.0	PL-00-POND-SD12-0300	43.4	8 / 50	2.10	YES
Cobalt	6.56 - 21.5	44 / 50	0.35	34.5	CAPL-SD85-1012	50.0	0 / 50	0.69	NO
Copper	1.30 - 3.50	48 / 50	1.60	1,000	CAPL-SD85-1012	31.6	21 / 50	31.6	YES
Cyanide	0.036 - 8.00	5 / 50	0.16	4.86	CAPL-SD79-1012	NSV	-- / --	NSV	YES
Iron	-- - --	50 / 50	1,820	69,400	PL-00-POND-SD12-0300	20,000	24 / 50	3.47	YES
Lead	-- - --	50 / 50	2.90	853	CAPL-SD85-1012	35.8	29 / 50	23.8	YES

Table D-75
Initial Screening Statistics - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
Magnesium [2]	-- - --	50 / 50	109	7,100	PL-00-POND-SD12-0300	NSV	-- / --	NSV	NO
Manganese	-- - --	50 / 50	10.3	467	PL-00-POND-SD12-0300	460	1 / 50	1.02	YES
Mercury	0.040 - 0.36	34 / 50	0.017	1.48	CAPL-SD64-1012	0.18	11 / 50	8.22	YES
Nickel	14.3 - 17.2	46 / 50	0.88	564	CAPL-SD85-1012	22.7	5 / 50	24.8	YES
Potassium [2]	-- - --	50 / 50	99.0	5,900	PL-00-POND-SD12-0300	NSV	-- / --	NSV	NO
Selenium	0.31 - 10.7	4 / 50	0.53	1.80	CAS011-11SD30-00-0602	2.00	0 / 50	0.90	NO
Silver	0.13 - 4.30	1 / 50	0.52	0.52	CAPL-SD85-1012	1.00	0 / 50	0.52	NO
Sodium [2]	54.8 - 6,450	21 / 50	10.7	22,200	PL-00-POND-SD12-0300	NSV	-- / --	NSV	NO
Vanadium	-- - --	50 / 50	3.80	86.8	PL-00-POND-SD12-0300	57.0	5 / 50	1.52	YES
Zinc	-- - --	50 / 50	6.90	2,950	CAPL-SD85-1012	121	23 / 50	24.4	YES
Other Parameters									
pH	-- - --	35 / 35	6.71	8.28	CAPL-SD84-1012	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	94 / 94	1,300	180,000	CAPL-SD22-0711	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Macronutrient - Not considered to be a COPC

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAA06-SD01		CAA06-SD02	CAPL-SWSD18	CAPL-SWSD19	CAPL-SWSD20		CAPL-SWSD21	CAPL-SWSD22	CAPL-SWSD23	CAPL-SWSD24
			CAA06-SD01-1008	CAA06-SD01P-1008	CAA06-SD02-1008	CAPL-SD18-0811	CAPL-SD19-0811	CAPL-SD20-0811	CAPL-SD20P-0811	CAPL-SD21-0811	CAPL-SD22-0711	CAPL-SD23-0711	CAPL-SD24-0711
			10/23/2008	10/23/2008	10/23/2008	8/2/2011	8/2/2011	8/2/2011	8/2/2011	8/2/2011	7/28/2011	7/28/2011	7/28/2011
Volatile Organic Compounds (UG/KG)													
2-Butanone	988	591	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NSV	2,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	3.11	25.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	1,464	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	1,354	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5,856	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)													
2-Methylnaphthalene	70.0	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	290	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	160	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NSV	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	57.2	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NSV	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	108	18.2	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	150	--	1,200 U	480 UJ	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	240	30.3	1,200 U	480 UJ	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	170	25.0	1,200 U	480 UJ	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	240	--	1,200 U	480 UJ	480 U	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	750	--	3,300 J	480 UJ	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	140	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	166	21.7	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	33.0	--	1,200 U	480 UJ	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	5,100	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	110	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NSV	--	2,500 J	480 UJ	480 UJ	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	423	24.3	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	77.4	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	200	--	1,200 U	480 UJ	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	176	--	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW) - Detects	2,900	381	0 U	0 U	0 U	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW) - Detects	786	1,670	0 U	0 U	0 U	NA	NA	NA	NA	NA	NA	NA	NA
PAH (total) - Detects	3,553	2,110	0 U	0 U	0 U	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW)	2,900	381	5,400 U	2,160 U	2,160 U	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW)	786	1,670	5,400 U	2,160 U	2,160 U	NA	NA	NA	NA	NA	NA	NA	NA
PAH (total)	3,553	2,110	10,800 U	4,320 U	4,320 U	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	204	33.0	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	195	35.3	1,200 U	480 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)													
4,4'-DDD	4.88	10.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAA06-SD01		CAA06-SD02	CAPL-SWSD18	CAPL-SWSD19	CAPL-SWSD20		CAPL-SWSD21	CAPL-SWSD22	CAPL-SWSD23	CAPL-SWSD24
			CAA06-SD01-1008	CAA06-SD01P-1008	CAA06-SD02-1008	CAPL-SD18-0811	CAPL-SD19-0811	CAPL-SD20-0811	CAPL-SD20P-0811	CAPL-SD21-0811	CAPL-SD22-0711	CAPL-SD23-0711	CAPL-SD24-0711
			10/23/2008	10/23/2008	10/23/2008	8/2/2011	8/2/2011	8/2/2011	8/2/2011	8/2/2011	7/28/2011	7/28/2011	7/28/2011
4,4'-DDE	3.16	44.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	4.16	1.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	2.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	6.00	0.813	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	3.24	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	5.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	3.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	1.90	0.948	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	10.6	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	51.2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	19.8	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	2.22	8.64	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	2.37	2.92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	3.24	1.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	249	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	2.47	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	69.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)													
Aroclor-1260	59.8	--	NA	NA	NA	4,100	2,600	25 U	15 J	45	16,000	6,200	930
Explosives (UG/KG)													
1,3-Dinitrobenzene	24.5	--	99 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	337	--	99 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	7,035	--	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	84.9	--	99 U	110	100 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	14,867	--	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA	NA
HMX	17.3	--	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	2,500 U	2,500 UJ	2,500 R	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	NSV	--	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)													
Aluminum	25,500	23,200	2,200 J	626 J	1,460	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.00	1.70	0.17 L	0.06 L	4.8 UL	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	9.79	108	12.1 J	3.7 J	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA
Barium	20.0	75.0	9.4 J	2.9 J	4.1 J	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NSV	1.39	0.18 J	0.06 J	0.07 J	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	0.99	0.571	0.07 B	0.37 U	0.02 B	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	43.4	52.0	5 J	1.8 J	2.9 J	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	50.0	9.45	0.67 J	0.2 J	0.35 J	NA	NA	NA	NA	NA	NA	NA	NA
Copper	31.6	25.6	3.5 B	0.98 B	1.3 B	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NSV	--	1.8 U	0.7 U	0.65 U	NA	NA	NA	NA	NA	NA	NA	NA
Iron	20,000	45,600	4,840 J	1,920 J	1,820 J	NA	NA	NA	NA	NA	NA	NA	NA
Lead	35.8	41.6	11 J	6.8 J	2.9 J	NA	NA	NA	NA	NA	NA	NA	NA

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAA06-SD01		CAA06-SD02	CAPL-SWSD18	CAPL-SWSD19	CAPL-SWSD20		CAPL-SWSD21	CAPL-SWSD22	CAPL-SWSD23	CAPL-SWSD24
			CAA06-SD01-1008	CAA06-SD01P-1008	CAA06-SD02-1008	CAPL-SD18-0811	CAPL-SD19-0811	CAPL-SD20-0811	CAPL-SD20P-0811	CAPL-SD21-0811	CAPL-SD22-0711	CAPL-SD23-0711	CAPL-SD24-0711
			10/23/2008	10/23/2008	10/23/2008	8/2/2011	8/2/2011	8/2/2011	8/2/2011	8/2/2011	7/28/2011	7/28/2011	7/28/2011
Manganese	460	368	37.1	13.6	15.2	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.18	0.255	0.36 UL	0.13 UL	0.15 UL	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	22.7	17.1	1.7 J	0.56 J	0.88 J	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	2.00	2.69	7.2 UL	2.6 UL	2.8 UL	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1.00	--	2.1 U	0.74 U	0.81 U	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	57.0	62.5	5.9 J	2.2 J	3.8 J	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	121	110	12.1	3.5 J	6.9	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters													
pH	--	--	7.60	NA	7.80	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	69,000 K	NA	23,000 K	34,000	3,800	110,000	NA	1,300	180,000	79,000	110,000

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD25	CAPL-SWSD26	CAPL-SWSD27	CAPL-SWSD28		CAPL-SWSD29	CAPL-SWSD30	CAPL-SWSD31	CAPL-SWSD32	CAPL-SWSD33	
			CAPL-SD25-0711	CAPL-SD26-0811	CAPL-SD27-0711	CAPL-SD28-0711	CAPL-SD28P-0711	CAPL-SD29-0711	CAPL-SD30-0711	CAPL-SD31-0711	CAPL-SD32-0711	CAPL-SD33-0711	CAPL-SD33P-0711
			7/28/2011	8/2/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011
Volatile Organic Compounds (UG/KG)													
2-Butanone	988	591	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NSV	2,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	3.11	25.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	1,464	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	1,354	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5,856	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)													
2-Methylnaphthalene	70.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	290	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	160	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	57.2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	108	18.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	240	30.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	170	25.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	240	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	750	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	140	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	166	21.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	33.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	5,100	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	110	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	423	24.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	77.4	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	200	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	176	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW) - Detects	2,900	381	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW) - Detects	786	1,670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (total) - Detects	3,553	2,110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW)	2,900	381	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW)	786	1,670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (total)	3,553	2,110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	204	33.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	195	35.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)													
4,4'-DDD	4.88	10.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD25	CAPL-SWSD26	CAPL-SWSD27	CAPL-SWSD28		CAPL-SWSD29	CAPL-SWSD30	CAPL-SWSD31	CAPL-SWSD32	CAPL-SWSD33	
			CAPL-SD25-0711	CAPL-SD26-0811	CAPL-SD27-0711	CAPL-SD28-0711	CAPL-SD28P-0711	CAPL-SD29-0711	CAPL-SD30-0711	CAPL-SD31-0711	CAPL-SD32-0711	CAPL-SD33-0711	CAPL-SD33P-0711
			7/28/2011	8/2/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011
4,4'-DDE	3.16	44.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	4.16	1.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	2.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	6.00	0.813	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	3.24	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	5.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	3.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	1.90	0.948	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	10.6	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	51.2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	19.8	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	2.22	8.64	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	2.37	2.92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	3.24	1.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	249	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	2.47	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	69.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)													
Aroclor-1260	59.8	--	18 U	35	150	590	410	950	1,100	180	210	580	1,000
Explosives (UG/KG)													
1,3-Dinitrobenzene	24.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	337	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	7,035	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	84.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	14,867	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	17.3	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)													
Aluminum	25,500	23,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.00	1.70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	9.79	108	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	20.0	75.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NSV	1.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	0.99	0.571	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	43.4	52.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	50.0	9.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	31.6	25.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	20,000	45,600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	35.8	41.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-76
Exceedances - Penniman Lake Surface Sediment
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Chemical	Sediment ESV	Background UTL	CAPL-SWSD25	CAPL-SWSD26	CAPL-SWSD27	CAPL-SWSD28		CAPL-SWSD29	CAPL-SWSD30	CAPL-SWSD31	CAPL-SWSD32	CAPL-SWSD33	
			CAPL-SD25-0711	CAPL-SD26-0811	CAPL-SD27-0711	CAPL-SD28-0711	CAPL-SD28P-0711	CAPL-SD29-0711	CAPL-SD30-0711	CAPL-SD31-0711	CAPL-SD32-0711	CAPL-SD33-0711	CAPL-SD33P-0711
			7/28/2011	8/2/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011	7/28/2011
Manganese	460	368	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.18	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	22.7	17.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	2.00	2.69	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	57.0	62.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	121	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters													
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	12,000	15,000	98,000	87,000	NA	78,000	75,000	68,000	110,000	80,000	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD34 CAPL-SD34-0711 7/27/2011	CAPL-SWSD35 CAPL-SD35-0711 7/28/2011	CAPL-SWSD36 CAPL-SD36-0711 7/28/2011	CAPL-SWSD37 CAPL-SD37-0711 7/27/2011	CAPL-SWSD38 CAPL-SD38-0711 7/27/2011	CAPL-SWSD38 CAPL-SD38P-0711 7/27/2011	CAPL-SWSD39 CAPL-SD39-0711 7/27/2011	CAPL-SWSD40 CAPL-SD40-0711 7/27/2011	CAPL-SWSD41 CAPL-SD41-0711 7/28/2011	CAPL-SWSD42 CAPL-SD42-0711 7/27/2011	CAPL-SWSD43 CAPL-SD43-0711 7/28/2011
Volatile Organic Compounds (UG/KG)													
2-Butanone	988	591	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NSV	2,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	3.11	25.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	1,464	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	1,354	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5,856	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)													
2-Methylnaphthalene	70.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	290	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	160	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	57.2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	108	18.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	240	30.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	170	25.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	240	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	750	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	140	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	166	21.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	33.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	5,100	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	110	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	423	24.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	77.4	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	200	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	176	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW) - Detects	2,900	381	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW) - Detects	786	1,670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (total) - Detects	3,553	2,110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW)	2,900	381	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW)	786	1,670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (total)	3,553	2,110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	204	33.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	195	35.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)													
4,4'-DDD	4.88	10.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Chemical	Sediment ESV	Background UTL	CAPL-SWSD34 CAPL-SD34-0711 7/27/2011	CAPL-SWSD35 CAPL-SD35-0711 7/28/2011	CAPL-SWSD36 CAPL-SD36-0711 7/28/2011	CAPL-SWSD37 CAPL-SD37-0711 7/27/2011	CAPL-SWSD38 CAPL-SD38-0711 7/27/2011	CAPL-SWSD38 CAPL-SD38P-0711 7/27/2011	CAPL-SWSD39 CAPL-SD39-0711 7/27/2011	CAPL-SWSD40 CAPL-SD40-0711 7/27/2011	CAPL-SWSD41 CAPL-SD41-0711 7/28/2011	CAPL-SWSD42 CAPL-SD42-0711 7/27/2011	CAPL-SWSD43 CAPL-SD43-0711 7/28/2011
4,4'-DDE	3.16	44.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	4.16	1.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	2.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	6.00	0.813	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	3.24	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	5.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	3.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	1.90	0.948	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	10.6	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	51.2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	19.8	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	2.22	8.64	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	2.37	2.92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	3.24	1.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	249	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	2.47	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	69.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)													
Aroclor-1260	59.8	--	760	390	110	380	41 J	91 J	220	95	430	230	110
Explosives (UG/KG)													
1,3-Dinitrobenzene	24.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	337	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	7,035	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	84.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	14,867	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	17.3	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)													
Aluminum	25,500	23,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.00	1.70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	9.79	108	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	20.0	75.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NSV	1.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	0.99	0.571	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	43.4	52.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	50.0	9.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	31.6	25.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	20,000	45,600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	35.8	41.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Chemical	Sediment ESV	Background UTL	CAPL-SWSD34 CAPL-SD34-0711 7/27/2011	CAPL-SWSD35 CAPL-SD35-0711 7/28/2011	CAPL-SWSD36 CAPL-SD36-0711 7/28/2011	CAPL-SWSD37 CAPL-SD37-0711 7/27/2011	CAPL-SWSD38 CAPL-SD38-0711 7/27/2011	CAPL-SWSD38 CAPL-SD38P-0711 7/27/2011	CAPL-SWSD39 CAPL-SD39-0711 7/27/2011	CAPL-SWSD40 CAPL-SD40-0711 7/27/2011	CAPL-SWSD41 CAPL-SD41-0711 7/28/2011	CAPL-SWSD42 CAPL-SD42-0711 7/27/2011	CAPL-SWSD43 CAPL-SD43-0711 7/28/2011
Manganese	460	368	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.18	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	22.7	17.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	2.00	2.69	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	57.0	62.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	121	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters													
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	78,000	110,000	64,000	72,000	85,000	NA	68,000	47,000	81,000	80,000	150,000

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

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Exceedances - Penniman Lake Surface Sediment
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Chemical	Sediment ESV	Background UTL	CAPL-SWSD44 CAPL-SD44-0711 7/28/2011	CAPL-SWSD45 CAPL-SD45-0711 7/28/2011	CAPL-SWSD46 CAPL-SD46-0711 7/27/2011	CAPL-SWSD47 CAPL-SD47-0711 7/27/2011	CAPL-SWSD48 CAPL-SD48-0711 7/29/2011	CAPL-SWSD49 CAPL-SD49-0711 7/29/2011	CAPL-SWSD50 CAPL-SD50-0711 7/29/2011	CAPL-SWSD50 CAPL-SD50P-0711 7/29/2011	CAPL-SWSD51 CAPL-SD51-0711 7/29/2011	CAPL-SWSD52 CAPL-SD52-0711 7/29/2011	CAPL-SWSD53 CAPL-SD53-0711 7/29/2011
Volatile Organic Compounds (UG/KG)													
2-Butanone	988	591	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NSV	2,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	3.11	25.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	1,464	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	1,354	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5,856	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)													
2-Methylnaphthalene	70.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	290	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	160	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	57.2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	108	18.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	240	30.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	170	25.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	240	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	750	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	140	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	166	21.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	33.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	5,100	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	110	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	423	24.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	77.4	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	200	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	176	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW) - Detects	2,900	381	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW) - Detects	786	1,670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (total) - Detects	3,553	2,110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (HMW)	2,900	381	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (LMW)	786	1,670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAH (total)	3,553	2,110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	204	33.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	195	35.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)													
4,4'-DDD	4.88	10.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Chemical	Sediment ESV	Background UTL	CAPL-SWSD44 CAPL-SD44-0711 7/28/2011	CAPL-SWSD45 CAPL-SD45-0711 7/28/2011	CAPL-SWSD46 CAPL-SD46-0711 7/27/2011	CAPL-SWSD47 CAPL-SD47-0711 7/27/2011	CAPL-SWSD48 CAPL-SD48-0711 7/29/2011	CAPL-SWSD49 CAPL-SD49-0711 7/29/2011	CAPL-SWSD50 CAPL-SD50-0711 7/29/2011	 CAPL-SD50P-0711 7/29/2011	CAPL-SWSD51 CAPL-SD51-0711 7/29/2011	CAPL-SWSD52 CAPL-SD52-0711 7/29/2011	CAPL-SWSD53 CAPL-SD53-0711 7/29/2011
4,4'-DDE	3.16	44.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	4.16	1.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	2.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	6.00	0.813	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	3.24	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	5.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	3.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	1.90	0.948	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	10.6	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	51.2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	19.8	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	2.22	8.64	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	2.37	2.92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	3.24	1.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	249	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	2.47	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	69.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)													
Aroclor-1260	59.8	--	410	130	390	200	23 J	270	540	440	250	400	180
Explosives (UG/KG)													
1,3-Dinitrobenzene	24.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	337	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	7,035	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	84.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	14,867	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	17.3	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)													
Aluminum	25,500	23,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.00	1.70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	9.79	108	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	20.0	75.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NSV	1.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	0.99	0.571	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	43.4	52.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	50.0	9.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	31.6	25.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	20,000	45,600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	35.8	41.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Chemical	Sediment ESV	Background UTL	CAPL-SWSD44 CAPL-SD44-0711 7/28/2011	CAPL-SWSD45 CAPL-SD45-0711 7/28/2011	CAPL-SWSD46 CAPL-SD46-0711 7/27/2011	CAPL-SWSD47 CAPL-SD47-0711 7/27/2011	CAPL-SWSD48 CAPL-SD48-0711 7/29/2011	CAPL-SWSD49 CAPL-SD49-0711 7/29/2011	CAPL-SWSD50 CAPL-SD50-0711 7/29/2011	CAPL-SWSD50 CAPL-SD50P-0711 7/29/2011	CAPL-SWSD51 CAPL-SD51-0711 7/29/2011	CAPL-SWSD52 CAPL-SD52-0711 7/29/2011	CAPL-SWSD53 CAPL-SD53-0711 7/29/2011
Manganese	460	368	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.18	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	22.7	17.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	2.00	2.69	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	57.0	62.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	121	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters													
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	130,000	5,500	80,000	100,000	8,200	130,000	66,000	NA	70,000	58,000	63,000

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD54	CAPL-SWSD55	CAPL-SWSD56	CAPL-SWSD57	CAPL-SWSD58		CAPL-SWSD59	CAPL-SWSD60	CAPL-SWSD61	CAPL-SWSD62	
			CAPL-SD54-0711	CAPL-SD55-0711	CAPL-SD56-0711	CAPL-SD57-0711	CAPL-SD58-0711	CAPL-SD58P-0711	CAPL-SD59-0711	CAPL-SD60-0711	CAPL-SD61-0811	CAPL-SD62-1012	CAPL-SD62-1012-V
			7/27/2011	7/27/2011	7/27/2011	7/27/2011	7/29/2011	7/29/2011	7/27/2011	7/29/2011	8/2/2011	10/17/2012	10/25/2012
Volatile Organic Compounds (UG/KG)													
2-Butanone	988	591	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	101
Acetone	NSV	2,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	323 J
Carbon disulfide	3.11	25.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.93 J
Chloromethane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22.6 U
cis-1,2-Dichloroethene	1,464	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.3 U
Methyl acetate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22.6 U
Methylcyclohexane	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.3 U
Methylene chloride	1,354	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22.6 U
Trichloroethene	5,856	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.3 U
Semivolatile Organic Compounds (UG/KG)													
2-Methylnaphthalene	70.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Acenaphthene	290	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Acenaphthylene	160	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Acetophenone	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	888 U	NA
Anthracene	57.2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Benzaldehyde	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	888 U	NA
Benzo(a)anthracene	108	18.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Benzo(a)pyrene	150	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Benzo(b)fluoranthene	240	30.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Benzo(g,h,i)perylene	170	25.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Benzo(k)fluoranthene	240	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
bis(2-Ethylhexyl)phthalate	750	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	888 U	NA
Carbazole	140	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	888 U	NA
Chrysene	166	21.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Dibenz(a,h)anthracene	33.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Dibenzofuran	5,100	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	888 U	NA
Di-n-butylphthalate	110	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	888 U	NA
Di-n-octylphthalate	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	888 U	NA
Fluoranthene	423	24.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Fluorene	77.4	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Indeno(1,2,3-cd)pyrene	200	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Naphthalene	176	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
PAH (HMW) - Detects	2,900	381	NA	NA	NA	NA	NA	NA	NA	NA	NA	0 U	NA
PAH (LMW) - Detects	786	1,670	NA	NA	NA	NA	NA	NA	NA	NA	NA	0 U	NA
PAH (total) - Detects	3,553	2,110	NA	NA	NA	NA	NA	NA	NA	NA	NA	0 U	NA
PAH (HMW)	2,900	381	NA	NA	NA	NA	NA	NA	NA	NA	NA	79.7 U	NA
PAH (LMW)	786	1,670	NA	NA	NA	NA	NA	NA	NA	NA	NA	515 U	NA
PAH (total)	3,553	2,110	NA	NA	NA	NA	NA	NA	NA	NA	NA	594 U	NA
Phenanthrene	204	33.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Pyrene	195	35.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7 U	NA
Pesticides (UG/KG)													
4,4'-DDD	4.88	10.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD54	CAPL-SWSD55	CAPL-SWSD56	CAPL-SWSD57	CAPL-SWSD58		CAPL-SWSD59	CAPL-SWSD60	CAPL-SWSD61	CAPL-SWSD62	
			CAPL-SD54-0711	CAPL-SD55-0711	CAPL-SD56-0711	CAPL-SD57-0711	CAPL-SD58-0711	CAPL-SD58P-0711	CAPL-SD59-0711	CAPL-SD60-0711	CAPL-SD61-0811	CAPL-SD62-1012	CAPL-SD62-1012-V
			7/27/2011	7/27/2011	7/27/2011	7/27/2011	7/29/2011	7/29/2011	7/27/2011	7/29/2011	8/2/2011	10/17/2012	10/25/2012
4,4'-DDE	3.16	44.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.69 J	NA
4,4'-DDT	4.16	1.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
Aldrin	2.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
alpha-BHC	6.00	0.813	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.777 J	NA
alpha-Chlordane	3.24	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.5 J	NA
beta-BHC	5.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
delta-BHC	3.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
Dieldrin	1.90	0.948	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.58 J	NA
Endosulfan I	10.6	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
Endosulfan II	51.2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.32 J	NA
Endosulfan sulfate	19.8	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
Endrin	2.22	8.64	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
Endrin aldehyde	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.54 J	NA
Endrin ketone	2.22	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	14.7 J	NA
gamma-BHC (Lindane)	2.37	2.92	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
gamma-Chlordane	3.24	1.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.963 J	NA
Heptachlor	249	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.63 J	NA
Heptachlor epoxide	2.47	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
Methoxychlor	69.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.81 UL	NA
Polychlorinated Biphenyls (UG/KG)													
Aroclor-1260	59.8	--	230	39	280	48 J	170	240	410	810	40	140 J	NA
Explosives (UG/KG)													
1,3-Dinitrobenzene	24.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	194 U	NA
2,4,6-Trinitrotoluene	337	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	194 U	NA
3-Nitrotoluene	7,035	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	194 U	NA
4-Amino-2,6-dinitrotoluene	84.9	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	194 U	NA
4-Nitrotoluene	14,867	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	194 U	NA
HMX	17.3	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	194 U	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	328 J	NA
Tetryl	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	194 U	NA
Inorganics (MG/KG)													
Aluminum	25,500	23,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	21,600	NA
Antimony	3.00	1.70	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.9 U	NA
Arsenic	9.79	108	NA	NA	NA	NA	NA	NA	NA	NA	NA	38.1	NA
Barium	20.0	75.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	77.3	NA
Beryllium	NSV	1.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.73 U	NA
Cadmium	0.99	0.571	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.73 U	NA
Chromium	43.4	52.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	49.4	NA
Cobalt	50.0	9.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.6 U	NA
Copper	31.6	25.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	43.9	NA
Cyanide	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.29 U	NA
Iron	20,000	45,600	NA	NA	NA	NA	NA	NA	NA	NA	NA	39,600	NA
Lead	35.8	41.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	80.7	NA

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD54	CAPL-SWSD55	CAPL-SWSD56	CAPL-SWSD57	CAPL-SWSD58		CAPL-SWSD59	CAPL-SWSD60	CAPL-SWSD61	CAPL-SWSD62	
			CAPL-SD54-0711	CAPL-SD55-0711	CAPL-SD56-0711	CAPL-SD57-0711	CAPL-SD58-0711	CAPL-SD58P-0711	CAPL-SD59-0711	CAPL-SD60-0711	CAPL-SD61-0811	CAPL-SD62-1012	CAPL-SD62-1012-V
			7/27/2011	7/27/2011	7/27/2011	7/27/2011	7/29/2011	7/29/2011	7/27/2011	7/29/2011	8/2/2011	10/17/2012	10/25/2012
Manganese	460	368	NA	NA	NA	NA	NA	NA	NA	NA	NA	142	NA
Mercury	0.18	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.154 J	NA
Nickel	22.7	17.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.5 J	NA
Selenium	2.00	2.69	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.81 U	NA
Silver	1.00	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.73 U	NA
Vanadium	57.0	62.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	55	NA
Zinc	121	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	253	NA
Other Parameters													
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.81 H3	NA
Total organic carbon (MG/KG)	--	--	83,000	19,000	84,000	35,000	74,000	NA	98,000	78,000	15,000	74,400	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD63		CAPL-SWSD64				CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
			CAPL-SD63-1012	CAPL-SD63-1012-V	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V	CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
			10/17/2012	10/25/2012	10/17/2012	10/17/2012	10/25/2012	10/25/2012	10/18/2012	10/18/2012	10/16/2012	10/18/2012	10/17/2012
Volatile Organic Compounds (UG/KG)													
2-Butanone	988	591	NA	146	NA	NA	156	135	17.6 J	25.1	15.9 J	50.3 J	43.7
Acetone	NSV	2,500	NA	472 J	NA	NA	543 J	460 J	70.1 J	87 J	47.2	204 J	140 J
Carbon disulfide	3.11	25.8	NA	13.3 J	NA	NA	17.5 J	13.2 J	4.87 U	4.66 U	4.35 UJ	13.9 L	7.4 U
Chloromethane	NSV	--	NA	28.8 U	NA	NA	25.1 U	22.5 U	9.74 UJ	9.33 UJ	8.71 UJ	30.2 UL	14.8 UJ
cis-1,2-Dichloroethene	1,464	--	NA	14.4 U	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 U	7.4 U
Methyl acetate	NSV	--	NA	28.8 U	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 U	30.2 U	14.8 U
Methylcyclohexane	NSV	--	NA	14.4 U	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Methylene chloride	1,354	--	NA	28.8 U	NA	NA	25.1 U	22.5 U	9.74 U	9.33 U	8.71 UJ	30.2 U	14.8 UJ
Trichloroethene	5,856	--	NA	14.4 U	NA	NA	12.6 U	11.3 U	4.87 U	4.66 U	4.35 U	15.1 UL	7.4 U
Semivolatile Organic Compounds (UG/KG)													
2-Methylnaphthalene	70.0	--	65 U	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	25.6 J	85.8 U	8.37 U
Acenaphthene	290	--	65 U	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	31.5 U	85.8 U	8.37 U
Acenaphthylene	160	--	65 U	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	22.2 J	85.8 U	8.37 U
Acetophenone	NSV	--	652 U	NA	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Anthracene	57.2	--	65 U	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	41.3 J	85.8 U	8.37 U
Benzaldehyde	NSV	--	384 J	NA	718 U	744 U	NA	NA	377 U	170 J	316 U	861 U	420 U
Benzo(a)anthracene	108	18.2	78.2 J	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	223	85.8 U	8.37 U
Benzo(a)pyrene	150	--	93.3 J	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	303	85.8 U	8.37 U
Benzo(b)fluoranthene	240	30.3	96.3 J	NA	14.3 U	14.8 U	NA	NA	13.2 J	6.29 U	400	85.8 U	8.37 U
Benzo(g,h,i)perylene	170	25.0	94.2 J	NA	14.3 U	14.8 U	NA	NA	7.52 U	7.31 J	208	85.8 U	8.37 U
Benzo(k)fluoranthene	240	--	102 J	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	335	85.8 U	8.37 U
bis(2-Ethylhexyl)phthalate	750	--	652 U	NA	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Carbazole	140	--	652 U	NA	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Chrysene	166	21.7	185	NA	14.3 U	14.8 U	NA	NA	10.3 J	9.23 J	285	85.8 U	8.37 U
Dibenz(a,h)anthracene	33.0	--	65 U	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	74.1	85.8 U	8.37 U
Dibenzofuran	5,100	--	652 U	NA	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Di-n-butylphthalate	110	--	652 U	NA	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Di-n-octylphthalate	NSV	--	652 U	NA	718 U	744 U	NA	NA	377 U	315 U	316 U	861 U	420 U
Fluoranthene	423	24.3	174	NA	16.5 J	20.8 J	NA	NA	16	12.2 J	123	85.8 U	8.37 U
Fluorene	77.4	--	99.7 J	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	31.5 U	85.8 U	8.37 U
Indeno(1,2,3-cd)pyrene	200	--	90.1 J	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	238	85.8 U	8.37 U
Naphthalene	176	--	65 U	NA	14.3 U	14.8 U	NA	NA	7.52 U	6.29 U	31.5 U	85.8 U	8.37 U
PAH (HMW) - Detects	2,900	381	933 J	NA	18.5 J	16.8 J	NA	NA	37.1 J	29.8 J	2,174 J	0 U	0 U
PAH (LMW) - Detects	786	1,670	455 J	NA	16.5 J	20.8 J	NA	NA	28.9 J	22.7 J	282 J	0 U	0 U
PAH (total) - Detects	3,553	2,110	1,388 J	NA	35.0 J	37.6 J	NA	NA	66.0 J	52.5 J	2,456 J	0 U	0 U
PAH (HMW)	2,900	381	966 J	NA	75.7 J	76.0 J	NA	NA	59.7 J	48.7 J	2,174 J	386 U	37.7 U
PAH (LMW)	786	1,670	943 J	NA	426 J	445 J	NA	NA	240 J	199 J	487 J	774 U	243 U
PAH (total)	3,553	2,110	1,909 J	NA	501 J	521 J	NA	NA	300 J	248 J	2,661 J	1,160 U	281 U
Phenanthrene	204	33.0	181	NA	14.3 U	14.8 U	NA	NA	12.9 J	10.5 J	69.7	85.8 U	8.37 U
Pyrene	195	35.3	194	NA	18.5 J	16.8 J	NA	NA	13.6 J	13.3	108	85.8 U	8.37 U
Pesticides (UG/KG)													
4,4'-DDD	4.88	10.1	7.08 J	NA	10.6 J	4.44 J	NA	NA	0.778 U	0.63 U	4.7 L	1.7 U	0.844 UL

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Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD63		CAPL-SWSD64				CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
			CAPL-SD63-1012	CAPL-SD63-1012-V	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V	CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
			10/17/2012	10/25/2012	10/17/2012	10/17/2012	10/25/2012	10/25/2012	10/18/2012	10/18/2012	10/16/2012	10/18/2012	10/17/2012
4,4'-DDE	3.16	44.1	39.2 J	NA	16.5 J	8.72 J	NA	NA	6.29 J	4.74	23.7 L	1.7 U	0.844 UL
4,4'-DDT	4.16	1.45	4.18 J	NA	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	7.55 J	1.7 U	0.844 UL
Aldrin	2.00	--	1.81 J	NA	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.95 L	1.7 U	0.844 UL
alpha-BHC	6.00	0.813	1.32 U	NA	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.427 L	1.7 U	0.844 UL
alpha-Chlordane	3.24	--	3.63 J	NA	2.22 J	1.48 U	NA	NA	1.02 J	0.63 U	4.25 L	1.7 U	0.844 UL
beta-BHC	5.00	--	1.32 U	NA	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
delta-BHC	3.00	--	2.71 J	NA	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
Dieldrin	1.90	0.948	20.7 J	NA	2.41 J	1.34 J	NA	NA	1.5 J	0.63 U	4.55 L	1.7 U	0.844 UL
Endosulfan I	10.6	--	0.68 J	NA	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.523 L	1.7 U	0.844 UL
Endosulfan II	51.2	--	13.2 J	NA	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	11.3 L	1.7 U	0.844 UL
Endosulfan sulfate	19.8	--	41.1 J	NA	2.13 J	1.42 J	NA	NA	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
Endrin	2.22	8.64	15.6 J	NA	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.619 UL	1.7 U	0.844 UL
Endrin aldehyde	2.22	--	4.96 J	NA	1.5 UL	2.02 J	NA	NA	2.75	1.99	3.11 L	1.7 U	0.844 UL
Endrin ketone	2.22	--	1.66 J	NA	6.86 J	3.13 J	NA	NA	0.778 U	0.63 U	2.03 L	1.7 U	0.844 UL
gamma-BHC (Lindane)	2.37	2.92	0.692 J	NA	1.5 UL	1.48 U	NA	NA	0.778 U	0.63 U	0.245 L	1.7 U	0.844 UL
gamma-Chlordane	3.24	1.10	41 J	NA	1.52 J	1 J	NA	NA	15.1 B	1.37	8.24 L	1.84 J	5.31 J
Heptachlor	249	--	1.32 UL	NA	1.5 UL	1.48 U	NA	NA	0.958 J	0.63 U	0.619 UL	1.7 U	0.844 UL
Heptachlor epoxide	2.47	--	1.32 UL	NA	1.5 UL	1.48 U	NA	NA	0.929 J	0.63 U	1.24 L	1.7 U	0.844 UL
Methoxychlor	69.5	--	10.7 J	NA	5.43 J	1.48 U	NA	NA	0.584 J	0.63 U	10.1 J	1.7 U	0.844 UL
Polychlorinated Biphenyls (UG/KG)													
Aroclor-1260	59.8	--	1,270 J	NA	84.7 J	34.5 J	NA	NA	63.6	35.9	914 L	41.6 U	20.7 UL
Explosives (UG/KG)													
1,3-Dinitrobenzene	24.5	--	196 U	NA	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
2,4,6-Trinitrotoluene	337	--	196 U	NA	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	125 J
3-Nitrotoluene	7,035	--	196 U	NA	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
4-Amino-2,6-dinitrotoluene	84.9	--	196 U	NA	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
4-Nitrotoluene	14,867	--	196 U	NA	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
HMX	17.3	--	196 U	NA	193 U	185 U	NA	NA	196 U	191 U	191 U	200 U	188 U
Nitroglycerin	NSV	--	969 J	NA	1,410 J	311 J	NA	NA	490 U	478 U	478 U	500 U	469 U
Tetryl	NSV	--	211 J	NA	193 U	185 U	NA	NA	196 U	191 U	191 U	200 R	188 U
Inorganics (MG/KG)													
Aluminum	25,500	23,200	19,800	NA	20,900	17,400	NA	NA	6,830	4,010	3,550	26,700	6,560
Antimony	3.00	1.70	7.82 U	NA	8.58 U	9.07 U	NA	NA	0.946 U	0.762 U	1.6 U	2.11 UL	5.25 U
Arsenic	9.79	108	36.5	NA	47.5	39.1	NA	NA	9.58	8.68	6.18	56.7	6.48 J
Barium	20.0	75.0	89	NA	80.5	66.3	NA	NA	26.7	19.7	30.2	80.2	21.2 J
Beryllium	NSV	1.39	1.14 J	NA	1.15 J	2.27 U	NA	NA	0.253 J	0.222 J	0.242 J	1.02 J	1.31 U
Cadmium	0.99	0.571	1.95 U	NA	2.14 U	2.27 U	NA	NA	0.237 U	0.204 J	0.239 J	0.528 U	1.31 U
Chromium	43.4	52.0	38.5	NA	44.9	36.9	NA	NA	11.8	7.22	6.45	45.6 K	16.1
Cobalt	50.0	9.45	5.25 J	NA	5.97 J	11.3 U	NA	NA	1.67	1.14 J	2.08 J	6.91	6.56 U
Copper	31.6	25.6	40.7	NA	51.4	44.5	NA	NA	10.1	8.22	4.58	26.3	4.31 J
Cyanide	NSV	--	0.937 U	NA	1.02 U	1.08 U	NA	NA	2.95	0.439 U	0.438 U	1.3 UL	0.649 U
Iron	20,000	45,600	34,000	NA	35,200	28,400	NA	NA	8,450	5,340	8,770	30,900	14,600
Lead	35.8	41.6	85.8	NA	78.2	63.8	NA	NA	14.8	11.7	12.4	33.3	6.8

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD63		CAPL-SWSD64				CAPL-SWSD65	CAPL-SWSD66	CAPL-SWSD67	CAPL-SWSD68	CAPL-SWSD69
			CAPL-SD63-1012	CAPL-SD63-1012-V	CAPL-SD64-1012	CAPL-SD64P-1012	CAPL-SD64-1012-V	CAPL-SD64P-1012-V	CAPL-SD65-1012	CAPL-SD66-1012	CAPL-SD67-1012	CAPL-SD68-1012	CAPL-SD69-1012
			10/17/2012	10/25/2012	10/17/2012	10/17/2012	10/25/2012	10/25/2012	10/18/2012	10/18/2012	10/16/2012	10/18/2012	10/17/2012
Manganese	460	368	143	NA	124	102	NA	NA	47.6	33.4	165	161	57.5
Mercury	0.18	0.255	0.197	NA	1.48	1.23	NA	NA	0.0444 J	0.0325 J	0.0664 J	0.0995 J	0.0391 J
Nickel	22.7	17.1	12.2	NA	13.9	11.8	NA	NA	4.18	2.61	3.62	18.2	3.4 J
Selenium	2.00	2.69	4.89 U	NA	5.36 U	5.67 U	NA	NA	0.591 U	0.476 U	1 U	1.32 U	3.28 U
Silver	1.00	--	1.95 U	NA	2.14 U	2.27 U	NA	NA	0.237 U	0.191 U	0.4 U	0.528 U	1.31 U
Vanadium	57.0	62.5	45.9	NA	54.6	43.6	NA	NA	17.2	9.92	10.9	67.8	19.3
Zinc	121	110	201	NA	187	151	NA	NA	41.9	29.9	41.9	90.4	24.2
Other Parameters													
pH	--	--	6.81 H3	NA	6.83 H3	NA	NA	NA	7.24 H3	7.10 H3	7.10 H3	7.10 H3	6.83 H3
Total organic carbon (MG/KG)	--	--	71,400	NA	75,900	NA	NA	NA	37,900 *	35,000 *	106,000	116,000	72,200 *

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD70		CAPL-SD71		CAPL-SD72		CAPL-SD73				CAPL-SD74
			CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V	CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012
			10/17/2012	10/25/2012	10/17/2012	10/25/2012	10/17/2012	10/25/2012	10/17/2012	10/17/2012	10/25/2012	10/25/2012	10/18/2012
Volatile Organic Compounds (UG/KG)													
2-Butanone	988	591	NA	125	NA	131	NA	50.6 J	NA	NA	59.5 J	79.9	108
Acetone	NSV	2,500	NA	330 J	NA	477 J	NA	181 J	NA	NA	215 J	309 J	418 J
Carbon disulfide	3.11	25.8	NA	4.41 J	NA	13.6 J	NA	26.7 J	NA	NA	29.9 J	19.0 J	19.2 U
Chloromethane	NSV	--	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 UJ
cis-1,2-Dichloroethene	1,464	--	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U
Methyl acetate	NSV	--	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U
Methylcyclohexane	NSV	--	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U
Methylene chloride	1,354	--	NA	13.3 U	NA	30 U	NA	32.3 U	NA	NA	31.1 U	39.8 U	38.4 U
Trichloroethene	5,856	--	NA	6.64 U	NA	15 U	NA	16.2 U	NA	NA	15.5 U	19.9 U	19.2 U
Semivolatile Organic Compounds (UG/KG)													
2-Methylnaphthalene	70.0	--	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Acenaphthene	290	--	140	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Acenaphthylene	160	--	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Acetophenone	NSV	--	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U
Anthracene	57.2	--	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Benzaldehyde	NSV	--	323 J	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U
Benzo(a)anthracene	108	18.2	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Benzo(a)pyrene	150	--	79.3 J	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Benzo(b)fluoranthene	240	30.3	143	NA	20.5 J	NA	27.2 U	NA	19.1 J	17 U	NA	NA	23.3 J
Benzo(g,h,i)perylene	170	25.0	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Benzo(k)fluoranthene	240	--	94.6 J	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
bis(2-Ethylhexyl)phthalate	750	--	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U
Carbazole	140	--	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U
Chrysene	166	21.7	173	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Dibenz(a,h)anthracene	33.0	--	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Dibenzofuran	5,100	--	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U
Di-n-butylphthalate	110	--	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U
Di-n-octylphthalate	NSV	--	474 U	NA	771 U	NA	1,370 U	NA	811 U	852 U	NA	NA	1,070 U
Fluoranthene	423	24.3	227	NA	32.5	NA	27.2 U	NA	22.4 J	17 U	NA	NA	34.9 J
Fluorene	77.4	--	70.7 J	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Indeno(1,2,3-cd)pyrene	200	--	66 J	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
Naphthalene	176	--	47.3 U	NA	15.4 U	NA	27.2 U	NA	16.2 U	17 U	NA	NA	21.2 U
PAH (HMW) - Detects	2,900	381	772 J	NA	50.1 J	NA	0 U	NA	42.8 J	0 U	NA	NA	55.7 J
PAH (LMW) - Detects	786	1,670	576 J	NA	48.8 J	NA	0 U	NA	22.4 J	0 U	NA	NA	57.4 J
PAH (total) - Detects	3,553	2,110	1,348 J	NA	98.9 J	NA	0 U	NA	65.2 J	0 U	NA	NA	113 J
PAH (HMW)	2,900	381	843 J	NA	104 J	NA	122 U	NA	99.5 J	76.5 U	NA	NA	130 J
PAH (LMW)	786	1,670	907 J	NA	481 J	NA	794 U	NA	485 J	494 U	NA	NA	656 J
PAH (total)	3,553	2,110	1,750 J	NA	585 J	NA	916 U	NA	584 J	571 U	NA	NA	786 J
Phenanthrene	204	33.0	138	NA	16.3 J	NA	27.2 U	NA	16.2 U	17 U	NA	NA	22.5 J
Pyrene	195	35.3	216	NA	29.6 J	NA	27.2 U	NA	23.7 J	17 U	NA	NA	32.4 J
Pesticides (UG/KG)													
4,4'-DDD	4.88	10.1	43.9 J	NA	1.52 J	NA	2.79 U	NA	1.66 J	1.23 J	NA	NA	2.13 U

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Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD70		CAPL-SD71		CAPL-SD72		CAPL-SD73				CAPL-SD74
			CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V	CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012
			10/17/2012	10/25/2012	10/17/2012	10/25/2012	10/17/2012	10/25/2012	10/17/2012	10/17/2012	10/25/2012	10/25/2012	10/18/2012
4,4'-DDE	3.16	44.1	121 J	NA	7.95 J	NA	6.03 J	NA	14 J	10.1 J	NA	NA	5.19 J
4,4'-DDT	4.16	1.45	21 J	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
Aldrin	2.00	--	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
alpha-BHC	6.00	0.813	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
alpha-Chlordane	3.24	--	29.6 L	NA	1.51 UL	NA	2.79 U	NA	1.97 J	1.73 U	NA	NA	2.13 U
beta-BHC	5.00	--	0.98 J	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
delta-BHC	3.00	--	0.954 UL	NA	1.51 U	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
Dieldrin	1.90	0.948	106 J	NA	1.68 J	NA	2.86 J	NA	2.64 J	1.48 J	NA	NA	2.13 U
Endosulfan I	10.6	--	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
Endosulfan II	51.2	--	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
Endosulfan sulfate	19.8	--	0.954 UL	NA	2.36 J	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
Endrin	2.22	8.64	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
Endrin aldehyde	2.22	--	16.4 J	NA	2.38 J	NA	3.95 J	NA	3.53 J	2.58 J	NA	NA	2.14 J
Endrin ketone	2.22	--	34.7 J	NA	4.31 J	NA	4.6 J	NA	5.62 J	3.4 J	NA	NA	2.88 J
gamma-BHC (Lindane)	2.37	2.92	0.954 UL	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
gamma-Chlordane	3.24	1.10	94.2 J	NA	5.18 J	NA	17 J	NA	1.8 J	2.98 J	NA	NA	12.7 J
Heptachlor	249	--	0.954 UL	NA	1.51 U	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
Heptachlor epoxide	2.47	--	2.42 J	NA	1.51 U	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
Methoxychlor	69.5	--	82.2 J	NA	1.51 UL	NA	2.79 U	NA	1.64 U	1.73 U	NA	NA	2.13 U
Polychlorinated Biphenyls (UG/KG)													
Aroclor-1260	59.8	--	8,240	NA	57.4 J	NA	68.2 U	NA	78.5 J	48.4 J	NA	NA	52.3 U
Explosives (UG/KG)													
1,3-Dinitrobenzene	24.5	--	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U
2,4,6-Trinitrotoluene	337	--	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U
3-Nitrotoluene	7,035	--	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U
4-Amino-2,6-dinitrotoluene	84.9	--	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U
4-Nitrotoluene	14,867	--	189 U	NA	195 U	NA	196 U	NA	198 U	104 J	NA	NA	192 U
HMX	17.3	--	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U
Nitroglycerin	NSV	--	472 U	NA	1,210 J	NA	490 U	NA	1,250 J	1,250	NA	NA	486 J
Tetryl	NSV	--	189 U	NA	195 U	NA	196 U	NA	198 U	195 U	NA	NA	192 U
Inorganics (MG/KG)													
Aluminum	25,500	23,200	8,670	NA	18,300	NA	28,200	NA	25,200	22,700	NA	NA	17,200
Antimony	3.00	1.70	6.01 U	NA	9.2 U	NA	17.2 U	NA	9.92 U	10.3 U	NA	NA	5.35 U
Arsenic	9.79	108	12.7	NA	33.9	NA	51.5	NA	51.7	50.9	NA	NA	42.4
Barium	20.0	75.0	43	NA	72.6	NA	107	NA	93.9	85.5	NA	NA	75.4
Beryllium	NSV	1.39	1.5 U	NA	2.3 U	NA	4.3 U	NA	2.48 U	2.57 U	NA	NA	0.949 J
Cadmium	0.99	0.571	1.5 U	NA	2.3 U	NA	4.3 U	NA	2.48 U	2.57 U	NA	NA	1.34 U
Chromium	43.4	52.0	19.4	NA	36.6	NA	50.4	NA	46.3	43.1	NA	NA	36.1
Cobalt	50.0	9.45	7.51 U	NA	11.5 U	NA	21.5 U	NA	12.4 U	12.8 U	NA	NA	4.99 J
Copper	31.6	25.6	33	NA	43.1	NA	40.2	NA	50.1	43.7	NA	NA	46
Cyanide	NSV	--	0.682 U	NA	1.05 U	NA	2.26 U	NA	1.27 U	1.24 U	NA	NA	1.66 U
Iron	20,000	45,600	21,900	NA	30,100	NA	41,300	NA	39,300	36,000	NA	NA	34,900
Lead	35.8	41.6	66.8	NA	72.8	NA	69.2	NA	81.6	74.7	NA	NA	56.2

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD70		CAPL-SD71		CAPL-SD72		CAPL-SD73				CAPL-SD74
			CAPL-SD70-1012	CAPL-SD70-1012-V	CAPL-SD71-1012	CAPL-SD71-1012-V	CAPL-SD72-1012	CAPL-SD72-1012-V	CAPL-SD73-1012	CAPL-SD73P-1012	CAPL-SD73-1012-V	CAPL-SD73P-1012-V	CAPL-SD74-1012
			10/17/2012	10/25/2012	10/17/2012	10/25/2012	10/17/2012	10/25/2012	10/17/2012	10/17/2012	10/25/2012	10/25/2012	10/18/2012
Manganese	460	368	102	NA	119	NA	206	NA	163	147	NA	NA	163
Mercury	0.18	0.255	0.11	NA	0.134 J	NA	0.198 J	NA	0.147 J	0.164 J	NA	NA	0.126 J
Nickel	22.7	17.1	11.7	NA	11.9	NA	18.1 J	NA	15.4	14.4	NA	NA	13
Selenium	2.00	2.69	3.75 U	NA	5.75 U	NA	10.7 U	NA	6.2 U	6.42 U	NA	NA	3.34 U
Silver	1.00	--	1.5 U	NA	2.3 U	NA	4.3 U	NA	2.48 U	2.57 U	NA	NA	1.34 U
Vanadium	57.0	62.5	25.4	NA	46.3	NA	69.9	NA	58.3	57.1	NA	NA	52.1
Zinc	121	110	190	NA	173	NA	186	NA	173	160	NA	NA	133
Other Parameters													
pH	--	--	7.47 H3	NA	6.85 H3	NA	6.93 H3	NA	7.01 H3	NA	NA	NA	7.30 H3
Total organic carbon (MG/KG)	--	--	98,300	NA	51,800	NA	107,000	NA	37,100	NA	NA	NA	79,300

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD75	CAPL-SD76	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81	CAPL-SD82
			CAPL-SD75-1012	CAPL-SD76-1012	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012	CAPL-SD82-1012
			10/18/2012	10/16/2012	10/16/2012	10/25/2012	10/16/2012	10/16/2012	10/16/2012	10/16/2012	10/18/2012	10/18/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	988	591	71.2	17.3 J	NA	42.7	23.1 J	23.8	39.7	42.7	42.2	90.7
Acetone	NSV	2,500	273 J	60.6	NA	137 J	77.5 J	85.3	121	150	229 J	399 J
Carbon disulfide	3.11	25.8	13.4 U	5.3 UJ	NA	6.19 U	5.21 UL	4.9 UJ	6.48 UJ	3.5 J	9.22 J	11.7 J
Chloromethane	NSV	--	26.8 UJ	10.6 UJ	NA	12.4 U	10.4 UJ	9.81 UJ	13 UJ	10.1 UJ	19.8 UJ	32.3 UJ
cis-1,2-Dichloroethene	1,464	--	13.4 U	5.3 U	NA	6.19 U	5.21 U	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U
Methyl acetate	NSV	--	26.8 U	10.6 U	NA	12.4 U	10.4 UJ	5.12 J	8.47 J	10.1 U	19.8 U	32.3 U
Methylcyclohexane	NSV	--	13.4 U	5.3 U	NA	26.4	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U
Methylene chloride	1,354	--	26.8 U	10.6 UJ	NA	12.4 U	10.4 UJ	9.81 UJ	13 UJ	10.1 UJ	19.8 U	32.3 U
Trichloroethene	5,856	--	13.4 U	5.3 U	NA	6.19 U	5.21 UL	4.9 U	6.48 U	5.03 U	9.9 U	16.1 U
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	70.0	--	16.6 U	6.71 U	34.2 J	NA	39.2 J	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Acenaphthene	290	--	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Acenaphthylene	160	--	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Acetophenone	NSV	--	833 U	337 U	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U
Anthracene	57.2	--	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Benzaldehyde	NSV	--	833 U	184 J	421 U	NA	398 U	326 U	459 U	212 J	640 U	4,860 U
Benzo(a)anthracene	108	18.2	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Benzo(a)pyrene	150	--	16.6 U	36.9	42 U	NA	39.7 U	9.18 J	45.8 U	36.4 U	12.8 U	96.9 U
Benzo(b)fluoranthene	240	30.3	16.6 U	34.9	42 U	NA	39.7 U	10.5 J	45.8 U	36.4 U	17.9 J	96.9 U
Benzo(g,h,i)perylene	170	25.0	16.6 U	29.9	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Benzo(k)fluoranthene	240	--	16.6 U	28.3	42 U	NA	39.7 U	8.89 J	45.8 U	36.4 U	12.8 U	96.9 U
bis(2-Ethylhexyl)phthalate	750	--	833 U	337 U	421 U	NA	398 U	326 U	508 B	365 U	640 U	4,860 U
Carbazole	140	--	833 U	337 U	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U
Chrysene	166	21.7	16.6 U	6.71 U	42 U	NA	57.2 J	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Dibenz(a,h)anthracene	33.0	--	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Dibenzofuran	5,100	--	833 U	337 U	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U
Di-n-butylphthalate	110	--	833 U	337 U	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U
Di-n-octylphthalate	NSV	--	833 U	337 U	421 U	NA	398 U	326 U	459 U	365 U	640 U	4,860 U
Fluoranthene	423	24.3	13.4 J	48.2	27 J	NA	36.8 J	22.4	36.4 J	33 J	18.5 J	63.6 J
Fluorene	77.4	--	16.6 U	6.71 U	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Indeno(1,2,3-cd)pyrene	200	--	16.6 U	23.2	42 U	NA	39.7 U	6.51 U	45.8 U	36.4 U	12.8 U	96.9 U
Naphthalene	176	--	16.6 U	6.71 U	42 U	NA	24.4 J	6.51 U	34.5 J	36.4 U	12.8 U	96.9 U
PAH (HMW) - Detects	2,900	381	12.2 J	207	23.2 J	NA	98.6 J	50.8 J	34.5 J	44.3 J	32.5 J	67.2 J
PAH (LMW) - Detects	786	1,670	13.4 J	78.7	114 J	NA	136 J	22.4 J	70.9 J	70.0 J	32.4 J	63.6 J
PAH (total) - Detects	3,553	2,110	25.6 J	285	138 J	NA	235 J	73.2 J	105 J	114 J	64.9 J	131 J
PAH (HMW)	2,900	381	78.6 J	217	191 J	NA	238 J	67.0 J	218 J	190 J	77.3 J	455 J
PAH (LMW)	786	1,670	488 J	267	430 J	NA	414 J	208 J	438 J	362 J	391 J	2,833 J
PAH (total)	3,553	2,110	567 J	484	621 J	NA	652 J	275 J	656 J	552 J	468 J	3,288 J
Phenanthrene	204	33.0	16.6 U	30.5	53.1 J	NA	35.5 J	6.51 U	45.8 U	37 J	13.9 J	96.9 U
Pyrene	195	35.3	12.2 J	53.3	23.2 J	NA	41.4 J	22.2	34.5 J	44.3 J	14.6 J	67.2 J
Pesticides (UG/KG)												
4,4'-DDD	4.88	10.1	1.67 U	23.3 J	2.64 L	NA	10.3 J	1.69 L	3.47 J	1.39 L	1.31 U	1.91 U

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD75	CAPL-SD76	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81	CAPL-SD82
			CAPL-SD75-1012	CAPL-SD76-1012	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012	CAPL-SD82-1012
			10/18/2012	10/16/2012	10/16/2012	10/25/2012	10/16/2012	10/16/2012	10/16/2012	10/16/2012	10/18/2012	10/18/2012
4,4'-DDE	3.16	44.1	4.58 J	45.9 J	46.5 J	NA	12.6	13.6 J	23.6 J	21.5	1.22 J	3.49 J
4,4'-DDT	4.16	1.45	1.67 U	0.966 J	3.61 J	NA	0.932 J	1.14 J	1.12 J	0.696 J	1.31 U	1.91 U
Aldrin	2.00	--	1.67 U	0.69 U	0.83 U	NA	0.8 UL	0.66 U	0.328 J	0.505 L	1.31 U	1.91 U
alpha-BHC	6.00	0.813	1.67 U	0.69 U	1.54 J	NA	0.536 J	0.66 U	0.912 U	0.585 L	1.31 U	1.91 U
alpha-Chlordane	3.24	--	1.67 U	0.69 UL	9.57 L	NA	0.8 UL	0.914 J	0.302 J	0.715 U	1.31 U	1.91 U
beta-BHC	5.00	--	1.67 U	0.69 U	0.287 L	NA	0.8 UL	0.66 U	0.912 U	0.744 L	1.31 U	1.91 U
delta-BHC	3.00	--	1.67 U	0.69 UL	1.14 J	NA	0.8 U	1.5 J	0.912 U	0.503 J	1.31 U	1.91 U
Dieldrin	1.90	0.948	1.67 U	0.377 L	15.1 J	NA	0.8 U	4.13 J	6.63 J	2.42 L	1.31 U	1.91 U
Endosulfan I	10.6	--	1.67 U	0.69 U	0.83 U	NA	0.8 U	0.66 U	0.912 U	0.715 UL	1.31 U	1.91 U
Endosulfan II	51.2	--	23.8 J	0.69 UL	1.41 L	NA	0.8 U	2.25 J	3.37 J	1.36 J	1.31 U	1.91 U
Endosulfan sulfate	19.8	--	1.67 U	0.69 U	12.8 J	NA	22.8 K	4.47 J	6.65 J	0.715 U	1.31 U	1.91 U
Endrin	2.22	8.64	1.67 U	0.576 L	13.7	NA	1.14 L	3.07 L	5.37 J	0.715 UL	1.31 U	1.91 U
Endrin aldehyde	2.22	--	2.49 J	0.368 L	0.637 J	NA	0.8 UL	0.79 J	0.683 J	3.05 L	1.31 U	1.91 U
Endrin ketone	2.22	--	1.67 U	0.69 U	0.83 UL	NA	0.8 U	0.66 U	0.912 U	0.715 U	1.31 U	1.91 U
gamma-BHC (Lindane)	2.37	2.92	1.67 U	0.485 J	0.364 J	NA	1 J	0.573 J	0.744 J	0.715 U	1.31 U	1.91 U
gamma-Chlordane	3.24	1.10	3.09 J	4.03 L	35.9 J	NA	2.58	3.78 J	6.3 J	2.71	0.735 J	2.58 J
Heptachlor	249	--	1.67 U	0.69 U	1.97 J	NA	0.9 L	0.66 U	0.744 J	0.715 UL	1.31 U	1.91 U
Heptachlor epoxide	2.47	--	1.67 U	0.69 UL	0.708 L	NA	0.8 UL	0.66 UL	0.912 U	0.715 UL	1.31 U	1.91 U
Methoxychlor	69.5	--	1.67 U	0.69 UL	0.83 UL	NA	4.11 J	0.66 UL	0.912 U	4.73 J	1.31 U	1.91 U
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	59.8	--	25.9 J	37.3 J	720 J	NA	66.1 L	212 J	354 J	156	32 U	46.9 U
Explosives (UG/KG)												
1,3-Dinitrobenzene	24.5	--	197 U	469 J	303 J	NA	151 J	179 U	384 J	200 U	190 U	195 U
2,4,6-Trinitrotoluene	337	--	197 U	194 U	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U
3-Nitrotoluene	7,035	--	197 U	882	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U
4-Amino-2,6-dinitrotoluene	84.9	--	197 U	194 U	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U
4-Nitrotoluene	14,867	--	330 J	194 U	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U
HMX	17.3	--	197 U	194 U	198 U	NA	195 U	179 U	464 J	200 U	190 U	195 U
Nitroglycerin	NSV	--	1,230 J	485 U	495 U	NA	488 U	448 U	493 U	500 U	476 U	641 J
Tetryl	NSV	--	197 U	245 J	198 U	NA	195 U	179 U	197 U	200 U	190 U	195 U
Inorganics (MG/KG)												
Aluminum	25,500	23,200	20,500	6,530	2,430	NA	4,040	2,630	3,200	5,770	26,000	17,400
Antimony	3.00	1.70	4.27 U	1.65 U	1.03 U	NA	0.952 UL	0.778 U	1.14 U	1.78 U	7.78 U	4.8 U
Arsenic	9.79	108	47.3	5.56	9.1	NA	5.53	7.87	7.53	16.8	27.9	46.3
Barium	20.0	75.0	88.3	28.1	12.9	NA	22.3	15.6	18.6	26.8	63.5	72.9
Beryllium	NSV	1.39	1 J	0.283 J	0.171 J	NA	0.253 J	0.181 J	0.214 J	0.306 J	1.15 J	0.803 J
Cadmium	0.99	0.571	1.07 U	0.414 U	0.144 J	NA	0.242 J	0.136 J	0.157 J	0.456 J	1.95 U	1.2 U
Chromium	43.4	52.0	38.7	9	5.73	NA	8.21	5.31	5.91	9.76	45.6 J	29.7
Cobalt	50.0	9.45	5.77 J	1.46 J	1.71	NA	1.83	1.15 J	1.43 J	1.6 J	8.67 J	5.34 J
Copper	31.6	25.6	56.9	4.7	4.63	NA	6.98	3.81	4.54	14.1	25.8	48.4
Cyanide	NSV	--	1.18 U	0.522 U	0.641 U	NA	0.56 U	4.86	0.672 U	0.516 U	0.922 U	1.38 U
Iron	20,000	45,600	34,000	5,960	4,360	NA	7,870	4,300	4,900	7,790	36,600	26,100
Lead	35.8	41.6	69.3	16.3	15.2	NA	19.8	11.6	13.2	23	30.4	49.7

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD75	CAPL-SD76	CAPL-SD77		CAPL-SD78	CAPL-SD79		CAPL-SD80	CAPL-SD81	CAPL-SD82
			CAPL-SD75-1012	CAPL-SD76-1012	CAPL-SD77-1012	CAPL-SD77-1012-V	CAPL-SD78-1012	CAPL-SD79-1012	CAPL-SD79P-1012	CAPL-SD80-1012	CAPL-SD81-1012	CAPL-SD82-1012
			10/18/2012	10/16/2012	10/16/2012	10/25/2012	10/16/2012	10/16/2012	10/16/2012	10/16/2012	10/18/2012	10/18/2012
Manganese	460	368	143	25.4	14.6	NA	14.9	13.4	15.5	40.2	199	144
Mercury	0.18	0.255	0.136 J	0.0408 J	0.0656 J	NA	0.0413 J	0.0476 J	0.0733 J	0.0641 J	0.103 J	0.14 J
Nickel	22.7	17.1	14.8	3.63	2.17	NA	3.06	1.99	2.31	3.72	18.4	13
Selenium	2.00	2.69	2.67 U	1.03 U	0.644 U	NA	0.53 J	0.486 U	0.71 U	1.11 U	4.86 U	3 U
Silver	1.00	--	1.07 U	0.414 U	0.258 U	NA	0.238 U	0.194 U	0.284 U	0.446 U	1.95 U	1.2 U
Vanadium	57.0	62.5	55.5	15	7.66	NA	12.2	7.34	7.96	13.7	58.5	45
Zinc	121	110	148	18.7	48.6	NA	83.1 L	33.5	37	70	89.5	110
Other Parameters												
pH	--	--	7.34 H3	6.83 H3	6.71 H3	NA	6.90 H3	6.98 H3	NA	7.29 H3	7.19 H3	7.16 H3
Total organic carbon (MG/KG)	--	--	84,300	51,400	91,100	NA	71,500	68,400	NA	69,200	108,000	134,000

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

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Exceedances - Penniman Lake Surface Sediment
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Chemical	Sediment ESV	Background UTL	CAPL-SD84		CAPL-SD85		CAPL-SD86		CAPL-SD87		CAS011-11SD18	
			CAPL-SD84-1012	CAPL-SD84-1012-A	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A	CAPL-SD87-1012	CAPL-SD87-1012-A	CAS011-11SD18-00-0602	CAS011-11SD18-00D-0602
			10/24/2012	10/26/2012	10/24/2012	10/26/2012	10/24/2012	10/26/2012	10/24/2012	10/26/2012	6/13/2002	6/13/2002
Volatile Organic Compounds (UG/KG)												
2-Butanone	988	591	6.15 U	NA	3.93 J	NA	4.8 U	NA	28.8	NA	13 U	13 U
Acetone	NSV	2,500	12.3 UJ	NA	21.3 J	NA	9.6 UJ	NA	111 J	NA	2 B	2 B
Carbon disulfide	3.11	25.8	3.07 U	NA	3.04 U	NA	2.4 U	NA	3.7 U	NA	13 U	13 U
Chloromethane	NSV	--	6.15 U	NA	6.08 U	NA	4.8 U	NA	7.39 U	NA	13 U	13 U
cis-1,2-Dichloroethene	1,464	--	3.07 U	NA	3.04 U	NA	2.4 U	NA	3.7 U	NA	13 U	13 U
Methyl acetate	NSV	--	6.15 U	NA	6.08 U	NA	4.8 U	NA	7.39 U	NA	13 U	13 U
Methylcyclohexane	NSV	--	3.07 U	NA	3.04 U	NA	2.4 U	NA	3.7 U	NA	13 U	13 U
Methylene chloride	1,354	--	6.15 U	NA	6.08 U	NA	4.8 U	NA	7.39 U	NA	0.8 J	4 B
Trichloroethene	5,856	--	3.07 U	NA	3.04 U	NA	2.4 U	NA	3.7 U	NA	13 U	13 U
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	70.0	--	19.6 U	NA	22 U	NA	20.3 U	NA	20.3 U	NA	430 U	430 U
Acenaphthene	290	--	19.6 U	NA	22 U	NA	20.3 U	NA	336 K	NA	430 U	430 U
Acenaphthylene	160	--	19.6 U	NA	22 U	NA	20.3 U	NA	20.3 U	NA	17 J	13 J
Acetophenone	NSV	--	196 U	NA	220 U	NA	204 U	NA	203 U	NA	430 U	430 U
Anthracene	57.2	--	19.6 U	NA	22 U	NA	20.3 U	NA	265	NA	27 J	21 J
Benzaldehyde	NSV	--	196 U	NA	220 U	NA	204 U	NA	203 U	NA	430 U	430 U
Benzo(a)anthracene	108	18.2	19.6 U	NA	22 U	NA	20.3 U	NA	125	NA	83 J	45 J
Benzo(a)pyrene	150	--	19.6 U	NA	22 U	NA	20.3 U	NA	20.3 U	NA	120 J	68 J
Benzo(b)fluoranthene	240	30.3	19.6 U	NA	22 U	NA	20.3 U	NA	81.9 K	NA	380 J	210 J
Benzo(g,h,i)perylene	170	25.0	19.6 U	NA	22 U	NA	20.3 U	NA	20.3 U	NA	140 J	100 J
Benzo(k)fluoranthene	240	--	19.6 U	NA	22 U	NA	20.3 U	NA	20.3 U	NA	240 J	180 J
bis(2-Ethylhexyl)phthalate	750	--	196 U	NA	220 U	NA	204 U	NA	203 U	NA	27 B	27 B
Carbazole	140	--	196 U	NA	220 U	NA	204 U	NA	203 U	NA	33 J	25 J
Chrysene	166	21.7	19.6 U	NA	22 U	NA	20.3 U	NA	130 K	NA	350 J	220 J
Dibenz(a,h)anthracene	33.0	--	19.6 U	NA	22 U	NA	20.3 U	NA	20.3 U	NA	29 J	22 J
Dibenzofuran	5,100	--	196 U	NA	220 U	NA	204 U	NA	125 J	NA	430 U	430 U
Di-n-butylphthalate	110	--	196 U	NA	220 U	NA	204 U	NA	203 U	NA	430 U	15 J
Di-n-octylphthalate	NSV	--	196 U	NA	220 U	NA	204 U	NA	203 U	NA	430 U	430 U
Fluoranthene	423	24.3	19.6 U	NA	22.2 J	NA	20.3 U	NA	440	NA	400 J	290 J
Fluorene	77.4	--	19.6 U	NA	22 U	NA	20.3 U	NA	285 K	NA	430 U	430 U
Indeno(1,2,3-cd)pyrene	200	--	19.6 U	NA	22 U	NA	20.3 U	NA	24.2 J	NA	140 J	99 J
Naphthalene	176	--	19.6 U	NA	22 U	NA	20.3 U	NA	20.3 U	NA	430 U	430 U
PAH (HMW) - Detects	2,900	381	0 U	NA	20.1 J	NA	0 U	NA	858 K	NA	1,862 J	1,184 J
PAH (LMW) - Detects	786	1,670	0 U	NA	22.2 J	NA	0 U	NA	2,275 K	NA	522 J	434 J
PAH (total) - Detects	3,553	2,110	0 U	NA	42.3 J	NA	0 U	NA	3,133 K	NA	2,384 J	1,618 J
PAH (HMW)	2,900	381	88.2 U	NA	108 J	NA	91.4 U	NA	899 K	NA	1,862 J	1,184 J
PAH (LMW)	786	1,670	176 U	NA	209 J	NA	183 U	NA	2,407 K	NA	1,597 J	1,509 J
PAH (total)	3,553	2,110	265 U	NA	317 J	NA	275 U	NA	3,306 K	NA	3,459 J	2,693 J
Phenanthrene	204	33.0	19.6 U	NA	22 U	NA	20.3 U	NA	949	NA	78 J	110 J
Pyrene	195	35.3	19.6 U	NA	20.1 J	NA	20.3 U	NA	497 K	NA	380 J	240 J
Pesticides (UG/KG)												
4,4'-DDD	4.88	10.1	10.2 J	NA	12.8 K	NA	6.53 J	NA	6.56 J	NA	8.7 U	8.6 U

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Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD84		CAPL-SD85		CAPL-SD86		CAPL-SD87		CAS011-11SD18	
			CAPL-SD84-1012	CAPL-SD84-1012-A	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A	CAPL-SD87-1012	CAPL-SD87-1012-A	CAS011-11SD18-00-0602	CAS011-11SD18-00D-0602
			10/24/2012	10/26/2012	10/24/2012	10/26/2012	10/24/2012	10/26/2012	10/24/2012	10/26/2012	6/13/2002	6/13/2002
4,4'-DDE	3.16	44.1	50.8 J	NA	64.9 J	NA	18.5 L	NA	13.1	NA	75	99
4,4'-DDT	4.16	1.45	137 K	NA	71 J	NA	27.6 J	NA	18.3 J	NA	8.7 U	8.6 U
Aldrin	2.00	--	3.54 J	NA	1.2 J	NA	0.407 J	NA	0.681 J	NA	4.5 U	4.4 U
alpha-BHC	6.00	0.813	0.408 U	NA	0.443 U	NA	0.414 UL	NA	0.419 U	NA	4.5 U	4.4 U
alpha-Chlordane	3.24	--	6.82 J	NA	13.1 K	NA	8.56 J	NA	9.44	NA	5.7 J	13 J
beta-BHC	5.00	--	0.408 UL	NA	2.09 K	NA	0.414 UL	NA	0.419 U	NA	4.5 U	4.4 U
delta-BHC	3.00	--	0.208 J	NA	1.3 K	NA	0.505 J	NA	1.04 J	NA	4.5 U	4.4 U
Dieldrin	1.90	0.948	364 K	NA	167 K	NA	66.6 J	NA	79.2	NA	8.7 U	8.6 U
Endosulfan I	10.6	--	0.408 U	NA	0.615 J	NA	0.325 J	NA	0.81 J	NA	4.5 U	4.4 U
Endosulfan II	51.2	--	56.1 J	NA	26.1 K	NA	43.9 J	NA	15.4 J	NA	8.7 U	8.6 U
Endosulfan sulfate	19.8	--	681 K	NA	319 K	NA	0.414 UL	NA	0.419 U	NA	8.7 U	8.6 U
Endrin	2.22	8.64	143 K	NA	51.7	NA	29.5 J	NA	35.7 J	NA	8.7 U	8.6 U
Endrin aldehyde	2.22	--	17.4 J	NA	8.26 J	NA	4.39 J	NA	5.11 J	NA	8.7 U	8.6 U
Endrin ketone	2.22	--	49.4 J	NA	22.2 J	NA	15.1 J	NA	12.6 J	NA	8.7 U	8.6 U
gamma-BHC (Lindane)	2.37	2.92	0.135 J	NA	0.614 J	NA	0.414 UL	NA	0.419 U	NA	4.5 U	4.4 U
gamma-Chlordane	3.24	1.10	22.7 J	NA	40.1	NA	17.2 J	NA	28.4	NA	5.4 J	9.4 J
Heptachlor	249	--	0.361 B	NA	0.974	NA	0.414 UL	NA	0.177 B	NA	4.5 U	4.4 U
Heptachlor epoxide	2.47	--	3.58 J	NA	5.37 K	NA	0.981 J	NA	1.22 J	NA	4.5 U	4.4 U
Methoxychlor	69.5	--	49.2 J	NA	25.7 J	NA	12.8 J	NA	11.4 J	NA	45 U	44 U
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	59.8	--	16,200 J	NA	8,300 J	NA	4,090 J	NA	3,780 J	NA	5,400	7,500
Explosives (UG/KG)												
1,3-Dinitrobenzene	24.5	--	182 U	NA	174 U	NA	182 U	NA	182 U	NA	NA	NA
2,4,6-Trinitrotoluene	337	--	182 U	NA	174 U	NA	182 U	NA	182 U	NA	NA	NA
3-Nitrotoluene	7,035	--	182 U	NA	174 U	NA	182 U	NA	182 U	NA	NA	NA
4-Amino-2,6-dinitrotoluene	84.9	--	182 U	NA	174 U	NA	182 U	NA	182 U	NA	NA	NA
4-Nitrotoluene	14,867	--	182 U	NA	174 U	NA	182 U	NA	182 U	NA	NA	NA
HMX	17.3	--	182 U	NA	174 U	NA	182 U	NA	182 U	NA	NA	NA
Nitroglycerin	NSV	--	455 U	NA	435 U	NA	455 U	NA	455 U	NA	NA	NA
Tetryl	NSV	--	182 U	NA	174 U	NA	182 U	NA	182 U	NA	NA	NA
Inorganics (MG/KG)												
Aluminum	25,500	23,200	2,310	NA	6,860	NA	2,270	NA	2,890	NA	8,080 K	6,950 K
Antimony	3.00	1.70	0.502 U	NA	3.89	NA	0.995 U	NA	1.07 U	NA	0.4 U	0.56 J
Arsenic	9.79	108	3.22	NA	5.62	NA	2.24	NA	2.42	NA	6.5	5.3
Barium	20.0	75.0	12.9	NA	90.2	NA	22.8	NA	16.5	NA	40.9 J	38.5 J
Beryllium	NSV	1.39	0.22 J	NA	5.98	NA	1.19	NA	0.393 J	NA	0.57 B	0.53 B
Cadmium	0.99	0.571	0.112 J	NA	0.712 U	NA	0.249 U	NA	0.267 U	NA	0.96 J	0.9 J
Chromium	43.4	52.0	7.75	NA	45	NA	11.3	NA	8.94	NA	26.2	22.7
Cobalt	50.0	9.45	1.03	NA	34.5	NA	5.24	NA	1.54 J	NA	2.5 J	2.3 J
Copper	31.6	25.6	3.99	NA	1,000	NA	98.3	NA	16.1	NA	14.3	14.6
Cyanide	NSV	--	0.155 J	NA	0.19 J	NA	0.306 U	NA	0.354 J	NA	0.039 U	0.039 U
Iron	20,000	45,600	8,880	NA	31,600	NA	9,880	NA	6,810	NA	15,100	16,400
Lead	35.8	41.6	90.3	NA	853	NA	126	NA	72.9	NA	77.1	63.7

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Chemical	Sediment ESV	Background UTL	CAPL-SD84		CAPL-SD85		CAPL-SD86		CAPL-SD87		CAS011-11SD18	
			CAPL-SD84-1012	CAPL-SD84-1012-A	CAPL-SD85-1012	CAPL-SD85-1012-A	CAPL-SD86-1012	CAPL-SD86-1012-A	CAPL-SD87-1012	CAPL-SD87-1012-A	CAS011-11SD18-00-0602	CAS011-11SD18-00D-0602
			10/24/2012	10/26/2012	10/24/2012	10/26/2012	10/24/2012	10/26/2012	10/24/2012	10/26/2012	6/13/2002	6/13/2002
Manganese	460	368	32.4	NA	275	NA	63.6	NA	20.6	NA	182	153
Mercury	0.18	0.255	0.0174 J	NA	0.0196 J	NA	0.0397 U	NA	0.0201 J	NA	0.057 U	0.062 U
Nickel	22.7	17.1	2.88	NA	564	NA	65.4	NA	11.1	NA	4.9 J	4.7 J
Selenium	2.00	2.69	0.314 U	NA	1.78 U	NA	0.622 UL	NA	0.668 U	NA	0.6 J	0.53 UL
Silver	1.00	--	0.125 UJ	NA	0.519 J	NA	0.249 UJ	NA	0.267 UJ	NA	0.17 U	0.17 U
Vanadium	57.0	62.5	9.12	NA	20.6	NA	7.99	NA	8.37	NA	28.5	25
Zinc	121	110	77.7	NA	2,950	NA	525	NA	119	NA	206	184
Other Parameters												
pH	--	--	8.28 H3	NA	8.11 H3	NA	7.88 H3	NA	8.04 H3	NA	NA	NA
Total organic carbon (MG/KG)	--	--	2,300	NA	3,440	NA	3,210	NA	7,080	NA	24,000	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

