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FINAL

SITE INSPECTION REPORT
SITE 4 AND AOC 1

NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

CONTRACT TASK ORDER 0104

MAY 10, 2001

Prepared for:

DEPARTMENT OF THE NAVY
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LIST OF ACRONYMS AND ABBREVIATIONS

μg/kg	Micrograms per Kilogram
μg/L	Micrograms per Liter
AOC	Area of Concern
Baker	Baker Environmental, Inc.
bgs	Below Ground Surface
CAX	Cheatham Annex Site
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
CNO	Chief of Naval Operations
COC	Chemical of Concern
COPC	Chemical of Potential Concern
cPAHs	Carcinogenic PAH's
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
CTO	Contract Task Order
DoN	Department of Navy
EE/CA	Engineering Evaluation/Cost Analysis
EM	Electromagnetic
EPIC	Aerial Photographic Analysis
ERA	Ecological Risk Assessment
FISC	Fleet and Industrial Supply Center
FSAP	Field Sampling and Analysis Plan
FY	Fiscal Year
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HQ	Hazard Quotient
HRS	Hazard Ranking System
IAS	Initial Assessment Study
ILCR	Incremental Lifetime Cancer Risk
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
IV	intravenous
LANTDIV	Atlantic Division, Naval Facilities Engineering Command
mg/kg	Milligram per Kilogram
MS/MSD	Matrix Spike/Matrix Spike Duplicate
msl	Mean Sea Level

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

NCEA	National Center for Environmental Assessment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFESC	Naval Facilities Engineering Service Center
NFG	National Functional Guideline
NEESA	Naval Energy and Environmental Support Activity
OSWER	Office of Solid Waste and Emergency Response
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
ppt	parts per thousand
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk-Based Concentration
RI	Remedial Investigation
RPD	Relative Percent Difference
RV	Recreational Vehicle
SARA	Superfund Amendments and Reauthorization Act
SCCRBS	Selection of Contaminants of Concern by Risk-Based Screening
SI	Site Investigation
SSP	Site Screening Process
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
VDEQ	Virginia Department of Environmental Quality
VOC	Volatile Organic Compound
WOE	Weight of Evidence
WPNSTA	Naval Weapons Station Yorktown

EXECUTIVE SUMMARY

This document presents the results of the Site Inspection which was conducted at Site 4 – Medical Supplies Disposal Area and Area of Concern (AOC) 1 – Scrap Metal Dump at Naval Weapons Station Yorktown, Yorktown, Virginia, Cheatham Annex Site (CAX), Williamsburg, Virginia, by Baker Environmental, Inc. (Baker). The Site Inspection was performed under contract to the Atlantic Division, Naval Facilities Engineering Command (LANTDIV), under the Comprehensive Long-Term Environmental Action – Navy (CLEAN II) Contract N62470-95-D-6007, Contract Task Order (CTO) 0104.

HISTORY AND SITE CONDITIONS

Site 4 - Medical Supplies Disposal Area

Site 4, Medical Supplies Disposal Area, is located along the pond just upgradient of Youth Pond, between buildings CAD 11 and CAD 12. In 1968 or 1969, out-of-date medical supplies possibly including syringes and empty intravenous (I.V.) bottles, and one-inch metal banding were unloaded down a bank in this area and covered with soil. It was reported that as much as 7,000 cubic yards of material was disposed at this site (NEESA, 1984). Observations in Initial Assessment Study (IAS) field notes show that it is possible dyes were disposed of at the site. In May 1998, Reactives Management, Inc. performed routine housekeeping activities at Site 4 to remove surficial debris. I.V. injection sets, many contained in aluminum or plastic bags, were encountered.

Summary of Investigative Findings for Site 4

The field investigation consisted of soil and sediment investigations. All samples were submitted for laboratory analysis of Target Compound List (TCL) organics, Target Analyte List (TAL) inorganics and cyanide, and explosives (nitramines/nitroaromatics). Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), inorganics, and cyanide were detected in the soil samples. VOCs, SVOCs, pesticides, PCBs, and inorganics were detected in the sediment samples.

The presence of the organic contaminants could be attributable to the extensive debris that is buried at the site. The detected concentrations of inorganics could result from the pieces of scrap metal present at the site.

Recommendations

- Implement an inspection program that includes periodic site visits with perimeter walks to locate medical supplies within and around Youth Pond and the York River shoreline.
- Install inlet protection controls to prevent medical supplies from entering the culvert that conveys flows from the upstream pond to Youth Pond.
- Perform a limited investigation to define the lateral extent of debris at the site.
- Complete an Engineering Evaluation/Cost Analysis (EE/CA) to evaluate the most appropriate means of removing or covering the debris that is present at the site.

Area of Concern 1 – Scrap Metal Dump

AOC 1 is a debris disposal area located just west of Chapman Road within two ravines associated with unnamed tributaries to Jones Pond. Wood and metal debris outcrop from the banks of the ravines, with debris being more extensive within the southern ravine.

Summary of Investigative Findings

The field investigation consisted of a geophysical survey and soil and surface water/sediment investigations. All samples were submitted for laboratory analysis of TCL organics, TAL inorganics and cyanide, and explosives (nitramines/nitroaromatics). VOCs, SVOCs, pesticides, PCBs, inorganics, and cyanide were detected in the soil samples. SVOCs and inorganics were detected in the surface water at low levels. VOCs, SVOCs, PCBs, and inorganics were detected at low levels in the sediment samples. The extensive volume of debris at the AOC is a potential source of contamination.

Recommendations

- Perform a limited investigation to evaluate disposal parameters.
- Complete an Engineering Evaluation/Cost Analysis (EE/CA) to evaluate the most appropriate means of removing or covering the debris that is present at the site.
- Review treatment plant effluent and analytical requirements to verify that fluoranthene, ethylbenzene, xylene, and Aroclor-1260 are not present in unacceptable levels in either the distributed water or the effluent.

1.0 INTRODUCTION

This document presents the results of the Site Inspection (SI) that was conducted at Site 4 – Medical Supplies Disposal Area and Area of Concern (AOC) 1 – Scrap Metal Dump at Naval Weapons Station Yorktown, Yorktown, Virginia, Cheatham Annex Site (CAX), Williamsburg, Virginia, by Baker Environmental, Inc. (Baker). The SI was performed under contract to the Atlantic Division, Naval Facilities Engineering Command (LANTDIV), Contract Number N62470-95-D-6007, Contract Task Order (CTO) Number 0104.

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) establishing the Superfund Program to respond to releases and the threatened release of hazardous substances. CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, required certain revisions to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to implement the new authorities and responsibilities of the CERCLA amendments. The revisions to the NCP established assessment programs to investigate releases such as those established in Section 300.420, which specifies the site assessment process known as the pre-remedial process which designates sites for long-term remedial evaluation and response.

The purpose of this SI was to collect data necessary to gain a better understanding of the nature and extent of possible contamination at Site 4 and AOC 1.

The field activities were conducted in accordance with the Site-Specific Project Plans (Baker, 1999a) for the Field Investigation. The Project Plans included a Work Plan, Field Sampling and Analysis Plan (FSAP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP) which addressed the full range of applicable activities required throughout the investigation process including: field investigative activities; sampling and analytical methods; health and safety considerations; data evaluation/interpretation methods; and overall project goals. To avoid repetition and increase readability, the Project Plans are referenced to the greatest extent possible.
This document is organized into the following sections:

<u>Text</u>

- Section 1.0 Introduction
- Section 2.0 Site History and Environmental Setting
- Section 3.0 Field Investigation Procedures and Physical Findings
- Section 4.0 Field Investigation Analytical Results
- Section 5.0 Risk Screening
- Section 6.0 Conclusions and Recommendations
- Section 7.0 References

<u>Appendices</u>

- Appendix A Removal Closeout Report (Site 4)
- Appendix B Site Photographs
- Appendix C Supplemental Documentation – AOC 1
- Appendix D Chain-of-Custody Forms
- Appendix E Analytical Data
- Appendix F Risk Screening Data

2.0 SITE HISTORY AND ENVIRONMENTAL SETTING

The information presented in this section has been gathered from reports of previous investigations conducted at CAX. A list of these reports is presented in Section 7.0 (References).

2.1 History of Cheatham Annex

Cheatham Annex, located in Williamsburg, Virginia, was established in June 1943 as a satellite unit of the Naval 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. The facility closed in 1918. Between 1918 and 1943, the property was used for farming or left idle until CAX was commissioned in 1943. Since 1943, Cheatham Annex has been used for receiving, storing, packaging, and shipping materials to federal facilities on the east coast and to major distribution centers in Europe.

Previously operated as an annex to Fleet and Industrial Supply Center (FISC), Norfolk, the world's largest navy supply center, CAX provided logistic and supply support to naval shore installations. CAX is the Navy Sea System Command's East Coast consolidated stock point for major shipboard mechanical, electronic, and some navigational equipment. In addition to receiving, storing, issuing, packing and shipping navy stock material, particularly large, bulky (often unique) shipboard equipment (e.g., submarine periscopes, ship propellers, bull gears, antennae, and sonar domes), CAX provides warehouse and distribution services for 39 Storage Authorization Programs and tenant organizations.

In July 1987, CAX was designated the Hampton Roads Navy Recreational Complex. Today the mission of CAX includes supplying Atlantic Fleet ships and providing recreational opportunities to military and civilian personnel; 55% of CAX is undeveloped and rich in natural resources. Outdoor recreational facilities and activities available include: 13 cabins, 19 recreational vehicle (RV) sites, camp sites, an 18-hole golf course, swimming pool, ball fields, freshwater and saltwater fishing, boating, wildlife watching and hunting (Department of the Navy [DON], 1998). CAX currently operates under the Naval Weapons Station (WPNSTA) Yorktown. The transition of CAX control from FISC to WPNSTA occurred in October 1998. The location of CAX is presented in Figure 2-1.

CAX Property

At inception, CAX occupied approximately 3,349 acres. Several portions of the original base have since been declared surplus and transferred to other government jurisdictions, including the National Park Service, the Commonwealth of Virginia, and York County. CAX is currently comprised of 1,578 acres. The Activity is divided into two separate parcels, with the larger parcel situated along the banks of the York River. Almost all of the activities at CAX (administration, training, maintenance, support, and housing) take place in this portion of the Activity. The smaller parcel is located south of the Colonial National Historic Parkway (Colonial Parkway). This area contains the Activity's water supply (Jones Pond) and is used mainly as a watershed protection area. A topographic map showing CAX and the surrounding properties is presented as Figure 2-2.

This SI was conducted under the Installation Restoration Program (IRP) and is intended to characterize environmental impacts resulting from past activities at Site 4 and at AOC 1.

2.2 Site Histories and Background Information

The following sections summarize site histories and background information.

2.2.1 Site 4 – Medical Supplies Disposal Area

Site 4 is located along the pond just upgradient of Youth Pond, between buildings CAD 11 and CAD 12. In 1968 or 1969, out-of-date medical supplies possibly including syringes and empty intravenous (I.V.) bottles, and one-inch metal banding were unloaded down a bank in this area and covered with soil. It was reported that as much as 7,000 cubic yards of material was disposed at this site. Naval Energy and Environmental Support Activity (NEESA, 1984). Previously (date unknown), a considerable volume of these materials were reportedly removed from the site because syringe needles were getting stuck in deer hooves. After heavy rains, what appeared to be syringes could sometimes be seen floating in the adjacent pond and in Youth Pond (both upstream and downstream of D Street) (NEESA, 1984). Observations in Initial Assessment Study (IAS) field notes show that it is possible dyes were disposed of at the site. The location, volume and type of dyes are not known. To avoid confusion with Youth Pond, the pond immediately adjacent to the site (i.e. the pond upstream of D Street) will be herein referred to as "the upstream pond."

The IAS concluded that additional study was not warranted for the site due to the inert nature of the materials disposed.

During a May 4, 1998, site visit with Virginia Department of Environmental Quality (VDEQ) representatives, packages of what appeared to be unused needles wrapped in foil were noted within the drainage swale leading to the unnamed pond.

In May 1998, Reactives Management, Inc. performed routine housekeeping activities at Site 4 to remove surficial debris. No I.V. bottles or bags were encountered. What was previously reported as I.V. bags or bottles was determined to be I.V. injection sets. Many of the sets were contained in foil wrappers or plastic bags. Plastic and metal sharps were also encountered along with small quantities (15 containers) of injectable drugs. The injectable drug containers contained either residue or small volumes (a few milliliters of liquid) and had either no labels or labels that were not legible. Photographs of the containers are presented in Appendix A along with the Closeout Report for this effort.

Approximately 200 pounds of debris and 13 pounds of sharps (metal and plastic) were recovered from the site and incinerated. Debris was removed from the surface, by hand or with hand tools, and no intrusive work (e.g., excavation) was conducted. Debris other than medical supplies including metal banding, railroad ties, metal, corroded drums, and beverage containers was present at the site, but not removed (Reactives Management, 1998). A site plan for Site 4 is presented as Figure 2-3. An aerial photograph of the site and the surrounding area is presented as Figure 2-4. Photographs of Site 4 are presented in Appendix B.

2.2.2 Area of Concern 1 – Scrap Metal Dump

AOC 1 is a debris disposal area located just west of Chapman Road within two ravines associated with unnamed tributaries to Jones Pond. Wood and metal debris outcrop from the banks of the ravines, with debris being more extensive within the southern ravine. There is orange staining in the unnamed tributary that receives runoff from the southern ravine. This discoloration may result from natural oxidation processes and is not necessarily indicative of site contamination. This location was designated as an AOC in 1998 following site visits by LANTDIV, United States Environmental Protection Agency (USEPA), and VDEQ representatives.

AOC 1 is divided into two distinct areas, the North Area and South Area. The area of AOC 1 - South Area is estimated to be 0.4 acres. The area of AOC 1 - North Area is estimated to be 0.2 acres. Based on an average thickness of debris of three feet, the total volume of debris is estimated to be 3,000 cubic yards.

Two cylinders are present along the top of bank along the northern ravine. The northern and southern ravines are depicted on Figures 2-5 and 2-6, respectively. From information presented in the September 30, 1998, letter from Mr. Robert McGlade (Roy F. Weston), the two cylinders, which are 8 inches in diameter and 54 inches long, are severely corroded. Markings were distinguishable on both of the cylinders, and included raised lettering around the neck "THE LIQUID CARBONIC CO." The cylinders have intact valves and welded base supports (Weston, 1998).

AOC 1 is not specifically identified in the Aerial Photographic Analysis (EPIC) Study (USEPA, 1998a). However, in 1942, the area had been cleared of trees and contained a large mound of light-toned material. The adjacent rail yard was under construction at the time. In 1955, the area appeared to be partially re-vegetated, and in 1963 a large mound of fill was noted. By 1975, vegetation had apparently re-established in the area.

An aerial photograph of the site and the surrounding area is presented as Figure 2-7. Photographs of Site 4 are presented in Appendix B.

2.3 Previous Investigations and Studies

Prior to this SI, no investigations or studies have been performed under the IR Program at Site 4 or AOC 1. As part of an investigation of the former Penniman Shell Loading Plant, Roy F. Weston, Inc. (contracted by the USEPA) conducted an SI which included sampling of media within the vicinity of AOC 1. No samples were collected in the vicinity of Site 4 under this effort, which is summarized below. Summaries of IR Program-related investigations that have been conducted to date are presented in the Final Fiscal Year (FY) 2000 Site Management Plan (Baker, 2000).