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Exceedances - Penniman Lake Surface Sediment
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Chemical	Sediment ESV	Background UTL	CAS011-11SD19	CAS011-11SD20	CAS011-11SD21		CAS011-11SD22	CAS011-11SD23	CAS011-11SD24
			CAS011-11SD19-00-0602	CAS011-11SD20-00-0602	CAS011-11SD21-00-0602	CAS011-11SD21-00D-0602	CAS011-11SD22-00-0602	CAS011-11SD23-00-0602	CAS011-11SD24-00-0602
			6/13/2002	6/13/2002	6/14/2002	6/14/2002	6/14/2002	6/17/2002	6/13/2002
Volatile Organic Compounds (UG/KG)									
2-Butanone	988	591	6 J	13 U	4 J	15 U	26 U	28 J	19 U
Acetone	NSV	2,500	12 B	7 B	12 B	15 B	7 B	66	19 U
Carbon disulfide	3.11	25.8	15 U	13 U	0.7 J	15 U	26 U	1 J	19 U
Chloromethane	NSV	--	15 U	13 U	15 U	15 U	26 U	32 U	19 U
cis-1,2-Dichloroethene	1,464	--	15 U	13 U	15 U	15 U	26 U	32 U	13 J
Methyl acetate	NSV	--	15 U	13 U	15 U	15 U	26 U	32 U	19 U
Methylcyclohexane	NSV	--	15 U	13 U	15 U	15 U	26 U	32 U	19 U
Methylene chloride	1,354	--	2 J	4 J	3 J	3 J	26 U	4 B	3 J
Trichloroethene	5,856	--	15 U	13 U	15 U	15 U	26 U	32 U	5 J
Semivolatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	70.0	--	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
Acenaphthene	290	--	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
Acenaphthylene	160	--	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
Acetophenone	NSV	--	16 J	410 U	460 U	460 U	39 J	1,100 U	610 U
Anthracene	57.2	--	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
Benzaldehyde	NSV	--	19 J	410 U	24 J	18 J	87 J	66 J	36 J
Benzo(a)anthracene	108	18.2	490 U	410 U	460 U	460 U	870 U	1,100 U	21 J
Benzo(a)pyrene	150	--	12 J	410 U	460 U	460 U	870 U	35 J	20 J
Benzo(b)fluoranthene	240	30.3	20 J	410 U	460 U	460 U	37 J	44 J	45 J
Benzo(g,h,i)perylene	170	25.0	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
Benzo(k)fluoranthene	240	--	490 U	410 U	460 U	460 U	870 U	56 J	36 J
bis(2-Ethylhexyl)phthalate	750	--	22 B	23 B	21 B	22 B	55 B	240 B	67 B
Carbazole	140	--	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
Chrysene	166	21.7	22 J	410 U	460 U	460 U	38 J	76 J	44 J
Dibenz(a,h)anthracene	33.0	--	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
Dibenzofuran	5,100	--	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
Di-n-butylphthalate	110	--	490 U	410 U	20 J	460 U	870 U	1,100 U	610 U
Di-n-octylphthalate	NSV	--	490 U	410 U	460 U	19 J	870 U	260 J	610 U
Fluoranthene	423	24.3	22 J	410 U	11 J	20 J	39 J	74 J	58 J
Fluorene	77.4	--	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
Indeno(1,2,3-cd)pyrene	200	--	12 J	410 U	460 U	460 U	870 U	44 J	25 J
Naphthalene	176	--	490 U	410 U	460 U	460 U	870 U	1,100 U	610 U
PAH (HMW) - Detects	2,900	381	90.0 J	0 U	0 U	21.0 J	115 J	338 J	242 J
PAH (LMW) - Detects	786	1,670	22.0 J	0 U	11.0 J	20.0 J	39.0 J	110 J	76.0 J
PAH (total) - Detects	3,553	2,110	112 J	0 U	11.0 J	41.0 J	154 J	448 J	318 J
PAH (HMW)	2,900	381	1,070 J	1,845 U	2,070 U	1,861 J	2,725 J	1,988 J	852 J
PAH (LMW)	786	1,670	1,982 J	1,845 U	1,851 J	1,860 J	3,519 J	3,960 J	2,211 J
PAH (total)	3,553	2,110	3,052 J	3,690 U	3,921 J	3,721 J	6,244 J	5,948 J	3,063 J
Phenanthrene	204	33.0	490 U	410 U	460 U	460 U	870 U	36 J	18 J
Pyrene	195	35.3	24 J	410 U	460 U	21 J	40 J	83 J	51 J
Pesticides (UG/KG)									
4,4'-DDD	4.88	10.1	4.9 U	4.1 U	4.6 U	4.6 U	8.7 U	11 U	6.1 U

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Chemical	Sediment ESV	Background UTL	CAS011-11SD19	CAS011-11SD20	CAS011-11SD21		CAS011-11SD22	CAS011-11SD23	CAS011-11SD24
			CAS011-11SD19-00-0602	CAS011-11SD20-00-0602	CAS011-11SD21-00-0602	CAS011-11SD21-00D-0602	CAS011-11SD22-00-0602	CAS011-11SD23-00-0602	CAS011-11SD24-00-0602
			6/13/2002	6/13/2002	6/14/2002	6/14/2002	6/14/2002	6/17/2002	6/13/2002
4,4'-DDE	3.16	44.1	15	4.1 U	4.4 J	3 J	12	110	16
4,4'-DDT	4.16	1.45	4.9 U	4.1 U	4.6 U	4.6 U	8.7 U	11 U	6.1 U
Aldrin	2.00	--	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	5.5 U	3.1 U
alpha-BHC	6.00	0.813	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	3.5 J	3.1 U
alpha-Chlordane	3.24	--	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	5.5 U	3.1 U
beta-BHC	5.00	--	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	7.3	3.1 U
delta-BHC	3.00	--	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	5.5 U	3.1 U
Dieldrin	1.90	0.948	4.9 U	4.1 U	4.6 U	4.6 U	8.7 U	11 U	6.1 U
Endosulfan I	10.6	--	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	5.5 U	3.1 U
Endosulfan II	51.2	--	4.9 U	4.1 U	4.6 U	4.6 U	8.7 U	11 U	6.1 U
Endosulfan sulfate	19.8	--	4.9 U	4.1 U	4.6 U	4.6 U	8.7 U	11 U	6.1 U
Endrin	2.22	8.64	4.9 U	4.1 U	4.6 U	4.6 U	8.7 U	11 U	6.1 U
Endrin aldehyde	2.22	--	4.9 U	4.1 U	4.6 U	4.6 U	8.7 U	11 U	6.1 U
Endrin ketone	2.22	--	4.9 U	4.1 U	4.6 U	4.6 U	8.7 U	11 U	6.1 U
gamma-BHC (Lindane)	2.37	2.92	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	5.5 U	3.1 U
gamma-Chlordane	3.24	1.10	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	5.5 U	3.1 U
Heptachlor	249	--	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	5.5 U	3.1 U
Heptachlor epoxide	2.47	--	2.5 U	2.1 U	2.4 U	2.4 U	4.5 U	5.5 U	3.1 U
Methoxychlor	69.5	--	25 U	21 U	24 U	24 U	45 U	55 U	31 U
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1260	59.8	--	160	26 J	99	52	330	300	81
Explosives (UG/KG)									
1,3-Dinitrobenzene	24.5	--	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	337	--	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	7,035	--	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	84.9	--	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	14,867	--	NA	NA	NA	NA	NA	NA	NA
HMX	17.3	--	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA
Tetryl	NSV	--	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)									
Aluminum	25,500	23,200	2,450 K	832 K	1,330 K	1,640 K	3,690 K	4,180 K	11,500 K
Antimony	3.00	1.70	0.47 U	0.38 U	0.45 U	0.467 U	0.83 U	0.98 U	1.5 J
Arsenic	9.79	108	2.3 J	1.9 J	1.2 U	1.22 U	3 J	20.5	16.1
Barium	20.0	75.0	13.4 J	6.5 J	8.7 J	10.4 J	28.9 J	26.2 J	46.7 J
Beryllium	NSV	1.39	0.4 B	0.17 B	0.28 B	0.28 B	0.45 B	0.36 B	1.1 B
Cadmium	0.99	0.571	0.1 B	0.45 B	0.14 B	0.11 B	0.43 B	0.36 B	0.39 B
Chromium	43.4	52.0	8.3	4 K	5.3 K	6.6 K	11.2	12 K	40.7
Cobalt	50.0	9.45	0.7 J	0.63 J	0.47 J	0.55 J	1.1 J	1.4 J	2.8 J
Copper	31.6	25.6	3.4 J	1.8 J	2.4 J	3.23 B	9.2 J	17.8	15.8
Cyanide	NSV	--	0.044 U	0.036 U	0.042 U	0.042 U	0.078 U	0.097 U	0.055 U
Iron	20,000	45,600	8,090	3,890	4,430	5,280	10,000	11,200	37,400
Lead	35.8	41.6	10.8	6.1	7.9	8.7	24.7	36.8	45.1

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Chemical	Sediment ESV	Background UTL	CAS011-11SD19 CAS011-11SD19-00-0602 6/13/2002	CAS011-11SD20 CAS011-11SD20-00-0602 6/13/2002	CAS011-11SD21 CAS011-11SD21-00-0602 6/14/2002	 CAS011-11SD21-00D-0602 6/14/2002	CAS011-11SD22 CAS011-11SD22-00-0602 6/14/2002	CAS011-11SD23 CAS011-11SD23-00-0602 6/17/2002	CAS011-11SD24 CAS011-11SD24-00-0602 6/13/2002
Manganese	460	368	20	10.3	8.2	10.4	41.5	41.6	67.9
Mercury	0.18	0.255	0.061 U	0.062 J	0.07 U	0.07 U	0.12 U	0.14 U	0.075 U
Nickel	22.7	17.1	2.1 J	1.3 J	1.3 J	1.5 J	3.6 J	4.2 J	9.7 J
Selenium	2.00	2.69	0.64 UL	0.52 UL	0.62 UL	0.641 U	1.1 UL	1.3 UL	0.77 UL
Silver	1.00	--	0.2 U	0.17 U	0.2 U	0.204 U	0.36 U	0.43 U	0.25 U
Vanadium	57.0	62.5	8.7 J	4.2 J	5.2 J	6.1 J	11.9 J	15 J	36.6
Zinc	121	110	32.8	22.7	22	25.1	70.8	78.6	178
Other Parameters									
pH	--	--	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	41,000	9,030	80,800	NA	123,000	90,600	20,500

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

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Chemical	Sediment ESV	Background UTL	CAS011-11SD25 CAS011-11SD25-00-0602 6/13/2002	CAS011-11SD26 CAS011-11SD26-00-0602 6/17/2002	CAS011-11SD27 CAS011-11SD27-00-0602 6/17/2002	CAS011-11SD28 CAS011-11SD28-00-0602 6/17/2002	CAS011-11SD29 CAS011-11SD29-00-0602 6/17/2002	CAS011-11SD30 CAS011-11SD30-00-0602 6/18/2002	CAS011-11SD31 CAS011-11SD31-00-0602 6/18/2002
Volatile Organic Compounds (UG/KG)									
2-Butanone	988	591	14 U	6 J	38 J	35	85	34	15 U
Acetone	NSV	2,500	4 B	11 B	100	92	220	86	15 U
Carbon disulfide	3.11	25.8	14 U	14 U	42 U	33 U	4.00 J	2 J	15 U
Chloromethane	NSV	--	14 U	14 U	2.00 J	33 U	40 U	33 U	15 U
cis-1,2-Dichloroethene	1,464	--	14 U	14 U	42 U	33 U	40 U	33 U	15 U
Methyl acetate	NSV	--	14 U	14 U	42 U	33 U	40 U	33 U	15 U
Methylcyclohexane	NSV	--	14 U	14 U	42 U	33 U	40 U	5.00 J	15 U
Methylene chloride	1,354	--	4 J	3 B	8 B	4 B	5 B	5 B	15 U
Trichloroethene	5,856	--	14 U	14 U	42 U	33 U	40 U	33 U	15 U
Semivolatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	70.0	--	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
Acenaphthene	290	--	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
Acenaphthylene	160	--	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
Acetophenone	NSV	--	450 U	420 U	1,400 U	1,100 U	1,300 U	35 J	17 J
Anthracene	57.2	--	450 U	420 U	1,400 U	1,100 U	1,300 U	31 J	500 U
Benzaldehyde	NSV	--	19 J	15 J	82 J	88 J	120 J	180 J	50 J
Benzo(a)anthracene	108	18.2	450 U	420 U	1,400 U	1,100 U	1,300 U	60 J	500 U
Benzo(a)pyrene	150	--	450 U	420 U	1,400 U	1,100 U	1,300 U	72 J	500 U
Benzo(b)fluoranthene	240	30.3	450 U	420 U	1,400 U	1,100 U	56 J	120 J	500 U
Benzo(g,h,i)perylene	170	25.0	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
Benzo(k)fluoranthene	240	--	450 U	420 U	1,400 U	1,100 U	1,300 U	98 J	500 U
bis(2-Ethylhexyl)phthalate	750	--	22 B	59 B	140 B	100 B	310 B	170 B	79 B
Carbazole	140	--	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
Chrysene	166	21.7	450 U	420 U	1,400 U	1,100 U	65 J	150 J	500 U
Dibenz(a,h)anthracene	33.0	--	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
Dibenzofuran	5,100	--	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
Di-n-butylphthalate	110	--	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
Di-n-octylphthalate	NSV	--	450 U	420 U	220 J	1,100 U	470 J	1,100 U	500 U
Fluoranthene	423	24.3	450 U	420 U	41 J	39 J	72 J	210 J	500 U
Fluorene	77.4	--	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
Indeno(1,2,3-cd)pyrene	200	--	450 U	420 U	1,400 U	1,100 U	1,300 U	77 J	500 U
Naphthalene	176	--	450 U	420 U	1,400 U	1,100 U	1,300 U	1,100 U	500 U
PAH (HMW) - Detects	2,900	381	0 U	0 U	0 U	0 U	216 J	777 J	0 U
PAH (LMW) - Detects	786	1,670	0 U	0 U	41.0 J	73.0 J	117 J	341 J	0 U
PAH (total) - Detects	3,553	2,110	0 U	0 U	41.0 J	73.0 J	333 J	1,118 J	0 U
PAH (HMW)	2,900	381	2,025 U	1,890 U	6,300 U	4,950 U	4,116 J	1,877 J	2,250 U
PAH (LMW)	786	1,670	2,025 U	1,890 U	5,641 J	3,923 J	4,667 J	3,641 J	2,250 U
PAH (total)	3,553	2,110	4,050 U	3,780 U	11,941 J	8,873 J	8,783 J	5,518 J	4,500 U
Phenanthrene	204	33.0	450 U	420 U	1,400 U	34 J	45 J	100 J	500 U
Pyrene	195	35.3	450 U	420 U	1,400 U	1,100 U	95 J	200 J	500 U
Pesticides (UG/KG)									
4,4'-DDD	4.88	10.1	4.5 U	4.2 U	14 U	11 U	13 U	22 U	5 U

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAS011-11SD25 CAS011-11SD25-00-0602 6/13/2002	CAS011-11SD26 CAS011-11SD26-00-0602 6/17/2002	CAS011-11SD27 CAS011-11SD27-00-0602 6/17/2002	CAS011-11SD28 CAS011-11SD28-00-0602 6/17/2002	CAS011-11SD29 CAS011-11SD29-00-0602 6/17/2002	CAS011-11SD30 CAS011-11SD30-00-0602 6/18/2002	CAS011-11SD31 CAS011-11SD31-00-0602 6/18/2002
4,4'-DDE	3.16	44.1	4.5 U	3.1 J	38	41	56	190	5 U
4,4'-DDT	4.16	1.45	4.5 U	4.2 U	14 U	11 U	13 U	22 U	5 U
Aldrin	2.00	--	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	11 U	2.6 U
alpha-BHC	6.00	0.813	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	11 U	2.6 U
alpha-Chlordane	3.24	--	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	11 U	2.6 U
beta-BHC	5.00	--	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	11 U	2.6 U
delta-BHC	3.00	--	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	11 U	2.6 U
Dieldrin	1.90	0.948	4.5 U	4.2 U	14 U	11 U	13 U	22 U	5 U
Endosulfan I	10.6	--	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	56	2.6 U
Endosulfan II	51.2	--	4.5 U	4.2 U	14 U	11 U	13 U	22 U	5 U
Endosulfan sulfate	19.8	--	4.5 U	4.2 U	14 U	11 U	13 U	22 U	5 U
Endrin	2.22	8.64	4.5 U	4.2 U	14 U	11 U	13 U	22 U	5 U
Endrin aldehyde	2.22	--	4.5 U	4.2 U	14 U	11 U	13 U	22 U	5 U
Endrin ketone	2.22	--	4.5 U	4.2 U	14 U	11 U	13 U	22 U	5 U
gamma-BHC (Lindane)	2.37	2.92	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	11 U	2.6 U
gamma-Chlordane	3.24	1.10	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	73 J	2.6 U
Heptachlor	249	--	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	11 U	2.6 U
Heptachlor epoxide	2.47	--	2.3 U	2.2 U	7.1 U	5.7 U	6.8 U	11 U	2.6 U
Methoxychlor	69.5	--	23 U	22 U	71 U	57 U	68 U	110 U	26 U
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1260	59.8	--	45 U	42 U	320 J	180	540	15,000	50 U
Explosives (UG/KG)									
1,3-Dinitrobenzene	24.5	--	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	337	--	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	7,035	--	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	84.9	--	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	14,867	--	NA	NA	NA	NA	NA	NA	NA
HMX	17.3	--	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA
Tetryl	NSV	--	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)									
Aluminum	25,500	23,200	3,120 K	1,700 K	9,690 K	7,900 K	7,940 K	8,970 K	2,610 K
Antimony	3.00	1.70	0.42 U	0.4 U	1.2 U	1 U	1.2 U	1 J	0.47 U
Arsenic	9.79	108	5.3	2.3 J	19	22.9	20.5	24.8	6.9
Barium	20.0	75.0	14.7 J	15 J	61.1 J	37.3 J	62.1 J	57.5 J	13.4 J
Beryllium	NSV	1.39	0.49 B	0.26 B	0.93 B	0.5 B	0.77 B	0.97 B	0.32 B
Cadmium	0.99	0.571	0.21 B	0.075 U	1.1 B	0.2 B	0.22 U	0.53 B	0.089 U
Chromium	43.4	52.0	14.5	8.4	32	23.2	19.8	24.4	9.6
Cobalt	50.0	9.45	0.87 J	0.56 J	3.6 J	2.1 J	2.4 J	3.2 J	0.99 J
Copper	31.6	25.6	2.5 J	1.6 J	14.3 J	21	17.6 J	42.8	3.1 J
Cyanide	NSV	--	0.04 U	0.037 U	0.12 U	0.097 U	0.12 U	0.099 U	0.045 U
Iron	20,000	45,600	14,800	7,700	26,600	15,400	19,000	30,600	9,710
Lead	35.8	41.6	10.8	6	47.7	61.7	45.8	125	5.6

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAS011-11SD25 CAS011-11SD25-00-0602 6/13/2002	CAS011-11SD26 CAS011-11SD26-00-0602 6/17/2002	CAS011-11SD27 CAS011-11SD27-00-0602 6/17/2002	CAS011-11SD28 CAS011-11SD28-00-0602 6/17/2002	CAS011-11SD29 CAS011-11SD29-00-0602 6/17/2002	CAS011-11SD30 CAS011-11SD30-00-0602 6/18/2002	CAS011-11SD31 CAS011-11SD31-00-0602 6/18/2002
Manganese	460	368	29.9	74	93.1	46.4	125	113	23.6
Mercury	0.18	0.255	0.049 U	0.044 U	0.18 U	0.15 U	0.19 U	0.14 U	0.058 U
Nickel	22.7	17.1	2.3 **J**	1.4 **J**	8 **J**	4.9 **J**	6 **J**	12.2 **J**	2.2 **J**
Selenium	2.00	2.69	0.57 UL	0.55 UL	1.7 UL	1.4 UL	1.6 UL	1.8 **J**	0.71 **J**
Silver	1.00	--	0.18 U	0.17 U	0.53 U	0.46 U	0.51 U	0.44 U	0.21 U
Vanadium	57.0	62.5	13.5	7.5 **J**	29.4 **J**	25 **J**	22.7 **J**	33.1	11.3 **J**
Zinc	121	110	51.4	22.4	241	105	80.5	242	13.5
Other Parameters									
pH	--	--	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	15,000	51,600	71,500	34,300	149,000	53,300	17,100

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAS011-11SD32	Penniman Lake-SD10		Penniman Lake-SD11	Penniman Lake-SD12	Penniman Lake-SD13	Penniman Lake-SD14	Penniman Lake-SD15
			CAS011-11SD32-00-0602	PL-00-POND-SD10-0300	PL-00-POND-SD10D-0300	PL-00-POND-SD11-0300	PL-00-POND-SD12-0300	PL-00-POND-SD13-0300	PL-00-POND-SD14-0300	PL-00-POND-SD15-0300
			6/18/2002	3/29/2000	3/29/2000	3/30/2000	3/29/2000	3/30/2000	3/29/2000	3/29/2000
Volatile Organic Compounds (UG/KG)										
2-Butanone	988	591	29 U	45 J	50 U	73 U	84	67 U	91 U	89 U
Acetone	NSV	2,500	29 U	180 J	250	460 B	200 B	360 B	200 BJ	340
Carbon disulfide	3.11	25.8	29 U	48 U	50 U	9.00 J	73 U	67 U	91 U	89 U
Chloromethane	NSV	--	29 U	48 U	50 U	73 U	73 U	67 U	91 U	89 U
cis-1,2-Dichloroethene	1,464	--	29 U	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	--	29 U	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NSV	--	29 U	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	1,354	--	29 U	23 BJ	24 BJ	32 BJ	25 BJ	23 BJ	28 BJ	20 BJ
Trichloroethene	5,856	--	29 U	48 U	50 U	73 U	73 U	67 U	91 U	89 U
Semivolatile Organic Compounds (UG/KG)										
2-Methylnaphthalene	70.0	--	940 U	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Acenaphthene	290	--	29 J	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Acenaphthylene	160	--	940 U	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Acetophenone	NSV	--	47 J	NA	NA	NA	NA	NA	NA	NA
Anthracene	57.2	--	39 J	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Benzaldehyde	NSV	--	270 J	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	108	18.2	940 U	220 J	230 J	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Benzo(a)pyrene	150	--	940 U	190 J	220 J	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Benzo(b)fluoranthene	240	30.3	940 U	590 J	520 J	170 J	220 J	2,200 U	3,000 UJ	2,900 U
Benzo(g,h,i)perylene	170	25.0	940 U	180 J	170 J	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Benzo(k)fluoranthene	240	--	940 U	150 J	190 J	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
bis(2-Ethylhexyl)phthalate	750	--	150 B	550 B	540 B	2,400 U	660 B	2,200 U	3,000 UJ	300 B
Carbazole	140	--	940 U	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Chrysene	166	21.7	32 J	430 J	380 J	2,400 U	160 J	2,200 U	3,000 UJ	2,900 U
Dibenz(a,h)anthracene	33.0	--	940 U	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Dibenzofuran	5,100	--	940 U	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Di-n-butylphthalate	110	--	940 U	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Di-n-octylphthalate	NSV	--	28 J	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Fluoranthene	423	24.3	79 J	490 J	450 J	170 J	150 J	2,200 U	3,000 UJ	2,900 U
Fluorene	77.4	--	940 U	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Indeno(1,2,3-cd)pyrene	200	--	940 U	190 J	200 J	130 J	2,400 U	2,200 U	3,000 UJ	2,900 U
Naphthalene	176	--	940 U	1,600 U	1,600 U	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
PAH (HMW) - Detects	2,900	381	103 J	2,570 J	2,440 J	470 J	540 J	0 U	0 U	0 U
PAH (LMW) - Detects	786	1,670	277 J	680 J	630 J	170 J	150 J	0 U	0 U	0 U
PAH (total) - Detects	3,553	2,110	380 J	3,250 J	3,070 J	640 J	690 J	0 U	0 U	0 U
PAH (HMW)	2,900	381	3,393 J	3,370 J	3,240 J	7,670 J	7,740 J	9,900 U	13,500 U	13,050 U
PAH (LMW)	786	1,670	2,627 J	6,280 J	6,230 J	9,770 J	9,750 J	9,900 U	13,500 U	13,050 U
PAH (total)	3,553	2,110	6,020 J	9,650 J	9,470 J	17,440 J	17,490 J	19,800 U	27,000 U	26,100 U
Phenanthrene	204	33.0	130 J	190 J	180 J	2,400 U	2,400 U	2,200 U	3,000 UJ	2,900 U
Pyrene	195	35.3	71 J	620 J	530 J	170 J	160 J	2,200 U	3,000 UJ	2,900 U
Pesticides (UG/KG)										
4,4'-DDD	4.88	10.1	9.4 U	36 K	13 K	23.8 U	23.8 U	22.2 U	30.3 U	30.3 U

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAS011-11SD32	Penniman Lake-SD10		Penniman Lake-SD11	Penniman Lake-SD12	Penniman Lake-SD13	Penniman Lake-SD14	Penniman Lake-SD15
			CAS011-11SD32-00-0602	PL-00-POND-SD10-0300	PL-00-POND-SD10D-0300	PL-00-POND-SD11-0300	PL-00-POND-SD12-0300	PL-00-POND-SD13-0300	PL-00-POND-SD14-0300	PL-00-POND-SD15-0300
			6/18/2002	3/29/2000	3/29/2000	3/30/2000	3/29/2000	3/30/2000	3/29/2000	3/29/2000
4,4'-DDE	3.16	44.1	7.6 J	46 K	33 K	35 K	39 K	17 K	47 K	50 K
4,4'-DDT	4.16	1.45	9.4 U	920 K	16.7 UJ	23.8 U	23.8 U	22.2 U	42 K	30.3 U
Aldrin	2.00	--	4.9 U	7.94 U	8.33 U	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
alpha-BHC	6.00	0.813	4.9 U	7.94 U	8.33 U	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
alpha-Chlordane	3.24	--	4.9 U	7.94 U	8.33 U	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
beta-BHC	5.00	--	4.9 U	7.94 U	8.33 U	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
delta-BHC	3.00	--	4.9 U	7.94 U	8.33 U	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
Dieldrin	1.90	0.948	9.4 U	15.9 UJ	59 K	23.8 U	23.8 U	22.2 U	30.3 U	30.3 U
Endosulfan I	10.6	--	4.9 U	7.94 U	8.33 U	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
Endosulfan II	51.2	--	9.4 U	15.9 U	16.7 U	23.8 U	23.8 U	22.2 U	30.3 U	30.3 U
Endosulfan sulfate	19.8	--	9.4 U	15.9 UJ	27 K	23.8 U	12 K	22.2 U	30.3 U	30.3 U
Endrin	2.22	8.64	9.4 U	15.9 UJ	38 K	23.8 U	23.8 U	22.2 U	30.3 U	30.3 U
Endrin aldehyde	2.22	--	9.4 U	15.9 U	16.7 U	23.8 U	23.8 U	22.2 U	30.3 U	30.3 U
Endrin ketone	2.22	--	9.4 U	11 K	16.7 UJ	23.8 U	15 K	22.2 U	17 K	30.3 U
gamma-BHC (Lindane)	2.37	2.92	4.9 U	7.94 U	8.33 U	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
gamma-Chlordane	3.24	1.10	4.9 U	7.94 UJ	18 K	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
Heptachlor	249	--	4.9 U	7.94 U	8.33 U	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
Heptachlor epoxide	2.47	--	4.9 U	7.94 UJ	9.1 K	11.9 U	11.9 U	11.1 U	15.2 U	15.2 U
Methoxychlor	69.5	--	49 U	79.4 U	83.3 U	119 U	119 U	111 U	152 U	152 U
Polychlorinated Biphenyls (UG/KG)										
Aroclor-1260	59.8	--	94 U	460 K	4,700 K	990 K	670 K	400 K	640 K	630 K
Explosives (UG/KG)										
1,3-Dinitrobenzene	24.5	--	NA	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ
2,4,6-Trinitrotoluene	337	--	NA	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ
3-Nitrotoluene	7,035	--	NA	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ
4-Amino-2,6-dinitrotoluene	84.9	--	NA	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ
4-Nitrotoluene	14,867	--	NA	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ
HMX	17.3	--	NA	500 UJ	500 UJ	500 UJ	500 UJ	500 UJ	500 UJ	500 UJ
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	NSV	--	NA	650 UJ	650 UJ	650 UJ	650 UJ	650 UJ	650 UJ	650 UJ
Inorganics (MG/KG)										
Aluminum	25,500	23,200	3,290 K	13,000	14,500	6,760	34,200	9,640	11,300	9,620
Antimony	3.00	1.70	0.87 U	1.93 U	1.67 U	2.78 U	3.07 U	2.86 U	3.37 U	3.35 U
Arsenic	9.79	108	8.5	15.2	15.9	40.8	30.7	19.2	30.4	26.8
Barium	20.0	75.0	21 J	88.7	85.5	56.7	163	80.3	97.4	85.9
Beryllium	NSV	1.39	0.36 B	1.4	1.3	0.672 U	2.8	1.6	1.6	1.9
Cadmium	0.99	0.571	0.16 U	2.3	1.88 U	3.13 U	5.9	3.22 U	3.79 U	3.76 U
Chromium	43.4	52.0	11.5	39.1	38.7	30.3	91	30	35	26.8
Cobalt	50.0	9.45	1.2 J	6.8	6.6	7.3	11.5	6.4	4.6	8
Copper	31.6	25.6	7.6 J	58.7	58.4	34.2	47.7	41.4	55.9	48.4
Cyanide	NSV	--	0.085 U	5 U	4 U	6 U	6 U	4 U	6 U	8 U
Iron	20,000	45,600	9,630	40,500	43,100	23,000	69,400	32,300	34,400	27,700
Lead	35.8	41.6	14.9	121	122	87.1	121	73.7	70.7	54.1

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAS011-11SD32	Penniman Lake-SD10		Penniman Lake-SD11	Penniman Lake-SD12	Penniman Lake-SD13	Penniman Lake-SD14	Penniman Lake-SD15
			CAS011-11SD32-00-0602	PL-00-POND-SD10-0300	PL-00-POND-SD10D-0300	PL-00-POND-SD11-0300	PL-00-POND-SD12-0300	PL-00-POND-SD13-0300	PL-00-POND-SD14-0300	PL-00-POND-SD15-0300
			6/18/2002	3/29/2000	3/29/2000	3/30/2000	3/29/2000	3/30/2000	3/29/2000	3/29/2000
Manganese	460	368	22.2	185	196	139	467	234	228	209
Mercury	0.18	0.255	0.38	0.25	0.29	0.29	0.200	0.17	0.28	0.20
Nickel	22.7	17.1	3.9 J	20.8	23.1	14.3 U	28.2	14.7 U	22.9	17.2 U
Selenium	2.00	2.69	1.2 UL	2.48 U	2.14 U	3.58 U	3.94 U	3.67 U	4.32 U	4.3 U
Silver	1.00	--	0.38 U	2.28 U	1.97 U	3.29 U	3.62 U	3.38 U	3.97 U	3.95 U
Vanadium	57.0	62.5	14.6 J	50.4	50.4	30.2	86.8	37.7	46.2	43.7
Zinc	121	110	31.8	429	424	262	566	199	179	123
Other Parameters										
pH	--	--	NA	7.30	7.20	7.60	7.30	7.60	7.80	8.00
Total organic carbon (MG/KG)	--	--	94,300	29,700	26,100	106,000	49,100	88,500	25,300	27,800

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	Penniman Lake-SD16 PL-00-POND-SD16-0300 3/29/2000	Penniman Lake-SD17 PL-00-POND-SD17-0300 3/29/2000
Volatile Organic Compounds (UG/KG)				
2-Butanone	988	591	79 U	84 U
Acetone	NSV	2,500	210 B	730
Carbon disulfide	3.11	25.8	79 U	84 U
Chloromethane	NSV	--	79 U	84 U
cis-1,2-Dichloroethene	1,464	--	NA	NA
Methyl acetate	NSV	--	NA	NA
Methylcyclohexane	NSV	--	NA	NA
Methylene chloride	1,354	--	26 BJ	22 BJ
Trichloroethene	5,856	--	79 U	84 U
Semivolatile Organic Compounds (UG/KG)				
2-Methylnaphthalene	70.0	--	2,600 U	2,800 U
Acenaphthene	290	--	2,600 U	2,800 U
Acenaphthylene	160	--	2,600 U	2,800 U
Acetophenone	NSV	--	NA	NA
Anthracene	57.2	--	2,600 U	2,800 U
Benzaldehyde	NSV	--	NA	NA
Benzo(a)anthracene	108	18.2	2,600 U	2,800 U
Benzo(a)pyrene	150	--	2,600 U	2,800 U
Benzo(b)fluoranthene	240	30.3	2,600 U	2,800 U
Benzo(g,h,i)perylene	170	25.0	2,600 U	2,800 U
Benzo(k)fluoranthene	240	--	2,600 U	2,800 U
bis(2-Ethylhexyl)phthalate	750	--	1,000 B	220 B
Carbazole	140	--	2,600 U	2,800 U
Chrysene	166	21.7	2,600 U	2,800 U
Dibenz(a,h)anthracene	33.0	--	2,600 U	2,800 U
Dibenzofuran	5,100	--	2,600 U	2,800 U
Di-n-butylphthalate	110	--	2,600 U	2,800 U
Di-n-octylphthalate	NSV	--	2,600 U	2,800 U
Fluoranthene	423	24.3	2,600 U	2,800 U
Fluorene	77.4	--	2,600 U	2,800 U
Indeno(1,2,3-cd)pyrene	200	--	2,600 U	2,800 U
Naphthalene	176	--	2,600 U	2,800 U
PAH (HMW) - Detects	2,900	381	0 U	0 U
PAH (LMW) - Detects	786	1,670	0 U	0 U
PAH (total) - Detects	3,553	2,110	0 U	0 U
PAH (HMW)	2,900	381	11,700 U	12,600 U
PAH (LMW)	786	1,670	11,700 U	12,600 U
PAH (total)	3,553	2,110	23,400 U	25,200 U
Phenanthrene	204	33.0	2,600 U	2,800 U
Pyrene	195	35.3	2,600 U	2,800 U
Pesticides (UG/KG)				
4,4'-DDD	4.88	10.1	25.6 U	27.8 U

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	Penniman Lake-SD16 PL-00-POND-SD16-0300 3/29/2000	Penniman Lake-SD17 PL-00-POND-SD17-0300 3/29/2000
4,4'-DDE	3.16	44.1	53 K	39 K
4,4'-DDT	4.16	1.45	36 K	34 K
Aldrin	2.00	--	12.8 U	13.9 U
alpha-BHC	6.00	0.813	12.8 U	13.9 U
alpha-Chlordane	3.24	--	12.8 U	13.9 U
beta-BHC	5.00	--	12.8 U	13.9 U
delta-BHC	3.00	--	12.8 U	13.9 U
Dieldrin	1.90	0.948	25.6 U	27.8 U
Endosulfan I	10.6	--	12.8 U	13.9 U
Endosulfan II	51.2	--	25.6 U	27.8 U
Endosulfan sulfate	19.8	--	25.6 U	16 K
Endrin	2.22	8.64	25.6 U	27.8 U
Endrin aldehyde	2.22	--	25.6 U	27.8 U
Endrin ketone	2.22	--	15 K	27.8 U
gamma-BHC (Lindane)	2.37	2.92	12.8 U	13.9 U
gamma-Chlordane	3.24	1.10	12.8 U	13.9 U
Heptachlor	249	--	12.8 U	13.9 U
Heptachlor epoxide	2.47	--	12.8 U	13.9 U
Methoxychlor	69.5	--	128 U	139 U
Polychlorinated Biphenyls (UG/KG)				
Aroclor-1260	59.8	--	480 K	480 K
Explosives (UG/KG)				
1,3-Dinitrobenzene	24.5	--	250 UJ	250 UJ
2,4,6-Trinitrotoluene	337	--	250 UJ	250 UJ
3-Nitrotoluene	7,035	--	250 UJ	250 UJ
4-Amino-2,6-dinitrotoluene	84.9	--	250 UJ	250 UJ
4-Nitrotoluene	14,867	--	250 UJ	250 UJ
HMX	17.3	--	500 UJ	500 UJ
Nitroglycerin	NSV	--	NA	NA
Tetryl	NSV	--	650 UJ	650 UJ
Inorganics (MG/KG)				
Aluminum	25,500	23,200	11,000	12,400
Antimony	3.00	1.70	3.26 U	2.91 U
Arsenic	9.79	108	29.9	24.2
Barium	20.0	75.0	83.1	87
Beryllium	NSV	1.39	0.81	1.4
Cadmium	0.99	0.571	3.66 U	3.27 U
Chromium	43.4	52.0	25.3	26.6
Cobalt	50.0	9.45	7.4	8.3
Copper	31.6	25.6	47.3	52.6
Cyanide	NSV	--	4 U	7 U
Iron	20,000	45,600	29,600	22,800
Lead	35.8	41.6	63.7	55.2

Table D-76
Exceedances - Penniman Lake Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	Penniman Lake-SD16 PL-00-POND-SD16-0300 3/29/2000	Penniman Lake-SD17 PL-00-POND-SD17-0300 3/29/2000
Manganese	460	368	212	189
Mercury	0.18	0.255	0.19	0.23
Nickel	22.7	17.1	19.6	14.9 U
Selenium	2.00	2.69	4.18 U	3.73 U
Silver	1.00	--	3.85 U	3.43 U
Vanadium	57.0	62.5	41.7	34.8
Zinc	121	110	145	195
Other Parameters				
pH	--	--	7.80	7.50
Total organic carbon (MG/KG)	--	--	30,600	28,600

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-77
Screening Statistics - Penniman Lake Surface Sediment - Group 1
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	2.00 - 460	7 / 15	21.3	330	CAPL-SD70-1012-V	89.8	112	141	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	2,500	0 / 15	0.13	NO
Carbon disulfide	2.40 - 50.0	6 / 15	0.70	9.00	PL-00-POND-SD11-0300	5.71	6.42	8.63	4.92	1 / 15	1.83	1.75	1.16	--	-- / --	--	--	--	25.8	0 / 15	0.35	NO
Chloromethane	4.80 - 73.0	0 / 15	--	--	--	11.6	9.71	16.0	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methyl acetate	4.80 - 40.0	0 / 13	--	--	--	8.64	5.81	11.5	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methylcyclohexane	2.40 - 40.0	1 / 13	5.00	5.00	CAS011-11SD30-00-0602	7.03	5.95	9.97	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	19.6 - 2,400	2 / 15	140	336	CAPL-SD87-1012	372	333	524	290	1 / 15	1.16	--	--	3,590	0 / 15	0.09	--	--	--	-- / --	--	--
Acetophenone	196 - 1,300	3 / 13	16.0	39.0	CAS011-11SD22-00-0602	199	194	295	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Anthracene	19.6 - 2,400	3 / 15	27.0	265	CAPL-SD87-1012	313	354	474	57.2	1 / 15	4.63	--	--	1,274	0 / 15	0.21	--	--	--	-- / --	--	--
Benzaldehyde	196 - 430	7 / 13	19.0	323	CAPL-SD70-1012	127	84.2	169	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Benzo(a)anthracene	19.6 - 2,400	4 / 15	60.0	230	PL-00-POND-SD10-0300	271	326	419	108	2 / 15	2.13	--	--	637	0 / 15	0.36	--	--	--	-- / --	--	--
Benzo(a)pyrene	19.6 - 2,400	6 / 15	12.0	220	PL-00-POND-SD10-0300	220	327	369	150	1 / 15	1.47	--	1.47	811	0 / 15	0.27	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	19.6 - 460	10 / 15	20.0	590	PL-00-POND-SD10-0300	141	162	214	240	2 / 15	2.46	0.89	0.59	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	19.6 - 2,400	2 / 15	140	180	PL-00-POND-SD10-0300	297	332	448	170	1 / 15	1.06	--	--	--	-- / --	--	--	--	25.0	2 / 15	7.20	--
Benzo(k)fluoranthene	19.6 - 2,400	5 / 15	56.0	240	CAS011-11SD18-00-0602	246	318	390	240	1 / 15	1.00	--	--	--	-- / --	--	--	--	--	-- / --	--	--
bis(2-Ethylhexyl)phthalate	22.0 - 2,400	0 / 15	--	--	--	171	296	305	750	-- / --	3.20	0.41	0.23	5,153,100	-- / --	0.0005	--	--	--	-- / --	--	NO
Chrysene	19.6 - 2,400	9 / 15	22.0	430	PL-00-POND-SD10-0300	207	303	344	166	3 / 15	2.59	2.07	1.24	--	-- / --	--	--	--	--	-- / --	--	--
Dibenz(a,h)anthracene	19.6 - 2,400	1 / 15	29.0	29.0	CAS011-11SD18-00-0602	331	360	494	33.0	0 / 15	0.88	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Di-n-octylphthalate	196 - 2,400	3 / 15	19.0	470	CAS011-11SD29-00-0602	337	317	481	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Fluoranthene	19.6 - 410	12 / 15	20.0	490	PL-00-POND-SD10-0300	161	166	236	423	2 / 15	1.16	0.56	0.38	16,791	0 / 15	0.03	--	--	--	-- / --	--	--
Fluorene	19.6 - 2,400	2 / 15	70.7	285	CAPL-SD87-1012	364	337	518	77.4	1 / 15	3.68	--	--	3,127	0 / 15	0.09	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	19.6 - 1,300	8 / 15	12.0	200	PL-00-POND-SD10-0300	150	181	232	200	1 / 15	1.00	--	0.75	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	12 / 15	20.1	2,570	PL-00-POND-SD10-0300	541	757	885	2,900	0 / 15	0.89	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	12 / 15	20.0	2,275	CAPL-SD87-1012	326	587	593	786	1 / 15	2.89	0.75	0.42	--	-- / --	--	--	--	--	-- / --	--	YES
PAH (total) - Detects	-- - --	12 / 15	41.0	3,250	PL-00-POND-SD10-0300	867	1,153	1,391	3,553	0 / 15	0.91	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	88.2 - 1,845	12 / 15	108	7,670	PL-00-POND-SD11-0300	1,960	1,980	2,860	2,900	3 / 15	2.64	0.99	0.68	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	176 - 1,845	12 / 15	209	9,770	PL-00-POND-SD11-0300	2,793	2,651	3,999	786	11 / 15	12.4	5.09	3.55	--	-- / --	--	--	--	1,670	9 / 15	5.85	--
PAH (total)	265 - 3,690	12 / 15	317	17,440	PL-00-POND-SD11-0300	4,767	4,571	6,846	3,553	7 / 15	4.91	1.93	1.34	--	-- / --	--	--	--	2,110	10 / 15	8.27	--
Phenanthrene	19.6 - 2,400	7 / 15	36.0	949	CAPL-SD87-1012	261	353	421	204	1 / 15	4.65	2.07	1.28	4,922	0 / 15	0.19	--	--	--	-- / --	--	--
Pyrene	19.6 - 410	12 / 15	20.1	620	PL-00-POND-SD10-0300	173	190	259	195	5 / 15	3.18	1.33	0.89	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	4.10 - 23.8	6 / 15	6.53	43.9	CAPL-SD70-1012	11.1	12.3	16.7	4.88	6 / 15	9.00	3.42	2.27	637	0 / 15	0.07	--	--	--	-- / --	--	NO
4,4'-DDE	4.10 - 4.10	14 / 15	4.40	190	CAS011-11SD30-00-0602	55.9	53.5	80.2	3.16	14 / 15	60.1	25.4	17.7	1,969	0 / 15	0.10	--	--	--	-- / --	--	NO
4,4'-DDT	4.10 - 23.8	6 / 15	18.3	920	PL-00-POND-SD10-0300	83.0	234	190	4.16	6 / 15	221	45.6	20.0	1,969	0 / 15	0.47	--	--	--	-- / --	--	NO
Aldrin	0.95 - 11.9	4 / 15	0.41	3.54	CAPL-SD84-1012	2.40	1.78	3.22	2.00	1 / 15	1.77	1.61	1.20	--	-- / --	--	--	--	--	-- / --	--	YES
alpha-Chlordane	2.10 - 11.9	6 / 15	6.82	29.6	CAPL-SD70-1012	7.20	7.36	10.6	3.24	6 / 15	9.14	3.26	2.22	16,212	0 / 15	0.002	--	--	--	-- / --	--	NO
beta-BHC	0.41 - 11.9	3 / 15	0.98	7.30	CAS011-11SD23-00-0602	2.53	2.26	3.56	5.00	1 / 15	1.46	0.71	0.51	695	0 / 15	0.01	--	--	--	-- / --	--	NO
Dieldrin	4.10 - 23.8	6 / 15	59.0	364	CAPL-SD84-1012	59.5	97.5	104	1.90	6 / 15	192	54.6	31.3	301	1 / 15	1.21	0.34	0.20	--	-- / --	--	NO
Endosulfan I	0.41 - 11.9	4 / 15	0.33	56.0	CAS011-11SD30-00-0602	5.51	14.1	11.9	16.8	1 / 15	3.34	0.71	0.33	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan II	0.95 - 23.8	4 / 15	15.4	56.1	CAPL-SD84-1012	13.4	16.4	20.8	81.1	0 / 15	0.69	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.41 - 23.8	3 / 15	27.0	681	CAPL-SD84-1012	71.9	187	157	31.3	2 / 15	21.8	5.02	2.30	--	-- / --	--	--	--	--	-- / --	--	YES
Endrin	0.95 - 23.8	5 / 15	29.5	143	CAPL-SD84-1012	23.3	36.8	40.0	2.22	5 / 15	64.4	18.0	10.5	116	1 / 15	1.23	0.35	0.20	--	-- / --	--	NO
Endrin aldehyde	4.10 - 23.8	5 / 15	4.39	17.4	CAPL-SD84-1012	7.35	4.87	9.57	2.22	5 / 15	7.84	4.31	3.31	116	0 / 15	0.15	--	--	--	-- / --	--	NO
Endrin ketone	4.10 - 23.8	6 / 15	11.0	49.4	CAPL-SD84-1012	13.0	13.3	19.1	2.22	6 / 15	22.3	8.60	5.87	116	0 / 15	0.43	--	--	--	-- / --	--	NO
gamma-Chlordane	2.10 - 11.9	8 / 15	9.40	94.2	CAPL-SD70-1012	21.4	28.1	34.2	3.24	8 / 15	29.1	10.5	6.60	16,212	0 / 15	0.01	--	--	--	-- / --	--	NO
Heptachlor epoxide	2.10 - 11.9	6 / 15	0.98	9.10	PL-00-POND-SD10-0300	3.22	2.34	4.28	2.47	3 / 15	3.68	1.73	1.30	394	0 / 15	0.02	--	--	--	-- / --	--	NO

Table D-77
Screening Statistics - Penniman Lake Surface Sediment - Group 1
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Methoxychlor	21.0 - 119	5 / 15	11.4	82.2	CAPL-SD70-1012	31.9	21.5	41.7	110	0 / 15	0.75	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	-- - --	22 / 22	15.0	16,200	CAPL-SD84-1012	4,272	5,408	6,256	59.8	18 / 22	271	105	71.4	4,690	7 / 22	3.45	1.33	0.91	--	-- / --	--	YES
Explosives (UG/KG)																						
1,3-Dinitrobenzene	174 - 250	0 / 7	--	--	--	101	16.8	113	38.8	-- / --	6.44	2.91	2.59	--	-- / --	--	--	--	--	-- / --	--	NO
4-Amino-2,6-dinitrotoluene	174 - 250	0 / 7	--	--	--	101	16.8	113	134	-- / --	1.86	0.84	0.75	--	-- / --	--	--	--	--	-- / --	--	NO
HMX	174 - 500	0 / 7	--	--	--	136	77.7	193	27.4	-- / --	18.2	7.05	4.97	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	435 - 472	0 / 5	--	--	--	227	6.55	233	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Tetryl	174 - 650	0 / 7	--	--	--	158	114	242	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Inorganics (MG/KG)																						
Aluminum	-- - --	15 / 15	832	14,500	PL-00-POND-SD10-0300	5,469	3,756	7,178	25,500	0 / 15	0.57	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	0.38 - 6.01	3 / 15	0.56	3.89	CAPL-SD85-1012	0.95	1.08	1.44	3.00	1 / 15	1.30	0.48	0.32	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	1.22 - 1.22	14 / 15	1.90	40.8	PL-00-POND-SD11-0300	10.9	11.6	16.1	9.79	6 / 15	4.17	1.65	1.11	--	-- / --	--	--	--	108	0 / 15	0.38	NO
Barium	-- - --	15 / 15	6.50	90.2	CAPL-SD85-1012	38.4	27.4	50.9	20.0	10 / 15	4.51	2.55	1.92	--	-- / --	--	--	--	75.0	2 / 15	1.20	YES
Beryllium	0.17 - 1.50	5 / 15	0.22	5.98	CAPL-SD85-1012	0.82	1.48	1.49	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	2 / 15	4.30	YES
Cadmium	0.10 - 3.13	3 / 15	0.11	2.30	PL-00-POND-SD10-0300	0.49	0.65	0.79	0.99	1 / 15	2.32	0.80	0.50	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	15 / 15	4.00	45.0	CAPL-SD85-1012	18.3	12.5	24.0	43.4	1 / 15	1.04	0.55	0.42	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	15 / 15	1.80	1,000	CAPL-SD85-1012	90.3	253	205	31.6	6 / 15	31.6	6.50	2.86	--	-- / --	--	--	--	25.6	6 / 15	39.1	YES
Cyanide	0.036 - 6.00	3 / 15	0.16	0.35	CAPL-SD87-1012	0.46	0.94	0.89	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Iron	-- - --	15 / 15	3,890	43,100	PL-00-POND-SD10-0300	16,642	11,444	21,846	20,000	5 / 15	2.16	1.09	0.83	--	-- / --	--	--	--	45,600	0 / 15	0.95	NO
Lead	-- - --	15 / 15	6.10	853	CAPL-SD85-1012	117	208	211	35.8	11 / 15	23.8	5.91	3.26	--	-- / --	--	--	--	41.6	10 / 15	20.5	YES
Manganese	-- - --	15 / 15	10.3	275	CAPL-SD85-1012	91.5	79.9	128	460	0 / 15	0.60	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.040 - 0.19	7 / 15	0.017	0.29	PL-00-POND-SD10-0300	0.081	0.089	0.12	0.18	2 / 15	1.61	0.68	0.45	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	14.3 - 14.3	14 / 15	1.30	564	CAPL-SD85-1012	48.1	144	113	22.7	3 / 15	24.8	5.00	2.12	--	-- / --	--	--	--	17.1	3 / 15	33.0	YES
Vanadium	-- - --	15 / 15	4.20	50.4	PL-00-POND-SD10-0300	18.8	12.9	24.7	57.0	0 / 15	0.88	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	15 / 15	22.7	2,950	CAPL-SD85-1012	354	733	688	121	7 / 15	24.4	5.68	2.93	--	-- / --	--	--	--	110	8 / 15	26.8	YES
Other Parameters																						
pH	-- - --	7 / 7	7.30	8.28	CAPL-SD84-1012	7.81	0.36	8.08	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	22 / 22	1,300	180,000	CAPL-SD22-0711	57,948	54,871	78,078	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-78
Screening Statistics - Penniman Lake Surface Sediment - Group 2
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	4.00 - 200	1 / 5	100	100	CAS011-11SD27-00-0602	43.4	51.7	92.7	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	2,500	0 / 5	0.04	NO
Carbon disulfide	14.0 - 73.0	0 / 5	--	--	--	16.2	12.7	28.3	3.11	-- / --	23.5	9.11	5.21	--	-- / --	--	--	--	--	-- / --	--	NO
Chloromethane	14.0 - 73.0	1 / 5	2.00	2.00	CAS011-11SD27-00-0602	12.4	13.7	25.5	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Methyl acetate	14.0 - 42.0	0 / 4	--	--	--	11.1	6.69	19.0	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methylcyclohexane	14.0 - 42.0	0 / 4	--	--	--	11.1	6.69	19.0	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	420 - 2,400	0 / 5	--	--	--	528	425	934	290	-- / --	8.28	3.22	1.82	2,269	-- / --	1.06	0.41	0.23	--	-- / --	--	--
Acetophenone	420 - 1,400	0 / 4	--	--	--	360	230	631	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Anthracene	420 - 2,400	0 / 5	--	--	--	528	425	934	57.2	-- / --	42.0	16.3	9.23	805	-- / --	2.98	1.16	0.66	--	-- / --	--	--
Benzaldehyde	-- - --	4 / 4	15.0	82.0	CAS011-11SD27-00-0602	38.0	30.7	74.1	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Benzo(a)anthracene	420 - 2,400	1 / 5	21.0	21.0	CAS011-11SD24-00-0602	471	478	927	108	0 / 5	0.19	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(a)pyrene	420 - 2,400	1 / 5	20.0	20.0	CAS011-11SD24-00-0602	471	479	927	150	0 / 5	0.13	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	420 - 1,400	2 / 5	45.0	220	PL-00-POND-SD12-0300	280	247	515	240	0 / 5	0.92	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	420 - 2,400	0 / 5	--	--	--	528	425	934	170	-- / --	14.1	5.49	3.11	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	420 - 2,400	1 / 5	36.0	36.0	CAS011-11SD24-00-0602	474	475	927	240	0 / 5	0.15	--	--	--	-- / --	--	--	--	--	-- / --	--	--
bis(2-Ethylhexyl)phthalate	22.0 - 660	0 / 5	--	--	--	94.8	133	222	750	-- / --	0.88	0.30	0.13	--	-- / --	--	--	--	--	-- / --	--	NO
Chrysene	420 - 1,400	2 / 5	44.0	160	PL-00-POND-SD12-0300	268	252	508	166	0 / 5	0.96	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Dibenz(a,h)anthracene	420 - 2,400	0 / 5	--	--	--	528	425	934	33.0	-- / --	72.7	28.3	16.0	--	-- / --	--	--	--	--	-- / --	--	--
Di-n-octylphthalate	420 - 2,400	1 / 5	220	220	CAS011-11SD27-00-0602	432	431	843	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Fluoranthene	420 - 450	3 / 5	41.0	150	PL-00-POND-SD12-0300	137	84.7	218	423	0 / 5	0.35	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	420 - 2,400	0 / 5	--	--	--	528	425	934	77.4	-- / --	31.0	12.1	6.82	1,976	-- / --	1.21	0.47	0.27	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	420 - 2,400	1 / 5	25.0	25.0	CAS011-11SD24-00-0602	472	477	927	200	0 / 5	0.13	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	2 / 5	242	540	PL-00-POND-SD12-0300	156	239	384	2,900	0 / 5	0.19	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	3 / 5	41.0	150	PL-00-POND-SD12-0300	53.4	62.6	113	786	0 / 5	0.19	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	3 / 5	41.0	690	PL-00-POND-SD12-0300	210	300	495	3,553	0 / 5	0.19	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	1,890 - 6,300	2 / 5	852	7,740	PL-00-POND-SD12-0300	2,740	2,955	5,558	2,900	1 / 5	2.67	1.92	0.94	--	-- / --	--	--	--	381	2 / 5	20.3	--
PAH (LMW)	1,890 - 2,025	3 / 5	2,211	9,750	PL-00-POND-SD12-0300	3,912	3,781	7,516	786	3 / 5	12.4	9.56	4.98	--	-- / --	--	--	--	1,670	3 / 5	5.84	--
PAH (total)	3,780 - 4,050	3 / 5	3,063	17,490	PL-00-POND-SD12-0300	7,282	7,078	14,030	3,553	2 / 5	4.92	3.95	2.05	--	-- / --	--	--	--	2,110	3 / 5	8.29	--
Phenanthrene	420 - 2,400	1 / 5	18.0	18.0	CAS011-11SD24-00-0602	471	479	927	204	0 / 5	0.09	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	420 - 1,400	2 / 5	51.0	160	PL-00-POND-SD12-0300	269	250	508	195	0 / 5	0.82	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	4.20 - 23.8	0 / 5	--	--	--	5.26	4.22	9.28	4.88	-- / --	4.88	1.90	1.08	403	-- / --	0.06	--	--	--	-- / --	--	NO
4,4'-DDE	4.50 - 4.50	4 / 5	3.10	39.0	PL-00-POND-SD12-0300	19.7	18.0	36.9	3.16	3 / 5	12.3	11.7	6.22	1,244	0 / 5	0.03	--	--	--	-- / --	--	NO
4,4'-DDT	4.20 - 23.8	0 / 5	--	--	--	5.26	4.22	9.28	4.16	-- / --	5.72	2.23	1.26	1,244	-- / --	0.02	--	--	--	-- / --	--	NO
Aldrin	2.20 - 11.9	0 / 5	--	--	--	2.66	2.10	4.66	2.00	-- / --	5.95	2.33	1.33	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	2.20 - 11.9	0 / 5	--	--	--	2.66	2.10	4.66	3.24	-- / --	3.67	1.44	0.82	10,248	-- / --	0.001	--	--	--	-- / --	--	NO
beta-BHC	2.20 - 11.9	0 / 5	--	--	--	2.66	2.10	4.66	5.00	-- / --	2.38	0.93	0.53	439	-- / --	0.03	--	--	--	-- / --	--	NO
Dieldrin	4.20 - 23.8	0 / 5	--	--	--	5.26	4.22	9.28	1.90	-- / --	12.5	4.88	2.77	190	-- / --	0.13	--	--	--	-- / --	--	NO
Endosulfan I	2.20 - 11.9	0 / 5	--	--	--	2.66	2.10	4.66	10.6	-- / --	1.12	0.44	0.25	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan II	4.20 - 23.8	0 / 5	--	--	--	5.26	4.22	9.28	51.2	-- / --	0.46	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	4.20 - 14.0	1 / 5	12.0	12.0	PL-00-POND-SD12-0300	5.28	4.25	9.34	19.8	0 / 5	0.61	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	4.20 - 23.8	0 / 5	--	--	--	5.26	4.22	9.28	2.22	-- / --	10.7	4.18	2.37	73.2	-- / --	0.33	--	--	--	-- / --	--	NO
Endrin aldehyde	4.20 - 23.8	0 / 5	--	--	--	5.26	4.22	9.28	2.22	-- / --	10.7	4.18	2.37	73.2	-- / --	0.33	--	--	--	-- / --	--	NO
Endrin ketone	4.20 - 14.0	1 / 5	15.0	15.0	PL-00-POND-SD12-0300	5.88	5.48	11.1	2.22	1 / 5	6.76	5.00	2.65	73.2	0 / 5	0.20	--	--	--	-- / --	--	NO
gamma-Chlordane	2.20 - 11.9	0 / 5	--	--	--	2.66	2.10	4.66	3.24	-- / --	3.67	1.44	0.82	10,248	-- / --	0.001	--	--	--	-- / --	--	NO
Heptachlor epoxide	2.20 - 11.9	0 / 5	--	--	--	2.66	2.10	4.66	2.47	-- / --	4.82	1.89	1.08	249	-- / --	0.05	--	--	--	-- / --	--	NO
Methoxychlor	22.0 - 119	0 / 5	--	--	--	26.6	21.0	46.6	69.5	-- / --	1.71	0.67	0.38	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	18.0 - 45.0	3 / 6	81.0	670	PL-00-POND-SD12-0300	187	264	404	59.8	3 / 6	11.2	6.76	3.13	2,965	0 / 6	0.23	--	--	--	-- / --	--	NO

Table D-78
Screening Statistics - Penniman Lake Surface Sediment - Group 2
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Explosives (UG/KG)																						
1,3-Dinitrobenzene	250 - 250	0 / 1	--	--	--	125	--	--	24.5	-- / --	10.2	--	5.10	--	-- / --	--	--	--	--	-- / --	--	NO
4-Amino-2,6-dinitrotoluene	250 - 250	0 / 1	--	--	--	125	--	--	84.9	-- / --	2.94	--	1.47	--	-- / --	--	--	--	--	-- / --	--	NO
HMX	500 - 500	0 / 1	--	--	--	250	--	--	17.3	-- / --	28.8	--	14.4	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	-- - --	0 / 0	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Tetryl	650 - 650	0 / 1	--	--	--	325	--	--	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Inorganics (MG/KG)																						
Aluminum	-- - --	5 / 5	1,700	34,200	PL-00-POND-SD12-0300	12,042	13,071	24,503	25,500	1 / 5	1.34	0.96	0.47	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	0.40 - 3.07	1 / 5	1.50	1.50	CAS011-11SD24-00-0602	0.81	0.67	1.44	3.00	0 / 5	0.50	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	5 / 5	2.30	30.7	PL-00-POND-SD12-0300	14.7	11.4	25.5	9.79	3 / 5	3.14	2.61	1.50	--	-- / --	--	--	--	108	0 / 5	0.28	NO
Barium	-- - --	5 / 5	14.7	163	PL-00-POND-SD12-0300	60.1	61.0	118	20.0	3 / 5	8.15	5.91	3.01	--	-- / --	--	--	--	75.0	1 / 5	2.17	YES
Beryllium	0.26 - 1.10	1 / 5	2.80	2.80	PL-00-POND-SD12-0300	0.84	1.11	1.90	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	1 / 5	2.01	YES
Cadmium	0.075 - 1.10	1 / 5	5.90	5.90	PL-00-POND-SD12-0300	1.36	2.55	3.79	0.99	1 / 5	5.96	3.82	1.37	--	-- / --	--	--	--	0.571	1 / 5	10.3	YES
Chromium	-- - --	5 / 5	8.40	91.0	PL-00-POND-SD12-0300	37.3	32.7	68.5	43.4	1 / 5	2.10	1.58	0.86	--	-- / --	--	--	--	52.0	1 / 5	1.75	YES
Copper	-- - --	5 / 5	1.60	47.7	PL-00-POND-SD12-0300	16.4	18.7	34.2	31.6	1 / 5	1.51	1.08	0.52	--	-- / --	--	--	--	25.6	1 / 5	1.86	YES
Cyanide	0.037 - 6.00	0 / 5	--	--	--	0.63	1.33	1.89	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	5 / 5	7,700	69,400	PL-00-POND-SD12-0300	31,180	24,187	54,240	20,000	3 / 5	3.47	2.71	1.56	--	-- / --	--	--	--	45,600	1 / 5	1.52	YES
Lead	-- - --	5 / 5	6.00	121	PL-00-POND-SD12-0300	46.1	46.0	90.0	35.8	3 / 5	3.38	2.51	1.29	--	-- / --	--	--	--	41.6	3 / 5	2.91	YES
Manganese	-- - --	5 / 5	29.9	467	PL-00-POND-SD12-0300	146	181	319	460	1 / 5	1.02	0.69	0.32	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.044 - 0.18	1 / 5	0.20	0.20	PL-00-POND-SD12-0300	0.075	0.075	0.15	0.18	1 / 5	1.11	0.81	0.42	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	5 / 5	1.40	28.2	PL-00-POND-SD12-0300	9.92	10.8	20.2	22.7	1 / 5	1.24	0.89	0.44	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	5 / 5	7.50	86.8	PL-00-POND-SD12-0300	34.8	31.4	64.7	57.0	1 / 5	1.52	1.13	0.61	--	-- / --	--	--	--	62.5	1 / 5	1.39	YES
Zinc	-- - --	5 / 5	22.4	566	PL-00-POND-SD12-0300	212	217	419	121	3 / 5	4.68	3.46	1.75	--	-- / --	--	--	--	110	3 / 5	5.15	YES
Other Parameters																						
pH	-- - --	1 / 1	7.30	7.30	PL-00-POND-SD12-0300	7.30	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	6 / 6	12,000	71,500	CAS011-11SD27-00-0602	36,617	24,208	56,531	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-79
Screening Statistics - Penniman Lake Surface Sediment - Group 3
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	-- - --	7 / 7	60.6	730	PL-00-POND-SD17-0300	195	238	370	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	2,500	0 / 7	0.29	NO
Carbon disulfide	4.66 - 84.0	1 / 7	3.50	3.50	CAPL-SD80-1012	8.49	14.8	19.3	5.58	0 / 7	0.63	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Chloromethane	9.33 - 84.0	0 / 7	--	--	--	10.7	13.8	20.8	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methyl acetate	9.33 - 12.4	1 / 6	8.47	8.47	CAPL-SD79-1012	5.81	1.40	6.96	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Methylcyclohexane	4.66 - 6.48	1 / 6	26.4	26.4	CAPL-SD77-1012-V	6.62	9.69	14.6	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	6.29 - 2,800	0 / 7	--	--	--	213	524	597	290	-- / --	9.66	2.06	0.73	4,073	-- / --	0.69	--	--	--	-- / --	--	--
Acetophenone	315 - 459	0 / 6	--	--	--	191	26.9	213	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Anthracene	6.29 - 2,800	0 / 7	--	--	--	213	524	597	57.2	-- / --	49.0	10.4	3.72	1,445	-- / --	1.94	0.41	0.15	--	-- / --	--	--
Benzaldehyde	398 - 459	3 / 6	170	212	CAPL-SD80-1012	201	21.3	218	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Benzo(a)anthracene	6.29 - 2,800	0 / 7	--	--	--	213	524	597	108	-- / --	25.9	5.53	1.97	723	-- / --	3.87	0.83	0.29	--	-- / --	--	--
Benzo(a)pyrene	6.29 - 2,800	2 / 7	9.18	36.9	CAPL-SD76-1012	215	522	599	150	0 / 7	0.25	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	6.29 - 2,800	2 / 7	10.5	34.9	CAPL-SD76-1012	215	522	599	240	0 / 7	0.15	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	36.4 - 2,800	2 / 7	7.31	29.9	CAPL-SD76-1012	217	522	600	170	0 / 7	0.18	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	6.29 - 2,800	2 / 7	8.89	28.3	CAPL-SD76-1012	214	523	598	240	0 / 7	0.12	--	--	--	-- / --	--	--	--	--	-- / --	--	--
bis(2-Ethylhexyl)phthalate	220 - 421	0 / 7	--	--	--	170	32.8	194	750	-- / --	0.56	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Chrysene	6.71 - 2,800	2 / 7	9.23	57.2	CAPL-SD78-1012	219	521	602	166	0 / 7	0.34	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Dibenz(a,h)anthracene	6.29 - 2,800	0 / 7	--	--	--	213	524	597	33.0	-- / --	84.8	18.1	6.44	--	-- / --	--	--	--	--	-- / --	--	--
Di-n-octylphthalate	315 - 2,800	0 / 7	--	--	--	364	458	700	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Fluoranthene	2,800 - 2,800	6 / 7	12.2	48.2	CAPL-SD76-1012	228	517	607	423	0 / 7	0.11	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	6.29 - 2,800	0 / 7	--	--	--	213	524	597	77.4	-- / --	36.2	7.72	2.75	3,548	-- / --	0.79	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	6.29 - 2,800	1 / 7	23.2	23.2	CAPL-SD76-1012	215	522	599	200	0 / 7	0.12	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	6 / 7	23.2	207	CAPL-SD76-1012	64.7	69.5	116	2,900	0 / 7	0.07	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	6 / 7	22.7	136	CAPL-SD78-1012	70.4	47.5	105	786	0 / 7	0.17	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	6 / 7	52.5	285	CAPL-SD76-1012	133	99.0	205	3,553	0 / 7	0.08	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	12,600 - 12,600	6 / 7	48.7	238	CAPL-SD78-1012	1,057	2,313	2,756	2,900	0 / 7	0.08	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	12,600 - 12,600	6 / 7	199	438	CAPL-SD79-1012	1,201	2,250	2,854	786	0 / 7	0.56	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (total)	25,200 - 25,200	6 / 7	248	656	CAPL-SD79-1012	2,259	4,562	5,610	3,553	0 / 7	0.18	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Phenanthrene	45.8 - 2,800	5 / 7	10.5	53.1	CAPL-SD77-1012	227	517	607	204	0 / 7	0.26	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	2,800 - 2,800	6 / 7	13.3	53.3	CAPL-SD76-1012	230	516	609	195	0 / 7	0.27	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	0.63 - 27.8	5 / 7	1.39	23.3	CAPL-SD76-1012	7.90	8.43	14.1	4.88	2 / 7	4.77	2.89	1.62	723	0 / 7	0.03	--	--	--	-- / --	--	NO
4,4'-DDE	-- - --	7 / 7	4.74	46.5	CAPL-SD77-1012	27.7	16.4	39.8	3.16	7 / 7	14.7	12.6	8.76	2,234	0 / 7	0.02	--	--	--	-- / --	--	NO
4,4'-DDT	0.63 - 0.63	6 / 7	0.70	34.0	PL-00-POND-SD17-0300	5.95	12.4	15.1	4.16	1 / 7	8.17	3.62	1.43	2,234	0 / 7	0.02	--	--	--	-- / --	--	NO
Aldrin	0.63 - 13.9	2 / 7	0.33	0.51	CAPL-SD80-1012	1.32	2.48	3.14	2.00	0 / 7	0.25	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	0.63 - 13.9	2 / 7	0.91	9.57	CAPL-SD77-1012	2.69	3.88	5.54	3.24	1 / 7	2.95	1.71	0.83	18,396	0 / 7	0.001	--	--	--	-- / --	--	NO
beta-BHC	0.63 - 13.9	2 / 7	0.29	0.74	CAPL-SD80-1012	1.36	2.47	3.17	5.00	0 / 7	0.15	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Dieldrin	0.63 - 27.8	4 / 7	0.38	15.1	CAPL-SD77-1012	5.59	6.49	10.4	1.90	3 / 7	7.95	5.45	2.94	342	0 / 7	0.04	--	--	--	-- / --	--	NO
Endosulfan I	0.63 - 13.9	0 / 7	--	--	--	1.32	2.48	3.14	19.1	-- / --	0.73	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan II	0.63 - 27.8	3 / 7	1.36	3.37	CAPL-SD79-1012	3.01	4.91	6.62	92.0	0 / 7	0.04	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.63 - 0.72	4 / 7	6.65	22.8	CAPL-SD78-1012	8.47	8.97	15.1	35.5	0 / 7	0.64	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	0.63 - 27.8	4 / 7	0.58	13.7	CAPL-SD77-1012	5.05	6.23	9.62	2.22	2 / 7	6.17	4.34	2.27	131	0 / 7	0.10	--	--	--	-- / --	--	NO
Endrin aldehyde	0.80 - 27.8	5 / 7	0.37	3.05	CAPL-SD80-1012	3.02	4.89	6.61	2.22	1 / 7	1.37	2.98	1.36	131	0 / 7	0.02	--	--	--	-- / --	--	NO
Endrin ketone	0.63 - 27.8	0 / 7	--	--	--	2.31	5.11	6.06	2.22	-- / --	12.5	2.73	1.04	131	-- / --	0.21	--	--	--	-- / --	--	NO
gamma-Chlordane	13.9 - 13.9	6 / 7	1.37	35.9	CAPL-SD77-1012	8.55	12.2	17.5	3.24	3 / 7	11.1	5.41	2.64	18,396	0 / 7	0.002	--	--	--	-- / --	--	NO
Heptachlor epoxide	0.63 - 13.9	1 / 7	0.71	0.71	CAPL-SD77-1012	1.36	2.47	3.17	2.47	0 / 7	0.29	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Methoxychlor	0.63 - 139	2 / 7	4.11	4.73	CAPL-SD80-1012	11.4	25.7	30.3	125	0 / 7	0.04	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	-- - --	9 / 9	35.9	810	CAPL-SD60-0711	341	292	522	59.8	7 / 9	13.5	8.73	5.70	5,322	0 / 9	0.15	--	--	--	-- / --	--	NO

Table D-79
Screening Statistics - Penniman Lake Surface Sediment - Group 3
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Explosives (UG/KG)																						
1,3-Dinitrobenzene	191 - 250	4 / 7	151	469	CAPL-SD76-1012	233	152	344	44.0	4 / 7	10.7	7.82	5.28	--	-- / --	--	--	--	--	-- / --	--	YES
4-Amino-2,6-dinitrotoluene	191 - 250	0 / 7	--	--	--	102	10.3	109	152	-- / --	1.64	0.72	0.67	--	-- / --	--	--	--	--	-- / --	--	NO
HMX	191 - 500	1 / 7	464	464	CAPL-SD79-1012	172	141	275	31.1	1 / 7	14.9	8.84	5.52	--	-- / --	--	--	--	--	-- / --	--	YES
Nitroglycerin	478 - 500	0 / 6	--	--	--	245	3.92	248	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Tetryl	191 - 650	1 / 7	245	245	CAPL-SD76-1012	152	94.1	221	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Inorganics (MG/KG)																						
Aluminum	-- - --	7 / 7	2,430	12,400	PL-00-POND-SD17-0300	5,483	3,362	7,952	25,500	0 / 7	0.49	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	0.76 - 2.91	0 / 7	--	--	--	0.73	0.37	1.00	3.00	-- / --	0.97	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	7 / 7	5.53	24.2	PL-00-POND-SD17-0300	11.1	6.91	16.2	9.79	2 / 7	2.47	1.65	1.13	--	-- / --	--	--	--	108	0 / 7	0.22	NO
Barium	-- - --	7 / 7	12.9	87.0	PL-00-POND-SD17-0300	30.8	25.3	49.4	20.0	4 / 7	4.35	2.47	1.54	--	-- / --	--	--	--	75.0	1 / 15	1.16	YES
Beryllium	-- - --	7 / 7	0.17	1.40	PL-00-POND-SD17-0300	0.41	0.44	0.73	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	1 / 15	1.01	NO
Cadmium	0.41 - 3.27	5 / 7	0.14	0.46	CAPL-SD80-1012	0.44	0.54	0.83	0.99	0 / 7	0.46	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	7 / 7	5.73	26.6	PL-00-POND-SD17-0300	10.3	7.32	15.7	43.4	0 / 7	0.61	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	7 / 7	4.54	52.6	PL-00-POND-SD17-0300	13.7	17.5	26.5	31.6	1 / 7	1.66	0.84	0.43	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.44 - 7.00	1 / 7	4.86	4.86	CAPL-SD79-1012	1.39	1.95	2.82	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Iron	-- - --	7 / 7	4,360	22,800	PL-00-POND-SD17-0300	8,431	6,479	13,190	20,000	1 / 7	1.14	0.66	0.42	--	-- / --	--	--	--	--	-- / --	--	NO
Lead	-- - --	7 / 7	11.7	55.2	PL-00-POND-SD17-0300	22.1	15.1	33.2	35.8	1 / 7	1.54	0.93	0.62	--	-- / --	--	--	--	--	-- / --	--	NO
Manganese	-- - --	7 / 7	14.6	189	PL-00-POND-SD17-0300	47.6	63.2	94.0	460	0 / 7	0.41	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	-- - --	7 / 7	0.033	0.23	PL-00-POND-SD17-0300	0.078	0.069	0.13	0.18	1 / 7	1.28	0.71	0.43	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	14.9 - 14.9	6 / 7	2.17	3.72	CAPL-SD80-1012	3.56	1.82	4.90	22.7	0 / 7	0.16	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	7 / 7	7.66	34.8	PL-00-POND-SD17-0300	14.5	9.39	21.4	57.0	0 / 7	0.61	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	7 / 7	18.7	195	PL-00-POND-SD17-0300	68.9	60.0	113	121	1 / 7	1.61	0.93	0.57	--	-- / --	--	--	--	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	7 / 7	6.71	7.50	PL-00-POND-SD17-0300	7.04	0.28	7.25	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	9 / 9	28,600	98,000	CAPL-SD59-0711	65,689	23,496	80,253	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-80
Screening Statistics - Penniman Lake Surface Sediment - Group 4
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	15.0 - 360	16 / 21	47.2	543	CAPL-SD64-1012-V	234	163	296	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	2,500	0 / 21	0.22	NO
Carbon disulfide	4.35 - 91.0	9 / 21	9.22	29.9	CAPL-SD73-1012-V	17.7	13.5	22.8	6.11	9 / 21	4.89	3.73	2.90	--	-- / --	--	--	--	25.8	2 / 21	1.16	NO
Chloromethane	8.71 - 91.0	0 / 21	--	--	--	18.2	12.2	22.7	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methyl acetate	8.71 - 39.8	0 / 17	--	--	--	12.8	4.65	14.8	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methylcyclohexane	4.35 - 33.0	0 / 17	--	--	--	7.55	3.72	9.13	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	7.52 - 3,000	1 / 23	29.0	29.0	CAS011-11SD32-00-0602	315	512	498	290	0 / 23	0.10	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Acetophenone	316 - 4,860	2 / 19	17.0	47.0	CAS011-11SD32-00-0602	462	509	665	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Anthracene	7.52 - 3,000	2 / 23	39.0	41.3	CAPL-SD67-1012	316	511	499	57.2	0 / 23	0.72	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzaldehyde	316 - 4,860	4 / 19	50.0	384	CAPL-SD63-1012	454	506	656	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Benzo(a)anthracene	7.52 - 3,000	2 / 23	78.2	223	CAPL-SD67-1012	345	504	525	108	1 / 23	2.06	--	--	791	0 / 23	0.28	--	--	--	-- / --	--	--
Benzo(a)pyrene	7.52 - 3,000	2 / 23	93.3	303	CAPL-SD67-1012	349	503	529	150	1 / 23	2.02	--	--	1,007	0 / 23	0.30	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	8.37 - 3,000	7 / 23	13.2	400	CAPL-SD67-1012	356	501	535	240	1 / 23	1.67	--	1.48	--	-- / --	--	--	--	30.3	2 / 23	13.2	--
Benzo(g,h,i)perylene	7.52 - 3,000	2 / 23	94.2	208	CAPL-SD67-1012	345	503	525	170	1 / 23	1.22	--	--	--	-- / --	--	--	--	25.0	2 / 23	8.32	--
Benzo(k)fluoranthene	7.52 - 3,000	2 / 23	102	335	CAPL-SD67-1012	351	502	531	240	1 / 23	1.40	--	--	--	-- / --	--	--	--	--	-- / --	--	--
bis(2-Ethylhexyl)phthalate	79.0 - 4,860	1 / 23	3,300	3,300	CAA06-SD01-1008	621	793	905	750	1 / 23	4.40	1.21	0.83	6,399,100	0 / 23	0.001	--	--	--	-- / --	--	NO
Chrysene	8.37 - 3,000	4 / 23	10.3	285	CAPL-SD67-1012	333	504	514	166	2 / 23	1.72	--	--	--	-- / --	--	--	--	21.7	3 / 23	13.1	--
Dibenz(a,h)anthracene	7.52 - 3,000	1 / 23	74.1	74.1	CAPL-SD67-1012	336	507	518	33.0	1 / 23	2.25	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Di-n-octylphthalate	316 - 4,860	2 / 23	28.0	2,500	CAA06-SD01-1008	706	689	953	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Fluoranthene	8.37 - 3,000	12 / 23	13.4	174	CAPL-SD63-1012	311	503	491	423	0 / 23	0.41	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	7.52 - 3,000	1 / 23	99.7	99.7	CAPL-SD63-1012	337	507	518	77.4	1 / 23	1.29	--	--	3,883	0 / 23	0.03	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	7.52 - 3,000	2 / 23	90.1	238	CAPL-SD67-1012	346	503	526	200	1 / 23	1.19	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	11 / 23	12.2	2,174	CAPL-SD67-1012	153	481	325	2,900	0 / 23	0.75	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	12 / 23	13.4	455	CAPL-SD63-1012	59.7	117	101	786	0 / 23	0.58	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	12 / 23	25.6	2,456	CAPL-SD67-1012	213	569	417	3,553	0 / 23	0.69	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	37.7 - 13,500	11 / 23	59.7	3,393	CAS011-11SD32-00-0602	1,712	2,264	2,523	2,900	1 / 23	1.17	0.87	0.59	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	243 - 13,500	12 / 23	240	3,923	CAS011-11SD28-00-0602	1,919	2,187	2,702	786	4 / 23	4.99	3.44	2.44	--	-- / --	--	--	--	1,670	3 / 23	2.35	--
PAH (total)	281 - 27,000	12 / 23	300	8,873	CAS011-11SD28-00-0602	3,739	4,493	5,348	3,553	2 / 23	2.50	1.51	1.05	--	-- / --	--	--	--	2,110	4 / 23	4.21	--
Phenanthrene	8.37 - 3,000	8 / 23	12.9	181	CAPL-SD63-1012	307	506	488	204	0 / 23	0.89	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	8.37 - 3,000	11 / 23	12.2	194	CAPL-SD63-1012	332	503	512	195	0 / 23	0.99	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	0.78 - 30.3	5 / 21	1.52	10.6	CAPL-SD64-1012	4.76	5.13	6.69	4.88	2 / 21	2.17	1.37	0.98	791	0 / 21	0.01	--	--	--	-- / --	--	NO
4,4'-DDE	0.84 - 5.00	18 / 21	1.22	53.0	PL-00-POND-SD16-0300	17.0	17.8	23.7	3.16	17 / 21	16.8	7.50	5.38	2,445	0 / 21	0.02	--	--	--	-- / --	--	NO
4,4'-DDT	0.78 - 30.3	4 / 21	4.18	42.0	PL-00-POND-SD14-0300	6.60	11.5	10.9	4.16	4 / 21	10.1	2.63	1.59	2,445	0 / 21	0.02	--	--	--	-- / --	--	NO
Aldrin	0.78 - 15.2	2 / 21	0.95	1.81	CAPL-SD63-1012	2.21	2.38	3.10	2.00	0 / 21	0.91	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	0.84 - 15.2	6 / 21	1.02	4.25	CAPL-SD67-1012	2.63	2.32	3.50	3.24	2 / 21	1.31	1.08	0.81	20,132	0 / 21	0.0002	--	--	--	-- / --	--	NO
beta-BHC	0.62 - 15.2	0 / 21	--	--	--	2.12	2.42	3.03	5.00	-- / --	3.03	0.61	0.42	863	-- / --	0.02	--	--	--	-- / --	--	NO
Dieldrin	0.84 - 30.3	8 / 21	1.50	20.7	CAPL-SD63-1012	5.32	5.93	7.55	1.90	6 / 21	10.9	3.97	2.80	374	0 / 21	0.06	--	--	--	-- / --	--	NO
Endosulfan I	0.78 - 15.2	2 / 21	0.52	0.68	CAPL-SD63-1012	2.13	2.42	3.04	20.9	0 / 21	0.03	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan II	0.78 - 30.3	4 / 21	1.32	23.8	CAPL-SD75-1012	5.94	6.87	8.52	101	0 / 21	0.24	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.62 - 30.3	3 / 21	2.13	41.1	CAPL-SD63-1012	5.77	9.52	9.35	38.8	1 / 21	1.06	0.24	0.15	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	0.62 - 30.3	1 / 21	15.6	15.6	CAPL-SD63-1012	4.41	5.70	6.56	2.22	1 / 21	7.03	2.95	1.99	144	0 / 21	0.11	--	--	--	-- / --	--	NO
Endrin aldehyde	0.84 - 30.3	10 / 21	2.02	4.96	CAPL-SD63-1012	4.79	4.63	6.54	2.22	8 / 21	2.23	--	2.16	144	0 / 21	0.03	--	--	--	-- / --	--	NO
Endrin ketone	0.78 - 30.3	10 / 21	1.66	17.0	PL-00-POND-SD14-0300	5.61	5.56	7.70	2.22	8 / 21	7.66	3.47	2.53	144	0 / 21	0.12	--	--	--	-- / --	--	NO
gamma-Chlordane	2.60 - 15.2	13 / 21	0.74	41.0	CAPL-SD63-1012	6.88	8.81	10.2	3.24	6 / 21	12.7	3.15	2.12	20,132	0 / 21	0.002	--	--	--	-- / --	--	NO
Heptachlor epoxide	0.84 - 15.2	2 / 21	0.93	1.24	CAPL-SD67-1012	2.19	2.38	3.09	2.47	0 / 21	0.50	--	--	489	0 / 21	0.003	--	--	--	-- / --	--	NO
Methoxychlor	0.84 - 152	4 / 21	0.58	10.7	CAPL-SD63-1012	17.7	26.4	27.7	137	0 / 21	0.08	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	20.7 - 94.0	47 / 55	23.0	6,200	CAPL-SD23-0711	401	853	593	59.8	41 / 55	104	9.92	6.70	5,824	1 / 55	1.06	0.10	0.07	--	-- / --	--	NO

Table D-80
Screening Statistics - Penniman Lake Surface Sediment - Group 4
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Explosives (UG/KG)																						
1,3-Dinitrobenzene	100 - 250	0 / 20	--	--	--	98.0	20.0	106	48.2	-- / --	5.19	2.20	2.03	--	-- / --	--	--	--	--	-- / --	--	NO
4-Amino-2,6-dinitrotoluene	100 - 250	1 / 20	110	110	CAA06-SD01-1008	101	16.6	107	167	0 / 20	0.66	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
HMX	188 - 500	0 / 20	--	--	--	128	62.6	152	34.1	-- / --	14.7	4.47	3.76	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	469 - 2,500	8 / 15	328	1,410	CAPL-SD64-1012	682	475	898	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Tetryl	188 - 650	1 / 19	211	211	CAPL-SD63-1012	151	95.8	189	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Inorganics (MG/KG)																						
Aluminum	-- - --	23 / 23	1,460	28,200	CAPL-SD72-1012	13,816	8,795	16,965	25,500	3 / 23	1.11	0.67	0.54	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	0.47 - 17.2	1 / 23	0.17	0.17	CAA06-SD01-1008	2.54	2.10	3.29	3.00	0 / 23	0.06	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	23 / 23	1.20	56.7	CAPL-SD68-1012	28.7	17.3	34.9	9.79	17 / 23	5.79	3.57	2.93	--	-- / --	--	--	--	108	0 / 23	0.53	NO
Barium	-- - --	23 / 23	4.10	107	CAPL-SD72-1012	61.3	32.4	72.9	20.0	20 / 23	5.35	3.65	3.07	--	-- / --	--	--	--	75.0	12 / 23	1.43	YES
Beryllium	0.32 - 4.30	15 / 23	0.070	1.90	PL-00-POND-SD15-0300	0.92	0.60	1.13	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	3 / 23	1.37	YES
Cadmium	0.020 - 4.30	1 / 23	0.24	0.24	CAPL-SD67-1012	0.86	0.69	1.11	0.99	0 / 23	0.24	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	23 / 23	2.90	50.4	CAPL-SD72-1012	28.9	15.5	34.5	43.4	6 / 23	1.16	0.79	0.67	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	1.30 - 3.50	21 / 23	3.10	56.9	CAPL-SD75-1012	31.3	20.1	38.4	31.6	13 / 23	1.80	1.22	0.99	--	-- / --	--	--	--	25.6	15 / 23	2.22	NO
Cyanide	0.045 - 8.00	1 / 23	2.95	2.95	CAPL-SD65-1012	1.00	1.06	1.38	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Iron	-- - --	23 / 23	1,820	41,300	CAPL-SD72-1012	25,183	12,729	29,741	20,000	15 / 23	2.07	1.49	1.26	--	-- / --	--	--	--	45,600	0 / 23	0.91	NO
Lead	-- - --	23 / 23	2.90	85.8	CAPL-SD63-1012	47.8	29.1	58.2	35.8	14 / 23	2.40	1.63	1.34	--	-- / --	--	--	--	41.6	14 / 23	2.06	YES
Manganese	-- - --	23 / 23	15.2	234	PL-00-POND-SD13-0300	131	71.6	156	460	0 / 23	0.51	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.058 - 0.36	19 / 23	0.039	1.48	CAPL-SD64-1012	0.20	0.29	0.31	0.18	7 / 23	8.22	1.70	1.13	--	-- / --	--	--	--	0.255	3 / 23	5.80	YES
Nickel	14.7 - 17.2	21 / 23	0.88	22.9	PL-00-POND-SD14-0300	10.7	6.61	13.0	22.7	1 / 23	1.01	0.57	0.47	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	23 / 23	3.80	69.9	CAPL-SD72-1012	38.5	20.5	45.9	57.0	4 / 23	1.23	0.80	0.68	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	23 / 23	6.90	253	CAPL-SD62-1012	116	72.8	142	121	12 / 23	2.09	1.17	0.96	--	-- / --	--	--	--	110	13 / 23	2.30	YES
Other Parameters																						
pH	-- - --	20 / 20	6.81	8.00	PL-00-POND-SD15-0300	7.26	0.39	7.40	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	57 / 57	5,500	150,000	CAPL-SD43-0711	71,858	33,036	79,176	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-81
Screening Statistics - Penniman Lake Surface Sediment - Group 4A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	15.0 - 29.0	4 / 6	92.0	543	CAPL-SD64-1012-V	242	236	436	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	2,500	0 / 6	0.22	NO
Carbon disulfide	15.0 - 33.0	3 / 6	9.93	17.5	CAPL-SD64-1012-V	13.2	3.85	16.4	6.33	3 / 6	2.76	2.59	2.09	--	-- / --	--	--	--	25.8	0 / 6	0.68	NO
Chloromethane	15.0 - 33.0	0 / 6	--	--	--	12.8	3.15	15.4	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methyl acetate	15.0 - 33.0	0 / 6	--	--	--	12.8	3.15	15.4	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methylcyclohexane	11.3 - 33.0	0 / 6	--	--	--	9.61	4.65	13.4	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	14.8 - 1,100	1 / 6	29.0	29.0	CAS011-11SD32-00-0602	146	218	326	290	0 / 6	0.10	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Acetophenone	652 - 1,100	2 / 6	17.0	47.0	CAS011-11SD32-00-0602	293	216	470	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Anthracene	14.8 - 1,100	1 / 6	39.0	39.0	CAS011-11SD32-00-0602	148	217	327	57.2	0 / 6	0.68	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzaldehyde	744 - 888	4 / 6	50.0	384	CAPL-SD63-1012	268	164	403	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Benzo(a)anthracene	14.8 - 1,100	1 / 6	78.2	78.2	CAPL-SD63-1012	227	237	423	108	0 / 6	0.72	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(a)pyrene	14.8 - 1,100	1 / 6	93.3	93.3	CAPL-SD63-1012	230	236	424	150	0 / 6	0.62	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	14.8 - 1,100	1 / 6	96.3	96.3	CAPL-SD63-1012	230	235	424	240	0 / 6	0.40	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	14.8 - 1,100	1 / 6	94.2	94.2	CAPL-SD63-1012	230	235	424	170	0 / 6	0.55	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	14.8 - 1,100	1 / 6	102	102	CAPL-SD63-1012	231	235	424	240	0 / 6	0.43	--	--	--	-- / --	--	--	--	--	-- / --	--	--
bis(2-Ethylhexyl)phthalate	79.0 - 888	0 / 6	--	--	--	218	183	368	750	-- / --	1.18	0.49	0.29	--	-- / --	--	--	--	--	-- / --	--	NO
Chrysene	14.8 - 1,100	2 / 6	32.0	185	CAPL-SD63-1012	172	211	346	166	1 / 6	1.11	--	1.04	--	-- / --	--	--	--	21.7	2 / 6	8.53	--
Dibenz(a,h)anthracene	14.8 - 1,100	0 / 6	--	--	--	220	244	420	33.0	-- / --	33.3	12.7	6.66	--	-- / --	--	--	--	--	-- / --	--	--
Di-n-octylphthalate	500 - 1,100	1 / 6	28.0	28.0	CAS011-11SD32-00-0602	328	179	476	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Fluoranthene	17.7 - 500	4 / 6	20.8	174	CAPL-SD63-1012	95.3	96.5	175	423	0 / 6	0.41	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	14.8 - 1,100	1 / 6	99.7	99.7	CAPL-SD63-1012	231	235	424	77.4	1 / 6	1.29	--	--	4,023	0 / 6	0.02	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	14.8 - 1,100	1 / 6	90.1	90.1	CAPL-SD63-1012	229	236	424	200	0 / 6	0.45	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	3 / 6	18.5	933	CAPL-SD63-1012	176	373	483	2,900	0 / 6	0.32	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	4 / 6	20.8	455	CAPL-SD63-1012	138	187	292	786	0 / 6	0.58	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	4 / 6	37.6	1,388	CAPL-SD63-1012	313	546	762	3,553	0 / 6	0.39	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	79.7 - 4,950	3 / 6	76.0	3,393	CAS011-11SD32-00-0602	1,346	1,340	2,448	2,900	1 / 6	1.17	0.84	0.46	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	515 - 2,250	4 / 6	445	3,923	CAS011-11SD28-00-0602	1,553	1,431	2,730	786	3 / 6	4.99	3.47	1.98	--	-- / --	--	--	--	1,670	2 / 6	2.35	--
PAH (total)	594 - 4,500	4 / 6	521	8,873	CAS011-11SD28-00-0602	3,312	3,413	6,119	3,553	2 / 6	2.50	1.72	0.93	--	-- / --	--	--	--	2,110	2 / 6	4.21	--
Phenanthrene	14.8 - 500	3 / 6	34.0	181	CAPL-SD63-1012	102	101	185	204	0 / 6	0.89	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	17.7 - 1,100	3 / 6	18.5	194	CAPL-SD63-1012	182	205	350	195	0 / 6	0.99	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	1.81 - 11.0	2 / 6	7.08	10.6	CAPL-SD64-1012	5.21	3.43	8.03	4.88	2 / 6	2.17	1.65	1.07	820	0 / 6	0.01	--	--	--	-- / --	--	NO
4,4'-DDE	5.00 - 5.00	5 / 6	7.60	41.0	CAS011-11SD28-00-0602	19.4	16.7	33.1	3.16	5 / 6	13.0	10.5	6.14	2,533	0 / 6	0.02	--	--	--	-- / --	--	NO
4,4'-DDT	1.50 - 11.0	1 / 6	4.18	4.18	CAPL-SD63-1012	3.09	2.01	4.74	4.16	1 / 6	1.00	--	0.74	2,533	0 / 6	0.002	--	--	--	-- / --	--	NO
Aldrin	1.50 - 5.70	1 / 6	1.81	1.81	CAPL-SD63-1012	1.68	0.85	2.37	2.00	0 / 6	0.91	--	0.84	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	2.60 - 5.70	3 / 6	1.50	3.63	CAPL-SD63-1012	2.33	0.86	3.04	3.24	1 / 6	1.12	0.94	0.72	20,860	0 / 6	0.0002	--	--	--	-- / --	--	NO
beta-BHC	1.32 - 5.70	0 / 6	--	--	--	1.49	0.94	2.26	5.00	-- / --	1.14	0.45	0.30	--	-- / --	--	--	--	--	-- / --	--	NO
Dieldrin	5.00 - 11.0	3 / 6	2.41	20.7	CAPL-SD63-1012	6.57	7.03	12.3	1.90	3 / 6	10.9	6.50	3.46	387	0 / 6	0.05	--	--	--	-- / --	--	NO
Endosulfan I	1.50 - 5.70	1 / 6	0.68	0.68	CAPL-SD63-1012	1.49	0.93	2.26	21.6	0 / 6	0.03	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan II	1.50 - 11.0	2 / 6	1.32	13.2	CAPL-SD63-1012	4.66	4.58	8.43	104	0 / 6	0.13	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	1.81 - 11.0	2 / 6	2.13	41.1	CAPL-SD63-1012	9.47	15.6	22.3	40.2	1 / 6	1.02	0.55	0.24	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	1.50 - 11.0	1 / 6	15.6	15.6	CAPL-SD63-1012	4.99	5.55	9.55	2.22	1 / 6	7.03	4.30	2.25	149	0 / 6	0.10	--	--	--	-- / --	--	NO
Endrin aldehyde	5.00 - 11.0	3 / 6	2.02	4.96	CAPL-SD63-1012	3.87	1.41	5.03	2.22	2 / 6	2.23	--	--	149	0 / 6	0.03	--	--	--	-- / --	--	NO
Endrin ketone	5.00 - 11.0	3 / 6	1.66	14.7	CAPL-SD62-1012	5.99	4.68	9.84	2.22	2 / 6	6.62	4.43	2.70	149	0 / 6	0.10	--	--	--	-- / --	--	NO
gamma-Chlordane	2.60 - 5.70	3 / 6	0.96	41.0	CAPL-SD63-1012	8.35	16.0	21.5	3.24	1 / 6	12.7	6.64	2.58	20,860	0 / 6	0.002	--	--	--	-- / --	--	NO
Heptachlor epoxide	1.32 - 5.70	0 / 6	--	--	--	1.49	0.94	2.26	2.47	-- / --	2.31	0.91	0.60	--	-- / --	--	--	--	--	-- / --	--	NO
Methoxychlor	1.81 - 57.0	2 / 6	5.43	10.7	CAPL-SD63-1012	13.8	10.7	22.7	142	0 / 6	0.08	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	50.0 - 94.0	10 / 12	84.7	6,200	CAPL-SD23-0711	927	1,717	1,817	59.8	10 / 12	104	30.4	15.5	6,035	1 / 12	1.03	0.30	0.15	--	-- / --	--	NO

Table D-81
Screening Statistics - Penniman Lake Surface Sediment - Group 4A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Explosives (UG/KG)																						
1,3-Dinitrobenzene	193 - 196	0 / 3	--	--	--	97.2	0.76	98.5	49.9	-- / --	3.93	1.97	1.95	--	-- / --	--	--	--	--	-- / --	--	NO
4-Amino-2,6-dinitrotoluene	193 - 196	0 / 3	--	--	--	97.2	0.76	98.5	173	-- / --	1.13	0.57	0.56	--	-- / --	--	--	--	--	-- / --	--	NO
HMX	193 - 196	0 / 3	--	--	--	97.2	0.76	98.5	35.3	-- / --	5.55	2.79	2.75	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	-- - --	3 / 3	328	1,410	CAPL-SD64-1012	902	544	1,820	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Tetryl	193 - 194	1 / 3	211	211	CAPL-SD63-1012	135	66.0	246	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Inorganics (MG/KG)																						
Aluminum	-- - --	6 / 6	2,610	21,600	CAPL-SD62-1012	12,683	9,058	20,135	25,500	0 / 6	0.85	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	0.47 - 10.9	0 / 6	--	--	--	2.51	2.38	4.47	3.00	-- / --	3.63	1.49	0.84	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	6 / 6	6.90	47.5	CAPL-SD64-1012	26.7	16.7	40.5	9.79	4 / 6	4.85	4.13	2.73	--	-- / --	--	--	--	108	0 / 6	0.44	NO
Barium	-- - --	6 / 6	13.4	89.0	CAPL-SD63-1012	53.1	33.1	80.3	20.0	5 / 6	4.45	4.02	2.65	--	-- / --	--	--	--	75.0	3 / 6	1.19	YES
Beryllium	0.32 - 2.73	2 / 6	1.14	1.15	CAPL-SD64-1012	0.71	0.57	1.17	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	0 / 6	0.83	NO
Cadmium	0.089 - 2.73	0 / 6	--	--	--	0.62	0.61	1.12	0.99	-- / --	2.76	1.13	0.62	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	6 / 6	9.60	49.4	CAPL-SD62-1012	29.5	17.2	43.6	43.4	2 / 6	1.14	1.01	0.68	--	-- / --	--	--	--	52.0	0 / 6	0.95	NO
Copper	-- - --	6 / 6	3.10	51.4	CAPL-SD64-1012	28.0	20.2	44.6	31.6	3 / 6	1.63	1.41	0.88	--	-- / --	--	--	--	25.6	3 / 6	2.01	YES
Cyanide	0.045 - 1.29	0 / 6	--	--	--	0.29	0.29	0.53	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	6 / 6	9,630	39,600	CAPL-SD62-1012	23,923	13,809	35,283	20,000	3 / 6	1.98	1.76	1.20	--	-- / --	--	--	--	45,600	0 / 6	0.87	NO
Lead	-- - --	6 / 6	5.60	85.8	CAPL-SD63-1012	54.5	35.3	83.5	35.8	4 / 6	2.40	2.33	1.52	--	-- / --	--	--	--	41.6	4 / 6	2.06	YES
Manganese	-- - --	6 / 6	22.2	143	CAPL-SD63-1012	83.5	58.9	132	460	0 / 6	0.31	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.058 - 0.15	4 / 6	0.15	1.48	CAPL-SD64-1012	0.39	0.55	0.84	0.18	3 / 6	8.22	4.66	2.14	--	-- / --	--	--	--	0.255	2 / 6	5.80	YES
Nickel	-- - --	6 / 6	2.20	13.9	CAPL-SD64-1012	8.43	5.32	12.8	22.7	0 / 6	0.61	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	6 / 6	11.3	55.0	CAPL-SD62-1012	34.4	19.9	50.8	57.0	0 / 6	0.96	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	6 / 6	13.5	253	CAPL-SD62-1012	132	97.2	212	121	3 / 6	2.09	1.75	1.09	--	-- / --	--	--	--	110	3 / 6	2.30	YES
Other Parameters																						
pH	-- - --	3 / 3	6.81	6.83	CAPL-SD64-1012	6.82	0.012	6.84	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	12 / 12	17,100	110,000	CAPL-SD35-0711	74,533	25,789	87,903	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-82
Screening Statistics - Penniman Lake Surface Sediment - Group 4B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	200 - 360	6 / 8	140	477	CAPL-SD71-1012-V	260	135	350	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	2,500	0 / 8	0.19	NO
Carbon disulfide	7.40 - 91.0	3 / 8	13.6	29.9	CAPL-SD73-1012-V	21.2	14.9	31.1	6.53	3 / 8	4.58	--	3.24	--	-- / --	--	--	--	25.8	2 / 8	1.16	NO
Chloromethane	14.8 - 91.0	0 / 8	--	--	--	21.3	12.3	29.5	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methyl acetate	14.8 - 39.8	0 / 6	--	--	--	15.2	4.54	18.9	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methylcyclohexane	7.40 - 19.9	0 / 6	--	--	--	7.59	2.27	9.46	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	290	-- / --	10.3	2.55	1.14	4,762	-- / --	0.63	--	--	--	-- / --	--	--
Acetophenone	420 - 1,370	0 / 6	--	--	--	443	159	573	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Anthracene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	57.2	-- / --	52.4	12.9	5.80	1,690	-- / --	1.78	0.44	0.20	--	-- / --	--	--
Benzaldehyde	420 - 1,370	0 / 6	--	--	--	443	159	573	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Benzo(a)anthracene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	108	-- / --	27.8	6.84	3.07	845	-- / --	3.55	0.87	0.39	--	-- / --	--	--
Benzo(a)pyrene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	150	-- / --	20.0	4.92	2.21	1,075	-- / --	2.79	0.69	0.31	--	-- / --	--	--
Benzo(b)fluoranthene	8.37 - 3,000	3 / 8	19.1	23.3	CAPL-SD74-1012	336	604	741	240	0 / 8	0.10	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	170	-- / --	17.6	4.34	1.95	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	240	-- / --	12.5	3.08	1.38	--	-- / --	--	--	--	--	-- / --	--	--
bis(2-Ethylhexyl)phthalate	420 - 3,000	0 / 8	--	--	--	657	432	947	750	-- / --	4.00	1.26	0.88	6,835,200	-- / --	0.0004	--	--	--	-- / --	--	NO
Chrysene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	166	-- / --	18.1	4.45	2.00	--	-- / --	--	--	--	--	-- / --	--	--
Dibenz(a,h)anthracene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	33.0	-- / --	90.9	22.4	10.0	--	-- / --	--	--	--	--	-- / --	--	--
Di-n-octylphthalate	420 - 3,000	0 / 8	--	--	--	657	432	947	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Fluoranthene	8.37 - 3,000	4 / 8	13.4	34.9	CAPL-SD74-1012	340	602	743	423	0 / 8	0.08	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	77.4	-- / --	38.8	9.54	4.28	4,147	-- / --	0.72	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	8.37 - 3,000	0 / 8	--	--	--	332	607	738	200	-- / --	15.0	3.69	1.66	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	4 / 8	12.2	55.7	CAPL-SD74-1012	20.1	25.0	36.8	2,900	0 / 8	0.02	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	4 / 8	13.4	57.4	CAPL-SD74-1012	17.8	23.4	33.4	786	0 / 8	0.07	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	4 / 8	25.6	113	CAPL-SD74-1012	37.9	47.8	69.9	3,553	0 / 8	0.03	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	37.7 - 13,500	4 / 8	78.6	130	CAPL-SD74-1012	1,524	2,713	3,341	2,900	0 / 8	0.04	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	243 - 13,500	4 / 8	481	656	CAPL-SD74-1012	1,791	2,555	3,503	786	0 / 8	0.83	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (total)	281 - 27,000	4 / 8	567	786	CAPL-SD74-1012	3,315	5,267	6,843	3,553	0 / 8	0.22	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Phenanthrene	8.37 - 3,000	2 / 8	16.3	22.5	CAPL-SD74-1012	334	606	740	204	0 / 8	0.11	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	8.37 - 3,000	4 / 8	12.2	32.4	CAPL-SD74-1012	339	602	743	195	0 / 8	0.17	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	0.84 - 30.3	2 / 8	1.52	1.66	CAPL-SD73-1012	4.14	5.66	7.94	4.88	0 / 8	0.34	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
4,4'-DDE	0.84 - 0.84	7 / 8	4.58	47.0	PL-00-POND-SD14-0300	12.8	14.8	22.7	3.16	7 / 8	14.9	7.18	4.04	2,611	0 / 8	0.02	--	--	--	-- / --	--	NO
4,4'-DDT	0.84 - 22.2	1 / 8	42.0	42.0	PL-00-POND-SD14-0300	7.31	14.5	17.0	4.16	1 / 8	10.1	4.09	1.76	2,611	0 / 8	0.02	--	--	--	-- / --	--	NO
Aldrin	0.84 - 15.2	0 / 8	--	--	--	2.31	2.70	4.11	2.00	-- / --	7.58	2.06	1.15	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	0.84 - 15.2	1 / 8	1.97	1.97	CAPL-SD73-1012	2.45	2.64	4.21	3.24	0 / 8	0.61	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
beta-BHC	0.84 - 15.2	0 / 8	--	--	--	2.31	2.70	4.11	5.00	-- / --	3.03	0.82	0.46	--	-- / --	--	--	--	--	-- / --	--	NO
Dieldrin	0.84 - 30.3	3 / 8	1.68	2.86	CAPL-SD72-1012	4.47	5.52	8.17	1.90	2 / 8	1.51	4.30	2.35	399	0 / 8	0.01	--	--	--	-- / --	--	NO
Endosulfan I	0.84 - 15.2	0 / 8	--	--	--	2.31	2.70	4.11	22.3	-- / --	0.68	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan II	0.84 - 30.3	1 / 8	23.8	23.8	CAPL-SD75-1012	6.82	8.88	12.8	108	0 / 8	0.22	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.84 - 30.3	1 / 8	2.36	2.36	CAPL-SD71-1012	4.15	5.68	7.95	41.5	0 / 8	0.06	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	0.84 - 30.3	0 / 8	--	--	--	3.95	5.78	7.82	2.22	-- / --	13.7	3.52	1.78	154	-- / --	0.20	--	--	--	-- / --	--	NO
Endrin aldehyde	0.84 - 30.3	5 / 8	2.14	3.95	CAPL-SD72-1012	5.15	5.15	8.60	2.22	4 / 8	1.78	--	--	154	0 / 8	0.03	--	--	--	-- / --	--	NO
Endrin ketone	0.84 - 22.2	5 / 8	2.88	17.0	PL-00-POND-SD14-0300	5.85	5.60	9.60	2.22	5 / 8	7.66	4.32	2.63	154	0 / 8	0.11	--	--	--	-- / --	--	NO
gamma-Chlordane	11.1 - 15.2	6 / 8	2.98	17.0	CAPL-SD72-1012	7.42	4.94	10.7	3.24	4 / 8	5.25	3.31	2.29	21,504	0 / 8	0.001	--	--	--	-- / --	--	NO
Heptachlor epoxide	0.84 - 15.2	0 / 8	--	--	--	2.31	2.70	4.11	2.47	-- / --	6.13	1.67	0.93	522	-- / --	0.03	--	--	--	-- / --	--	NO
Methoxychlor	0.84 - 152	0 / 8	--	--	--	17.1	30.5	37.5	146	-- / --	1.04	0.26	0.12	146	-- / --	1.04	0.26	0.12	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	20.7 - 68.2	21 / 24	25.9	1,000	CAPL-SD33-0711	259	253	348	59.8	19 / 24	16.7	5.81	4.33	6,221	0 / 24	0.16	--	--	--	-- / --	--	NO

Table D-82
Screening Statistics - Penniman Lake Surface Sediment - Group 4B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Explosives (UG/KG)																						
1,3-Dinitrobenzene	188 - 250	0 / 8	--	--	--	104	13.0	113	51.5	-- / --	4.86	2.19	2.02	--	-- / --	--	--	--	--	-- / --	--	NO
4-Amino-2,6-dinitrotoluene	188 - 250	0 / 8	--	--	--	104	13.0	113	178	-- / --	1.40	0.63	0.58	--	-- / --	--	--	--	--	-- / --	--	NO
HMX	188 - 500	0 / 8	--	--	--	135	70.8	183	36.4	-- / --	13.7	5.02	3.72	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	469 - 490	4 / 6	486	1,250	CAPL-SD73-1012	776	506	1,192	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Tetryl	188 - 650	0 / 8	--	--	--	154	105	225	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Inorganics (MG/KG)																						
Aluminum	-- - --	8 / 8	6,560	28,200	CAPL-SD72-1012	17,113	7,580	22,190	25,500	1 / 8	1.11	0.87	0.67	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	2.86 - 17.2	0 / 8	--	--	--	3.61	2.41	5.23	3.00	-- / --	5.73	1.74	1.20	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	8 / 8	6.48	51.7	CAPL-SD73-1012	35.4	16.2	46.2	9.79	7 / 8	5.28	4.72	3.61	--	-- / --	--	--	--	108	0 / 8	0.48	NO
Barium	-- - --	8 / 8	21.2	107	CAPL-SD72-1012	79.5	26.3	97.1	20.0	8 / 8	5.35	4.85	3.98	--	-- / --	--	--	--	75.0	6 / 8	1.43	YES
Beryllium	1.31 - 4.30	4 / 8	0.95	1.60	PL-00-POND-SD13-0300	1.30	0.47	1.61	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	2 / 8	1.15	NO
Cadmium	1.07 - 4.30	0 / 8	--	--	--	1.24	0.61	1.65	0.99	-- / --	4.34	1.67	1.26	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	8 / 8	16.1	50.4	CAPL-SD72-1012	36.2	10.4	43.1	43.4	2 / 8	1.16	0.99	0.83	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	8 / 8	4.31	56.9	CAPL-SD75-1012	42.2	16.6	53.3	31.6	7 / 8	1.80	1.69	1.34	--	-- / --	--	--	--	25.6	7 / 8	2.22	YES
Cyanide	0.65 - 6.00	0 / 8	--	--	--	1.13	0.92	1.74	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	8 / 8	14,600	41,300	CAPL-SD72-1012	32,613	8,119	38,051	20,000	7 / 8	2.07	1.90	1.63	--	-- / --	--	--	--	45,600	0 / 8	0.91	NO
Lead	-- - --	8 / 8	6.80	81.6	CAPL-SD73-1012	62.5	23.6	78.3	35.8	7 / 8	2.28	2.19	1.75	--	-- / --	--	--	--	41.6	7 / 8	1.96	YES
Manganese	-- - --	8 / 8	57.5	234	PL-00-POND-SD13-0300	164	59.2	204	460	0 / 8	0.51	0.44	0.36	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	-- - --	8 / 8	0.039	0.28	PL-00-POND-SD14-0300	0.16	0.069	0.20	0.18	2 / 8	1.56	1.12	0.87	--	-- / --	--	--	--	0.255	1 / 8	1.10	NO
Nickel	14.7 - 14.7	7 / 8	3.40	22.9	PL-00-POND-SD14-0300	13.4	6.07	17.4	22.7	1 / 8	1.01	0.77	0.59	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	8 / 8	19.3	69.9	CAPL-SD72-1012	48.2	15.1	58.3	57.0	2 / 8	1.23	1.02	0.84	--	-- / --	--	--	--	62.5	1 / 8	1.12	NO
Zinc	-- - --	8 / 8	24.2	199	PL-00-POND-SD13-0300	152	55.7	189	121	7 / 8	1.64	1.56	1.26	--	-- / --	--	--	--	110	7 / 8	1.81	YES
Other Parameters																						
pH	-- - --	8 / 8	6.83	7.80	PL-00-POND-SD14-0300	7.21	0.36	7.45	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	24 / 24	5,500	150,000	CAPL-SD43-0711	76,833	31,100	87,713	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-83
Screening Statistics - Penniman Lake Surface Sediment - Group 4C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	210 - 210	6 / 7	47.2	399	CAPL-SD82-1012	199	135	298	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	2,500	0 / 7	0.16	NO
Carbon disulfide	4.35 - 89.0	3 / 7	9.22	13.9	CAPL-SD68-1012	17.6	17.3	30.3	5.49	3 / 7	2.53	--	--	--	-- / --	--	--	--	25.8	0 / 7	0.54	NO
Chloromethane	8.71 - 89.0	0 / 7	--	--	--	19.2	16.3	31.2	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methyl acetate	8.71 - 32.3	0 / 5	--	--	--	10.1	5.52	15.3	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Methylcyclohexane	4.35 - 16.1	0 / 5	--	--	--	5.03	2.76	7.66	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	7.52 - 2,900	0 / 9	--	--	--	412	580	771	290	-- / --	10.0	2.66	1.42	4,005	-- / --	0.72	--	--	--	-- / --	--	--
Acetophenone	316 - 4,860	0 / 7	--	--	--	624	811	1,219	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Anthracene	7.52 - 2,900	1 / 9	41.3	41.3	CAPL-SD67-1012	415	577	773	57.2	0 / 9	0.72	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzaldehyde	316 - 4,860	0 / 7	--	--	--	624	811	1,219	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Benzo(a)anthracene	7.52 - 2,900	1 / 9	223	223	CAPL-SD67-1012	435	566	786	108	1 / 9	2.06	--	--	711	0 / 9	0.31	--	--	--	-- / --	--	--
Benzo(a)pyrene	7.52 - 2,900	1 / 9	303	303	CAPL-SD67-1012	444	563	793	150	1 / 9	2.02	--	--	904	0 / 9	0.34	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	85.8 - 2,900	3 / 9	13.2	400	CAPL-SD67-1012	457	559	803	240	1 / 9	1.67	--	--	--	-- / --	--	--	--	30.3	1 / 9	13.2	--
Benzo(g,h,i)perylene	7.52 - 2,900	1 / 9	208	208	CAPL-SD67-1012	433	567	784	170	1 / 9	1.22	--	--	--	-- / --	--	--	--	25.0	1 / 9	8.32	--
Benzo(k)fluoranthene	7.52 - 2,900	1 / 9	335	335	CAPL-SD67-1012	447	562	796	240	1 / 9	1.40	--	--	--	-- / --	--	--	--	--	-- / --	--	--
bis(2-Ethylhexyl)phthalate	300 - 4,860	1 / 9	3,300	3,300	CAA06-SD01-1008	857	1,165	1,580	750	1 / 9	4.40	2.11	1.14	5,749,400	0 / 9	0.001	--	--	--	-- / --	--	NO
Chrysene	12.8 - 2,900	2 / 9	10.3	285	CAPL-SD67-1012	443	563	791	166	1 / 9	1.72	--	--	--	-- / --	--	--	--	21.7	1 / 9	13.1	--
Dibenz(a,h)anthracene	7.52 - 2,900	1 / 9	74.1	74.1	CAPL-SD67-1012	418	575	775	33.0	1 / 9	2.25	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Di-n-octylphthalate	316 - 4,860	1 / 9	2,500	2,500	CAA06-SD01-1008	1,002	957	1,595	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Fluoranthene	85.8 - 2,900	4 / 9	16.0	123	CAPL-SD67-1012	428	568	780	423	0 / 9	0.29	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	7.52 - 2,900	0 / 9	--	--	--	412	580	771	77.4	-- / --	37.5	9.96	5.32	3,488	-- / --	0.83	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	7.52 - 2,900	1 / 9	238	238	CAPL-SD67-1012	437	565	787	200	1 / 9	1.19	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	4 / 9	32.5	2,174	CAPL-SD67-1012	257	719	703	2,900	0 / 9	0.75	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	4 / 9	28.9	282	CAPL-SD67-1012	45.2	91.5	102	786	0 / 9	0.36	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	4 / 9	64.9	2,456	CAPL-SD67-1012	302	809	803	3,553	0 / 9	0.69	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	386 - 13,050	4 / 9	59.7	2,174	CAPL-SD67-1012	2,124	2,491	3,668	2,900	0 / 9	0.75	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	774 - 13,050	4 / 9	240	2,833	CAPL-SD82-1012	2,277	2,429	3,783	786	1 / 9	3.60	--	2.90	--	-- / --	--	--	--	1,670	1 / 9	1.70	--
PAH (total)	1,160 - 26,100	4 / 9	300	3,288	CAPL-SD82-1012	4,401	4,812	7,384	3,553	0 / 9	0.93	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Phenanthrene	85.8 - 2,900	3 / 9	12.9	69.7	CAPL-SD67-1012	420	574	775	204	0 / 9	0.34	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	85.8 - 2,900	4 / 9	13.6	108	CAPL-SD67-1012	426	569	779	195	0 / 9	0.55	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	0.78 - 30.3	1 / 7	4.70	4.70	CAPL-SD67-1012	5.07	6.30	9.70	4.88	0 / 7	0.96	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
4,4'-DDE	1.70 - 1.70	6 / 7	1.22	53.0	PL-00-POND-SD16-0300	19.8	23.0	36.7	3.16	5 / 7	16.8	11.6	6.26	2,196	0 / 7	0.02	--	--	--	-- / --	--	NO
4,4'-DDT	0.78 - 30.3	2 / 7	7.55	36.0	PL-00-POND-SD16-0300	8.79	13.2	18.5	4.16	2 / 7	8.65	4.44	2.11	2,196	0 / 7	0.02	--	--	--	-- / --	--	NO
Aldrin	0.78 - 15.2	1 / 7	0.95	0.95	CAPL-SD67-1012	2.54	3.07	4.79	2.00	0 / 7	0.48	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	1.31 - 15.2	2 / 7	1.02	4.25	CAPL-SD67-1012	3.10	2.95	5.27	3.24	1 / 7	1.31	1.63	0.96	18,088	0 / 7	0.0002	--	--	--	-- / --	--	NO
beta-BHC	0.62 - 15.2	0 / 7	--	--	--	2.45	3.13	4.75	5.00	-- / --	3.03	0.95	0.49	775	-- / --	0.02	--	--	--	-- / --	--	NO
Dieldrin	1.31 - 30.3	2 / 7	1.50	4.55	CAPL-SD67-1012	5.21	6.18	9.75	1.90	1 / 7	2.39	--	--	336	0 / 7	0.01	--	--	--	-- / --	--	NO
Endosulfan I	0.78 - 15.2	1 / 7	0.52	0.52	CAPL-SD67-1012	2.48	3.11	4.76	18.7	0 / 7	0.03	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan II	0.78 - 30.3	1 / 7	11.3	11.3	CAPL-SD67-1012	6.02	6.71	10.9	90.4	0 / 7	0.12	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.62 - 30.3	0 / 7	--	--	--	4.45	6.55	9.26	34.9	-- / --	0.87	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	0.62 - 30.3	0 / 7	--	--	--	4.45	6.55	9.26	2.22	-- / --	13.7	4.17	2.00	129	-- / --	0.23	--	--	--	-- / --	--	NO
Endrin aldehyde	1.31 - 30.3	2 / 7	2.75	3.11	CAPL-SD67-1012	5.18	6.12	9.68	2.22	2 / 7	1.40	--	--	129	0 / 7	0.02	--	--	--	-- / --	--	NO
Endrin ketone	0.78 - 30.3	2 / 7	2.03	15.0	PL-00-POND-SD16-0300	5.00	6.90	10.1	2.22	1 / 7	6.76	4.54	2.25	129	0 / 7	0.12	--	--	--	-- / --	--	NO
gamma-Chlordane	12.8 - 15.2	4 / 7	0.74	8.24	CAPL-SD67-1012	4.99	3.15	7.31	3.24	1 / 7	2.54	2.25	1.54	18,088	0 / 7	0.0005	--	--	--	-- / --	--	NO
Heptachlor epoxide	1.31 - 15.2	2 / 7	0.93	1.24	CAPL-SD67-1012	2.66	2.98	4.85	2.47	0 / 7	0.50	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Methoxychlor	1.31 - 152	2 / 7	0.58	10.1	CAPL-SD67-1012	21.9	33.2	46.2	123	0 / 7	0.08	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	32.0 - 46.9	16 / 19	23.0	914	CAPL-SD67-1012	247	250	346	59.8	12 / 19	15.3	5.79	4.13	5,233	0 / 19	0.17	--	--	--	-- / --	--	NO

Table D-83
Screening Statistics - Penniman Lake Surface Sediment - Group 4C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Explosives (UG/KG)																						
1,3-Dinitrobenzene	100 - 250	0 / 9	--	--	--	92.9	27.0	110	43.3	-- / --	5.78	2.53	2.15	--	-- / --	--	--	--	--	-- / --	--	NO
4-Amino-2,6-dinitrotoluene	100 - 250	1 / 9	110	110	CAA06-SD01-1008	99.6	22.1	113	150	0 / 9	0.73	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
HMX	190 - 500	0 / 9	--	--	--	132	67.1	173	30.6	-- / --	16.3	5.66	4.30	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	476 - 2,500	1 / 6	641	641	CAPL-SD82-1012	477	411	815	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Tetryl	190 - 650	0 / 8	--	--	--	155	105	225	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Inorganics (MG/KG)																						
Aluminum	-- - --	9 / 9	1,460	26,700	CAPL-SD68-1012	11,640	9,695	17,650	25,500	2 / 9	1.05	0.69	0.46	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	0.95 - 7.78	1 / 9	0.17	0.17	CAA06-SD01-1008	1.61	1.16	2.33	3.00	0 / 9	0.06	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	9 / 9	1.20	56.7	CAPL-SD68-1012	24.1	18.7	35.7	9.79	6 / 9	5.79	3.65	2.46	--	-- / --	--	--	--	108	0 / 9	0.53	NO
Barium	-- - --	9 / 9	4.10	85.9	PL-00-POND-SD15-0300	50.7	33.0	71.1	20.0	7 / 9	4.30	3.55	2.53	--	-- / --	--	--	--	75.0	3 / 9	1.15	YES
Beryllium	-- - --	9 / 9	0.070	1.90	PL-00-POND-SD15-0300	0.71	0.60	1.08	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	1 / 9	1.37	NO
Cadmium	0.020 - 3.76	1 / 9	0.24	0.24	CAPL-SD67-1012	0.68	0.73	1.13	0.99	0 / 9	0.24	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	9 / 9	2.90	45.6	CAPL-SD68-1012	22.1	16.6	32.4	43.4	2 / 9	1.05	0.75	0.51	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	1.30 - 3.50	7 / 9	4.58	48.4	CAPL-SD82-1012	23.7	20.5	36.4	31.6	3 / 9	1.53	1.15	0.75	--	-- / --	--	--	--	25.6	5 / 9	1.89	YES
Cyanide	0.44 - 8.00	1 / 9	2.95	2.95	CAPL-SD65-1012	1.36	1.33	2.18	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Iron	-- - --	9 / 9	1,820	36,600	CAPL-SD81-1012	19,420	13,228	27,619	20,000	5 / 9	1.83	1.38	0.97	--	-- / --	--	--	--	45,600	0 / 9	0.80	NO
Lead	-- - --	9 / 9	2.90	63.7	PL-00-POND-SD16-0300	30.3	21.7	43.7	35.8	3 / 9	1.78	1.22	0.85	--	-- / --	--	--	--	41.6	3 / 9	1.53	NO
Manganese	-- - --	9 / 9	15.2	212	PL-00-POND-SD16-0300	132	78.0	181	460	0 / 9	0.46	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.15 - 0.36	7 / 9	0.044	0.20	PL-00-POND-SD15-0300	0.12	0.058	0.16	0.18	2 / 9	1.11	0.88	0.68	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	17.2 - 17.2	8 / 9	0.88	19.6	PL-00-POND-SD16-0300	9.80	7.64	14.5	22.7	0 / 9	0.86	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	9 / 9	3.80	67.8	CAPL-SD68-1012	32.7	23.8	47.5	57.0	2 / 9	1.19	0.83	0.57	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	9 / 9	6.90	145	PL-00-POND-SD16-0300	73.4	49.5	104	121	2 / 9	1.20	0.86	0.61	--	-- / --	--	--	--	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	9 / 9	7.10	8.00	PL-00-POND-SD15-0300	7.44	0.36	7.66	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	21 / 21	8,200	134,000	CAPL-SD82-1012	64,643	38,590	79,167	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-84
Screening Statistics - King Creek Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)															
2-Butanone	-- - --	1 / 1	5.92	5.92	CAPL-SD83-1012-V	5.92	--	--	NSV	-- / --	NSV	591	0 / 1	0.01	NO
Acetone	-- - --	1 / 1	22.6	22.6	CAPL-SD83-1012-V	22.6	--	--	NSV	-- / --	NSV	2,500	0 / 1	0.01	NO
Carbon disulfide	-- - --	1 / 1	2.26	2.26	CAPL-SD83-1012-V	2.26	--	--	NSV	-- / --	NSV	25.8	0 / 1	0.09	NO
Toluene	-- - --	1 / 1	6.87	6.87	CAPL-SD83-1012-V	6.87	--	--	3,920	0 / 1	0.002	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)															
No Detections															
Pesticides (UG/KG)															
4,4'-DDD	-- - --	1 / 1	2.88	2.88	CAPL-SD83-1012	2.88	--	--	1.22	1 / 1	2.36	10.1	0 / 1	0.29	NO
4,4'-DDE	-- - --	1 / 1	2.15	2.15	CAPL-SD83-1012	2.15	--	--	2.20	0 / 1	0.98	--	-- / --	--	NO
Aldrin	-- - --	1 / 1	0.47	0.47	CAPL-SD83-1012	0.47	--	--	9.50	0 / 1	0.05	--	-- / --	--	NO
alpha-BHC	-- - --	1 / 1	0.49	0.49	CAPL-SD83-1012	0.49	--	--	4,910	0 / 1	0.0001	--	-- / --	--	NO
Endrin aldehyde	-- - --	1 / 1	0.73	0.73	CAPL-SD83-1012	0.73	--	--	12.6	0 / 1	0.06	--	-- / --	--	NO
Heptachlor	-- - --	1 / 1	1.27	1.27	CAPL-SD83-1012	1.27	--	--	0.30	1 / 1	4.23	--	-- / --	--	YES
Heptachlor epoxide	-- - --	1 / 1	0.34	0.34	CAPL-SD83-1012	0.34	--	--	2.47	0 / 1	0.14	--	-- / --	--	NO
Methoxychlor	-- - --	1 / 1	0.30	0.30	CAPL-SD83-1012	0.30	--	--	107	0 / 1	0.003	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)															
Aroclor-1260	-- - --	1 / 1	29.3	29.3	CAPL-SD83-1012	29.3	--	--	48.0	0 / 1	0.61	--	-- / --	--	NO
Explosives (UG/KG)															
No Detections															
Inorganics (MG/KG)															
Aluminum	-- - --	1 / 1	13,300	13,300	CAPL-SD83-1012	13,300	--	--	18,000	0 / 1	0.74	--	-- / --	--	NO
Arsenic	-- - --	1 / 1	30.2	30.2	CAPL-SD83-1012	30.2	--	--	8.20	1 / 1	3.68	108	0 / 1	0.28	NO
Barium	-- - --	1 / 1	21.7	21.7	CAPL-SD83-1012	21.7	--	--	48.0	0 / 1	0.45	--	-- / --	--	NO
Beryllium	-- - --	1 / 1	0.86	0.86	CAPL-SD83-1012	0.86	--	--	NSV	-- / --	NSV	1.39	0 / 1	0.62	NO
Calcium [2]	-- - --	1 / 1	2,070	2,070	CAPL-SD83-1012	2,070	--	--	NSV	-- / --	NSV	--	-- / --	--	NO
Chromium	-- - --	1 / 1	56.3	56.3	CAPL-SD83-1012	56.3	--	--	81.0	0 / 1	0.70	--	-- / --	--	NO
Copper	-- - --	1 / 1	13.8	13.8	CAPL-SD83-1012	13.8	--	--	34.0	0 / 1	0.41	--	-- / --	--	NO
Iron	-- - --	1 / 1	68,200	68,200	CAPL-SD83-1012	68,200	--	--	220,000	0 / 1	0.31	--	-- / --	--	NO
Lead	-- - --	1 / 1	23.6	23.6	CAPL-SD83-1012	23.6	--	--	46.7	0 / 1	0.51	--	-- / --	--	NO
Magnesium [2]	-- - --	1 / 1	3,080	3,080	CAPL-SD83-1012	3,080	--	--	NSV	-- / --	NSV	--	-- / --	--	NO
Manganese	-- - --	1 / 1	98.5	98.5	CAPL-SD83-1012	98.5	--	--	260	0 / 1	0.38	--	-- / --	--	NO
Mercury	-- - --	1 / 1	0.034	0.034	CAPL-SD83-1012	0.034	--	--	0.15	0 / 1	0.23	--	-- / --	--	NO
Nickel	-- - --	1 / 1	6.27	6.27	CAPL-SD83-1012	6.27	--	--	20.9	0 / 1	0.30	--	-- / --	--	NO
Potassium [2]	-- - --	1 / 1	2,010	2,010	CAPL-SD83-1012	2,010	--	--	NSV	-- / --	NSV	--	-- / --	--	NO
Sodium [2]	-- - --	1 / 1	5,040	5,040	CAPL-SD83-1012	5,040	--	--	NSV	-- / --	NSV	--	-- / --	--	NO
Vanadium	-- - --	1 / 1	171	171	CAPL-SD83-1012	171	--	--	57.0	1 / 1	3.00	62.5	1 / 1	2.74	YES
Zinc	-- - --	1 / 1	111	111	CAPL-SD83-1012	111	--	--	150	0 / 1	0.74	--	-- / --	--	NO
Other Parameters															
pH	-- - --	1 / 1	7.24	7.24	CAPL-SD83-1012	7.24	--	--	--	-- / --	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	1 / 1	36,100	36,100	CAPL-SD83-1012	36,100	--	--	--	-- / --	--	--	-- / --	--	--

Table D-84
Screening Statistics - King Creek Surface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Macronutrient - Not considered to be a COPC

Table D-85
Initial Screening Statistics - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
Volatile Organic Compounds (UG/KG)									
2-Butanone	12.0 - 20.0	27 / 39	3.55	138	CAPL-SSD63-1012	459	0 / 39	0.30	NO
Acetone	12.0 - 14.0	36 / 39	10.0	459	CAPL-SSD63-1012	NSV	-- / --	NSV	YES
Carbon disulfide	2.42 - 29.0	11 / 39	1.88	29.7	CAPL-SSD81-1012	1.45	11 / 39	20.6	YES
cis-1,2-Dichloroethene	2.42 - 29.0	1 / 39	2.00	2.00	CAS011-11SD24-01-0602	680	0 / 39	0.003	NO
Semivolatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	4.09 - 940	6 / 41	8.35	1,420	CAPL-SSD70-1012	70.0	1 / 41	20.3	YES
Acenaphthene	4.09 - 940	6 / 41	8.55	79,800	CAPL-SSD70-1012	290	2 / 41	275	YES
Anthracene	4.09 - 940	7 / 41	15.0	85,600	CAPL-SSD70-1012	57.2	2 / 41	1,497	YES
Benzaldehyde	170 - 27,500	8 / 41	18.0	931	CAPL-SSD63-1012	NSV	-- / --	NSV	YES
Benzo(a)anthracene	4.09 - 940	12 / 41	4.43	36,600	CAPL-SSD70-1012	108	3 / 41	339	YES
Benzo(a)pyrene	4.09 - 940	13 / 41	9.10	20,500	CAPL-SSD70-1012	150	3 / 41	137	YES
Benzo(b)fluoranthene	4.09 - 940	16 / 41	6.61	16,100	CAPL-SSD70-1012	240	3 / 41	67.1	YES
Benzo(g,h,i)perylene	4.09 - 940	6 / 41	7.15	5,990	CAPL-SSD70-1012	170	3 / 41	35.2	YES
Benzo(k)fluoranthene	4.09 - 940	13 / 41	5.29	17,700	CAPL-SSD70-1012	240	3 / 41	73.8	YES
Carbazole	170 - 27,500	1 / 41	16.0	16.0	CAS011-11SD30-01-0602	140	0 / 41	0.11	NO
Chrysene	4.09 - 680	14 / 41	6.28	46,300	CAPL-SSD70-1012	166	5 / 41	279	YES
Dibenz(a,h)anthracene	4.09 - 940	3 / 41	77.5	2,710	CAPL-SSD70-1012	33.0	3 / 41	82.1	YES
Dibenzofuran	170 - 5,660	2 / 41	380	32,900	CAPL-SSD70-1012	5,100	1 / 41	6.45	YES
Di-n-octylphthalate	170 - 27,500	1 / 41	90.0	90.0	CAS011-11SD25-01-0602	NSV	-- / --	NSV	YES
Fluoranthene	4.10 - 680	31 / 41	2.93	125,000	CAPL-SSD70-1012	423	2 / 41	296	YES
Fluorene	4.09 - 940	3 / 41	10.7	81,700	CAPL-SSD70-1012	77.4	2 / 41	1,056	YES
Indeno(1,2,3-cd)pyrene	4.09 - 940	9 / 41	4.33	5,960	CAPL-SSD70-1012	200	3 / 41	29.8	YES
Naphthalene	4.09 - 940	3 / 41	8.60	145	CAPL-SSD79-1012	176	0 / 41	0.82	NO
PAH (HMW) - Detects	-- - --	29 / 41	3.25	286,860	CAPL-SSD70-1012	2,900	2 / 41	98.9	YES
PAH (LMW) - Detects	-- - --	31 / 41	2.93	660,520	CAPL-SSD70-1012	786	2 / 41	840	YES
PAH (total) - Detects	-- - --	31 / 41	6.08	947,380	CAPL-SSD70-1012	3,553	2 / 41	267	YES
PAH (HMW)	18.5 - 3,060	29 / 41	21.7	286,860	CAPL-SSD70-1012	2,900	3 / 41	98.9	YES
PAH (LMW)	119 - 3,060	31 / 41	131	674,818	CAPL-SSD70-1012	786	12 / 41	859	YES

Table D-85
Initial Screening Statistics - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
PAH (total)	138 - 6,120	31 / 41	156	961,678	CAPL-SSD70-1012	3,553	6 / 41	271	YES
Phenanthrene	4.10 - 940	15 / 41	4.95	287,000	CAPL-SSD70-1012	204	2 / 41	1,407	YES
Pyrene	4.10 - 940	28 / 41	3.25	135,000	CAPL-SSD70-1012	195	5 / 41	692	YES
Pesticides (UG/KG)									
4,4'-DDD	0.42 - 9.40	21 / 39	0.43	70.7	CAPL-SSD70-1012	4.88	12 / 39	14.5	YES
4,4'-DDE	1.12 - 6.10	30 / 39	0.62	251	CAPL-SSD78-1012	3.16	27 / 39	79.4	YES
4,4'-DDT	0.47 - 9.40	13 / 39	0.44	218	CAPL-SSD84-1012	4.16	7 / 39	52.4	YES
Aldrin	0.45 - 4.90	7 / 39	0.20	5.33	CAPL-SSD84-1012	2.00	1 / 39	2.67	YES
alpha-BHC	0.42 - 4.90	4 / 39	0.56	3.69	CAPL-SSD70-1012	6.00	0 / 39	0.62	NO
alpha-Chlordane	0.45 - 4.90	19 / 39	0.46	34.7	CAPL-SSD78-1012	3.24	9 / 39	10.7	YES
beta-BHC	0.42 - 4.90	4 / 39	0.77	26.2	CAPL-SSD70-1012	5.00	1 / 39	5.24	YES
delta-BHC	0.42 - 4.90	7 / 39	0.39	6.34	CAPL-SSD70-1012	3.00	1 / 39	2.11	YES
Dieldrin	0.45 - 9.40	17 / 39	0.32	709	CAPL-SSD84-1012	1.90	13 / 39	373	YES
Endosulfan I	0.42 - 4.90	5 / 39	0.22	1.21	CAPL-SSD78-1012	4.93	0 / 39	0.25	NO
Endosulfan II	0.44 - 9.40	10 / 39	0.60	483	CAPL-SSD84-1012	23.8	2 / 39	20.3	YES
Endosulfan sulfate	0.42 - 9.40	13 / 39	0.36	129	CAPL-SSD84-1012	9.18	5 / 39	14.1	YES
Endrin	0.44 - 9.40	12 / 39	0.36	59.1	CAPL-SSD84-1012	2.22	7 / 39	26.6	YES
Endrin aldehyde	0.45 - 9.40	17 / 39	0.28	30.0	CAPL-SSD84-1012	2.22	11 / 39	13.5	YES
Endrin ketone	0.45 - 9.40	12 / 39	0.59	28.0	CAPL-SSD84-1012	2.22	9 / 39	12.6	YES
gamma-BHC (Lindane)	0.42 - 4.90	4 / 39	0.20	0.68	CAPL-SSD78-1012	2.37	0 / 39	0.29	NO
gamma-Chlordane	2.20 - 40.8	27 / 39	0.67	212	CAPL-SSD78-1012	3.24	15 / 39	65.4	YES
Heptachlor	0.42 - 4.90	5 / 39	0.54	5.50	CAS011-11SD30-01-0602	116	0 / 39	0.05	NO
Heptachlor epoxide	0.45 - 4.90	7 / 39	0.42	6.42	CAPL-SSD84-1012	2.47	2 / 39	2.60	YES
Methoxychlor	0.47 - 49.0	12 / 39	0.48	276	CAPL-SSD78-1012	32.3	2 / 39	8.54	YES
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1260	10.9 - 94.0	22 / 39	7.74	34,200	CAPL-SSD84-1012	59.8	17 / 39	572	YES
Explosives (UG/KG)									
1,3-Dinitrobenzene	100 - 200	3 / 27	117	551	CAPL-SSD70-1012	11.4	3 / 27	48.4	YES
2,4,6-Trinitrotoluene	100 - 200	1 / 27	150	150	CAA06-SSD02-1008	156	0 / 27	0.96	NO

Table D-85
Initial Screening Statistics - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?
4-Nitrotoluene	178 - 200	1 / 27	109	109	CAPL-SSD73-1012	6,905	0 / 27	0.02	NO
Nitroglycerin	444 - 2,500	6 / 26	326	1,160	CAPL-SSD73-1012	NSV	-- / --	NSV	YES
Inorganics (MG/KG)									
Aluminum	-- - --	41 / 41	1,026	34,700	CAPL-SSD81-1012	25,500	3 / 41	1.36	YES
Antimony	0.41 - 11.9	7 / 41	0.18	2.58	CAPL-SSD85-1012	3.00	0 / 41	0.86	NO
Arsenic	-- - --	41 / 41	0.80	52.0	CAPL-SSD73-1012	9.79	17 / 41	5.31	YES
Barium	-- - --	41 / 41	7.13	104	CAPL-SSD73-1012	20.0	27 / 41	5.20	YES
Beryllium	0.14 - 2.97	21 / 41	0.12	3.09	CAPL-SSD85-1012	NSV	-- / --	NSV	YES
Cadmium	0.030 - 2.97	2 / 41	0.19	0.42	CAPL-SSD78-1012	0.99	0 / 41	0.42	NO
Calcium [2]	-- - --	41 / 41	481	170,000	CAS011-11SD25-01-0602	NSV	-- / --	NSV	NO
Chromium	-- - --	41 / 41	2.65	61.7	CAPL-SSD81-1012	43.4	4 / 41	1.42	YES
Cobalt	0.56 - 14.8	34 / 41	0.39	13.1	CAPL-SSD81-1012	50.0	0 / 41	0.26	NO
Copper	1.20 - 1.52	39 / 41	0.88	379	CAPL-SSD85-1012	31.6	9 / 41	12.0	YES
Cyanide	0.037 - 1.70	2 / 41	0.21	0.25	CAPL-SSD85-1012	NSV	-- / --	NSV	YES
Iron	-- - --	41 / 41	1,520	51,400	CAPL-SSD81-1012	20,000	18 / 41	2.57	YES
Lead	-- - --	41 / 41	3.00	236	CAPL-SSD85-1012	35.8	14 / 41	6.59	YES
Magnesium [2]	-- - --	41 / 41	146	6,550	CAPL-SSD81-1012	NSV	-- / --	NSV	NO
Manganese	-- - --	41 / 41	5.77	317	CAPL-SSD81-1012	460	0 / 41	0.69	NO
Mercury	0.016 - 0.20	20 / 41	0.023	1.45	CAPL-SSD64-1012	0.18	3 / 41	8.06	YES
Nickel	2.18 - 2.18	40 / 41	0.80	242	CAPL-SSD85-1012	22.7	3 / 41	10.7	YES
Potassium [2]	-- - --	41 / 41	130	6,790	CAS011-11SD24-01-0602	NSV	-- / --	NSV	NO
Selenium	0.35 - 7.42	5 / 41	0.76	2.10	CAS011-11SD28-01-0602	2.00	1 / 41	1.05	YES
Sodium [2]	81.7 - 4,450	14 / 41	28.6	5,440	CAPL-SSD64-1012	NSV	-- / --	NSV	NO
Vanadium	-- - --	41 / 41	3.89	76.9	CAPL-SSD81-1012	57.0	3 / 41	1.35	YES
Zinc	-- - --	41 / 41	3.99	1,040	CAPL-SSD85-1012	121	7 / 41	8.60	YES
Other Parameters									
pH	-- - --	27 / 27	6.77	8.28	CAPL-SSD85-1012	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	27 / 27	2,510	165,000	CAPL-SSD72-1012	--	-- / --	--	--

Table D-85
Initial Screening Statistics - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC?

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Macronutrient - Not considered to be a COPC

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAA06-SD01 CAA06-SSD01-1008 10/23/2008	CAA06-SD02 CAA06-SSD02-1008 10/23/2008	CAPL-SWSD62 CAPL-SSD62-1012 10/17/2012	CAPL-SWSD63 CAPL-SSD63-1012 10/17/2012	CAPL-SWSD64 CAPL-SSD64-1012 10/17/2012	CAPL-SWSD65 CAPL-SSD65-1012 10/18/2012	CAPL-SWSD66 CAPL-SSD66-1012 10/18/2012	CAPL-SWSD66 CAPL-SSD66P-1012 10/18/2012	CAPL-SWSD67 CAPL-SSD67-1012 10/16/2012	CAPL-SWSD67 CAPL-SSD67-1012-V 10/25/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	459	43.9	NA	NA	89.3	138	117	19.4 J	6.49 J	8.17 J	NA	13.2
Acetone	NSV	157	NA	NA	331 J	459 J	415 J	77.6 J	35.4 J	35.8 J	NA	46.9 J
Carbon disulfide	1.45	--	NA	NA	12.1 U	12.1 U	11.8 U	6.02 J	1.48 J	1.88 J	NA	3.23 U
cis-1,2-Dichloroethene	680	--	NA	NA	12.1 U	12.1 U	11.8 U	7.41 U	2.55 U	2.83 U	NA	3.23 U
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	70.0	3.26	680 U	600 U	12.6 U	50 J	13.1 U	9.9 U	4.6 U	4.6 U	8.35 J	NA
Acenaphthene	290	--	680 U	600 U	12.6 U	38.6 J	13.1 U	9.9 U	4.6 U	4.6 U	8.55 J	NA
Anthracene	57.2	--	680 U	600 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U	25.1	NA
Benzaldehyde	NSV	--	680 U	600 U	631 U	931 J	656 U	496 U	231 U	230 U	276 U	NA
Benzo(a)anthracene	108	--	680 U	600 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U	230	NA
Benzo(a)pyrene	150	14.5	680 U	600 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U	369	NA
Benzo(b)fluoranthene	240	17.7	680 U	600 U	12.6 U	80.1 J	13.1 U	9.9 U	4.6 U	4.6 U	392	NA
Benzo(g,h,i)perylene	170	--	680 U	600 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U	246	NA
Benzo(k)fluoranthene	240	12.6	680 U	600 U	12.6 U	61.3 J	13.1 U	9.9 U	4.6 U	4.6 U	467	NA
Carbazole	140	--	680 U	600 U	631 U	641 U	656 U	496 U	231 U	230 U	276 U	NA
Chrysene	166	19.6	680 U	600 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U	359	NA
Dibenz(a,h)anthracene	33.0	--	680 U	600 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U	77.5	NA
Dibenzofuran	5,100	--	680 U	600 U	631 U	641 U	656 U	496 U	231 U	230 U	276 U	NA
Di-n-octylphthalate	NSV	--	680 UJ	600 UJ	631 U	641 U	656 U	496 U	231 U	230 U	276 U	NA
Fluoranthene	423	21.2	680 U	600 U	9.31 J	127 J	9.64 J	8.82 J	2.93 J	2.7 J	199	NA
Fluorene	77.4	3.18	680 U	600 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U	10.7 J	NA
Indeno(1,2,3-cd)pyrene	200	--	680 U	600 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U	221	NA
Naphthalene	176	4.78	680 U	600 U	12.6 U	63.9 U	13.1 U	9.9 U	4.6 U	4.6 U	8.6 J	NA
PAH (HMW) - Detects	2,900	95.9	0 U	0 U	7.72 J	252 J	9.35 J	7.81 J	3.15 J	3.25 J	2,588 J	NA
PAH (LMW) - Detects	786	316	0 U	0 U	9.31 J	328 J	9.64 J	8.82 J	2.93 J	2.70 J	325 J	NA
PAH (total) - Detects	3,553	369	0 U	0 U	17.0 J	580 J	19.0 J	16.6 J	6.08 J	5.95 J	2,912 J	NA
PAH (HMW)	2,900	95.9	3,060 U	2,700 U	58.1 J	444 J	61.8 J	47.4 J	21.6 J	21.7 J	2,588 J	NA
PAH (LMW)	786	316	3,060 U	2,700 U	369 J	776 J	383 J	291 J	135 J	134 J	465 J	NA
PAH (total)	3,553	369	6,120 U	5,400 U	427 J	1,220 J	445 J	339 J	156 J	155 J	3,053 J	NA
Phenanthrene	204	16.7	680 U	600 U	12.6 U	112 J	13.1 U	9.9 U	4.6 U	4.6 U	64.4	NA
Pyrene	195	21.5	680 U	600 U	7.72 J	111 J	9.35 J	7.81 J	3.15 J	3.25 J	226	NA
Pesticides (UG/KG)												
4,4'-DDD	4.88	18.4	NA	NA	17.7 J	3.06 J	5.53 J	0.986 U	0.471 U	0.465 U	2.18 L	NA
4,4'-DDE	3.16	8.98	NA	NA	26.4 J	10.1 J	9.13 J	3.35 J	0.617 J	0.567 J	14 L	NA
4,4'-DDT	4.16	--	NA	NA	0.848 J	0.959 J	1.36 UL	0.986 U	0.471 U	0.465 U	1.51 J	NA
Aldrin	2.00	0.91	NA	NA	1.27 UL	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U	0.531 L	NA
alpha-BHC	6.00	0.322	NA	NA	0.563 J	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U	0.548 UL	NA
alpha-Chlordane	3.24	--	NA	NA	1.64 L	1.04 L	1.44 L	0.457 J	0.471 U	0.465 U	0.908 L	NA
beta-BHC	5.00	2.21	NA	NA	1.27 UL	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U	0.548 UL	NA

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAA06-SD01 CAA06-SSD01-1008 10/23/2008	CAA06-SD02 CAA06-SSD02-1008 10/23/2008	CAPL-SWSD62 CAPL-SSD62-1012 10/17/2012	CAPL-SWSD63 CAPL-SSD63-1012 10/17/2012	CAPL-SWSD64 CAPL-SSD64-1012 10/17/2012	CAPL-SWSD65 CAPL-SSD65-1012 10/18/2012	CAPL-SWSD66 CAPL-SSD66-1012 10/18/2012	CAPL-SWSD66 CAPL-SSD66P-1012 10/18/2012	CAPL-SWSD67 CAPL-SSD67-1012 10/16/2012	CAPL-SWSD67 CAPL-SSD67-1012-V 10/25/2012
delta-BHC	3.00	0.294	NA	NA	1.27 UL	0.509 J	1.36 UL	0.986 U	0.471 U	0.465 U	0.548 UL	NA
Dieldrin	1.90	--	NA	NA	4.65 J	4.36 J	1.36 UL	0.986 U	0.471 U	0.465 U	1.11 L	NA
Endosulfan I	4.93	0.805	NA	NA	1.27 UL	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U	0.548 UL	NA
Endosulfan II	23.8	--	NA	NA	2.1 J	2.44 J	1.36 UL	0.986 U	0.471 U	0.465 U	0.604 L	NA
Endosulfan sulfate	9.18	--	NA	NA	6.42 J	9.51 J	1.36 UL	1.66 J	0.471 U	0.465 U	0.355 L	NA
Endrin	2.22	0.64	NA	NA	0.859 J	1.09 J	1.36 UL	0.986 U	0.471 U	0.465 U	3.15 L	NA
Endrin aldehyde	2.22	--	NA	NA	5.11 L	4.52 J	1.36 UL	1.45 J	0.471 U	0.465 U	3.73 L	NA
Endrin ketone	2.22	--	NA	NA	16.5 J	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U	0.548 UL	NA
gamma-BHC (Lindane)	2.37	0.48	NA	NA	1.27 UL	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U	0.548 UL	NA
gamma-Chlordane	3.24	--	NA	NA	2.12 J	12.2 L	1.26 J	9.23 B	1.01 J	1.23 J	5.22 L	NA
Heptachlor	116	--	NA	NA	1.27 UL	1.35 UL	1.36 UL	0.927 J	0.471 U	0.465 U	0.54 L	NA
Heptachlor epoxide	2.47	--	NA	NA	1.27 UL	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U	0.548 UL	NA
Methoxychlor	32.3	--	NA	NA	16.2 J	1.35 UL	1.36 UL	0.986 U	0.471 U	0.465 U	2.42 J	NA
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	59.8	--	NA	NA	169 J	217 J	33.4 UL	24.2 U	7.74 J	6.18 J	230 L	NA
Explosives (UG/KG)												
1,3-Dinitrobenzene	11.4	--	100 U	100 U	197 U	196 U	194 U	183 U	178 U	182 U	198 U	NA
2,4,6-Trinitrotoluene	156	--	100 U	150	197 U	196 U	194 U	183 U	178 U	182 U	198 U	NA
4-Nitrotoluene	6,905	--	200 U	200 U	197 U	196 U	194 U	183 U	178 U	182 U	198 U	NA
Nitroglycerin	NSV	--	2,500 U	2,500 R	326 J	490 U	996 J	459 U	444 U	455 U	495 U	NA
Inorganics (MG/KG)												
Aluminum	25,500	10,200	1,690	5,760	18,800	17,800	19,300	20,300	1,770	1,920	2,100	NA
Antimony	3.00	--	0.18 L	4.8 UL	7.6 U	8 U	8.22 U	5.96 U	0.564 U	0.56 U	1.32 U	NA
Arsenic	9.79	57.2	6.9 J	4.6 J	44.3	27.4	22.8	19	2.33	2.74	9.01	NA
Barium	20.0	36.5	8.3 J	16.4	70.2	86.7	71.5	40.3	13.1 J	8.81 J	9.73	NA
Beryllium	NSV	0.599	0.12 J	0.19 J	1.9 U	2 U	1.15 J	1.49 U	0.156 J	0.153 J	0.329 U	NA
Cadmium	0.99	--	0.03 B	0.05 B	1.9 U	2 U	2.06 U	1.49 U	0.141 U	0.14 U	0.329 U	NA
Chromium	43.4	15.9	2.9 J	7.6 J	45	35.2	39.3	30.7 J	3.99 J	4.3	4.65	NA
Cobalt	50.0	2.47	0.49 J	1.2 J	9.5 U	10 U	6.01 J	5.51 J	0.507 J	0.578 J	1.64 U	NA
Copper	31.6	3.67	2.7	4	34.4	32.3	37.6	11.4	1.43	1.59	4.45	NA
Cyanide	NSV	--	1 U	0.8 U	0.892 U	0.962 U	1.01 U	0.745 U	0.327 U	0.352 U	0.396 U	NA
Iron	20,000	11,300	3,610 J	4,740 J	30,400	33,700	29,600	25,600	2,530	2,870	4,330	NA
Lead	35.8	12.1	6.4 J	11.5 J	107	68.4	57.6	15.6	3.41	4.1	18.2	NA
Manganese	460	28.9	38.1	53.2	108	139	97.2	105	9.66	11.7	30.7	NA
Mercury	0.18	0.052	0.2 UL	0.17 UL	0.115 J	0.252	1.45	0.0484 J	0.035 U	0.0384 U	0.0493 J	NA
Nickel	22.7	5.63	1.3 J	3.3	11	10.9	12.7	12.6	1.08	1.21	1.55 J	NA
Selenium	2.00	--	3.5 UL	2.8 UL	4.75 U	5 U	5.14 U	3.73 U	0.353 U	0.35 U	0.822 U	NA
Vanadium	57.0	20.4	4.4 J	10.2 J	45	40	46.6	39.6	6.04	6.62	6.4	NA
Zinc	121	22.6	10	28.9	215	165	155	69	6.03	6.81	50.7	NA