USEPA 1999 SI

In January 1999, Weston/USEPA performed an SI which included collection of soil, sediment, surface water, and waste samples. The purpose of the investigation was to assess potential sources of contamination associated with the Penniman Facility and determine the need for additional investigation. The data would also be available to support Hazard Ranking System (HRS) evaluations.

A total of 29 samples were collected including fourteen waste source samples, two surface water samples, one drinking water sample, nine sediment samples, and three background samples.

The report concluded that six inorganic compounds and one nitroaromatic compound were present at levels exceeding USEPA Region III Risk-Based Concentrations (RBCs) in waste source samples, Four of these constituents (cadmium, chromium, lead, and magnesium) were detected in sediment and surface water samples at levels which indicate a release. Several areas of potential concern associated with remnant waste materials from the Penniman loading operations were noted. Based on the findings of the SI, additional sampling of groundwater, waste materials, soil, treated drinking water, surface water and sediment, along with performance of a human health risk assessment was recommended. The final report was submitted August 1999 (Weston, 1999).

Two sediment samples (PEN1-SED-03 and PEN1-SED-04) were collected as part of the Penniman SI from the southern portion of the AOC, as shown on Figure 2-8. The manganese concentration in PEN1-SED-04 was 168 milligrams per kilogram (mg/kg). This concentration exceeds the study's background concentration of 20.8 mg/kg and the adjusted USEPA Region III risk-based RBC of 156 mg/kg. (The USEPA applied a hazard quotient adjustment 0.1 for non-carcinogens). It should be noted that only one background sample was collected as part of the Penniman SI. Based on this manganese detection, it was concluded that a release of contaminants to surface water had occurred (Table 6 of the Penniman SI). The Penniman SI recommended that a sample of "source" soil be collected to adequately assess potential impacts to Jones Pond.

One surface water sample (PEN1-SW-01 and an associated duplicate PEN1-SW01A) and one sediment sample (PEN1-SED05) were collected from one of the fingers of Jones Pond. Elevated levels of cadmium, chromium, and manganese (as compared to one surface water background sample) were detected in PEN1-SW-01, while chromium was detected at an elevated level (as compared to one sediment background sample) in PEN1-SED05. These sample locations are shown on Figure 2-7.

Data Usability

The analytical data collected as part of the Penniman SI has been referenced herein, but is not incorporated with the AOC 1 SI data for risk screening purposes due to the following:

1) It is not clear if the analytical data was validated
2) The Jones Pond surface water and sediment samples were collected from a finger of the pond that is not influenced by AOC 1 (i.e., the Penniman SI samples were not collected in the finger that receives runoff from AOC 1).
3) No data for PEN1-SED-03 is presented in the Penniman SI.

2.4 Physical Characteristics of Cheatham Annex

This section presents a summary of information regarding the environmental setting of CAX including geography, meteorology, surface water hydrology, geology, hydrogeology, and ecology. Specific conditions encountered at the individual sites are discussed in Section 3.0 (Field Investigation Procedures and Physical Findings).

2.4.1 General Physiography, Topography, and Climate

CAX is located in Williamsburg, Virginia, on the York-James Peninsula, which is an embayed portion of the Atlantic Coastal Plain physiographic province (Teifke, 1973). This elongated peninsula trends northwest-southeast and occupies an area of approximately 1,752 square miles. The peninsula 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. At CAX, the peninsula is approximately 6 miles wide.

The topography at CAX is characterized by gently rolling terrain dissected by ravines and stream valleys trending predominantly northeastward toward the York River. Ground elevations at CAX vary from sea level along the eastern boundary, which borders the York River, to a maximum elevation of approximately 50 ft above mean sea level (msl) on a few scattered hills in the western portion of the Activity. Valleys consisting of 40- to 60-foot ravines with steep slopes (slopes exceeding 1:1) occur along the major creeks draining CAX (see Figure 2-2).

The climate of the Virginia Peninsula is influenced by the moderating effects of the Atlantic Ocean. This results in mild winters and long, warm summers. High humidity frequently occurs along the coast and less frequently inland. Ground fog is frequent in the late summer, especially during the early morning hours. Freezing temperatures occur intermittently from October through March. Average monthly temperatures in the area range from approximately 38.8°F in January to 77.4°F in July.

Because of its location near the coastline, York County is subject to easterly storms throughout late summer and early fall, causing high tides and flooding. Intense hurricanes occasionally sweep the coast. Winter is characterized by storms that move along the eastern seaboard. The storms from the north are associated with high winds and precipitation occasionally in the form of snow, ice pellets, or rain; however, the snow is seldom prolonged or heavy. The average annual precipitation is 44.15 inches, with the summer months being the wettest and the winter months being the driest.

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

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

2.4.2 Regional Geology

The Atlantic Coastal Plain physiographic province is underlain by unconsolidated sediments of Quaternary, Tertiary, and Cretaceous ages that dip gently to the southeast and have a combined thickness of approximately 1,900 ft in the vicinity of CAX (Teifke, 1973).

Most of the surficial unconsolidated sediment at CAX has been mapped as the Shirley Formation of the Pleistocene series (Mixon et. al., 1989). This formation is composed of gravel, sand, silt, clay, and peat deposited in river and estuarine environments. Its thickness is estimated to vary from 0- to 80-ft. The Chuckatuck Formation of Pleistocene age underlies the Shirley Formation and is described as sand, silt, and clay with minor amounts of peat deposited in bay environments. The Chuckatuck Formation rests on the top of the Windsor Formation, also of Pleistocene age. This formation is composed of a series of sand and silt deposited in marine and estuarine environments. Its thickness is estimated to vary from 0- to 40-ft.

The Bacons Castle Formation of Pliocene age underlies the Windsor Formation and is described as a clayey silt and silty fine-grained sand. The Bacons Castle Formation rests unconformably on the weathered top of the Upper Yorktown Formation, also of Pliocene age. The presence of calcite-cemented shells and shell fragments is characteristic of the upper portion of the Yorktown Formation.

2.4.3 Regional Hydrogeology

The Atlantic Coastal Plain sediments are the most important source of potable water in the region. Recharge to the groundwater system is derived from precipitation. Approximately 50 percent of the precipitation is lost to evapotranspiration. The remaining 50 percent either results in surface runoff, or infiltrates and is introduced into the groundwater regime. Recharge of aquifers may occur at the surface near outcrop zones, or from downward migration from overlying strata.

The shallow aquifer system in York County is comprised of the following six units: (1) the Columbia aquifer, (2) the Cornwallis Cave confining unit, (3) the Cornwallis Cave aquifer, (4) the Yorktown confining unit, (5) the Yorktown-Eastover aquifer, and (6) the Eastover-Calvert confining unit (Brockman et. al., 1997). Hydrogeologic units are recognized only where they are saturated (for aquifers) or confining (for confining units). For example, although the strata that typically comprise a given aquifer (when saturated) are present, the hydrogeologic unit does not exist in areas where the unit is not saturated. Vertical migration of groundwater is typically impeded in areas where the confining units are continuous, relatively thick, and comprised primarily of low-permeability strata such as clay or silt.

2.4.4 Ecology

Characterization of the terrestrial and wetland/aquatic biology of CAX has been adapted from the IAS (NEESA, 1984).

2.4.4.1 Terrestrial Ecology

Terrestrial flora on CAX consist of predominantly woodland species. Three types of forest are present: pine stands composed primarily of loblolly and Virginia pines, mixed pine and hardwood stands, and hardwood stands. Elevated level areas are the predominant locations of pine stands, while hardwood stands are found on slopes and ravines. These wooded areas are important in reducing soil erosion and providing wildlife habitat. Native tree species found at CAX include beech, black cherry, red maple, sweet gum, various pines, white ash, and white oak.

The woodland's understory is composed of various seedling trees and vine species, such as Virginia creeper, briars, and honeysuckle. Ferns are found in many moist, shaded areas. Ornamental trees and shrubs have been planted in the improved areas and along major roadways. None of the plant species that thrive at CAX are listed on the federal or Commonwealth endangered lists.

Small undeveloped tracts of land at CAX support a variety of indigenous wildlife species. White-tail deer, beavers, skunks, bobcats, red and gray foxes, squirrels, raccoons, opossums, and rabbits are present. Game birds such as wild turkey, quail, duck, and pheasants are also present. Songbirds common to the eastern Virginia area are abundant at CAX, along with a raptor population consisting of small hawks, owls, and osprey. Carrion-feeding birds such as crows and turkey vultures are also common. The southern bald eagle (listed on the federal endangered list) is known to nest nearby at WPNSTA Yorktown. Suitable habitat exists for roosting and perching in the area, but only occasional sightings of eagles have been made. Infrequent sightings of several endangered/threatened avian species, including the peregrine falcon and Bachman's and Kirtland's warblers, have been made in the general area (NEESA, 1984).

2.4.4.2 Wetlands/Aquatic Biology

At CAX, wetlands are mainly found along principal tributaries to the York River and along the York River shoreline. Four major marsh types exist in the vicinity:

- Type I: Salt-marsh cordgrass community.
- Type V: Big cordgrass community.
- Type VI: Cattail community.
- Type XII: Brackish water mixed community.

The wetlands are grouped into classifications based on their estimated environmental value per acre. Group One marshes, of which Type I and Type XII are a part, have the highest productivity and use by wildfowl and wildlife, as well as a close association with fish spawning and nursery areas. They are also important to the shellfish industry and as shoreline erosion inhibitors. These wetlands merit the highest order of protection. The majority of wetlands on CAX are of this type. Type V and Type VI marshes are in Group Two and are only slightly less important than the Group One marshes. Because these marshes are found at higher elevations, there is less opportunity for detritus (loose soil or organic particles) to be washed into nearby waterways by the tides. This group of marshes is also valuable as flood buffers and should be preserved. CAX wetlands and adjacent creeks provide nursery areas for striped bass, white perch, and other species. These wetlands are also prime habitats for migrating waterfowl.

Referring to the wetlands map presented as Figure 2-9, the identified wetlands in the vicinity of Site 4 and AOC 1 include the following:

- Wetlands near Site 4 – The upstream pond is mapped as "PUBHh," where P = Palustrine; UB = Unconsolidated Bottom; H = Permanently Flooded; h = Diked/Impounded.

- The drainage swales at AOC 1are not mapped as wetlands on the NWI mapping. The swales eventually merge to form an unnamed tributary to Jones Pond, which is located approximately 1500 feet downstream of the site. Jones Pond is mapped as L1UBHh," where L = Lacustrine; 1 = Limnetic; UB = Unconsolidated Bottom; H = Permanently Flooded; h = Diked/Impounded.

The habitat of aquatic floral species is generally determined by water salinity and bottom types. Along the York River in the vicinity of CAX, the following species are associated with certain salinity ranges:

- Hornwort: Freshwater only.
- Water-celery: Freshwater only.
- Pondweed: Fresh to 5 parts per thousand (ppt).
- Horned pondweed: Fresh to 5 ppt.
- Water milfoil: Fresh to 10 ppt.
- Eelgrass: 10 to 35 ppt.
- Widgeon grass: 5 to 40 ppt.

These species are commonly found growing at depths of 3 to 9 feet in soft bottom muds. Due to increased nutrient loading, waterweed and water milfoil have been plant pests at times. Eelgrass is most often found growing in soft mud. Widgeon grass is sensitive to both increased water temperature and turbidity.

Oysters, blue crabs, and hard- and soft-shell clams are found in the York River offshore of CAX. This area of the York River is designated as a crab pot fishery. In addition, south of Queens Creek, immediately north of CAX, the river is a spawning and nursery ground for blue crabs. Fish species commonly found in the York River include hogchoker, white perch, white catfish, channel catfish, bay anchovy, oyster toadfish, striped bass, Atlantic croaker, weakfish, spotted hake, and spotted and silver perch. It has been determined that these 12 species account for more than 92 percent of a total catch of 98 species. The first seven of the listed species are considered resident species, while the remaining five inhabit the waters only seasonally. No threatened or endangered fish or invertebrates have been found on CAX or nearby; however, several species of endangered sea turtles (namely the green, hawkbill, leatherback, loggerhead, and Atlantic ridley) are known to feed in the Chesapeake Bay and occasionally swim up the York River during the summer.

SECTION 2.0
FIGURES

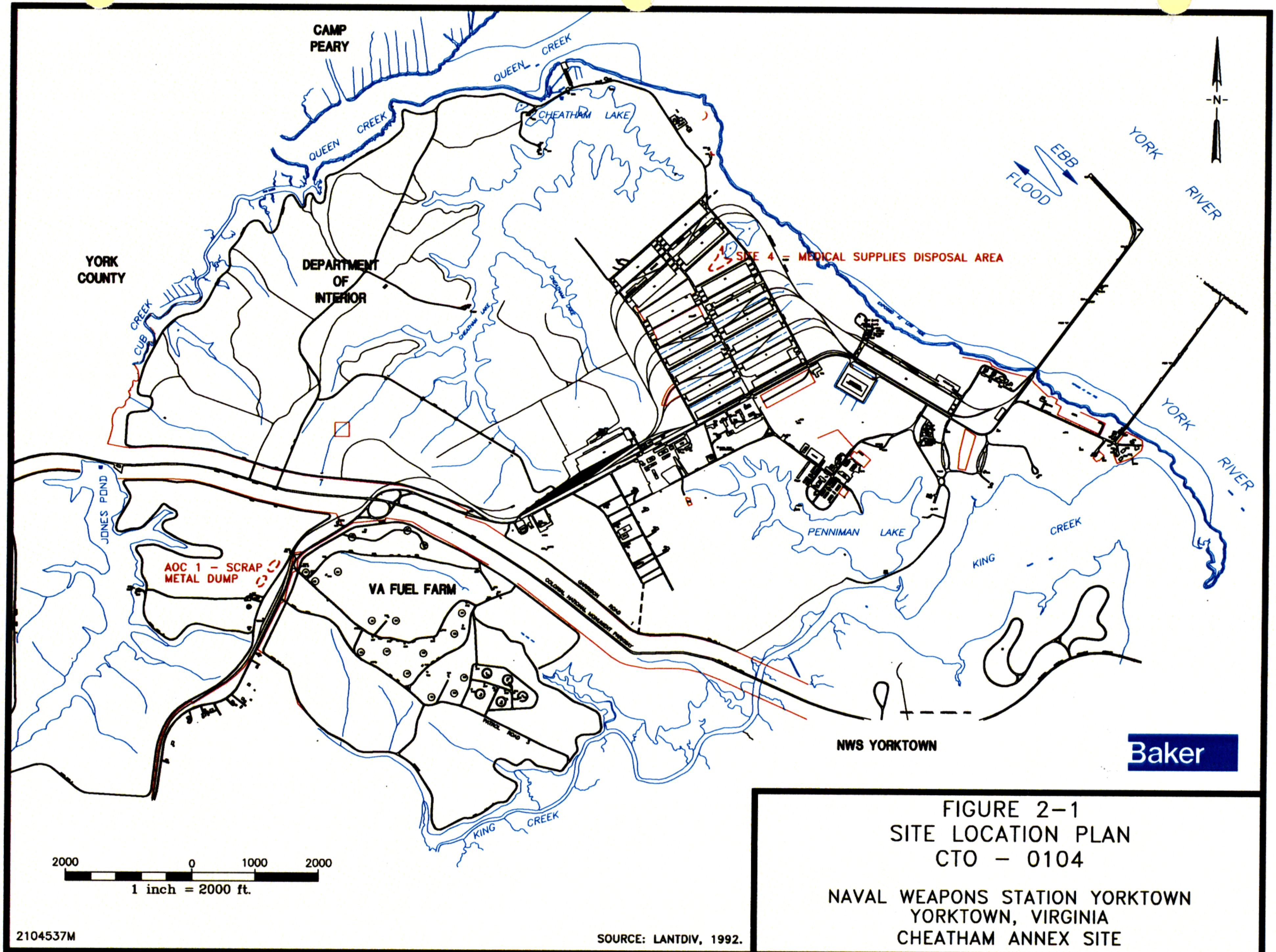
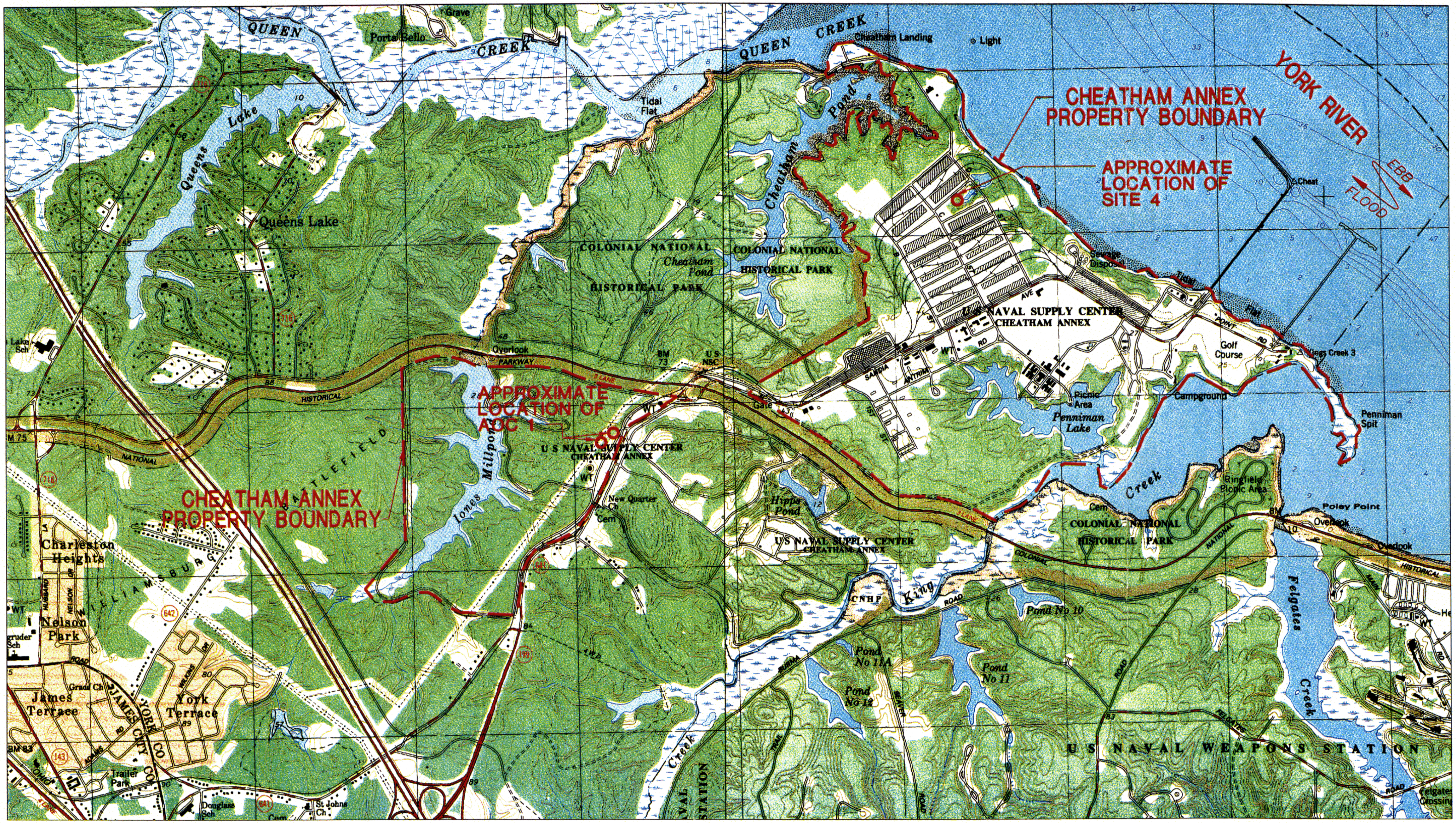


FIGURE 2–1
SITE LOCATION PLAN
CTO – 0104

NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



SOURCE: CLAY BANK, VA AND WILLIAMSBURG, VA U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLES.

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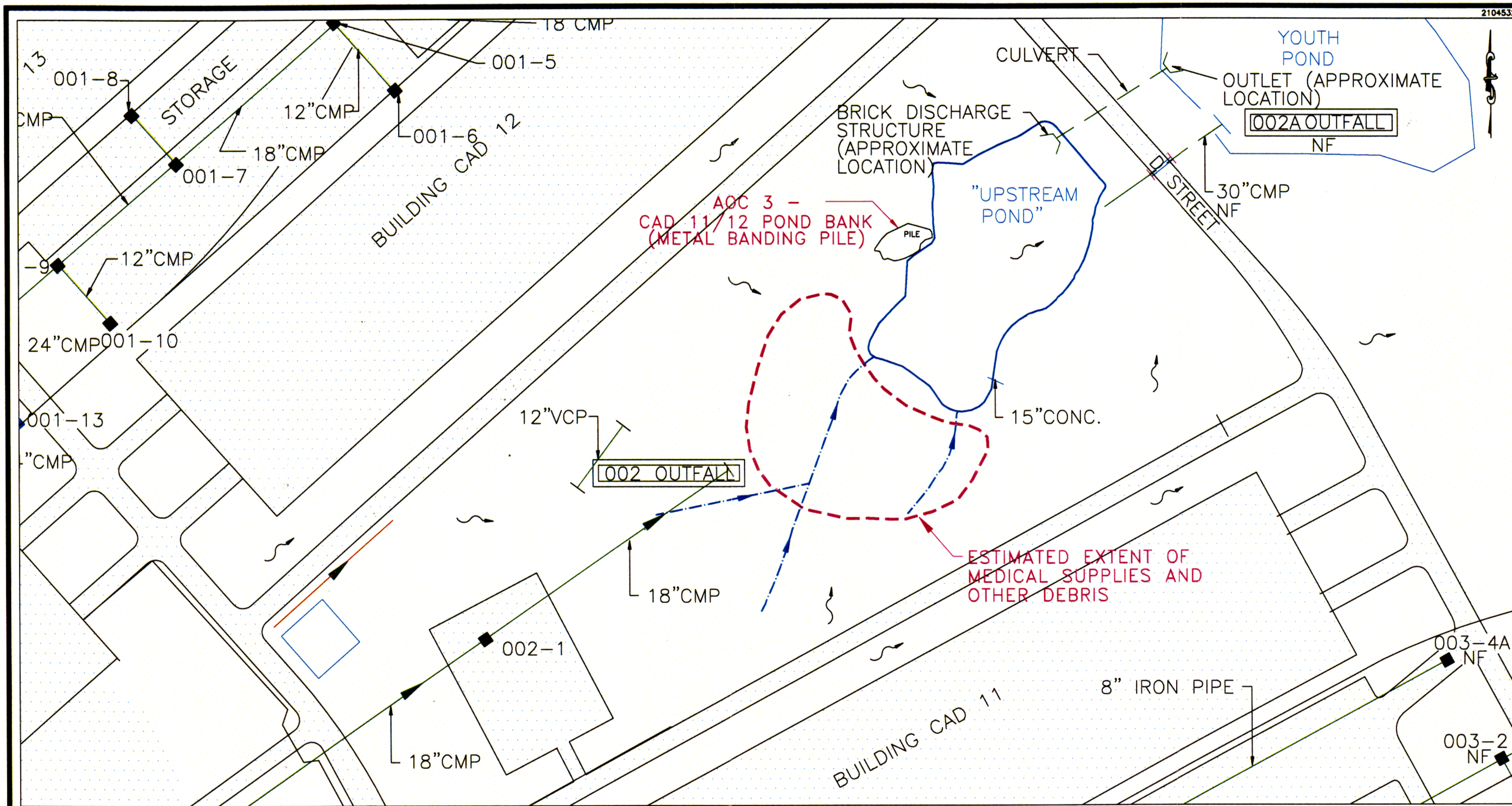
FIGURE 2-2
TOPOGRAPHIC MAP
CTO – 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



100 0 50 100
1 inch = 100 ft.

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NOTES
1) EDGE OF POND LOCATION APPROXIMATE

SOURCE: NAVFAC DRAWING 4255914 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 3".

LEGEND

- ■ – DROP INLET
- NF – NOT FOUND
- – OVERLAND FLOW DIRECTION
- CMP – CORRUGATED METAL PIPE
- – DRAINAGE CHANNEL WITH FLOW DIRECTION

FIGURE 2-3
SITE PLAN – SITE 4
CTO – 0104

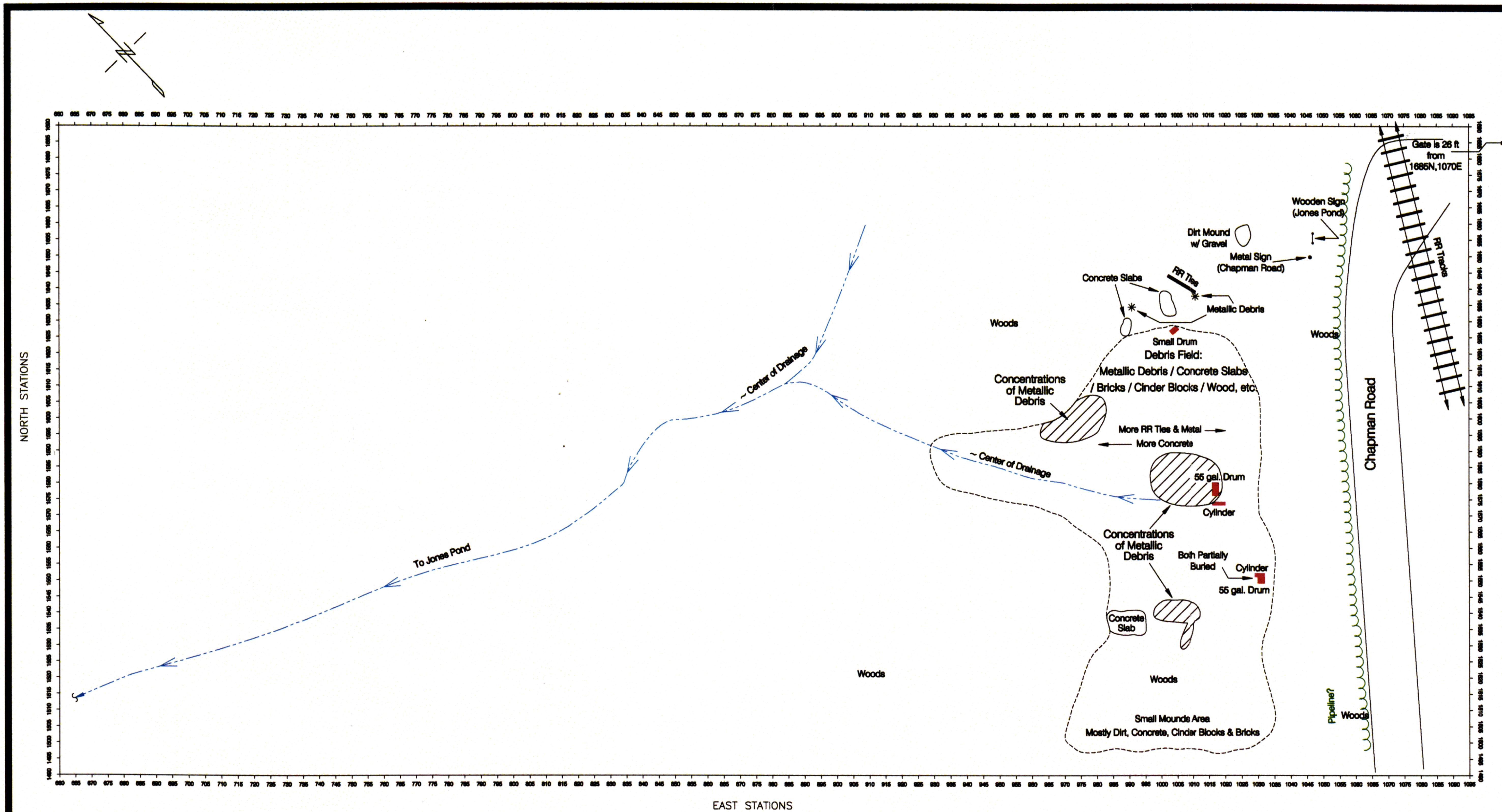
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Baker

FIGURE 2-4
AERIAL PHOTOGRAPH - SITE 4
CTO - 0104

NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

2104538M



LEGEND

- ------- – APPROXIMATE EXTENT OF VISIBLE DEBRIS
- ⌒⌒⌒ – TREE LINE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

30 0 15 30
1 inch = 30 ft.

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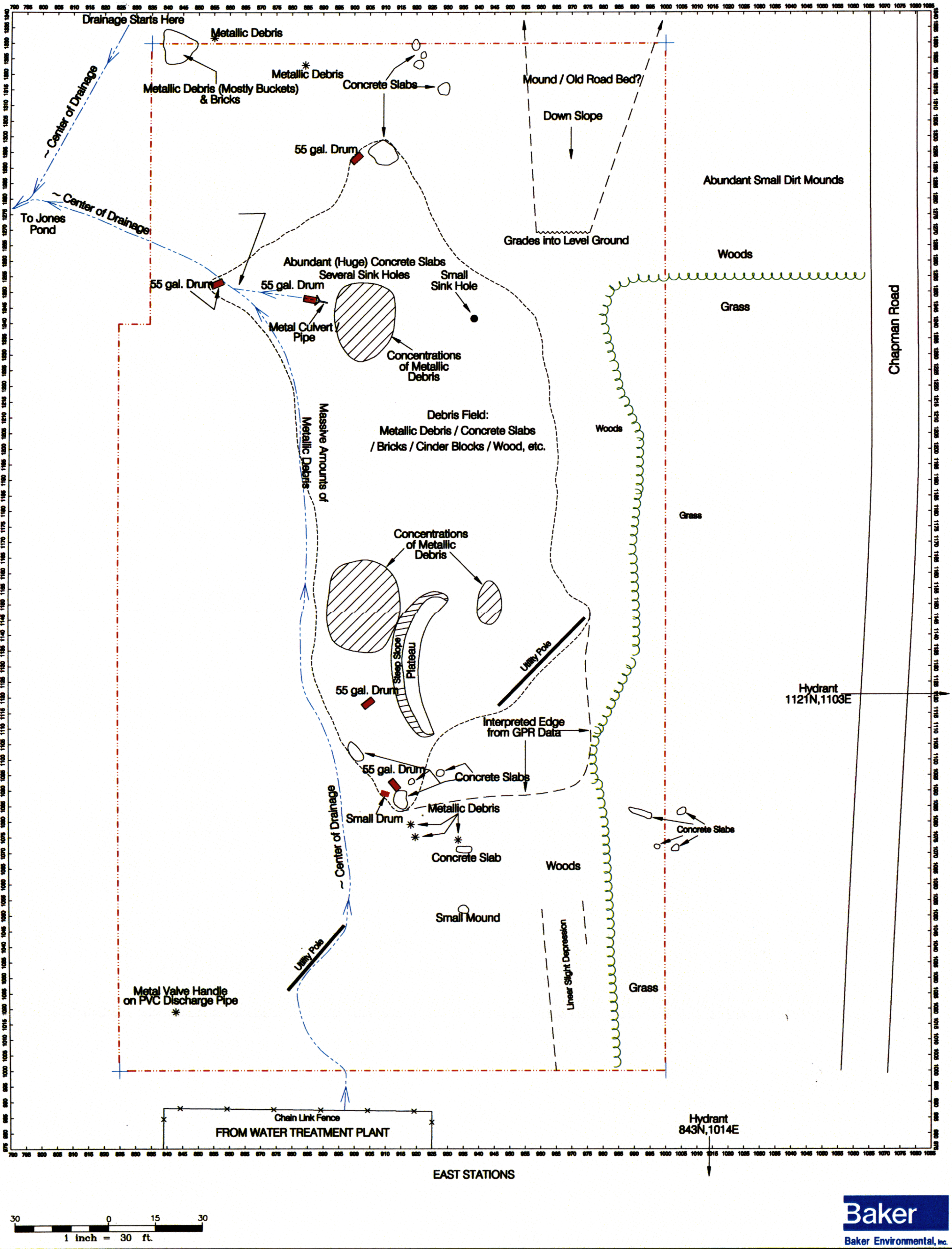
2104534M