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAA06-SD01	CAA06-SD02	CAPL-SWSD62	CAPL-SWSD63	CAPL-SWSD64	CAPL-SWSD65	CAPL-SWSD66		CAPL-SWSD67	
			CAA06-SSD01-1008	CAA06-SSD02-1008	CAPL-SSD62-1012	CAPL-SSD63-1012	CAPL-SSD64-1012	CAPL-SSD65-1012	CAPL-SSD66-1012	CAPL-SSD66P-1012	CAPL-SSD67-1012	CAPL-SSD67-1012-V
			10/23/2008	10/23/2008	10/17/2012	10/17/2012	10/17/2012	10/18/2012	10/18/2012	10/18/2012	10/16/2012	10/25/2012
Other Parameters												
pH	--	--	7.40	7.30	7.31 H3	6.92 H3	6.89 H3	7.16 H3	7.35 H3	NA	7.34 H3	NA
Total organic carbon (MG/KG)	--	--	36,000 K	31,000 K	45,400	103,000	124,000	63,000	10,700	NA	30,900	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD68	CAPL-SWSD69		CAPL-SD70	CAPL-SD71	CAPL-SD72	CAPL-SD73	CAPL-SD74		CAPL-SD75
			CAPL-SSD68-1012	CAPL-SSD69-1012	CAPL-SSD69-1012-V	CAPL-SSD70-1012	CAPL-SSD71-1012	CAPL-SSD72-1012	CAPL-SSD73-1012	CAPL-SSD74-1012	CAPL-SSD74P-1012	CAPL-SSD75-1012
			10/18/2012	10/17/2012	10/25/2012	10/17/2012	10/17/2012	10/17/2012	10/17/2012	10/18/2012	10/18/2012	10/18/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	459	43.9	21.8 J	NA	44.8	43.3	71.6	39.6 J	92.6	49.2 J	59.5	71.2 J
Acetone	NSV	157	86.5 J	NA	133 J	141 J	271 J	151 J	347 J	224 J	234 J	323 J
Carbon disulfide	1.45	--	14.8 J	NA	4.08 J	4.48 U	9.37 U	11.5 J	11.8 U	13.4 J	9.4 J	9.7 J
cis-1,2-Dichloroethene	680	--	11.2 U	NA	4.4 U	4.48 U	9.37 U	12 U	11.8 U	13.6 U	12.1 U	18.8 U
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	70.0	3.26	14.6 U	5.68 U	NA	1,420	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Acenaphthene	290	--	14.6 U	5.68 U	NA	79,800	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Anthracene	57.2	--	14.6 U	5.68 U	NA	85,600	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Benzaldehyde	NSV	--	735 U	285 U	NA	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U
Benzo(a)anthracene	108	--	14.6 U	5.68 U	NA	36,600	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Benzo(a)pyrene	150	14.5	14.6 U	5.68 U	NA	20,500	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Benzo(b)fluoranthene	240	17.7	14.6 U	5.68 U	NA	16,100	11 U	19.5 U	15.1 U	20.8 J	15.6 U	77.8 U
Benzo(g,h,i)perylene	170	--	14.6 U	5.68 U	NA	5,990	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Benzo(k)fluoranthene	240	12.6	14.6 U	5.68 U	NA	17,700	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Carbazole	140	--	735 U	285 U	NA	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U
Chrysene	166	19.6	14.6 U	5.68 U	NA	46,300	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Dibenz(a,h)anthracene	33.0	--	14.6 U	5.68 U	NA	2,710	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Dibenzofuran	5,100	--	735 U	285 U	NA	32,900 J	550 U	979 U	756 U	816 U	782 U	3,900 U
Di-n-octylphthalate	NSV	--	735 U	285 U	NA	27,500 U	550 U	979 U	756 U	816 U	782 U	3,900 U
Fluoranthene	423	21.2	13.4 J	5.41 J	NA	125,000	9.84 J	19.5 U	13.1 J	27.1 J	15.6 U	55.5 J
Fluorene	77.4	3.18	14.6 U	5.68 U	NA	81,700	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Indeno(1,2,3-cd)pyrene	200	--	14.6 U	5.68 U	NA	5,960	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
Naphthalene	176	4.78	14.6 U	5.68 U	NA	548 U	11 U	19.5 U	15.1 U	16.3 U	15.6 U	77.8 U
PAH (HMW) - Detects	2,900	95.9	0 U	3.83 J	NA	286,860	9.76 J	0 U	14.4 J	46.7 J	0 U	48.2 J
PAH (LMW) - Detects	786	316	13.4 J	5.41 J	NA	660,520	9.84 J	0 U	13.1 J	49.4 J	0 U	55.5 J
PAH (total) - Detects	3,553	369	13.4 J	9.24 J	NA	947,380	19.6 J	0 U	27.5 J	96.1 J	0 U	104 J
PAH (HMW)	2,900	95.9	65.7 U	26.6 J	NA	286,860	53.8 J	87.8 U	74.8 J	104 J	70.2 U	359 J
PAH (LMW)	786	316	432 J	168 J	NA	674,818	323 J	568 U	444 J	506 J	453 U	2,278 J
PAH (total)	3,553	369	498 J	194 J	NA	961,678	377 J	655 U	519 J	610 J	524 U	2,637 J
Phenanthrene	204	16.7	14.6 U	5.68 U	NA	287,000	11 U	19.5 U	15.1 U	22.3 J	15.6 U	77.8 U
Pyrene	195	21.5	14.6 U	3.83 J	NA	135,000	9.76 J	19.5 U	14.4 J	25.9 J	15.6 U	48.2 J
Pesticides (UG/KG)												
4,4'-DDD	4.88	18.4	1.48 U	0.434 J	NA	70.7 J	3.85 J	1.98 U	6.99 J	2.96 J	1.86 J	1.58 U
4,4'-DDE	3.16	8.98	1.48 U	1.51 J	NA	50.1 J	8.61 J	1.98 U	21.6 J	6.22 J	5.12 J	3.67 J
4,4'-DDT	4.16	--	1.48 U	0.569 UL	NA	4.21 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U
Aldrin	2.00	0.91	1.48 U	0.569 UL	NA	0.453 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U
alpha-BHC	6.00	0.322	1.48 U	0.569 UL	NA	3.69 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U
alpha-Chlordane	3.24	--	1.48 U	0.569 UL	NA	7.13 J	0.492 J	1.98 U	2.1 J	1.55 J	1.64 UL	1.58 U
beta-BHC	5.00	2.21	1.48 U	0.569 UL	NA	26.2 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD68	CAPL-SWSD69		CAPL-SD70	CAPL-SD71	CAPL-SD72	CAPL-SD73	CAPL-SD74		CAPL-SD75
			CAPL-SSD68-1012	CAPL-SSD69-1012	CAPL-SSD69-1012-V	CAPL-SSD70-1012	CAPL-SSD71-1012	CAPL-SSD72-1012	CAPL-SSD73-1012	CAPL-SSD74-1012	CAPL-SSD74P-1012	CAPL-SSD75-1012
			10/18/2012	10/17/2012	10/25/2012	10/17/2012	10/17/2012	10/17/2012	10/17/2012	10/18/2012	10/18/2012	10/18/2012
delta-BHC	3.00	0.294	1.48 U	0.569 UL	NA	6.34 J	1.11 U	1.98 U	1.07 J	1.66 U	1.64 UL	1.58 U
Dieldrin	1.90	--	1.48 U	1.07 J	NA	8.03 J	2.1 J	1.98 U	3.01 J	1.66 U	0.919 J	1.58 U
Endosulfan I	4.93	0.805	1.48 U	0.569 UL	NA	0.571 UL	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U
Endosulfan II	23.8	--	1.48 U	0.569 UL	NA	0.806 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U
Endosulfan sulfate	9.18	--	1.48 U	0.37 J	NA	45.9 J	0.946 J	1.98 U	1.48 J	0.921 J	1.64 UL	1.58 U
Endrin	2.22	0.64	1.48 U	0.863 J	NA	23.9 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U
Endrin aldehyde	2.22	--	1.48 U	0.867 J	NA	5.18 J	2.29 J	1.98 U	0.813 J	2.27 J	1.64 J	1.58 U
Endrin ketone	2.22	--	1.48 U	0.569 UL	NA	3.62 J	2.73	1.98 U	3.04 J	1.66 U	1.64 L	1.58 U
gamma-BHC (Lindane)	2.37	0.48	1.48 U	0.569 UL	NA	0.201 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U
gamma-Chlordane	3.24	--	1.56 J	4.77 K	NA	26.9 J	1.11 J	16.4 J	2.69 J	14.7 J	8.95 J	1.8 J
Heptachlor	116	--	1.48 U	0.569 U	NA	1.56 J	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	0.964 J
Heptachlor epoxide	2.47	--	1.48 U	0.569 UL	NA	0.571 UL	1.11 U	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U
Methoxychlor	32.3	--	1.48 U	0.569 U	NA	10.3 J	0.478 J	1.98 U	1.5 U	1.66 U	1.64 UL	1.58 U
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	59.8	--	36.1 U	13.9 UL	NA	2,030 J	37.3 J	48.5 U	52.7 J	40.7 U	40.2 UL	38.6 U
Explosives (UG/KG)												
1,3-Dinitrobenzene	11.4	--	197 U	187 U	NA	551	197 U	190 U	190 U	194 U	197 U	192 U
2,4,6-Trinitrotoluene	156	--	197 U	187 U	NA	178 U	197 U	190 U	190 U	194 U	197 U	192 U
4-Nitrotoluene	6,905	--	197 U	187 U	NA	178 U	197 U	190 U	109 J	194 U	197 U	192 U
Nitroglycerin	NSV	--	493 U	467 U	NA	444 U	928 J	476 U	1,160	485 U	493 U	842 J
Inorganics (MG/KG)												
Aluminum	25,500	10,200	30,700	3,460	NA	4,690	15,900	21,100	29,100	18,800	19,700	22,300
Antimony	3.00	--	8.7 U	0.679 UL	NA	3.53 U	6.84 U	11.9 U	9.26 U	4.01 U	3.93 U	3.83 U
Arsenic	9.79	57.2	22.5	5.86	NA	16.5	26.5	31.2	52	47	43.5	40.6
Barium	20.0	36.5	60	10.2	NA	36.5	59.9	53.7 J	104	62.8	65.6	75.4
Beryllium	NSV	0.599	1.14 J	0.224 J	NA	0.443 J	0.876 J	2.97 U	1.44 J	1.04 J	1.07 J	1.04 J
Cadmium	0.99	--	2.17 U	0.17 U	NA	0.883 U	1.71 U	2.97 U	2.31 U	1 U	0.983 U	0.958 U
Chromium	43.4	15.9	51.4 J	10.3	NA	11.5	31.7	35.2	54.2	35.5	37.9	40.1
Cobalt	50.0	2.47	6.73 J	0.761 J	NA	2.23 J	4.41 J	14.8 U	7.32 J	5.97 J	6.28	6.54
Copper	31.6	3.67	16.3	3.46	NA	10.4	29.2	14.7 J	60	31.7	39.1	44
Cyanide	NSV	--	1.04 U	0.399 UL	NA	0.399 U	0.778 U	1.57 U	1.18 U	1.13 U	1.16 U	1.1 U
Iron	20,000	11,300	28,400	9,000	NA	14,900	24,500	21,200	41,800	31,100	30,500	30,000
Lead	35.8	12.1	19.6	4.92	NA	37.6	47.9	22.3	92.3	41.8	44	48.5
Manganese	460	28.9	160	24.6	NA	48.4	106	120	180	151	150	142
Mercury	0.18	0.052	0.0582 J	0.0233 J	NA	0.0538 J	0.12	0.167 U	0.13 J	0.106 J	0.106 J	0.113 J
Nickel	22.7	5.63	18.6	2.18 B	NA	4.07 J	9.94	12 J	18	13.4	14	15.8
Selenium	2.00	--	5.43 U	0.424 U	NA	2.21 U	4.28 U	7.42 U	5.79 U	2.51 U	2.46 U	2.4 U
Vanadium	57.0	20.4	73.6	12.1	NA	14.7	41.1	48.9	67	48.8	50.2	52.9
Zinc	121	22.6	74.6	14.7	NA	67.8	102	56.6	186	97.4	103	118

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SWSD68	CAPL-SWSD69		CAPL-SD70	CAPL-SD71	CAPL-SD72	CAPL-SD73	CAPL-SD74		CAPL-SD75
			CAPL-SSD68-1012	CAPL-SSD69-1012	CAPL-SSD69-1012-V	CAPL-SSD70-1012	CAPL-SSD71-1012	CAPL-SSD72-1012	CAPL-SSD73-1012	CAPL-SSD74-1012	CAPL-SSD74P-1012	CAPL-SSD75-1012
			10/18/2012	10/17/2012	10/25/2012	10/17/2012	10/17/2012	10/17/2012	10/17/2012	10/18/2012	10/18/2012	10/18/2012
Other Parameters												
pH	--	--	7.53 H3	6.77 H3	NA	7.02 H3	6.86 H3	7.36 H3	7.06 H3	7.71 H3	NA	7.13 H3
Total organic carbon (MG/KG)	--	--	88,200	28,400	NA	33,600	44,500	165,000	57,300	124,000	NA	74,400

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD76 CAPL-SSD76-1012 10/16/2012	CAPL-SD77 CAPL-SSD77-1012 10/16/2012	CAPL-SD78 CAPL-SSD78-1012 10/16/2012	CAPL-SD79 CAPL-SSD79-1012 10/16/2012	CAPL-SD79 CAPL-SSD79-1012-V 10/25/2012	CAPL-SD80 CAPL-SSD80-1012 10/16/2012	CAPL-SD80 CAPL-SSD80-1012-V 10/25/2012	CAPL-SD81 CAPL-SSD81-1012 10/18/2012	CAPL-SD82 CAPL-SSD82-1012 10/18/2012	CAPL-SD84 CAPL-SSD84-1012 10/24/2012
Volatile Organic Compounds (UG/KG)												
2-Butanone	459	43.9	3.66 J	8.71 J	27.9	NA	3.88 J	NA	57.3	22.7 J	116	7.37 J
Acetone	NSV	157	17.3 J	36.3	107	NA	17.2 J	NA	195 J	120 J	438 J	25 J
Carbon disulfide	1.45	--	2.46 UJ	2.42 UJ	6.56 UJ	NA	3.29 U	NA	7.31 J	29.7	22.7 U	2.11 J
cis-1,2-Dichloroethene	680	--	2.46 U	2.42 U	6.56 U	NA	3.29 U	NA	5.2 U	12.1 U	22.7 U	3.26 U
Semivolatile Organic Compounds (UG/KG)												
2-Methylnaphthalene	70.0	3.26	4.38 U	10.7	40.3 U	9.45 J	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Acenaphthene	290	--	4.38 U	4.35 U	40.3 U	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Anthracene	57.2	--	4.38 U	4.35 U	40.3 U	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Benzaldehyde	NSV	--	219 U	218 U	404 U	242 U	NA	310 U	NA	170 U	5,660 U	205 U
Benzo(a)anthracene	108	--	4.38 U	19.7	99.9	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Benzo(a)pyrene	150	14.5	9.1	18.9	87.4	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Benzo(b)fluoranthene	240	17.7	7.75 J	15.5	87.4	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Benzo(g,h,i)perylene	170	--	7.15 J	11	92	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Benzo(k)fluoranthene	240	12.6	5.29 J	18	68.1 J	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Carbazole	140	--	219 U	218 U	404 U	242 U	NA	310 U	NA	170 U	5,660 U	205 U
Chrysene	166	19.6	4.38 U	21.8	194	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Dibenz(a,h)anthracene	33.0	--	4.38 U	4.35 U	40.3 U	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Dibenzofuran	5,100	--	219 U	218 U	404 U	242 U	NA	310 U	NA	170 U	5,660 U	205 U
Di-n-octylphthalate	NSV	--	219 U	218 U	404 U	242 U	NA	310 U	NA	170 U	5,660 U	205 U
Fluoranthene	423	21.2	6.27 J	24.2	186	16.2	NA	12.4 J	NA	7.01 J	66.5 J	9.91
Fluorene	77.4	3.18	4.38 U	4.35 U	40.3 U	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Indeno(1,2,3-cd)pyrene	200	--	5.21 J	10.6	63.3 J	4.83 U	NA	6.18 U	NA	11.5 U	113 U	4.09 U
Naphthalene	176	4.78	4.38 U	4.35 U	131	145	NA	6.18 U	NA	11.5 U	113 U	4.09 U
PAH (HMW) - Detects	2,900	95.9	42.5 J	139	975 J	17.3 J	NA	11.1 J	NA	0 U	64.8 J	9.78 K
PAH (LMW) - Detects	786	316	6.27 J	34.9	448 J	171 J	NA	12.4 J	NA	7.01 J	66.5 J	16.7 J
PAH (total) - Detects	3,553	369	48.7 J	174	1,423 J	188 J	NA	23.5 J	NA	7.01 J	131 J	26.5 J
PAH (HMW)	2,900	95.9	49.0 J	141	995 J	36.6 J	NA	35.8 J	NA	51.8 U	517 J	26.1 K
PAH (LMW)	786	316	131 J	157	751 J	304 J	NA	189 J	NA	132 J	3,292 J	131 J
PAH (total)	3,553	369	180 J	298	1,746 J	340 J	NA	225 J	NA	184 J	3,809 J	158 J
Phenanthrene	204	16.7	4.38 U	4.35 U	131	4.83 U	NA	6.18 U	NA	11.5 U	113 U	6.8 J
Pyrene	195	21.5	7.97 J	23.4	283	17.3	NA	11.1 J	NA	11.5 U	64.8 J	9.78 K
Pesticides (UG/KG)												
4,4'-DDD	4.88	18.4	3.16 J	0.438 UL	33.6 L	0.804 L	NA	0.607 U	NA	1.12 U	2.32 U	0.422 U
4,4'-DDE	3.16	8.98	6.3	20 J	251 J	32.7 J	NA	3.57 J	NA	1.12 U	4.8	17.1 J
4,4'-DDT	4.16	--	0.67 J	5.25 J	9.17 J	3.14 J	NA	0.607 U	NA	1.12 U	2.32 U	218 J
Aldrin	2.00	0.91	0.447 U	0.414 J	0.792 U	0.934 J	NA	0.607 U	NA	1.12 U	2.32 U	5.33 J
alpha-BHC	6.00	0.322	0.447 UL	0.438 UL	0.792 U	0.478 U	NA	0.606 J	NA	1.12 U	2.32 U	0.422 U
alpha-Chlordane	3.24	--	0.447 U	3.88 L	34.7	9.94 L	NA	0.607 U	NA	1.12 U	2.32 U	13.4 J
beta-BHC	5.00	2.21	0.447 U	0.438 UL	0.792 U	1.12 L	NA	0.607 U	NA	1.12 U	2.32 U	0.422 U

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD76 CAPL-SSD76-1012 10/16/2012	CAPL-SD77 CAPL-SSD77-1012 10/16/2012	CAPL-SD78 CAPL-SSD78-1012 10/16/2012	CAPL-SD79 CAPL-SSD79-1012 10/16/2012	CAPL-SD79 CAPL-SSD79-1012-V 10/25/2012	CAPL-SD80 CAPL-SSD80-1012 10/16/2012	CAPL-SD80 CAPL-SSD80-1012-V 10/25/2012	CAPL-SD81 CAPL-SSD81-1012 10/18/2012	CAPL-SD82 CAPL-SSD82-1012 10/18/2012	CAPL-SD84 CAPL-SSD84-1012 10/24/2012
delta-BHC	3.00	0.294	0.447 UL	0.438 U	0.582 J	0.478 U	NA	0.607 U	NA	1.12 U	2.32 U	0.505 J
Dieldrin	1.90	--	0.447 U	5.14 J	50.1 L	6.88 J	NA	0.323 J	NA	1.12 U	2.32 U	709
Endosulfan I	4.93	0.805	0.376 L	0.438 UL	1.21 J	0.22 J	NA	0.607 U	NA	1.12 U	2.32 U	0.422 U
Endosulfan II	23.8	--	0.447 U	0.438 UL	1.3 L	12.5 L	NA	0.607 U	NA	1.12 U	2.32 U	483 J
Endosulfan sulfate	9.18	--	2.01 K	0.438 U	102 J	20.3 L	NA	0.607 U	NA	1.12 U	2.32 U	129 J
Endrin	2.22	0.64	0.355 J	0.438 UL	49 L	1.15 J	NA	0.607 U	NA	1.12 U	2.32 U	59.1 J
Endrin aldehyde	2.22	--	0.447 UL	3.54 J	16.2 L	2.1 J	NA	0.607 U	NA	1.12 U	2.32 U	30 J
Endrin ketone	2.22	--	0.447 U	3.41 J	8.6 J	1.72 J	NA	0.607 U	NA	1.12 U	2.32 U	28 J
gamma-BHC (Lindane)	2.37	0.48	0.447 U	0.438 U	0.683 J	0.478 U	NA	0.415 J	NA	1.12 U	2.32 U	0.427 J
gamma-Chlordane	3.24	--	0.667 L	26.1	212	40.6	NA	1.3	NA	1.85 J	3.72 J	40.8 B
Heptachlor	116	--	0.447 U	0.438 UL	0.792 U	0.478 U	NA	0.607 U	NA	1.12 U	2.32 U	0.422 U
Heptachlor epoxide	2.47	--	0.447 UL	0.856 L	3.43 L	0.72 L	NA	0.607 U	NA	1.12 U	2.32 U	6.42 J
Methoxychlor	32.3	--	1.12 J	3.14 J	276 J	9.38 J	NA	0.607 U	NA	1.12 U	2.32 U	137 J
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	59.8	--	10.9 U	1,170	3,020 J	630 J	NA	14.9 U	NA	27.4 U	36.6 J	34,200 J
Explosives (UG/KG)												
1,3-Dinitrobenzene	11.4	--	187 U	200 U	456	117 J	NA	199 U	NA	193 U	193 U	200 U
2,4,6-Trinitrotoluene	156	--	187 U	200 U	199 U	193 U	NA	199 U	NA	193 U	193 U	200 U
4-Nitrotoluene	6,905	--	187 U	200 U	199 U	193 U	NA	199 U	NA	193 U	193 U	200 U
Nitroglycerin	NSV	--	467 U	500 U	498 U	483 U	NA	498 U	NA	483 U	968 J	500 U
Inorganics (MG/KG)												
Aluminum	25,500	10,200	1,740	3,690	10,500	4,070	NA	3,660	NA	34,700	15,600	5,360
Antimony	3.00	--	0.577 UL	0.561 U	1.99 U	0.599 U	NA	1.47 U	NA	6.94 U	5.62 U	1.04 U
Arsenic	9.79	57.2	0.801	2.18	8.75	3.11	NA	4.29	NA	24.4	45.8	5.1
Barium	20.0	36.5	7.13	18.7	49.5	21.3	NA	17.1	NA	64.7	66.9	25.6
Beryllium	NSV	0.599	0.144 U	0.163 J	0.558 J	0.209 J	NA	0.26 J	NA	1.63 J	0.731 J	0.474 J
Cadmium	0.99	--	0.144 U	0.14 U	0.417 J	0.15 U	NA	0.188 J	NA	1.73 U	1.4 U	0.259 U
Chromium	43.4	15.9	2.65	5.52	15.2	6.11	NA	7.39	NA	61.7	26.9	14.1
Cobalt	50.0	2.47	0.389 J	0.995	2.95 J	1.23	NA	0.949 J	NA	13.1	5.24 J	1.74
Copper	31.6	3.67	0.883	2.2	19.8	2.62	NA	3.4	NA	18.4	42.5	2.69
Cyanide	NSV	--	0.298 U	0.332 U	0.577 U	0.351 U	NA	0.434 U	NA	0.826 U	1.7 U	0.205 J
Iron	20,000	11,300	1,520	3,530	11,300	4,400	NA	4,880	NA	51,400	26,000	14,000
Lead	35.8	12.1	3.98	10.4	43	10.6	NA	9.16	NA	25	42.1	13.5
Manganese	460	28.9	5.77	8.18	32.3	12.3	NA	24.5	NA	317	144	35.4
Mercury	0.18	0.052	0.0234 J	0.0244 J	0.0894 J	0.0331 J	NA	0.0297 J	NA	0.0813 J	0.0957 J	0.0229 B
Nickel	22.7	5.63	0.945	1.94	6.36	2.15	NA	2.27	NA	26.1	12.5	3.58
Selenium	2.00	--	0.36 U	0.351 U	1.24 U	0.374 U	NA	0.919 U	NA	4.33 U	3.51 U	0.647 U
Vanadium	57.0	20.4	3.89	7.92	23.5	9.04	NA	9.33	NA	76.9	39.8	13.8
Zinc	121	22.6	3.99	18.2	84.3	21.1	NA	20.3	NA	97.2	101	28.3

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD76 CAPL-SSD76-1012 10/16/2012	CAPL-SD77 CAPL-SSD77-1012 10/16/2012	CAPL-SD78 CAPL-SSD78-1012 10/16/2012	CAPL-SD79 CAPL-SSD79-1012 10/16/2012	CAPL-SD79 CAPL-SSD79-1012-V 10/25/2012	CAPL-SD80 CAPL-SSD80-1012 10/16/2012	CAPL-SD80 CAPL-SSD80-1012-V 10/25/2012	CAPL-SD81 CAPL-SSD81-1012 10/18/2012	CAPL-SD82 CAPL-SSD82-1012 10/18/2012	CAPL-SD84 CAPL-SSD84-1012 10/24/2012
Other Parameters												
pH	--	--	6.93 H3	7.00 H3	6.79 H3	7.00 H3	NA	7.53 H3	NA	7.25 H3	7.26 H3	8.02 H3
Total organic carbon (MG/KG)	--	--	7,570	15,800	63,700	25,500	NA	37,000	NA	75,400	136,000	4,950

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD85	CAPL-SD86	CAPL-SD87	CAS011-11SD18		CAS011-11SD19	CAS011-11SD21	
			CAPL-SSD85-1012	CAPL-SSD86-1012	CAPL-SSD87-1012	CAS011-11SD18-01-0602	CAS011-11SD18-01D-0602	CAS011-11SD19-01-0602	CAS011-11SD21-01-0602	CAS011-11SD21-01D-0602
			10/24/2012	10/24/2012	10/24/2012	6/13/2002	6/13/2002	6/13/2002	6/14/2002	6/14/2002
Volatile Organic Compounds (UG/KG)										
2-Butanone	459	43.9	3.55 J	6.23 J	23.9	12 U	12 U	18 U	13 U	15 U
Acetone	NSV	157	16.7 J	26.3 J	90.6 J	12 UJ	12 UJ	28 J	13 UJ	10 J
Carbon disulfide	1.45	--	2.92 U	4.19 J	3.9 U	12 U	12 U	18 U	13 U	15 U
cis-1,2-Dichloroethene	680	--	2.92 U	2.59 U	3.9 U	12 U	12 U	18 U	13 U	15 U
Semivolatile Organic Compounds (UG/KG)										
2-Methylnaphthalene	70.0	3.26	4.1 U	4.2 U	47.2 U	410 U	410 U	830 U	420 U	420 U
Acenaphthene	290	--	4.1 U	4.2 U	1,270 K	410 U	410 U	830 U	420 U	420 U
Anthracene	57.2	--	4.1 U	4.2 U	2,650	410 U	410 U	830 U	15 J	12 J
Benzaldehyde	NSV	--	206 U	211 U	236 U	410 U	410 U	57 J	420 U	420 U
Benzo(a)anthracene	108	--	4.1 U	4.43 J	2,300	410 U	410 U	38 J	28 J	20 J
Benzo(a)pyrene	150	14.5	4.1 U	4.2 U	1,230 K	10 J	27 J	46 J	30 J	22 J
Benzo(b)fluoranthene	240	17.7	4.1 U	6.61 K	1,400 K	24 J	39 J	57 J	30 J	26 J
Benzo(g,h,i)perylene	170	--	4.1 U	4.2 U	466 K	410 U	410 U	830 U	420 U	420 U
Benzo(k)fluoranthene	240	12.6	4.1 U	4.2 U	726	22 J	24 J	57 J	30 J	19 J
Carbazole	140	--	206 U	211 U	236 U	410 U	410 U	830 U	420 U	420 U
Chrysene	166	19.6	4.1 U	6.28 K	2,350 K	26 J	42 J	69 J	34 J	26 J
Dibenz(a,h)anthracene	33.0	--	4.1 U	4.2 U	134 K	410 U	410 U	830 U	420 U	420 U
Dibenzofuran	5,100	--	206 U	211 U	380 J	410 U	410 U	830 U	420 U	420 U
Di-n-octylphthalate	NSV	--	206 U	211 U	236 U	410 U	410 U	830 U	420 U	420 U
Fluoranthene	423	21.2	4.1 U	11	6,230	21 J	47 J	74 J	56 J	46 J
Fluorene	77.4	3.18	4.1 U	4.2 U	1,340 K	410 U	410 U	830 U	420 U	420 U
Indeno(1,2,3-cd)pyrene	200	--	4.1 U	4.33 J	386	410 U	410 U	830 U	420 U	420 U
Naphthalene	176	4.78	4.1 U	4.2 U	47.2 U	410 U	410 U	830 U	420 U	420 U
PAH (HMW) - Detects	2,900	95.9	0 U	30.5 K	15,962 K	104 J	171 J	346 J	215 J	158 J
PAH (LMW) - Detects	786	316	0 U	16.0 J	19,080	21.0 J	61.0 J	110 J	98.0 J	83.0 J
PAH (total) - Detects	3,553	369	0 U	46.4 J	35,042 K	125 J	232 J	456 J	313 J	241 J
PAH (HMW)	2,900	95.9	18.5 U	38.9 K	15,962 K	924 J	991 J	1,591 J	845 J	788 J
PAH (LMW)	786	316	119 U	134 J	19,269	1,661 J	1,496 J	3,015 J	1,358 J	1,343 J
PAH (total)	3,553	369	138 U	173 J	35,231 K	2,585 J	2,487 J	4,606 J	2,203 J	2,131 J
Phenanthrene	204	16.7	4.1 U	4.95 J	7,590	410 U	14 J	36 J	27 J	25 J
Pyrene	195	21.5	4.1 U	8.84 K	6,970 K	22 J	39 J	79 J	63 J	45 J
Pesticides (UG/KG)										
4,4'-DDD	4.88	18.4	3.02 J	7.08 L	13.6 J	4.1 U	4.1 U	14	16	8.1
4,4'-DDE	3.16	8.98	9.61	23.5 L	2.09 J	21	19	32	4.2 J	4.2 U
4,4'-DDT	4.16	--	11.2 J	13.9 J	0.441 J	4.1 U	4.1 U	6.7 U	4.2 U	4.2 U
Aldrin	2.00	0.91	0.196 J	0.715 J	0.493 UL	2.1 U	2.1 U	3.5 U	2.2 U	2.2 U
alpha-BHC	6.00	0.322	0.423 U	0.441 U	0.493 UL	2.1 U	2.1 U	3.5 U	2.2 U	2.2 U
alpha-Chlordane	3.24	--	3.34	17 J	1.48 J	1.3 J	1.6 J	5.2 J	2.2 U	2.2 U
beta-BHC	5.00	2.21	0.423 U	0.441 UL	1.26	2.1 U	0.77 J	3.5 U	2.2 U	2.2 U

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Exceedances - Penniman Lake Subsurface Sediment
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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD85	CAPL-SD86	CAPL-SD87	CAS011-11SD18		CAS011-11SD19	CAS011-11SD21	
			CAPL-SSD85-1012	CAPL-SSD86-1012	CAPL-SSD87-1012	CAS011-11SD18-01-0602	CAS011-11SD18-01D-0602	CAS011-11SD19-01-0602	CAS011-11SD21-01-0602	CAS011-11SD21-01D-0602
			10/24/2012	10/24/2012	10/24/2012	6/13/2002	6/13/2002	6/13/2002	6/14/2002	6/14/2002
delta-BHC	3.00	0.294	0.423 U	0.642 L	0.387 L	2.1 U	2.1 U	3.5 U	2.2 U	2.2 U
Dieldrin	1.90	--	4.07 J	62.4 J	3.49 J	3.3 J	3 J	6.7 U	4.2 U	4.2 U
Endosulfan I	4.93	0.805	0.354 J	0.663 J	0.493 UL	2.1 U	2.1 U	3.5 U	2.2 U	2.2 U
Endosulfan II	23.8	--	18.1 J	39.7 J	0.595 J	4.1 U	4.1 U	6.7 U	4.2 U	4.2 U
Endosulfan sulfate	9.18	--	0.423 U	0.441 U	0.493 UL	4.1 U	4.1 U	6.7 U	4.2 U	4.2 U
Endrin	2.22	0.64	12.2 J	31.1 J	3.12 J	4.1 U	4.1 U	6.7 U	4.2 UJ	4.2 U
Endrin aldehyde	2.22	--	1.56 J	2.55 J	0.284 J	4.1 U	4.1 U	6.7 U	4.2 U	4.2 U
Endrin ketone	2.22	--	5.59 J	13.1 J	0.592 J	4.1 U	4.1 U	6.7 U	4.2 U	4.2 U
gamma-BHC (Lindane)	2.37	0.48	0.423 U	0.441 UL	0.493 UL	2.1 U	2.1 U	3.5 U	2.2 UJ	2.2 U
gamma-Chlordane	3.24	--	11.6	38.1 B	7.05 L	2.9 J	3.4 J	3.5 U	2.1 J	2.2 U
Heptachlor	116	--	0.423 U	0.441 U	0.493 UL	2.1 U	2.1 U	3.5 U	2.2 U	2.2 U
Heptachlor epoxide	2.47	--	0.965 J	1.75 L	0.422 J	2.1 U	2.1 U	3.5 U	2.2 U	2.2 U
Methoxychlor	32.3	--	5.58 J	10.1 J	0.947 J	21 U	21 U	35 U	22 U	22 U
Polychlorinated Biphenyls (UG/KG)										
Aroclor-1260	59.8	--	1,840 J	3,700 J	138 L	2,500 C	1,800 C	250	400	200
Explosives (UG/KG)										
1,3-Dinitrobenzene	11.4	--	182 U	182 U	190 U	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	156	--	182 U	182 U	190 U	NA	NA	NA	NA	NA
4-Nitrotoluene	6,905	--	182 U	182 U	190 U	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	455 U	455 U	476 U	NA	NA	NA	NA	NA
Inorganics (MG/KG)										
Aluminum	25,500	10,200	6,220	2,840	7,680	10,900	13,900	3,330	911	1,026
Antimony	3.00	--	2.58 J	2.59 U	2.86 U	0.45 J	0.53 J	0.63 U	0.41 U	0.4 U
Arsenic	9.79	57.2	5.72	3.16 J	5.28	4.5	4	2.9 J	1.1 J	1.2 J
Barium	20.0	36.5	49.9	28.2	32.1	24.7 J	26.5 J	18.4 J	8.4 J	9.98 B
Beryllium	NSV	0.599	3.09	1.6 J	0.572 J	0.69 B	0.68 B	0.56 B	0.17 B	0.2 B
Cadmium	0.99	--	0.656 U	0.648 U	0.715 U	0.071 U	0.072 U	0.23 B	0.14 B	0.118 B
Chromium	43.4	15.9	27.6	15.1	18.6	32.9	39.6	12	4.3 K	4.8 K
Cobalt	50.0	2.47	11.4	9.62	2.78 J	1.7 J	2.2 J	1.1 B	0.37 B	0.558 B
Copper	31.6	3.67	379	160	10.9	5 J	6.7	4.2 J	1.5 B	1.52 B
Cyanide	NSV	--	0.246 J	0.321 U	0.349 U	0.037 U	0.034 U	0.061 U	0.038 U	0.038 U
Iron	20,000	11,300	28,400	9,490	15,300	22,500	23,600	12,200	3,540	3,590
Lead	35.8	12.1	236	236	26.4	11.8	12.1	13.8	8.6	8.29
Manganese	460	28.9	153	79.2	31.4	20.8	20.6	27.9	10.6	9.7
Mercury	0.18	0.052	0.0155 B	0.0185 B	0.0922 B	0.052 U	0.053 U	0.093 U	0.064 U	0.056 U
Nickel	22.7	5.63	242	118	7.09	3 J	3.5 J	2.7 J	0.8 J	1.10 B
Selenium	2.00	--	1.64 U	1.62 U	1.79 U	0.76 J	0.53 UL	0.87 UL	0.56 UL	0.55 UL
Vanadium	57.0	20.4	21.2	8.15	20.4	41.1	38.1	12.2 J	3.9 J	4.58 B
Zinc	121	22.6	1,040	927	73.6	31	34.1	43.9	11.6	14.1

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAPL-SD85	CAPL-SD86	CAPL-SD87	CAS011-11SD18		CAS011-11SD19	CAS011-11SD21	
			CAPL-SSD85-1012	CAPL-SSD86-1012	CAPL-SSD87-1012	CAS011-11SD18-01-0602	CAS011-11SD18-01D-0602	CAS011-11SD19-01-0602	CAS011-11SD21-01-0602	CAS011-11SD21-01D-0602
			10/24/2012	10/24/2012	10/24/2012	6/13/2002	6/13/2002	6/13/2002	6/14/2002	6/14/2002
Other Parameters										
pH	--	--	8.28 H3	7.91 H3	7.92 H3	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	2,510	11,400	32,400	NA	NA	NA	NA	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

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Exceedances - Penniman Lake Subsurface Sediment
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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAS011-11SD22 CAS011-11SD22-01-0602 6/14/2002	CAS011-11SD23 CAS011-11SD23-01-0602 6/17/2002	CAS011-11SD24 CAS011-11SD24-01-0602 6/13/2002	CAS011-11SD25 CAS011-11SD25-01-0602 6/13/2002	CAS011-11SD26 CAS011-11SD26-01-0602 6/17/2002	CAS011-11SD27 CAS011-11SD27-01-0602 6/17/2002	CAS011-11SD28 CAS011-11SD28-01-0602 6/17/2002
Volatile Organic Compounds (UG/KG)									
2-Butanone	459	43.9	18 U	46	14 U	13 U	15 U	20 U	88
Acetone	NSV	157	16 J	120	14 UJ	13 UJ	18	98	290
Carbon disulfide	1.45	--	18 U	19 U	14 U	13 U	15 U	20 U	29 U
cis-1,2-Dichloroethene	680	--	18 U	19 U	2 J	13 U	15 U	20 U	29 U
Semivolatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	70.0	3.26	580 U	610 U	500 U	430 U	490 U	660 U	940 U
Acenaphthene	290	--	580 U	610 U	500 U	430 U	490 U	660 U	940 U
Anthracene	57.2	--	18 J	610 U	500 U	430 U	490 U	660 U	940 U
Benzaldehyde	NSV	--	23 J	40 J	500 U	430 U	490 U	59 J	66 J
Benzo(a)anthracene	108	--	36 J	610 U	500 U	430 U	490 U	27 J	940 U
Benzo(a)pyrene	150	14.5	43 J	610 U	500 U	430 U	490 U	29 J	940 U
Benzo(b)fluoranthene	240	17.7	63 J	610 U	500 U	430 U	490 U	38 J	940 U
Benzo(g,h,i)perylene	170	--	580 U	610 U	500 U	430 U	490 U	660 U	940 U
Benzo(k)fluoranthene	240	12.6	57 J	610 U	500 U	430 U	490 U	30 J	940 U
Carbazole	140	--	580 U	610 U	500 U	430 U	490 U	660 U	940 U
Chrysene	166	19.6	69 J	610 U	500 U	430 U	490 U	50 J	38 J
Dibenz(a,h)anthracene	33.0	--	580 U	610 U	500 U	430 U	490 U	660 U	940 U
Dibenzofuran	5,100	--	580 U	610 U	500 U	430 U	490 U	660 U	940 U
Di-n-octylphthalate	NSV	--	580 U	610 U	500 U	90 J	490 U	660 U	940 U
Fluoranthene	423	21.2	91 J	610 U	500 U	430 U	490 U	87 J	37 J
Fluorene	77.4	3.18	580 U	610 U	500 U	430 U	490 U	660 U	940 U
Indeno(1,2,3-cd)pyrene	200	--	27 J	610 U	500 U	430 U	490 U	660 U	940 U
Naphthalene	176	4.78	580 U	610 U	500 U	430 U	490 U	660 U	940 U
PAH (HMW) - Detects	2,900	95.9	380 J	0 U	0 U	0 U	0 U	294 J	38.0 J
PAH (LMW) - Detects	786	316	140 J	0 U	0 U	0 U	0 U	137 J	37.0 J
PAH (total) - Detects	3,553	369	520 J	0 U	0 U	0 U	0 U	431 J	75.0 J
PAH (HMW)	2,900	95.9	960 J	2,745 U	2,250 U	1,935 U	2,205 U	1,284 J	3,798 J
PAH (LMW)	786	316	1,880 J	2,745 U	2,250 U	1,935 U	2,205 U	2,447 J	3,797 J
PAH (total)	3,553	369	2,840 J	5,490 U	4,500 U	3,870 U	4,410 U	3,731 J	7,595 J
Phenanthrene	204	16.7	31 J	610 U	500 U	430 U	490 U	50 J	940 U
Pyrene	195	21.5	85 J	610 U	500 U	430 U	490 U	120 J	940 U
Pesticides (UG/KG)									
4,4'-DDD	4.88	18.4	17	6.1 U	5 U	4.3 U	3.5 J	13	9.4 U
4,4'-DDE	3.16	8.98	16 J	6.1 U	5 U	4.3 U	7.4	110	9.5
4,4'-DDT	4.16	--	5.8 U	6.1 U	5 U	4.3 U	4.9 U	6.6 U	9.4 U
Aldrin	2.00	0.91	3 U	3.1 U	2.6 U	2.2 U	2.5 U	3.4 U	4.9 U
alpha-BHC	6.00	0.322	3 U	3.1 U	2.6 U	2.2 U	2.5 U	3.4 U	4.9 U
alpha-Chlordane	3.24	--	3.9 J	3.1 U	2.6 U	2.2 U	2.5 U	3.4 U	4.9 U
beta-BHC	5.00	2.21	3 U	3.1 U	2.6 U	2.2 U	2.5 U	3.4 U	4.9 U

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Chemical	Sediment ESV	Background UTL	CAS011-11SD22 CAS011-11SD22-01-0602 6/14/2002	CAS011-11SD23 CAS011-11SD23-01-0602 6/17/2002	CAS011-11SD24 CAS011-11SD24-01-0602 6/13/2002	CAS011-11SD25 CAS011-11SD25-01-0602 6/13/2002	CAS011-11SD26 CAS011-11SD26-01-0602 6/17/2002	CAS011-11SD27 CAS011-11SD27-01-0602 6/17/2002	CAS011-11SD28 CAS011-11SD28-01-0602 6/17/2002
delta-BHC	3.00	0.294	3 U	3.1 U	2.6 U	2.2 U	2.5 U	3.4 U	4.9 U
Dieldrin	1.90	--	5.8 U	6.1 U	5 U	4.3 U	4.9 U	6.6 U	9.4 U
Endosulfan I	4.93	0.805	3 U	3.1 U	2.6 U	2.2 U	2.5 U	3.4 U	4.9 U
Endosulfan II	23.8	--	5.8 U	6.1 U	5 U	4.3 U	4.9 U	6.6 U	9.4 U
Endosulfan sulfate	9.18	--	5.8 U	6.1 U	5 U	4.3 U	4.9 U	6.6 U	9.4 U
Endrin	2.22	0.64	5.8 U	6.1 U	5 U	4.3 U	4.9 U	6.6 U	9.4 U
Endrin aldehyde	2.22	--	5.8 U	6.1 U	5 U	4.3 U	4.9 U	6.6 U	9.4 U
Endrin ketone	2.22	--	5.8 U	6.1 U	5 U	4.3 U	4.9 U	6.6 U	9.4 U
gamma-BHC (Lindane)	2.37	0.48	3 U	3.1 U	2.6 U	2.2 U	2.5 U	3.4 U	4.9 U
gamma-Chlordane	3.24	--	3.3 J	3.1 U	2.6 U	2.2 U	2.5 U	1.4 J	4.9 U
Heptachlor	116	--	3 U	3.1 U	2.6 U	2.2 U	2.5 U	3.4 U	4.9 U
Heptachlor epoxide	2.47	--	3 U	3.1 U	2.6 U	2.2 U	2.5 U	3.4 U	4.9 U
Methoxychlor	32.3	--	30 U	31 U	26 U	22 U	25 U	34 U	49 U
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1260	59.8	--	480	61 U	50 U	43 U	49 U	130 J	94 U
Explosives (UG/KG)									
1,3-Dinitrobenzene	11.4	--	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	156	--	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	6,905	--	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)									
Aluminum	25,500	10,200	2,050	7,030	8,110	3,210	3,230	6,530	10,800
Antimony	3.00	--	0.54 U	0.57 U	0.83 J	0.43 J	0.46 U	0.7 J	0.88 U
Arsenic	9.79	57.2	2.4 J	2.3 J	13.1	6.3	4.5	14.7	11.9
Barium	20.0	36.5	17.6 J	49.4 J	29.1 J	14.1 J	16.4 J	35.7 J	63 J
Beryllium	NSV	0.599	0.3 B	0.74 B	0.99 B	0.45 B	0.55 B	0.73 B	0.86 B
Cadmium	0.99	--	0.27 B	0.11 U	0.088 U	0.19 B	0.085 U	0.11 U	0.17 U
Chromium	43.4	15.9	7	15.5	32.7	14.9	15.8	25.5	24.2
Cobalt	50.0	2.47	0.74 B	1.5 J	1.7 J	1.1 J	1.2 J	2.1 J	2.4 J
Copper	31.6	3.67	4.6 J	4 J	5.8 J	2.6 J	2 J	5.7 J	14.7
Cyanide	NSV	--	0.051 U	0.055 U	0.056 B	0.037 U	0.041 U	0.06 U	0.087 U
Iron	20,000	11,300	6,150	14,700	33,300	13,900	13,400	21,300	15,500
Lead	35.8	12.1	18.3	7.2	8.9	6	9.2	33.2	37.5
Manganese	460	28.9	20.1	45.1	66.1	62.6	27.5	67	47.1
Mercury	0.18	0.052	0.079 U	0.08 U	0.076 U	0.062 U	0.07 U	0.083 U	0.14 U
Nickel	22.7	5.63	2 J	3.7 J	5.3 J	3 J	3.4 J	4.6 J	5.6 J
Selenium	2.00	--	0.75 UL	0.83 J	0.65 UL	0.55 UL	0.62 UL	0.84 UL	2.1 J
Vanadium	57.0	20.4	7.8 J	17.4 J	29.4	14.6	13.6 J	21.1	26.8 J
Zinc	121	22.6	38.1	14.5	42.3	30.2	40.8	155	61

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Chemical	Sediment ESV	Background UTL	CAS011-11SD22 CAS011-11SD22-01-0602 6/14/2002	CAS011-11SD23 CAS011-11SD23-01-0602 6/17/2002	CAS011-11SD24 CAS011-11SD24-01-0602 6/13/2002	CAS011-11SD25 CAS011-11SD25-01-0602 6/13/2002	CAS011-11SD26 CAS011-11SD26-01-0602 6/17/2002	CAS011-11SD27 CAS011-11SD27-01-0602 6/17/2002	CAS011-11SD28 CAS011-11SD28-01-0602 6/17/2002
Other Parameters									
pH	--	--	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	NA	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-86
Exceedances - Penniman Lake Subsurface Sediment
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV	Background UTL	CAS011-11SD29 CAS011-11SD29-01-0602 6/18/2002	CAS011-11SD30 CAS011-11SD30-01-0602 6/18/2002	CAS011-11SD31 CAS011-11SD31-01-0602 6/18/2002	CAS011-11SD32 CAS011-11SD32-01-0602 6/18/2002
Volatile Organic Compounds (UG/KG)						
2-Butanone	459	43.9	16 U	17 U	19 U	18 U
Acetone	NSV	157	85	64	60	53
Carbon disulfide	1.45	--	16 U	17 U	19 U	18 U
cis-1,2-Dichloroethene	680	--	16 U	17 U	19 U	18 U
Semivolatile Organic Compounds (UG/KG)						
2-Methylnaphthalene	70.0	3.26	520 U	16 J	450 U	590 U
Acenaphthene	290	--	21 J	16 J	450 U	590 U
Anthracene	57.2	--	30 J	41 J	450 U	590 U
Benzaldehyde	NSV	--	520 U	46 J	18 J	590 U
Benzo(a)anthracene	108	--	26 J	100 J	450 U	590 U
Benzo(a)pyrene	150	14.5	23 J	100 J	450 U	590 U
Benzo(b)fluoranthene	240	17.7	26 J	190 J	450 U	590 U
Benzo(g,h,i)perylene	170	--	520 U	550 U	450 U	590 U
Benzo(k)fluoranthene	240	12.6	520 U	120 J	450 U	590 U
Carbazole	140	--	520 U	16 J	450 U	590 U
Chrysene	166	19.6	75 J	170 J	450 U	590 U
Dibenz(a,h)anthracene	33.0	--	520 U	550 U	450 U	590 U
Dibenzofuran	5,100	--	520 U	550 U	450 U	590 U
Di-n-octylphthalate	NSV	--	520 U	550 U	450 U	590 U
Fluoranthene	423	21.2	45 J	290 J	450 U	590 U
Fluorene	77.4	3.18	520 U	550 U	450 U	590 U
Indeno(1,2,3-cd)pyrene	200	--	520 U	61 J	450 U	590 U
Naphthalene	176	4.78	520 U	550 U	450 U	590 U
PAH (HMW) - Detects	2,900	95.9	250 J	1,011 J	0 U	0 U
PAH (LMW) - Detects	786	316	136 J	533 J	0 U	0 U
PAH (total) - Detects	3,553	369	386 J	1,544 J	0 U	0 U
PAH (HMW)	2,900	95.9	1,290 J	1,561 J	2,025 U	2,655 U
PAH (LMW)	786	316	1,436 J	1,633 J	2,025 U	2,655 U
PAH (total)	3,553	369	2,726 J	3,194 J	4,050 U	5,310 U
Phenanthrene	204	16.7	40 J	170 J	450 U	590 U
Pyrene	195	21.5	100 J	270 J	450 U	590 U
Pesticides (UG/KG)						
4,4'-DDD	4.88	18.4	5.2 U	18	4.5 U	5.9 U
4,4'-DDE	3.16	8.98	5.2 U	33 J	4.5 U	5.9 U
4,4'-DDT	4.16	--	5.2 U	5.5 U	5.1 J	5.9 U
Aldrin	2.00	0.91	2.7 U	2.8 U	2.3 U	3 U
alpha-BHC	6.00	0.322	2.7 U	2.4 J	2.3 U	3 U
alpha-Chlordane	3.24	--	2.7 U	2.8 U	2.3 U	3 U
beta-BHC	5.00	2.21	2.7 U	2.8 U	2.3 U	3 U

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Exceedances - Penniman Lake Subsurface Sediment
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Chemical	Sediment ESV	Background UTL	CAS011-11SD29 CAS011-11SD29-01-0602 6/18/2002	CAS011-11SD30 CAS011-11SD30-01-0602 6/18/2002	CAS011-11SD31 CAS011-11SD31-01-0602 6/18/2002	CAS011-11SD32 CAS011-11SD32-01-0602 6/18/2002
delta-BHC	3.00	0.294	2.7 U	2.8 U	2.3 U	3 U
Dieldrin	1.90	--	5.2 U	5.5 U	4.5 U	5.9 U
Endosulfan I	4.93	0.805	2.7 U	2.8 U	2.3 U	3 U
Endosulfan II	23.8	--	5.2 U	5.5 U	4.5 U	5.9 U
Endosulfan sulfate	9.18	--	5.2 U	5.5 U	4.5 U	5.9 U
Endrin	2.22	0.64	5.2 U	5.5 U	4.5 U	5.9 U
Endrin aldehyde	2.22	--	5.2 U	5.8	4.5 U	5.9 U
Endrin ketone	2.22	--	5.2 U	5.5 U	4.5 U	5.9 U
gamma-BHC (Lindane)	2.37	0.48	2.7 U	2.8 U	2.3 U	3 U
gamma-Chlordane	3.24	--	2.7 U	3.9 J	2.3 U	3 U
Heptachlor	116	--	2.7 U	5.5 J	2.3 U	3 U
Heptachlor epoxide	2.47	--	2.7 U	2.8 U	2.3 U	3 U
Methoxychlor	32.3	--	27 U	28 U	23 U	30 U
Polychlorinated Biphenyls (UG/KG)						
Aroclor-1260	59.8	--	52 U	200	34 J	59 U
Explosives (UG/KG)						
1,3-Dinitrobenzene	11.4	--	NA	NA	NA	NA
2,4,6-Trinitrotoluene	156	--	NA	NA	NA	NA
4-Nitrotoluene	6,905	--	NA	NA	NA	NA
Nitroglycerin	NSV	--	NA	NA	NA	NA
Inorganics (MG/KG)						
Aluminum	25,500	10,200	4,740	12,100	2,790	12,800
Antimony	3.00	--	0.48 U	0.52 U	0.42 U	0.83 J
Arsenic	9.79	57.2	3.5	8.9	3.7	11.9
Barium	20.0	36.5	36.1 J	59.9 J	9.3 J	36.7 J
Beryllium	NSV	0.599	0.58 B	0.9 B	0.42 B	1.1 B
Cadmium	0.99	--	0.09 U	0.096 U	0.078 U	0.1 U
Chromium	43.4	15.9	12.1	24.2	11.1	40.2
Cobalt	50.0	2.47	1.3 J	2.9 J	1.3 J	3.6 J
Copper	31.6	3.67	6.2 J	13.4	1.2 B	6.4 J
Cyanide	NSV	--	0.046 U	0.046 U	0.056 U	0.05 U
Iron	20,000	11,300	10,300	25,900	9,960	37,000
Lead	35.8	12.1	23.7	37.3	3	9.8
Manganese	460	28.9	45.5	71.7	15.3	36.1
Mercury	0.18	0.052	0.078 U	0.19	0.093 U	0.075 U
Nickel	22.7	5.63	3.1 J	6.9 J	2.3 J	10 J
Selenium	2.00	--	0.78 J	0.76 J	0.57 UL	0.76 UL
Vanadium	57.0	20.4	12.3 J	30	11.8 J	41.6
Zinc	121	22.6	29.8	103	8.7	38.7

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Chemical	Sediment ESV	Background UTL	CAS011-11SD29 CAS011-11SD29-01-0602 6/18/2002	CAS011-11SD30 CAS011-11SD30-01-0602 6/18/2002	CAS011-11SD31 CAS011-11SD31-01-0602 6/18/2002	CAS011-11SD32 CAS011-11SD32-01-0602 6/18/2002
Other Parameters						
pH	--	--	NA	NA	NA	NA
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-87
Screening Statistics - Penniman Lake Subsurface Sediment - Group 1
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Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	12.0 - 12.0	11 / 12	10.0	141	CAPL-SSD70-1012	52.4	46.4	76.4	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	157	0 / 12	0.90	NO
Carbon disulfide	2.92 - 19.0	2 / 12	2.11	4.19	CAPL-SSD86-1012	5.79	3.19	7.44	1.45	2 / 12	2.90	--	--	--	-- / --	--	--	--	--	-- / --	--	YES
Semivolatile Organic Compounds (UG/KG)																						
2-Methylnaphthalene	4.09 - 830	2 / 12	16.0	1,420	CAPL-SSD70-1012	263	392	466	70.0	1 / 12	20.3	6.66	3.75	--	-- / --	--	--	--	3.26	2 / 12	436	--
Acenaphthene	4.09 - 830	4 / 12	16.0	79,800	CAPL-SSD70-1012	6,878	22,967	18,785	290	2 / 12	275	64.8	23.7	1,054	2 / 12	75.7	17.8	6.53	--	-- / --	--	--
Anthracene	4.09 - 830	6 / 12	15.0	85,600	CAPL-SSD70-1012	7,440	24,625	20,207	57.2	2 / 12	1,497	353	130	374	2 / 12	229	54.0	19.9	--	-- / --	--	--
Benzaldehyde	205 - 27,500	4 / 12	23.0	57.0	CAS011-11SD19-01-0602	1,252	3,937	3,293	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Benzo(a)anthracene	4.09 - 610	8 / 12	4.43	36,600	CAPL-SSD70-1012	3,304	10,505	8,750	108	2 / 12	339	81.0	30.6	187	2 / 12	196	46.8	17.7	--	-- / --	--	--
Benzo(a)pyrene	4.09 - 610	8 / 12	23.0	20,500	CAPL-SSD70-1012	1,859	5,881	4,908	150	2 / 12	137	32.7	12.4	238	2 / 12	86.1	20.6	7.81	14.5	8 / 12	1,414	--
Benzo(b)fluoranthene	4.09 - 610	9 / 12	6.61	16,100	CAPL-SSD70-1012	1,518	4,609	3,908	240	2 / 12	67.1	16.3	6.33	--	-- / --	--	--	--	17.7	8 / 12	910	--
Benzo(g,h,i)perylene	4.09 - 830	2 / 12	466	5,990	CAPL-SSD70-1012	702	1,672	1,569	170	2 / 12	35.2	9.23	4.13	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	4.09 - 610	7 / 12	24.0	17,700	CAPL-SSD70-1012	1,607	5,072	4,237	240	2 / 12	73.8	17.7	6.70	--	-- / --	--	--	--	12.6	7 / 12	1,405	--
Chrysene	4.09 - 610	9 / 12	6.28	46,300	CAPL-SSD70-1012	4,119	13,300	11,014	166	3 / 12	279	66.3	24.8	--	-- / --	--	--	--	19.6	8 / 12	2,362	--
Dibenz(a,h)anthracene	4.09 - 830	2 / 12	134	2,710	CAPL-SSD70-1012	401	739	784	33.0	2 / 12	82.1	23.8	12.1	--	-- / --	--	--	--	--	-- / --	--	--
Dibenzofuran	205 - 830	2 / 12	380	32,900	CAPL-SSD70-1012	2,963	9,428	7,851	5,100	1 / 12	6.45	1.54	0.58	3,400	1 / 12	9.68	2.31	0.87	--	-- / --	--	YES
Di-n-octylphthalate	205 - 27,500	0 / 12	--	--	--	1,345	3,908	3,371	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Fluoranthene	4.10 - 610	10 / 12	9.91	125,000	CAPL-SSD70-1012	11,013	35,940	29,646	423	2 / 12	296	70.1	26.0	4,930	2 / 12	25.4	6.01	2.23	21.2	8 / 12	5,896	--
Fluorene	4.09 - 830	2 / 12	1,340	81,700	CAPL-SSD70-1012	7,084	23,501	19,267	77.4	2 / 12	1,056	249	91.5	918	2 / 12	89.0	21.0	7.72	3.18	2 / 12	25,692	--
Indeno(1,2,3-cd)pyrene	4.09 - 830	5 / 12	4.33	5,960	CAPL-SSD70-1012	653	1,678	1,523	200	2 / 12	29.8	7.62	3.27	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	10 / 12	9.78	286,860	CAPL-SSD70-1012	25,436	82,452	68,181	2,900	2 / 12	98.9	23.5	8.77	--	-- / --	--	--	--	95.9	8 / 12	2,991	YES
PAH (LMW) - Detects	-- - --	10 / 12	16.0	660,520	CAPL-SSD70-1012	56,726	190,224	155,343	786	2 / 12	840	198	72.2	--	-- / --	--	--	--	316	3 / 12	2,090	YES
PAH (total) - Detects	-- - --	10 / 12	26.5	947,380	CAPL-SSD70-1012	82,162	272,656	223,514	3,553	2 / 12	267	62.9	23.1	--	-- / --	--	--	--	369	6 / 12	2,567	YES
PAH (HMW)	18.5 - 2,745	10 / 12	26.1	286,860	CAPL-SSD70-1012	25,959	82,279	68,615	2,900	2 / 12	98.9	23.7	8.95	--	-- / --	--	--	--	95.9	8 / 12	2,991	--
PAH (LMW)	119 - 2,745	10 / 12	131	674,818	CAPL-SSD70-1012	58,897	194,036	159,491	786	8 / 12	859	203	74.9	--	-- / --	--	--	--	316	8 / 12	2,136	--
PAH (total)	138 - 5,490	10 / 12	158	961,678	CAPL-SSD70-1012	84,851	276,296	228,090	3,553	3 / 12	271	64.2	23.9	--	-- / --	--	--	--	369	8 / 12	2,605	--
Phenanthrene	4.10 - 610	10 / 12	4.95	287,000	CAPL-SSD70-1012	24,602	82,662	67,457	204	2 / 12	1,407	331	121	1,445	2 / 12	199	46.7	17.0	16.7	7 / 12	17,186	--
Pyrene	4.10 - 610	10 / 12	8.84	135,000	CAPL-SSD70-1012	11,911	38,813	32,033	195	3 / 12	692	164	61.1	--	-- / --	--	--	--	21.5	8 / 12	6,279	--
Pesticides (UG/KG)																						
4,4'-DDD	0.42 - 6.10	8 / 12	3.02	70.7	CAPL-SSD70-1012	13.9	19.1	23.8	4.88	7 / 12	14.5	4.88	2.86	187	0 / 12	0.38	--	--	--	-- / --	--	NO
4,4'-DDE	5.20 - 6.10	10 / 12	2.09	50.1	CAPL-SSD70-1012	17.9	15.0	25.6	3.16	9 / 12	15.9	8.11	5.65	578	0 / 12	0.09	--	--	--	-- / --	--	NO
4,4'-DDT	4.10 - 6.70	5 / 12	0.44	218	CAPL-SSD84-1012	22.2	61.8	54.2	4.16	4 / 12	52.4	13.0	5.34	578	0 / 12	0.38	--	--	--	-- / --	--	NO
Aldrin	0.49 - 3.50	4 / 12	0.20	5.33	CAPL-SSD84-1012	1.39	1.35	2.09	2.00	1 / 12	2.67	1.04	0.69	--	-- / --	--	--	--	0.91	1 / 12	5.86	YES
alpha-Chlordane	2.20 - 3.10	8 / 12	1.48	17.0	CAPL-SSD86-1012	4.87	5.22	7.58	3.24	6 / 12	5.25	2.34	1.50	4,760	0 / 12	0.004	--	--	--	-- / --	--	NO
beta-BHC	0.42 - 3.50	3 / 12	0.77	26.2	CAPL-SSD70-1012	3.13	7.29	6.90	5.00	1 / 12	5.24	1.38	0.63	204	0 / 12	0.13	--	--	--	-- / --	--	NO
delta-BHC	0.42 - 3.50	4 / 12	0.39	6.34	CAPL-SSD70-1012	1.48	1.61	2.32	3.00	1 / 12	2.11	0.77	0.49	204	0 / 12	0.03	--	--	--	-- / --	--	NO
Dieldrin	4.20 - 6.70	6 / 12	3.30	709	CAPL-SSD84-1012	67.3	203	172	1.90	6 / 12	373	90.7	35.4	88.4	1 / 12	8.02	1.95	0.76	--	-- / --	--	YES
Endosulfan II	4.10 - 6.70	5 / 12	0.60	483	CAPL-SSD84-1012	46.8	138	118	23.8	2 / 12	20.3	4.97	1.96	--	-- / --	--	--	--	--	-- / --	--	YES
Endosulfan sulfate	0.42 - 6.70	2 / 12	45.9	129	CAPL-SSD84-1012	16.2	37.7	35.8	9.18	2 / 12	14.1	3.89	1.76	--	-- / --	--	--	--	--	-- / --	--	YES
Endrin	4.10 - 6.70	5 / 12	3.12	59.1	CAPL-SSD84-1012	12.4	17.6	21.5	2.22	5 / 12	26.6	9.68	5.56	34.0	1 / 12	1.74	0.63	0.36	--	-- / --	--	NO
Endrin aldehyde	4.10 - 6.70	6 / 12	0.28	30.0	CAPL-SSD84-1012	5.12	7.97	9.25	2.22	4 / 12	13.5	4.17	2.31	34.0	0 / 12	0.88	--	--	--	-- / --	--	NO
Endrin ketone	4.10 - 6.70	5 / 12	0.59	28.0	CAPL-SSD84-1012	5.81	7.67	9.79	2.22	4 / 12	12.6	4.41	2.62	34.0	0 / 12	0.82	--	--	--	-- / --	--	NO
gamma-Chlordane	2.70 - 40.8	7 / 12	2.10	26.9	CAPL-SSD70-1012	8.53	8.86	13.1	3.24	6 / 12	8.30	4.05	2.63	4,760	0 / 12	0.01	--	--	--	-- / --	--	NO
Heptachlor epoxide	0.57 - 3.50	4 / 12	0.42	6.42	CAPL-SSD84-1012	1.63	1.58	2.45	2.47	1 / 12	2.60	0.99	0.66	116	0 / 12	0.06	--	--	--	-- / --	--	NO
Methoxychlor	21.0 - 35.0	5 / 12	0.95	137	CAPL-SSD84-1012	21.7	36.6	40.7	32.3	1 / 12	4.24	1.26	0.67	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	52.0 - 61.0	10 / 12	138	34,200	CAPL-SSD84-1012	3,816	9,643	8,815	59.8	10 / 12	572	147	63.8	1,377	5 / 12	24.8	6.40	2.77	--	-- / --	--	YES
Explosives (UG/KG)																						
1,3-Dinitrobenzene	182 - 200	1 / 5	551	551	CAPL-SSD70-1012	186	204	380	11.4	1 / 5	48.4	33.4	16.3	--	-- / --	--	--	--	--	-- / --	--	YES
Nitroglycerin	444 - 500	0 / 5	--	--	--	233	11.1	244	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO

Table D-87
Screening Statistics - Penniman Lake Subsurface Sediment - Group 1
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Inorganics (MG/KG)																						
Aluminum	-- - --	12 / 12	1,026	13,900	CAS011-11SD18-01-0602	5,914	3,869	7,919	25,500	0 / 12	0.55	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	12 / 12	1.20	16.5	CAPL-SSD70-1012	5.12	4.12	7.26	9.79	1 / 12	1.69	0.74	0.52	--	-- / --	--	--	--	--	-- / --	--	NO
Barium	-- - --	12 / 12	8.40	59.9	CAS011-11SD30-01-0602	32.4	15.0	40.2	20.0	9 / 12	3.00	2.01	1.62	--	-- / --	--	--	--	36.5	4 / 12	1.64	YES
Beryllium	0.20 - 0.90	5 / 12	0.44	3.09	CAPL-SSD85-1012	0.68	0.85	1.12	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.599	2 / 12	5.16	YES
Chromium	-- - --	12 / 12	4.80	39.6	CAS011-11SD18-01-0602	16.8	9.63	21.8	43.4	0 / 12	0.91	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	1.52 - 1.52	11 / 12	2.69	379	CAPL-SSD85-1012	50.2	113	109	31.6	2 / 12	12.0	3.44	1.59	--	-- / --	--	--	--	3.67	10 / 12	103	YES
Cyanide	0.037 - 0.40	2 / 12	0.21	0.25	CAPL-SSD85-1012	0.096	0.091	0.14	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Iron	-- - --	12 / 12	3,590	28,400	CAPL-SSD85-1012	14,878	7,640	18,839	20,000	3 / 12	1.42	0.94	0.74	--	-- / --	--	--	--	--	-- / --	--	NO
Lead	-- - --	12 / 12	7.20	236	CAPL-SSD85-1012	55.9	84.7	99.8	35.8	4 / 12	6.59	2.79	1.56	--	-- / --	--	--	--	12.1	10 / 12	19.5	YES
Mercury	0.016 - 0.093	2 / 12	0.054	0.19	CAS011-11SD30-01-0602	0.045	0.048	0.070	0.18	1 / 12	1.06	0.39	0.25	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	12 / 12	0.80	242	CAPL-SSD85-1012	33.1	73.5	71.2	22.7	2 / 12	10.7	3.14	1.46	--	-- / --	--	--	--	5.63	4 / 12	43.0	YES
Selenium	0.56 - 2.21	4 / 12	0.76	0.83	CAS011-11SD23-01-0602	0.68	0.26	0.82	2.00	0 / 12	0.42	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	12 / 12	3.90	41.1	CAS011-11SD18-01-0602	16.9	10.3	22.3	57.0	0 / 12	0.72	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	12 / 12	14.1	1,040	CAPL-SSD85-1012	201	367	392	121	2 / 12	8.60	3.24	1.66	--	-- / --	--	--	--	22.6	10 / 12	46.0	YES
Other Parameters																						
pH	-- - --	5 / 5	7.02	8.28	CAPL-SSD85-1012	7.83	0.48	8.28	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	5 / 5	2,510	33,600	CAPL-SSD70-1012	16,972	14,994	31,267	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-88
Screening Statistics - Penniman Lake Subsurface Sediment - Group 2
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	13.0 - 14.0	2 / 4	18.0	98.0	CAS011-11SD27-01-0602	32.4	44.1	84.2	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	157	0 / 4	0.62	NO
Carbon disulfide	13.0 - 20.0	0 / 4	--	--	--	7.75	1.55	9.58	1.45	-- / --	13.8	6.63	5.36	--	-- / --	--	--	--	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
2-Methylnaphthalene	430 - 660	0 / 4	--	--	--	260	49.2	318	70.0	-- / --	9.43	4.54	3.71	--	-- / --	--	--	--	--	-- / --	--	--
Acenaphthene	430 - 660	0 / 4	--	--	--	260	49.2	318	290	-- / --	2.28	1.10	0.90	1,054	-- / --	0.63	--	--	--	-- / --	--	--
Anthracene	430 - 660	0 / 4	--	--	--	260	49.2	318	57.2	-- / --	11.5	5.56	4.55	374	-- / --	1.76	0.85	0.70	--	-- / --	--	--
Benzaldehyde	430 - 500	1 / 4	59.0	59.0	CAS011-11SD27-01-0602	192	90.2	298	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Benzo(a)anthracene	430 - 500	1 / 4	27.0	27.0	CAS011-11SD27-01-0602	184	106	309	108	0 / 4	0.25	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(a)pyrene	430 - 500	1 / 4	29.0	29.0	CAS011-11SD27-01-0602	185	105	308	150	0 / 4	0.19	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	430 - 500	1 / 4	38.0	38.0	CAS011-11SD27-01-0602	187	101	305	240	0 / 4	0.16	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	430 - 660	0 / 4	--	--	--	260	49.2	318	170	-- / --	3.88	1.87	1.53	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	430 - 500	1 / 4	30.0	30.0	CAS011-11SD27-01-0602	185	104	308	240	0 / 4	0.13	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Chrysene	430 - 500	1 / 4	50.0	50.0	CAS011-11SD27-01-0602	190	94.6	301	166	0 / 4	0.30	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Dibenz(a,h)anthracene	430 - 660	0 / 4	--	--	--	260	49.2	318	33.0	-- / --	20.0	9.63	7.88	--	-- / --	--	--	--	--	-- / --	--	--
Dibenzofuran	430 - 660	0 / 4	--	--	--	260	49.2	318	5,100	-- / --	0.13	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Di-n-octylphthalate	490 - 660	1 / 4	90.0	90.0	CAS011-11SD25-01-0602	229	100	347	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Fluoranthene	430 - 500	1 / 4	87.0	87.0	CAS011-11SD27-01-0602	199	76.4	289	423	0 / 4	0.21	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	430 - 660	0 / 4	--	--	--	260	49.2	318	77.4	-- / --	8.53	4.11	3.36	918	-- / --	0.72	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	430 - 660	0 / 4	--	--	--	260	49.2	318	200	-- / --	3.30	1.59	1.30	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	1 / 4	294	294	CAS011-11SD27-01-0602	73.5	147	246	2,900	0 / 4	0.10	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	1 / 4	137	137	CAS011-11SD27-01-0602	34.3	68.5	115	786	0 / 4	0.17	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	1 / 4	431	431	CAS011-11SD27-01-0602	108	216	361	3,553	0 / 4	0.12	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	1,935 - 2,250	1 / 4	1,284	1,284	CAS011-11SD27-01-0602	1,120	130	1,272	2,900	0 / 4	0.44	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	1,935 - 2,250	1 / 4	2,447	2,447	CAS011-11SD27-01-0602	1,411	694	2,228	786	1 / 4	3.11	2.83	1.79	--	-- / --	--	--	--	316	1 / 4	7.74	--
PAH (total)	3,870 - 4,500	1 / 4	3,731	3,731	CAS011-11SD27-01-0602	2,530	812	3,486	3,553	1 / 4	1.05	0.98	0.71	--	-- / --	--	--	--	--	-- / --	--	--
Phenanthrene	430 - 500	1 / 4	50.0	50.0	CAS011-11SD27-01-0602	190	94.6	301	204	0 / 4	0.25	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	430 - 500	1 / 4	120	120	CAS011-11SD27-01-0602	208	60.3	279	195	0 / 4	0.62	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	4.30 - 5.00	2 / 4	3.50	13.0	CAS011-11SD27-01-0602	5.29	5.17	11.4	4.88	1 / 4	2.66	2.33	1.08	187	0 / 4	0.07	--	--	--	-- / --	--	NO
4,4'-DDE	4.30 - 5.00	2 / 4	7.40	110	CAS011-11SD27-01-0602	30.5	53.0	92.9	3.16	2 / 4	34.8	29.4	9.66	578	0 / 4	0.19	--	--	--	-- / --	--	NO
4,4'-DDT	4.30 - 6.60	0 / 4	--	--	--	2.60	0.49	3.18	4.16	-- / --	1.59	0.76	0.63	578	-- / --	0.01	--	--	--	-- / --	--	NO
Aldrin	2.20 - 3.40	0 / 4	--	--	--	1.34	0.26	1.64	2.00	-- / --	1.70	0.82	0.67	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	2.20 - 3.40	0 / 4	--	--	--	1.34	0.26	1.64	3.24	-- / --	1.05	0.51	0.41	4,760	-- / --	0.001	--	--	--	-- / --	--	NO
beta-BHC	2.20 - 3.40	0 / 4	--	--	--	1.34	0.26	1.64	5.00	-- / --	0.68	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
delta-BHC	2.20 - 3.40	0 / 4	--	--	--	1.34	0.26	1.64	3.00	-- / --	1.13	0.55	0.45	204	-- / --	0.02	--	--	--	-- / --	--	NO
Dieldrin	4.30 - 6.60	0 / 4	--	--	--	2.60	0.49	3.18	1.90	-- / --	3.47	1.67	1.37	88.4	-- / --	0.07	--	--	--	-- / --	--	NO
Endosulfan II	4.30 - 6.60	0 / 4	--	--	--	2.60	0.49	3.18	23.8	-- / --	0.28	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	4.30 - 6.60	0 / 4	--	--	--	2.60	0.49	3.18	9.18	-- / --	0.72	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	4.30 - 6.60	0 / 4	--	--	--	2.60	0.49	3.18	2.22	-- / --	2.97	1.43	1.17	34.0	-- / --	0.19	--	--	--	-- / --	--	NO
Endrin aldehyde	4.30 - 6.60	0 / 4	--	--	--	2.60	0.49	3.18	2.22	-- / --	2.97	1.43	1.17	34.0	-- / --	0.19	--	--	--	-- / --	--	NO
Endrin ketone	4.30 - 6.60	0 / 4	--	--	--	2.60	0.49	3.18	2.22	-- / --	2.97	1.43	1.17	34.0	-- / --	0.19	--	--	--	-- / --	--	NO
gamma-Chlordane	2.20 - 2.60	1 / 4	1.40	1.40	CAS011-11SD27-01-0602	1.26	0.12	1.41	3.24	0 / 4	0.43	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Heptachlor epoxide	2.20 - 3.40	0 / 4	--	--	--	1.34	0.26	1.64	2.47	-- / --	1.38	0.66	0.54	116	-- / --	0.03	--	--	--	-- / --	--	NO
Methoxychlor	22.0 - 34.0	0 / 4	--	--	--	13.4	2.56	16.4	32.3	-- / --	1.05	0.51	0.41	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	43.0 - 50.0	1 / 4	130	130	CAS011-11SD27-01-0602	50.3	53.2	113	59.8	1 / 4	2.17	1.89	0.84	1,377	0 / 4	0.09	--	--	--	-- / --	--	NO
Explosives (UG/KG)																						
1,3-Dinitrobenzene	-- - --	0 / 0	--	--	--	--	--	--	--	-- / --	--		--	--	-- / --	--	--	--	--	-- / --	--	--
Nitroglycerin	-- - --	0 / 0	--	--	--	--	--	--	--	-- / --	--		--	--	-- / --	--	--	--	--	-- / --	--	--

Table D-88
Screening Statistics - Penniman Lake Subsurface Sediment - Group 2
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Inorganics (MG/KG)																						
Aluminum	-- - --	4 / 4	3,210	8,110	CAS011-11SD24-01-0602	5,270	2,453	8,157	25,500	0 / 4	0.32	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	4 / 4	4.50	14.7	CAS011-11SD27-01-0602	9.65	5.00	15.5	9.79	2 / 4	1.50	--	0.99	--	-- / --	--	--	--	57.2	0 / 4	0.26	NO
Barium	-- - --	4 / 4	14.1	35.7	CAS011-11SD27-01-0602	23.8	10.3	36.0	20.0	2 / 4	1.79	--	1.19	--	-- / --	--	--	--	36.5	0 / 4	0.98	NO
Beryllium	0.45 - 0.99	0 / 4	--	--	--	0.34	0.12	0.48	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	4 / 4	14.9	32.7	CAS011-11SD24-01-0602	22.2	8.47	32.2	43.4	0 / 4	0.75	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	4 / 4	2.00	5.80	CAS011-11SD24-01-0602	4.03	2.01	6.39	31.6	0 / 4	0.18	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.037 - 0.060	0 / 4	--	--	--	0.024	0.0056	0.031	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	4 / 4	13,400	33,300	CAS011-11SD24-01-0602	20,475	9,282	31,397	20,000	2 / 4	1.67	1.57	1.02	--	-- / --	--	--	--	11,300	4 / 4	2.95	YES
Lead	-- - --	4 / 4	6.00	33.2	CAS011-11SD27-01-0602	14.3	12.7	29.2	35.8	0 / 4	0.93	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.062 - 0.083	0 / 4	--	--	--	0.036	0.0045	0.042	0.18	-- / --	0.46	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	4 / 4	3.00	5.30	CAS011-11SD24-01-0602	4.08	1.06	5.33	22.7	0 / 4	0.23	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	0.55 - 0.84	0 / 4	--	--	--	0.33	0.062	0.41	2.00	-- / --	0.42	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	4 / 4	13.6	29.4	CAS011-11SD24-01-0602	19.7	7.29	28.2	57.0	0 / 4	0.52	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	4 / 4	30.2	155	CAS011-11SD27-01-0602	67.1	58.9	136	121	1 / 4	1.28	1.13	0.55	--	-- / --	--	--	--	22.6	4 / 4	6.86	YES

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-89
Screening Statistics - Penniman Lake Subsurface Sediment - Group 3
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	-- - --	6 / 6	17.2	195	CAPL-SSD80-1012-V	68.1	70.5	126	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	157	1 / 6	1.24	NO
Carbon disulfide	2.42 - 6.56	2 / 6	1.88	7.31	CAPL-SSD80-1012-V	2.76	2.36	4.70	2.27	1 / 6	3.22	2.07	1.22	--	-- / --	--	--	--	--	-- / --	--	YES
Semivolatile Organic Compounds (UG/KG)																						
2-Methylnaphthalene	4.38 - 40.3	2 / 6	9.45	10.7	CAPL-SSD77-1012	7.98	7.03	13.8	70.0	0 / 6	0.15	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Acenaphthene	4.35 - 40.3	0 / 6	--	--	--	5.39	7.24	11.3	290	-- / --	0.14	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Anthracene	4.35 - 40.3	0 / 6	--	--	--	5.39	7.24	11.3	57.2	-- / --	0.70	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzaldehyde	218 - 404	0 / 6	--	--	--	135	36.9	166	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Benzo(a)anthracene	4.38 - 6.18	2 / 6	19.7	99.9	CAPL-SSD78-1012	21.6	39.0	53.7	108	0 / 6	0.93	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(a)pyrene	4.60 - 6.18	3 / 6	9.10	87.4	CAPL-SSD78-1012	20.5	33.4	48.0	150	0 / 6	0.58	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	4.60 - 6.18	3 / 6	7.75	87.4	CAPL-SSD78-1012	19.7	33.5	47.3	240	0 / 6	0.36	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	4.60 - 6.18	3 / 6	7.15	92.0	CAPL-SSD78-1012	19.7	35.6	48.9	170	0 / 6	0.54	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	4.60 - 6.18	3 / 6	5.29	68.1	CAPL-SSD78-1012	16.5	26.0	37.9	240	0 / 6	0.28	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Chrysene	4.38 - 6.18	2 / 6	21.8	194	CAPL-SSD78-1012	37.6	77.0	101	166	1 / 6	1.17	0.61	0.23	--	-- / --	--	--	--	--	-- / --	--	--
Dibenz(a,h)anthracene	4.35 - 40.3	0 / 6	--	--	--	5.39	7.24	11.3	33.0	-- / --	1.22	0.34	0.16	--	-- / --	--	--	--	--	-- / --	--	--
Dibenzofuran	218 - 404	0 / 6	--	--	--	135	36.9	166	5,100	-- / --	0.08	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Di-n-octylphthalate	218 - 404	0 / 6	--	--	--	135	36.9	166	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Fluoranthene	-- - --	6 / 6	2.93	186	CAPL-SSD78-1012	41.3	71.3	100.0	423	0 / 6	0.44	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	4.35 - 40.3	0 / 6	--	--	--	5.39	7.24	11.3	77.4	-- / --	0.52	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	4.60 - 6.18	3 / 6	5.21	63.3	CAPL-SSD78-1012	14.5	24.1	34.3	200	0 / 6	0.32	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	6 / 6	3.25	975	CAPL-SSD78-1012	198	384	514	2,900	0 / 6	0.34	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	6 / 6	2.93	448	CAPL-SSD78-1012	113	176	257	786	0 / 6	0.57	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	6 / 6	6.08	1,423	CAPL-SSD78-1012	311	550	763	3,553	0 / 6	0.40	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	-- - --	6 / 6	21.7	995	CAPL-SSD78-1012	213	386	530	2,900	0 / 6	0.34	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	-- - --	6 / 6	131	751	CAPL-SSD78-1012	278	240	475	786	0 / 6	0.96	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (total)	-- - --	6 / 6	156	1,746	CAPL-SSD78-1012	491	619	1,000	3,553	0 / 6	0.49	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Phenanthrene	4.35 - 6.18	1 / 6	131	131	CAPL-SSD78-1012	23.9	52.5	67.0	204	0 / 6	0.64	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	-- - --	6 / 6	3.25	283	CAPL-SSD78-1012	57.7	111	149	195	1 / 6	1.45	0.76	0.30	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	0.44 - 0.61	3 / 6	0.80	33.6	CAPL-SSD78-1012	6.39	13.4	17.4	4.88	1 / 6	6.89	3.56	1.31	294	0 / 6	0.11	--	--	--	-- / --	--	NO
4,4'-DDE	-- - --	6 / 6	0.62	251	CAPL-SSD78-1012	52.4	98.1	133	3.16	5 / 6	79.4	42.1	16.6	908	0 / 6	0.28	--	--	--	-- / --	--	NO
4,4'-DDT	0.47 - 0.61	4 / 6	0.67	9.17	CAPL-SSD78-1012	3.13	3.56	6.06	4.16	2 / 6	2.20	1.46	0.75	908	0 / 6	0.01	--	--	--	-- / --	--	NO
Aldrin	0.45 - 0.79	2 / 6	0.41	0.93	CAPL-SSD79-1012	0.42	0.26	0.64	2.00	0 / 6	0.47	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	0.45 - 0.61	3 / 6	3.88	34.7	CAPL-SSD78-1012	8.21	13.5	19.3	3.24	3 / 6	10.7	5.97	2.54	7,476	0 / 6	0.005	--	--	--	-- / --	--	NO
beta-BHC	0.44 - 0.79	1 / 6	1.12	1.12	CAPL-SSD79-1012	0.42	0.35	0.71	5.00	0 / 6	0.22	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
delta-BHC	0.44 - 0.61	1 / 6	0.58	0.58	CAPL-SSD78-1012	0.30	0.14	0.42	3.00	0 / 6	0.19	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Dieldrin	0.45 - 0.47	4 / 6	0.32	50.1	CAPL-SSD78-1012	10.5	19.6	26.6	1.90	3 / 6	26.4	14.0	5.52	139	0 / 6	0.36	--	--	--	-- / --	--	NO
Endosulfan II	0.44 - 0.61	2 / 6	1.30	12.5	CAPL-SSD79-1012	2.46	4.93	6.52	37.4	0 / 6	0.33	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	0.44 - 0.61	3 / 6	2.01	102	CAPL-SSD78-1012	20.8	40.5	54.2	14.4	2 / 6	7.07	3.76	1.45	--	-- / --	--	--	--	--	-- / --	--	YES
Endrin	0.44 - 0.61	3 / 6	0.36	49.0	CAPL-SSD78-1012	8.54	19.8	24.9	2.22	1 / 6	22.1	11.2	3.85	53.4	0 / 6	0.92	--	--	--	-- / --	--	NO
Endrin aldehyde	0.45 - 0.61	3 / 6	2.10	16.2	CAPL-SSD78-1012	3.77	6.24	8.90	2.22	2 / 6	7.30	4.01	1.70	53.4	0 / 6	0.30	--	--	--	-- / --	--	NO
Endrin ketone	0.45 - 0.61	3 / 6	1.72	8.60	CAPL-SSD78-1012	2.42	3.28	5.11	2.22	2 / 6	3.87	2.30	1.09	53.4	0 / 6	0.16	--	--	--	-- / --	--	NO
gamma-Chlordane	-- - --	6 / 6	0.67	212	CAPL-SSD78-1012	47.0	82.5	115	3.24	3 / 6	65.4	35.4	14.5	7,476	0 / 6	0.03	--	--	--	-- / --	--	NO
Heptachlor epoxide	0.45 - 0.61	3 / 6	0.72	3.43	CAPL-SSD78-1012	0.96	1.24	1.98	2.47	1 / 6	1.39	0.80	0.39	182	0 / 6	0.02	--	--	--	-- / --	--	NO
Methoxychlor	0.47 - 0.61	4 / 6	1.12	276	CAPL-SSD78-1012	48.4	112	140	50.7	1 / 6	5.44	2.76	0.95	--	-- / --	--	--	--	--	-- / --	--	YES
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	10.9 - 14.9	4 / 6	7.74	3,020	CAPL-SSD78-1012	807	1,182	1,779	59.8	3 / 6	50.5	29.7	13.5	2,163	1 / 6	1.40	0.82	0.37	--	-- / --	--	NO
Explosives (UG/KG)																						
1,3-Dinitrobenzene	182 - 200	2 / 6	117	456	CAPL-SSD78-1012	160	146	279	17.9	2 / 6	25.5	15.6	8.92	--	-- / --	--	--	--	--	-- / --	--	YES
Nitroglycerin	455 - 500	0 / 6	--	--	--	242	9.43	250	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO

Table D-89
Screening Statistics - Penniman Lake Subsurface Sediment - Group 3
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Inorganics (MG/KG)																						
Aluminum	-- - --	6 / 6	1,740	10,500	CAPL-SSD78-1012	4,263	3,209	6,903	25,500	0 / 6	0.41	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	6 / 6	0.80	8.75	CAPL-SSD78-1012	3.65	2.75	5.91	9.79	0 / 6	0.89	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Barium	-- - --	6 / 6	7.13	49.5	CAPL-SSD78-1012	21.1	14.7	33.3	20.0	2 / 6	2.48	1.66	1.06	--	-- / --	--	--	--	36.5	1 / 6	1.36	YES
Beryllium	0.14 - 0.14	5 / 6	0.16	0.56	CAPL-SSD78-1012	0.24	0.17	0.38	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.599	0 / 6	0.93	NO
Chromium	-- - --	6 / 6	2.65	15.2	CAPL-SSD78-1012	6.86	4.39	10.5	43.4	0 / 6	0.35	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	6 / 6	0.88	19.8	CAPL-SSD78-1012	5.08	7.26	11.1	31.6	0 / 6	0.63	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.30 - 0.58	0 / 6	--	--	--	0.20	0.051	0.24	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	6 / 6	1,520	11,300	CAPL-SSD78-1012	4,750	3,420	7,564	20,000	0 / 6	0.57	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Lead	-- - --	6 / 6	3.98	43.0	CAPL-SSD78-1012	13.5	14.7	25.7	35.8	1 / 6	1.20	0.72	0.38	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.038 - 0.038	5 / 6	0.023	0.089	CAPL-SSD78-1012	0.037	0.026	0.058	0.18	0 / 6	0.50	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	6 / 6	0.95	6.36	CAPL-SSD78-1012	2.48	1.97	4.10	22.7	0 / 6	0.28	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	0.35 - 1.24	0 / 6	--	--	--	0.30	0.19	0.46	2.00	-- / --	0.62	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	6 / 6	3.89	23.5	CAPL-SSD78-1012	10.1	6.88	15.7	57.0	0 / 6	0.41	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	6 / 6	3.99	84.3	CAPL-SSD78-1012	25.8	29.6	50.1	121	0 / 6	0.70	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	6 / 6	6.79	7.53	CAPL-SSD80-1012	7.10	0.28	7.33	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	6 / 6	7,570	63,700	CAPL-SSD78-1012	26,712	21,058	44,035	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-90
Screening Statistics - Penniman Lake Subsurface Sediment - Group 4
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	-- - --	17 / 17	46.9	459	CAPL-SSD63-1012	226	144	287	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	157	9 / 17	2.92	YES
Carbon disulfide	3.23 - 29.0	7 / 17	4.08	29.7	CAPL-SSD81-1012	9.63	6.42	12.4	6.52	5 / 17	4.56	1.89	1.48	--	-- / --	--	--	--	--	-- / --	--	YES
Semivolatile Organic Compounds (UG/KG)																						
2-Methylnaphthalene	5.68 - 940	2 / 19	8.35	50.0	CAPL-SSD63-1012	97.3	148	156	70.0	0 / 19	0.71	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Acenaphthene	5.68 - 940	2 / 19	8.55	38.6	CAPL-SSD63-1012	96.7	148	155	290	0 / 19	0.13	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Anthracene	5.68 - 940	1 / 19	25.1	25.1	CAPL-SSD67-1012	97.2	147	156	57.2	0 / 19	0.44	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzaldehyde	170 - 5,660	3 / 19	18.0	931	CAPL-SSD63-1012	521	703	801	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Benzo(a)anthracene	5.68 - 940	1 / 19	230	230	CAPL-SSD67-1012	108	149	167	108	1 / 19	2.13	1.55	1.00	844	0 / 19	0.27	--	--	--	-- / --	--	--
Benzo(a)pyrene	5.68 - 940	1 / 19	369	369	CAPL-SSD67-1012	115	159	178	150	1 / 19	2.46	1.19	0.77	1,074	0 / 19	0.34	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	5.68 - 940	3 / 19	20.8	392	CAPL-SSD67-1012	120	159	183	240	1 / 19	1.63	0.76	0.50	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	5.68 - 940	1 / 19	246	246	CAPL-SSD67-1012	109	150	169	170	1 / 19	1.45	0.99	0.64	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	5.68 - 940	2 / 19	61.3	467	CAPL-SSD67-1012	122	168	189	240	1 / 19	1.95	0.79	0.51	--	-- / --	--	--	--	--	-- / --	--	--
Chrysene	5.68 - 680	2 / 19	38.0	359	CAPL-SSD67-1012	92.1	133	145	166	1 / 19	2.16	0.87	0.55	--	-- / --	--	--	--	--	-- / --	--	--
Dibenz(a,h)anthracene	5.68 - 940	1 / 19	77.5	77.5	CAPL-SSD67-1012	100.0	147	158	33.0	1 / 19	2.35	4.80	3.03	--	-- / --	--	--	--	--	-- / --	--	--
Dibenzofuran	170 - 5,660	0 / 19	--	--	--	521	683	793	5,100	-- / --	1.11	0.16	0.10	15,340	-- / --	0.37	--	--	--	-- / --	--	NO
Di-n-octylphthalate	170 - 5,660	0 / 19	--	--	--	521	683	793	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Fluoranthene	19.5 - 680	14 / 19	5.41	199	CAPL-SSD67-1012	92.5	117	139	423	0 / 19	0.47	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	5.68 - 940	1 / 19	10.7	10.7	CAPL-SSD67-1012	96.5	148	155	77.4	0 / 19	0.14	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	5.68 - 940	1 / 19	221	221	CAPL-SSD67-1012	108	149	167	200	1 / 19	1.11	0.83	0.54	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	12 / 19	3.83	2,588	CAPL-SSD67-1012	163	590	397	2,900	0 / 19	0.89	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	14 / 19	5.41	328	CAPL-SSD63-1012	49.3	99.6	89.0	786	0 / 19	0.42	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	14 / 19	7.01	2,912	CAPL-SSD67-1012	212	667	477	3,553	0 / 19	0.82	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	51.8 - 3,060	12 / 19	26.6	3,798	CAS011-11SD28-01-0602	708	1,032	1,119	2,900	1 / 19	1.31	0.39	0.24	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	568 - 3,060	14 / 19	132	3,797	CAS011-11SD28-01-0602	1,008	1,057	1,429	786	3 / 19	4.83	1.82	1.28	--	-- / --	--	--	--	316	11 / 19	12.0	--
PAH (total)	655 - 6,120	14 / 19	184	7,595	CAS011-11SD28-01-0602	1,720	1,875	2,466	3,553	2 / 19	2.14	0.69	0.48	--	-- / --	--	--	--	--	-- / --	--	--
Phenanthrene	5.68 - 940	3 / 19	22.3	112	CAPL-SSD63-1012	104	145	162	204	0 / 19	0.55	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	11.5 - 940	11 / 19	3.83	226	CAPL-SSD67-1012	115	146	173	195	1 / 19	1.16	0.89	0.59	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	0.99 - 9.40	8 / 17	0.43	17.7	CAPL-SSD62-1012	3.37	4.16	5.14	4.88	3 / 17	3.63	1.05	0.69	844	0 / 17	0.02	--	--	--	-- / --	--	NO
4,4'-DDE	1.12 - 5.90	12 / 17	1.51	26.4	CAPL-SSD62-1012	7.43	7.39	10.6	3.16	11 / 17	8.35	3.34	2.35	2,608	0 / 17	0.01	--	--	--	-- / --	--	NO
4,4'-DDT	0.57 - 9.40	4 / 17	0.85	5.10	CAS011-11SD31-01-0602	1.41	1.44	2.02	4.16	1 / 17	1.23	0.48	0.34	2,608	0 / 17	0.002	--	--	--	-- / --	--	NO
Aldrin	0.57 - 4.90	1 / 17	0.53	0.53	CAPL-SSD67-1012	0.87	0.50	1.08	2.00	0 / 17	0.27	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	0.57 - 4.90	8 / 17	0.46	2.10	CAPL-SSD73-1012	1.13	0.59	1.38	3.24	0 / 17	0.65	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
beta-BHC	0.55 - 4.90	0 / 17	--	--	--	0.85	0.52	1.07	5.00	-- / --	0.98	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
delta-BHC	0.55 - 4.90	2 / 17	0.51	1.07	CAPL-SSD73-1012	0.86	0.52	1.08	3.00	0 / 17	0.36	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Dieldrin	0.99 - 9.40	7 / 17	0.92	4.65	CAPL-SSD62-1012	1.91	1.49	2.54	1.90	4 / 17	2.45	1.34	1.01	399	0 / 17	0.01	--	--	--	-- / --	--	NO
Endosulfan II	0.57 - 9.40	3 / 17	0.60	2.44	CAPL-SSD63-1012	1.35	1.17	1.84	107	0 / 17	0.02	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	1.12 - 9.40	8 / 17	0.36	9.51	CAPL-SSD63-1012	2.15	2.51	3.21	41.4	0 / 17	0.23	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	0.99 - 9.40	4 / 17	0.86	3.15	CAPL-SSD67-1012	1.38	1.18	1.88	2.22	1 / 17	1.42	0.85	0.62	153	0 / 17	0.02	--	--	--	-- / --	--	NO
Endrin aldehyde	1.12 - 9.40	8 / 17	0.81	5.11	CAPL-SSD62-1012	2.11	1.56	2.77	2.22	5 / 17	2.30	1.25	0.95	153	0 / 17	0.03	--	--	--	-- / --	--	NO
Endrin ketone	0.55 - 9.40	4 / 17	1.64	16.5	CAPL-SSD62-1012	2.38	3.84	4.01	2.22	3 / 17	7.43	1.81	1.07	153	0 / 17	0.11	--	--	--	-- / --	--	NO
gamma-Chlordane	2.30 - 9.23	13 / 17	1.11	16.4	CAPL-SSD72-1012	4.65	4.90	6.73	3.24	6 / 17	5.06	2.08	1.44	21,476	0 / 17	0.001	--	--	--	-- / --	--	NO
Heptachlor epoxide	0.55 - 4.90	0 / 17	--	--	--	0.85	0.52	1.07	2.47	-- / --	1.98	0.43	0.35	522	-- / --	0.01	--	--	--	-- / --	--	NO
Methoxychlor	0.57 - 49.0	3 / 17	0.48	16.2	CAPL-SSD62-1012	4.59	7.39	7.72	146	0 / 17	0.11	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	13.9 - 94.0	7 / 17	34.0	230	CAPL-SSD67-1012	57.9	72.3	88.5	59.8	3 / 17	3.85	1.48	0.97	6,213	0 / 17	0.04	--	--	--	-- / --	--	NO
Explosives (UG/KG)																						
1,3-Dinitrobenzene	100 - 198	0 / 16	--	--	--	90.8	16.0	97.8	51.4	-- / --	3.85	1.90	1.77	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	459 - 2,500	6 / 15	326	1,160	CAPL-SSD73-1012	560	403	743	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES

Table D-90
Screening Statistics - Penniman Lake Subsurface Sediment - Group 4
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Inorganics (MG/KG)																						
Aluminum	-- - --	19 / 19	1,690	34,700	CAPL-SSD81-1012	16,037	9,802	19,936	25,500	3 / 19	1.36	0.78	0.63	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	19 / 19	3.70	52.0	CAPL-SSD73-1012	24.1	15.8	30.4	9.79	14 / 19	5.31	3.10	2.46	--	-- / --	--	--	--	57.2	0 / 19	0.91	NO
Barium	-- - --	19 / 19	8.30	104	CAPL-SSD73-1012	51.2	28.8	62.6	20.0	14 / 19	5.20	3.13	2.56	--	-- / --	--	--	--	36.5	14 / 19	2.85	YES
Beryllium	0.33 - 2.97	11 / 19	0.12	1.63	CAPL-SSD81-1012	0.80	0.48	0.99	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.599	8 / 12	2.72	YES
Chromium	-- - --	19 / 19	2.90	61.7	CAPL-SSD81-1012	31.1	17.2	37.9	43.4	4 / 19	1.42	0.87	0.72	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	1.20 - 1.20	18 / 19	2.70	60.0	CAPL-SSD73-1012	21.9	17.5	28.9	31.6	7 / 19	1.90	0.91	0.69	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.050 - 1.70	0 / 19	--	--	--	0.41	0.23	0.51	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	19 / 19	3,610	51,400	CAPL-SSD81-1012	24,097	13,315	29,394	20,000	13 / 19	2.57	1.47	1.20	--	-- / --	--	--	--	11,300	14 / 19	4.55	YES
Lead	-- - --	19 / 19	3.00	107	CAPL-SSD62-1012	35.9	29.5	47.6	35.8	9 / 19	2.99	1.33	1.00	--	-- / --	--	--	--	12.1	14 / 19	8.84	YES
Mercury	0.075 - 0.20	13 / 19	0.023	1.45	CAPL-SSD64-1012	0.16	0.32	0.29	0.18	2 / 19	8.06	1.59	0.90	--	-- / --	--	--	--	0.052	10 / 19	27.9	YES
Nickel	2.18 - 2.18	18 / 19	1.30	26.1	CAPL-SSD81-1012	10.5	6.74	13.2	22.7	1 / 19	1.15	0.58	0.46	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	0.42 - 7.42	1 / 19	2.10	2.10	CAS011-11SD28-01-0602	1.77	0.97	2.16	2.00	1 / 19	1.05	--	0.89	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	19 / 19	4.40	76.9	CAPL-SSD81-1012	38.7	21.9	47.4	57.0	3 / 19	1.35	0.83	0.68	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	19 / 19	8.70	215	CAPL-SSD62-1012	87.1	60.1	111	121	4 / 19	1.78	0.92	0.72	--	-- / --	--	--	--	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	16 / 16	6.77	7.71	CAPL-SSD74-1012	7.20	0.26	7.32	--	-- / --	--		--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	16 / 16	28,400	165,000	CAPL-SSD72-1012	76,656	42,720	95,379	--	-- / --	--		--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-91
Screening Statistics - Penniman Lake Subsurface Sediment - Group 4A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	-- - --	6 / 6	53.0	459	CAPL-SSD63-1012	268	174	411	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	157	4 / 6	2.92	YES
Carbon disulfide	11.8 - 29.0	0 / 6	--	--	--	8.50	3.35	11.3	7.72	-- / --	3.76	1.46	1.10	--	-- / --	--	--	--	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
2-Methylnaphthalene	12.6 - 940	1 / 6	50.0	50.0	CAPL-SSD63-1012	175	188	330	70.0	0 / 6	0.71	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Acenaphthene	12.6 - 940	1 / 6	38.6	38.6	CAPL-SSD63-1012	174	189	329	290	0 / 6	0.13	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Anthracene	12.6 - 940	0 / 6	--	--	--	172	190	329	57.2	-- / --	16.4	5.75	3.02	1,998	-- / --	0.47	--	--	--	-- / --	--	--
Benzaldehyde	590 - 656	3 / 6	18.0	931	CAPL-SSD63-1012	326	325	593	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES
Benzo(a)anthracene	12.6 - 940	0 / 6	--	--	--	172	190	329	108	-- / --	8.70	3.05	1.60	999	-- / --	0.94	--	--	--	-- / --	--	--
Benzo(a)pyrene	12.6 - 940	0 / 6	--	--	--	172	190	329	150	-- / --	6.27	2.19	1.15	1,271	-- / --	0.74	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	12.6 - 940	1 / 6	80.1	80.1	CAPL-SSD63-1012	180	184	332	240	0 / 6	0.33	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	12.6 - 940	0 / 6	--	--	--	172	190	329	170	-- / --	5.53	1.94	1.01	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	12.6 - 940	1 / 6	61.3	61.3	CAPL-SSD63-1012	177	186	331	240	0 / 6	0.26	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Chrysene	12.6 - 590	1 / 6	38.0	38.0	CAS011-11SD28-01-0602	100	126	204	166	0 / 6	0.23	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Dibenz(a,h)anthracene	12.6 - 940	0 / 6	--	--	--	172	190	329	33.0	-- / --	28.5	9.97	5.23	--	-- / --	--	--	--	--	-- / --	--	--
Dibenzofuran	450 - 940	0 / 6	--	--	--	326	80.1	392	5,100	-- / --	0.18	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Di-n-octylphthalate	450 - 940	0 / 6	--	--	--	326	80.1	392	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Fluoranthene	450 - 590	4 / 6	9.31	127	CAPL-SSD63-1012	117	121	217	423	0 / 6	0.30	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	12.6 - 940	0 / 6	--	--	--	172	190	329	77.4	-- / --	12.1	4.25	2.23	4,903	-- / --	0.19	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	12.6 - 940	0 / 6	--	--	--	172	190	329	200	-- / --	4.70	1.65	0.86	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	4 / 6	7.72	252	CAPL-SSD63-1012	51.2	99.5	133	2,900	0 / 6	0.09	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	4 / 6	9.31	328	CAPL-SSD63-1012	63.9	130	171	786	0 / 6	0.42	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	4 / 6	17.0	580	CAPL-SSD63-1012	115	229	304	3,553	0 / 6	0.16	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	2,025 - 2,655	4 / 6	58.1	3,798	CAS011-11SD28-01-0602	1,117	1,409	2,276	2,900	1 / 6	1.31	0.78	0.39	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	2,025 - 2,655	4 / 6	369	3,797	CAS011-11SD28-01-0602	1,278	1,288	2,337	786	1 / 6	4.83	2.97	1.63	--	-- / --	--	--	--	316	4 / 6	12.0	--
PAH (total)	4,050 - 5,310	4 / 6	427	7,595	CAS011-11SD28-01-0602	2,395	2,694	4,611	3,553	1 / 6	2.14	1.30	0.67	--	-- / --	--	--	--	369	4 / 6	20.6	--
Phenanthrene	12.6 - 940	1 / 6	112	112	CAPL-SSD63-1012	186	181	335	204	0 / 6	0.55	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	450 - 940	3 / 6	7.72	111	CAPL-SSD63-1012	186	180	335	195	0 / 6	0.57	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	4.50 - 9.40	3 / 6	3.06	17.7	CAPL-SSD62-1012	6.03	5.84	10.8	4.88	2 / 6	3.63	2.22	1.24	999	0 / 6	0.02	--	--	--	-- / --	--	NO
4,4'-DDE	4.50 - 5.90	4 / 6	9.13	26.4	CAPL-SSD62-1012	10.1	8.71	17.2	3.16	4 / 6	8.35	5.45	3.18	3,087	0 / 6	0.01	--	--	--	-- / --	--	NO
4,4'-DDT	1.36 - 9.40	3 / 6	0.85	5.10	CAS011-11SD31-01-0602	2.54	2.01	4.19	4.16	1 / 6	1.23	1.01	0.61	3,087	0 / 6	0.002	--	--	--	-- / --	--	NO
Aldrin	1.27 - 4.90	0 / 6	--	--	--	1.18	0.71	1.77	2.00	-- / --	2.45	0.88	0.59	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	2.30 - 4.90	3 / 6	1.04	1.64	CAPL-SSD62-1012	1.54	0.50	1.95	3.24	0 / 6	0.51	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
beta-BHC	1.27 - 4.90	0 / 6	--	--	--	1.18	0.71	1.77	5.00	-- / --	0.98	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
delta-BHC	1.27 - 4.90	1 / 6	0.51	0.51	CAPL-SSD63-1012	1.15	0.74	1.76	3.00	0 / 6	0.17	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Dieldrin	1.36 - 9.40	2 / 6	4.36	4.65	CAPL-SSD62-1012	3.27	1.61	4.59	1.90	2 / 6	2.45	2.42	1.72	472	0 / 6	0.01	--	--	--	-- / --	--	NO
Endosulfan II	1.36 - 9.40	2 / 6	2.10	2.44	CAPL-SSD63-1012	2.52	1.31	3.60	127	0 / 6	0.02	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	1.36 - 9.40	2 / 6	6.42	9.51	CAPL-SSD63-1012	4.42	3.19	7.04	49.0	0 / 6	0.19	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	1.36 - 9.40	2 / 6	0.86	1.09	CAPL-SSD63-1012	2.09	1.55	3.37	2.22	0 / 6	0.49	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin aldehyde	1.36 - 9.40	2 / 6	4.52	5.11	CAPL-SSD62-1012	3.37	1.72	4.78	2.22	2 / 6	2.30	2.15	1.52	182	0 / 6	0.03	--	--	--	-- / --	--	NO
Endrin ketone	1.35 - 9.40	1 / 6	16.5	16.5	CAPL-SSD62-1012	4.63	6.01	9.57	2.22	1 / 6	7.43	4.31	2.08	182	0 / 6	0.09	--	--	--	-- / --	--	NO
gamma-Chlordane	2.30 - 4.90	3 / 6	1.26	12.2	CAPL-SSD63-1012	3.45	4.32	7.00	3.24	1 / 6	3.77	2.16	1.06	25,424	0 / 6	0.0005	--	--	--	-- / --	--	NO
Heptachlor epoxide	1.27 - 4.90	0 / 6	--	--	--	1.18	0.71	1.77	2.47	-- / --	1.98	0.71	0.48	617	-- / --	0.01	--	--	--	-- / --	--	NO
Methoxychlor	1.35 - 49.0	1 / 6	16.2	16.2	CAPL-SSD62-1012	11.4	9.35	19.1	173	0 / 6	0.09	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	33.4 - 94.0	3 / 6	34.0	217	CAPL-SSD63-1012	85.5	85.2	156	59.8	2 / 6	3.63	2.60	1.43	7,355	0 / 6	0.03	--	--	--	-- / --	--	NO
Explosives (UG/KG)																						
1,3-Dinitrobenzene	194 - 197	0 / 3	--	--	--	97.8	0.76	99.1	60.8	-- / --	3.24	1.63	1.61	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	490 - 490	2 / 3	326	996	CAPL-SSD64-1012	522	412	1,217	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES

Table D-91
Screening Statistics - Penniman Lake Subsurface Sediment - Group 4A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Inorganics (MG/KG)																						
Aluminum	-- - --	6 / 6	2,790	19,300	CAPL-SSD64-1012	13,715	6,363	18,949	25,500	0 / 6	0.76	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	6 / 6	3.70	44.3	CAPL-SSD62-1012	20.3	14.5	32.3	9.79	5 / 6	4.53	3.29	2.08	--	-- / --	--	--	--	57.2	0 / 6	0.77	NO
Barium	-- - --	6 / 6	9.30	86.7	CAPL-SSD63-1012	56.2	28.2	79.5	20.0	5 / 6	4.34	3.97	2.81	--	-- / --	--	--	--	36.5	5 / 6	2.38	YES
Beryllium	0.42 - 2.00	1 / 6	1.15	1.15	CAPL-SSD64-1012	0.72	0.37	1.02	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.599	1 / 6	1.92	YES
Chromium	-- - --	6 / 6	11.1	45.0	CAPL-SSD62-1012	32.5	12.6	42.9	43.4	1 / 6	1.04	0.99	0.75	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	1.20 - 1.20	5 / 6	6.40	37.6	CAPL-SSD64-1012	21.0	15.8	34.0	31.6	3 / 6	1.19	1.08	0.66	--	-- / --	--	--	--	3.67	5 / 6	10.2	YES
Cyanide	0.050 - 1.01	0 / 6	--	--	--	0.25	0.24	0.46	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	6 / 6	9,960	37,000	CAS011-11SD32-01-0602	26,027	10,772	34,888	20,000	4 / 6	1.85	1.74	1.30	--	-- / --	--	--	--	11,300	5 / 6	3.27	YES
Lead	-- - --	6 / 6	3.00	107	CAPL-SSD62-1012	47.2	38.9	79.2	35.8	4 / 6	2.99	2.21	1.32	--	-- / --	--	--	--	12.1	4 / 6	8.84	YES
Mercury	0.075 - 0.14	3 / 6	0.12	1.45	CAPL-SSD64-1012	0.33	0.56	0.79	0.18	2 / 6	8.06	4.36	1.83	--	-- / --	--	--	--	0.052	3 / 6	27.9	YES
Nickel	-- - --	6 / 6	2.30	12.7	CAPL-SSD64-1012	8.75	3.96	12.0	22.7	0 / 6	0.56	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	0.57 - 5.14	1 / 6	2.10	2.10	CAS011-11SD28-01-0602	1.70	1.07	2.58	2.00	1 / 6	1.05	--	0.85	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	6 / 6	11.8	46.6	CAPL-SSD64-1012	35.3	13.5	46.4	57.0	0 / 6	0.82	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	6 / 6	8.70	215	CAPL-SSD62-1012	107	82.2	175	121	3 / 6	1.78	1.45	0.89	--	-- / --	--	--	--	22.6	5 / 6	9.51	YES
Other Parameters																						
pH	-- - --	3 / 3	6.89	7.31	CAPL-SSD62-1012	7.04	0.23	7.44	--	-- / --	--		--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	3 / 3	45,400	124,000	CAPL-SSD64-1012	90,800	40,695	159,407	--	-- / --	--		--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-92
Screening Statistics - Penniman Lake Subsurface Sediment - Group 4B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	-- - --	6 / 6	133	347	CAPL-SSD73-1012	243	87.9	315	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	157	4 / 6	2.21	YES
Carbon disulfide	9.37 - 11.8	4 / 6	4.08	13.4	CAPL-SSD74-1012	8.21	3.87	11.4	7.00	3 / 6	1.92	1.63	1.17	--	-- / --	--	--	--	--	-- / --	--	YES
Semivolatile Organic Compounds (UG/KG)																						
2-Methylnaphthalene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	70.0	-- / --	1.11	0.33	0.17	--	-- / --	--	--	--	--	-- / --	--	--
Acenaphthene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	290	-- / --	0.27	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Anthracene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	57.2	-- / --	1.36	0.40	0.21	--	-- / --	--	--	--	--	-- / --	--	--
Benzaldehyde	285 - 3,900	0 / 6	--	--	--	607	669	1,157	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Benzo(a)anthracene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	108	-- / --	0.72	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(a)pyrene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	150	-- / --	0.52	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	5.68 - 77.8	1 / 6	20.8	20.8	CAPL-SSD74-1012	14.2	13.6	25.4	240	0 / 6	0.09	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(g,h,i)perylene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	170	-- / --	0.46	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	240	-- / --	0.32	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Chrysene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	166	-- / --	0.47	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Dibenz(a,h)anthracene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	33.0	-- / --	2.36	0.70	0.37	--	-- / --	--	--	--	--	-- / --	--	--
Dibenzofuran	285 - 3,900	0 / 6	--	--	--	607	669	1,157	5,100	-- / --	0.76	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Di-n-octylphthalate	285 - 3,900	0 / 6	--	--	--	607	669	1,157	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Fluoranthene	19.5 - 19.5	5 / 6	5.41	55.5	CAPL-SSD75-1012	20.1	18.9	35.6	423	0 / 6	0.13	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	77.4	-- / --	1.01	0.30	0.16	--	-- / --	--	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	5.68 - 77.8	0 / 6	--	--	--	12.1	13.3	23.1	200	-- / --	0.39	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	5 / 6	3.83	48.2	CAPL-SSD75-1012	20.5	21.5	38.1	2,900	0 / 6	0.02	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	5 / 6	5.41	55.5	CAPL-SSD75-1012	22.2	23.9	41.9	786	0 / 6	0.07	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	5 / 6	9.24	104	CAPL-SSD75-1012	42.7	45.3	80.0	3,553	0 / 6	0.03	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	87.8 - 87.8	5 / 6	26.6	359	CAPL-SSD75-1012	110	125	213	2,900	0 / 6	0.12	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	568 - 568	5 / 6	168	2,278	CAPL-SSD75-1012	667	798	1,324	786	1 / 6	2.90	1.68	0.85	--	-- / --	--	--	--	316	4 / 6	7.21	--
PAH (total)	655 - 655	5 / 6	194	2,637	CAPL-SSD75-1012	778	923	1,537	3,553	0 / 6	0.74	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Phenanthrene	5.68 - 77.8	1 / 6	22.3	22.3	CAPL-SSD74-1012	14.5	13.7	25.8	204	0 / 6	0.11	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	19.5 - 19.5	5 / 6	3.83	48.2	CAPL-SSD75-1012	18.6	16.3	32.0	195	0 / 6	0.25	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pesticides (UG/KG)																						
4,4'-DDD	1.58 - 1.98	4 / 6	0.43	6.99	CAPL-SSD73-1012	2.67	2.51	4.73	4.88	1 / 6	1.43	0.97	0.55	905	0 / 6	0.01	--	--	--	-- / --	--	NO
4,4'-DDE	1.98 - 1.98	5 / 6	1.51	21.6	CAPL-SSD73-1012	7.10	7.66	13.4	3.16	4 / 6	6.84	4.24	2.25	2,798	0 / 6	0.01	--	--	--	-- / --	--	NO
4,4'-DDT	0.57 - 1.98	0 / 6	--	--	--	0.70	0.25	0.90	4.16	-- / --	0.48	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Aldrin	0.57 - 1.98	0 / 6	--	--	--	0.70	0.25	0.90	2.00	-- / --	0.99	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	0.57 - 1.98	3 / 6	0.49	2.10	CAPL-SSD73-1012	1.03	0.68	1.59	3.24	0 / 6	0.65	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
beta-BHC	0.57 - 1.98	0 / 6	--	--	--	0.70	0.25	0.90	5.00	-- / --	0.40	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
delta-BHC	0.57 - 1.98	1 / 6	1.07	1.07	CAPL-SSD73-1012	0.75	0.29	0.99	3.00	0 / 6	0.36	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Dieldrin	1.58 - 1.98	4 / 6	0.92	3.01	CAPL-SSD73-1012	1.48	0.89	2.21	1.90	2 / 6	1.58	1.16	0.78	428	0 / 6	0.01	--	--	--	-- / --	--	NO
Endosulfan II	0.57 - 1.98	0 / 6	--	--	--	0.70	0.25	0.90	115	-- / --	0.02	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	1.58 - 1.98	4 / 6	0.37	1.48	CAPL-SSD73-1012	0.92	0.36	1.21	44.4	0 / 6	0.03	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	1.11 - 1.98	1 / 6	0.86	0.86	CAPL-SSD69-1012	0.80	0.14	0.91	2.22	0 / 6	0.39	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin aldehyde	1.58 - 1.98	4 / 6	0.81	2.29	CAPL-SSD71-1012	1.34	0.73	1.94	2.22	2 / 6	1.03	0.87	0.60	165	0 / 6	0.01	--	--	--	-- / --	--	NO
Endrin ketone	0.57 - 1.98	3 / 6	1.64	3.04	CAPL-SSD73-1012	1.58	1.11	2.49	2.22	2 / 6	1.37	1.12	0.71	165	0 / 6	0.02	--	--	--	-- / --	--	NO
gamma-Chlordane	-- - --	6 / 6	1.11	16.4	CAPL-SSD72-1012	6.91	6.82	12.5	3.24	3 / 6	5.06	3.87	2.13	23,044	0 / 6	0.001	--	--	--	-- / --	--	NO
Heptachlor epoxide	0.57 - 1.98	0 / 6	--	--	--	0.70	0.25	0.90	2.47	-- / --	0.80	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Methoxychlor	0.57 - 1.98	1 / 6	0.48	0.48	CAPL-SSD71-1012	0.69	0.26	0.90	156	0 / 6	0.003	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	13.9 - 48.5	2 / 6	37.3	52.7	CAPL-SSD73-1012	26.8	16.0	40.0	59.8	0 / 6	0.88	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Explosives (UG/KG)																						
1,3-Dinitrobenzene	187 - 197	0 / 6	--	--	--	96.1	2.04	97.8	55.1	-- / --	3.57	1.77	1.74	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	467 - 493	3 / 6	842	1,160	CAPL-SSD73-1012	608	417	951	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES

Table D-92
Screening Statistics - Penniman Lake Subsurface Sediment - Group 4B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Inorganics (MG/KG)																						
Aluminum	-- - --	6 / 6	3,460	29,100	CAPL-SSD73-1012	18,593	8,578	25,650	25,500	1 / 6	1.14	1.01	0.73	--	-- / --	--	--	--	10,200	5 / 6	2.85	NO
Arsenic	-- - --	6 / 6	5.86	52.0	CAPL-SSD73-1012	33.9	16.7	47.6	9.79	5 / 6	5.31	4.86	3.46	--	-- / --	--	--	--	57.2	0 / 6	0.91	NO
Barium	-- - --	6 / 6	10.2	104	CAPL-SSD73-1012	61.5	30.7	86.7	20.0	5 / 6	5.20	4.34	3.07	--	-- / --	--	--	--	36.5	5 / 6	2.85	YES
Beryllium	2.97 - 2.97	5 / 6	0.22	1.44	CAPL-SSD73-1012	1.02	0.46	1.40	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.599	4 / 6	2.40	YES
Chromium	-- - --	6 / 6	10.3	54.2	CAPL-SSD73-1012	34.9	14.3	46.7	43.4	1 / 6	1.25	1.08	0.80	--	-- / --	--	--	--	15.9	5 / 6	3.41	NO
Copper	-- - --	6 / 6	3.46	60.0	CAPL-SSD73-1012	31.7	20.5	48.6	31.6	3 / 6	1.90	1.54	1.00	--	-- / --	--	--	--	3.67	5 / 6	16.3	YES
Cyanide	0.40 - 1.57	0 / 6	--	--	--	0.52	0.20	0.68	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	6 / 6	9,000	41,800	CAPL-SSD73-1012	26,267	11,005	35,320	20,000	5 / 6	2.09	1.77	1.31	--	-- / --	--	--	--	11,300	5 / 6	3.70	YES
Lead	-- - --	6 / 6	4.92	92.3	CAPL-SSD73-1012	43.3	29.5	67.6	35.8	4 / 6	2.58	1.89	1.21	--	-- / --	--	--	--	12.1	5 / 6	7.63	YES
Mercury	0.17 - 0.17	5 / 6	0.023	0.13	CAPL-SSD73-1012	0.096	0.039	0.13	0.18	0 / 6	0.72	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	2.18 - 2.18	5 / 6	9.94	18.0	CAPL-SSD73-1012	11.8	5.96	16.7	22.7	0 / 6	0.79	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	0.42 - 7.42	0 / 6	--	--	--	1.90	1.27	2.95	2.00	-- / --	3.71	1.47	0.95	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	6 / 6	12.1	67.0	CAPL-SSD73-1012	45.4	18.4	60.5	57.0	1 / 6	1.18	1.06	0.80	--	-- / --	--	--	--	20.4	5 / 6	3.28	NO
Zinc	-- - --	6 / 6	14.7	186	CAPL-SSD73-1012	96.7	58.0	144	121	1 / 6	1.54	1.19	0.80	--	-- / --	--	--	--	22.6	5 / 6	8.23	NO
Other Parameters																						
pH	-- - --	6 / 6	6.77	7.71	CAPL-SSD74-1012	7.15	0.34	7.43	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	6 / 6	28,400	165,000	CAPL-SSD72-1012	82,267	52,153	125,170	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-93
Screening Statistics - Penniman Lake Subsurface Sediment - Group 4C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Volatile Organic Compounds (UG/KG)																						
Acetone	-- - --	5 / 5	46.9	438	CAPL-SSD82-1012	154	161	307	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	157	1 / 5	2.79	YES
Carbon disulfide	3.23 - 22.7	3 / 5	6.02	29.7	CAPL-SSD81-1012	12.7	10.8	23.0	5.59	3 / 5	5.31	4.10	2.27	--	-- / --	--	--	--	--	-- / --	--	YES
Semivolatile Organic Compounds (UG/KG)																						
2-Methylnaphthalene	9.90 - 680	1 / 7	8.35	8.35	CAPL-SSD67-1012	103	150	213	70.0	0 / 7	0.12	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Acenaphthene	9.90 - 680	1 / 7	8.55	8.55	CAPL-SSD67-1012	103	150	213	290	0 / 7	0.03	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Anthracene	9.90 - 680	1 / 7	25.1	25.1	CAPL-SSD67-1012	106	148	214	57.2	0 / 7	0.44	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Benzaldehyde	170 - 5,660	0 / 7	--	--	--	616	982	1,337	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Benzo(a)anthracene	9.90 - 680	1 / 7	230	230	CAPL-SSD67-1012	135	150	245	108	1 / 7	2.13	--	1.25	724	0 / 7	0.32	--	--	--	-- / --	--	--
Benzo(a)pyrene	9.90 - 680	1 / 7	369	369	CAPL-SSD67-1012	155	172	281	150	1 / 7	2.46	1.87	1.03	921	0 / 7	0.40	--	--	--	-- / --	--	--
Benzo(b)fluoranthene	9.90 - 680	1 / 7	392	392	CAPL-SSD67-1012	158	177	288	240	1 / 7	1.63	1.20	0.66	--	-- / --	--	--	--	17.7	1 / 7	22.1	--
Benzo(g,h,i)perylene	9.90 - 680	1 / 7	246	246	CAPL-SSD67-1012	137	151	248	170	1 / 7	1.45	--	0.81	--	-- / --	--	--	--	--	-- / --	--	--
Benzo(k)fluoranthene	9.90 - 680	1 / 7	467	467	CAPL-SSD67-1012	169	195	312	240	1 / 7	1.95	1.30	0.70	--	-- / --	--	--	--	12.6	1 / 7	37.1	--
Chrysene	9.90 - 680	1 / 7	359	359	CAPL-SSD67-1012	153	170	278	166	1 / 7	2.16	1.68	0.92	--	-- / --	--	--	--	19.6	1 / 7	18.3	--
Dibenz(a,h)anthracene	9.90 - 680	1 / 7	77.5	77.5	CAPL-SSD67-1012	113	145	219	33.0	1 / 7	2.35	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Dibenzofuran	170 - 5,660	0 / 7	--	--	--	616	982	1,337	5,100	-- / --	1.11	0.26	0.12	13,160	-- / --	0.43	--	--	--	-- / --	--	NO
Di-n-octylphthalate	170 - 5,660	0 / 7	--	--	--	616	982	1,337	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Fluoranthene	600 - 680	5 / 7	7.01	199	CAPL-SSD67-1012	134	144	240	423	0 / 7	0.47	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Fluorene	9.90 - 680	1 / 7	10.7	10.7	CAPL-SSD67-1012	104	149	213	77.4	0 / 7	0.14	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Indeno(1,2,3-cd)pyrene	9.90 - 680	1 / 7	221	221	CAPL-SSD67-1012	134	149	243	200	1 / 7	1.11	--	0.67	--	-- / --	--	--	--	--	-- / --	--	--
PAH (HMW) - Detects	-- - --	3 / 7	7.81	2,588	CAPL-SSD67-1012	380	974	1,095	2,900	0 / 7	0.89	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (LMW) - Detects	-- - --	5 / 7	7.01	325	CAPL-SSD67-1012	60.1	119	147	786	0 / 7	0.41	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (total) - Detects	-- - --	5 / 7	7.01	2,912	CAPL-SSD67-1012	440	1,091	1,241	3,553	0 / 7	0.82	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
PAH (HMW)	51.8 - 3,060	3 / 7	47.4	2,588	CAPL-SSD67-1012	870	986	1,594	2,900	0 / 7	0.89	--	--	--	-- / --	--	--	--	--	-- / --	--	--
PAH (LMW)	2,700 - 3,060	5 / 7	132	3,292	CAPL-SSD82-1012	1,070	1,117	1,891	786	1 / 7	4.19	2.41	1.36	--	-- / --	--	--	--	316	3 / 7	10.4	--
PAH (total)	5,400 - 6,120	5 / 7	184	3,809	CAPL-SSD82-1012	1,949	1,543	3,082	3,553	1 / 7	1.07	0.87	0.55	--	-- / --	--	--	--	--	-- / --	--	--
Phenanthrene	9.90 - 680	1 / 7	64.4	64.4	CAPL-SSD67-1012	111	145	218	204	0 / 7	0.32	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Pyrene	11.5 - 680	3 / 7	7.81	226	CAPL-SSD67-1012	136	148	245	195	1 / 7	1.16	--	0.70	--	-- / --	--	--	--	21.5	2 / 7	10.5	--
Pesticides (UG/KG)																						
4,4'-DDD	0.99 - 2.32	1 / 5	2.18	2.18	CAPL-SSD67-1012	1.03	0.70	1.69	4.88	0 / 5	0.45	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
4,4'-DDE	1.12 - 1.48	3 / 5	3.35	14.0	CAPL-SSD67-1012	4.69	5.50	9.94	3.16	3 / 5	4.43	3.14	1.48	2,237	0 / 5	0.01	--	--	--	-- / --	--	NO
4,4'-DDT	0.99 - 2.32	1 / 5	1.51	1.51	CAPL-SSD67-1012	0.89	0.43	1.30	4.16	0 / 5	0.36	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Aldrin	0.99 - 2.32	1 / 5	0.53	0.53	CAPL-SSD67-1012	0.70	0.28	0.96	2.00	0 / 5	0.27	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
alpha-Chlordane	1.12 - 2.32	2 / 5	0.46	0.91	CAPL-SSD67-1012	0.77	0.28	1.03	3.24	0 / 5	0.28	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
beta-BHC	0.55 - 2.32	0 / 5	--	--	--	0.65	0.33	0.96	5.00	-- / --	0.46	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
delta-BHC	0.55 - 2.32	0 / 5	--	--	--	0.65	0.33	0.96	3.00	-- / --	0.77	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Dieldrin	0.99 - 2.32	1 / 5	1.11	1.11	CAPL-SSD67-1012	0.81	0.31	1.11	1.90	0 / 5	0.58	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan II	0.99 - 2.32	1 / 5	0.60	0.60	CAPL-SSD67-1012	0.71	0.27	0.97	92.1	0 / 5	0.01	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endosulfan sulfate	1.12 - 2.32	2 / 5	0.36	1.66	CAPL-SSD65-1012	0.90	0.52	1.39	35.5	0 / 5	0.05	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Endrin	0.99 - 2.32	1 / 5	3.15	3.15	CAPL-SSD67-1012	1.22	1.11	2.28	2.22	1 / 5	1.42	1.03	0.55	132	0 / 5	0.02	--	--	--	-- / --	--	NO
Endrin aldehyde	1.12 - 2.32	2 / 5	1.45	3.73	CAPL-SSD67-1012	1.53	1.28	2.75	2.22	1 / 5	1.68	1.24	0.69	132	0 / 5	0.03	--	--	--	-- / --	--	NO
Endrin ketone	0.55 - 2.32	0 / 5	--	--	--	0.65	0.33	0.96	2.22	-- / --	1.05	0.43	0.29	132	-- / --	0.02	--	--	--	-- / --	--	NO
gamma-Chlordane	9.23 - 9.23	4 / 5	1.56	5.22	CAPL-SSD67-1012	3.39	1.63	4.95	3.24	2 / 5	1.61	1.53	1.05	18,424	0 / 5	0.0003	--	--	--	-- / --	--	NO
Heptachlor epoxide	0.55 - 2.32	0 / 5	--	--	--	0.65	0.33	0.96	2.47	-- / --	0.94	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Methoxychlor	0.99 - 2.32	1 / 5	2.42	2.42	CAPL-SSD67-1012	1.07	0.80	1.83	125	0 / 5	0.02	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1260	24.2 - 36.1	2 / 5	36.6	230	CAPL-SSD67-1012	62.1	94.4	152	59.8	1 / 5	3.85	2.54	1.04	5,330	0 / 5	0.04	--	--	--	-- / --	--	NO
Explosives (UG/KG)																						
1,3-Dinitrobenzene	100 - 198	0 / 7	--	--	--	83.1	22.8	99.9	44.1	-- / --	4.49	2.27	1.89	--	-- / --	--	--	--	--	-- / --	--	NO
Nitroglycerin	459 - 2,500	1 / 6	968	968	CAPL-SSD82-1012	531	457	906	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	YES

Table D-93
Screening Statistics - Penniman Lake Subsurface Sediment - Group 4C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	Step 3A COPC?
Inorganics (MG/KG)																						
Aluminum	-- - --	7 / 7	1,690	34,700	CAPL-SSD81-1012	15,836	13,460	25,722	25,500	2 / 7	1.36	1.01	0.62	--	-- / --	--	--	--	10,200	4 / 7	3.40	NO
Arsenic	-- - --	7 / 7	4.60	45.8	CAPL-SSD82-1012	18.9	14.2	29.3	9.79	4 / 7	4.68	3.00	1.93	--	-- / --	--	--	--	57.2	0 / 7	0.80	NO
Barium	-- - --	7 / 7	8.30	66.9	CAPL-SSD82-1012	38.0	26.4	57.4	20.0	4 / 7	3.35	2.87	1.90	--	-- / --	--	--	--	36.5	4 / 7	1.83	YES
Beryllium	0.33 - 1.49	5 / 7	0.12	1.63	CAPL-SSD81-1012	0.67	0.57	1.09	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.599	3 / 7	2.72	YES
Chromium	-- - --	7 / 7	2.90	61.7	CAPL-SSD81-1012	26.6	23.3	43.7	43.4	2 / 7	1.42	1.01	0.61	--	-- / --	--	--	--	15.9	4 / 7	3.88	NO
Copper	-- - --	7 / 7	2.70	42.5	CAPL-SSD82-1012	14.3	13.9	24.5	31.6	1 / 7	1.34	0.77	0.45	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.40 - 1.70	0 / 7	--	--	--	0.46	0.20	0.61	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	7 / 7	3,610	51,400	CAPL-SSD81-1012	20,583	17,647	33,544	20,000	4 / 7	2.57	1.68	1.03	--	-- / --	--	--	--	11,300	4 / 7	4.55	YES
Lead	-- - --	7 / 7	6.40	42.1	CAPL-SSD82-1012	19.8	11.5	28.2	35.8	1 / 7	1.18	0.79	0.55	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.17 - 0.20	5 / 7	0.048	0.096	CAPL-SSD82-1012	0.074	0.022	0.090	0.18	0 / 7	0.53	0.50	0.41	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	7 / 7	1.30	26.1	CAPL-SSD81-1012	10.9	9.43	17.8	22.7	1 / 7	1.15	0.78	0.48	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	0.82 - 5.43	0 / 7	--	--	--	1.72	0.71	2.24	2.00	-- / --	2.72	1.12	0.86	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	7 / 7	4.40	76.9	CAPL-SSD81-1012	35.8	30.7	58.4	57.0	2 / 7	1.35	1.02	0.63	--	-- / --	--	--	--	20.4	4 / 7	3.77	NO
Zinc	-- - --	7 / 7	10.0	101	CAPL-SSD82-1012	61.6	33.9	86.5	121	0 / 7	0.83	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	7 / 7	7.16	7.53	CAPL-SSD68-1012	7.32	0.12	7.41	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	7 / 7	30,900	136,000	CAPL-SSD82-1012	65,786	38,399	93,988	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV
2 - Shaded cells indicate hazard quotient based on reporting limits

Table D-94A
Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - All Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	1.48E-01	9.38E-02	5.94E-02	5.24E-02	3.31E-02	2.10E-02	9.34E-02	5.91E-02	3.74E-02	8.52E-03	5.39E-03	3.41E-03	3.33E-01	1.92E-01	1.11E-01	1.06E-01	8.39E-02	6.64E-02	2.65E+00	1.18E+00	5.29E-01	3.22E-01	2.55E-01	2.02E-01
Cadmium	5.54E-02	2.48E-02	1.11E-02	1.84E-02	8.24E-03	3.68E-03	1.38E-01	6.18E-02	2.77E-02	5.55E-03	2.48E-03	1.11E-03	6.28E-02	2.81E-02	1.26E-02	1.45E-02	4.60E-03	1.45E-03	2.70E-01	8.54E-02	2.70E-02	7.09E-02	2.24E-02	7.09E-03
Chromium	5.20E-01	2.33E-01	1.04E-01	2.06E-01	9.21E-02	4.12E-02	4.61E-01	2.06E-01	9.21E-02	1.02E-01	4.57E-02	2.04E-02	2.41E-01	1.08E-01	4.83E-02	1.26E-01	5.62E-02	2.51E-02	6.58E-01	2.94E-01	1.32E-01	2.04E-01	9.13E-02	4.09E-02
Copper	6.61E+01	3.82E+01	2.21E+01	1.20E-01	6.97E-02	4.03E-02	2.47E+01	1.43E+01	8.27E+00	6.71E-02	3.88E-02	2.25E-02	1.50E+02	8.68E+01	5.02E+01	2.38E-02	2.10E-02	1.84E-02	2.20E+00	1.71E+00	1.32E+00	9.43E+00	8.30E+00	7.30E+00
Lead	4.15E-01	1.86E-01	8.31E-02	1.42E-01	6.33E-02	2.83E-02	2.93E+00	2.07E+00	1.47E+00	3.53E-03	1.58E-03	7.05E-04	4.97E-01	2.22E-01	9.94E-02	4.42E-02	3.21E-02	2.33E-02	1.97E+00	1.43E+00	1.04E+00	6.33E-01	4.60E-01	3.35E-01
Mercury	6.29E+00	3.63E+00	2.10E+00	3.52E-01	2.03E-01	1.17E-01	3.92E+00	2.26E+00	1.31E+00	3.02E-02	1.93E-02	1.23E-02	1.25E+01	7.20E+00	4.16E+00	3.88E-02	3.02E-02	2.36E-02	1.76E+00	7.89E-01	3.53E-01	4.50E-01	3.50E-01	2.73E-01
Nickel	2.18E-01	9.73E-02	4.35E-02	3.17E-02	1.42E-02	6.34E-03	5.64E-01	2.52E-01	1.13E-01	2.02E-02	9.02E-03	4.03E-03	3.38E-01	1.51E-01	6.75E-02	7.49E-02	5.30E-02	3.75E-02	3.85E+00	2.72E+00	1.93E+00	1.29E+00	9.14E-01	6.46E-01
Selenium	1.53E-01	6.86E-02	3.07E-02	5.32E-02	2.38E-02	1.06E-02	3.17E-01	2.24E-01	1.59E-01	2.51E-02	1.12E-02	5.02E-03	3.45E-01	2.44E-01	1.72E-01	2.95E-01	2.29E-01	1.79E-01	5.36E-01	4.18E-01	3.25E-01	2.24E-01	1.75E-01	1.36E-01
Silver	2.64E-03	1.18E-03	5.28E-04	7.13E-04	3.19E-04	1.43E-04	1.26E-03	5.65E-04	2.53E-04	6.81E-04	3.05E-04	1.36E-04	1.81E-03	8.08E-04	3.61E-04	1.71E-04	7.64E-05	3.42E-05	5.67E-04	2.54E-04	1.13E-04	2.63E-04	1.18E-04	5.26E-05
Zinc	5.49E-01	2.45E-01	1.10E-01	1.53E-01	6.83E-02	3.05E-02	8.36E-01	3.74E-01	1.67E-01	9.69E-02	4.33E-02	1.94E-02	2.45E-01	1.10E-01	4.91E-02	1.06E-01	4.73E-02	2.11E-02	8.74E-01	3.91E-01	1.75E-01	2.23E-01	9.96E-02	4.46E-02
Polychlorinated Biphenyls																								
Aroclor-1260	9.67E+00	4.32E+00	1.93E+00	2.85E+00	1.27E+00	5.69E-01	8.26E-01	3.69E-01	1.65E-01	2.05E+00	9.18E-01	4.11E-01	2.77E+01	1.24E+01	5.54E+00	2.32E+01	1.04E+01	4.64E+00	2.30E+00	1.03E+00	4.60E-01	9.96E+00	4.45E+00	1.99E+00
PCB (total)	3.79E+00	1.70E+00	7.59E-01	6.50E-01	2.91E-01	1.30E-01	8.63E-01	3.86E-01	1.73E-01	3.24E+00	1.45E+00	6.49E-01	2.77E+01	1.24E+01	5.54E+00	5.63E+00	2.52E+00	1.13E+00	2.68E+00	1.20E+00	5.35E-01	9.20E+00	4.12E+00	1.84E+00
Pesticides																								
4,4'-DDD	3.68E-02	1.16E-02	3.68E-03	7.76E-03	2.45E-03	7.76E-04	1.50E-02	6.69E-03	2.99E-03	8.21E-03	2.60E-03	8.21E-04	4.57E-02	2.04E-02	9.14E-03	1.61E-02	7.18E-03	3.21E-03	7.73E-03	3.46E-03	1.55E-03	8.63E-03	3.86E-03	1.73E-03
4,4'-DDE	1.62E-01	5.14E-02	1.62E-02	3.41E-02	1.08E-02	3.41E-03	5.61E-02	2.51E-02	1.12E-02	8.77E-02	2.77E-02	8.77E-03	1.98E-01	8.84E-02	3.95E-02	7.13E-02	3.19E-02	1.43E-02	2.70E-02	1.21E-02	5.40E-03	3.65E-02	1.63E-02	7.30E-03
4,4'-DDT	9.76E-02	3.09E-02	9.76E-03	1.85E-02	5.85E-03	1.85E-03	2.42E-02	1.53E-02	9.67E-03	2.44E-02	7.73E-03	2.44E-03	3.49E-02	2.21E-02	1.40E-02	3.74E-02	1.67E-02	7.47E-03	1.08E-01	4.83E-02	2.16E-02	5.10E-02	2.28E-02	1.02E-02
Aldrin	3.59E-02	1.61E-02	7.19E-03	1.01E-02	4.52E-03	2.02E-03	5.41E-04	2.42E-04	1.08E-04	3.13E-02	1.40E-02	6.27E-03	8.05E-04	3.60E-04	1.61E-04	7.54E-03	3.37E-03	1.51E-03	4.07E-04	1.82E-04	8.14E-05	4.58E-04	2.05E-04	9.17E-05
alpha-BHC	9.58E-03	4.78E-03	2.38E-03	2.47E-03	1.23E-03	6.15E-04	1.19E-03	5.92E-04	2.95E-04	8.67E-03	4.33E-03	2.16E-03	3.84E-04	1.92E-04	9.56E-05	9.01E-04	6.37E-04	4.50E-04	3.73E-04	2.64E-04	1.86E-04	1.06E-04	7.53E-05	5.32E-05
alpha-Chlordane	8.93E-03	3.99E-03	1.79E-03	1.96E-03	8.75E-04	3.91E-04	1.47E-03	6.59E-04	2.94E-04	6.04E-03	2.70E-03	1.21E-03	1.73E-03	7.73E-04	3.46E-04	3.29E-04	2.33E-04	1.65E-04	1.61E-04	1.14E-04	8.04E-05	1.86E-04	1.32E-04	9.30E-05
beta-BHC	3.31E-03	1.65E-03	8.23E-04	1.21E-03	6.04E-04	3.01E-04	2.45E-03	1.22E-03	6.10E-04	8.66E-03	4.32E-03	2.15E-03	7.95E-04	3.96E-04	1.98E-04	2.83E-04	2.00E-04	1.42E-04	7.70E-04	5.44E-04	3.85E-04	1.74E-04	1.23E-04	8.70E-05
delta-BHC	9.98E-03	4.98E-03	2.48E-03	2.80E-03	1.39E-03	6.96E-04	7.10E-04	3.54E-04	1.77E-04	8.63E-03	4.30E-03	2.15E-03	2.99E-04	1.49E-04	7.43E-05	9.43E-04	6.67E-04	4.71E-04	2.23E-04	1.57E-04	1.11E-04	8.41E-05	5.95E-05	4.20E-05
Dieldrin	9.24E-01	1.27E-01	1.73E-02	2.19E-02	3.00E-03	4.10E-04	1.10E+00	1.50E-01	2.06E-02	6.85E-02	9.38E-03	1.28E-03	1.93E+00	2.64E-01	3.62E-02	1.00E-01	7.09E-02	5.01E-02	3.60E+00	2.54E+00	1.80E+00	2.13E+00	1.51E+00	1.07E+00
Endosulfan I	5.64E-04	2.52E-04	1.13E-04	1.57E-04	7.00E-05	3.13E-05	9.85E-04	4.41E-04	1.97E-04	4.86E-04	2.17E-04	9.71E-05	2.73E-05	1.22E-05	5.47E-06	1.01E-02	4.50E-03	2.01E-03	6.18E-02	2.76E-02	1.24E-02	9.54E-03	4.27E-03	1.91E-03
Endosulfan II	5.40E-04	2.41E-04	1.08E-04	1.39E-04	6.22E-05	2.78E-05	5.30E-04	2.37E-04	1.06E-04	4.86E-04	2.17E-04	9.71E-05	2.74E-05	1.23E-05	5.48E-06	9.62E-03	4.30E-03	1.92E-03	3.42E-02	1.53E-02	6.84E-03	5.82E-03	2.60E-03	1.16E-03
Endrin	1.77E-02	7.91E-03	3.54E-03	2.72E-03	1.22E-03	5.44E-04	3.06E-02	1.37E-02	6.13E-03	9.92E-02	4.44E-02	1.98E-02	1.90E-02	8.50E-03	3.80E-03	4.17E-03	1.86E-03	8.33E-04	4.59E-02	2.05E-02	9.17E-03	1.30E-02	5.82E-03	2.60E-03
gamma-BHC (Lindane)	1.34E-03	6.01E-04	2.69E-04	3.54E-04	1.58E-04	7.09E-05	5.33E-05	2.38E-05	1.07E-05	1.20E-03	5.39E-04	2.41E-04	3.32E-05	1.49E-05	6.65E-06	1.82E-04	8.13E-05	3.63E-05	2.28E-05	1.02E-05	4.57E-06	1.22E-05	5.45E-06	2.44E-06
gamma-Chlordane	3.25E-02	1.46E-02	6.51E-03	6.03E-03	2.70E-03	1.21E-03	5.61E-03	2.51E-03	1.12E-03	1.14E-02	5.08E-03	2.27E-03	7.75E-03	3.47E-03	1.55E-03	1.12E-03	7.92E-04	5.60E-04	5.11E-04	3.62E-04	2.56E-04	7.76E-04	5.49E-04	3.88E-04
Heptachlor	1.15E-02	5.14E-03	2.30E-03	3.26E-03	1.46E-03	6.52E-04	9.32E-05	4.17E-05	1.86E-05	1.01E-02	4.52E-03	2.02E-03	2.41E-05	1.08E-05	4.81E-06	7.54E-03	3.37E-03	1.51E-03	2.58E-04	1.15E-04	5.16E-05	3.24E-04	1.45E-04	6.49E-05
Heptachlor epoxide	1.13E-02	5.05E-03	2.26E-03	2.96E-03	1.32E-03	5.91E-04	1.24E-03	5.53E-04	2.47E-04	5.54E-03	2.48E-03	1.11E-03	4.75E-04	2.12E-04	9.50E-05	7.27E-03	3.25E-03	1.45E-03	2.82E-03	1.26E-03	5.65E-04	8.93E-04	3.99E-04	1.79E-04
Methoxychlor	8.70E-05	3.89E-05	1.74E-05	2.25E-05	1.01E-05	4.50E-06	1.60E-05	7.13E-06	3.19E-06	6.84E-05	3.06E-05	1.37E-05	1.77E-05	7.91E-06	3.54E-06	1.92E-03	1.36E-03	9.62E-04	1.19E-03	8.44E-04	5.97E-04	5.37E-04	3.80E-04	2.68E-04
Volatile/Semivolatile Organics																								
Acenaphthene	2.08E-03	9.32E-04	4.17E-04	2.90E-04	1.30E-04	5.80E-05	7.77E-04	3.48E-04	1.55E-04	3.34E-04	1.49E-04	6.68E-05	2.96E-03	1.32E-03	5.91E-04	2.34E-05	1.05E-05	4.67E-06	6.33E-05	2.83E-05	1.27E-05	7.43E-05	3.33E-05	1.49E-05
Acenaphthylene	1.52E-04	6.80E-05	3.04E-05	1.25E-05	5.61E-06	2.51E-06	2.79E-04	1.25E-04	5.58E-05	1.46E-05	6.52E-06	2.92E-06	2.72E-04	1.22E-04	5.44E-05	1.01E-06	4.53E-07	2.03E-07	2.56E-05	1.15E-05	5.12E-06	9.30E-06	4.16E-06	1.86E-06
Anthracene	1.63E-03	7.28E-04	3.26E-04	7.07E-05	3.16E-05	1.41E-05	2.54E-03	1.14E-03	5.08E-04	8.16E-05	3.65E-05	1.63E-05	3.28E-03	1.46E-03	6.55E-04	5.70E-06	2.55E-06	1.14E-06	2.26E-04	1.01E-04	4.51E-05	9.96E-05	4.45E-05	1.99E-05
Benzo(a)anthracene	8.15E-04	3.65E-04	1.63E-04	1.44E-04	6.43E-05	2.87E-05	6.73E-04	3.01E-04	1.35E-04	1.66E-04	7.41E-05	3.31E-05	9.67E-04	4.33E-04	1.93E-04	1.24E-03	5.53E-04	2.48E-04	7.79E-03	3.49E-03	1.56E-03	3.68E-03	1.65E-03	7.37E-04
Benzo(a)pyrene	1.94E-03	8.68E-04	3.88E-04	2.22E-05	9.93E-06	4.44E-06	1.39E-03	6.23E-04	2.78E-04	2.57E-05	1.15E-05	5.14E-06	4.29E-03	1.92E-03	8.58E-04	1.91E-04	8.55E-05	3.83E-05	1.07E-02	4.80E-03	2.15E-03	1.10E-02	4.92E-03	2.20E-03
Benzo(b)fluoranthene	1.43E-03	6.39E-04	2.86E-04	4.71E-05	2.11E-05	9.42E-06	4.83E-03	2.16E-03	9.65E-04	5.43E-05	2.43E-05	1.09E-05	2.96E-03	1.33E-03	5.93E-04	4.05E-04	1.81E-04	8.12E-05	5.18E-02	2.32E-02	1.04E-02	1.45E-02	6.51E-03	2.91E-03
Benzo(g,h,i)perylene	9.23E-04	4.13E-04	1.85E-04	2.37E-04	1.06E-04	4.74E-05	1.09E-03	4.88E-04	2.18E-04	2.73E-04	1.22E-04	5.47E-05	6.34E-04	2.84E-04	1.27E-04	2.04E-03	9.13E-04	4.09E-04	1.25E-02	5.60E-03	2.51E-03	3.61E-03	1.62E-03	7.23E-04
Benzo(k)fluoranthene	7.00E-04	3.13E-04	1.40E-04	2.49E-05	1.11E-05	4.98E-06	1.05E-03	4.70E-04	2.10E-04	2.88E-05	1.29E-05	5.76E-06	1.44E-03	6.45E-04	2.88E-04	2.14E-04	9.59E-05	4.29E-05	1.20E-02	5.38E-03	2.41E-03	5.44E-03	2.44E-03	1.09E-03
Chrysene	1.47E-03	6.58E-04	2.94E-04	1.93E-04	8.64E-05	3.87E-05	1.14E-03	5.11E-04	2.29E-04	2.23E-04	9.96E-05	4.45E-05	2.15E-03	9.63E-04	4.31E-04	1.66E-03	7.44E-04	3.33E-04	1.28E-02	5.73E-03	2.56E-03	7.31E-03	3.27E-03	1.47E-03
Dibenz(a,h)anthracene	8.69E-05	3.89E-05	1.74E-05	5.97E-06	2.67E-06	1.19E-06	3.10E-04	1.39E-04	6.20E-05	6.99E-06	3.12E-06	1.40E-06	1.64E-04	7.32E-05	3.27E-05	5.15E-05	2.30E-05	1.03E-05	3.74E-03	1.67E-03	7.49E-04	1.04E-03	4.65E-04	2.08E-04
Fluoranthene	1.01E-03	4.50E-04	2.01E-04	9.58E-05	4.29E-05	1.92E-05	3.35E-02	1.50E-02	6.69E-03	1.11E-04	4.95E-05	2.21E-05	1.70E-03	7.61E-04	3.40E-04	7.73E-06	3.46E-06	1.55E-06	3.32E-03	1.48E-03	6.63E-04	4.89E-04	2.18E-04	9.77E-05

Table D-94A
Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - All Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Fluorene	4.16E-03	1.86E-03	8.33E-04	7.12E-04	3.19E-04	1.42E-04	1.10E-03	4.90E-04	2.19E-04	8.21E-04	3.67E-04	1.64E-04	5.07E-03	2.27E-03	1.01E-03	5.74E-05	2.57E-05	1.15E-05	5.79E-05	2.59E-05	1.16E-05	1.14E-04	5.11E-05	2.28E-05
Indeno(1,2,3-cd)pyrene	7.77E-04	3.48E-04	1.55E-04	1.91E-04	8.56E-05	3.83E-05	7.31E-04	3.27E-04	1.46E-04	2.21E-04	9.86E-05	4.41E-05	5.85E-04	2.62E-04	1.17E-04	1.65E-03	7.37E-04	3.30E-04	9.10E-03	4.07E-03	1.82E-03	3.12E-03	1.40E-03	6.24E-04
Phenanthrene	5.63E-03	2.52E-03	1.13E-03	1.19E-03	5.33E-04	2.39E-04	1.31E-02	5.85E-03	2.62E-03	1.37E-03	6.15E-04	2.75E-04	5.44E-03	2.43E-03	1.09E-03	9.62E-05	4.30E-05	1.92E-05	1.29E-03	5.79E-04	2.59E-04	3.05E-04	1.36E-04	6.10E-05
Pyrene	9.90E-03	4.43E-03	1.98E-03	5.76E-04	2.58E-04	1.15E-04	2.45E-02	1.10E-02	4.91E-03	6.64E-04	2.97E-04	1.33E-04	1.90E-02	8.49E-03	3.80E-03	4.96E-03	2.22E-03	9.93E-04	2.33E-01	1.04E-01	4.67E-02	7.17E-02	3.21E-02	1.44E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	2.26E+00	7.15E-01	2.26E-01	9.39E-01	2.97E-01	9.39E-02	0.00E+00	0.00E+00	0.00E+00	6.82E-01	2.16E-01	6.82E-02	0.00E+00	0.00E+00	0.00E+00	7.22E+00	2.28E+00	7.22E-01	0.00E+00	0.00E+00	0.00E+00	3.87E-01	1.22E-01	3.87E-02

Table D-94B
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - 95% UCL - All Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	4.13E-02	2.61E-02	1.65E-02	1.80E-02	1.14E-02	7.19E-03	1.88E-02	1.19E-02	7.54E-03	6.01E-03	3.80E-03	2.41E-03	1.05E-01	6.05E-02	3.49E-02	3.39E-02	2.68E-02	2.12E-02	5.93E-01	2.65E-01	1.19E-01	8.40E-02	6.65E-02	5.26E-02
Copper	4.03E-01	2.33E-01	1.35E-01	7.50E-02	4.34E-02	2.51E-02	2.18E-01	1.26E-01	7.31E-02	2.51E-02	1.45E-02	8.39E-03	7.45E-01	4.31E-01	2.49E-01	1.08E-02	9.49E-03	8.35E-03	1.57E-01	1.21E-01	9.39E-02	5.95E-02	5.23E-02	4.60E-02
Lead	5.38E-02	2.41E-02	1.08E-02	2.50E-02	1.12E-02	4.99E-03	1.94E-01	1.37E-01	9.68E-02	1.32E-03	5.89E-04	2.64E-04	7.18E-02	3.21E-02	1.44E-02	6.57E-03	4.77E-03	3.47E-03	1.28E-01	9.30E-02	6.76E-02	4.72E-02	3.43E-02	2.49E-02
Mercury	5.65E-01	3.26E-01	1.88E-01	2.50E-01	1.44E-01	8.32E-02	2.89E-01	1.67E-01	9.63E-02	2.13E-02	1.36E-02	8.71E-03	3.99E-01	2.30E-01	1.33E-01	2.32E-02	1.80E-02	1.41E-02	2.42E-01	1.08E-01	4.84E-02	2.10E-02	1.64E-02	1.28E-02
Nickel	3.41E-02	1.53E-02	6.83E-03	1.43E-02	6.39E-03	2.86E-03	2.32E-02	1.04E-02	4.63E-03	7.54E-03	3.37E-03	1.51E-03	3.27E-02	1.46E-02	6.55E-03	2.71E-02	1.92E-02	1.36E-02	1.58E-01	1.12E-01	7.88E-02	6.70E-02	4.74E-02	3.35E-02
Polychlorinated Biphenyls																								
Aroclor-1260	6.16E-01	2.76E-01	1.23E-01	2.84E-01	1.27E-01	5.67E-02	3.20E-02	1.43E-02	6.41E-03	1.45E+00	6.48E-01	2.90E-01	2.22E+00	9.94E-01	4.45E-01	1.89E+00	8.46E-01	3.78E-01	1.32E-01	5.89E-02	2.63E-02	5.26E-01	2.35E-01	1.05E-01
PCB (total)	7.16E-01	3.20E-01	1.43E-01	3.06E-01	1.37E-01	6.12E-02	3.38E-02	1.51E-02	6.76E-03	2.29E+00	1.02E+00	4.58E-01	2.22E+00	9.94E-01	4.45E-01	2.26E+00	1.01E+00	4.52E-01	1.53E-01	6.85E-02	3.06E-02	5.34E-01	2.39E-01	1.07E-01
Pesticides																								
Dieldrin	7.03E-02	9.62E-03	1.32E-03	9.38E-03	1.28E-03	1.76E-04	2.18E-02	2.98E-03	4.09E-04	3.06E-02	4.19E-03	5.73E-04	1.19E-01	1.63E-02	2.23E-03	3.29E-02	2.33E-02	1.64E-02	5.80E-02	4.10E-02	2.90E-02	1.03E-01	7.26E-02	5.14E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	8.31E-01	2.63E-01	8.31E-02	4.73E-01	1.50E-01	4.73E-02	0.00E+00	0.00E+00	0.00E+00	4.81E-01	1.52E-01	4.81E-02	0.00E+00	0.00E+00	0.00E+00	2.91E+00	9.21E-01	2.91E-01	0.00E+00	0.00E+00	0.00E+00	1.16E-01	3.66E-02	1.16E-02

Table D-94C
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - Mean - All Samples
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	3.01E-02	1.90E-02	1.20E-02	9.21E-03	5.83E-03	3.69E-03	1.64E-02	1.04E-02	6.55E-03	4.10E-03	2.60E-03	1.64E-03	9.15E-02	5.28E-02	3.05E-02	1.97E-02	1.56E-02	1.23E-02	5.05E-01	2.26E-01	1.01E-01	7.14E-02	5.65E-02	4.47E-02
Copper	2.58E-01	1.49E-01	8.62E-02	6.17E-02	3.57E-02	2.07E-02	1.51E-01	8.75E-02	5.06E-02	2.12E-02	1.23E-02	7.09E-03	4.30E-01	2.49E-01	1.44E-01	9.17E-03	8.06E-03	7.09E-03	1.11E-01	8.57E-02	6.64E-02	3.59E-02	3.16E-02	2.78E-02
Lead	3.57E-02	1.60E-02	7.14E-03	1.23E-02	5.50E-03	2.46E-03	1.47E-01	1.04E-01	7.33E-02	1.11E-03	4.98E-04	2.23E-04	5.67E-02	2.54E-02	1.13E-02	3.33E-03	2.42E-03	1.76E-03	9.31E-02	6.77E-02	4.92E-02	3.43E-02	2.49E-02	1.81E-02
Mercury	4.46E-01	2.58E-01	1.49E-01	2.11E-01	1.22E-01	7.04E-02	2.38E-01	1.37E-01	7.92E-02	1.96E-02	1.25E-02	8.00E-03	2.92E-01	1.68E-01	9.72E-02	1.89E-02	1.47E-02	1.15E-02	2.01E-01	8.98E-02	4.02E-02	1.62E-02	1.26E-02	9.85E-03
Nickel	2.55E-02	1.14E-02	5.10E-03	1.08E-02	4.83E-03	2.16E-03	1.35E-02	6.06E-03	2.71E-03	6.37E-03	2.85E-03	1.27E-03	2.10E-02	9.37E-03	4.19E-03	2.22E-02	1.57E-02	1.11E-02	8.73E-02	6.17E-02	4.36E-02	3.86E-02	2.73E-02	1.93E-02
Polychlorinated Biphenyls																								
Aroclor-1260	4.32E-01	1.93E-01	8.63E-02	2.00E-01	8.94E-02	4.00E-02	2.19E-02	9.80E-03	4.38E-03	9.01E-01	4.03E-01	1.80E-01	1.60E+00	7.16E-01	3.20E-01	1.33E+00	5.96E-01	2.67E-01	9.29E-02	4.15E-02	1.86E-02	3.59E-01	1.61E-01	7.18E-02
PCB (total)	3.88E-01	1.74E-01	7.76E-02	1.62E-01	7.24E-02	3.24E-02	2.32E-02	1.04E-02	4.63E-03	1.26E+00	5.61E-01	2.51E-01	1.60E+00	7.16E-01	3.20E-01	1.17E+00	5.25E-01	2.35E-01	1.08E-01	4.83E-02	2.16E-02	3.52E-01	1.58E-01	7.04E-02
Pesticides																								
Dieldrin	4.47E-02	6.12E-03	8.38E-04	6.75E-03	9.24E-04	1.27E-04	1.33E-02	1.82E-03	2.49E-04	1.70E-02	2.33E-03	3.19E-04	7.25E-02	9.93E-03	1.36E-03	2.31E-02	1.63E-02	1.15E-02	3.53E-02	2.50E-02	1.76E-02	6.26E-02	4.43E-02	3.13E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	4.67E-01	1.48E-01	4.67E-02	2.67E-01	8.45E-02	2.67E-02	0.00E+00	0.00E+00	0.00E+00	2.22E-01	7.02E-02	2.22E-02	0.00E+00	0.00E+00	0.00E+00	1.42E+00	4.49E-01	1.42E-01	0.00E+00	0.00E+00	0.00E+00	6.00E-02	1.90E-02	6.00E-03