FIGURE 2-5
SITE PLAN – AOC 1 (NORTH AREA)
CTO – 0104

NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



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LEGEND

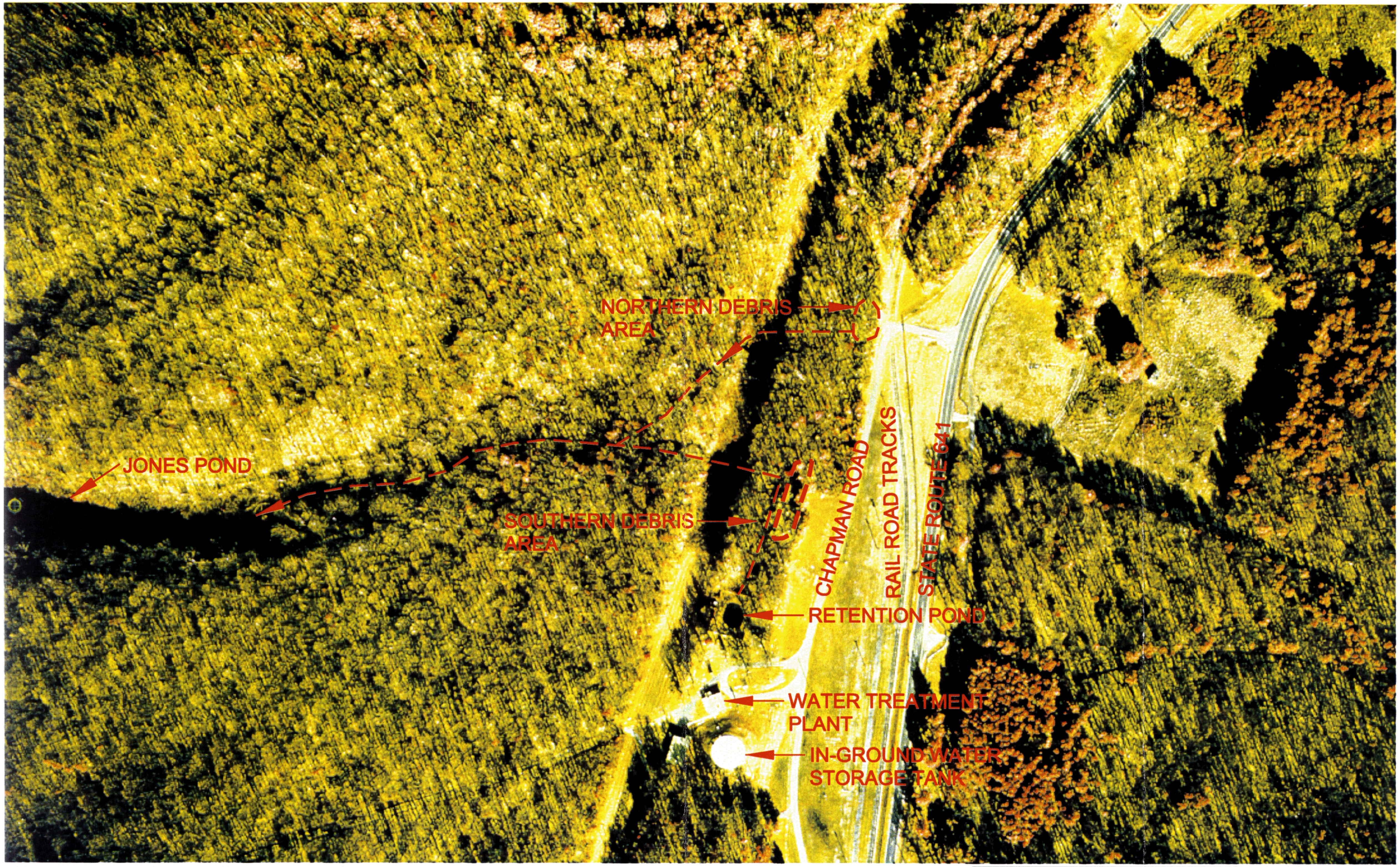
------ - APPROXIMATE EXTENT OF VISIBLE DEBRIS

⌒⌒⌒ - TREE LINE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 2-6
SITE PLAN -AOC 1 (SOUTH AREA)
CTO-0104

NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE



Baker

LEGEND
UNNAMED TRIBUTARY WITH FLOW DIRECTION

N

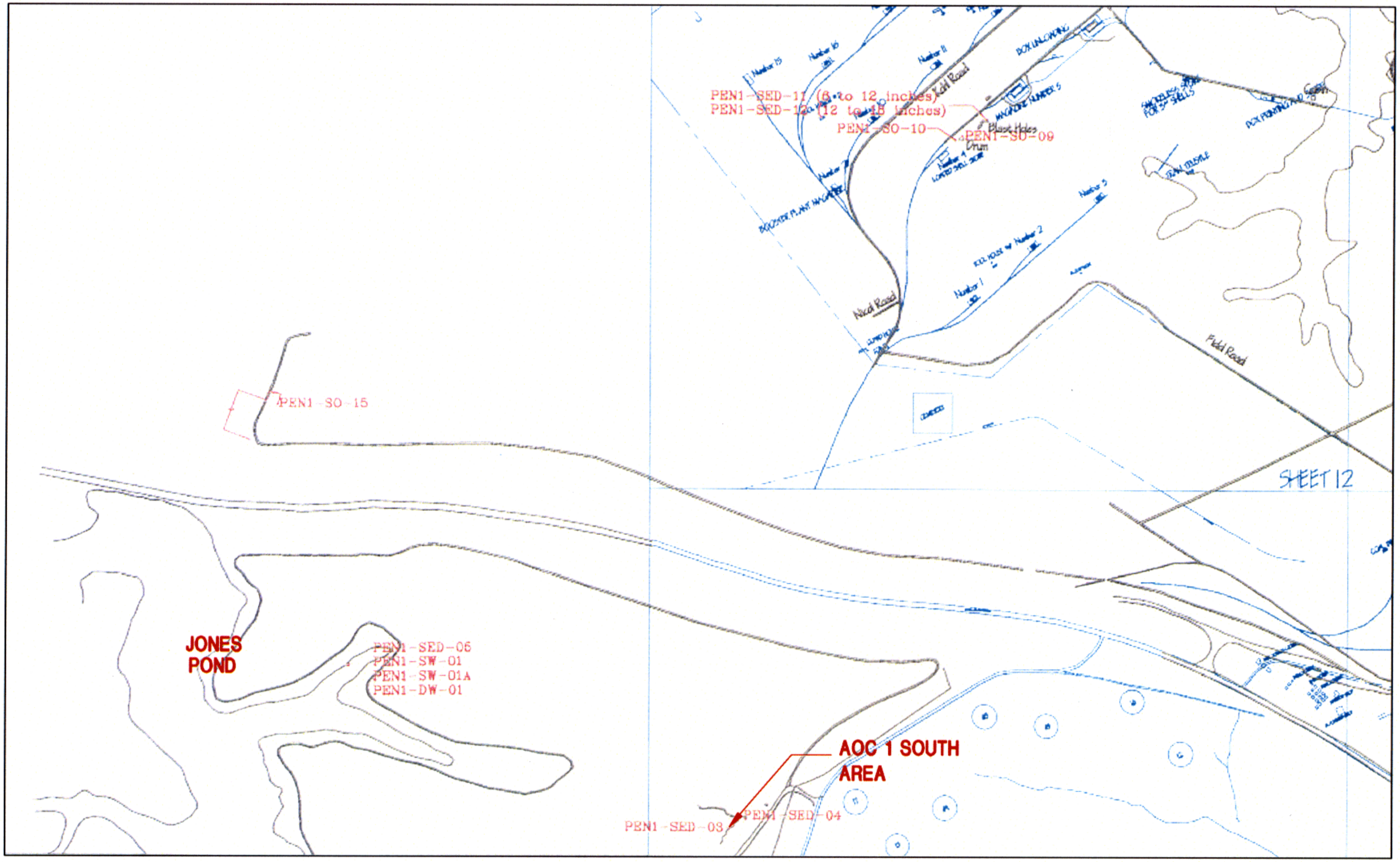
APPROXIMATE SCALE
0 250 500

SOURCE: AERIAL PHOTOGRAPHIC ANALYSIS USEPA 1998.

FIGURE 2-7
AERIAL PHOTOGRAPH - AOC 1
JANUARY 1, 1998

NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

2104535M



N.T.S.

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Baker Environmental, Inc.

LEGEND

SOURCE: FIGURE 4, FINAL SITE INSPECTION NARRATIVE REPORT, USEPA, 1999

FIGURE 2-8
SAMPLE LOCATION PLAN– USEPA 1999
JONES POND/TRIBUTARY SAMPLES
CTO – 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

2104528M

NOTES

1. SITE LOCATIONS ARE APPROXIMATE.
2. REFER TO SHEET 2 OF 2 FOR DESCRIPTIONS.

SOURCE: DRAFT NATIONAL WETLANDS INVENTORY MAP, CLAY BANK AND WILLIAMSBURG, VIRGINIA. U.S. DEPT. OF THE INTERIOR. ACCEPTED BY FISH AND WILDLIFE SERVICE JANUARY 15, 1993.

FIGURE 2-9
(SHEET 1 OF 2)
WETLANDS INVENTORY MAP
CTO – 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

HOW TO USE THIS WETLANDS INVENTORY MAP

The wetlands inventory map is a reduction of the 1:24,000 National Wetlands Inventory (NWI) map. This map shows the configuration, location and type of wetlands and deepwater habitats found within a given area.

WETLANDS LEGEND

Wetland data are displayed on maps by a series of letters and numbers (alpha-numerics). Mixing of classes and subclasses are represented by a diagonal line. The more common symbols are shown below; uncommon symbols have been omitted for simplicity. For identifying these latter symbols, the reader must refer to an actual NWI map legend.

SYMBOLOGY

Systems and Subsystems:

M1	=	Marine Subtidal	R3	=	Riverine Upper Perennial
M2	=	Marine Intertidal	R4	=	Riverine Intermittent
E1	=	Estuarine Subtidal	L1	=	Lacustrine Limnetic
E2	=	Estuarine Intertidal	L2	=	Lacustrine Littoral
R1	=	Riverine Tidal	P	=	Palustrine
R2	=	Riverine Lower Perennial	U	=	Upland

Classes and Subclasses:

AB	=	Aquatic Bed
BB	=	Beach/Bar
EM1	=	Emergent Wetland, Persistent
EM2	=	Emergent Wetland, Nonpersistent
EM5	=	Emergent Wetland, Narrow-leaved Persistent
FL	=	Flat
FO1	=	Forested Wetland, Broad-leaved Deciduous
FO2	=	Forested Wetland, Needle-leaved Evergreen
FO4	=	Forested Wetland, Needle-leaved Evergreen
OW	=	Open Water/Unknown Bottom
SS1	=	Scrub-Shrub Wetland, Broad-leaved Deciduous
SS3	=	Scrub-Shrub Wetland, Broad-leaved Evergreen
SS4	=	Scrub-Shrub Wetland, Needle-leaved Evergreen
UB	=	Unconsolidated Bottom
US	=	Unconsolidated Shore

Water Regimes:

TIDAL	NONTIDAL
L = Subtidal	A = Temporarily Flooded
M = Irregularly Exposed	C = Seasonally Flooded
N = Regularly Flooded	E = Seasonally Flooded-Saturated
P = Irregularly Flooded	F = Semi-permanently Flooded
R = Seasonally Flooded-Tidal	H = Permanently Flooded
V = Permanently Flooded-Tidal	K = Artificially Flooded
Z = Permanently Flooded/ Intermittently Exposed	

Examples:

Alpha-numerics

E2EM5P6d =	Estuarine (E)	SYSTEM
	Intertidal (2)	SUBSYSTEM
	Emergent Wetland (EM)	CLASS
	Narrow-Leaved Persistent (5)	SUBCLASS
	Irregularly Flooded (P)	WATER REGIME
	Oligohaline (6)	WATER CHEMISTRY
	Ditched (d)	SPECIAL MODIFIER

E2FLN = Estuarine (E), Intertidal (2), Flat (FL), Regularly Flooded (N)

PFO1E = Palustrine (P), Forested Wetland (FO), Broad-leaved Deciduous (1), Seasonally Flooded-Saturated (E)

PEM/OWH = Palustrine (P), Emergent Wetland/Open Water (EM/OW), Permanently Flooded (H)

PFO/SSIA = Palustrine (P), Forested Wetland/Scrub-Shrub Wetland (FO/SS), Broad-leaved Deciduous (1), Temporarily Flooded (A)

REFERENCE: DRAFT NATIONAL WETLANDS INVENTORY MAP, CLAY BANK AND WILLIAMSBURG, VIRGINIA. U.S. DEPT. OF THE INTERIOR. ACCEPTED BY FISH AND WILDLIFE SERVICE JAN. 15, 1993.

Baker

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FIGURE 2-9
(SHEET 2 OF 2)
WETLANDS INVENTORY MAP
CTO - 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

3.0 FIELD INVESTIGATION PROCEDURES AND PHYSICAL FINDINGS

The purpose of this section is to summarize the November 1999 Field Investigation program that was conducted at Site 4 and AOC 1. To avoid repetition, specific procedures that are detailed in the Work Plan and FSAP are not repeated herein, except where the methodologies deviated from those stated in these documents, or where additional details are warranted.

The field investigation for this CTO consisted of the following investigative activities:

- Geophysical Survey – AOC 1
- Soil sampling - Site 4 and AOC 1
- Surface Water sampling – AOC 1
- Sediment sampling – Site 4 and AOC 1

Sample locations are presented on Figure 3-1 (Site 4), Figure 3-2 (AOC 1 – North Area), and Figure 3-3 (AOC1 – South Area). The physical results/findings of this investigation are presented in this section. Analytical results are discussed in Section 4.0. A summary of the samples collected under this SI is presented on Table 3-1. Field Quality Assurance/Quality Control (QA/QC) samples are tabulated on Table 3-2.

3.1 Geophysical Investigation

The purpose of the geophysical survey at AOC 1 was to delineate the eastern (buried) edge of the disposal areas in the northern and southern portions of the AOC. Debris outcrops along the slopes and is exposed at the surface at the toe of these slopes. However, prior to the investigation, the lateral extent of the buried debris was not known. The survey was also intended to provide information regarding the depth of debris burial.

The geophysical surveys were conducted between November 9, and November 11, 1999, by NAEVA Geophysics, Inc. of Charlottesville, Virginia. A Geonics EM-31 terrain conductivity meter was used for the electromagnetic (EM) survey, while an EKKO system was used for the Ground Penetrating Radar (GPR) survey. Grid systems were established for both the northern and southern areas, with baselines placed parallel to Chapman Road. Traverse lines were placed perpendicular to the baselines at 50 foot and 20 foot spacings in the south and north areas, respectively, with EM data collected at 5-foot intervals along the lines. GPR data points were recorded at irregular intervals (not uniformly spaced) due to the rugged terrain and presence of large trees along the slopes. A common point between the two grid systems was established to allow for cross-referencing.

Detailed descriptions of the geophysical survey procedures and results are included in the Geophysical Report which is attached as Appendix C.

Findings of the Geophysical Survey

The debris areas in both the northern and southern portions of the site as defined by the geophysical survey are roughly coincident with the extent of debris that is present at the surface. In the northern area, the eastern (buried) edge of debris is interpreted to be approximately 10 to 12 feet beyond the edge of the surface debris (i.e., unexposed debris is buried within an approximately 10 to 12 foot wide area). With the exception of this 10 to 12 foot wide area, the results of the survey indicate that there is not extensive buried debris at the site. This conclusion was reached from evaluation of signal response and the nearly complete correlation between anomalous responses and visible surface debris.

The survey also detected an apparent buried pipeline that traverses along the top of the slope. The pipe size, age, type, and use are not known. The results of the geophysical survey are shown on Figure 3-4 (North Area) and Figure 3-5 (South Area).

3.2 Soil Investigation

The following sections describe the investigative procedures employed for the soil investigations at Site 4 and AOC 1.

3.2.1 Site 4 Soil Investigation

A total of six shallow hand auger borings were advanced at Site 4. One surface soil sample (0 to 6 inch below ground surface [bgs] interval) and one subsurface soil sample were collected from each hand auger boring location. The subsurface soil samples were intended to be collected from the 12 to 24 inch bgs interval. At two locations, the samples were collected from the 6 to 12 inch bgs interval because groundwater was encountered at approximately 1 foot bgs.

Sample points were placed in areas of heavy debris, or immediately downgradient from areas of heavy debris. The sampling program is summarized on Table 3-1. Sample locations are shown on Figure 3-1. Lithologic descriptions of the soil samples are presented on Table 3-3.

3.2.2 AOC 1 Soil Investigation

A total of six shallow hand auger borings were advanced at AOC 1. Three borings were advanced each in the north and south portions of the AOC. One surface soil sample (0 to 6 inch bgs interval) was collected from each hand auger boring location. Subsurface soil samples were collected from five of the locations, no subsurface sample could be collected from the A1-HA01 location due auger refusal (possibly concrete). Subsurface samples were collected at locations A1-HA02, A1-HA03, A1-HA04, and A1-HA06 from the 12 to 24 inch bgs interval. At one location (A1-HA05), the sample was collected from the 6 to 12 inch bgs interval due to auger refusal at a depth of 12 inches (possibly concrete).

Sample points were placed in areas of heavy debris, or immediately downgradient from areas of heavy debris. The sampling program is summarized on Table 3-1. Sample locations are shown on Figure 3-2 (North Area) and Figure 3-3 (South Area). Lithologic descriptions of the soil samples are presented on Table 3-4.

3.3 Surface Water/Sediment Investigation

The following sections describe the surface water and sediment sampling programs for Site 4 and AOC 1.

Site 4 - Sediment Sampling

Sediment samples were collected at two intervals from four separate stations at Site 4. At each station, samples were collected from the 0 to 4 inch interval and the 4 to 8 inch interval. Surface water samples were not collected at Site 4. Sample 4-SD01-01 was collected with a hand auger due to heavy organic debris. The remaining samples were collected via acetate coring sleeve inside of corer.

Descriptions of the sample locations and sediment lithology are presented on Table 3-5. The analytical program is summarized on Table 3-1.

AOC 1 - Surface Water/Sediment Sampling

Surface water samples were collected at Stations A1-SW01, A1-SW02, and A1-SW03. No sample was collected at the A1-SW04 location because the swale was dry at this location. Samples were collected via direct dip, with the exception of preserved fractions (VOCs, metals, and cyanide) which were filled by transferring from a dedicated amber glass container.

Sediment samples were collected at two intervals from all four sample stations. At each station, samples were collected from the 0 to 4 inch interval and the 4 to 8 inch interval, with the exception of sample A1-SD01-01. This sample was collected from the 4 to 6 inch interval rather than the 4 to 8 inch interval due to the presence of tree roots at a depth of 6 inches. Sediment samples were collected with a decontaminated stainless steel hand auger. Descriptions of the sediment lithology and sample locations are presented on Table 3-6 along with the field surface water quality parameters. The analytical program is summarized on Table 3-1.

SECTION 3.0
TABLES

TABLE 3-1

SUMMARY OF SITE INSPECTION SAMPLING PROGRAM
SITE INSPECTION REPORT - SITE 4 AND AOC 1
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Site 4 Samples				
Sample ID	**Date**	**Media**	**Depth (inches)**	**Analytical Parameters**
4-HA01-00	11/12/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
4-HA02-00	11/12/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
4-HA03-00	11/12/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
4-HA04-00	11/12/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
4-HA05-00	11/12/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
4-HA06-00	11/12/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
4-HA01-02	11/12/99	Subsurface Soil	12-24	TCL organics, nitramines, TAL inorganics and cyanide
4-HA02-02	11/12/99	Subsurface Soil	12-24	TCL organics, nitramines, TAL inorganics and cyanide
4-HA03-02	11/12/99	Subsurface Soil	12-24	TCL organics, nitramines, TAL inorganics and cyanide
4-HA04-01	11/12/99	Subsurface Soil	6-12	TCL organics, nitramines, TAL inorganics and cyanide
4-HA05-01	11/12/99	Subsurface Soil	6-12	TCL organics, nitramines, TAL inorganics and cyanide
4-HA06-02	11/12/99	Subsurface Soil	12-24	TCL organics, nitramines, TAL inorganics and cyanide
4-SD01-00	11/12/99	Surface Sediment	0-4	TCL organics, nitramines, TAL inorganics and cyanide
4-SD02-00	11/13/99	Surface Sediment	0-4	TCL organics, nitramines, TAL inorganics and cyanide
4-SD03-00	11/13/00	Surface Sediment	0-4	TCL organics, nitramines, TAL inorganics and cyanide
4-SD04-00	11/14/99	Surface Sediment	0-4	TCL organics, nitramines, TAL inorganics and cyanide
4-SD01-01	11/12/99	Subsurface Sediment	4-8	TCL organics, nitramines, TAL inorganics and cyanide
4-SD02-01	11/13/99	Subsurface Sediment	4-8	TCL organics, nitramines, TAL inorganics and cyanide
4-SD03-01	11/13/99	Subsurface Sediment	4-8	TCL organics, nitramines, TAL inorganics and cyanide
4-SD04-01	11/13/99	Subsurface Sediment	4-8	TCL organics, nitramines, TAL inorganics and cyanide

TABLE 3-1 (continued)

SUMMARY OF SITE INSPECTION SAMPLING PROGRAM
SITE INSPECTION REPORT - SITE 4 AND AOC 1
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

AOC 1 Samples				
Sample ID	**Date**	**Media**	**Depth (inches)**	**Analytical Parameters**
A1-HA01-00	11/14/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA02-00	11/14/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA03-00	11/14/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA04-00	11/14/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA05-00	11/14/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA06-00	11/14/99	Surface Soil	0-6	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA02-02	11/14/99	Subsurface Soil	12-24	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA03-02	11/14/99	Subsurface Soil	12-24	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA04-02	11/14/99	Subsurface Soil	12-24	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA05-01	11/14/99	Subsurface Soil	6-12	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA06-02	11/14/99	Subsurface Soil	12-24	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD01-00	11/14/99	Surface Sediment	0-4	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD02-00	11/14/99	Surface Sediment	0-4	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD03-00	11/14/99	Surface Sediment	0-4	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD04-00	11/14/99	Surface Sediment	0-4	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD01-01	11/14/99	Subsurface Sediment	4-6	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD02-01	11/14/99	Subsurface Sediment	4-8	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD03-01	11/14/99	Subsurface Sediment	4-8	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD04-01	11/14/99	Subsurface Sediment	4-8	TCL organics, nitramines, TAL inorganics and cyanide
A1-SW01	11/14/99	Surface Water	NA	TCL organics, nitramines, TAL inorganics and cyanide
A1-SW02	11/14/99	Surface Water	NA	TCL organics, nitramines, TAL inorganics and cyanide
A1-SW03	11/14/99	Surface Water	NA	TCL organics, nitramines, TAL inorganics and cyanide

Notes:

NA Not Applicable
TCL Target Compound List
TAL Target Analyte List

Refer to Table 3-2 for QA/QC Samples

TABLE 3-2

SUMMARY OF FIELD QA/QC SAMPLES
SITE INVESTIGATION REPORT – SITE 4 AND AOC 1
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Sample Identification	Sample Date	QA/QC Sample Type	Comments
4-HA02-00D	11/12/99	Surface soil duplicate	Duplicate of 4-HA02-00
4-HA01-02D	11/12/99	Subsurface soil duplicate	Duplicate of 4-HA01-02
4-SD04-00D	11/13/00	Sediment duplicate	Duplicate of 4-SD04-00
A1-HA05-00D	11/14/99	Surface soil duplicate	Duplicate of A1-HA05-00
A1-HA05-01D	11/14/99	Subsurface soil duplicate	Duplicate of A1-HA05-01
A1-SW03D	11/14/99	Surface water duplicate	Duplicate of A1-SW03
A1-SD03-00D	11/14/99	Sediment duplicate	Duplicate of A1-SD03-00
104-TB01	11/12/99	Trip blank	Shipped in cooler with VOA samples
104-TB02	11/12/99	Trip blank	Shipped in cooler with VOA samples
104-TB03	11/15/99	Trip blank	Shipped in cooler with VOA samples
104-RS01	11/13/00	Rinsate blank	Sampling spoon
104-RS02	11/13/00	Rinsate blank	Acetate sediment coring sleeve
104-RS03	11/13/00	Rinsate blank	Aluminum pie pan
104-RS04	11/13/00	Rinsate blank	Hand auger bucket
104-FB01	11/10/00	Field Blank	Laboratory grade DI water (rinsates)
104-FB02	11/10/00	Field Blank	Commercial grade DI water (decontamination)

Notes:

DI Deionized
VOA Volatile Organic Analysis

TABLE 3-3

SOIL SAMPLE LITHOLOGY
SITE 4 – MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT - SITE 4 AND AOC 1
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Location	Sample ID	Interval (inches)	Description
Upland area	4-HA01-00	0 – 6	0.0 - 0.2 TOP SOIL 0.2 - 0.5 SILTY SAND, tan
	4-HA01-02	12 - 24	CLAYEY SAND matrix with bags/foil, trace glass, tubing present at 1.0 foot
In ditch	4-HA02-00	0 – 6	HEAVY DEBRIS, tubing, foil, injection needles
	4-HA02-02	12 - 24	1.0 - 1.5 HEAVY DEBRIS 1.5 - 2.0 SILT, dark brown, moist to wet
Toe of small slope, approximately 2 feet from railroad ties	4-HA03-00	0 – 6	0.0 - 0.2 TOP SOIL 0.2 - 0.5 SILTY SAND with clay, trace marine shell fragments, tan
	4-HA03-02	12 - 24	MEDICAL DEBRIS, extremely heavy, nearly solid debris to 2.0 feet (tubing, needles, bags, foil, etc.)
Toe of slope, approximately 1 foot in front of railroad ties	4-HA04-00	0 – 6	TOPSOIL with heavy medical debris (tubing, needles, bags, foil, etc.)
	4-HA04-01	6 - 12	MEDICAL DEBRIS in dark brown silt matrix, trace wood debris. Groundwater at 1.0 foot. Root at 1.0 foot
Toe of slope, 2 feet from edge of stream. Adjacent to 3-inch diameter rope-wrapped hoses	4-HA05-00	0 – 6	TOPSOIL, only minimal medical debris (part of vial top),piece of scrap metal at 2 inches
	4-HA05-01	6 - 12	0.5 - 0.8 Debris is very minimal, one piece of plastic, one piece of tubing, moist 0.8 - 1.0 SITY SAND, moist to wet, green (apparently native)
Adjacent to metal scrap pile	4-HA06-00	0 – 6	TOP SOIL at surface underlain by SILT, little sand, brown, debris throughout including black (charred?) wood, metal banding, concrete, shingles?
	4-HA06-02	12 - 14	Attempted multiple locations, could not get past approximately 14 inches due to obstructions. SILT, little sand, brown, refusal at 14 inches apparently due to shingles

TABLE 3-4

SOIL SAMPLE LITHOLOGY
AOC 1 – SCRAP METAL DUMP
SITE INSPECTION REPORT - SITE 4 AND AOC 1
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Location	Sample ID	Interval (inches)	Description
Between cinder block, concrete rubble and 24 inch CMP	A1-HA01-00	0 – 6	Concrete at 4 to 6 inches in area surrounding sample location. Could not auger below 6 inches. Concrete appears to be continuous, no subsurface sample collected due to refusal. TOPSOIL, trace roots, trace slag/gravel, very dark brown to black
10 feet from 2 gallon bucket, 4 foot x 6 foot metal frame	A1-HA02-00	0 – 6	TOPSOIL, little rock fragments/gravel, dark brown, trace concrete, glass, red clay pipe material
	A1-HA02-02	12 - 24	1.0 - 1.5 CLAYEY SAND, trace roots, tan (apparently native) 1.5 - 2.0 SANDY CLAY, trace roots, orange
6 feet from 1600N, 920 E pin flag	A1-HA03-00	0 – 6	TOPSOIL, trace roots, dark brown, little concrete chunks, yellow, very brittle, crumbly, trace glass. Refusal at 6 inches
	A1-HA03-02	12 - 24	Relocated several times due to auger removal. 12-24 sample collected at right edge of swale. Small, soft, yellow laminated nodule at 6 inches. Top: SANDY CLAY, damp, very plastic, very small piece of charred material at 12 inches. Bottom: SILTY CLAY, moist, very plastic
Next to 5 gallon rusted drum near 1100N, 900E	A1-HA04-00	0 – 6	TOPSOIL with bark, no debris
	A1-HA04-02	12 -24	SILTY SAND, light brown, (apparently native)
Next to 1500N, 900E	A1-HA05-00	0 – 6	TOPSOIL, dark brown, trace roots, trace rusted wire, concrete, large gravel/rock fragments
	A1-HA05-01	6 - 12	Refusal at 12 inches (concrete) Same as above, except with orange iron oxide ?? nodules
On debris slope, next to concrete	A1-HA06-00	0 – 6	SILT, brown, little sand, trace clay, trace roots, damp (apparently native)
	A1-HA06-02	12 - 24	SILT, some clay, some sand, orange brown, damp