Table D-95A
Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Group 1
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	1.33E-01	8.41E-02	5.32E-02	5.24E-02	3.31E-02	2.10E-02	7.16E-02	4.53E-02	2.87E-02	8.52E-03	5.39E-03	3.41E-03	2.60E-01	1.50E-01	8.66E-02	1.06E-01	8.39E-02	6.64E-02	1.96E+00	8.76E-01	3.92E-01	2.44E-01	1.93E-01	1.53E-01
Copper	6.61E+01	3.82E+01	2.21E+01	1.20E-01	6.97E-02	4.03E-02	2.47E+01	1.43E+01	8.27E+00	6.71E-02	3.88E-02	2.25E-02	1.50E+02	8.68E+01	5.02E+01	2.38E-02	2.10E-02	1.84E-02	2.20E+00	1.71E+00	1.32E+00	9.43E+00	8.30E+00	7.30E+00
Lead	4.15E-01	1.86E-01	8.31E-02	1.42E-01	6.33E-02	2.83E-02	2.93E+00	2.07E+00	1.47E+00	3.53E-03	1.58E-03	7.05E-04	4.97E-01	2.22E-01	9.94E-02	4.42E-02	3.21E-02	2.33E-02	1.97E+00	1.43E+00	1.04E+00	6.33E-01	4.60E-01	3.35E-01
Mercury	1.89E+00	1.09E+00	6.30E-01	3.52E-01	2.03E-01	1.17E-01	1.15E+00	6.66E-01	3.85E-01	3.02E-02	1.93E-02	1.23E-02	2.44E+00	1.41E+00	8.15E-01	3.88E-02	3.02E-02	2.36E-02	6.32E-01	2.83E-01	1.26E-01	9.80E-02	7.64E-02	5.95E-02
Nickel	2.18E-01	9.73E-02	4.35E-02	3.17E-02	1.42E-02	6.34E-03	5.64E-01	2.52E-01	1.13E-01	2.02E-02	9.02E-03	4.03E-03	3.38E-01	1.51E-01	6.75E-02	7.49E-02	5.30E-02	3.75E-02	3.85E+00	2.72E+00	1.93E+00	1.29E+00	9.14E-01	6.46E-01
Polychlorinated Biphenyls																								
Aroclor-1260	1.07E+01	4.80E+00	2.15E+00	3.24E+00	1.45E+00	6.47E-01	8.26E-01	3.69E-01	1.65E-01	2.05E+00	9.18E-01	4.11E-01	2.77E+01	1.24E+01	5.54E+00	2.64E+01	1.18E+01	5.28E+00	2.30E+00	1.03E+00	4.60E-01	1.01E+01	4.52E+00	2.02E+00
PCB (total)	3.79E+00	1.70E+00	7.59E-01	6.50E-01	2.91E-01	1.30E-01	8.63E-01	3.86E-01	1.73E-01	3.24E+00	1.45E+00	6.49E-01	2.77E+01	1.24E+01	5.54E+00	5.63E+00	2.52E+00	1.13E+00	2.68E+00	1.20E+00	5.35E-01	9.20E+00	4.12E+00	1.84E+00
Pesticides																								
Dieldrin	9.24E-01	1.27E-01	1.73E-02	2.19E-02	3.00E-03	4.10E-04	1.10E+00	1.50E-01	2.06E-02	6.85E-02	9.38E-03	1.28E-03	1.93E+00	2.64E-01	3.62E-02	1.00E-01	7.09E-02	5.01E-02	3.60E+00	2.54E+00	1.80E+00	2.13E+00	1.51E+00	1.07E+00
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	2.26E+00	7.15E-01	2.26E-01	9.39E-01	2.97E-01	9.39E-02	0.00E+00	0.00E+00	0.00E+00	6.82E-01	2.16E-01	6.82E-02	0.00E+00	0.00E+00	0.00E+00	7.22E+00	2.28E+00	7.22E-01	0.00E+00	0.00E+00	0.00E+00	3.87E-01	1.22E-01	3.87E-02

Table D-95B
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 1
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	3.62E-02	2.29E-02	1.45E-02	1.80E-02	1.14E-02	7.19E-03	1.42E-02	8.95E-03	5.67E-03	6.01E-03	3.80E-03	2.41E-03	7.94E-02	4.58E-02	2.65E-02	3.39E-02	2.68E-02	2.12E-02	4.28E-01	1.91E-01	8.55E-02	6.20E-02	4.90E-02	3.88E-02
Copper	9.07E-01	5.25E-01	3.04E-01	7.50E-02	4.34E-02	2.51E-02	4.44E-01	2.57E-01	1.49E-01	2.51E-02	1.45E-02	8.39E-03	1.96E+00	1.13E+00	6.56E-01	1.08E-02	9.49E-03	8.35E-03	3.07E-01	2.38E-01	1.84E-01	1.48E-01	1.30E-01	1.14E-01
Lead	7.50E-02	3.35E-02	1.50E-02	2.50E-02	1.12E-02	4.99E-03	3.71E-01	2.62E-01	1.86E-01	1.32E-03	5.89E-04	2.64E-04	1.23E-01	5.49E-02	2.46E-02	6.57E-03	4.77E-03	3.47E-03	2.68E-01	1.95E-01	1.42E-01	9.79E-02	7.12E-02	5.17E-02
Mercury	5.08E-01	2.93E-01	1.69E-01	2.50E-01	1.44E-01	8.32E-02	2.22E-01	1.28E-01	7.41E-02	2.13E-02	1.36E-02	8.71E-03	2.62E-01	1.51E-01	8.72E-02	2.32E-02	1.80E-02	1.41E-02	1.88E-01	8.42E-02	3.77E-02	1.50E-02	1.17E-02	9.14E-03
Nickel	4.88E-02	2.18E-02	9.76E-03	1.43E-02	6.39E-03	2.86E-03	5.68E-02	2.54E-02	1.14E-02	7.54E-03	3.37E-03	1.51E-03	6.80E-02	3.04E-02	1.36E-02	2.71E-02	1.92E-02	1.36E-02	4.21E-01	2.98E-01	2.11E-01	1.69E-01	1.19E-01	8.43E-02
Polychlorinated Biphenyls																								
Aroclor-1260	2.37E+00	1.06E+00	4.73E-01	1.09E+00	4.86E-01	2.18E-01	1.20E-01	5.37E-02	2.40E-02	1.45E+00	6.48E-01	2.90E-01	6.96E+00	3.11E+00	1.39E+00	7.25E+00	3.24E+00	1.45E+00	4.44E-01	1.99E-01	8.89E-02	2.01E+00	8.99E-01	4.02E-01
PCB (total)	1.00E+00	4.49E-01	2.01E-01	3.06E-01	1.37E-01	6.12E-02	1.26E-01	5.63E-02	2.52E-02	2.29E+00	1.02E+00	4.58E-01	6.96E+00	3.11E+00	1.39E+00	2.26E+00	1.01E+00	4.52E-01	5.17E-01	2.31E-01	1.03E-01	1.84E+00	8.21E-01	3.67E-01
Pesticides																								
Dieldrin	1.61E-01	2.21E-02	3.02E-03	9.38E-03	1.28E-03	1.76E-04	6.18E-02	8.47E-03	1.16E-03	3.06E-02	4.19E-03	5.73E-04	3.38E-01	4.63E-02	6.34E-03	3.29E-02	2.33E-02	1.64E-02	1.64E-01	1.16E-01	8.22E-02	2.90E-01	2.05E-01	1.45E-01
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	8.31E-01	2.63E-01	8.31E-02	4.73E-01	1.50E-01	4.73E-02	0.00E+00	0.00E+00	0.00E+00	4.81E-01	1.52E-01	4.81E-02	0.00E+00	0.00E+00	0.00E+00	2.91E+00	9.21E-01	2.91E-01	0.00E+00	0.00E+00	0.00E+00	1.16E-01	3.66E-02	1.16E-02

Table D-95C
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - Mean - Group 1
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	2.36E-02	1.49E-02	9.45E-03	9.21E-03	5.83E-03	3.69E-03	1.05E-02	6.63E-03	4.19E-03	4.10E-03	2.60E-03	1.64E-03	5.90E-02	3.40E-02	1.97E-02	1.97E-02	1.56E-02	1.23E-02	3.03E-01	1.36E-01	6.07E-02	4.41E-02	3.49E-02	2.76E-02
Copper	4.37E-01	2.53E-01	1.46E-01	6.17E-02	3.57E-02	2.07E-02	2.41E-01	1.40E-01	8.08E-02	2.12E-02	1.23E-02	7.09E-03	8.61E-01	4.98E-01	2.88E-01	9.17E-03	8.06E-03	7.09E-03	1.72E-01	1.33E-01	1.03E-01	6.79E-02	5.97E-02	5.25E-02
Lead	4.68E-02	2.09E-02	9.36E-03	1.23E-02	5.50E-03	2.46E-03	2.31E-01	1.64E-01	1.16E-01	1.11E-03	4.98E-04	2.23E-04	8.34E-02	3.73E-02	1.67E-02	3.33E-03	2.42E-03	1.76E-03	1.57E-01	1.14E-01	8.28E-02	5.75E-02	4.18E-02	3.03E-02
Mercury	3.98E-01	2.30E-01	1.33E-01	2.11E-01	1.22E-01	7.04E-02	1.74E-01	1.00E-01	5.79E-02	1.96E-02	1.25E-02	8.00E-03	1.75E-01	1.01E-01	5.82E-02	1.89E-02	1.47E-02	1.15E-02	1.49E-01	6.65E-02	2.97E-02	1.10E-02	8.53E-03	6.65E-03
Nickel	3.24E-02	1.45E-02	6.47E-03	1.08E-02	4.83E-03	2.16E-03	2.73E-02	1.22E-02	5.46E-03	6.37E-03	2.85E-03	1.27E-03	3.75E-02	1.68E-02	7.49E-03	2.22E-02	1.57E-02	1.11E-02	1.89E-01	1.34E-01	9.44E-02	7.89E-02	5.58E-02	3.95E-02
Polychlorinated Biphenyls																								
Aroclor-1260	1.60E+00	7.18E-01	3.21E-01	7.43E-01	3.32E-01	1.49E-01	7.93E-02	3.55E-02	1.59E-02	9.01E-01	4.03E-01	1.80E-01	4.87E+00	2.18E+00	9.73E-01	4.95E+00	2.21E+00	9.90E-01	3.03E-01	1.36E-01	6.07E-02	1.33E+00	5.93E-01	2.65E-01
PCB (total)	5.73E-01	2.56E-01	1.15E-01	1.62E-01	7.24E-02	3.24E-02	8.33E-02	3.73E-02	1.67E-02	1.26E+00	5.61E-01	2.51E-01	4.87E+00	2.18E+00	9.73E-01	1.17E+00	5.25E-01	2.35E-01	3.53E-01	1.58E-01	7.06E-02	1.20E+00	5.35E-01	2.39E-01
Pesticides																								
Dieldrin	9.50E-02	1.30E-02	1.78E-03	6.75E-03	9.24E-04	1.27E-04	3.54E-02	4.85E-03	6.64E-04	1.70E-02	2.33E-03	3.19E-04	1.94E-01	2.65E-02	3.63E-03	2.31E-02	1.63E-02	1.15E-02	9.42E-02	6.66E-02	4.71E-02	1.66E-01	1.17E-01	8.30E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	4.67E-01	1.48E-01	4.67E-02	2.67E-01	8.45E-02	2.67E-02	0.00E+00	0.00E+00	0.00E+00	2.22E-01	7.02E-02	2.22E-02	0.00E+00	0.00E+00	0.00E+00	1.42E+00	4.49E-01	1.42E-01	0.00E+00	0.00E+00	0.00E+00	6.00E-02	1.90E-02	6.00E-03

Table D-96A
Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Group 2
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	1.22E-01	7.75E-02	4.90E-02	5.24E-02	3.31E-02	2.10E-02	5.71E-02	3.61E-02	2.29E-02	8.52E-03	5.39E-03	3.41E-03	2.10E-01	1.21E-01	6.99E-02	1.06E-01	8.39E-02	6.64E-02	1.51E+00	6.77E-01	3.03E-01	1.93E-01	1.53E-01	1.21E-01
Copper	3.39E+00	1.96E+00	1.14E+00	1.20E-01	6.97E-02	4.03E-02	1.37E+00	7.91E-01	4.58E-01	6.71E-02	3.88E-02	2.25E-02	7.16E+00	4.14E+00	2.40E+00	2.38E-02	2.10E-02	1.84E-02	2.29E-01	1.78E-01	1.38E-01	4.59E-01	4.04E-01	3.55E-01
Lead	2.58E-01	1.16E-01	5.17E-02	1.42E-01	6.33E-02	2.83E-02	5.81E-01	4.11E-01	2.90E-01	3.53E-03	1.58E-03	7.05E-04	1.39E-01	6.21E-02	2.78E-02	4.42E-02	3.21E-02	2.33E-02	3.24E-01	2.35E-01	1.71E-01	1.09E-01	7.92E-02	5.76E-02
Mercury	1.56E+00	9.00E-01	5.19E-01	3.52E-01	2.03E-01	1.17E-01	8.90E-01	5.14E-01	2.97E-01	3.02E-02	1.93E-02	1.23E-02	1.69E+00	9.74E-01	5.62E-01	3.88E-02	3.02E-02	2.36E-02	5.05E-01	2.26E-01	1.01E-01	7.03E-02	5.47E-02	4.27E-02
Nickel	8.79E-02	3.93E-02	1.76E-02	3.17E-02	1.42E-02	6.34E-03	4.26E-02	1.91E-02	8.53E-03	2.02E-02	9.02E-03	4.03E-03	4.22E-02	1.89E-02	8.43E-03	7.49E-02	5.30E-02	3.75E-02	2.31E-01	1.63E-01	1.15E-01	9.13E-02	6.46E-02	4.57E-02
Polychlorinated Biphenyls																								
Aroclor-1260	6.32E-01	2.83E-01	1.26E-01	2.12E-01	9.47E-02	4.23E-02	2.60E-02	1.16E-02	5.20E-03	2.05E+00	9.18E-01	4.11E-01	1.39E+00	6.22E-01	2.78E-01	1.73E+00	7.72E-01	3.45E-01	9.55E-02	4.27E-02	1.91E-02	3.44E-01	1.54E-01	6.87E-02
PCB (total)	1.94E+00	8.66E-01	3.87E-01	6.50E-01	2.91E-01	1.30E-01	2.75E-02	1.23E-02	5.50E-03	3.24E+00	1.45E+00	6.49E-01	1.39E+00	6.22E-01	2.78E-01	5.63E+00	2.52E+00	1.13E+00	1.11E-01	4.95E-02	2.21E-02	5.06E-01	2.26E-01	1.01E-01
Pesticides																								
Dieldrin	1.33E-01	1.82E-02	2.49E-03	2.19E-02	3.00E-03	4.10E-04	7.18E-02	9.84E-03	1.35E-03	6.85E-02	9.38E-03	1.28E-03	1.26E-01	1.73E-02	2.37E-03	1.00E-01	7.09E-02	5.01E-02	2.35E-01	1.66E-01	1.18E-01	1.43E-01	1.01E-01	7.14E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	2.26E+00	7.15E-01	2.26E-01	9.39E-01	2.97E-01	9.39E-02	0.00E+00	0.00E+00	0.00E+00	6.82E-01	2.16E-01	6.82E-02	0.00E+00	0.00E+00	0.00E+00	7.22E+00	2.28E+00	7.22E-01	0.00E+00	0.00E+00	0.00E+00	3.87E-01	1.22E-01	3.87E-02

Table D-96B
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 2
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	4.27E-02	2.70E-02	1.71E-02	1.80E-02	1.14E-02	7.19E-03	2.02E-02	1.28E-02	8.09E-03	6.01E-03	3.80E-03	2.41E-03	1.12E-01	6.48E-02	3.74E-02	3.39E-02	2.68E-02	2.12E-02	6.42E-01	2.87E-01	1.28E-01	9.05E-02	7.16E-02	5.67E-02
Copper	2.29E-01	1.32E-01	7.66E-02	7.50E-02	4.34E-02	2.51E-02	1.27E-01	7.36E-02	4.26E-02	2.51E-02	1.45E-02	8.39E-03	3.26E-01	1.89E-01	1.09E-01	1.08E-02	9.49E-03	8.35E-03	9.41E-02	7.28E-02	5.64E-02	2.82E-02	2.48E-02	2.18E-02
Lead	5.31E-02	2.38E-02	1.06E-02	2.50E-02	1.12E-02	4.99E-03	1.89E-01	1.33E-01	9.43E-02	1.32E-03	5.89E-04	2.64E-04	7.03E-02	3.14E-02	1.41E-02	6.57E-03	4.77E-03	3.47E-03	1.24E-01	9.03E-02	6.56E-02	4.59E-02	3.33E-02	2.42E-02
Mercury	5.29E-01	3.06E-01	1.76E-01	2.50E-01	1.44E-01	8.32E-02	2.49E-01	1.44E-01	8.29E-02	2.13E-02	1.36E-02	8.71E-03	3.14E-01	1.81E-01	1.05E-01	2.32E-02	1.80E-02	1.41E-02	2.10E-01	9.38E-02	4.20E-02	1.73E-02	1.35E-02	1.05E-02
Nickel	2.91E-02	1.30E-02	5.81E-03	1.43E-02	6.39E-03	2.86E-03	1.32E-02	5.92E-03	2.65E-03	7.54E-03	3.37E-03	1.51E-03	2.05E-02	9.19E-03	4.11E-03	2.71E-02	1.92E-02	1.36E-02	8.50E-02	6.01E-02	4.25E-02	3.79E-02	2.68E-02	1.90E-02
Polychlorinated Biphenyls																								
Aroclor-1260	2.21E-01	9.88E-02	4.42E-02	1.11E-01	4.98E-02	2.23E-02	6.16E-03	2.76E-03	1.23E-03	1.45E+00	6.48E-01	2.90E-01	5.32E-01	2.38E-01	1.06E-01	7.42E-01	3.32E-01	1.48E-01	2.88E-02	1.29E-02	5.76E-03	1.12E-01	5.01E-02	2.24E-02
PCB (total)	6.35E-01	2.84E-01	1.27E-01	3.06E-01	1.37E-01	6.12E-02	6.54E-03	2.92E-03	1.31E-03	2.29E+00	1.02E+00	4.58E-01	5.32E-01	2.38E-01	1.06E-01	2.26E+00	1.01E+00	4.52E-01	3.34E-02	1.49E-02	6.68E-03	1.59E-01	7.10E-02	3.17E-02
Pesticides																								
Dieldrin	3.33E-02	4.57E-03	6.25E-04	9.38E-03	1.28E-03	1.76E-04	5.53E-03	7.57E-04	1.04E-04	3.06E-02	4.19E-03	5.73E-04	3.02E-02	4.14E-03	5.67E-04	3.29E-02	2.33E-02	1.64E-02	1.47E-02	1.04E-02	7.36E-03	2.68E-02	1.89E-02	1.34E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	8.31E-01	2.63E-01	8.31E-02	4.73E-01	1.50E-01	4.73E-02	0.00E+00	0.00E+00	0.00E+00	4.81E-01	1.52E-01	4.81E-02	0.00E+00	0.00E+00	0.00E+00	2.91E+00	9.21E-01	2.91E-01	0.00E+00	0.00E+00	0.00E+00	1.16E-01	3.66E-02	1.16E-02

Table D-96C
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - Mean - Group 2
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	2.66E-02	1.68E-02	1.06E-02	9.21E-03	5.83E-03	3.69E-03	1.32E-02	8.33E-03	5.27E-03	4.10E-03	2.60E-03	1.64E-03	7.39E-02	4.27E-02	2.46E-02	1.97E-02	1.56E-02	1.23E-02	3.94E-01	1.76E-01	7.87E-02	5.64E-02	4.47E-02	3.54E-02
Copper	1.44E-01	8.34E-02	4.82E-02	6.17E-02	3.57E-02	2.07E-02	8.27E-02	4.78E-02	2.77E-02	2.12E-02	1.23E-02	7.09E-03	1.56E-01	9.05E-02	5.23E-02	9.17E-03	8.06E-03	7.09E-03	6.25E-02	4.84E-02	3.75E-02	1.50E-02	1.32E-02	1.16E-02
Lead	3.10E-02	1.39E-02	6.20E-03	1.23E-02	5.50E-03	2.46E-03	1.14E-01	8.04E-02	5.69E-02	1.11E-03	4.98E-04	2.23E-04	4.54E-02	2.03E-02	9.09E-03	3.33E-03	2.42E-03	1.76E-03	6.94E-02	5.04E-02	3.67E-02	2.56E-02	1.86E-02	1.35E-02
Mercury	3.92E-01	2.26E-01	1.31E-01	2.11E-01	1.22E-01	7.04E-02	1.65E-01	9.53E-02	5.50E-02	1.96E-02	1.25E-02	8.00E-03	1.61E-01	9.28E-02	5.36E-02	1.89E-02	1.47E-02	1.15E-02	1.42E-01	6.33E-02	2.83E-02	1.03E-02	8.02E-03	6.25E-03
Nickel	2.20E-02	9.84E-03	4.40E-03	1.08E-02	4.83E-03	2.16E-03	7.35E-03	3.29E-03	1.47E-03	6.37E-03	2.85E-03	1.27E-03	1.25E-02	5.60E-03	2.51E-03	2.22E-02	1.57E-02	1.11E-02	4.44E-02	3.14E-02	2.22E-02	2.09E-02	1.48E-02	1.04E-02
Polychlorinated Biphenyls																								
Aroclor-1260	1.02E-01	4.54E-02	2.03E-02	5.15E-02	2.30E-02	1.03E-02	2.68E-03	1.20E-03	5.37E-04	9.01E-01	4.03E-01	1.80E-01	2.58E-01	1.15E-01	5.16E-02	3.43E-01	1.54E-01	6.87E-02	1.34E-02	5.99E-03	2.68E-03	4.89E-02	2.19E-02	9.79E-03
PCB (total)	3.28E-01	1.47E-01	6.56E-02	1.62E-01	7.24E-02	3.24E-02	2.86E-03	1.28E-03	5.71E-04	1.26E+00	5.61E-01	2.51E-01	2.58E-01	1.15E-01	5.16E-02	1.17E+00	5.25E-01	2.35E-01	1.55E-02	6.92E-03	3.09E-03	7.53E-02	3.37E-02	1.51E-02
Pesticides																								
Dieldrin	2.17E-02	2.97E-03	4.07E-04	6.75E-03	9.24E-04	1.27E-04	3.14E-03	4.29E-04	5.88E-05	1.70E-02	2.33E-03	3.19E-04	1.71E-02	2.35E-03	3.21E-04	2.31E-02	1.63E-02	1.15E-02	8.36E-03	5.91E-03	4.18E-03	1.53E-02	1.08E-02	7.67E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	4.67E-01	1.48E-01	4.67E-02	2.67E-01	8.45E-02	2.67E-02	0.00E+00	0.00E+00	0.00E+00	2.22E-01	7.02E-02	2.22E-02	0.00E+00	0.00E+00	0.00E+00	1.42E+00	4.49E-01	1.42E-01	0.00E+00	0.00E+00	0.00E+00	6.00E-02	1.90E-02	6.00E-03

Table D-97A
Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Group 3
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	1.15E-01	7.29E-02	4.61E-02	5.24E-02	3.31E-02	2.10E-02	4.74E-02	3.00E-02	1.90E-02	8.52E-03	5.39E-03	3.41E-03	1.75E-01	1.01E-01	5.85E-02	1.06E-01	8.39E-02	6.64E-02	1.22E+00	5.47E-01	2.45E-01	1.59E-01	1.26E-01	9.98E-02
Copper	3.72E+00	2.15E+00	1.24E+00	1.20E-01	6.97E-02	4.03E-02	1.49E+00	8.64E-01	5.00E-01	6.71E-02	3.88E-02	2.25E-02	7.89E+00	4.57E+00	2.64E+00	2.38E-02	2.10E-02	1.84E-02	2.44E-01	1.89E-01	1.46E-01	5.06E-01	4.45E-01	3.91E-01
Lead	2.34E-01	1.05E-01	4.68E-02	1.42E-01	6.33E-02	2.83E-02	3.18E-01	2.25E-01	1.59E-01	3.53E-03	1.58E-03	7.05E-04	8.32E-02	3.72E-02	1.66E-02	4.42E-02	3.21E-02	2.33E-02	1.62E-01	1.18E-01	8.56E-02	5.66E-02	4.12E-02	2.99E-02
Mercury	1.67E+00	9.64E-01	5.56E-01	3.52E-01	2.03E-01	1.17E-01	9.81E-01	5.66E-01	3.27E-01	3.02E-02	1.93E-02	1.23E-02	1.94E+00	1.12E+00	6.46E-01	3.88E-02	3.02E-02	2.36E-02	5.49E-01	2.46E-01	1.10E-01	7.96E-02	6.20E-02	4.83E-02
Nickel	7.39E-02	3.31E-02	1.48E-02	3.17E-02	1.42E-02	6.34E-03	8.13E-03	3.63E-03	1.63E-03	2.02E-02	9.02E-03	4.03E-03	1.04E-02	4.64E-03	2.07E-03	7.49E-02	5.30E-02	3.75E-02	3.69E-02	2.61E-02	1.84E-02	1.99E-02	1.41E-02	9.97E-03
Polychlorinated Biphenyls																								
Aroclor-1260	4.57E-01	2.04E-01	9.14E-02	1.43E-01	6.38E-02	2.85E-02	3.19E-02	1.43E-02	6.38E-03	2.05E+00	9.18E-01	4.11E-01	1.66E+00	7.44E-01	3.33E-01	1.16E+00	5.20E-01	2.33E-01	1.15E-01	5.16E-02	2.31E-02	3.80E-01	1.70E-01	7.60E-02
PCB (total)	1.95E+00	8.72E-01	3.90E-01	6.50E-01	2.91E-01	1.30E-01	3.38E-02	1.51E-02	6.75E-03	3.24E+00	1.45E+00	6.49E-01	1.66E+00	7.44E-01	3.33E-01	5.63E+00	2.52E+00	1.13E+00	1.34E-01	5.98E-02	2.68E-02	5.68E-01	2.54E-01	1.14E-01
Pesticides																								
Dieldrin	1.13E-01	1.54E-02	2.11E-03	2.19E-02	3.00E-03	4.10E-04	4.56E-02	6.24E-03	8.54E-04	6.85E-02	9.38E-03	1.28E-03	8.01E-02	1.10E-02	1.50E-03	1.00E-01	7.09E-02	5.01E-02	1.49E-01	1.06E-01	7.47E-02	9.18E-02	6.49E-02	4.59E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	2.26E+00	7.15E-01	2.26E-01	9.39E-01	2.97E-01	9.39E-02	0.00E+00	0.00E+00	0.00E+00	6.82E-01	2.16E-01	6.82E-02	0.00E+00	0.00E+00	0.00E+00	7.22E+00	2.28E+00	7.22E-01	0.00E+00	0.00E+00	0.00E+00	3.87E-01	1.22E-01	3.87E-02

Table D-97B
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 3
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	3.63E-02	2.29E-02	1.45E-02	1.80E-02	1.14E-02	7.19E-03	1.42E-02	8.97E-03	5.68E-03	6.01E-03	3.80E-03	2.41E-03	7.95E-02	4.59E-02	2.65E-02	3.39E-02	2.68E-02	2.12E-02	4.29E-01	1.92E-01	8.57E-02	6.21E-02	4.92E-02	3.89E-02
Copper	1.98E-01	1.15E-01	6.64E-02	7.50E-02	4.34E-02	2.51E-02	1.09E-01	6.31E-02	3.65E-02	2.51E-02	1.45E-02	8.39E-03	2.53E-01	1.47E-01	8.48E-02	1.08E-02	9.49E-03	8.35E-03	8.13E-02	6.30E-02	4.88E-02	2.26E-02	1.99E-02	1.75E-02
Lead	3.92E-02	1.75E-02	7.83E-03	2.50E-02	1.12E-02	4.99E-03	8.92E-02	6.31E-02	4.46E-02	1.32E-03	5.89E-04	2.64E-04	3.66E-02	1.64E-02	7.33E-03	6.57E-03	4.77E-03	3.47E-03	5.24E-02	3.81E-02	2.77E-02	1.96E-02	1.42E-02	1.03E-02
Mercury	5.14E-01	2.96E-01	1.71E-01	2.50E-01	1.44E-01	8.32E-02	2.30E-01	1.33E-01	7.65E-02	2.13E-02	1.36E-02	8.71E-03	2.76E-01	1.59E-01	9.19E-02	2.32E-02	1.80E-02	1.41E-02	1.94E-01	8.69E-02	3.89E-02	1.57E-02	1.22E-02	9.52E-03
Nickel	2.32E-02	1.04E-02	4.63E-03	1.43E-02	6.39E-03	2.86E-03	3.32E-03	1.48E-03	6.64E-04	7.54E-03	3.37E-03	1.51E-03	6.35E-03	2.84E-03	1.27E-03	2.71E-02	1.92E-02	1.36E-02	1.84E-02	1.30E-02	9.19E-03	1.00E-02	7.09E-03	5.02E-03
Polychlorinated Biphenyls																								
Aroclor-1260	1.70E-01	7.61E-02	3.40E-02	8.00E-02	3.58E-02	1.60E-02	8.12E-03	3.63E-03	1.62E-03	1.45E+00	6.48E-01	2.90E-01	6.76E-01	3.02E-01	1.35E-01	5.33E-01	2.39E-01	1.07E-01	3.72E-02	1.66E-02	7.43E-03	1.32E-01	5.92E-02	2.65E-02
PCB (total)	6.41E-01	2.87E-01	1.28E-01	3.06E-01	1.37E-01	6.12E-02	8.61E-03	3.85E-03	1.72E-03	2.29E+00	1.02E+00	4.58E-01	6.76E-01	3.02E-01	1.35E-01	2.26E+00	1.01E+00	4.52E-01	4.31E-02	1.93E-02	8.62E-03	1.87E-01	8.35E-02	3.73E-02
Pesticides																								
Dieldrin	3.48E-02	4.76E-03	6.52E-04	9.38E-03	1.28E-03	1.76E-04	6.17E-03	8.45E-04	1.16E-04	3.06E-02	4.19E-03	5.73E-04	3.37E-02	4.62E-03	6.32E-04	3.29E-02	2.33E-02	1.64E-02	1.64E-02	1.16E-02	8.21E-03	2.98E-02	2.11E-02	1.49E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	8.31E-01	2.63E-01	8.31E-02	4.73E-01	1.50E-01	4.73E-02	0.00E+00	0.00E+00	0.00E+00	4.81E-01	1.52E-01	4.81E-02	0.00E+00	0.00E+00	0.00E+00	2.91E+00	9.21E-01	2.91E-01	0.00E+00	0.00E+00	0.00E+00	1.16E-01	3.66E-02	1.16E-02

Table D-97C
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - Mean - Group 3
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	2.38E-02	1.51E-02	9.53E-03	9.21E-03	5.83E-03	3.69E-03	1.06E-02	6.74E-03	4.26E-03	4.10E-03	2.60E-03	1.64E-03	5.99E-02	3.46E-02	2.00E-02	1.97E-02	1.56E-02	1.23E-02	3.09E-01	1.38E-01	6.18E-02	4.49E-02	3.55E-02	2.81E-02
Copper	1.33E-01	7.72E-02	4.47E-02	6.17E-02	3.57E-02	2.07E-02	7.49E-02	4.33E-02	2.51E-02	2.12E-02	1.23E-02	7.09E-03	1.31E-01	7.56E-02	4.37E-02	9.17E-03	8.06E-03	7.09E-03	5.69E-02	4.40E-02	3.41E-02	1.29E-02	1.13E-02	9.98E-03
Lead	2.38E-02	1.06E-02	4.76E-03	1.23E-02	5.50E-03	2.46E-03	6.65E-02	4.70E-02	3.33E-02	1.11E-03	4.98E-04	2.23E-04	2.81E-02	1.26E-02	5.62E-03	3.33E-03	2.42E-03	1.76E-03	3.73E-02	2.71E-02	1.97E-02	1.38E-02	1.00E-02	7.29E-03
Mercury	3.95E-01	2.28E-01	1.32E-01	2.11E-01	1.22E-01	7.04E-02	1.70E-01	9.80E-02	5.66E-02	1.96E-02	1.25E-02	8.00E-03	1.68E-01	9.70E-02	5.60E-02	1.89E-02	1.47E-02	1.15E-02	1.45E-01	6.50E-02	2.91E-02	1.06E-02	8.29E-03	6.46E-03
Nickel	1.93E-02	8.65E-03	3.87E-03	1.08E-02	4.83E-03	2.16E-03	3.21E-03	1.43E-03	6.42E-04	6.37E-03	2.85E-03	1.27E-03	6.16E-03	2.76E-03	1.23E-03	2.22E-02	1.57E-02	1.11E-02	1.77E-02	1.25E-02	8.85E-03	9.43E-03	6.67E-03	4.71E-03
Polychlorinated Biphenyls																								
Aroclor-1260	1.10E-01	4.94E-02	2.21E-02	5.23E-02	2.34E-02	1.05E-02	5.13E-03	2.29E-03	1.03E-03	9.01E-01	4.03E-01	1.80E-01	4.53E-01	2.03E-01	9.07E-02	3.48E-01	1.56E-01	6.97E-02	2.43E-02	1.09E-02	4.86E-03	8.34E-02	3.73E-02	1.67E-02
PCB (total)	3.35E-01	1.50E-01	6.71E-02	1.62E-01	7.24E-02	3.24E-02	5.44E-03	2.43E-03	1.09E-03	1.26E+00	5.61E-01	2.51E-01	4.53E-01	2.03E-01	9.07E-02	1.17E+00	5.25E-01	2.35E-01	2.82E-02	1.26E-02	5.63E-03	1.10E-01	4.91E-02	2.20E-02
Pesticides																								
Dieldrin	2.21E-02	3.03E-03	4.15E-04	6.75E-03	9.24E-04	1.27E-04	3.33E-03	4.56E-04	6.25E-05	1.70E-02	2.33E-03	3.19E-04	1.82E-02	2.49E-03	3.42E-04	2.31E-02	1.63E-02	1.15E-02	8.88E-03	6.28E-03	4.44E-03	1.63E-02	1.15E-02	8.13E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	4.67E-01	1.48E-01	4.67E-02	2.67E-01	8.45E-02	2.67E-02	0.00E+00	0.00E+00	0.00E+00	2.22E-01	7.02E-02	2.22E-02	0.00E+00	0.00E+00	0.00E+00	1.42E+00	4.49E-01	1.42E-01	0.00E+00	0.00E+00	0.00E+00	6.00E-02	1.90E-02	6.00E-03

Table D-98A
Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Group 4
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	1.48E-01	9.38E-02	5.94E-02	5.24E-02	3.31E-02	2.10E-02	9.34E-02	5.91E-02	3.74E-02	8.52E-03	5.39E-03	3.41E-03	3.33E-01	1.92E-01	1.11E-01	1.06E-01	8.39E-02	6.64E-02	2.65E+00	1.18E+00	5.29E-01	3.22E-01	2.55E-01	2.02E-01
Copper	4.00E+00	2.31E+00	1.34E+00	1.20E-01	6.97E-02	4.03E-02	1.60E+00	9.28E-01	5.37E-01	6.71E-02	3.88E-02	2.25E-02	8.54E+00	4.94E+00	2.86E+00	2.38E-02	2.10E-02	1.84E-02	2.56E-01	1.98E-01	1.53E-01	5.46E-01	4.81E-01	4.23E-01
Lead	2.46E-01	1.10E-01	4.92E-02	1.42E-01	6.33E-02	2.83E-02	4.44E-01	3.14E-01	2.22E-01	3.53E-03	1.58E-03	7.05E-04	1.11E-01	4.96E-02	2.22E-02	4.42E-02	3.21E-02	2.33E-02	2.38E-01	1.73E-01	1.26E-01	8.14E-02	5.92E-02	4.30E-02
Mercury	6.29E+00	3.63E+00	2.10E+00	3.52E-01	2.03E-01	1.17E-01	3.92E+00	2.26E+00	1.31E+00	3.02E-02	1.93E-02	1.23E-02	1.25E+01	7.20E+00	4.16E+00	3.88E-02	3.02E-02	2.36E-02	1.76E+00	7.89E-01	3.53E-01	4.50E-01	3.50E-01	2.73E-01
Nickel	8.54E-02	3.82E-02	1.71E-02	3.17E-02	1.42E-02	6.34E-03	3.58E-02	1.60E-02	7.17E-03	2.02E-02	9.02E-03	4.03E-03	3.65E-02	1.63E-02	7.30E-03	7.49E-02	5.30E-02	3.75E-02	1.90E-01	1.35E-01	9.52E-02	7.70E-02	5.44E-02	3.85E-02
Polychlorinated Biphenyls																								
Aroclor-1260	3.38E+00	1.51E+00	6.75E-01	9.97E-01	4.46E-01	1.99E-01	2.90E-01	1.30E-01	5.81E-02	2.05E+00	9.18E-01	4.11E-01	1.12E+01	5.03E+00	2.25E+00	8.13E+00	3.64E+00	1.63E+00	8.81E-01	3.94E-01	1.76E-01	3.45E+00	1.54E+00	6.91E-01
PCB (total)	2.54E+00	1.14E+00	5.08E-01	6.50E-01	2.91E-01	1.30E-01	3.05E-01	1.36E-01	6.09E-02	3.24E+00	1.45E+00	6.49E-01	1.12E+01	5.03E+00	2.25E+00	5.63E+00	2.52E+00	1.13E+00	1.02E+00	4.58E-01	2.05E-01	3.35E+00	1.50E+00	6.69E-01
Pesticides																								
Dieldrin	1.26E-01	1.72E-02	2.36E-03	2.19E-02	3.00E-03	4.10E-04	6.24E-02	8.55E-03	1.17E-03	6.85E-02	9.38E-03	1.28E-03	1.10E-01	1.50E-02	2.06E-03	1.00E-01	7.09E-02	5.01E-02	2.05E-01	1.45E-01	1.02E-01	1.25E-01	8.81E-02	6.23E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	2.26E+00	7.15E-01	2.26E-01	9.39E-01	2.97E-01	9.39E-02	0.00E+00	0.00E+00	0.00E+00	6.82E-01	2.16E-01	6.82E-02	0.00E+00	0.00E+00	0.00E+00	7.22E+00	2.28E+00	7.22E-01	0.00E+00	0.00E+00	0.00E+00	3.87E-01	1.22E-01	3.87E-02

Table D-98B
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 4
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	4.87E-02	3.08E-02	1.95E-02	1.80E-02	1.14E-02	7.19E-03	2.59E-02	1.64E-02	1.04E-02	6.01E-03	3.80E-03	2.41E-03	1.42E-01	8.19E-02	4.73E-02	3.39E-02	2.68E-02	2.12E-02	8.50E-01	3.80E-01	1.70E-01	1.18E-01	9.31E-02	7.37E-02
Copper	2.46E-01	1.42E-01	8.22E-02	7.50E-02	4.34E-02	2.51E-02	1.37E-01	7.92E-02	4.58E-02	2.51E-02	1.45E-02	8.39E-03	3.67E-01	2.12E-01	1.23E-01	1.08E-02	9.49E-03	8.35E-03	1.01E-01	7.80E-02	6.04E-02	3.13E-02	2.75E-02	2.42E-02
Lead	4.59E-02	2.05E-02	9.18E-03	2.50E-02	1.12E-02	4.99E-03	1.35E-01	9.57E-02	6.77E-02	1.32E-03	5.89E-04	2.64E-04	5.29E-02	2.37E-02	1.06E-02	6.57E-03	4.77E-03	3.47E-03	8.49E-02	6.17E-02	4.48E-02	3.15E-02	2.29E-02	1.66E-02
Mercury	6.72E-01	3.88E-01	2.24E-01	2.50E-01	1.44E-01	8.32E-02	3.96E-01	2.29E-01	1.32E-01	2.13E-02	1.36E-02	8.71E-03	6.56E-01	3.79E-01	2.19E-01	2.32E-02	1.80E-02	1.41E-02	3.26E-01	1.46E-01	6.53E-02	3.16E-02	2.46E-02	1.92E-02
Nickel	2.68E-02	1.20E-02	5.37E-03	1.43E-02	6.39E-03	2.86E-03	9.20E-03	4.12E-03	1.84E-03	7.54E-03	3.37E-03	1.51E-03	1.51E-02	6.77E-03	3.03E-03	2.71E-02	1.92E-02	1.36E-02	5.69E-02	4.02E-02	2.85E-02	2.64E-02	1.87E-02	1.32E-02
Polychlorinated Biphenyls																								
Aroclor-1260	1.79E-01	8.02E-02	3.59E-02	8.31E-02	3.71E-02	1.66E-02	9.32E-03	4.17E-03	1.86E-03	1.45E+00	6.48E-01	2.90E-01	7.62E-01	3.41E-01	1.52E-01	5.54E-01	2.48E-01	1.11E-01	4.22E-02	1.89E-02	8.44E-03	1.50E-01	6.72E-02	3.01E-02
PCB (total)	6.44E-01	2.88E-01	1.29E-01	3.06E-01	1.37E-01	6.12E-02	9.88E-03	4.42E-03	1.98E-03	2.29E+00	1.02E+00	4.58E-01	7.62E-01	3.41E-01	1.52E-01	2.26E+00	1.01E+00	4.52E-01	4.90E-02	2.19E-02	9.80E-03	2.04E-01	9.12E-02	4.08E-02
Pesticides																								
Dieldrin	3.10E-02	4.24E-03	5.81E-04	9.38E-03	1.28E-03	1.76E-04	4.50E-03	6.16E-04	8.44E-05	3.06E-02	4.19E-03	5.73E-04	2.46E-02	3.37E-03	4.61E-04	3.29E-02	2.33E-02	1.64E-02	1.20E-02	8.47E-03	5.99E-03	2.20E-02	1.55E-02	1.10E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	8.31E-01	2.63E-01	8.31E-02	4.73E-01	1.50E-01	4.73E-02	0.00E+00	0.00E+00	0.00E+00	4.81E-01	1.52E-01	4.81E-02	0.00E+00	0.00E+00	0.00E+00	2.91E+00	9.21E-01	2.91E-01	0.00E+00	0.00E+00	0.00E+00	1.16E-01	3.66E-02	1.16E-02

Table D-98C
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - Mean - Group 4
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	3.62E-02	2.29E-02	1.45E-02	9.21E-03	5.83E-03	3.69E-03	2.22E-02	1.40E-02	8.87E-03	4.10E-03	2.60E-03	1.64E-03	1.22E-01	7.07E-02	4.08E-02	1.97E-02	1.56E-02	1.23E-02	7.13E-01	3.19E-01	1.43E-01	9.88E-02	7.82E-02	6.19E-02
Copper	2.03E-01	1.18E-01	6.80E-02	6.17E-02	3.57E-02	2.07E-02	1.20E-01	6.97E-02	4.03E-02	2.12E-02	1.23E-02	7.09E-03	2.98E-01	1.73E-01	9.99E-02	9.17E-03	8.06E-03	7.09E-03	8.93E-02	6.91E-02	5.35E-02	2.60E-02	2.28E-02	2.01E-02
Lead	3.15E-02	1.41E-02	6.29E-03	1.23E-02	5.50E-03	2.46E-03	1.17E-01	8.26E-02	5.84E-02	1.11E-03	4.98E-04	2.23E-04	4.65E-02	2.08E-02	9.30E-03	3.33E-03	2.42E-03	1.76E-03	7.16E-02	5.20E-02	3.78E-02	2.64E-02	1.92E-02	1.39E-02
Mercury	5.05E-01	2.92E-01	1.68E-01	2.11E-01	1.22E-01	7.04E-02	3.05E-01	1.76E-01	1.02E-01	1.96E-02	1.25E-02	8.00E-03	4.34E-01	2.51E-01	1.45E-01	1.89E-02	1.47E-02	1.15E-02	2.54E-01	1.14E-01	5.09E-02	2.23E-02	1.74E-02	1.36E-02
Nickel	2.23E-02	9.96E-03	4.45E-03	1.08E-02	4.83E-03	2.16E-03	7.81E-03	3.49E-03	1.56E-03	6.37E-03	2.85E-03	1.27E-03	1.32E-02	5.90E-03	2.64E-03	2.22E-02	1.57E-02	1.11E-02	4.74E-02	3.35E-02	2.37E-02	2.22E-02	1.57E-02	1.11E-02
Polychlorinated Biphenyls																								
Aroclor-1260	1.20E-01	5.38E-02	2.41E-02	5.61E-02	2.51E-02	1.12E-02	6.10E-03	2.73E-03	1.22E-03	9.01E-01	4.03E-01	1.80E-01	5.27E-01	2.36E-01	1.05E-01	3.74E-01	1.67E-01	7.48E-02	2.85E-02	1.28E-02	5.71E-03	9.81E-02	4.39E-02	1.96E-02
PCB (total)	3.38E-01	1.51E-01	6.77E-02	1.62E-01	7.24E-02	3.24E-02	6.47E-03	2.89E-03	1.29E-03	1.26E+00	5.61E-01	2.51E-01	5.27E-01	2.36E-01	1.05E-01	1.17E+00	5.25E-01	2.35E-01	3.31E-02	1.48E-02	6.62E-03	1.24E-01	5.53E-02	2.47E-02
Pesticides																								
Dieldrin	2.18E-02	2.98E-03	4.08E-04	6.75E-03	9.24E-04	1.27E-04	3.17E-03	4.34E-04	5.94E-05	1.70E-02	2.33E-03	3.19E-04	1.73E-02	2.37E-03	3.25E-04	2.31E-02	1.63E-02	1.15E-02	8.44E-03	5.97E-03	4.22E-03	1.55E-02	1.10E-02	7.75E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	4.67E-01	1.48E-01	4.67E-02	2.67E-01	8.45E-02	2.67E-02	0.00E+00	0.00E+00	0.00E+00	2.22E-01	7.02E-02	2.22E-02	0.00E+00	0.00E+00	0.00E+00	1.42E+00	4.49E-01	1.42E-01	0.00E+00	0.00E+00	0.00E+00	6.00E-02	1.90E-02	6.00E-03

Table D-99A
Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Group 4A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	1.40E-01	8.83E-02	5.59E-02	5.24E-02	3.31E-02	2.10E-02	8.09E-02	5.12E-02	3.24E-02	8.52E-03	5.39E-03	3.41E-03	2.91E-01	1.68E-01	9.72E-02	1.06E-01	8.39E-02	6.64E-02	2.25E+00	1.01E+00	4.50E-01	2.77E-01	2.20E-01	1.74E-01
Copper	3.64E+00	2.10E+00	1.22E+00	1.20E-01	6.97E-02	4.03E-02	1.46E+00	8.46E-01	4.90E-01	6.71E-02	3.88E-02	2.25E-02	7.71E+00	4.46E+00	2.58E+00	2.38E-02	2.10E-02	1.84E-02	2.40E-01	1.86E-01	1.44E-01	4.94E-01	4.35E-01	3.82E-01
Lead	2.46E-01	1.10E-01	4.92E-02	1.42E-01	6.33E-02	2.83E-02	4.44E-01	3.14E-01	2.22E-01	3.53E-03	1.58E-03	7.05E-04	1.11E-01	4.96E-02	2.22E-02	4.42E-02	3.21E-02	2.33E-02	2.38E-01	1.73E-01	1.26E-01	8.14E-02	5.92E-02	4.30E-02
Mercury	6.29E+00	3.63E+00	2.10E+00	3.52E-01	2.03E-01	1.17E-01	3.92E+00	2.26E+00	1.31E+00	3.02E-02	1.93E-02	1.23E-02	1.25E+01	7.20E+00	4.16E+00	3.88E-02	3.02E-02	2.36E-02	1.76E+00	7.89E-01	3.53E-01	4.50E-01	3.50E-01	2.73E-01
Nickel	8.07E-02	3.61E-02	1.61E-02	3.17E-02	1.42E-02	6.34E-03	2.37E-02	1.06E-02	4.74E-03	2.02E-02	9.02E-03	4.03E-03	2.58E-02	1.15E-02	5.16E-03	7.49E-02	5.30E-02	3.75E-02	1.21E-01	8.53E-02	6.03E-02	5.16E-02	3.65E-02	2.58E-02
Polychlorinated Biphenyls																								
Aroclor-1260	3.28E+00	1.47E+00	6.56E-01	9.62E-01	4.30E-01	1.92E-01	2.90E-01	1.30E-01	5.81E-02	2.05E+00	9.18E-01	4.11E-01	1.12E+01	5.03E+00	2.25E+00	7.85E+00	3.51E+00	1.57E+00	8.81E-01	3.94E-01	1.76E-01	3.44E+00	1.54E+00	6.88E-01
PCB (total)	2.54E+00	1.14E+00	5.08E-01	6.50E-01	2.91E-01	1.30E-01	3.05E-01	1.36E-01	6.09E-02	3.24E+00	1.45E+00	6.49E-01	1.12E+01	5.03E+00	2.25E+00	5.63E+00	2.52E+00	1.13E+00	1.02E+00	4.58E-01	2.05E-01	3.35E+00	1.50E+00	6.69E-01
Pesticides																								
Dieldrin	1.26E-01	1.72E-02	2.36E-03	2.19E-02	3.00E-03	4.10E-04	6.24E-02	8.55E-03	1.17E-03	6.85E-02	9.38E-03	1.28E-03	1.10E-01	1.50E-02	2.06E-03	1.00E-01	7.09E-02	5.01E-02	2.05E-01	1.45E-01	1.02E-01	1.25E-01	8.81E-02	6.23E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	2.26E+00	7.15E-01	2.26E-01	9.39E-01	2.97E-01	9.39E-02	0.00E+00	0.00E+00	0.00E+00	6.82E-01	2.16E-01	6.82E-02	0.00E+00	0.00E+00	0.00E+00	7.22E+00	2.28E+00	7.22E-01	0.00E+00	0.00E+00	0.00E+00	3.87E-01	1.22E-01	3.87E-02

Table D-99B
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 4A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	5.20E-02	3.29E-02	2.08E-02	1.80E-02	1.14E-02	7.19E-03	2.91E-02	1.84E-02	1.17E-02	6.01E-03	3.80E-03	2.41E-03	1.59E-01	9.16E-02	5.29E-02	3.39E-02	2.68E-02	2.12E-02	9.72E-01	4.35E-01	1.94E-01	1.33E-01	1.06E-01	8.36E-02
Copper	2.70E-01	1.56E-01	9.04E-02	7.50E-02	4.34E-02	2.51E-02	1.50E-01	8.70E-02	5.03E-02	2.51E-02	1.45E-02	8.39E-03	4.26E-01	2.46E-01	1.42E-01	1.08E-02	9.49E-03	8.35E-03	1.10E-01	8.53E-02	6.60E-02	3.57E-02	3.14E-02	2.76E-02
Lead	5.18E-02	2.31E-02	1.04E-02	2.50E-02	1.12E-02	4.99E-03	1.78E-01	1.26E-01	8.91E-02	1.32E-03	5.89E-04	2.64E-04	6.70E-02	2.99E-02	1.34E-02	6.57E-03	4.77E-03	3.47E-03	1.16E-01	8.46E-02	6.15E-02	4.30E-02	3.12E-02	2.27E-02
Mercury	1.14E+00	6.60E-01	3.81E-01	2.50E-01	1.44E-01	8.32E-02	7.71E-01	4.45E-01	2.57E-01	2.13E-02	1.36E-02	8.71E-03	1.79E+00	1.04E+00	5.98E-01	2.32E-02	1.80E-02	1.41E-02	6.10E-01	2.73E-01	1.22E-01	7.57E-02	5.90E-02	4.60E-02
Nickel	2.68E-02	1.20E-02	5.35E-03	1.43E-02	6.39E-03	2.86E-03	9.07E-03	4.06E-03	1.81E-03	7.54E-03	3.37E-03	1.51E-03	1.50E-02	6.69E-03	2.99E-03	2.71E-02	1.92E-02	1.36E-02	5.60E-02	3.96E-02	2.80E-02	2.60E-02	1.84E-02	1.30E-02
Polychlorinated Biphenyls																								
Aroclor-1260	5.45E-01	2.44E-01	1.09E-01	2.46E-01	1.10E-01	4.91E-02	3.14E-02	1.40E-02	6.27E-03	1.45E+00	6.48E-01	2.90E-01	2.18E+00	9.76E-01	4.36E-01	1.64E+00	7.32E-01	3.28E-01	1.29E-01	5.78E-02	2.58E-02	5.07E-01	2.27E-01	1.01E-01
PCB (total)	7.14E-01	3.19E-01	1.43E-01	3.06E-01	1.37E-01	6.12E-02	3.31E-02	1.48E-02	6.61E-03	2.29E+00	1.02E+00	4.58E-01	2.18E+00	9.75E-01	4.36E-01	2.26E+00	1.01E+00	4.52E-01	1.50E-01	6.71E-02	3.00E-02	5.24E-01	2.34E-01	1.05E-01
Pesticides																								
Dieldrin	3.75E-02	5.13E-03	7.03E-04	9.38E-03	1.28E-03	1.76E-04	7.35E-03	1.01E-03	1.38E-04	3.06E-02	4.19E-03	5.73E-04	4.02E-02	5.51E-03	7.54E-04	3.29E-02	2.33E-02	1.64E-02	1.96E-02	1.38E-02	9.79E-03	3.53E-02	2.50E-02	1.77E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	8.31E-01	2.63E-01	8.31E-02	4.73E-01	1.50E-01	4.73E-02	0.00E+00	0.00E+00	0.00E+00	4.81E-01	1.52E-01	4.81E-02	0.00E+00	0.00E+00	0.00E+00	2.91E+00	9.21E-01	2.91E-01	0.00E+00	0.00E+00	0.00E+00	1.16E-01	3.66E-02	1.16E-02

Table D-99C
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - Mean - Group 4A
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	3.50E-02	2.21E-02	1.40E-02	9.21E-03	5.83E-03	3.69E-03	2.10E-02	1.33E-02	8.39E-03	4.10E-03	2.60E-03	1.64E-03	1.16E-01	6.70E-02	3.87E-02	1.97E-02	1.56E-02	1.23E-02	6.69E-01	2.99E-01	1.34E-01	9.31E-02	7.37E-02	5.83E-02
Copper	1.90E-01	1.10E-01	6.36E-02	6.17E-02	3.57E-02	2.07E-02	1.13E-01	6.51E-02	3.77E-02	2.12E-02	1.23E-02	7.09E-03	2.67E-01	1.54E-01	8.93E-02	9.17E-03	8.06E-03	7.09E-03	8.38E-02	6.49E-02	5.02E-02	2.35E-02	2.07E-02	1.82E-02
Lead	3.32E-02	1.48E-02	6.64E-03	1.23E-02	5.50E-03	2.46E-03	1.29E-01	9.11E-02	6.44E-02	1.11E-03	4.98E-04	2.23E-04	5.07E-02	2.27E-02	1.01E-02	3.33E-03	2.42E-03	1.76E-03	8.01E-02	5.82E-02	4.23E-02	2.95E-02	2.14E-02	1.56E-02
Mercury	6.68E-01	3.86E-01	2.23E-01	2.11E-01	1.22E-01	7.04E-02	4.60E-01	2.65E-01	1.53E-01	1.96E-02	1.25E-02	8.00E-03	8.26E-01	4.77E-01	2.75E-01	1.89E-02	1.47E-02	1.15E-02	3.76E-01	1.68E-01	7.51E-02	3.83E-02	2.98E-02	2.33E-02
Nickel	2.14E-02	9.59E-03	4.29E-03	1.08E-02	4.83E-03	2.16E-03	6.44E-03	2.88E-03	1.29E-03	6.37E-03	2.85E-03	1.27E-03	1.12E-02	5.01E-03	2.24E-03	2.22E-02	1.57E-02	1.11E-02	3.83E-02	2.71E-02	1.92E-02	1.83E-02	1.30E-02	9.17E-03
Polychlorinated Biphenyls																								
Aroclor-1260	2.74E-01	1.23E-01	5.49E-02	1.25E-01	5.60E-02	2.51E-02	1.51E-02	6.76E-03	3.02E-03	9.01E-01	4.03E-01	1.80E-01	1.16E+00	5.19E-01	2.32E-01	8.35E-01	3.74E-01	1.67E-01	6.59E-02	2.95E-02	1.32E-02	2.43E-01	1.09E-01	4.87E-02
PCB (total)	3.67E-01	1.64E-01	7.33E-02	1.62E-01	7.24E-02	3.24E-02	1.60E-02	7.15E-03	3.20E-03	1.26E+00	5.61E-01	2.51E-01	1.16E+00	5.19E-01	2.32E-01	1.17E+00	5.25E-01	2.35E-01	7.66E-02	3.42E-02	1.53E-02	2.53E-01	1.13E-01	5.07E-02
Pesticides																								
Dieldrin	2.34E-02	3.21E-03	4.40E-04	6.75E-03	9.24E-04	1.27E-04	3.91E-03	5.36E-04	7.34E-05	1.70E-02	2.33E-03	3.19E-04	2.14E-02	2.93E-03	4.01E-04	2.31E-02	1.63E-02	1.15E-02	1.04E-02	7.37E-03	5.21E-03	1.90E-02	1.34E-02	9.48E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	4.67E-01	1.48E-01	4.67E-02	2.67E-01	8.45E-02	2.67E-02	0.00E+00	0.00E+00	0.00E+00	2.22E-01	7.02E-02	2.22E-02	0.00E+00	0.00E+00	0.00E+00	1.42E+00	4.49E-01	1.42E-01	0.00E+00	0.00E+00	0.00E+00	6.00E-02	1.90E-02	6.00E-03

Table D-100A
Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Group 4B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	1.44E-01	9.09E-02	5.75E-02	5.24E-02	3.31E-02	2.10E-02	8.67E-02	5.48E-02	3.47E-02	8.52E-03	5.39E-03	3.41E-03	3.11E-01	1.79E-01	1.04E-01	1.06E-01	8.39E-02	6.64E-02	2.43E+00	1.09E+00	4.86E-01	2.98E-01	2.36E-01	1.87E-01
Copper	4.00E+00	2.31E+00	1.34E+00	1.20E-01	6.97E-02	4.03E-02	1.60E+00	9.28E-01	5.37E-01	6.71E-02	3.88E-02	2.25E-02	8.54E+00	4.94E+00	2.86E+00	2.38E-02	2.10E-02	1.84E-02	2.56E-01	1.98E-01	1.53E-01	5.46E-01	4.81E-01	4.23E-01
Lead	2.44E-01	1.09E-01	4.89E-02	1.42E-01	6.33E-02	2.83E-02	4.27E-01	3.02E-01	2.14E-01	3.53E-03	1.58E-03	7.05E-04	1.07E-01	4.80E-02	2.15E-02	4.42E-02	3.21E-02	2.33E-02	2.28E-01	1.66E-01	1.20E-01	7.81E-02	5.67E-02	4.12E-02
Mercury	1.85E+00	1.07E+00	6.18E-01	3.52E-01	2.03E-01	1.17E-01	1.13E+00	6.50E-01	3.75E-01	3.02E-02	1.93E-02	1.23E-02	2.36E+00	1.36E+00	7.87E-01	3.88E-02	3.02E-02	2.36E-02	6.19E-01	2.77E-01	1.24E-01	9.49E-02	7.40E-02	5.77E-02
Nickel	8.54E-02	3.82E-02	1.71E-02	3.17E-02	1.42E-02	6.34E-03	3.58E-02	1.60E-02	7.17E-03	2.02E-02	9.02E-03	4.03E-03	3.65E-02	1.63E-02	7.30E-03	7.49E-02	5.30E-02	3.75E-02	1.90E-01	1.35E-01	9.52E-02	7.70E-02	5.44E-02	3.85E-02
Polychlorinated Biphenyls																								
Aroclor-1260	4.97E-01	2.22E-01	9.94E-02	1.51E-01	6.73E-02	3.01E-02	4.01E-02	1.79E-02	8.02E-03	2.05E+00	9.18E-01	4.11E-01	2.03E+00	9.06E-01	4.05E-01	1.23E+00	5.49E-01	2.46E-01	1.42E-01	6.37E-02	2.85E-02	4.69E-01	2.10E-01	9.37E-02
PCB (total)	1.97E+00	8.80E-01	3.93E-01	6.50E-01	2.91E-01	1.30E-01	4.24E-02	1.90E-02	8.48E-03	3.24E+00	1.45E+00	6.49E-01	2.03E+00	9.06E-01	4.05E-01	5.63E+00	2.52E+00	1.13E+00	1.65E-01	7.39E-02	3.30E-02	6.54E-01	2.93E-01	1.31E-01
Pesticides																								
Dieldrin	8.42E-02	1.15E-02	1.58E-03	2.19E-02	3.00E-03	4.10E-04	8.64E-03	1.18E-03	1.62E-04	6.85E-02	9.38E-03	1.28E-03	1.52E-02	2.08E-03	2.85E-04	1.00E-01	7.09E-02	5.01E-02	2.84E-02	2.01E-02	1.42E-02	2.03E-02	1.43E-02	1.01E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	2.26E+00	7.15E-01	2.26E-01	9.39E-01	2.97E-01	9.39E-02	0.00E+00	0.00E+00	0.00E+00	6.82E-01	2.16E-01	6.82E-02	0.00E+00	0.00E+00	0.00E+00	7.22E+00	2.28E+00	7.22E-01	0.00E+00	0.00E+00	0.00E+00	3.87E-01	1.22E-01	3.87E-02

Table D-100B
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 4B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	5.53E-02	3.50E-02	2.21E-02	1.80E-02	1.14E-02	7.19E-03	3.24E-02	2.05E-02	1.30E-02	6.01E-03	3.80E-03	2.41E-03	1.75E-01	1.01E-01	5.85E-02	3.39E-02	2.68E-02	2.12E-02	1.10E+00	4.91E-01	2.19E-01	1.49E-01	1.18E-01	9.36E-02
Copper	3.05E-01	1.76E-01	1.02E-01	7.50E-02	4.34E-02	2.51E-02	1.69E-01	9.77E-02	5.65E-02	2.51E-02	1.45E-02	8.39E-03	5.09E-01	2.95E-01	1.70E-01	1.08E-02	9.49E-03	8.35E-03	1.23E-01	9.51E-02	7.37E-02	4.19E-02	3.69E-02	3.24E-02
Lead	5.06E-02	2.26E-02	1.01E-02	2.50E-02	1.12E-02	4.99E-03	1.70E-01	1.20E-01	8.48E-02	1.32E-03	5.89E-04	2.64E-04	6.42E-02	2.87E-02	1.28E-02	6.57E-03	4.77E-03	3.47E-03	1.10E-01	7.99E-02	5.81E-02	4.06E-02	2.95E-02	2.15E-02
Mercury	5.79E-01	3.34E-01	1.93E-01	2.50E-01	1.44E-01	8.32E-02	3.04E-01	1.75E-01	1.01E-01	2.13E-02	1.36E-02	8.71E-03	4.32E-01	2.50E-01	1.44E-01	2.32E-02	1.80E-02	1.41E-02	2.54E-01	1.13E-01	5.07E-02	2.24E-02	1.75E-02	1.36E-02
Nickel	2.82E-02	1.26E-02	5.65E-03	1.43E-02	6.39E-03	2.86E-03	1.17E-02	5.22E-03	2.34E-03	7.54E-03	3.37E-03	1.51E-03	1.85E-02	8.28E-03	3.70E-03	2.71E-02	1.92E-02	1.36E-02	7.41E-02	5.24E-02	3.70E-02	3.35E-02	2.37E-02	1.67E-02
Polychlorinated Biphenyls																								
Aroclor-1260	9.86E-02	4.41E-02	1.97E-02	4.56E-02	2.04E-02	9.12E-03	5.23E-03	2.34E-03	1.05E-03	1.45E+00	6.48E-01	2.90E-01	4.62E-01	2.06E-01	9.23E-02	3.04E-01	1.36E-01	6.08E-02	2.48E-02	1.11E-02	4.96E-03	8.33E-02	3.73E-02	1.67E-02
PCB (total)	6.32E-01	2.83E-01	1.26E-01	3.06E-01	1.37E-01	6.12E-02	5.56E-03	2.49E-03	1.11E-03	2.29E+00	1.02E+00	4.58E-01	4.62E-01	2.06E-01	9.23E-02	2.26E+00	1.01E+00	4.52E-01	2.87E-02	1.28E-02	5.74E-03	1.45E-01	6.50E-02	2.91E-02
Pesticides																								
Dieldrin	2.47E-02	3.38E-03	4.62E-04	9.38E-03	1.28E-03	1.76E-04	1.71E-03	2.34E-04	3.20E-05	3.06E-02	4.19E-03	5.73E-04	9.32E-03	1.28E-03	1.75E-04	3.29E-02	2.33E-02	1.64E-02	4.56E-03	3.22E-03	2.28E-03	8.94E-03	6.32E-03	4.47E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	8.31E-01	2.63E-01	8.31E-02	4.73E-01	1.50E-01	4.73E-02	0.00E+00	0.00E+00	0.00E+00	4.81E-01	1.52E-01	4.81E-02	0.00E+00	0.00E+00	0.00E+00	2.91E+00	9.21E-01	2.91E-01	0.00E+00	0.00E+00	0.00E+00	1.16E-01	3.66E-02	1.16E-02

Table D-100C
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - Mean - Group 4B
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	4.04E-02	2.55E-02	1.62E-02	9.21E-03	5.83E-03	3.69E-03	2.61E-02	1.65E-02	1.05E-02	4.10E-03	2.60E-03	1.64E-03	1.43E-01	8.27E-02	4.78E-02	1.97E-02	1.56E-02	1.23E-02	8.60E-01	3.85E-01	1.72E-01	1.18E-01	9.34E-02	7.39E-02
Copper	2.47E-01	1.43E-01	8.26E-02	6.17E-02	3.57E-02	2.07E-02	1.45E-01	8.40E-02	4.86E-02	2.12E-02	1.23E-02	7.09E-03	4.03E-01	2.33E-01	1.35E-01	9.17E-03	8.06E-03	7.09E-03	1.07E-01	8.25E-02	6.39E-02	3.39E-02	2.98E-02	2.62E-02
Lead	3.52E-02	1.57E-02	7.04E-03	1.23E-02	5.50E-03	2.46E-03	1.43E-01	1.01E-01	7.14E-02	1.11E-03	4.98E-04	2.23E-04	5.54E-02	2.48E-02	1.11E-02	3.33E-03	2.42E-03	1.76E-03	9.03E-02	6.56E-02	4.77E-02	3.32E-02	2.42E-02	1.76E-02
Mercury	4.64E-01	2.68E-01	1.55E-01	2.11E-01	1.22E-01	7.04E-02	2.59E-01	1.49E-01	8.62E-02	1.96E-02	1.25E-02	8.00E-03	3.34E-01	1.93E-01	1.11E-01	1.89E-02	1.47E-02	1.15E-02	2.18E-01	9.73E-02	4.35E-02	1.81E-02	1.41E-02	1.10E-02
Nickel	2.32E-02	1.04E-02	4.64E-03	1.08E-02	4.83E-03	2.16E-03	9.38E-03	4.20E-03	1.88E-03	6.37E-03	2.85E-03	1.27E-03	1.54E-02	6.89E-03	3.08E-03	2.22E-02	1.57E-02	1.11E-02	5.81E-02	4.11E-02	2.91E-02	2.66E-02	1.88E-02	1.33E-02
Polychlorinated Biphenyls																								
Aroclor-1260	7.31E-02	3.27E-02	1.46E-02	3.40E-02	1.52E-02	6.79E-03	3.81E-03	1.70E-03	7.62E-04	9.01E-01	4.03E-01	1.80E-01	3.50E-01	1.57E-01	7.00E-02	2.26E-01	1.01E-01	4.53E-02	1.85E-02	8.27E-03	3.70E-03	6.06E-02	2.71E-02	1.21E-02
PCB (total)	3.31E-01	1.48E-01	6.63E-02	1.62E-01	7.24E-02	3.24E-02	4.05E-03	1.81E-03	8.10E-04	1.26E+00	5.61E-01	2.51E-01	3.50E-01	1.57E-01	7.00E-02	1.17E+00	5.25E-01	2.35E-01	2.14E-02	9.57E-03	4.28E-03	9.12E-02	4.08E-02	1.82E-02
Pesticides																								
Dieldrin	1.84E-02	2.53E-03	3.46E-04	6.75E-03	9.24E-04	1.27E-04	1.71E-03	2.34E-04	3.20E-05	1.70E-02	2.33E-03	3.19E-04	9.32E-03	1.28E-03	1.75E-04	2.31E-02	1.63E-02	1.15E-02	4.56E-03	3.22E-03	2.28E-03	8.67E-03	6.13E-03	4.33E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	4.67E-01	1.48E-01	4.67E-02	2.67E-01	8.45E-02	2.67E-02	0.00E+00	0.00E+00	0.00E+00	2.22E-01	7.02E-02	2.22E-02	0.00E+00	0.00E+00	0.00E+00	1.42E+00	4.49E-01	1.42E-01	0.00E+00	0.00E+00	0.00E+00	6.00E-02	1.90E-02	6.00E-03

Table D-101A
Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Group 4C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	1.48E-01	9.38E-02	5.94E-02	5.24E-02	3.31E-02	2.10E-02	9.34E-02	5.91E-02	3.74E-02	8.52E-03	5.39E-03	3.41E-03	3.33E-01	1.92E-01	1.11E-01	1.06E-01	8.39E-02	6.64E-02	2.65E+00	1.18E+00	5.29E-01	3.22E-01	2.55E-01	2.02E-01
Copper	3.44E+00	1.99E+00	1.15E+00	1.20E-01	6.97E-02	4.03E-02	1.39E+00	8.02E-01	4.64E-01	6.71E-02	3.88E-02	2.25E-02	7.26E+00	4.20E+00	2.43E+00	2.38E-02	2.10E-02	1.84E-02	2.31E-01	1.79E-01	1.39E-01	4.66E-01	4.10E-01	3.60E-01
Lead	2.37E-01	1.06E-01	4.75E-02	1.42E-01	6.33E-02	2.83E-02	3.54E-01	2.50E-01	1.77E-01	3.53E-03	1.58E-03	7.05E-04	9.14E-02	4.09E-02	1.83E-02	4.42E-02	3.21E-02	2.33E-02	1.84E-01	1.33E-01	9.69E-02	6.36E-02	4.62E-02	3.36E-02
Mercury	1.56E+00	9.00E-01	5.19E-01	3.52E-01	2.03E-01	1.17E-01	8.90E-01	5.14E-01	2.97E-01	3.02E-02	1.93E-02	1.23E-02	1.69E+00	9.74E-01	5.62E-01	3.88E-02	3.02E-02	2.36E-02	5.05E-01	2.26E-01	1.01E-01	7.03E-02	5.47E-02	4.27E-02
Nickel	8.38E-02	3.75E-02	1.68E-02	3.17E-02	1.42E-02	6.34E-03	3.15E-02	1.41E-02	6.30E-03	2.02E-02	9.02E-03	4.03E-03	3.28E-02	1.46E-02	6.55E-03	7.49E-02	5.30E-02	3.75E-02	1.65E-01	1.17E-01	8.26E-02	6.78E-02	4.80E-02	3.39E-02
Polychlorinated Biphenyls																								
Aroclor-1260	5.24E-01	2.35E-01	1.05E-01	1.64E-01	7.32E-02	3.27E-02	3.64E-02	1.63E-02	7.28E-03	2.05E+00	9.18E-01	4.11E-01	1.86E+00	8.33E-01	3.73E-01	1.33E+00	5.97E-01	2.67E-01	1.30E-01	5.82E-02	2.60E-02	4.34E-01	1.94E-01	8.69E-02
PCB (total)	1.96E+00	8.76E-01	3.92E-01	6.50E-01	2.91E-01	1.30E-01	3.85E-02	1.72E-02	7.69E-03	3.24E+00	1.45E+00	6.49E-01	1.86E+00	8.33E-01	3.73E-01	5.63E+00	2.52E+00	1.13E+00	1.51E-01	6.75E-02	3.02E-02	6.15E-01	2.75E-01	1.23E-01
Pesticides																								
Dieldrin	8.81E-02	1.21E-02	1.65E-03	2.19E-02	3.00E-03	4.10E-04	1.37E-02	1.88E-03	2.58E-04	6.85E-02	9.38E-03	1.28E-03	2.42E-02	3.31E-03	4.53E-04	1.00E-01	7.09E-02	5.01E-02	4.51E-02	3.19E-02	2.25E-02	3.02E-02	2.13E-02	1.51E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	2.26E+00	7.15E-01	2.26E-01	9.39E-01	2.97E-01	9.39E-02	0.00E+00	0.00E+00	0.00E+00	6.82E-01	2.16E-01	6.82E-02	0.00E+00	0.00E+00	0.00E+00	7.22E+00	2.28E+00	7.22E-01	0.00E+00	0.00E+00	0.00E+00	3.87E-01	1.22E-01	3.87E-02

Table D-101B
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - 95% UCL - Group 4C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	4.91E-02	3.11E-02	1.97E-02	1.80E-02	1.14E-02	7.19E-03	2.63E-02	1.67E-02	1.05E-02	6.01E-03	3.80E-03	2.41E-03	1.44E-01	8.33E-02	4.81E-02	3.39E-02	2.68E-02	2.12E-02	8.68E-01	3.88E-01	1.74E-01	1.20E-01	9.49E-02	7.51E-02
Copper	2.38E-01	1.37E-01	7.95E-02	7.50E-02	4.34E-02	2.51E-02	1.32E-01	7.65E-02	4.43E-02	2.51E-02	1.45E-02	8.39E-03	3.47E-01	2.01E-01	1.16E-01	1.08E-02	9.49E-03	8.35E-03	9.75E-02	7.55E-02	5.85E-02	2.98E-02	2.62E-02	2.30E-02
Lead	4.22E-02	1.89E-02	8.43E-03	2.50E-02	1.12E-02	4.99E-03	1.09E-01	7.72E-02	5.46E-02	1.32E-03	5.89E-04	2.64E-04	4.39E-02	1.96E-02	8.77E-03	6.57E-03	4.77E-03	3.47E-03	6.62E-02	4.81E-02	3.50E-02	2.47E-02	1.79E-02	1.30E-02
Mercury	5.39E-01	3.11E-01	1.80E-01	2.50E-01	1.44E-01	8.32E-02	2.60E-01	1.50E-01	8.68E-02	2.13E-02	1.36E-02	8.71E-03	3.38E-01	1.95E-01	1.13E-01	2.32E-02	1.80E-02	1.41E-02	2.19E-01	9.80E-02	4.38E-02	1.84E-02	1.43E-02	1.12E-02
Nickel	2.73E-02	1.22E-02	5.46E-03	1.43E-02	6.39E-03	2.86E-03	1.01E-02	4.50E-03	2.01E-03	7.54E-03	3.37E-03	1.51E-03	1.63E-02	7.30E-03	3.27E-03	2.71E-02	1.92E-02	1.36E-02	6.28E-02	4.44E-02	3.14E-02	2.89E-02	2.04E-02	1.44E-02
Polychlorinated Biphenyls																								
Aroclor-1260	1.14E-01	5.09E-02	2.27E-02	5.40E-02	2.41E-02	1.08E-02	5.21E-03	2.33E-03	1.04E-03	1.45E+00	6.48E-01	2.90E-01	4.60E-01	2.06E-01	9.20E-02	3.60E-01	1.61E-01	7.20E-02	2.47E-02	1.10E-02	4.93E-03	8.50E-02	3.80E-02	1.70E-02
PCB (total)	6.32E-01	2.82E-01	1.26E-01	3.06E-01	1.37E-01	6.12E-02	5.53E-03	2.47E-03	1.11E-03	2.29E+00	1.02E+00	4.58E-01	4.60E-01	2.06E-01	9.20E-02	2.26E+00	1.01E+00	4.52E-01	2.86E-02	1.28E-02	5.72E-03	1.45E-01	6.49E-02	2.90E-02
Pesticides																								
Dieldrin	2.69E-02	3.69E-03	5.05E-04	9.38E-03	1.28E-03	1.76E-04	2.71E-03	3.71E-04	5.09E-05	3.06E-02	4.19E-03	5.73E-04	1.48E-02	2.03E-03	2.78E-04	3.29E-02	2.33E-02	1.64E-02	7.23E-03	5.11E-03	3.62E-03	1.36E-02	9.64E-03	6.82E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	8.31E-01	2.63E-01	8.31E-02	4.73E-01	1.50E-01	4.73E-02	0.00E+00	0.00E+00	0.00E+00	4.81E-01	1.52E-01	4.81E-02	0.00E+00	0.00E+00	0.00E+00	2.91E+00	9.21E-01	2.91E-01	0.00E+00	0.00E+00	0.00E+00	1.16E-01	3.66E-02	1.16E-02