TABLE 3-5
SEDIMENT SAMPLING DATA - SITE 4
SITE INSPECTION REPORT - SITE 4 AND AOC 1
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Sample ID	Sediment Sample Depth (inches)	Stream/Sediment Description
4-SD01-00	0 - 4	SILT, highly organic, very woody, some fine sand, few clam shells, dark brown to black
4-SD01-01	4 - 8	SILTY SAND, gray, trace organic debris
4-SD02-00	0 - 4	At mouth of southern swale 0 - 2 inches: ORGANIC SILT, dark brown with heavy organic debris 2 - 4 inches: SANDY SILT, trace marine shells, olive-gray intermixed with black decaying organic material
4-SD02-01	4 - 8	SANDY SILT, trace marine shells, olive-gray intermixed with black decaying organic material
4-SD03-00	0 - 4	West edge of pond next to four 4-inch willows. In front of ties 0 - 2 inches: SILT with heavy decaying matter 2 - 4 inches: SILTY SAND, trace organics, gray-brown
4-SD03-01	4 - 8	SILTY SAND, trace marine shell fragments, only occasional organic debris,m green-gray
4-SD04-00	0 - 4	No flow in swale upstream of this point. SILT, some sand, trace roots, leaves, stems., heavy decomposing organics, gray
4-SD04-01	4 - 8	SANDY SILT, gray, found one piece of foil

TABLE 3-6

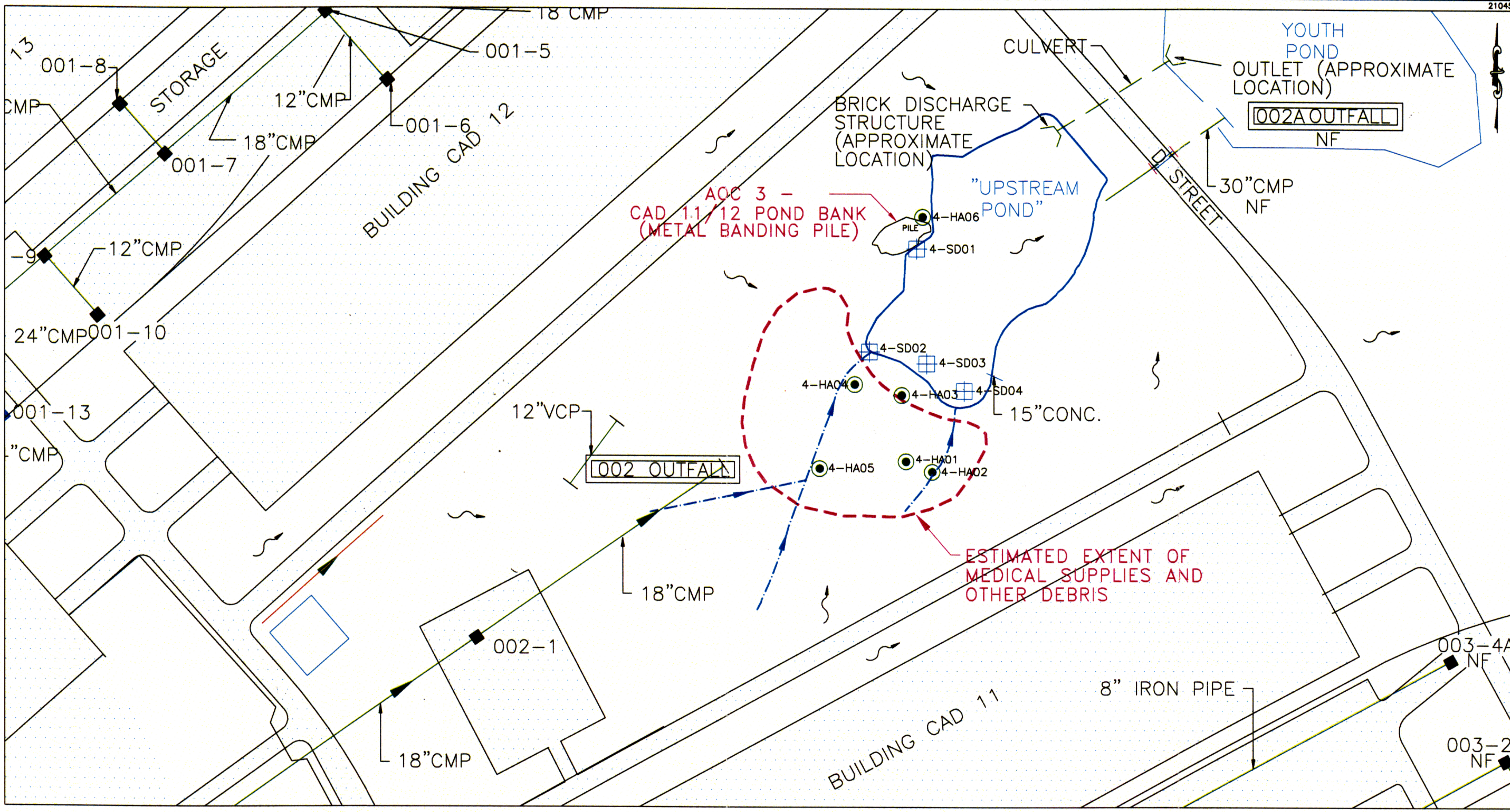
SURFACE WATER AND SEDIMENT SAMPLING DATA – AOC 1
SITE INSPECTION REPORT - SITE 4 AND AOC 1
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Sample ID	Temp (C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	pH	Conductivity (µmhos)	Sediment Sample Depth (inches)	Stream/Sediment Description
A1-SW01	16.8	0.4 ppt	4.90	212.5	6.93	732	--	Approx. 4.0 ft wide, 4 inches deep. 1 foot drop in channel. Steep slopes on both sides. Flow is approx. 0.25 gpm
A1- SD01-00	--	--	--	--	--	--	0 - 4	SILT and FINE SAND, light brown, some organic matter
A1- SD01-01	--	--	--	--	--	--	4 - 6	Could not sample deeper due to tree roots) SILT and FINE SAND, light brown, some organic matter
A1-SW02	17.6	0.3 ppt	6.74	195.6	7.28	690	--	Approx. 1.5 ft wide, 3 inches deep. 1 foot drop in channel. Telephone poles along slope on left bank
A1- SD02-00	--	--	--	--	--	--	0 - 4	SILT,some fine sand, little clay, light gray-green
A1- SD02-01	--	--	--	--	--	--	4 - 8	SILT,some fine sand, little marine shells, little clay, light gray-green
A1-SW03	17.4	0.4	2.66	-2.6	6.85	715	--	Approx. 4 ft wide, 6 inches deep. Immediately downstream of disposal area. Adjacent to scrap metal, several drums. Orange discoloration
A1- SD03-00	--	--	--	--	--	--	0 - 4	SAND, fine, some marine shell fragments, little silt, trace clay, black and brown to light brown. Black discoloration from organic decay
A1- SD03-01	--	--	--	--	--	--	4 - 8	SILT, some fine sand, little clay, black/brown. Black discoloration from organic decay
A1-SW04	--	--	--	--	--	--	--	No surface water sample collected - swale dry at this location. Located approx. 50 feet downstream of WTP pond. Channel 2 ft wide, 2.5 ft deep.
A1- SD04-00	--	--	--	--	--	--	0 - 4	SILT, some fine sand, trace clay, trace roots, brown, damp
A1- SD04-01	--	--	--	--	--	--	4 - 8	SAME to 6 inches 6 - 8 inches. SAND, fine, little silt, trace clay moist

Notes:

°C	Degree Celsius
mg/L	milligrams per liter
mV	millivolts
ppt	parts per thousand
µmhos	micromhos

SECTION 3.0
FIGURES



Baker
Baker Environmental, Inc.

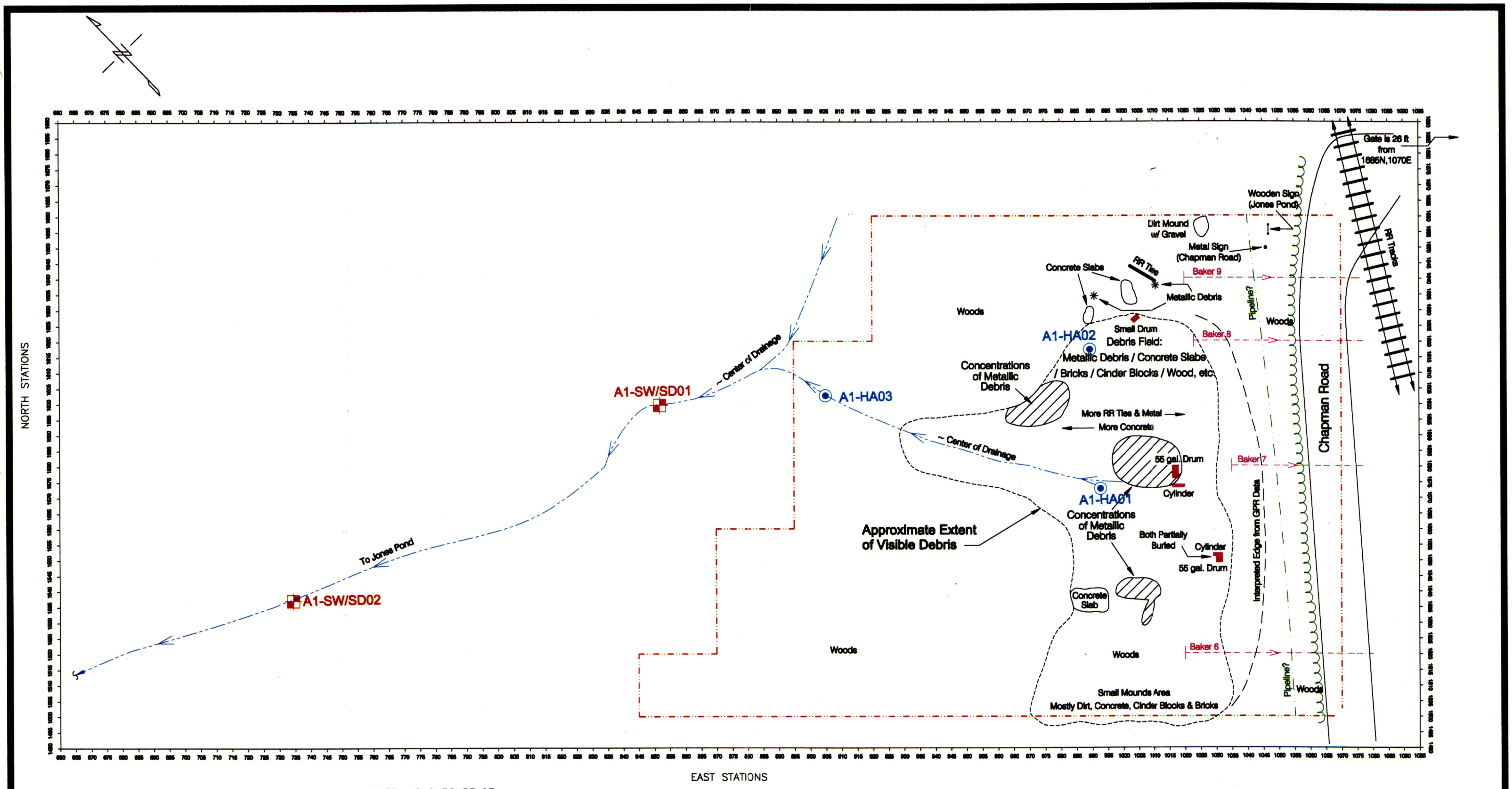
NOTES
1) SAMPLES LOCATED BY GPS (BAKER, 11/99)
2) EDGE OF POND LOCATION APPROXIMATE

SOURCE: NAVFAC DRAWING 4255914 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 3".

LEGEND

■	DROP INLET
NF	NOT FOUND
∼→	OVERLAND FLOW DIRECTION
CMP	CORRUGATED METAL PIPE
⊙	HAND AUGER BORING LOCATION
⊞	SEDIMENT SAMPLE LOCATION
-·-→	DRAINAGE CHANNEL WITH FLOW DIRECTION

FIGURE 3-1
INVESTIGATION LOCATION PLAN
SITE 4
CTO - 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



NOTE: NO SUBSURFACE
SOIL SAMPLE
COLLECTED AT A1-HA01
DUE TO OBSTRUCTION

30 0 15 30
1 inch = 30 ft.

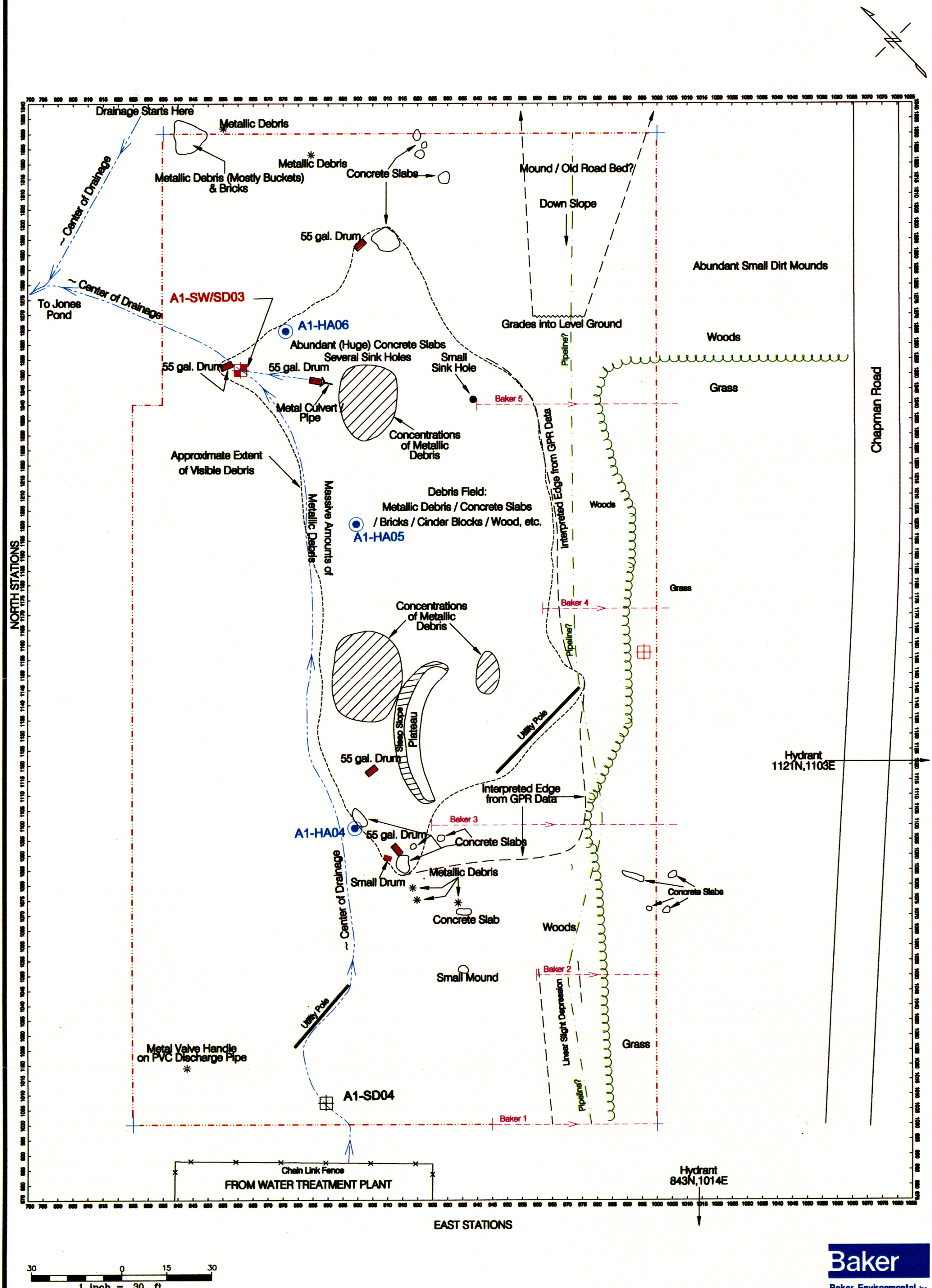
Baker
Baker Environmental, Inc.

2104529M

LEGEND
- AREA OF GEOPHYSICAL INVESTIGATION
Baker 6 - GPR PROFILE
- HAND AUGER BORING LOCATION
- SURFACE WATER/ SEDIMENT SAMPLE LOCATION
- TREE LINE
SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 3-2
INVESTIGATION LOCATION PLAN
AOC 1 (NORTH AREA)
CTO - 0104
NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

2104531M



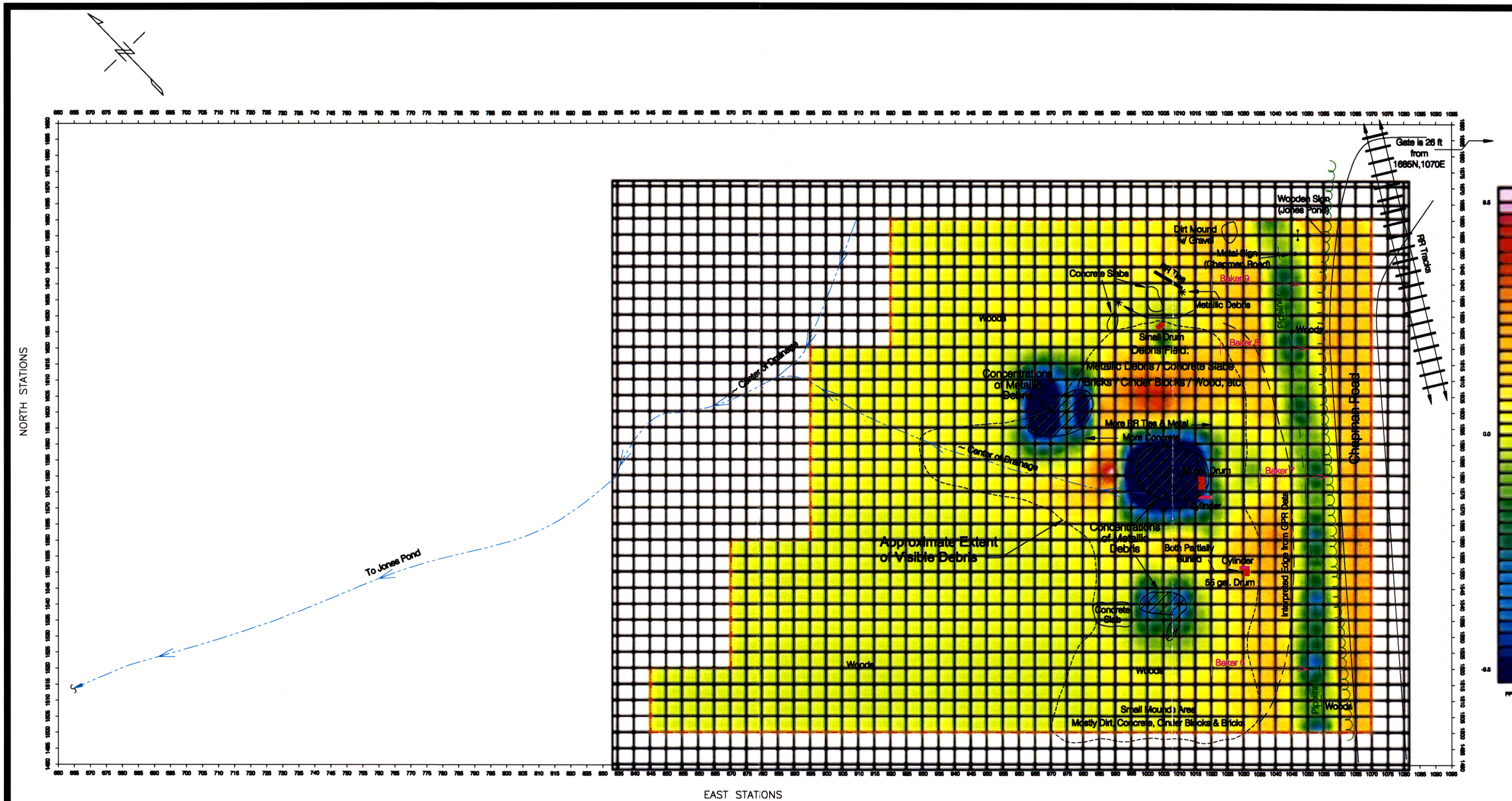
LEGEND

- AREA OF GEOPHYSICAL INVESTIGATION
- Baker 1 - GPR PROFILE
- TREE LINE
- HAND AUGER BORING LOCATION
- SEDIMENT SAMPLE LOCATION
- SURFACE WATER/ SEDIMENT SAMPLE LOCATION

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 3-3
INVESTIGATION LOCATION PLAN -AOC 1 (SOUTH AREA)
CTO-0104

NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE



NOTE: 1.) NO SUBSURFACE SOIL SAMPLE COLLECTED AT A1-HA01 DUE TO OBSTRUCTION.

2.) RESULTS ARE FOR EM-31 IN-PHASE. REFER TO GEOPHYSICAL REPORT FOR ADDITIONAL DATA.

30 0 15 30
1 inch = 30 ft.

Baker
Baker Environmental, Inc.

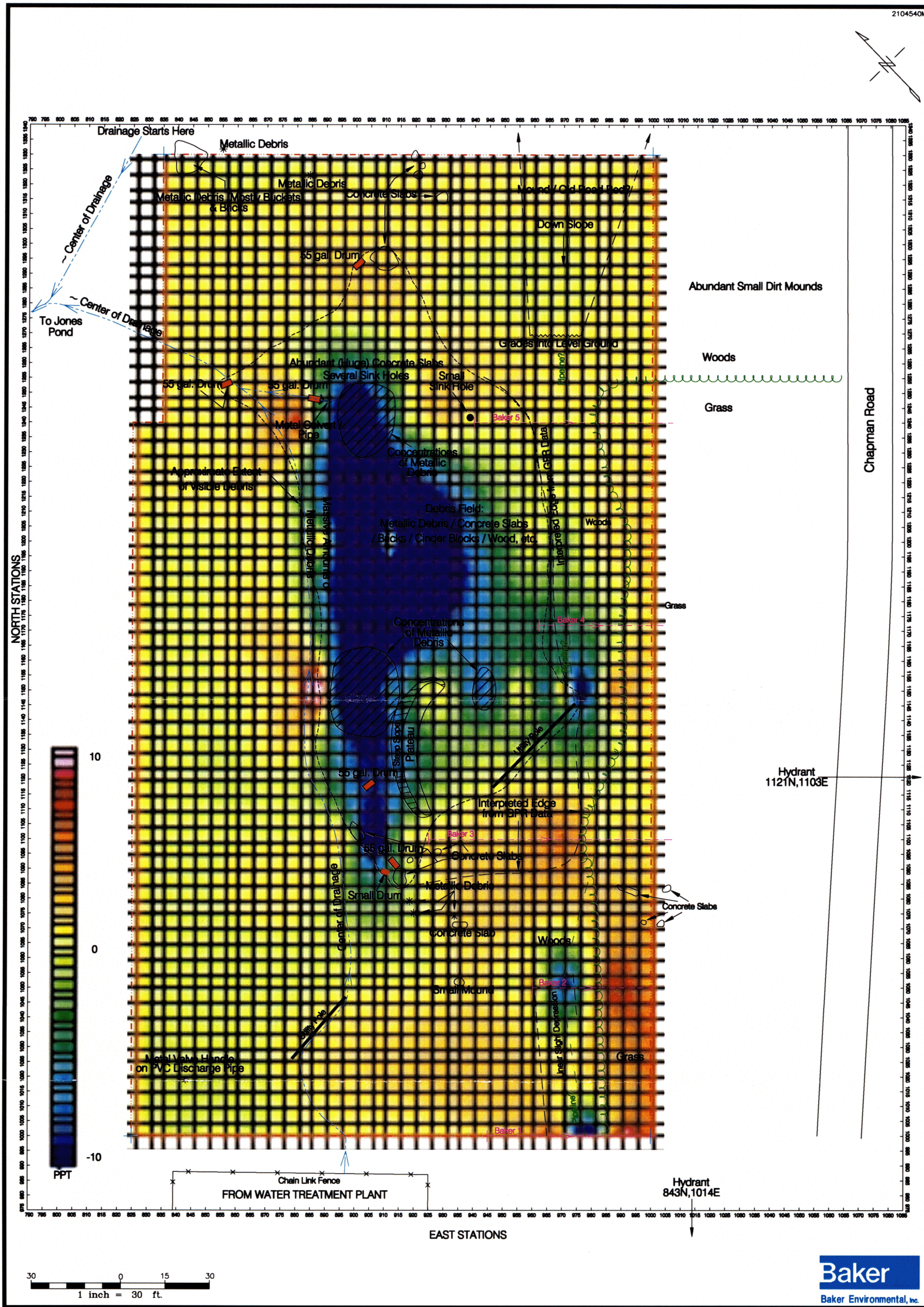
2104539M

LEGEND
- AREA OF GEOPHYSICAL INVESTIGATION
Baker 6 - GPR PROFILE
- TREE LINE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 3-4
GEOPHYSICAL SURVEY RESULTS
AOC 1 (NORTH AREA)
CTO – 0104
NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

2104540M



Baker
Baker Environmental, Inc.

LEGEND

- AREA OF GEOPHYSICAL INVESTIGATION
Baker 1 - GPR PROFILE
- TREE LINE

NOTE: RESULTS ARE FOR EM-31 IN-PHASE. REFER TO GEOPHYSICAL REPORT FOR ADDITIONAL DATA.

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 3-5
GEOPHYSICAL SURVEY RESULTS - AOC 1 (SOUTH AREA)
CTO-0104

NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE

4.0 FIELD INVESTIGATION ANALYTICAL RESULTS

The objective of this section is to discuss detected contamination that may be present as a result of past operational practices at Site 4 and AOC 1. The characterization of contaminants at Site 4 and AOC 1 was performed by field testing and laboratory analysis of soil (surface and subsurface), surface water (AOC 1 only), and sediment samples. The analytical results for environmental and QA/QC samples associated with SI are presented in this section. Chain-of-custody forms are presented in Appendix D while complete data summary tables are presented in Appendix E.

4.1 Data Quality

The quality of the data collected as part of the 1999 SI has been assessed by its accuracy and precision with respect to prescribed requirements or specifications for laboratory analysis. To make these determinations, an independent third-party validator performed data quality evaluations. Data were evaluated in accordance with the criteria established by USEPA guidelines, Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses (USEPA, 1991) specific method requirements in OLM02.1, USEPA Region III modifications, Level D data requirements, and professional judgement. Validation of the analytical data serves to reduce the inherent uncertainties associated with usability.

Additionally, analytical data were evaluated to determine both the usability of results as well as contractual compliance relative to deliverables and the aforementioned criteria. Data validation also provided an interpretation of the reported quality control results. A minimum of ten percent of all laboratory calculations was verified as part of this validation. In addition, all instrument output (i.e., spectra, chromatograms, etc.) for each sample was carefully reviewed. Data quality was evaluated based on, but not limited to the following criteria:

- Data completeness
- Holding times
- Calibrations
- Blanks
- Surrogate recoveries
- Laboratory control samples
- Laboratory and field duplicates
- MS/MSD samples
- Internal standard performance
- Compound identification
- Compound quantitation

Based upon the results of this evaluation, various qualifiers and/or codes have been attached to certain data by either the laboratory or by the data validator with regard to the data's usability. These qualifiers often pertain to QA/QC problems and generally indicate questions concerning chemical identity, chemical concentration, or both. Because the data validation process is intended to assess the effect of QC issues on data usability, validation data qualifiers are attached to the data subsequent to the laboratory qualifiers and supersede any laboratory qualifiers. During the 1999 SI, QA/QC sample results consisting of trip blanks and equipment rinsate blanks were used to qualify the appropriate environmental sample results while field blank results were used to qualify all environmental sample results.

Qualified data are flagged with a letter qualifier representing an associated explanatory note needed to clarify the corresponding analytical result. Data qualified as "J" were retained as estimated. Estimated analytical results within a data set are common and considered to be usable by the USEPA (USEPA, 1989). Data may be qualified as estimated for several reasons including an exceedence of holding times, high or low surrogate recovery, or intra-sample variability. In addition, values may be assigned an estimated "J" qualifier if the reported value is below the Contract Required Detection Limit (CRDL) or the Contract Required Quantitation Limit (CRQL). Data assigned a rejected, "R" qualifier, were excluded from the usable data set, and other qualified data were retained in the usable data set. Only one sample in the data set for this SI contained rejected data. The volatile analysis for sample 4-HA05-00 resulted in a percent recovery of less than 25 percent. Therefore, the detection limits for the compounds not detected were qualified with a "UR" qualifier (i.e., the detection limit was rejected). Data qualifier definitions are summarized on Table 4-20. Annotated Form Is for all samples were reviewed by the data validator and included in the overall data assessment. Based on the overall assessment of this data, the validator has deemed it accurate and representative of site conditions.

4.2 Data Management and Tracking

The management and tracking of data from the time of field collection to receipt of the validated analytical results is of primary importance and facilitates the overall organization of the analytical results. Field samples and their corresponding analytical tests were recorded on the chain-of-custody forms, which have been provided in Appendix C. The chain-of-custody forms were checked against the Site-Specific FSAP (Baker, 1999b) to determine if all designated samples were collected for the appropriate parameters. Upon receipt of the laboratory results, a comparison of the field information was made to determine if each sample received by the laboratory was analyzed for the correct parameters. Similarly, the validated information was compared to the laboratory information as a final check. In summary, the tracking information was used for the following:

- Identify sample discrepancies between the sample analysis plan and the SI;
- Verify that the laboratory received all samples and performed the correct analysis;
- Verify that the data validator received a complete data set; and
- Ensure that a complete data set was available for each media of concern prior to entering results into the database

4.3 QA/QC Sample Results

As part of the requirements for field quality control under the Naval Facilities Engineering Service Center (NFESC), four types of QA/QC blanks were evaluated for this site: duplicate samples, trip blanks, field blanks, and equipment rinsate blanks. Laboratory QC samples (extra volume collected for matrix spike/matrix spike duplicate [MS/MSD]) were collected in the field. In addition to MS/MSD samples, laboratory QA/QC procedures include analysis of surrogate spikes, lab control standards/blanks, and continuing calibration standards/blanks. Laboratory and field duplicate sample results were compared during validation to determine the relative percent difference (RPD) for assessment of variabilities of the measurement process and sampling techniques. This section presents only field duplicates since laboratory duplicates were evaluated by the validator and were not collected as individual samples during the field program.

Analysis of blank samples provides a measurement of contamination that has been introduced into a sample set during the collection, transportation, preparation, and/or analysis of samples. To remove non-site related contaminants from further consideration, the concentrations of chemicals detected in blanks were compared with concentrations of the same chemicals detected in environmental samples.

Detections of common laboratory contaminants (acetone, 2-butanone, methylene chloride, toluene, and phthalate esters) in environmental samples are considered to be positive results only when observed concentrations exceeded ten times the maximum concentration detected in an associated blank (USEPA, 1989). Blanks containing organic constituents that are not considered common laboratory contaminants (i.e., all other TCL compounds) were considered as positive results only when observed concentrations exceeded five times the maximum concentration detected in an associated blank (USEPA, 1989). Furthermore, inorganic (i.e., TAL) constituents were considered as positive results only when observed concentrations exceeded five times the maximum concentration detected in an associated blank. The data validator determined which detected concentrations were blank-related. The environmental samples that contained compounds at a concentration less than ten or five times (as appropriate) the concentrations reported in the associated blank were qualified as "B," blank contamination by the data validator. These results qualified as "B" were evaluated as not detected.