Table D-101C
Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 3A) - Mean - Group 4C
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	3.32E-02	2.10E-02	1.33E-02	9.21E-03	5.83E-03	3.69E-03	1.93E-02	1.22E-02	7.73E-03	4.10E-03	2.60E-03	1.64E-03	1.07E-01	6.19E-02	3.58E-02	1.97E-02	1.56E-02	1.23E-02	6.09E-01	2.72E-01	1.22E-01	8.52E-02	6.75E-02	5.34E-02
Copper	1.73E-01	1.00E-01	5.80E-02	6.17E-02	3.57E-02	2.07E-02	1.02E-01	5.91E-02	3.42E-02	2.12E-02	1.23E-02	7.09E-03	2.26E-01	1.31E-01	7.57E-02	9.17E-03	8.06E-03	7.09E-03	7.64E-02	5.91E-02	4.58E-02	2.04E-02	1.80E-02	1.58E-02
Lead	2.65E-02	1.18E-02	5.30E-03	1.23E-02	5.50E-03	2.46E-03	8.35E-02	5.90E-02	4.17E-02	1.11E-03	4.98E-04	2.23E-04	3.45E-02	1.54E-02	6.90E-03	3.33E-03	2.42E-03	1.76E-03	4.85E-02	3.53E-02	2.56E-02	1.79E-02	1.30E-02	9.47E-03
Mercury	4.34E-01	2.50E-01	1.45E-01	2.11E-01	1.22E-01	7.04E-02	2.22E-01	1.28E-01	7.41E-02	1.96E-02	1.25E-02	8.00E-03	2.62E-01	1.51E-01	8.72E-02	1.89E-02	1.47E-02	1.15E-02	1.88E-01	8.42E-02	3.77E-02	1.49E-02	1.16E-02	9.05E-03
Nickel	2.19E-02	9.82E-03	4.39E-03	1.08E-02	4.83E-03	2.16E-03	7.28E-03	3.25E-03	1.46E-03	6.37E-03	2.85E-03	1.27E-03	1.24E-02	5.55E-03	2.48E-03	2.22E-02	1.57E-02	1.11E-02	4.39E-02	3.10E-02	2.19E-02	2.07E-02	1.46E-02	1.03E-02
Polychlorinated Biphenyls																								
Aroclor-1260	8.06E-02	3.61E-02	1.61E-02	3.85E-02	1.72E-02	7.69E-03	3.61E-03	1.62E-03	7.23E-04	9.01E-01	4.03E-01	1.80E-01	3.35E-01	1.50E-01	6.69E-02	2.56E-01	1.15E-01	5.13E-02	1.76E-02	7.87E-03	3.52E-03	5.89E-02	2.63E-02	1.18E-02
PCB (total)	3.31E-01	1.48E-01	6.62E-02	1.62E-01	7.24E-02	3.24E-02	3.84E-03	1.72E-03	7.68E-04	1.26E+00	5.61E-01	2.51E-01	3.34E-01	1.50E-01	6.69E-02	1.17E+00	5.25E-01	2.35E-01	2.04E-02	9.11E-03	4.07E-03	8.84E-02	3.95E-02	1.77E-02
Pesticides																								
Dieldrin	2.07E-02	2.84E-03	3.89E-04	6.75E-03	9.24E-04	1.27E-04	2.71E-03	3.71E-04	5.09E-05	1.70E-02	2.33E-03	3.19E-04	1.48E-02	2.03E-03	2.78E-04	2.31E-02	1.63E-02	1.15E-02	7.23E-03	5.11E-03	3.62E-03	1.34E-02	9.45E-03	6.68E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	4.67E-01	1.48E-01	4.67E-02	2.67E-01	8.45E-02	2.67E-02	0.00E+00	0.00E+00	0.00E+00	2.22E-01	7.02E-02	2.22E-02	0.00E+00	0.00E+00	0.00E+00	1.42E+00	4.49E-01	1.42E-01	0.00E+00	0.00E+00	0.00E+00	6.00E-02	1.90E-02	6.00E-03

Table D-102
Screening Statistics - Penniman Lake Frog Tissue (wet weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	NOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 2 COPC?	Maximum Background Value	Frequency of UTL Exceedance	Maximum Ratio	LOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Pesticides (UG/KG)																							
4,4'-DDE	1.90 - 2.00	5 / 8	1.10	10.0	CAPL-TS05-1012	2.88	3.13	4.98	NSV	-- / --	NSV	NSV	NSV	YES	74.0	0 / 8	0.14	--	-- / --	--	--	--	NO
4,4'-DDT	1.90 - 2.00	4 / 8	1.70	5.60	CAPL-TS04-1012	2.79	2.31	4.34	NSV	-- / --	NSV	NSV	NSV	YES	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	YES
alpha-BHC	1.90 - 2.00	1 / 8	1.10	1.10	CAPL-TS03-1012	0.98	0.053	1.02	NSV	-- / --	NSV	NSV	NSV	YES	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	YES
beta-BHC	1.90 - 2.00	3 / 8	1.00	2.40	CAPL-TS06-1012	1.21	0.51	1.54	NSV	-- / --	NSV	NSV	NSV	YES	1.00	3 / 8	2.40	NSV	-- / --	NSV	NSV	NSV	YES
Dieldrin	1.90 - 2.00	2 / 8	1.60	2.10	CAPL-TS04-1012	1.19	0.43	1.48	NSV	-- / --	NSV	NSV	NSV	YES	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	YES
Endosulfan II	1.90 - 2.00	1 / 8	1.10	1.10	CAPL-TS01-1012	0.98	0.053	1.02	NSV	-- / --	NSV	NSV	NSV	YES	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	YES
Endosulfan sulfate	1.90 - 2.00	5 / 8	0.88	7.00	CAPL-TS04-1012	3.02	2.36	4.60	NSV	-- / --	NSV	NSV	NSV	YES	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	YES
Endrin	1.90 - 2.00	1 / 8	1.50	1.50	CAPL-TS05-1012	1.04	0.19	1.16	60.0	0 / 8	0.03	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Endrin aldehyde	1.90 - 2.00	1 / 8	0.83	0.83	CAPL-TS03-1012	0.95	0.053	0.98	60.0	0 / 8	0.01	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
gamma-BHC (Lindane)	1.90 - 2.00	2 / 8	0.97	1.30	CAPL-TS01-1012	1.01	0.12	1.09	NSV	-- / --	NSV	NSV	NSV	YES	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	YES
gamma-Chlordane	1.90 - 2.00	3 / 8	1.70	2.40	CAPL-TS04-1012	1.38	0.58	1.76	NSV	-- / --	NSV	NSV	NSV	YES	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	YES
Heptachlor epoxide	1.90 - 2.00	1 / 8	1.20	1.20	CAPL-TS04-1012	1.00	0.085	1.06	NSV	-- / --	NSV	NSV	NSV	YES	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	YES
Dioxin-Like PCB Congeners (PG/G)																							
3,3',4,4'-Tetrachlorobiphenyl (77)	12.0 - 12.0	8 / 9	3.47	30.9	CAPL-TS07-1012	14.7	10.8	21.4	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
3,4,4',5-Tetrachlorobiphenyl (81)	12.0 - 14.8	5 / 9	2.44	11.1	CAPL-TS06-1012	7.49	2.52	9.05	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	9 / 9	29.8	567	CAPL-TS06-1012	239	204	365	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3,4,4',5-Pentachlorobiphenyl (114)	12.8 - 81.5	3 / 9	7.24	166	CAPL-TS06-1012	38.8	52.8	71.6	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	9 / 9	313	19,100	CAPL-TS06-1012	4,715	6,281	8,608	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3',4,4',5'-Pentachlorobiphenyl (123)	76.6 - 87.3	7 / 9	7.32	79.7	CAPL-TS06-1012	31.9	27.8	49.1	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
3,3',4,4',5-Pentachlorobiphenyl (126)	13.4 - 13.7	7 / 9	12.5	430	CAPL-TS06-1012	136	157	233	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Congeners (156/157)	-- - --	9 / 9	235	25,500	CAPL-TS06-1012	7,116	8,980	12,682	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	9 / 9	180	11,900	CAPL-TS06-1012	3,727	4,388	6,447	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	12.0 - 153	0 / 9	--	--	--	15.3	23.1	29.6	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	9 / 9	81.9	6,350	CAPL-TS06-1012	2,309	2,662	3,959	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
TEQ (Fish)	-- - --	9 / 9	0.0060	2.47	CAPL-TS06-1012	0.77	0.91	1.33	NSV	-- / --	NSV	NSV	NSV	YES	0.57	4 / 9	4.36	NSV	-- / --	NSV	NSV	NSV	YES
PCB Homologues (PG/G)																							
Total Monochlorobiphenyls	0.91 - 2.26	0 / 9	--	--	--	0.79	0.20	0.91	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Dichlorobiphenyls	-- - --	9 / 9	23.7	64.8	CAPL-TS09-1012	36.5	12.9	44.5	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Trichlorobiphenyls	-- - --	9 / 9	84.2	540	CAPL-TS07-1012	269	155	365	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Tetrachlorobiphenyls	-- - --	9 / 9	2,030	11,900	CAPL-TS01-1012	6,888	3,520	9,070	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Pentachlorobiphenyls	-- - --	9 / 9	1,760	31,500	CAPL-TS06-1012	13,812	11,158	20,728	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Hexachlorobiphenyls	-- - --	9 / 9	9,830	1,030,000	CAPL-TS06-1012	276,970	354,559	496,743	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Heptachlorobiphenyls	-- - --	9 / 9	10,300	1,150,000	CAPL-TS06-1012	356,622	431,628	624,167	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Octachlorobiphenyls	-- - --	9 / 9	2,500	275,000	CAPL-TS06-1012	100,029	116,489	172,234	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Nonachlorobiphenyls	-- - --	9 / 9	213	20,600	CAPL-TS01-1012	8,270	9,443	14,123	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Decachlorobiphenyl (209)	23.8 - 46.0	5 / 9	83.2	367	CAPL-TS01-1012	145	146	235	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
PCBs (total)	-- - --	9 / 9	38,293	2,511,118	CAPL-TS06-1012	763,034	914,508	1,329,891	22,800,000	0 / 9	0.11	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Metals (MG/KG)																							
Arsenic	0.19 - 0.19	8 / 9	0.064	1.90	CAPL-TS09-1012	0.31	0.60	0.68	NSV	-- / --	NSV	NSV	NSV	YES	0.13	3 / 9	14.6	NSV	-- / --	NSV	NSV	NSV	YES
Cadmium	-- - --	9 / 9	0.030	0.19	CAPL-TS09-1012	0.083	0.049	0.11	3.80	0 / 9	0.05	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Chromium	0.78 - 0.99	1 / 9	3.10	3.10	CAPL-TS09-1012	0.76	0.88	1.31	NSV	-- / --	NSV	NSV	NSV	YES	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	YES
Copper	-- - --	9 / 9	0.40	2.50	CAPL-TS01-1012	1.59	0.63	1.98	13.0	0 / 9	0.19	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Mercury	-- - --	9 / 9	0.021	0.044	CAPL-TS01-1012	0.029	0.0071	0.034	NSV	-- / --	NSV	NSV	NSV	YES	0.015	9 / 9	2.93	NSV	-- / --	NSV	NSV	NSV	YES
Nickel	0.47 - 0.49	4 / 9	0.27	1.10	CAPL-TS09-1012	0.38	0.29	0.55	0.122	4 / 9	9.02	4.54	3.09	YES	--	-- / --	--	0.610	1 / 9	1.80	0.91	0.62	YES
Selenium	-- - --	9 / 9	0.20	0.48	CAPL-TS09-1012	0.32	0.085	0.37	NSV	-- / --	NSV	NSV	NSV	YES	0.43	1 / 9	1.12	NSV	-- / --	NSV	NSV	NSV	YES
Silver	-- - --	9 / 9	0.0029	0.011	CAPL-TS05-1012	0.0072	0.0027	0.0089	NSV	-- / --	NSV	NSV	NSV	YES	0.0095	3 / 9	1.16	NSV	-- / --	NSV	NSV	NSV	YES

Table D-102
Screening Statistics - Penniman Lake Frog Tissue (wet weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	NOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 2 COPC?	Maximum Background Value	Frequency of UTL Exceedance	Maximum Ratio	LOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Zinc	-- - --	9 / 9	13.0	33.0	CAPL-TS01-1012	23.3	6.38	27.3	9.80	9 / 9	3.37	2.78	2.38	YES	23.0	4 / 9	1.43	49.0	0 / 9	0.67	--	--	YES
Other Parameters																							
Percent Moisture	-- - --	9 / 9	75.0	81.0	CAPL-TS06-1012	77.2	2.11	78.5	--	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Percent Lipids	-- - --	9 / 9	0.64	2.20	CAPL-TS05-1012	1.43	0.56	1.78	--	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV

Table D-103
Exceedances - Penniman Lake Frog Tissue
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Frog Tissue NOEC ESV	Maximum Background Value	CAPL-TS01 CAPL-TS01-1012 10/24/2012	CAPL-TS02 CAPL-TS02-1012 10/24/2012	CAPL-TS03 CAPL-TS03-1012 10/24/2012	CAPL-TS04 CAPL-TS04-1012 10/24/2012	CAPL-TS05 CAPL-TS05-1012 10/24/2012	CAPL-TS06 CAPL-TS06-1012 10/24/2012	CAPL-TS07 CAPL-TS07-1012 10/24/2012	CAPL-TS08 CAPL-TS08-1012 10/24/2012	CAPL-TS09 CAPL-TS09-1012 10/24/2012
Pesticides (UG/KG)											
4,4'-DDE	NSV	74.0	2.3	2 U	2 U	4.6	10	1.1 J	2.1	1.9 U	NA
4,4'-DDT	NSV	--	2 U	2 U	2 U	5.6 J	1.7 J	5.6 J	5.5 J	1.9 U	NA
alpha-BHC	NSV	--	2 U	2 U	1.1 J	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA
beta-BHC	NSV	1.00	2 U	1.4 J	2 U	1.9 U	1.9 U	2.4	1.9 U	1.0 J	NA
Dieldrin	NSV	--	2 U	2 U	2 U	2.1 J	1.9 U	1.9 U	1.6 J	1.9 U	NA
Endosulfan II	NSV	--	1.1 J	2 U	2 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA
Endosulfan sulfate	NSV	--	4.7 J	2 U	2 U	7.0 J	0.88 J	4.2 J	4.4 J	1.9 U	NA
Endrin	60.0	--	2 U	2 U	2 U	1.9 U	1.5 J	1.9 U	1.9 U	1.9 U	NA
Endrin aldehyde	60.0	--	2 U	2 U	0.83 J	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	NA
gamma-BHC (Lindane)	NSV	--	1.3 J	2 U	2 U	0.97 J	1.9 U	1.9 U	1.9 U	1.9 U	NA
gamma-Chlordane	NSV	--	2 U	2 U	2 U	2.4	1.9 U	1.7 J	2.0	1.9 U	NA
Heptachlor epoxide	NSV	--	2 U	2 U	2 U	1.2 J	1.9 U	1.9 U	1.9 U	1.9 U	NA
Dioxin-Like PCB Congeners (PG/G)											
3,3',4,4'-Tetrachlorobiphenyl (77)	TEQ	--	20 J	3.47 J	12 U	26.8	4.41 J	11 J	30.9 J	5.35 J	24.4
3,4,4',5-Tetrachlorobiphenyl (81)	TEQ	--	9.19 J	13.4 U	12 U	9.33 J	14.8 U	11.1 J	8.82 J	12.8 U	2.44 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	TEQ	--	241 K	29.8	44.3	412	59.6	567	450	53.7	291
2,3,4,4',5-Pentachlorobiphenyl (114)	TEQ	--	75.2 U	13.4 U	7.24 J	81.5 U	14.8 U	166	70.7	12.8 U	13.7 U
2,3',4,4',5-Pentachlorobiphenyl (118)	TEQ	--	5,950 K	313	375	6,890	417	19,100	8,170	373	849
2,3',4,4',5'-Pentachlorobiphenyl (123)	TEQ	--	76.6 U	7.32 J	11 J	87.3 U	10.6 J	79.7	70.6	10.8 J	14.7 J
3,3',4,4',5-Pentachlorobiphenyl (126)	TEQ	--	250 K	13.4 U	24 J	251	12.5 J	430 J	227	13.8 J	13.7 U
Congeners (156/157)	TEQ	--	11,700 K	235	782	14,000	252	25,500	10,800	269	507
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	TEQ	--	6,920 K	180	570	7,620	261	11,900	5,560	202	326
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	TEQ	--	5,220	81.9	343	4,950	89.9	6,350	3,530	87.2	133
TEQ (Fish)	NSV	0.57	1.41	0.00597	0.131	1.44	0.0702	2.47	1.29	0.0767	0.0230
PCB Homologues (PG/G)											
Total Dichlorobiphenyls	Total PCBs	--	32.4	28.9	23.7	29.8	49.7	29	38.1	32.2	64.8
Total Trichlorobiphenyls	Total PCBs	--	316	171	84.2	480	274	189	540	246	121
Total Tetrachlorobiphenyls	Total PCBs	--	11,900	6,070	2,030	10,600	6,580	4,340	8,500	9,530	2,440
Total Pentachlorobiphenyls	Total PCBs	--	20,500	4,500	1,760	26,200	4,570	31,500	21,900	7,280	6,100
Total Hexachlorobiphenyls	Total PCBs	--	383,000	14,500	9,830	544,000	17,300	1,030,000	436,000	19,200	38,900
Total Heptachlorobiphenyls	Total PCBs	--	735,000	10,300	22,800	639,000	13,000	1,150,000	602,000	12,000	25,500
Total Octachlorobiphenyls	Total PCBs	--	230,000	2,510	9,120	209,000	2,620	275,000	162,000	2,500	7,510
Total Nonachlorobiphenyls	Total PCBs	--	20,600	213	1,070	18,200	246	19,800	13,400	240	660
Decachlorobiphenyl (209)	Total PCBs	--	367	25.8 B	46 B	337	37.8 B	260	187	23.8 B	83.2
PCBs (total)	22,800,000	203,917	1,401,715	38,293	46,718	1,447,847	44,641	2,511,118	1,244,565	51,028	81,379
Metals (MG/KG)											
Arsenic	NSV	0.13	0.25	0.10 J	0.19 U	0.20 J	0.07 J	0.068 J	0.064 J	0.065 J	1.9
Cadmium	3.80	0.084	0.08	0.03	0.032	0.078	0.11	0.085	0.094	0.044	0.19
Chromium	NSV	--	0.98 U	0.96 U	0.95 U	0.99 U	0.98 U	0.98 U	0.78 U	0.94 U	3.1
Copper	13.0	2.20	2.5	0.94 J	0.4 J	1.5	2	2.1	1.6	1.5	1.8
Mercury	NSV	0.015	0.044	0.024 J	0.035	0.032	0.03	0.021 J	0.023 J	0.027 J	0.027
Nickel	0.122	--	0.49 U	0.48 U	0.47 U	0.49 U	0.31 J	0.51	0.27 J	0.47 U	1.1

Table D-103
Exceedances - Penniman Lake Frog Tissue
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Frog Tissue NOEC ESV	Maximum Background Value	CAPL-TS01 CAPL-TS01-1012 10/24/2012	CAPL-TS02 CAPL-TS02-1012 10/24/2012	CAPL-TS03 CAPL-TS03-1012 10/24/2012	CAPL-TS04 CAPL-TS04-1012 10/24/2012	CAPL-TS05 CAPL-TS05-1012 10/24/2012	CAPL-TS06 CAPL-TS06-1012 10/24/2012	CAPL-TS07 CAPL-TS07-1012 10/24/2012	CAPL-TS08 CAPL-TS08-1012 10/24/2012	CAPL-TS09 CAPL-TS09-1012 10/24/2012
Selenium	NSV	0.43	0.40	0.36	0.20	0.27	0.34	0.25	0.29	0.28	0.48
Silver	NSV	0.0095	0.0078 J	0.0096 J	0.01	0.0039 J	0.011	0.0029 J	0.007 J	0.0066 J	0.0062 J
Zinc	9.80	23.0	33	18	21	21	31	24	21	13	28
Other Parameters											
Percent Moisture	--	--	76	80	75	78	75	81	77	77	76
Percent Lipids	--	--	1.80	0.64	0.91	1.60	2.20	0.95	1.90	1.00	1.90

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-104
Screening Statistics - Penniman Lake - Whole-Body Fish Tissue (wet weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	NOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 2 COPC?	Maximum Background Value	Frequency of UTL Exceedance	Maximum Ratio	LOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Pesticides (UG/KG)																							
4,4'-DDD	-- - --	6 / 6	3.00	18.0	CAPL-TS15-WB-1012	7.78	5.84	12.6	600	0 / 6	0.03	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
4,4'-DDE	-- - --	6 / 6	18.0	72.0	CAPL-TS14-WB-1012	43.7	23.5	63.0	600	0 / 6	0.12	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
4,4'-DDT	-- - --	6 / 6	2.30	37.0	CAPL-TS14-WB-1012	10.8	13.1	21.6	600	0 / 6	0.06	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
beta-BHC	7.30 - 11.0	3 / 6	1.50	2.00	CAPL-TS10-WB-1012	3.26	1.72	4.67	42,000	0 / 6	0.00005	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Endosulfan sulfate	-- - --	6 / 6	6.20	120	CAPL-TS14-WB-1012	29.4	44.6	66.2	210	0 / 6	0.57	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Endrin	1.90 - 11.0	3 / 6	2.90	5.00	CAPL-TS14-WB-1012	3.21	1.77	4.66	310	0 / 6	0.02	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
gamma-Chlordane	-- - --	6 / 6	3.60	36.0	CAPL-TS14-WB-1012	12.3	12.2	22.4	1,380	0 / 6	0.03	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Dioxin-Like PCB Congeners (PG/G)																							
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	6 / 6	16.6	389	CAPL-TS14-WB-1012	136	137	249	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
3,4,4',5-Tetrachlorobiphenyl (81)	13.1 - 54.9	1 / 6	3.48	3.48	CAPL-TS10-WB-1012	10.7	8.59	17.7	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	6 / 6	617	4,270	CAPL-TS14-WB-1012	1,676	1,350	2,787	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3,4,4',5-Pentachlorobiphenyl (114)	13.1 - 85.0	0 / 6	--	--	--	14.7	14.4	26.6	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	6 / 6	3,040	29,500	CAPL-TS14-WB-1012	9,988	9,851	18,092	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3',4,4',5'-Pentachlorobiphenyl (123)	88.7 - 88.7	5 / 6	29.0	406	CAPL-TS14-WB-1012	119	143	237	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
3,3',4,4',5-Pentachlorobiphenyl (126)	13.1 - 98.0	2 / 6	157	334	CAPL-TS13-WB-1012	95.7	130	202	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Congeners (156/157)	-- - --	6 / 6	1,290	23,000	CAPL-TS14-WB-1012	6,573	8,156	13,283	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	6 / 6	804	12,200	CAPL-TS14-WB-1012	3,682	4,244	7,173	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	13.1 - 298	0 / 6	--	--	--	37.3	56.9	84.1	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	6 / 6	310	6,770	CAPL-TS14-WB-1012	1,802	2,455	3,821	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
TEQ (Fish)	-- - --	6 / 6	0.070	1.85	CAPL-TS13-WB-1012	0.60	0.70	1.17	23,500	0 / 6	0.0001	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
PCB Homologues (PG/G)																							
Total Monochlorobiphenyls	0.76 - 3.80	0 / 6	--	--	--	0.92	0.57	1.38	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Dichlorobiphenyls	-- - --	6 / 6	33.4	81.9	CAPL-TS15-WB-1012	53.9	19.3	69.8	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Trichlorobiphenyls	-- - --	6 / 6	793	3,840	CAPL-TS14-WB-1012	1,614	1,192	2,595	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Tetrachlorobiphenyls	-- - --	6 / 6	23,300	299,000	CAPL-TS14-WB-1012	77,217	109,104	166,970	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Pentachlorobiphenyls	-- - --	6 / 6	38,300	494,000	CAPL-TS14-WB-1012	137,017	176,202	281,968	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Hexachlorobiphenyls	-- - --	6 / 6	159,000	1,680,000	CAPL-TS14-WB-1012	555,667	564,124	1,019,738	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Heptachlorobiphenyls	-- - --	6 / 6	86,200	1,380,000	CAPL-TS14-WB-1012	411,033	482,491	807,949	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Octachlorobiphenyls	-- - --	6 / 6	21,200	510,000	CAPL-TS14-WB-1012	125,383	189,453	281,235	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Nonachlorobiphenyls	-- - --	6 / 6	1,280	42,600	CAPL-TS14-WB-1012	9,547	16,248	22,913	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Decachlorobiphenyl (209)	42.6 - 109	1 / 6	611	611	CAPL-TS14-WB-1012	134	234	326	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
PCBs (total)	-- - --	6 / 6	330,108	4,410,084	CAPL-TS14-WB-1012	1,317,633	1,536,713	2,581,795	2,800,000	1 / 6	1.58	0.92	0.47	YES	220,434	6 / 6	20.0	11,000,000	0 / 6	0.40	0.23	0.12	NO
Metals (MG/KG)																							
Arsenic	0.18 - 0.19	4 / 6	0.056	0.099	CAPL-TS10-WB-1012	0.089	0.017	0.10	1.80	0 / 6	0.06	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Cadmium	0.027 - 0.029	1 / 6	0.011	0.011	CAPL-TS10-WB-1012	0.014	0.0013	0.015	0.036	0 / 6	0.31	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Mercury	-- - --	6 / 6	0.010	0.028	CAPL-TS13-WB-1012	0.018	0.0077	0.024	0.21	0 / 6	0.13	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Selenium	-- - --	6 / 6	0.13	0.28	CAPL-TS15-WB-1012	0.20	0.049	0.24	0.80	0 / 6	0.35	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Zinc	-- - --	6 / 6	20.0	42.0	CAPL-TS12-WB-1012	27.7	8.16	34.4	60.0	0 / 6	0.70	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Other Parameters																							
Percent Moisture	-- - --	6 / 6	71.0	77.0	CAPL-TS11-WB-1012	74.3	2.42	76.3	--	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Percent Lipids	-- - --	6 / 6	1.80	9.10	CAPL-TS15-WB-1012	3.73	2.71	5.96	--	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV

Table D-105
Exceedances - Penniman Lake Whole-Body Fish Tissue
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Fish Tissue NOEC ESV	Maximum Background Value	CAPL-TS10 CAPL-TS10-WB-1012 10/10/2012	CAPL-TS11 CAPL-TS11-WB-1012 10/10/2012	CAPL-TS12 CAPL-TS12-WB-1012 10/10/2012	CAPL-TS13 CAPL-TS13-WB-1012 10/10/2012	CAPL-TS14 CAPL-TS14-WB-1012 10/10/2012	CAPL-TS15 CAPL-TS15-WB-1012 10/10/2012
Pesticides (UG/KG)								
4,4'-DDD	600	2.30	3.3	3 J	4.3	11	7.1 J	18
4,4'-DDE	600	15.0	18	27	29 J	44	72	72
4,4'-DDT	600	1.80	2.3 J	4.4 J	3.4 J	8.5 J	37 J	9 J
beta-BHC	42,000	2.30	2 J	1.5 J	1.9 J	7.3 U	10 U	11 U
Endosulfan sulfate	210	--	6.6	9.8 J	6.2 J	19 J	120 J	15 J
Endrin	310	0.70	1.9 U	3.1 J	3.6 U	2.9 J	5 J	11 U
gamma-Chlordane	1,380	--	3.6	6.2	4.1 J	14	36 J	10 J
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	--	--	79	55.1	86.7	192	389	16.6 J
3,4,4',5-Tetrachlorobiphenyl (81)	--	--	3.48 J	17.2 U	13.8 U	21.9 U	54.9 U	13.1 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	--	--	617	1,000	791	1,580	4,270	1,800
2,3',4,4',5-Pentachlorobiphenyl (118)	--	--	3,040	5,690	4,160	8,130	29,500	9,410
2,3',4,4',5'-Pentachlorobiphenyl (123)	--	--	29 J	88.7 U	45.4	87.6 J	406	102
3,3',4,4',5-Pentachlorobiphenyl (126)	--	--	13.4 U	98 U	157	334	41.4 U	13.1 U
Congeners (156/157)	--	--	1,290	3,530	2,340	4,330	23,000	4,950
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	--	--	804	2,270	1,390	2,500	12,200	2,930
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	--	--	310	875	585	1,160	6,770	1,110
TEQ (Fish)	23,500	0.035	0.0703	0.0944	0.875	1.85	0.575	0.110
PCB Homologues (PG/G)								
Total Dichlorobiphenyls	--	--	34.6	45.2	64.8	63.7	33.4	81.9
Total Trichlorobiphenyls	--	--	793	937	826	2,090	3,840	1,200
Total Tetrachlorobiphenyls	--	--	23,300	30,100	25,200	51,100	299,000	34,600
Total Pentachlorobiphenyls	--	--	38,300	68,300	46,400	98,200	494,000	76,900
Total Hexachlorobiphenyls	--	--	159,000	356,000	223,000	451,000	1,680,000	465,000
Total Heptachlorobiphenyls	--	--	86,200	239,000	152,000	314,000	1,380,000	295,000
Total Octachlorobiphenyls	--	--	21,200	45,000	35,400	75,900	510,000	64,800
Total Nonachlorobiphenyls	--	--	1,280	2,660	2,000	5,140	42,600	3,600
Decachlorobiphenyl (209)	--	--	42.6 B	63.8 B	58.8 B	109 B	611	106 B
PCBs (total)	2,800,000	220,434	330,108	742,042	484,891	997,494	4,410,084	941,182
Metals (MG/KG)								
Arsenic	1.80	0.38	0.099 J	0.19 U	0.099 J	0.056 J	0.096 J	0.18 U
Cadmium	0.036	--	0.011 J	0.028 U	0.029 U	0.028 U	0.028 U	0.027 U

Table D-105
Exceedances - Penniman Lake Whole-Body Fish Tissue
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Fish Tissue NOEC ESV	Maximum Background Value	CAPL-TS10 CAPL-TS10-WB-1012 10/10/2012	CAPL-TS11 CAPL-TS11-WB-1012 10/10/2012	CAPL-TS12 CAPL-TS12-WB-1012 10/10/2012	CAPL-TS13 CAPL-TS13-WB-1012 10/10/2012	CAPL-TS14 CAPL-TS14-WB-1012 10/10/2012	CAPL-TS15 CAPL-TS15-WB-1012 10/10/2012
Mercury	0.21	0.014	0.01 J	0.014 J	0.017 J	0.028	0.011 J	0.026 J
Selenium	0.80	0.14	0.13	0.18	0.21	0.2	0.19	0.28
Zinc	60.0	36.0	31	21	42	24	20	28
Other Parameters								
Percent Moisture	--	--	76.0	77.0	76.0	72.0	74.0	71.0
Percent Lipids	--	--	3.00	1.80	3.10	3.40	2.00	9.10

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-106
Screening Statistics - Penniman Lake - Reconstituted Largemouth Bass Tissue (wet weight)
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	NOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 2 COPC?	Maximum Background Value	Frequency of UTL Exceedance	Maximum Ratio	LOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?
Pesticides (UG/KG)																							
4,4'-DDD	-- - --	3 / 3	3.77	10.6	CAPL-TS17-WB-1012	7.54	3.47	13.4	600	0 / 3	0.02	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
4,4'-DDE	-- - --	3 / 3	26.1	113	CAPL-TS17-WB-1012	70.0	43.6	143	600	0 / 3	0.19	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
4,4'-DDT	-- - --	3 / 3	7.77	31.6	CAPL-TS17-WB-1012	20.5	12.0	40.7	600	0 / 3	0.05	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
alpha-Chlordane	-- - --	3 / 3	6.39	20.8	CAPL-TS17-WB-1012	14.1	7.25	26.3	1,380	0 / 3	0.02	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
beta-BHC	-- - --	3 / 3	4.38	20.9	CAPL-TS17-WB-1012	13.4	8.34	27.4	42,000	0 / 3	0.0005	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
delta-BHC	5.95 - 15.0	1 / 3	20.8	20.8	CAPL-TS17-WB-1012	10.4	9.27	26.0	42,000	0 / 3	0.0005	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Endosulfan sulfate	-- - --	3 / 3	13.5	56.3	CAPL-TS17-WB-1012	40.1	23.2	79.1	210	0 / 3	0.27	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Endrin	-- - --	3 / 3	3.65	8.88	CAPL-TS17-WB-1012	6.17	2.62	10.6	310	0 / 3	0.03	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
gamma-BHC (Lindane)	-- - --	3 / 3	5.72	20.7	CAPL-TS17-WB-1012	13.7	7.56	26.5	297	0 / 3	0.07	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
gamma-Chlordane	5.95 - 5.95	2 / 3	32.0	39.1	CAPL-TS17-WB-1012	24.7	19.1	56.9	1,380	0 / 3	0.03	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Heptachlor epoxide	5.95 - 15.0	1 / 3	11.5	11.5	CAPL-TS17-WB-1012	7.31	4.24	14.5	3,700	0 / 3	0.003	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Polychlorinated Biphenyls (UG/KG)																							
Aroclor-1260	-- - --	3 / 3	453	3,624	CAPL-TS17-WB-1012	2,166	1,601	4,865	32,000	0 / 3	0.11	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Dioxin-Like PCB Congeners (PG/G)																							
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	3 / 3	49.2	671	CAPL-TS17-WB-1012	304	326	853	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
3,4,4',5-Tetrachlorobiphenyl (81)	14.3 - 79.3	0 / 3	--	--	--	18.0	18.7	49.6	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	3 / 3	922	13,396	CAPL-TS17-WB-1012	5,859	6,631	17,038	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3,4,4',5-Pentachlorobiphenyl (114)	14.7 - 218	0 / 3	--	--	--	44.5	56.2	139	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	3 / 3	4,936	108,328	CAPL-TS17-WB-1012	43,697	56,342	138,681	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	3 / 3	65.3	837	CAPL-TS17-WB-1012	376	408	1,063	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
3,3',4,4',5-Pentachlorobiphenyl (126)	14.7 - 251	0 / 3	--	--	--	50.2	65.4	160	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Congeners (156/157)	-- - --	3 / 3	3,404	47,410	CAPL-TS17-WB-1012	21,041	23,266	60,265	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	3 / 3	2,097	28,140	CAPL-TS17-WB-1012	12,560	13,755	35,748	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	54.1 - 274	0 / 3	--	--	--	71.7	57.7	169	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	3 / 3	821	13,167	CAPL-TS17-WB-1012	5,791	6,515	16,775	TEQ	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
TEQ (Fish)	-- - --	3 / 3	0.086	1.39	CAPL-TS17-WB-1012	0.60	0.70	1.77	23,500	0 / 3	0.0001	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
PCB Homologues (PG/G)																							
Total Monochlorobiphenyls	1.82 - 2.13	1 / 3	3.22	3.22	CAPL-TS17-WB-1012	1.73	1.29	3.90	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Dichlorobiphenyls	-- - --	3 / 3	29.0	86.0	CAPL-TS17-WB-1012	53.6	29.3	103	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Trichlorobiphenyls	-- - --	3 / 3	519	3,755	CAPL-TS17-WB-1012	1,822	1,707	4,700	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Tetrachlorobiphenyls	-- - --	3 / 3	13,362	140,705	CAPL-TS17-WB-1012	71,696	64,339	180,162	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Pentachlorobiphenyls	-- - --	3 / 3	49,256	716,627	CAPL-TS17-WB-1012	332,913	344,753	914,116	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Hexachlorobiphenyls	-- - --	3 / 3	327,467	2,473,090	CAPL-TS17-WB-1012	1,394,791	1,072,854	3,203,466	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Heptachlorobiphenyls	-- - --	3 / 3	215,845	1,594,619	CAPL-TS17-WB-1012	871,912	691,798	2,038,183	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Octachlorobiphenyls	-- - --	3 / 3	49,169	749,878	CAPL-TS17-WB-1012	336,526	366,953	955,155	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Total Nonachlorobiphenyls	-- - --	3 / 3	2,545	48,078	CAPL-TS17-WB-1012	21,392	23,757	61,443	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Decachlorobiphenyl (209)	58.7 - 58.7	2 / 3	238	956	CAPL-TS17-WB-1012	408	486	1,228	Total PCBs	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
PCBs (total)	-- - --	3 / 3	658,192	5,727,797	CAPL-TS17-WB-1012	3,031,504	2,550,188	7,330,751	2,800,000	1 / 3	2.05	2.62	1.08	YES	242,847	3 / 3	23.6	11,000,000	0 / 3	0.52	0.67	0.28	YES
Metals (MG/KG)																							
Arsenic	0.19 - 0.19	1 / 3	0.16	0.16	CAPL-TS16-WB-1012	0.12	0.035	0.17	1.80	0 / 3	0.09	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Mercury	-- - --	3 / 3	0.041	0.062	CAPL-TS17-WB-1012	0.054	0.012	0.074	0.21	0 / 3	0.30	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Selenium	-- - --	3 / 3	0.13	0.16	CAPL-TS16-WB-1012	0.15	0.014	0.17	0.80	0 / 3	0.20	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Zinc	-- - --	3 / 3	14.8	22.9	CAPL-TS16-WB-1012	18.4	4.09	25.3	60.0	0 / 3	0.38	--	--	NO	--	-- / --	--	--	-- / --	--	--	--	NO
Other Parameters																							
Percent Moisture	-- - --	3 / 3	68.0	73.4	CAPL-TS16-WB-1012	70.5	2.76	75.2	--	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Percent Lipids	-- - --	3 / 3	2.43	3.68	CAPL-TS18-WB-1012	2.86	0.71	4.05	--	-- / --	--	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling ESV

Table D-107
Exceedances - Penniman Lake Reconstituted Largemouth Bass Tissue
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Fish Tissue NOEC ESV	Maximum Background Value	CAPL-TS16 CAPL-TS16-WB-1012 10/10/2012	CAPL-TS17 CAPL-TS17-WB-1012 10/10/2012	CAPL-TS18 CAPL-TS18-WB-1012 10/10/2012
Pesticides (UG/KG)					
4,4'-DDD	600	3.86	3.77 J	10.6 J	8.25 J
4,4'-DDE	600	31.5	26.1 J	113	70.5 J
4,4'-DDT	600	2.78	7.77 J	31.6 J	22.1 J
alpha-Chlordane	1,380	1.58	6.39 J	20.8 J	15.0 J
beta-BHC	42,000	6.74	4.38 J	20.9 J	14.9 J
delta-BHC	42,000	--	5.95 U	20.8 J	15.0 U
Endosulfan sulfate	210	2.78	13.5 J	56.3 J	50.4 J
Endrin	310	1.63	3.65 J	8.88 J	5.98 J
gamma-BHC (Lindane)	297	--	5.72 J	20.7 J	14.7 J
gamma-Chlordane	1,380	1.59	5.95 U	39.1	32.0
Heptachlor epoxide	3,700	--	5.95 U	11.5 J	15.0 U
Polychlorinated Biphenyls (UG/KG)					
Aroclor-1260	32,000	135	453	3,624	2,422
Dioxin-Like PCB Congeners (PG/G)					
3,3',4,4'-Tetrachlorobiphenyl (77)	--	--	49.2 J	671	191 J
2,3,3',4,4'-Pentachlorobiphenyl (105)	--	--	922	13,396	3,259
2,3',4,4',5-Pentachlorobiphenyl (118)	--	--	4,936	108,328	17,826
2,3',4,4',5'-Pentachlorobiphenyl (123)	--	--	65.3 J	837	225 J
Congeners (156/157)	--	--	3,404	47,410	12,309
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	--	--	2,097	28,140	7,442
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	--	--	821	13,167	3,386
TEQ (Fish)	23,500	0.056	0.0858	1.39	0.318
PCB Homologues (PG/G)					
Total Monochlorobiphenyls	--	--	1.82 U	3.22	2.13 U
Total Dichlorobiphenyls	--	--	29.0	86.0	45.7
Total Trichlorobiphenyls	--	--	519	3,755	1,192
Total Tetrachlorobiphenyls	--	--	13,362	140,705	61,021
Total Pentachlorobiphenyls	--	--	49,256	716,627	232,857

Table D-107
Exceedances - Penniman Lake Reconstituted Largemouth Bass Tissue
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Fish Tissue NOEC ESV	Maximum Background Value	CAPL-TS16 CAPL-TS16-WB-1012 10/10/2012	CAPL-TS17 CAPL-TS17-WB-1012 10/10/2012	CAPL-TS18 CAPL-TS18-WB-1012 10/10/2012
Total Hexachlorobiphenyls	--	--	327,467	2,473,090	1,383,816
Total Heptachlorobiphenyls	--	--	215,845	1,594,619	805,271
Total Octachlorobiphenyls	--	--	49,169	749,878	210,531
Total Nonachlorobiphenyls	--	--	2,545	48,078	13,552
Decachlorobiphenyl (209)	--	--	58.7 B	956	238
PCBs (total)	2,800,000	242,847	658,192	5,727,797	2,708,524
Metals (MG/KG)					
Arsenic	1.80	--	0.156 J	0.19 U	0.19 U
Mercury	0.21	0.23	0.0410 J	0.0625	0.0596
Selenium	0.80	0.10	0.161	0.154	0.135
Zinc	60.0	9.87	22.9	14.8	17.6
Other Parameters					
Percent Moisture	--	--	73.4	68.0	70.1
Percent Lipids	--	--	2.43	2.48	3.68

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

Table D-108
Summary of Step 3A Chemicals of Potential Concern for Further Risk Evaluation
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Soil										Subsurface Soil					Terrestrial Food Web										Surface Water	Surface Sediment								Subsurface Sediment							Tissue			Aquatic Food Web							
	Group 1A	Group 1B	Group 1C	Group 1D	Group 1E	Group 1F	Group 2A	Group 2B	Group 2C	Group 2D	Group 1B	Group 1F	Group 2B	Group 2C	Group 2D	Group 1A	Group 1B	Group 1C	Group 1D	Group 1E	Group 1F	Group 2A	Group 2B	Group 2C	Group 2D	Penniman Lake	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C	Group 5	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C	Frog	Whole-Body Fish	Reconstituted Fish	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C
Inorganics																																																	
Arsenic																																											N							
Barium																											X	X	X	X	X	X	X		X		X	X	X	X	X										
Beryllium																											N	N		N					N			N	N	N	N										
Cadmium																												X																						
Chromium																												X														N									
Copper																											X	X			X	X	X		X				X	X					X					
Cyanide																											N		N	N			N		N															
Iron																												X								X			X	X	X	X									
Lead		X								X																	X	X		X	X	X			X			X	X	X										
Manganese										X																																								
Mercury		X							X																					X	X							X	X			N								
Nickel																											X								X							X									
Selenium																																											N									
Silver																																											N									
Vanadium																												X						X																	
Zinc		X							X	X																	X	X		X	X	X			X	X			X			X								
PCBs																																																	
Aroclor-1260	X	X														X	X					X			X		X								X										X						
Total PCBs																																												X	X	X	X	X	X	X
Dioxin-like PCBs																																										N									
Pesticides																																																	
4,4'-DDE		X							X																																									
4,4'-DDT		X							X	X																																N									
Aldrin																											X								X															
alpha-BHC																																										N									
beta-BHC																																										N									
Dieldrin		X															X																										N									
Endosulfan II		X								X																																N									
Endosulfan sulfate		X							X		X			X													X								X								N									
Endrin		X							X					X																																					
Endrin aldehyde		X							X	X																																									
Endrin ketone		X							X	X				X																																					
gamma-BHC (lindane)																																										N									
gamma-Chlordane																																										N									
Heptachlor																																		X																	
Heptachlor epoxide																																										N									
Methoxychlor																																					X													
Semivolatile Organic Compounds																																																	
Acetophenone																											N			N	N																				
Benzaldehyde																											N	N	N	N	N				N	N		N	N											
Di-n-octylphthalate																											N	N		N	N		N			N														
Dibenzofuran																																			X														

Table D-108
Summary of Step 3A Chemicals of Potential Concern for Further Risk Evaluation
Step 2 Technical Memorandum - Penniman Lake
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Soil										Subsurface Soil					Terrestrial Food Web										Surface Water	Surface Sediment								Subsurface Sediment							Tissue			Aquatic Food Web							
	Group 1A	Group 1B	Group 1C	Group 1D	Group 1E	Group 1F	Group 2A	Group 2B	Group 2C	Group 2D	Group 1B	Group 1F	Group 2B	Group 2C	Group 2D	Group 1A	Group 1B	Group 1C	Group 1D	Group 1E	Group 1F	Group 2A	Group 2B	Group 2C	Group 2D	Penniman Lake	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C	Group 5	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C	Frog	Whole-Body Fish	Reconstituted Fish	Group 1	Group 2	Group 3	Group 4	Group 4A	Group 4B	Group 4C
HMW PAHs									X																									X																	
LMW PAHs																											X							X																	
Total PAHs																																		X																	
Volatile Organic Compounds																																																			
Acetone																																									N	N	N	N									
Carbon disulfide																																			X		X	X		X	X									
Chloromethane																												N																							
Methyl acetate																														N																					
Methylcyclohexane																												N		N																					
Explosives																																																			
1,3-Dinitrobenzene																														X					X		X														
HMX																														X																					
Nitroglycerin																															N	N	N	N							N	N	N	N									
Tetryl																														N	N	N																				

X - COPC based on exceedance of ESV/UTL; gray shading indicates risk driver
N - COPC based on detection and no ESV

Attachment E
Comprehensive Exceedance Figures

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_10E-1_SS_SAMPLE_LOCS_AND_EXCEEDANCES_POTENTIALSPRAYEDAREALOCS.MXD JMONTI 11/4/2014 12:29:54 PM

Sample ID	CAPL-SS73-1112
Sample Date	11/05/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**119**
Benzo(b)fluoranthene	**157**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	146 L
4,4'-DDT	334 L
alpha-Chlordane	13.3 J
Aroclor-1260	**4,630 J**
Dieldrin	19.1 J
Endosulfan II	39.2 L
Endrin aldehyde	7.81 J
Endrin ketone	40.2 J
gamma-Chlordane	12.7 L
Total Metals (mg/kg)	
Arsenic	**2.6 J**
Chromium	**16.7**
Copper	44.8
Iron	**11,100**
Lead	127
Zinc	175

Sample ID	CAPL-SS75-1112
Sample Date	11/05/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**357 J**
Total Metals (mg/kg)	
Aluminum	**9,110**
Arsenic	**7.22**
Barium	61.1
Beryllium	0.759 J
Chromium	**19.3**
Cobalt	**3.66 J**
Copper	51.5
Iron	**18,500**
Lead	159
Manganese	**351**
Zinc	196

Sample ID	CAPL-SS74-1112
Sample Date	11/05/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)anthracene	**797**
Benzo(a)pyrene	**722**
Benzo(b)fluoranthene	**418**
Dibenz(a,h)anthracene	**137**
Indeno(1,2,3-cd)pyrene	**321**
Total Metals (mg/kg)	
Arsenic	**5.29**
Barium	66.4
Chromium	**23.3**
Cobalt	**3.8**
Copper	28.3
Iron	**10,900**
Nickel	11.8
Vanadium	28.3
Zinc	47.5

Sample ID	CAPL-SS71-1112
Sample Date	11/02/12
Total Metals (mg/kg)	
Aluminum	**9,460**
Arsenic	**2.1 J**
Beryllium	1.35 J
Chromium	**10.5**
Copper	4.57
Iron	**15,100**
Manganese	**331**
Zinc	33.3

Sample ID	CAPL-SS70-1112
Sample Date	11/02/12
Total Metals (mg/kg)	
Arsenic	**1.19**
Beryllium	1.63
Chromium	**5.78**
Iron	**10,400**
Manganese	**405**
Zinc	44.6

Sample ID	CAPL-SS72-1112
Sample Date	11/02/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Endosulfan sulfate	9.86 J
Total Metals (mg/kg)	
Arsenic	**0.941 J**
Chromium	**7.84**
Copper	6.47
Iron	**6,370**

	CAX 95% UTL BKG SS	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Semivolatile Organic Compounds (µg/kg)			
Benzo(a)anthracene	--	150	--
Benzo(a)pyrene	--	15	--
Benzo(b)fluoranthene	--	150	--
Benzo(k)fluoranthene	--	1,500	--
Chrysene	--	15,000	--
Dibenz(a,h)anthracene	--	15	--
Indeno(1,2,3-cd)pyrene	--	150	--
Pesticide/Polychlorinated Biphenyls (µg/kg)			
4,4'-DDE	--	1,600	114
4,4'-DDT	--	1,900	100
alpha-Chlordane	--	1,800	11
Aroclor-1260	--	240	8,000
Dieldrin	--	33	10.5
Endosulfan II	--	37,000	6.32
Endosulfan sulfate	--	37,000	6.32
Endrin	--	1,800	1.95
Endrin aldehyde	--	1,800	1.95
Endrin ketone	--	1,800	1.95
gamma-Chlordane	--	1,800	11
Explosives (µg/kg)			
Nitroglycerin	--	620	--
Total Metals (mg/kg)			
Aluminum	12,200	7,700	pH < 5.5
Antimony	--	3.1	78
Arsenic	6.36	0.67	18
Barium	52.9	1,500	330
Beryllium	0.587	16	40
Chromium	18.2	0.3	64
Cobalt	9.93	2.3	13
Copper	4.25	310	70
Iron	19,900	5,500	5 < pH > 8
Lead	17.4	400	120
Manganese	324	180	220
Mercury	0.111	2.3	0.1
Nickel	9.52	150	38
Vanadium	27.9	39	130
Zinc	26.5	2,300	120

Legend

- Surface and Subsurface Soil Locations - Other Upland Areas
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Underline indicates exceedance of CAX 95% UTL BKG SS
Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)
Grey shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
L - Analyte present, value may be biased low, actual value may be higher
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

Figure 1E
Surface Soil Exceedance Results – Other Upland Areas
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

N W E S
0 175 350
Feet

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_10E-2_SB_LOCS_AND_EXCEEDANCES_POTENTIAL_SPRAYED_AREAS_11X17.MXD JMONTI 11/5/2014 8:16:50 AM

Sample ID	CAPL-SB75-1112*
Sample Date	11/05/12
Total Metals (mg/kg)	
Aluminum	**12,900**
Arsenic	**7.79**
Barium	212 J
Chromium	**25.8**
Cobalt	**2.9 J**
Copper	11.7
Iron	**34,200**
Lead	21.7
Manganese	**373 J**
Zinc	38.8

Sample ID	CAPL-SB72-1112
Sample Date	11/02/12
Total Metals (mg/kg)	
Arsenic	**1.51 J**
Chromium	**8.4**
Iron	**8,050**
Zinc	29.9

Sample ID	CAPL-SB73-1112
Sample Date	11/05/12
Total Metals (mg/kg)	
Aluminum	**8,690**
Arsenic	**2.69**
Chromium	**16.5 K**
Copper	10.9 L
Iron	**14,700**
Lead	34.4 L
Zinc	36.5 L

Sample ID	CAPL-SB74-1112
Sample Date	11/05/12
Total Metals (mg/kg)	
Aluminum	**13,400**
Arsenic	**11.6**
Chromium	**33.3**
Cobalt	**2.71 J**
Copper	3.96
Iron	**64,700**
Lead	10.6
Vanadium	**42.3**

Sample ID	CAPL-SB71-1112
Sample Date	11/02/12
Total Metals (mg/kg)	
Aluminum	**13,700**
Arsenic	**7.08**
Chromium	**37.3**
Cobalt	**3 J**
Iron	**37,600**

Sample ID	CAPL-SB70-1112
Sample Date	11/02/12
Total Metals (mg/kg)	
Aluminum	**8,670**
Arsenic	**1.82**
Chromium	**13.9**
Copper	3.48
Iron	**10,200**

	CAX 95% UTL BKG SB	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Total Metals (mg/kg)			
Aluminum	13,000	7,700	pH < 5.5
Arsenic	5.54	0.67	18
Barium	84.5	1,500	330
Chromium	33.7	0.3	64
Cobalt	5.18	2.3	13
Copper	3.17	310	70
Iron	32,000	5,500	5 < pH < 8
Lead	8.79	400	120
Manganese	176	180	220
Vanadium	48.3	39	130
Zinc	28	2,300	120

Legend

- Surface and Subsurface Soil Locations - Other Upland Areas
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Notes:
Underline indicates exceedance of CAX 95% UTL Surface Soil (SS) Background value
Bold text indicates exceedance of Adjusted Residential Soil RSLs (May 2014)
Shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
PCBs - Polychlorinated Biphenyls
J - Analyte present, value may or may not be accurate or precise
µg/kg - Micrograms per kilogram

Figure 2E
Subsurface Soil Exceedance Results – Other Upland Areas
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

N W E S
0 150 300 600 900
Feet

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_6E_SS_SAMPLE_LOCS_AND_EXCEEDANCES_DRAINAGELOCS.MXD CVONFREEDEN 9/3/2014 1:35:24 PM

Sample ID	CAPL-SS50-1012
Sample Date	10/24/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**90.9 K**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	285 K
4,4'-DDT	132 K
Aroclor-1260	**1,170 J**
Dieldrin	18.8 J
Endosulfan II	8.16 J
Endrin	3.09 J
Endrin ketone	2.62 J
Total Metals (mg/kg)	
Aluminum	**9,410**
Arsenic	**5.48**
Beryllium	0.854 J
Chromium	**19.9**
Cobalt	**2.94 J**
Copper	19.8
Iron	**15,300**
Lead	81
Manganese	**297**
Zinc	85.2

Sample ID	CAPL-SS49-1012*
Sample Date	10/24/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**51.5**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	254 J
Aroclor-1260	**589 J**
Dieldrin	13.7 J
Endosulfan sulfate	20.5
Endrin	4.55 J
Total Metals (mg/kg)	
Aluminum	**11,000**
Arsenic	**5.69**
Barium	76.1
Beryllium	0.749 J
Chromium	**17.7**
Cobalt	**3.09 J**
Copper	18.1 J
Iron	**22,500 J**
Lead	61.6 J
Zinc	71

Sample ID	CAPL-SS48-1012
Sample Date	10/24/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**86.6 K**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	206
4,4'-DDT	214 J
Aroclor-1260	**1,600 J**
Dieldrin	16.8 J
Endosulfan II	10.8 J
Endrin	3.25 J
Endrin ketone	5.46 J
Total Metals (mg/kg)	
Aluminum	**9,730**
Arsenic	**6.35**
Chromium	**17.2**
Cobalt	**2.38 J**
Copper	11.9
Iron	**13,400**
Lead	65
Manganese	**212**
Vanadium	28.9
Zinc	139

Sample ID	CAPL-SS56-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Arsenic	**1.55**
Chromium	**3.54**
Zinc	31.7

Sample ID	CAPL-SS57-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Arsenic	**1.17 J**
Chromium	**4.76**
Lead	29.3 J

Sample ID	CAPL-SS47-1012
Sample Date	10/26/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**78.4 J**
Benzo(b)fluoranthene	**187**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**9,980 J**
Dieldrin	**140 L**
Endosulfan II	19.7 J
Endosulfan sulfate	365 L
Endrin	43 J
Endrin aldehyde	16.5 J
Endrin ketone	83.3 J
gamma-Chlordane	15.5 J
Total Metals (mg/kg)	
Aluminum	**19,500**
Arsenic	**6.69**
Barium	84.5
Beryllium	1.24 J
Chromium	**35.3**
Cobalt	**4.71**
Copper	39.3
Iron	**25,100**
Lead	211
Manganese	**308**
Mercury	0.134
Nickel	11.1
Vanadium	**43.9**
Zinc	428

Sample ID	CAPL-SS55-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Aluminum	4,920
Arsenic	**1.64**
Chromium	**5.46**
Iron	**6,440**

Sample ID	CAPL-SS58-1012
Sample Date	10/26/12
Explosives (µg/kg)	
Nitroglycerin	**866 J**
Total Metals (mg/kg)	
Arsenic	**1.12 J**
Chromium	**4.26**
Zinc	74.4

Sample ID	CAPL-SS59-1012*
Sample Date	10/26/12
Total Metals (mg/kg)	
Arsenic	**1.73**
Chromium	**6.91**
Copper	7.11
Iron	**7,610**
Zinc	60.2

Sample ID	CAPL-SS46-1012
Sample Date	10/26/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**122**
Benzo(b)fluoranthene	**197**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	179
4,4'-DDT	194 J
Aroclor-1260	**16,500 J**
Dieldrin	**253 J**
Endosulfan II	42.8 J
Endosulfan sulfate	694 J
Endrin	77.7 J
Endrin aldehyde	22.9 J
Endrin ketone	45.9 J
Total Metals (mg/kg)	
Aluminum	**20,500**
Arsenic	**6.07**
Barium	73.7
Beryllium	0.97 J
Chromium	**41.4**
Cobalt	**3.76 J**
Copper	24.9
Iron	**26,000**
Lead	141
Manganese	**213**
Mercury	0.138
Vanadium	**45.8**
Zinc	315

Sample ID	CAPL-SS45-1012*
Sample Date	10/26/12
Total Metals (mg/kg)	
Aluminum	**25,200**
Arsenic	**7.03**
Beryllium	1.64
Chromium	**46.3**
Cobalt	**4.96**
Copper	6.59
Iron	**48,000**
Nickel	13.2
Vanadium	**67.3**
Zinc	41

Sample ID	CAPL-SS44-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Aluminum	**10,100**
Arsenic	**2.54**
Chromium	**14**
Copper	6.4
Iron	**10,100**
Lead	17.6
Zinc	36.7

	CAX 95% UTL BKG SS	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Semivolatile Organic Compounds (µg/kg)			
Benzo(a)anthracene	--	150	--
Benzo(a)pyrene	--	15	--
Benzo(b)fluoranthene	--	150	--
Benzo(k)fluoranthene	--	1,500	--
Chrysene	--	15,000	--
Dibenz(a,h)anthracene	--	15	--
Indeno(1,2,3-cd)pyrene	--	150	--
Pesticide/Polychlorinated Biphenyls (µg/kg)			
4,4'-DDE	--	1,600	114
4,4'-DDT	--	1,900	100
alpha-Chlordane	--	1,800	11
Aroclor-1260	--	240	8,000
Dieldrin	--	33	10.5
Endosulfan II	--	37,000	6.32
Endosulfan sulfate	--	37,000	6.32
Endrin	--	1,800	1.95
Endrin aldehyde	--	1,800	1.95
Endrin ketone	--	1,800	1.95
gamma-Chlordane	--	1,800	11
Explosives (µg/kg)			
Nitroglycerin	--	620	--
Total Metals (mg/kg)			
Aluminum	12,200	7,700	pH < 5.5
Antimony	--	3.1	78
Arsenic	6.36	0.67	18
Barium	52.9	1,500	330
Beryllium	0.587	16	40
Calcium	2,290	--	--
Chromium	18.2	0.3	64
Cobalt	9.93	2.3	13
Copper	4.25	310	70
Iron	19,900	5,500	5 < pH > 8
Lead	17.4	400	120
Magnesium	1,070	--	--
Manganese	324	180	220
Mercury	0.111	2.3	0.1
Nickel	9.52	150	38
Potassium	708	--	--
Vanadium	27.9	39	130
Zinc	26.5	2,300	120

PENNIMAN LAKE

Legend
- Surface and Subsurface Soil Locations - Drainages
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline
- structure_existing_area

Note:
Underline indicates exceedance of CAX 95% UTL BKG SS
Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)
Grey shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
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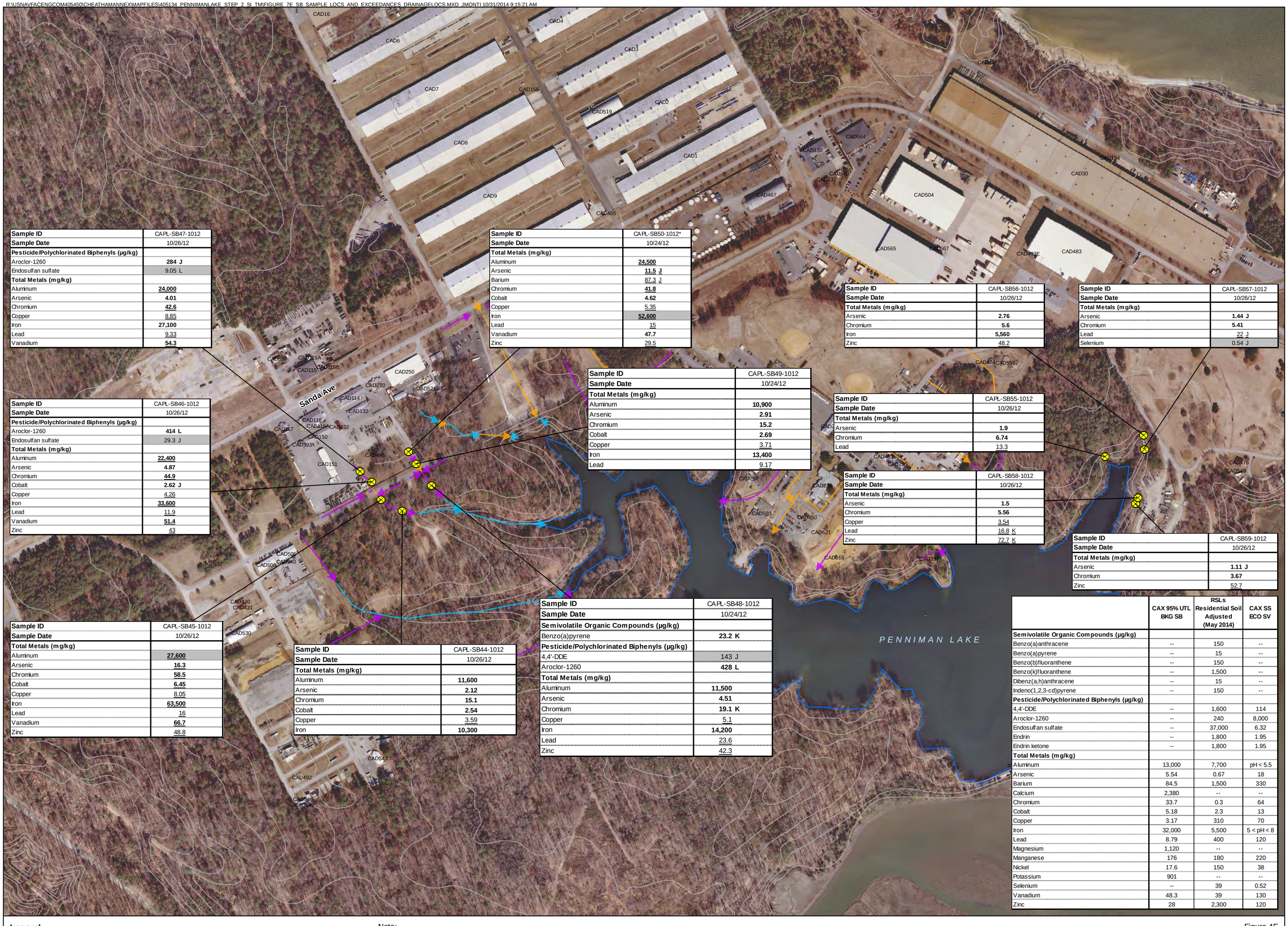
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
* a duplicate was collected at this location, the higher of the two results is shown.

Figure 3E
Surface Soil Exceedance Results – Drainage Locations
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

N W E S
0 175 350
Feet

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_7E_SB_SAMPLE_LOCS_AND_EXCEEDANCES_DRAINAGELOCS.MXD JMONTI 10/31/2014 9:15:21 AM



Sample ID	CAPL-SB47-1012
Sample Date	10/26/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**284 J**
Endosulfan sulfate	9.05 L
Total Metals (mg/kg)	
Aluminum	**24,000**
Arsenic	**4.01**
Chromium	**42.6**
Copper	8.85
Iron	**27,100**
Lead	9.33
Vanadium	**54.3**

Sample ID	CAPL-SB46-1012
Sample Date	10/26/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**414 L**
Endosulfan sulfate	29.3 J
Total Metals (mg/kg)	
Aluminum	**22,400**
Arsenic	**4.87**
Chromium	**44.9**
Cobalt	**2.62 J**
Copper	4.26
Iron	**33,600**
Lead	11.9
Vanadium	**51.4**
Zinc	43

Sample ID	CAPL-SB45-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Aluminum	**27,600**
Arsenic	**16.3**
Chromium	**58.5**
Cobalt	**6.45**
Copper	8.05
Iron	**63,500**
Lead	16
Vanadium	**66.7**
Zinc	48.8

Sample ID	CAPL-SB44-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Aluminum	**11,600**
Arsenic	**2.12**
Chromium	**15.1**
Cobalt	**2.54**
Copper	3.59
Iron	**10,300**

Sample ID	CAPL-SB50-1012*
Sample Date	10/24/12
Total Metals (mg/kg)	
Aluminum	**24,500**
Arsenic	**11.5 J**
Barium	87.3 J
Chromium	**41.8**
Cobalt	**4.62**
Copper	5.35
Iron	**52,600**
Lead	15
Vanadium	**47.7**
Zinc	29.5

Sample ID	CAPL-SB49-1012
Sample Date	10/24/12
Total Metals (mg/kg)	
Aluminum	**10,900**
Arsenic	**2.91**
Chromium	**15.2**
Cobalt	**2.69**
Copper	3.71
Iron	**13,400**
Lead	9.17

Sample ID	CAPL-SB48-1012
Sample Date	10/24/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**23.2 K**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	143 J
Aroclor-1260	**428 L**
Total Metals (mg/kg)	
Aluminum	**11,500**
Arsenic	**4.51**
Chromium	**19.1 K**
Copper	5.1
Iron	**14,200**
Lead	23.6
Zinc	42.3

Sample ID	CAPL-SB56-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Arsenic	**2.76**
Chromium	**5.6**
Iron	**5,560**
Zinc	48.2

Sample ID	CAPL-SB57-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Arsenic	**1.44 J**
Chromium	**5.41**
Lead	22 J
Selenium	0.54 J

Sample ID	CAPL-SB55-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Arsenic	**1.9**
Chromium	**6.74**
Lead	13.3

Sample ID	CAPL-SB58-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Arsenic	**1.5**
Chromium	**5.56**
Copper	3.54
Lead	16.8 K
Zinc	72.7 K

Sample ID	CAPL-SB59-1012
Sample Date	10/26/12
Total Metals (mg/kg)	
Arsenic	**1.11 J**
Chromium	**3.67**
Zinc	52.7

	CAX 95% UTL BKG SB	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Semivolatile Organic Compounds (µg/kg)			
Benzo(a)anthracene	--	150	--
Benzo(a)pyrene	--	15	--
Benzo(b)fluoranthene	--	150	--
Benzo(k)fluoranthene	--	1,500	--
Dibenz(a,h)anthracene	--	15	--
Indeno(1,2,3-cd)pyrene	--	150	--
Pesticide/Polychlorinated Biphenyls (µg/kg)			
4,4'-DDE	--	1,600	114
Aroclor-1260	--	240	8,000
Endosulfan sulfate	--	37,000	6.32
Endrin	--	1,800	1.95
Endrin ketone	--	1,800	1.95
Total Metals (mg/kg)			
Aluminum	13,000	7,700	pH < 5.5
Arsenic	5.54	0.67	18
Barium	84.5	1,500	330
Calcium	2,380	--	--
Chromium	33.7	0.3	64
Cobalt	5.18	2.3	13
Copper	3.17	310	70
Iron	32,000	5,500	5 < pH < 8
Lead	8.79	400	120
Magnesium	1,120	--	--
Manganese	176	180	220
Nickel	17.6	150	38
Potassium	901	--	--
Selenium	--	39	0.52
Vanadium	48.3	39	130
Zinc	28	2,300	120

Legend
- Surface and Subsurface Soil Locations - Drainages
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Underline indicates exceedance of CAX 95% UTL BKG SB
Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)
Grey Shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher

mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
* a duplicate was collected at this location, the higher of the two results is shown.

Figure 4E
Subsurface Soil Exceedance Results – Drainage Locations
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

N W E S
0 175 350
Feet

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_8E_SS_SAMPLE_LOCS_AND_EXCEEDANCES_UPGRADIENT_DRAINAGELOCS.MXD JMONTI 10/31/2014 9:23:33 AM

Sample ID	CAPL-SS63-1112
Sample Date	11/01/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**23.9 J**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	**2,640**
4,4'-DDT	808
Aroclor-1260	**397**
Endosulfan II	9.2 L
Endosulfan sulfate	12.4 J
Endrin	13.3 J
Endrin ketone	4.05 L
gamma-Chlordane	14.5
Total Metals (mg/kg)	
Arsenic	**8.93**
Beryllium	1.3 J
Chromium	**66.7**
Cobalt	**2.73 J**
Copper	12
Iron	**32,800**
Lead	46.8
Mercury	0.145
Zinc	83.9

Sample ID	CAPL-SS64-1112
Sample Date	11/01/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Endrin aldehyde	5.31 J
Total Metals (mg/kg)	
Aluminum	**13,700**
Arsenic	**10**
Beryllium	0.866 J
Chromium	**29.9**
Cobalt	**3.28 J**
Copper	8.2
Iron	**33,300**
Lead	21.3
Vanadium	33.3
Zinc	59.6

Sample ID	CAPL-SS66-1112
Sample Date	11/01/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)anthracene	**182**
Benzo(a)pyrene	**192**
Benzo(b)fluoranthene	**335**
Indeno(1,2,3-cd)pyrene	**175**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**2,770 J**
Dieldrin	26.5 K
Endosulfan sulfate	64.2 L
Endrin	13.6 J
Endrin aldehyde	2.19 J
Endrin ketone	26.5 J
Total Metals (mg/kg)	
Aluminum	**8,330**
Arsenic	**6.5**
Barium	66.3
Beryllium	0.677 J
Chromium	**18.5**
Cobalt	**3.75 J**
Copper	20.1
Iron	**17,500**
Lead	77.7
Manganese	**216**
Mercury	0.247
Zinc	142

Sample ID	CAPL-SS69-1112*
Sample Date	11/01/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**283 J**
Endosulfan sulfate	10.1 L
Endrin	2.62 J
Endrin ketone	3.04 J
Total Metals (mg/kg)	
Aluminum	**10,300**
Arsenic	**7.9 J**
Chromium	**21.1**
Copper	12.4 J
Iron	**18,400**
Lead	29.9
Zinc	58.6 J

Sample ID	CAPL-SS68-1112
Sample Date	11/01/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**54.3**
Dibenz(a,h)anthracene	**15.8**
Total Metals (mg/kg)	
Aluminum	**25,800**
Arsenic	**14.4**
Barium	81.8
Beryllium	1.44
Chromium	**56.1**
Cobalt	**5.81**
Copper	9.67
Iron	**49,100**
Nickel	18.5
Vanadium	**55.6**
Zinc	73.9 K

Sample ID	CAPL-SS62-1112
Sample Date	11/01/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**54.6**
Dibenz(a,h)anthracene	**17.6**
Total Metals (mg/kg)	
Arsenic	**3.47**
Chromium	**10.9**
Cobalt	**2.53**
Copper	6.24
Iron	**8,330**
Lead	25.3
Manganese	**256**
Mercury	0.11
Zinc	45.5

Sample ID	CAPL-SS67-1112
Sample Date	11/01/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)anthracene	**14,400**
Benzo(a)pyrene	**8,120**
Benzo(b)fluoranthene	**11,300**
Benzo(k)fluoranthene	**8,830**
Chrysene	**19,200**
Dibenz(a,h)anthracene	**2,080**
Indeno(1,2,3-cd)pyrene	**3,800**
Total Metals (mg/kg)	
Arsenic	**2.69 J**
Chromium	**8.3**
Copper	5.05
Iron	**9,300**
Lead	28.8
Zinc	35.2

Sample ID	CAPL-SS61-1112
Sample Date	11/01/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)anthracene	**3,570**
Benzo(a)pyrene	**4,780**
Benzo(b)fluoranthene	**8,910**
Benzo(k)fluoranthene	**7,950**
Dibenz(a,h)anthracene	**1,260**
Indeno(1,2,3-cd)pyrene	**4,200**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	127 K
4,4'-DDT	122 K
Aroclor-1260	**627 J**
Dieldrin	13.3 J
Endrin ketone	4.97 J
Total Metals (mg/kg)	
Aluminum	**11,100**
Arsenic	**8.12**
Beryllium	0.838 J
Chromium	**69.7**
Cobalt	**4.6**
Copper	26.1
Iron	**22,300**
Lead	107
Nickel	11.4
Vanadium	29.1
Zinc	235

Sample ID	CAPL-SS60-1112
Sample Date	11/01/12
Total Metals (mg/kg)	
Aluminum	**14,800**
Arsenic	**19.3**
Barium	80.8
Beryllium	1.4 J
Chromium	**40.3**
Cobalt	**6.04**
Copper	5.81
Iron	**53,300**
Manganese	**259**
Nickel	15.8
Vanadium	**40.3**
Zinc	63.4

Sample ID	CAPL-SS65-1112
Sample Date	11/01/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**195**
Benzo(b)fluoranthene	**242**
Dibenz(a,h)anthracene	**62.6**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Endrin aldehyde	3.16 J
Total Metals (mg/kg)	
Antimony	**11.6**
Arsenic	**2.44 J**
Barium	175
Beryllium	0.887 J
Chromium	**8.21**
Cobalt	**2.91 J**
Copper	10.7
Iron	**8,680**
Lead	42.5
Manganese	**264**
Zinc	190

	CAX 95% UTL BKG SS	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Semivolatile Organic Compounds (µg/kg)			
Benzo(a)anthracene	--	150	--
Benzo(a)pyrene	--	15	--
Benzo(b)fluoranthene	--	150	--
Benzo(k)fluoranthene	--	1,500	--
Chrysene	--	15,000	--
Dibenz(a,h)anthracene	--	15	--
Indeno(1,2,3-cd)pyrene	--	150	--
Pesticide/Polychlorinated Biphenyls (µg/kg)			
4,4'-DDE	--	1,600	114
4,4'-DDT	--	1,900	100
alpha-Chlordane	--	1,800	11
Aroclor-1260	--	240	8,000
Dieldrin	--	33	10.5
Endosulfan II	--	37,000	6.32
Endosulfan sulfate	--	37,000	6.32
Endrin	--	1,800	1.95
Endrin aldehyde	--	1,800	1.95
Endrin ketone	--	1,800	1.95
gamma-Chlordane	--	1,800	11
Explosives (µg/kg)			
Nitroglycerin	--	620	--
Total Metals (mg/kg)			
Aluminum	12,200	7,700	pH < 5.5
Antimony	--	3.1	78
Arsenic	6.36	0.67	18
Barium	52.9	1,500	330
Beryllium	0.587	16	40
Chromium	18.2	0.3	64
Cobalt	9.93	2.3	13
Copper	4.25	310	70
Iron	19,900	5,500	5 < pH > 8
Lead	17.4	400	120
Manganese	324	180	220
Mercury	0.111	2.3	0.1
Nickel	9.52	150	38
Vanadium	27.9	39	130
Zinc	26.5	2,300	120

Legend
- Surface and Subsurface Soil Locations - Upgradient to Drainage Ditches
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Underline indicates exceedance of CAX 95% UTL BKG SS
Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)
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µg/kg - Micrograms per kilogram
* a duplicate was collected at this location, the higher of the two results is shown.

N W E S

0 100 200 Feet

Figure 5E
Surface Soil Exceedance Results – Upgradient to Drainage Locations
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_9E_SB_SAMPLE_LOCS_AND_EXCEEDANCES_UPGRADIENT_TO_DRAINAGELOCS.MXD CVONFREEDEN 9/3/2014 2:18:04 PM

Sample ID	CAPL-SB64-1112
Sample Date	11/01/12
Total Metals (mg/kg)	
Aluminum	**13,600**
Chromium	**31.7**
Cobalt	**3.4 J**
Copper	6.64
Iron	**38,600**
Lead	190
Zinc	32.2

Sample ID	CAPL-SB68-1112
Sample Date	11/01/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Endrin	4.14 J
Total Metals (mg/kg)	
Aluminum	**15,300**
Arsenic	**17.1**
Chromium	**39.4**
Cobalt	**5.26**
Copper	4.12
Iron	**34,400**
Lead	10.8
Zinc	49.9

Sample ID	CAPL-SB69-1112
Sample Date	11/01/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)pyrene	**213**
Benzo(b)fluoranthene	**292**
Dibenz(a,h)anthracene	**56.2 J**
Indeno(1,2,3-cd)pyrene	**161**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Endosulfan sulfate	7.5 L
Endrin ketone	2.52 J
Total Metals (mg/kg)	
Aluminum	**10,300**
Arsenic	**7.05**
Chromium	**22.2**
Copper	12.6
Iron	**23,800**
Lead	23.2
Zinc	53.8

Sample ID	CAPL-SB63-1112
Sample Date	11/01/12
Total Metals (mg/kg)	
Aluminum	**11,600**
Arsenic	**3.41**
Chromium	**19.7**
Copper	5.31
Iron	**19,300**
Lead	11.2

Sample ID	CAPL-SB66-1112
Sample Date	11/01/12
Total Metals (mg/kg)	
Aluminum	**8,500**
Arsenic	**6.85**
Barium	89.3
Chromium	**19.2**
Copper	5.04
Iron	**22,500**
Lead	14.8

Sample ID	CAPL-SB62-1112
Sample Date	11/01/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)anthracene	**610**
Benzo(a)pyrene	**859**
Benzo(b)fluoranthene	**2,100**
Benzo(k)fluoranthene	**2,210**
Dibenz(a,h)anthracene	**250**
Indeno(1,2,3-cd)pyrene	**1,000**
Pesticide/Polychlorinated Biphenyls (µg/kg)	
Aroclor-1260	**704 J**
Endosulfan sulfate	19.7 K
Endrin	6.12 L
Endrin ketone	7.34 L
Total Metals (mg/kg)	
Aluminum	**8,930**
Arsenic	**2.64 J**
Chromium	**20**
Copper	10.1
Iron	**12,700**
Lead	66.5
Zinc	98.6

Sample ID	CAPL-SB67-1112
Sample Date	11/01/12
Total Metals (mg/kg)	
Aluminum	**18,100**
Arsenic	**11.9**
Chromium	**39.6**
Cobalt	**3.67 J**
Copper	4.57
Iron	**51,400**
Lead	10.7
Vanadium	**45.1**

Sample ID	CAPL-SB61-1112
Sample Date	11/01/12
Total Metals (mg/kg)	
Aluminum	**16,400**
Arsenic	**1.9 J**
Chromium	**34.6**
Copper	4.89
Iron	**26,600**
Lead	14.4

Sample ID	CAPL-SB65-1112
Sample Date	11/01/12
Total Metals (mg/kg)	
Aluminum	**16,800**
Arsenic	**6.91**
Chromium	**33**
Cobalt	**3.27 J**
Iron	**37,200**
Lead	8.99

Sample ID	CAPL-SB60-1112*
Sample Date	11/01/12
Total Metals (mg/kg)	
Aluminum	**15,800**
Arsenic	**22.4 J**
Chromium	**41.8**
Cobalt	**9.11 J**
Copper	5.19
Iron	**51,100**
Lead	14 J
Manganese	**520 J**
Nickel	18.2
Vanadium	**40**
Zinc	51.5

	CAX 95% UTL BKG SB	RSLs Residential Soil Adjusted (May 2014)	CAX SS ECO SV
Semivolatile Organic Compounds (µg/kg)			
Benzo(a)anthracene	--	150	--
Benzo(a)pyrene	--	15	--
Benzo(b)fluoranthene	--	150	--
Benzo(k)fluoranthene	--	1,500	--
Dibenz(a,h)anthracene	--	15	--
Indeno(1,2,3-cd)pyrene	--	150	--
Pesticide/Polychlorinated Biphenyls (µg/kg)			
4,4'-DDE	--	1,600	114
Aroclor-1260	--	240	8,000
Endosulfan sulfate	--	37,000	6.32
Endrin	--	1,800	1.95
Endrin ketone	--	1,800	1.95
Total Metals (mg/kg)			
Aluminum	13,000	7,700	pH < 5.5
Arsenic	5.54	0.67	18
Barium	84.5	1,500	330
Chromium	33.7	0.3	64
Cobalt	5.18	2.3	13
Copper	3.17	310	70
Iron	32,000	5,500	5 < pH < 8
Lead	8.79	400	120
Manganese	176	180	220
Nickel	17.6	150	38
Selenium	--	39	0.52
Vanadium	48.3	39	130
Zinc	28	2,300	120

Legend
- Surface and Subsurface Soil Locations - Drainages
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Underline indicates exceedance of CAX 95% UTL BKG SB
Bold text indicates exceedance of RSLs Residential Soil Adjusted (May 2014)
Grey Shading indicates exceedance of CAX SS ECO SV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher

mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
* a duplicate was collected at this location, the higher of the two results is shown.

Figure 6E
Subsurface Soil Exceedance Results – Upgradient to Drainage Locations
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

N W E S
0 175 350 Feet

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Sample ID	CAPL-SD85-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	12.8 K
4,4'-DDE	64.9 J
4,4'-DDT	71 J
alpha-Chlordane	13.1 K
Aroclor-1260	**8,300 J**
Deldrin	167 K
Endosulfan II	26.1 K
Endosulfan sulfate	319 K
Endrin	51.7
Endrin aldehyde	8.26 J
Endrin ketone	22.2 J
gamma-Chlordane	40.1
Heptachlor epoxide	5.37 K
Methoxychlor	25.7 J
Total Metals (mg/kg)	
Antimony	3.89
Barium	90.2
Chromium	**45**
Cobalt	**34.5**
Copper	1,000
Iron	31,600
Lead	853
Nickel	564
Zinc	2,950

Sample ID	CAPL-SD86-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	6.53 J
4,4'-DDE	18.5 L
4,4'-DDT	27.6 J
alpha-Chlordane	8.56 J
Aroclor-1260	**4,090 J**
Deldrin	66.6 J
Endosulfan II	43.9 J
Endrin	29.5 J
Endrin aldehyde	4.39 J
Endrin ketone	15.1 J
gamma-Chlordane	17.2 J
Total Metals (mg/kg)	
Barium	22.8
Chromium	**11.3**
Copper	98.3
Lead	126
Nickel	65.4
Zinc	525

Sample ID	CAPL-SD87-1012
Sample Date	10/24/12
Semivolatile Organic Compounds (µg/kg)	
Acenaphthene	336 K
Anthracene	265
Benzo(a)anthracene	125
Fluoranthene	440
Fluorene	285 K
Phenanthrene	949
Pyrene	497 K
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	6.56 J
4,4'-DDE	13.1
4,4'-DDT	18.3 J
alpha-Chlordane	9.44
Aroclor-1260	**3,780 J**
Deldrin	79.2
Endosulfan II	15.4 J
Endrin	35.7 J
Endrin aldehyde	5.11 J
Endrin ketone	12.6 J
gamma-Chlordane	28.4
Total Metals (mg/kg)	
Chromium	**8.94**
Lead	72.9

Sample ID	CAPL-SD70-1012	CAPL-SD70-1012-V
Sample Date	10/17/12	10/25/12
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	NA	4.41 J
Semivolatile Organic Compounds (µg/kg)		
Chrysene	173	NA
Pyrene	216	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDD	43.9 J	NA
4,4'-DDE	121 J	NA
4,4'-DDT	21 J	NA
alpha-Chlordane	29.6 L	NA
Aroclor-1260	**8,240**	NA
Deldrin	106 J	NA
Endrin aldehyde	16.4 J	NA
Endrin ketone	34.7 J	NA
gamma-Chlordane	94.2 J	NA
Methoxychlor	82.2 J	NA
Total Metals (mg/kg)		
Arsenic	**12.7**	NA
Barium	43	NA
Chromium	**19.4**	NA
Copper	33	NA
Iron	21,900	NA
Lead	66.8	NA
Zinc	190	NA

Sample ID	CAPL-SD63-1012	CAPL-SD63-1012-V
Sample Date	10/17/12	10/25/12
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	NA	13.3 J
Semivolatile Organic Compounds (µg/kg)		
Chrysene	185	NA
Fluorene	99.7 J	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDD	7.08 J	NA
4,4'-DDE	39.2 J	NA
4,4'-DDT	4.18 J	NA
alpha-Chlordane	3.63 J	NA
Aroclor-1260	1,270 J	NA
Deldrin	20.7 J	NA
Endosulfan sulfate	41.1 J	NA
Endrin	15.6 J	NA
Endrin aldehyde	4.96 J	NA
gamma-Chlordane	41 J	NA
Total Metals (mg/kg)		
Arsenic	**36.5**	NA
Barium	89	NA
Chromium	**38.5**	NA
Copper	40.7	NA
Iron	34,000	NA
Lead	85.8	NA
Mercury	0.197	NA
Zinc	201	NA

Sample ID	CAPL-SD71-1012	CAPL-SD71-1012-V
Sample Date	10/17/12	10/25/12
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	NA	13.6 J
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDE	7.95 J	NA
Endrin aldehyde	2.38 J	NA
Endrin ketone	4.31 J	NA
gamma-Chlordane	5.18 J	NA
Total Metals (mg/kg)		
Arsenic	**33.9**	NA
Barium	72.6	NA
Chromium	**36.6**	NA
Copper	43.1	NA
Iron	30,100	NA
Lead	72.8	NA
Zinc	173	NA

Sample ID	CAPL-SD76-1012
Sample Date	10/16/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	23.3 J
4,4'-DDE	45.9 J
gamma-Chlordane	4.03 L
Explosives (µg/kg)	
1,3-Dinitrobenzene	469 J
Total Metals (mg/kg)	
Barium	28.1
Chromium	**9**

Sample ID	CAPL-SD78-1012
Sample Date	10/16/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	10.3 J
4,4'-DDE	12.6
Aroclor-1260	66.1 L
Endosulfan sulfate	22.8 K
Explosives (µg/kg)	
1,3-Dinitrobenzene	151 J
Total Metals (mg/kg)	
Barium	22.3
Chromium	**8.21**

Sample ID	CAPL-SD65-1012
Sample Date	10/18/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	6.29 J
Aroclor-1260	63.6
Endrin aldehyde	2.75
Total Metals (mg/kg)	
Arsenic	**9.58**
Barium	26.7
Chromium	**11.8**

Sample ID	CAPL-SD64-1012*	CAPL-SD64-1012-V*
Sample Date	10/17/12	10/25/12
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	NA	17.5 J
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDD	10.6 J	NA
4,4'-DDE	16.5 J	NA
Aroclor-1260	84.7 J	NA
Deldrin	2.41 J	NA
Endrin ketone	6.86 J	NA
Total Metals (mg/kg)		
Arsenic	**47.5**	NA
Barium	80.5	NA
Chromium	**44.9**	NA
Copper	51.4	NA
Iron	35,200	NA
Lead	78.2	NA
Mercury	1.48	NA
Zinc	187	NA

Sample ID	CAPL-SD81-1012
Sample Date	10/18/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	9.22 J
Total Metals (mg/kg)	
Aluminum	26,000
Arsenic	**27.9**
Barium	63.5
Chromium	**45.6 J**
Iron	36,600

Sample ID	CAPL-SD77-1012
Sample Date	10/16/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	46.5 J
alpha-Chlordane	9.57 L
Aroclor-1260	720 J
Deldrin	15.1 J
Endosulfan sulfate	12.8 J
Endrin	13.7
gamma-Chlordane	35.9 J
Explosives (µg/kg)	
1,3-Dinitrobenzene	303 J
Total Metals (mg/kg)	
Arsenic	**9.1**
Chromium	**5.73**

Sample ID	CAPL-SD79-1012*
Sample Date	10/16/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	23.6 J
Aroclor-1260	354 J
Deldrin	6.63 J
Endosulfan sulfate	6.65 J
Endrin	5.37 J
gamma-Chlordane	6.3 J
Explosives (µg/kg)	
1,3-Dinitrobenzene	384 J
HMX	464 J
Total Metals (mg/kg)	
Arsenic	**7.87**
Chromium	**5.91**

Sample ID	CAPL-SD80-1012
Sample Date	10/16/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	3.5 J
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	21.5
Aroclor-1260	156
Deldrin	2.42 L
Endrin aldehyde	3.05 L
Total Metals (mg/kg)	
Arsenic	**16.8**
Barium	26.8
Chromium	**9.76**

Sample ID	CAPL-SD66-1012
Sample Date	10/18/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	4.74
Total Metals (mg/kg)	
Arsenic	**8.68**
Chromium	**7.22**

Sample ID	CAPL-SD84-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	10.2 J
4,4'-DDE	50.8 J
4,4'-DDT	137 K
Aldrin	3.54 J
alpha-Chlordane	6.82 J
Aroclor-1260	**16,200 J**
Deldrin	**364 K**
Endosulfan II	56.1 J
Endosulfan sulfate	681 K
Endrin	143 K
Endrin aldehyde	17.4 J
Endrin ketone	49.4 J
gamma-Chlordane	22.7 J
Heptachlor epoxide	3.58 J
Methoxychlor	49.2 J
Total Metals (mg/kg)	
Chromium	**7.75**
Lead	90.3

Sample ID	CAPL-SD62-1012	CAPL-SD62-1012-V
Sample Date	10/17/12	10/25/12
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	NA	9.93 J
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDE	9.69 J	NA
Aroclor-1260	140 J	NA
Deldrin	3.58 J	NA
Endrin aldehyde	3.54 J	NA
Endrin ketone	14.7 J	NA
Total Metals (mg/kg)		
Arsenic	**38.1**	NA
Barium	77.3	NA
Chromium	**49.4**	NA
Copper	43.9	NA
Iron	39,600	NA
Lead	80.7	NA
Zinc	253	NA

Sample ID	CAPL-SD69-1012
Sample Date	10/17/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
gamma-Chlordane	5.31 J
Explosives (µg/kg)	
2,4,6-Trinitrotoluene	125 J
Total Metals (mg/kg)	
Barium	21.2 J
Chromium	**16.1**

Sample ID	CAPL-SD72-1012	CAPL-SD72-1012-V
Sample Date	10/17/12	10/25/12
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	NA	26.7 J
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDE	6.03 J	NA
Deldrin	2.86 J	NA
Endrin aldehyde	3.95 J	NA
Endrin ketone	4.6 J	NA
gamma-Chlordane	17 J	NA
Total Metals (mg/kg)		
Aluminum	28,200	NA
Arsenic	**51.5**	NA
Barium	107	NA
Chromium	**50.4**	NA
Copper	40.2	NA
Iron	41,300	NA
Lead	69.2	NA
Mercury	0.198 J	NA
Zinc	186	NA

Sample ID	CAPL-SD73-1012*	CAPL-SD73-1012-V*
Sample Date	10/17/12	10/25/12
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	NA	29.9 J
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDE	14 J	NA
Aroclor-1260	78.5 J	NA
Deldrin	2.64 J	NA
Endrin aldehyde	3.53 J	NA
Endrin ketone	5.62 J	NA
Total Metals (mg/kg)		
Arsenic	**51.7**	NA
Barium	93.9	NA
Chromium	**46.3**	NA
Copper	50.1	NA
Iron	39,300	NA
Lead	81.6	NA
Zinc	173	NA

Sample ID	CAPL-SD74-1012
Sample Date	10/18/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	5.19 J
Endrin ketone	2.88 J
gamma-Chlordane	12.7 J
Total Metals (mg/kg)	
Arsenic	**42.4**
Barium	75.4
Chromium	**36.1**
Copper	46
Iron	34,900
Lead	56.2
Zinc	133

Sample ID	CAPL-SD75-1012
Sample Date	10/18/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	4.58 J
Endosulfan II	23.8 J
Endrin aldehyde	2.49 J
Total Metals (mg/kg)	
Arsenic	**47.3**
Barium	88.3
Chromium	**38.7**
Copper	56.9
Iron	34,000
Lead	69.3
Zinc	148

Sample ID	CAPL-SD82-1012
Sample Date	10/18/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	11.7 J
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	3.49 J
Total Metals (mg/kg)	
Arsenic	**46.3**
Barium	72.9
Chromium	**29.7**
Copper	48.4
Iron	26,100
Lead	49.7

Sample ID	CAPL-SD83-1012	CAPL-SD83-1012-V
Sample Date	10/16/12	10/25/12
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDD	2.88 L	NA
Total Metals (mg/kg)		
Arsenic	**30.2**	NA
Chromium	**56.3**	NA
Iron	**68,200**	NA
Vanadium	**171.0**	NA

Sample ID	CAPL-SD68-1012
Sample Date	10/18/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	13.9 L
Total Metals (mg/kg)	
Aluminum	26,700
Arsenic	**56.7**
Barium	80.2
Chromium	**45.6 K**
Iron	30,900

Sample ID	CAPL-SD67-1012
Sample Date	10/16/12
Semivolatile Organic Compounds (µg/kg)	
Benzo(a)anthracene	223
Benzo(a)pyrene	**303**
Benzo(b)fluoranthene	400
Benzo(g,h,i)perylene	208
Benzo(k)fluoranthene	335
Chrysene	285
Dibenz(a,h)anthracene	74.1
Indeno(1,2,3-cd)pyrene	238
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	23.7 L
4,4'-DDT	7.55 J
alpha-Chlordane	4.25 L
Aroclor-1260	914 L
Deldrin	4.55 L
Endrin aldehyde	3.11 L
gamma-Chlordane	8.24 L
Total Metals (mg/kg)	
Barium	30.2
Chromium	**6.45**

	Adjusted Residential RSL x 10 for SD 0514	CAX Freshwater Sediment ESV	CAX Marine Sediment ESV[1]
Volatile Organic Compounds (µg/kg)			
Carbon disulfide	740,000	0.85	--
Semivolatile Organic Compounds (µg/kg)			
Acenaphthene	3,500,000	290	16
Anthracene	17,000,000	57.2	85.3
Benzo(a)anthracene	1,500	108	261
Benzo(a)pyrene	150	150	430
Benzo(b)fluoranthene	1,500	240	1,800
Benzo(g,h,i)perylene	--	170	670
Benzo(k)fluoranthene	15,000	240	1,800
Chrysene	150,000	166	384
Dibenz(a,h)anthracene	150	33	63.4
Fluoranthene	2,300,000	423	600
Fluorene	2,300,000	77.4	19.0
Indeno(1,2,3-cd)pyrene	1,500	200	600
Phenanthrene	--	204	240
Pyrene	1,700,000	195	665
Pesticide/Polychlorinated Biphenyls (µg/kg)			
4,4'-DDD	22,000	4.88	1.22
4,4'-DDE	16,000	3.16	2.2
4,4'-DDT	19,000	4.16	1.19
Aldrin	310	2	9.5
alpha-Chlordane	18,000	3.24	2.26
Aroclor-1260	2,400	59.8	48.0
Deldrin	330	1.9	0.72
Endosulfan II	370,000	14	--
Endosulfan sulfate	370,000	5.4	--
Endrin	18,000	2.22	2.67
Endrin aldehyde	18,000	2.22	--
Endrin ketone	18,000	2.22	--
gamma-Chlordane	18,000	3.24	2.26
Heptachlor epoxide	590	2.47	--
Methoxychlor	310,000	19	--
Explosives (µg/kg)			
1,3-Dinitrobenzene	6,200	6.7	--
2,4,6-Trinitrotoluene	36,000	92	20,000
HMX	3,800,000	4.74	115,000
Total Metals (mg/kg)			
Aluminum	77,000	25,500	18,000
Antimony	31	3	2
Arsenic	6.7	9.79	8.2
Barium	15,000	20	48
Chromium	3	43.4	81.0
Cobalt	23	50	10
Copper	3,100	31.6	34.0
Iron	55,000	20,000	220,000
Lead	4,000	35.8	35.8
Mercury	23	0.18	0.15
Nickel	1,500	22.7	20.9
Zinc	23,000	121	150

PENNIMAN LAKE

Legend
- Surface and Subsurface Sediment Sample Locations
- Surface Water, Surface Sediment, and Subsurface Sediment Sample Locations
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Bold text indicates exceedance of Adjusted Residential Soil RSL x 10 for Sediment (May 2014)
Shading indicates exceedance of CAX Freshwater Sediment ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
[1]Marine SD ESV applicable only to samples collected at station ID CAPL-SD83, located on the south side of the the Penniman Lake dam, in King Creek

J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be higher
L - Analyte present, value may be biased low, actual value may be higher
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

* a duplicate was collected at this location, the higher of the two results is shown.

N W E S

0 175 350 Feet

Figure 7E
Surface Sediment Exceedance Results
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_13E_SUBSURFACE_SEDIMENT_SAMPLE_LOCS_AND_EXCEEDANCES.MXD JMONTI 10/31/2014 9:35:22 AM

Sample ID	CAPL-SSD85-1012
Sample Date	10/24/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	9.61
4,4'-DDT	11.2 J
alpha-Chlordane	3.34
Aroclor-1260	1,840 J
Dieldrin	4.07 J
Endosulfan II	18.1 J
Endrin	12.2 J
Endrin ketone	5.59 J
gamma-Chlordane	11.6
Total Metals (mg/kg)	
Barium	49.9
Chromium	**27.6**
Copper	379
Iron	28,400
Lead	236
Nickel	242
Zinc	1,040

Sample ID	CAPL-SSD86-1012
Sample Date	10/24/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	4.19 J
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	7.08 L
4,4'-DDE	23.5 L
4,4'-DDT	13.9 J
alpha-Chlordane	17 J
Aroclor-1260	**3,700 J**
Dieldrin	62.4 J
Endosulfan II	39.7 J
Endrin	31.1 J
Endrin aldehyde	2.55 J
Endrin ketone	13.1 J
Total Metals (mg/kg)	
Barium	28.2
Chromium	**15.1**
Copper	160
Lead	236
Nickel	118
Zinc	927

Sample ID	CAPL-SSD87-1012
Sample Date	10/24/12
Semivolatile Organic Compounds (µg/kg)	
Acenaphthene	1,270 K
Anthracene	2,650
Benzo(a)anthracene	**2,300**
Benzo(a)pyrene	**1,230 K**
Benzo(b)fluoranthene	1,400 K
Benzo(g,h,i)perylene	466 K
Benzo(k)fluoranthene	726
Chrysene	2,350 K
Dibenz(a,h)anthracene	134 K
Fluoranthene	6,230
Fluorene	1,340 K
Indeno(1,2,3-cd)pyrene	386
Phenanthrene	7,590
Pyrene	6,970 K
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	13.6 J
Aroclor-1260	138 L
Dieldrin	3.49 J
Endrin	3.12 J
gamma-Chlordane	7.05 L
Total Metals (mg/kg)	
Barium	32.1
Chromium	**18.6**

Sample ID	CAPL-SSD70-1012
Sample Date	10/17/12
Semivolatile Organic Compounds (µg/kg)	
Acenaphthene	79,800
Anthracene	85,600
Benzo(a)anthracene	**36,600**
Benzo(a)pyrene	**20,500**
Benzo(b)fluoranthene	**16,100**
Benzo(g,h,i)perylene	5,990
Benzo(k)fluoranthene	**17,700**
Chrysene	46,300
Dibenz(a,h)anthracene	**2,710**
Dibenzofuran	32,900 J
Fluoranthene	125,000
Fluorene	81,700
Indeno(1,2,3-cd)pyrene	**5,960**
Phenanthrene	287,000
Pyrene	135,000
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	70.7 J
4,4'-DDE	50.1 J
4,4'-DDT	4.21 J
alpha-Chlordane	7.13 J
Aroclor-1260	2,030 J
beta-BHC	26.2 J
delta-BHC	6.34 J
Dieldrin	8.03 J
Endosulfan sulfate	45.9 J
Endrin	23.9 J
Endrin aldehyde	5.18 J
Endrin ketone	3.62 J
gamma-Chlordane	26.9 J
Explosives (µg/kg)	
1,3-Dinitrobenzene	551
Total Metals (mg/kg)	
Arsenic	**16.5**
Barium	36.5
Chromium	**11.5**
Lead	37.6

Sample ID	CAPL-SSD63-1012
Sample Date	10/17/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	10.1 J
Aroclor-1260	217 J
Dieldrin	4.36 J
Endosulfan sulfate	9.51 J
Endrin aldehyde	4.52 J
gamma-Chlordane	12.2 L
Total Metals (mg/kg)	
Arsenic	**27.4**
Barium	86.7
Chromium	**35.2**
Copper	32.3
Iron	33,700
Lead	68.4
Mercury	0.252
Zinc	165

Sample ID	CAPL-SSD64-1012
Sample Date	10/17/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	5.53 J
4,4'-DDE	9.13 J
Total Metals (mg/kg)	
Arsenic	**22.8**
Barium	71.5
Chromium	**39.3**
Copper	37.6
Iron	29,600
Lead	57.6
Mercury	1.45
Zinc	155

Sample ID	CAPL-SSD71-1012
Sample Date	10/17/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	8.61 J
Dieldrin	2.1 J
Endrin aldehyde	2.29 J
Endrin ketone	2.73
Total Metals (mg/kg)	
Arsenic	**26.5**
Barium	59.9
Chromium	**31.7**
Iron	24,500
Lead	47.9

Sample ID	CAPL-SSD65-1012
Sample Date	10/18/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	6.02 J
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	3.35 J
Total Metals (mg/kg)	
Arsenic	**19**
Barium	40.3
Chromium	**30.7 J**
Iron	25,600

Sample ID	CAPL-SSD76-1012
Sample Date	10/16/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	6.3

Sample ID	CAPL-SSD78-1012
Sample Date	10/16/12
Semivolatile Organic Compounds (µg/kg)	
Chrysene	194
Pyrene	283
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	33.6 L
4,4'-DDE	251 J
4,4'-DDT	9.17 J
alpha-Chlordane	34.7
Aroclor-1260	**3,020 J**
Dieldrin	50.1 L
Endosulfan sulfate	102 J
Endrin	49 L
Endrin aldehyde	16.2 L
Endrin ketone	8.6 J
gamma-Chlordane	212
Heptachlor epoxide	3.43 L
Methoxychlor	276 J
Explosives (µg/kg)	
1,3-Dinitrobenzene	456
Total Metals (mg/kg)	
Arsenic	**8.75**
Barium	49.5
Chromium	**15.2**
Lead	43

Sample ID	CAPL-SSD77-1012
Sample Date	10/16/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	20 J
4,4'-DDT	5.25 J
alpha-Chlordane	3.88 L
Aroclor-1260	1,170
Dieldrin	5.14 J
Endrin aldehyde	3.54 J
Endrin ketone	3.41 J
gamma-Chlordane	26.1
Total Metals (mg/kg)	
Chromium	**5.52**

Sample ID	CAPL-SSD84-1012
Sample Date	10/24/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	2.11 J
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	17.1 J
4,4'-DDT	218 J
Aldrin	5.33 J
alpha-Chlordane	13.4 J
Aroclor-1260	**34,200 J**
Dieldrin	**709**
Endosulfan II	483 J
Endosulfan sulfate	129 J
Endrin	59.1 J
Endrin aldehyde	30 J
Endrin ketone	28 J
Heptachlor epoxide	6.42 J
Methoxychlor	137 J
Total Metals (mg/kg)	
Barium	25.6
Chromium	**14.1**

Sample ID	CAPL-SSD79-1012	CAPL-SSD79-1012-V
Sample Date	10/16/12	10/25/2012
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDE	32.7 J	NA
alpha-Chlordane	9.94 L	NA
Aroclor-1260	630 J	NA
Dieldrin	6.88 J	NA
Endosulfan sulfate	20.3 L	NA
gamma-Chlordane	40.6	NA
Explosives (µg/kg)		
1,3-Dinitrobenzene	117 J	NA
Total Metals (mg/kg)		
Barium	21.3	NA
Chromium	**6.11**	

Sample ID	CAPL-SSD80-1012	CAPL-SSD80-1012-V
Sample Date	10/16/12	10/25/12
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	NA	7.31 J
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDE	3.57 J	NA
Total Metals (mg/kg)		
Chromium	**7.39**	NA

Sample ID	CAPL-SSD66-1012*
Sample Date	10/18/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	1.88 J
Total Metals (mg/kg)	
Chromium	**4.3**

Sample ID	CAPL-SSD62-1012
Sample Date	10/17/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	17.7 J
4,4'-DDE	26.4 J
Aroclor-1260	169 J
Dieldrin	4.65 J
Endosulfan sulfate	6.42 J
Endrin aldehyde	5.11 L
Endrin ketone	16.5 J
Total Metals (mg/kg)	
Arsenic	**44.3**
Barium	70.2
Chromium	**45**
Copper	34.4
Iron	30,400
Lead	107
Zinc	215

Sample ID	CAPL-SSD81-1012
Sample Date	10/18/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	29.7
Total Metals (mg/kg)	
Aluminum	34,700
Arsenic	**24.4**
Barium	64.7
Chromium	**61.7**
Iron	51,400
Nickel	26.1

	Adjusted Residential RSL x 10 for SD 0514	CAX Freshwater Sediment ESV
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	740,000	0.85
Semivolatile Organic Compounds (µg/kg)		
Acenaphthene	3,500,000	290
Anthracene	17,000,000	57.2
Benzo(a)anthracene	1,500	108
Benzo(a)pyrene	150	150
Benzo(b)fluoranthene	1,500	240
Benzo(g,h,i)perylene	--	170
Benzo(k)fluoranthene	15,000	240
Chrysene	150,000	166
Dibenz(a,h)anthracene	150	33
Dibenzofuran	72,000	5,100
Fluoranthene	2,300,000	423
Fluorene	2,300,000	77.4
Indeno(1,2,3-cd)pyrene	1,500	200
Phenanthrene	--	204
Pyrene	1,700,000	195
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDD	22,000	4.88
4,4'-DDE	16,000	3.16
4,4'-DDT	19,000	4.16
Aldrin	310	2
alpha-Chlordane	18,000	3.24
Aroclor-1260	2,400	59.8
beta-BHC	3,000	5
delta-BHC	3,000	3
Dieldrin	330	1.9
Endosulfan II	370,000	14
Endosulfan sulfate	370,000	5.4
Endrin	18,000	2.22
Endrin aldehyde	18,000	2.22
Endrin ketone	18,000	2.22
gamma-Chlordane	18,000	3.24
Heptachlor epoxide	590	2.47
Methoxychlor	310,000	19
Explosives (µg/kg)		
1,3-Dinitrobenzene	6,200	6.7
Total Metals (mg/kg)		
Aluminum	77,000	25,500
Arsenic	6.7	9.79
Barium	15,000	20
Chromium	3	43.4
Copper	3,100	31.6
Iron	55,000	20,000
Lead	4,000	35.8
Mercury	23	0.18
Nickel	1,500	22.7
Zinc	23,000	121

Sample ID	CAPL-SSD67-1012	CAPL-SSD67-1012-V
Sample Date	10/16/12	10/25/2012
Semivolatile Organic Compounds (µg/kg)		
Benzo(a)anthracene	230	NA
Benzo(a)pyrene	**369**	NA
Benzo(b)fluoranthene	392	NA
Benzo(g,h,i)perylene	246	NA
Benzo(k)fluoranthene	467	NA
Chrysene	359	NA
Dibenz(a,h)anthracene	77.5	NA
Indeno(1,2,3-cd)pyrene	221	NA
Pyrene	226	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)		
4,4'-DDE	14 L	NA
Aroclor-1260	230 L	NA
Endrin	3.15 L	NA
Endrin aldehyde	3.73 L	NA
gamma-Chlordane	5.22 L	NA
Total Metals (mg/kg)		
Arsenic	**9.01**	NA
Chromium	**4.65**	NA

Sample ID	CAPL-SSD72-1012
Sample Date	10/17/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	11.5 J
Pesticide/Polychlorinated Biphenyls (µg/kg)	
gamma-Chlordane	16.4 J
Total Metals (mg/kg)	
Arsenic	**31.2**
Barium	53.7 J
Chromium	**35.2**
Iron	21,200

Sample ID	CAPL-SSD69-1012	CAPL-SSD69-1012-V
Sample Date	10/17/12	10/25/12
Volatile Organic Compounds (µg/kg)		
Carbon disulfide	NA	4.08 J
Pesticide/Polychlorinated Biphenyls (µg/kg)		
gamma-Chlordane	4.77 K	NA
Total Metals (mg/kg)		
Chromium	**10.3**	NA

Sample ID	CAPL-SSD73-1012
Sample Date	10/17/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDD	6.99 J
4,4'-DDE	21.6 J
Dieldrin	3.01 J
Endrin ketone	3.04 J
Total Metals (mg/kg)	
Aluminum	29,100
Arsenic	**52**
Barium	104
Chromium	**54.2**
Copper	60
Iron	41,800
Lead	92.3
Zinc	186

Sample ID	CAPL-SSD74-1012*
Sample Date	10/18/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	13.4 J
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	6.22 J
Endrin aldehyde	2.27 J
gamma-Chlordane	14.7 J
Total Metals (mg/kg)	
Arsenic	**47**
Barium	65.6
Chromium	**37.9**
Copper	39.1
Iron	31,100
Lead	44

Sample ID	CAPL-SSD75-1012
Sample Date	10/18/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	9.7 J
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	3.67 J
Total Metals (mg/kg)	
Arsenic	**40.6**
Barium	75.4
Chromium	**40.1**
Copper	44
Iron	30,000
Lead	48.5

Sample ID	CAPL-SSD82-1012
Sample Date	10/18/12
Pesticide/Polychlorinated Biphenyls (µg/kg)	
4,4'-DDE	4.8
gamma-Chlordane	3.72 J
Total Metals (mg/kg)	
Arsenic	**45.8**
Barium	66.9
Chromium	**26.9**
Copper	42.5
Iron	26,000
Lead	42.1

Sample ID	CAPL-SSD68-1012
Sample Date	10/18/12
Volatile Organic Compounds (µg/kg)	
Carbon disulfide	14.8 J
Total Metals (mg/kg)	
Aluminum	30,700
Arsenic	**22.5**
Barium	60
Chromium	**51.4 J**
Iron	28,400

Legend
- Surface and Subsurface Sediment Sample Locations
- Surface Water, Surface Sediment, and Subsurface Sediment Sample Locations
- Grassy Stormwater Drainage Channels
- Intermittent Creek
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- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Bold text indicates exceedance of Adjusted Residential Soil RSL x 10 for Sediment (May 2014)
Shading indicates exceedance of CAX Freshwater Sediment ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram
* a duplicate was collected at this location, the higher of the two results is shown.

N, W, E, S

0 175 350 Feet

Figure 8E
Subsurface Sediment Exceedance Results
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

CH2MHILL.

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\405134_PENNIMANLAKE_STEP_2_SI_TM\FIGURE_15_SW_SAMPLE_LOCS_AND_EXCEEDANCES.MXD CVONFREEDEN 9/3/2014 4:33:45 PM

Sample ID	CAPL-SW64-1012
Sample Date	10/15/12
Total Metals (µg/l)	
Arsenic	**1.44 J**
Barium	19.1
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.17 J**
Barium, Dissolved	18.4

Sample ID	CAPL-SW65-1012
Sample Date	10/15/12
Total Metals (µg/l)	
Arsenic	**2.01 J**
Barium	21.6
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.19 J**
Barium, Dissolved	19.5

Sample ID	CAPL-SW66-1012
Sample Date	10/15/12
SVOCs (µg/l)	
Benzo(a)anthracene	0.0707 J
Pyrene	0.19
Total Metals (µg/l)	
Arsenic	**1.37 J**
Barium	20.4
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.26 J**
Barium, Dissolved	19.1

Sample ID	CAPL-SW63-1012
Sample Date	10/15/12
Total Metals (µg/l)	
Arsenic	**1.64 J**
Barium	19.5
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.32 J**
Barium, Dissolved	19.5

Sample ID	CAPL-SW62-1012
Sample Date	10/15/12
Total Metals (µg/l)	
Arsenic	**1.5 J**
Barium	20.1
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.31 J**
Barium, Dissolved	18.5

Sample ID	CAPL-SW69-1012
Sample Date	10/15/12
SVOCs (µg/l)	
Benzo(a)anthracene	0.0563 J
Dibenz(a,h)anthracene	**0.0782 J**
Total Metals (µg/l)	
Arsenic	**1.7 J**
Barium	20.4
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.42 J**
Barium, Dissolved	19

Sample ID	CAPL-SW68-1012
Sample Date	10/15/12
Total Metals (µg/l)	
Arsenic	**1.62 J**
Barium	21
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.15 J**
Barium, Dissolved	20.1

Sample ID	CAPL-SW67-1012
Sample Date	10/15/12
Total Metals (µg/l)	
Arsenic	**1.85 J**
Barium	21
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.24 J**
Barium, Dissolved	19.2

	RSLs Tap X 10 for SW Adjusted (May 2014)	Surface Water Eco SV
SVOCs (µg/l)		
Benzo(a)anthracene	0.34	0.027
Dibenz(a,h)anthracene	0.034	--
Pyrene	120	0.025
Total Metals (µg/l)		
Arsenic	0.67	150
Barium	3,800	4
Dissolved Metals (µg/l)		
Arsenic, Dissolved	0.67	150
Barium, Dissolved	3,800	4

PENNIMAN LAKE

Legend
- Surface Water, Surface Sediment, and Subsurface Sediment Sample Locations
- Grassy Stormwater Drainage Channels
- Intermittent Creek
- Underground Stormwater Pipe
- Overflow pipe
- Elevation Contours (ft amsl)
- Shoreline

Note:
Bold text indicates exceedance of RSLs Tap X 10 for SW Adjusted (May 2014)
Shading indicates exceedance of Surface Water ESV
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
SVOCs - Semivolatile Organic Compounds
J - Analyte present, value may or may not be accurate or precise
µg/l - Micrograms per liter

N W E S
0 175 350
Feet

Figure 9E
Surface Water Exceedance Results
Penniman Lake Site Inspection – Step 2
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

Response to Comments

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

February 5, 2015

Mr. Scott Park
NAVFAC MIDLANT, Building N-26, Room 3208
Attention: Code OPHE3, Mr. Scott Park
9742 Maryland Avenue
Norfolk, VA 23511-3095

Subject: Site Inspection Step 2 Results and Proposed Path Forward for Penniman Lake, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia, November 2014

Mr. Park:

Thank you for the opportunity to review the subject document. Attached are EPA's comments on the document. As always, EPA is open to further dialogue regarding Penniman Lake issues and the appropriate path forward. EPA understands that some clarification of our comments and the issues that they raise may be required before the Navy can provide formal responses to these comments. We look forward to working with you further on this matter. If you have any questions, please contact me at 215-814-2077.

Sincerely,

Gerald F. Hoover

Gerald F. Hoover, RPM
NPL/BRAC Federal Facilities Branch

cc: Wade Smith, VDEQ

Tox Comments:

Overall, the methodologies to complete the human health risk screening appear appropriate; however, the following comments and recommendations must be considered as the draft Technical Memorandum is finalized.

Draft Technical Memorandum

- Page 1, Section 1 – delete phrase, "or remedial actions" as the RI is the documentation for determining whether remedial actions are warranted.

- Page 1, Section 1 – The stated secondary objective of the Step 2 field activities was to determine if the impacts from SVOCs, pesticides, and metals may originate from non-CERCLA-regulated sources. However, making this determination at the SI stage is inappropriate. The SI may highlight and eliminate areas of concern based on the risk ratio approach, but should not eliminate COPCs without suitable analysis.

- Page7, Section 4.5 – The last sentence of the second paragraph of this section references the samples collected at Penniman Lake to be used in the background analysis; but should instead reference Cheatham Pond.

- Page 11, Table 5A – The 'Relevance' column should be deleted, as this column is providing conclusions about the relevance of specific occurrences prior to discussion or analysis. In addition, the table heading implies that the information in the table will be limited to an overview of the screening criteria results.

- Page 14, Section 5.5.2 – The statements assigning constituent occurrences to non-CERLCA sources is inappropriate prior to human health risk assessment, or in this case, a human health risk screening. This section should identify the constituents observed and the locations at which they were observed, without statements attributing to non-CERLCA sources (anthropomorphic or naturally-occurring).

- Page 14, Section 6.1 – The comparison of the maximum detected concentration to background concentrations is not appropriate as an initial step prior to estimating risk. Background concentrations are typically handled in accordance with OSWER 9285.6-07P, *Role of Background in the CERCLA Cleanup Program*, which "recommends a baseline risk assessment approach that retains constituents that exceed risk-based screening concentrations. This approach involves addressing site-specific background issues at the end of the risk assessment, in the risk characterization." Step 1 of the HHRS should be limited to a comparison of the maximum detected concentration and the risk-based screening level.

- Page 14, Section 6.1 – Step 3 of the HHRS is not endorsed by the Agency and may be removed. If Step 3 is retained, the Agency will support the results (COPCs) of the HHRS through Step 2 and further constituents will not be removed due to a calculation of a

corresponding risk level using the 95% UCL. The removal of Step 3 from the Technical Memorandum and the HHRS (Appendix C text and tables) is recommended.

- Page 15, Section 6.1 – the COPCs identified in the bullets are likely to change provided the HHRS process is revised as recommended.

- Page 19, Section 7.3 – Delete 5th bullet on page. The conclusion that only the Aroclor-1260 and explosives are due to CERCLA-regulated activities is preemptive and circumstantial. The purpose of the SI is to identify areas that require additional investigation; not to remove COPCs by assuming that concentrations are due to natural occurrence or anthropomorphic sources.

- Page 20, Section 8 – The conclusions and recommendations, which incorrectly state that Aroclor-1260 is the only COPC and the remaining observed constituents are non-CERLCA related sources, are likely to change provided the HHRS process is revised as recommended. This may result in an HHRA for more COPCs than just Aroclor-1260 and total PCBs.

Appendix C – Human Health Risk Screening

- Page 3, Section C.2.1 – As previously recommended, the comparison of observed environmental concentrations to background levels should be made after the calculation of the corresponding risk level (i.e. risk ratio technique). This comparison may be more appropriate in the RI.

- Page 4, Section C.2.3 – As previously recommended, the Step 3 of the HHRS is unnecessary and may be removed.

- Table C-2, *Summary of Human Health COPCs* and Table 2.2 (Appendix C) – Lead was identified as a COPC in Table 2.2 (Appendix C), for Sediment, Surface Sediment, Group 1 – Northwest Lobes and Drainages (North of Site 11), but was not included in the calculation of the corresponding hazard index in Table 2.2a, thus ignoring any toxicity from exposure to lead. The maximum concentration for lead in the surface sediment was 8.5E+2, double the RSL for lead (4.0E+2), and should be retained as a COPC.

- Appendix C – As previously stated, do not remove COPCs from the calculation of corresponding cancer risk and/or hazard index due to comparison to background. This exclusion may remove critical information from the remaining analyses. A more thorough comparison to background, as stated, should be incorporated into the RI.

- Appendix C – The calculations of the corresponding cancer risk and corresponding hazard index appear appropriate; however, the following specific comments should be considered:

    - Table C-2 – The COPCs identified in Step 1 and 2 in this table may change provided the HHRS is revised as recommended.

- Table 2.2 (and throughout remaining tables) – dibenzo(a,e)pyrene is a more appropriate surrogate for benzo(g,h,i)perylene than pyrene. Dibenzo(a,e)pyrene and benzo(g,h,i)perylene have similar molecular weights and chemical structures. Please use screening toxicity value from dibenzo(a,e)pyrene (4E-2) for benzo(g,h,i)perylene.

- Table 2-4a – the non-carcinogenic residential soil RSL for chromium was 2.3E+3; which is 10x greater than the resident soil RSL for HI = 1 from the R3 RSL table. Please clarify.

- Table 2-9 – CAS # 7782-49-2 is incorrectly listed as 'vanadium' in the Chemical column and should be 'selenium'. CAS # 7440-23-5 is incorrectly listed as 'zinc' in the Chemical column and should be 'sodium'.

- Table 2-15 – The use of the lower of detected concentrations from 2 reference fish tissue samples from Penniman Lake are not appropriate background samples. The use of this background value is not recommended.

- Table 2-20 – Carbazole is not listed in the RSL tables. Please clarify the original information for carbazole.

BTAG Comments:

1. Regarding surface soil (Table 8), 26 of 54 sample locations have NA (not analyzed) listed for all trace metals, explosives, pesticides/PCBs (except Aroclor 1260), SVOCs, and VOCs. An explanation should be provided on why all samples were not analyzed for these chemicals. If spatial coverage is not adequate and/or concentrations are heterogeneous, this could represent a significant data gap and may result in not all COPCs being properly identified. This issue must be addressed. In addition, the ecological screening value for Aroclor 1260 in soil is listed as 8,000 µg/kg. Support for the use of this value needs to be included in the text.

2. Regarding surface sediment (Table 11), 41 of 70 samples have NA listed for all trace metals, explosives, pesticides/PCBs (except Aroclor 1260), SVOCs, and VOCs. An explanation should be provided on why all samples were not analyzed for these chemicals. Again, if spatial coverage is not adequate and/or concentrations are heterogeneous, this could represent a significant data gap and may result in not all COPCs being properly identified. This issue must be addressed.

3. Regarding surface water (Table 13), eight samples are listed with data. An explanation should be provided on how it was determined that eight surface water samples was sufficient to characterize the nature and extent of contamination given the large size of

the lake. If additional surface water data existed, it may change the list of contaminants of potential concern (COPCs).

4. Regarding Table 14, tissue detection results needs to identify the species used for this analysis. According to Section 5.4, both fish and frog tissue were analyzed. The data for each of these tissue types need to be in a separate table.

5. Please provide the minimum and maximum depths within Penniman Lake and how this relates to groundwater elevations. Ultimately, bathymetric mapping may be necessary.

6. Section 5.5.2 on page 14 states that impacts in all media associated with concentrations of semi-volatile organic compounds, pesticides, and metals above screening criteria appear to be consistent with the presence of non-CERCLA regulated sources. This appears to be speculative as no specific information such as a comparison to reference/background concentrations is presented to support this statement. In fact, Site 11, which drained into Penniman Lake, contained all of these contaminants. Therefore, releases from Site 11 or some other unknown CERCLA-regulated source cannot be discounted for these contaminants in Penniman Lake. Theoretically lake area itself could be "CERCLA site" Therefore, BTAG does not support the recommendation in Section 8 that any further investigation in Penniman Lake should be limited to PCBs and explosives. While BTAG supports the recommendation to complete a baseline ecological risk assessment in Section 8, it should not be limited to PCBs. Instead, it must also include an evaluation of these other contaminants that exceeded screening criteria.

7. Section 8 on pages 20 and 21 provides conclusions and recommendations for Penniman Lake. There is no recommendation to further assess the nature and extent of contamination from AOC 6 TNT Subareas, despite the fact that this part of the site was deferred to the Penniman Lake investigation. Sediment sampling in Penniman Lake adjacent to AOC 6 is limited (only one sample) and additional sampling as part of this study is recommended. Any additional sampling needs to consider the fact that activity at AOC 6 predates construction of the dam which likely results in different migration pathways than those present today.

8. Table 5 A Regulatory Screening Criteria Exceedance Overview Table: Regarding the King Creek Sediment sample, this table states "No exceedances in this sample. This indicates that contamination within Penniman Lake sediments is not migrating significantly out of the lake." One sample is not sufficient to determine if contamination has migrated to King Creek. BTAG supports the recommendation in Section 8 that additional sediment samples should be collected below the dam. Sediment sampling should focus on depositional areas below the spillway where contaminants would have accumulated.

Response to Comments
Penniman Lake
Site Inspection – Step 2 Results and Proposed Path Forward
Draft Technical Memorandum
Naval Weapons Station Yorktown Cheatham Annex
Williamsburg, VA
June 3, 2015

Comments received by email on February 5, 2015 from Gerald Hoover, U. S. Environmental Protection Agency (EPA) Region III, following review of the Penniman Lake Site Inspection – Step 2 Draft Technical Memorandum submitted November 6, 2014.

Note: Per the Partnering Team discussion on May 28, 2015, the Navy intends to conduct an interim removal action at AOC 9 to address the PCB contamination in the northwest area (the details of which will be worked out at a later date) as the next step for the site prior to the continuation of any investigative work.

Comments received from USEPA via email dated February 5, 2015

TOX COMMENTS

Overall, the methodologies to complete the human health risk screening appear appropriate; however, the following comments and recommendations must be considered as the draft Technical Memorandum is finalized.

EPA General Comment #1: *Page 1, Section 1 –delete phrase, "or remedial actions" as the RI is the documentation for determining whether remedial actions are warranted.*

Navy Response: The phrase will be deleted as requested.

EPA General Comment #2: *Page 1, Section 1 –The stated secondary objective of the Step 2 field activities was to determine if the impacts from SVOCs, pesticides, and metals may originate from non-CERCLA-regulated sources. However, making this determination at the SI stage is inappropriate. The SI may highlight and eliminate areas of concern based on the risk ratio approach, but should not eliminate COPCs without suitable analysis.*

Navy Response: The Navy is not aware of any EPA CERCLA guidance that prohibits conclusions regarding whether COPCs originate from CERCLA-regulated or non-CERCLA-regulated sources from being drawn at the SI stage, and believes that a "suitable analysis" has occurred to document the existence of a plethora of potential non-CERCLA-regulated sources to explain the concentrations of these constituents in Penniman Lake sediment. Based on the evaluation of the results of the SI and the incorporated human health and ecological risk screenings, there exist constituents other than Aroclor-1260 and explosives that could potentially drive risk in soil and or sediment, but that the nature and distribution of these constituents are consistent with impacts from typical urban runoff. Specifically, impacts in all media associated with concentrations of SVOCs, pesticides, and metals above screening criteria appear to be consistent with typical impacts in urban environments from non-CERCLA-regulated sources for these contaminants, including the normal use of pesticides around buildings, roads, and parking areas and the impacts of stormwater runoff that would be expected from contact with the asphalt-paved parking lots, roadways, and extensive building rooftops in the upland industrialized and developed areas that drain to the lake. In addition, the detected concentrations of some metals (particularly arsenic, iron, and manganese) appear to be consistent with background and likely represent naturally occurring conditions. It must be emphasized that whether the detected concentrations of these constituents drive potential human health risk is not

relevant to the issue of whether or not these constituents originate from CERCLA-regulated or non-CERCLA-regulated sources. Therefore, there is no logic to retaining constituents that do not originate from CERCLA-regulated sources as COPCs for future investigation activities or for future human health risk analysis.

EPA General Comment #3: *Page 7, Section 4.5 - The last sentence of the second paragraph of this section references the samples collected at Penniman Lake to be used in the background analysis; but should instead reference Cheatham Pond.*

Navy Response: This sentence is not referencing samples collected from Penniman Lake, but is referencing the samples collected from Cheatham Pond as "Penniman Lake reference samples." The paragraph will be changed as follows to make this clear, as indicated by the bold text:

> Based on a review of the preliminary (unvalidated) data, the CAX Partnering Team agreed **on October 25, 2012** not to use the three reference samples **from Cheatham Pond that were to be representative of** Youth Pond **background** due to elevated concentrations of PCBs and metals in sediment. Thus, only the samples collected from Cheatham Pond selected to match habitat conditions at Penniman Lake and Site 4 were used to develop background upper tolerance limits (UTLs). **For the calculated surface water background UTLs, these samples were the ten Cheatham Pond surface water samples associated with Site 4 and Penniman Lake. For the calculated surface sediment UTLs, these samples included the ten Cheatham Pond samples associated with Site 4 and Penniman Lake, as well as the eight Pond Study samples (Baker, 2001). For the calculated subsurface sediment UTLs, these samples were the five Cheatham Pond samples associated with Penniman Lake.**

Additionally, the last paragraph of Section 4.5 will be changed as follows:

> The methodology used to develop background 95 percent UTLs for surface water and sediment followed the same methodology used to derive the base background 95 percent UTLs for soil and groundwater (CH2M HILL, 2011b), **and is detailed in Appendix M of the Final Site 4 and Youth Pond Remedial Investigation Report (CH2M HILL, 2014a).**

EPA General Comment #4: *Page 11, Table 5A - The 'Relevance' column should be deleted, as this column is providing conclusions about the relevance of specific occurrences prior to discussion or analysis. In addition, the table heading implies that the information in the table will be limited to an overview of the screening criteria results.*

Navy Response: A sentence will be added after the first sentence in Section 5.5, as follows:

> Table 5A presents an overview of the soil, sediment, and surface water sample results exceeding screening criteria. Preliminary evaluations of the Aroclor-1260 results and their relevance to identifying potential source(s) for the PCBs detected in Penniman Lake, as well as discussions of the results for other constituents exceeding screening criteria, are provided in Table 5A.

The "relevance" column will not be deleted as suggested, because it summarizes the evaluation of the data and conclusions regarding potential sources that have already been presented in the preceding subsections (i.e., Sections 5.1 through 5.4). Moreover, the information presented in this column has no impact on the risk screenings presented in Section 6.

EPA General Comment #5: *Page 14, Section 5.5.2 - The statements assigning constituent occurrences to non-CERLCA sources is inappropriate prior to human health risk assessment, or in this case, a human health risk screening. This section should identify the constituents observed and the locations at which they were observed, without statements attributing to non-CERLCA sources (anthropomorphic or naturally-occurring).*

Navy Response: The human health risk screening has no bearing on whether the detected analytes or any associated potential human health risk can be attributed to CERCLA-regulated or non-CERCLA-regulated sources. The human health risk screening merely indicates the potential for unacceptable risk. The data evaluation in Section 5 discusses the nature and spatial distribution of detected constituents and potential sources of the contamination, which can be done prior to or after the human health risk screening.

EPA General Comment #6: *Page 14, Section 6.1 - The comparison of the maximum detected concentration to background concentrations is not appropriate as an initial step prior to estimating risk. Background concentrations are typically handled in accordance with OSWER 9285.6-07P, Role of Background in the CERCLA Cleanup Program, which "recommends a baseline risk assessment approach that retains constituents that exceed risk-based screening concentrations. This approach involves addressing site-specific background issues at the end of the risk assessment, in the risk characterization." Step 1 of the HI-IRS should be limited to a comparison of the maximum detected concentration and the risk-based screening level.*

Navy Response: This TM does not include a baseline human health risk assessment, but includes a screening level human health risk assessment following the Navy risk ratio approach, which allows for comparison to background. Comparison to background has been used in numerous other SIs to focus further evaluation and sampling needs, which is how it is being used in this TM. When the baseline HHRA is conducted for the constituents directly related to a CERCLA-regulated release (Aroclor-1260 and explosives constituents) as part of the RI, background will not be used to screen for human health COPCs.

EPA General Comment #7: *Page 14, Section 6.1 - Step 3 of the HHRS is not endorsed by the Agency and may be removed. If Step 3 is retained, the Agency will support the results (COPCs) of the HHRS through Step 2 and further constituents will not be removed due to a calculation of a Corresponding risk level using the 95% UCL. The removal of Step 3 from the Technical Memorandum and the HHRS (Appendix C text and tables) is recommended*.

Navy Response: The purpose of this TM and screening level human health risk assessment was to focus any additional data collection needs. A full baseline HHRA will be conducted for the constituents directly related to a CERCLA-regulated release (Aroclor-1260 and explosives constituents) following standard baseline HHRA methodology.

EPA General Comment #8: *Page 15, Section 6.1 –the COPCs identified in the bullets are likely to change provided the HHRS process is revised as recommended.*

Navy Response: No changes will be made to the HHRS included in the TM. As indicated in responses to previous comments, the purpose of this TM and screening level human health risk assessment was to focus any additional data collection needs. A full baseline HHRA will be conducted for the constituents directly related to a CERCLA-regulated release (Aroclor-1260 and explosives constituents) following standard baseline HHRA methodology.

EPA General Comment #9: *Page 19, Section 7.3 - Delete 5th bullet on page. The conclusion that only the Aroclor- 1260 and explosives are due to CERCLA-regulated activities is preemptive and circumstantial. The purpose of the SI is to identify areas that require additional investigation; not to remove COPCs by assuming that concentrations are due to natural occurrence or anthropomorphic sources.*

Navy Response: The 5th bullet will not be deleted as suggested for the reasons provided in the response to EPA General Comment #2.

EPA General Comment #10: *Page 20, Section 8 – The conclusions and recommendations, which incorrectly state that Aroclor-1260 is the only COPC and the remaining observed constituents are non-CERLCA related sources, are likely to change provided the HHRS process is revised as recommended. This may result in an HHRA for more COPCs than just Aroclor-1260 and total PCBs.*

Navy Response: The Navy respectfully disagrees, since, with the exception of Aroclor-1260, total PCBs, and several explosives constituents, the evidence suggest that the remaining constituents exceeding screening criteria are not related to a CERCLA-regulated release and do not require further investigation.

Appendix C–Human Health Risk Screening

EPA General Comment #11: *Page 3, Section C.2.1 –As previously recommended, the comparison of observed environmental concentrations to background levels should be made after the calculation of the corresponding risk level (i.e. risk ratio technique). This comparison may be more appropriate in the RI*.

Navy Response: See the response to EPA General Comment #6.

EPA General Comment #12: *Page 4, Section C.2.3 - As previously recommended, the Step 3 of the HHRS is unnecessary and may be removed*.

Navy Response: See the response to EPA General Comment #7.

EPA General Comment #13: *Table C-2, Summary of Human Health COPCs and Table 2.2 (Appendix C) –Lead was identified as a COPC in Table 2.2 (Appendix C), for Sediment, Surface Sediment, Group 1-Northwest Lobes and Drainages (North of Site 11), but was not included in the calculation of the corresponding hazard index in Table 2.2a, thus ignoring any toxicity from exposure to lead. The maximum concentration for lead in the surface sediment was 8.5E+2, double the RSL for lead (4.0E+2), and should be retained as a COPC.*

Navy Response: It is agreed that lead was identified as a COPC for surface sediment in Group 1. However, risks associated with exposure to lead are not evaluated in the same manner as risks for other analytes and would not be added to the corresponding hazard index. Lead will be further evaluated using the IEUBK model to determine if there are any potential risks above acceptable levels associated with exposure to lead, and the TM will be updated. However, as the distribution and concentrations of lead appear to be associated with non-CERCLA-regulated sources, such as those discussed in Section 7.1 of the TM, and as discussed in Response to EPA General Comment #2, lead will not be evaluated in the RI HHRA.

EPA General Comment #14: *Appendix C – As previously stated, do not remove COPCs from the calculation of corresponding cancer risk and/or hazard index due to comparison to background. This exclusion may remove critical information from the remaining analyses. A more thorough comparison to background, as stated, should be incorporated into the RI.*

Navy Response: See the response to EPA General Comment #6.

EPA General Comment #15: *Appendix C – The calculations of the corresponding cancer risk and corresponding hazard index appear appropriate; however, the following specific comments should be considered:*

- *Table C-2 – The COPCs identified in Step 1 and 2 in this table may change provided the HHRS is revised as recommended.*

  Navy Response: See responses to previous comments concerning the risk screening process.

- *Table 2.2 (and throughout remaining tables) – dibenzo(a,e)pyrene is a more appropriate surrogate for benzo(g,h,i)perylene than pyrene. Dibenzo(a,e)pyrene and benzo(g,h,i)perylene have similar molecular weights and chemical structures. Please use screening toxicity value from dibenzo(a,e)pyrene (4E-2) for benzo(g,h,i)perylene.*

  Navy Response: EPA has recommended use of pyrene as a surrogate for benzo(g,h,i)pyrene in previous risk assessments. Please confirm that EPA has changed its opinion on the appropriate surrogate for benzo(g,h,i)pyrene and provide a reference for this change.

- *Table 2-4a – the non-carcinogenic residential soil RSL for chromium was 2.3E+3; which is 10x greater than the resident soil RSL for HI = 1 from the R3 RSL table. Please clarify.*

  Navy Response: As indicted in the text and on Table 2.4a, the screening criteria for sediment are 10x the residential soil RSL.

- *Table 2-9 – CAS # 7782-49-2 is incorrectly listed as 'vanadium' in the Chemical column and should be 'selenium'. CAS # 7440-23-5 is incorrectly listed as 'zinc' in the Chemical column and should be 'sodium'.*

  Navy Response: The CAS numbers for all of the metals and some of the other analytes on Table 2.9 are incorrect and will be corrected. Additionally, the last two rows (the second occurrence of vanadium and zinc) are incorrect and will be removed from the table.

- *Table 2-15 -- The use of the lower of detected concentrations from 2 reference fish tissue samples from Penniman Lake are not appropriate background samples. The use of this background value is not recommended*.

  Navy Response: These fish tissue samples were collected from Cheatham Pond for use as background (reference) samples for the Penniman Lake human health risk assessment, as documented in the Step 2 UFP-SAP (CH2M HILL, 2012). Following collection of the reference samples, the CAX Partnering Team agreed during a conference call on October

25, 2012 to submit the samples for laboratory analysis. During this conference call, the Team also agreed to allow CH2M HILL to match the reference samples to the Penniman Lake tissue samples by species and size, as best as possible based on professional judgement, without the need for additional Team input.

- *Table 2-20 –Carbazole is not listed in the RSL tables. Please clarify the original information for carbazole.*

  Navy Response: A footnote will be added to Table 2.20 indicating the carbazole screening value was calculated using the RSL calculator tool and the oral CSF of 2x10-2 $(mg/kg/day)^{-1}$ from HEAST.

BTAG COMMENTS

BTAG Comment # 1: *Regarding surface soil (Table 8), 26 of 54 sample locations have NA (not analyzed) listed for all trace metals, explosives, pesticides/PCBs (except Aroclor 1260), SVOCs, and VOCs. An explanation should be provided on why all samples were not analyzed for these chemicals. If spatial coverage is not adequate and/or concentrations are heterogeneous, this could represent a significant data gap and may result in not all COPCs being properly identified. This issue must be addressed. In addition, the ecological screening value for Aroclor 1260 in soil is listed as 8,000 µg/kg. Support for the use of this value needs to be included in the text.*

Navy Response: The analytes for the Step 1 (2011) soil samples included PCBs (Aroclors) only, as discussed in Section 3 of the TM and the final Step 1 SI SAP (2011), since the purpose of these samples was to try and delineate potential PCB source areas and migration pathways into the lake. It should be noted that BTAG participated in the field survey of drainages to the lake and the sample location selection that was conducted prior to collection of the Step 1 soil and sediment samples. The rationale for the analyte list for the Step 2 (2012) soil samples is discussed in Section 4 of the TM and in the final Step 2 SI SAP (2012). BTAG also participated in the scoping of the Step 2 sampling.

The soil ESV for Aroclor-1260 is based on the ORNL soil screening value for plants (40,000 µg/kg) with an uncertainty factor of 5 (see Attachment D of the TM, Table D-33).

BTAG Comment # 2: *Regarding surface sediment (Table 11), 41 of 70 samples have NA listed for all trace metals, explosives, pesticides/PCBs (except Aroclor 1260), SVOCs, and VOCs. An explanation should be provided on why all samples were not analyzed for these chemicals. Again, if spatial coverage is not adequate and/or concentrations are heterogeneous, this could represent a significant data gap and may result in not all COPCs being properly identified. This issue must be addressed.*

Navy Response: The analytes for the Step 1 (2011) sediment samples included PCBs (Aroclors) only, as discussed in Section 3 of the TM and the final Step 1 SI SAP (2011), since the purpose of these samples was to try and delineate potential PCB source areas and migration pathways into the lake. It should be noted that BTAG participated in the field survey of drainages to the lake and the sample location selection that was conducted prior to collection of the Step 1 soil and sediment samples. The rationale for the analyte list for the Step 2 (2012) sediment samples is discussed in Section 4 of the TM and in the final Step 2 SI SAP (2012). BTAG also participated in the scoping of the Step 2 sampling.

In addition to the Step 1 and Step 2 sediment samples collected specifically for this evaluation, available historical sediment data from other studies were also considered; these studies included AOC 6, Site 11, and the 2000 Pond Study. The analytes for these samples were specific to the objectives of the individual studies. AOC 6 samples were analyzed for SVOCs, explosives, and inorganics; Site 11 samples were analyzed

for VOCs, SVOCs, pesticides/PCBs, and inorganics; and Pond Study samples were analyzed for VOCs, SVOCs, pesticides/PCBs, explosives, and inorganics. The available analytes from these historical samples, and their locations, were considered during the scoping of the Step 1 and Step 2 sediment sampling.

BTAG Comment # 3: *Regarding surface water (Table 13), eight samples are listed with data. An explanation should be provided on how it was determined that eight surface water samples was sufficient to characterize the nature and extent of contamination given the large size of the lake. If additional surface water data existed, it may change the list of contaminants of potential concern (COPCs).*

Navy Response: Only the Step 2 surface water data were used in the TM since these were the most recent available data. The rationale for the numbers, locations, and analytes for these Step 2 surface water samples is discussed in Section 4 of the TM and in the final Step 2 SI SAP (2012). BTAG participated in the scoping of this Step 2 sampling.

BTAG Comment #4: *Regarding Table 14, tissue detection results needs to identify the species used for this analysis. According to Section 5.4, both fish and frog tissue were analyzed. The data for each of these tissue types need to be in a separate table.*

Navy Response: This information is provided in Attachment D of the TM, Table D-9, and will be added to Table 14; fish and frog samples will be partitioned within this table. Table 14 will also be modified to clearly indicate the sample type (whole-body, fillet, or offal) for each of the samples.

BTAG Comment #5: *Please provide the minimum and maximum depths within Penniman Lake and how this relates to groundwater elevations. Ultimately, bathymetric mapping may be necessary.*

Navy Response: The approximate depths of Penniman Lake at the various surface water and sediment sampling locations from 2012 are presented in Table D-2 in Attachment D of the TM (see TM Figure 3 for the locations). Water depths ranged from less than 1 foot to up to 13 feet. The question of whether shallow groundwater is discharging to Penniman Lake or whether Penniman Lake is recharging the surficial aquifer groundwater adjacent to Penniman Lake is controlled by the surface elevation of Penniman Lake relative to the elevation of the water table in the adjacent surficial aquifer and not by the bathymetry of Penniman Lake. Thus, bathymetric mapping is not needed to evaluate potential groundwater discharge/recharge.

BTAG Comment #6: *Section 5.5.2 on page 14 states that impacts in all media associated with concentrations of semi-volatile organic compounds, pesticides, and metals above screening criteria appear to be consistent with the presence of non-CERCLA regulated sources. This appears to be speculative as no specific information such as a comparison to reference/background concentrations is presented to support this statement. In fact, Site 11, which drained into Penniman Lake, contained all of these contaminants. Therefore, releases from Site 11 or some other unknown CERCLA-regulated source cannot be discounted for these contaminants in Penniman Lake. Theoretically lake area itself could be "CERCLA site". Therefore, BTAG does not support the recommendation in Section 8 that any further investigation in Penniman Lake should be limited to PCBs and explosives. While BTAG supports the recommendation to complete a baseline ecological risk assessment in Section 8, it should not be limited to PCBs. Instead, it must also include an evaluation of these other contaminants that exceeded screening criteria.*

Navy Response: The 2009 removal action to address surface debris in the upland portions of Site 11 resulted in a No Further Action ROD for this site (all media) in August 2010. Site 11 was not considered a source of PCBs to the lake. Further, all of the relevant sediment samples from the Site 11 RI were included in the data set evaluated in the Step 2 TM.

As noted at the beginning of these RTCs, the Navy intends to conduct an interim removal action at AOC 9 to address the PCB contamination in the northwest area. Because the highest concentrations of metals, pesticides, and PAHs in sediments were typically co-located with high levels of PCBs, it is expected that this action will also indirectly address these other constituent groups. The BERA, and any subsequent ecological

sampling (such as the sediment toxicity testing originally proposed in Section 8), will be deferred until this interim removal action is completed. Once this occurs, the scope of the BERA and the need for any additional ecological sampling will be reassessed.

BTAG Comment # 7: *Section 8 on pages 20 and 21 provides conclusions and recommendations for Penniman Lake. There is no recommendation to further assess the nature and extent of contamination from AOC 6 TNT Subareas, despite the fact that this part of the site was deferred to the Penniman Lake investigation. Sediment sampling in Penniman Lake adjacent to AOC 6 is limited (only one sample) and additional sampling as part of this study is recommended. Any additional sampling needs to consider the fact that activity at AOC 6 predates construction of the dam which likely results in different migration pathways than those present today*.

Navy Response: There is more than one available sediment sample from the lake adjacent to the three AOC 6 Subareas (ASP and two TNT); the results from the available samples (CAA06-SD01, CAA06-SD02, and CAPL-SD81) are summarized in the attached Table 1. Note that there are two historical sediment samples (from 1999) that were not included in the data set used for the Step 2 TM because the validation status of these samples could not be determined. However, these two samples will be considered qualitatively when evaluating this portion of the lake. Since the available samples have been placed at the expected surface runoff discharge points from these Subareas to the lake, the available data are considered adequate for the evaluation of AOC 6 and no additional sediment sampling is proposed for this portion of the lake.

BTAG Comment #8: *Table 5 A Regulatory Screening Criteria Exceedance Overview Table: Regarding the King Creek sediment sample, this table states "No exceedances in this sample. This indicates that contamination within Penniman Lake sediments is not migrating significantly out of the lake." One sample is not sufficient to determine if contamination has migrated to King Creek. BTAG supports the recommendation in Section 8 that additional sediment samples should be collected below the dam. Sediment sampling should focus on depositional areas below the spillway where contaminants would have accumulated.*

Navy Response: Comment noted. The details regarding the additional sediment sampling in King Creek near the dam will be worked out as part of a future scoping session with the Partnering Team and technical support.

Table 1
Penniman Lake Sediment Samples in the Vicinity of AOC 6
Penniman Lake Site Inspection - Step 2
Cheatham Annex
Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Chemical Analytes						Physical Parameters			
				Inorganics	Pesticides	PCBs	SVOCs	VOCs	Explosives	pH	TOC	Grain Size	AVS/SEM
Surface Sediment - Used in Step 2 TM													
CAA06-SD01	CAA06-SD01-1008	10/23/2008	0 - 4	X			X		X	X	X	X	X
CAA06-SD01	CAA06-SD01P-1008	10/23/2008	0 - 4	X			X		X				X
CAA06-SD02	CAA06-SD02-1008	10/23/2008	0 - 4	X			X		X	X	X	X	X
CAPL-SWSD45	CAPL-SD45-0711	7/29/2011	0 - 4			X					X	X	
CAPL-SWSD48	CAPL-SD48-0711	7/29/2011	0 - 4			X					X	X	
CAPL-SWSD49	CAPL-SD49-0711	7/29/2011	0 - 4			X					X	X	
CAPL-SWSD50	CAPL-SD50-0711	7/29/2011	0 - 4			X					X	X	
CAPL-SWSD50	CAPL-SD50P-0711	7/29/2011	0 - 4			X							
CAPL-SD82	CAPL-SD82-1012	10/18/2012	0 - 4	X	X	A-1260	X	X	X	X	X	X	X
Surface Sediment - Not Used in Step 2 TM													
PEN1-SED01	PEN1-SED01	1/12/1999	0-?	X	X	X	X	X	X				
PEN1-SED02	PEN1-SED02	1/12/1999	0-?	X	X	X	X	X	X				
PEN1-SED02A	PEN1-SED02A	1/12/1999	0-?	X	X	X	X	X	X				
Subsurface Sediment - Used in Step 2 TM													
CAA06-SD01	CAA06-SSD01-1008	10/23/2008	4 - 8	X			X	X	X	X	X	X	X
CAA06-SD02	CAA06-SSD02-1008	10/23/2008	4 - 8	X			X	X	X	X	X	X	X
CAPL-SD82	CAPL-SSD82-1012	10/18/2012	4 - 8	X	X	A-1260	X	X	X	X	X		
Shaded cells indicate field duplicates													

Ivester, Marlene/VBO

From: Smith, Wade (DEQ) <Wade.Smith@deq.virginia.gov>
Sent: Thursday, February 19, 2015 1:09 PM
To: scott.park@navy.mil
Cc: Ivester, Marlene/VBO; Sawyer, Stephanie/VBO; Hoover, Gerald
Subject: CAX: Penniman Lake Tech Memo - DEQ Comments
Attachments: Draft Penniman Lake Step 2 SI Tech Memo To Team_rev1(DEQ).docx

Thank you for giving the DEQ the opportunity to comment on the November 6, 2014 Tech Memo for Penniman Lake at CAX.

The Tech Memo was received by the DEQ on November 7, 2014.

The EPA's comment letter submitted on February 5, 2014 addresses most of the DEQ's technical comments on the Tech Memo, so I have attached a red-lined version with minor suggested revisions/comments.

Please let me know if you have any questions.

Sincerely,

Wade M. Smith
Remediation Project Manager
Virginia Department of Environmental Quality
Office of Remediation Programs
Phone: (804) 698-4125
wade.smith@deq.virginia.gov

From: Marlene.Ivester@CH2M.com [mailto:Marlene.Ivester@CH2M.com]
Sent: Thursday, February 12, 2015 12:01 PM
To: Smith, Wade (DEQ)
Cc: Anita.Dodson@CH2M.com
Subject: CAX - AOC 9 (PL) Step 2 TM Comments

Wade,

You had mentioned you would submit your comments on the PL Step 2 TM after EPA had. Now that we have received EPA's comments, I'm checking when we can expect yours?

Thanks much,

Marlene

From: Hoover, Gerald [mailto:Hoover.Gerald@epa.gov]
Sent: Thursday, February 05, 2015 11:52 AM
To: lboucher@up.net; Marlene.Ivester@CH2M.com; scott.park@navy.mil; Stephanie.Sawyer@CH2M.com; Smith, Wade (DEQ)
Subject: EPA comment letter on the draft SI Step 2 for Penniman Lake attached

Hi folks, here's our comment letter on Penniman Lake. Hope you're all doing well.

~~~~~~

Jerry Hoover
Remedial Project Manager
Federal Facility Program Coordinator
Environmental Protection Agency, Region III
Mail Code (3HS11)
1650 Arch Str.
Philadelphia, PA 19103
(215) 814-2077
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Response to Comments
Penniman Lake
Site Inspection – Step 2 Results and Proposed Path Forward
Draft Technical Memorandum
Naval Weapons Station Yorktown Cheatham Annex
Williamsburg, VA
June 3, 2015

Comments received by email on February 19, 2015 from Wade Smith, Virginia Department of Environmental Protection (VDEQ), following review of the Penniman Lake Site Inspection – Step 2 Draft Technical Memorandum submitted November 6, 2014. (Comments received were directly inserted in the Draft Technical Memorandum text file.)

Note: Per the Partnering Team discussion on May 28, 2015, the Navy intends to conduct an interim removal action at AOC 9 to address the PCB contamination in the northwest area (the details of which will be worked out at a later date) as the next step for the site prior to the continuation of any investigative work.

Comments received from VDEQ via email dated February 19, 2015

VDEQ Comment 1: *Section 2, second paragraph - Please consistently use either the correct one of King Creek or King's Creek throughout the document.*

Navy Response: All references to "King's Creek" will be changed to "King Creek" throughout the document, since this is the correct name for this body of water.

VDEQ Comment 2: *Section 4.4, first paragraph, last sentence - Please include a reference to when this approval was made/documented.*

Navy Response: The last sentence will be deleted and the final sentence of the paragraph will be revised as follows (additional text noted in bold): "This information was used to select ~~a suitable reference pond and associated reference pond~~ **reference** sample locations **within Cheatham Pond (the reference pond preliminarily selected in the Step 2 UFP-SAP [CH2M HILL, 2012c]),** to allow a comparison of site data to reference data for the purpose of discerning potential non-site-related contaminant impacts."

In addition, the second paragraph of Section 4.5 will be revised as follows (additional text noted in bold):

"Based on a reconnaissance survey conducted in Cheatham Pond, five locations were selected to match habitat conditions at Penniman Lake. In addition, five locations were also selected to match habitat conditions at Site 4 (Upstream Pond) and three locations were selected to match habitat conditions at Youth Pond, since field activities for these sites were conducted at the same time as those for Penniman Lake. Based on a review of the preliminary (unvalidated) data, the CAX Partnering Team agreed on **October 25, 2012** not to use the three reference samples **from Cheatham Pond that were to be representative of** Youth Pond **background** due to elevated concentrations of PCBs and metals in sediment. Thus, only the samples collected from Cheatham Pond selected to match habitat conditions at Penniman Lake and Site 4 were used to develop background upper tolerance limits (UTLs). **For the calculated surface water background UTLs, these samples were the ten Cheatham Pond surface water samples associated with Site 4 and Penniman Lake. For the calculated surface sediment UTLs, these samples included the ten Cheatham Pond samples associated with Site 4 and Penniman Lake, as well as, the eight Pond Study samples (Baker, 2001). For the calculated subsurface sediment UTLs, these samples were the five Cheatham Pond samples associated with Penniman Lake.**"

VDEQ Comment 3: *Section 4.4, third paragraph, first sentence - Please include a reference to when this call was made.*

Navy Response: The first sentence will be revised as follows (additional text noted in bold): "After the biological survey was completed, the Partnering Team held a **conference** call **on October 22, 2012** to discuss the amount and types of biota found."

VDEQ Comment 4: *Section 8, eighth bullet - Please include more info on this "Conclusion", specifically as it relates to what "relatively minor" means.*

Navy Response: The text in this bullet will be revised as follows (additional text noted in bold): "The extent of the elevated Aroclor-1260 concentrations in the drainage way leading to the northeast finger of Penniman Lake does not appear to be fully defined; however, the soil and sediment data from this area suggest a relatively minor input of Aroclor-1260 to Penniman Lake sediment from this area **since no concentrations of Aroclor-1260 exceeded the Residential RSL for sediment or the Residential RSL for soil at sample locations downstream of this drainage way in Penniman Lake**. "

All other editorial comments provided by VDEQ throughout the text have been addressed.

Regulatory Acceptance

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

November 12, 2015

Ms. Angela Jones
Bldg. N-26 Room 3300
NAVFAC MIDLANT
9742 Maryland Ave.
Norfolk, VA 23511

Subject: Draft Final Penniman Lake Step 2 SI Tech Memo, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Ms. Jones:

EPA has reviewed the subject document submitted via email from Marlene Ivester of CH2M on October 27, 2015. EPA has no comments on the document. This document closes out all comments on this issue that were submitted in my letter to Scott Park dated February 5, 2015. No additional response to EPA comments is required. If you have any questions, please contact me at 215-814-2077.

Sincerely,

Gerald F. Hoover

Gerald F. Hoover, RPM
NPL/BRAC Federal Facilities Branch

cc: Wade Smith, VDEQ

Ivester, Marlene/VBO

From: Smith, Wade (DEQ) <Wade.Smith@deq.virginia.gov>
Sent: Monday, November 16, 2015 10:46 AM
To: angela.jones1@navy.mil
Cc: Ivester, Marlene/VBO; Sawyer, Stephanie/VBO; Dodson, Anita/VBO; Hoover.Gerald@epa.gov
Subject: CAX: Revised AOC 9 Step 2 TM - DEQ Concurrence
Attachments: CAXPennimanLakeTechMemoApprovalLetter-6_29_15.pdf

The text revisions are acceptable as proposed.
Thanks,
wade

From: Marlene.Ivester@CH2M.com [mailto:Marlene.Ivester@CH2M.com]
Sent: Tuesday, October 27, 2015 10:26 PM
To: Smith, Wade (DEQ); Hoover.Gerald@epa.gov
Cc: angela.jones1@navy.mil; Stephanie.Sawyer@CH2M.com; Anita.Dodson@CH2M.com
Subject: CAX - Revised AOC 9 Step 2 TM

Wade and Jerry,

Per our September Partnering discussion for closure on the Step 2 TM, attached is the revised text. We feel this revision will allow the Step 2 TM to go final, as it removes the "CERCLA vs non-CERCLA" sticking point. It also bridges the gap between the TM and current step, the desktop study. There were no changes to the figures or attachments, so I have not sent those again, assuming you already have a copy. However, if you need anything else, let me know.

I didn't envision this review needing to go back through tech support, so request your input (edits, comments, approval) by 11/13/15. If my assumption is wrong, let me know and we can adjust the date.

Thanks much,

Marlene

ch2m
Marlene Ivester
Project Manager
Virginia Beach Office
Email: marlene.ivester@ch2m.com
Direct - 757.671.6282 (VM only)
Please consider the environment before printing this email

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 629 East Main Street, Richmond, Virginia 23219
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Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

June 29, 2015

Mr. Tom Kowalski
NAVFAC MIDLANT, Building N-26
Hampton Roads Restoration Product Line, Code OPHREV4
9742 Maryland Avenue
Norfolk, VA 23511-3095

Technical Memorandum – Step 2
AOC 9 – Penniman Lake
Naval Weapons Station Yorktown
Cheatham Annex
Williamsburg, Virginia

Dear Mr. Kowalski:

The Virginia Department of Environmental Quality (DEQ) has received the *Response to Comments* (RTCs) associated with the Technical Memorandum (Tech Memo) – Step 2 for AOC 9 – Penniman Lake at Naval Weapons Station Yorktown, Cheatham Annex (CAX), Williamsburg, Virginia. The RTCs, prepared by CH2M HILL, were received by the DEQ (electronically) on June 3, 2015.

Thank you for providing the DEQ's Office of Remediation Programs the opportunity to review the above-referenced RTCs. Subsequent to DEQ's internal review, this office concurs with the proposed text revisions and recommends submittal of the *Final Tech Memo*.

Please contact me at (804) 698-4125 or wade.smith@deq.virginia.gov with any additional questions.

Sincerely,

Wade M. Smith
Remediation Project Manager
Office of Remediation Programs

cc: Jerry Hoover, EPA