The following presents the 1999 analytical results of the QA/QC samples collected. These results were used to qualify the environmental samples collected as part of the investigation. Equipment rinsate blank and trip blank results were used to qualify appropriate environmental sample results (i.e., trip blanks and equipment rinsate blanks associated with a particular sample) while field blank results were used to qualify all environmental sample results. These results are presented on Tables 4-1 through 4-5. The SI for Site 4 and AOC 1 was conducted concurrently with investigations for Site 1, Site 7, Site 11, and AOC 2. Only QA/QC samples associated with Site 4 and AOC 1 samples are discussed herein.

There were no major findings with respect to the RPDs; therefore, no further discussion will be provided for the field duplicates.

4.3.1 Trip Blanks

Two trip blanks associated with Site 4 and AOC 1 (104-TB01 and 104-TB03) were collected as part of the 1999 SI and analyzed for VOCs. The following VOCs were detected in the trip blanks: 1,1,2,2-tetrachloroethane, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, chloromethane, and methylene chloride.

Since there were no laboratory trip blanks available, they were made on-site by field team personnel with laboratory grade de-ionized (DI) water. Therefore, the trip blanks were not made in a "sterile" setting, and contamination may have entered the vials. This may explain the presence of 1,1,2,2-tetrachloroethane in the trip blank and not in the environmental samples. 2-Butanone, acetone, and methylene chloride are common laboratory contaminants. A positive detection summary for the trip blanks is presented on Table 4-1.

4.3.2 Field Blanks

Two field blanks were collected as part of the 1999 SI. 104-FB01 was collected from the laboratory grade DI water (used for preparation of rinsate samples), and 104-FB02 was collected from store-bought DI water (used for decontamination). The field blanks were analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide (unfiltered only). There were no pesticides, PCBs, or nitramines/nitroaromatics detected in the field blanks. The following organics were detected in the field blanks: acetone, methylene chloride, and bis(2-ethylhexyl)phthalate. These are all common laboratory contaminants.

Aluminum, barium, calcium, copper, iron, silver, sodium, thallium, and zinc were the inorganic constituents detected in the field blanks. These constituents occur naturally in groundwater and surface water and are commonly present at low concentrations in laboratory supplied water or store-bought water, and therefore, should not be interpreted to be the result of field practices. Positive detection summaries for the field blanks are presented in Tables 4-2 and 4-3.

4.3.3 Equipment Rinsate Blanks

Four equipment rinsate blanks were collected as part of the 1999 SI. The equipment rinsate blanks were analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide (unfiltered). The following summarizes from what sampling equipment each rinsate was collected:

104-RS01 – Hand Spoon
104-RS02 – Sediment Coring Sleeve
104-RS03 – Pie Pan
104-RS04 – Auger Bucket

Pesticides, PCBs, and nitramines/nitroaromatics were not detected in any of the equipment rinsate blanks collected during the 1999 SI. Three organic compounds were detected in the rinsate blanks: acetone, methylene chloride, and bis(2-ethylhexyl)phthalate. Acetone was detected in 104-RS01 and 104-RS04 (6J micrograms per liter [μg/L] and 8J μg/L, respectively). Methylene chloride was detected in all rinsates at 2J μg/L. Bis(2-ethylhexyl)phthalate was detected in 104-RS01 (2J μg/L). These compounds are commonly associated with laboratory practices and the presence of these compounds can most likely be attributed to laboratory contamination and not to sampling procedures.

Unfiltered inorganic constituents were detected in the equipment rinsate blanks and included aluminum, antimony, barium, iron, lead, magnesium, potassium, sodium, and zinc. All of these constituents may occur naturally in groundwater and surface water. Antimony was detected in 104-RS02 at a concentration of 2.3J μg/L. Barium was detected in 104-RS01 at a concentration of 11.3 μg/L. Lead was detected in 104-RS04 at a low concentration (1.5J μg/L). Positive detection summaries for the rinsate blanks are presented in Tables 4-4 and 4-5.

4.4 <u>Site-Specific Analytical Results</u>

The primary objectives of this SI were as follows: (1) to adequately define the nature and extent of possible contamination at Site 4 and AOC 1; (2) to provide the necessary information for conducting a public health and environmental risk screening; (3) to identify existing data gaps, if applicable; and (4) to provide necessary information to screen alternatives to determine the most feasible methods for remediation of potential sources of risk to public health and safety and the environment, if necessary.

This section characterizes, based upon all available data, surface soil, subsurface soil, surface water (AOC 1 only), and sediment with respect to specific constituents of concern. Essential nutrients (calcium, magnesium, potassium, and sodium) have been eliminated from discussion in this section, as they are not detrimental to human health or the environment are typically found at elevated concentrations in tidally influenced coastal plain areas. Positive detections from each analytical fraction are presented in tabular format for both sites (Tables 4-6 through 4-19). Figures 4-1 through 4-22 graphically depict the detected concentrations.

In order to focus on potential constituents of concern, detected compounds/constituents were compared to USEPA Region III RBCs (USEPA, 2000). The RBCs were developed by the USEPA Region III as human health-based criteria. They are used in this section as benchmark concentrations for evaluating SI data. RBCs are not intended as stand-alone decision-making tools, but as a screening tool to be used in conjunction with other information to help in the evaluation of detected compounds/constituents in site/AOC-related media. Residential soil RBCs were used as comparison criteria for detected compounds/constituents in surface soil, subsurface soil, and sediment. Tap water RBCs multiplied by a factor of ten (to account for the difference between an accidental surface water exposure versus a very conservative drinking water ingestion exposure) were used as comparison criteria for detected compounds/constituents in surface water. Surface water was evaluated using these conservative comparison criteria because the samples were collected from the swales that flow around AOC 1 into Jones Pond (which is a source of potable water at CAX). Jones Pond is a spring-fed water body with an area of 69 acres. Water from the plant is checked daily for turbidity and chlorine residual by on-site personnel. Fecal coliform counts are made once a week. The water from Jones Pond is treated and meets public drinking water standards prior to distribution. Background data taken from the WPNSTA background study (Baker, 1995) are also used in the evaluation of site-specific data.

4.4.1 Site 4 – Medical Supplies Disposal Area Analytical Results

This section presents the analytical results of the soil and sediment investigations performed at Site 4. Positive detection summaries for Site 4 are presented on Tables 4-6 through 4-11 and Figures 4-1 through 4-6.

Surface Soil

Seven surface soil samples (including one duplicate sample) were collected during the 1999 SI. The surface soil samples were analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide. One VOC, semivolatile organic compounds (SVOCs), pesticides, PCBs, and inorganics were detected in the surface soil samples collected at Site 4 as presented on Tables 4-6 and 4-7 and Figures 4-1 and 4-2. Nitramines/nitroaromatics were not detected in any surface soil samples.

One VOC, total xylene, was detected in sample 4-HA02-00 at a low concentration of 2J micrograms per kilogram (μg/kg). As shown in Table 4-6, this concentration of total xylene was well below its USEPA Region III Residential Risk-Based Concentration (RBC), the comparison criterion.

SVOCs, primarily carcinogenic and noncarcinogenic polyaromatic hydrocarbons (PAHs), were detected in all surface soil samples except for 4-HA01-00. Benzo(a)pyrene exceeded its corresponding residential RBC in samples 4-HA02-00 (950J μg/kg), 4-HA02-00D (440 μg/kg), 4-HA05-00 (2,300J μg/kg), and 4-HA06-00 (7,000 μg/kg). Benzo(a)anthracene and benzo(b)fluoranthene exceeded their corresponding residential RBCs in samples 4-HA02-00, 4-HA05-00, and 4-HA06-00.

Dibenz(a,h)anthracene exceeded its corresponding residential RBC in sample 4-HA06-00. Indeno(1,2,3-cd)pyrene exceeded its corresponding residential RBC in samples 4-HA05-00 and 4-HA06-00. The carcinogenic PAHs carbazole and chrysene were detected at concentrations less than their respective residential soil RBCs. Phthalate compounds were detected in 4-HA02-00 (bis[2-ethylhexyl]phthalate), 4-HA02-00D (bis[2-ethylhexyl]phthalate), and 4-HA04-00 (bis[2-ethylhexyl]phthalate and di-n-butylphthalate) at concentrations that did not exceed corresponding comparison criteria. The positively detected noncarcinogenic PAHs (acenaphthene, anthracene, benzo(g,h,i)perylene, fluoranthene, fluorene, phenanthrene, and pyrene) were detected at concentrations that did not exceed comparison criteria. A summary of the positively detected compounds compared to residential soil RBCs is presented in Table 4-6 and Figure 4-1.

Sample 4-HA06-00 exhibited the highest concentrations of PAHs. It was collected from an area immediately adjacent to the exposed pile of metal banding and debris (AOC 3 – CAD 11/12 Pond Bank). This pile of debris also contained pieces of charred wood, which is most likely the source of the PAHs. The remaining samples collected from within the medical supplies disposal area also exhibited concentrations of PAHs. The PAHs could result from buried wastes such as charred wood. Phthalate compounds were detected in samples 4-HA02-00 and 4-HA04-00. These samples were collected from areas with heavy medical debris such as I.V. tubing, plastic bags, foil, and injection needles.

Nine pesticides (4,4'-DDE, 4,4'-DDD, 4,4'-DDT, aldrin, gamma-chlordane, endosulfan II, endrin, endrin aldehyde, and endrin ketone) were detected in the surface soil samples collected at Site 4. As shown on Table 4-6, the concentrations of the aforementioned pesticides did not exceed their respective residential soil RBCs. Sample 4-HA05-00 exhibited the highest number of pesticides at the highest concentrations detected in the sample. This sample was collected approximately two feet from a small stream that runs through the medical supplies disposal area. The detected concentrations of pesticides are indicative of routine application rather than bulk disposal of pesticides.

As shown on Table 4-6, Aroclor-1242 was detected once in the surface soil at Site 4. This PCB was detected at a concentration (1,000J μg/kg) that exceeded its residential soil RBC in sample 4-HA05-00. Aroclor-1260 was detected in all surface soil samples collected at Site 4. Aroclor-1260 was detected at a maximum concentration of 2,700K μg/kg that exceeded its residential soil RBC. This PCB was also detected in sample 4-HA04-00 at a concentration that exceeded its residential soil RBC. There are no known sources of PCBs present at Site 4.

As shown on Table 4-7, TAL inorganics were detected in all surface soil samples (beryllium and sodium were the only inorganics not detected). The maximum detected concentrations of most inorganics were found in samples 4-HA04-00, 4-HA05-00, and 4-HA06-00. Arsenic was detected in all surface soil samples at concentrations (2.6L milligrams per kilogram [mg/kg] – 4.1L mg/kg) exceeding the residential soil RBC. The maximum detected concentration of iron in sample 4-HA06-00 (61,700 mg/kg) also exceeded its residential soil RBC.

Several inorganics were detected in the surface soil at elevated concentrations. When compared with surface soil background data collected at WPNSTA, Yorktown, the concentrations of inorganics detected in the Site 4 surface soil samples generally fall in or around the ranges represented by background data. The maximum concentration for arsenic detected in Site 4 surface soil was 4.1 mg/kg. The range of WPNSTA arsenic background concentrations is from 1L mg/kg to 14.8 mg/kg.

The maximum concentration for iron detected in Site 4 surface soil was 61,700 mg/kg. The range of WPNSTA iron background concentrations is from 2070 mg/kg to 46,400 mg/kg. With the exception of the maximum detected concentration (4-HA06-00), all other concentrations of iron were within the range of background. The presence of arsenic and iron is not suspected to be site related. With the exception of iron at location 4-HA06-00, this location is adjacent to the scrap metal banding pile, the likely source of the elevated iron. A summary of the positively detected inorganic constituents compared to residential soil RBCs is presented in Table 4-7 and Figure 4-2.

Subsurface Soil

A total of seven subsurface soil samples (including one duplicate sample) were collected during the 1999 SI. These samples were analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide. VOCs, SVOCs, pesticides, PCBs, and inorganics were detected in the subsurface soil samples at Site 4 as presented on Tables 4-8 and 4-9 and Figures 4-3 and 4-4. Nitramines/nitroaromatics were not detected in the subsurface soil samples.

Four VOCs (2-butanone, ethylbenzene, tetrachloroethene, and toluene) were detected in subsurface soil samples 4-HA01-02, 4-HA01-02D, 4-HA02-02, and 4-HA03-02. As shown on Table 4-8, the detected concentrations of these compounds were well below their respective residential soil RBC, the comparison criterion. Furthermore, 2-butanone and toluene are common laboratory contaminants. It is not likely that these VOCs are related to past site activities.

SVOCs, primarily carcinogenic and noncarcinogenic PAHs, were detected in all subsurface soil samples. Benzo(a)pyrene exceeded its corresponding residential RBC in samples 4-HA02-02 (110J µg/kg), 4-HA05-01 (550J µg/kg), and 4-HA06-02 (600J µg/kg). The carcinogenic PAHs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and chrysene were detected at concentrations less than their respective residential soil RBCs. Bis[2-ethylhexyl]phthalate was detected in sample 4-HA03-02 at a concentration (63,000 µg/kg) that exceeded its residential soil RBC. Bis[2-ethylhexyl]phthalate was also detected in 4-HA01-02, 4-HA01-02D, and 4-HA02-02 at concentrations below the residential soil RBC. Di-n-butylphthalate was detected in sample 4-HA04-01 at a concentration that did not exceed its comparison criteria. The positively detected noncarcinogenic PAHs (benzo(g,h,i)perylene, fluoranthene, phenanthrene, and pyrene) were detected at concentrations that did not exceed comparison criteria. A summary of the positively detected compounds compared to residential soil RBCs is presented in Table 4-8 and Figure 4-3.

Samples 4-HA02-02, 4-HA05-01, and 4-HA06-02 were collected at the same locations as the surface soil samples; similar to the surface soil sample results, the subsurface soil samples showed detected concentrations of SVOCs. However, the concentrations detected in the subsurface soil were an order of magnitude less than those detected in the surface soil. The SVOC reporting limits for samples 4-HA03-02, 4-HA04-01, 4-HA05-01, and 4-HA06-00 were notably high. This is likely the result of the medium from which they were collected. The area from which these samples were collected was moist silty-sand that was filled with debris such as burned wood and shingles. The concentrations and frequency of the phthalate compounds increased compared to surface soil. This is likely due to the increased occurrence of medical supply debris such as I.V. tubing, foil, plastic bags, and injection needles at depth. Also, similar to the surface soil samples, the presence of SVOCs is expected and is more than likely related to the contents of the disposal area.

Ten pesticides (4,4'-DDE, 4,4'-DDD, 4,4'-DDT, aldrin, alpha-chlordane, gamma-chlordane, endosulfan II, endrin ketone, heptachlor, and methoxychlor) were detected in the subsurface soil samples collected at Site 4. As shown on Table 4-8, the concentrations of the aforementioned pesticides did not exceed their respective residential soil RBCs. Similar to the surface soil results, sample 4-HA05-01 exhibited the highest number of pesticides at the highest concentrations detected in the sample. This sample was collected approximately two feet from a small stream that runs through the medical supplies disposal area.

As shown on Table 4-8, Aroclor-1242 was detected once in the subsurface soil at Site 4. This PCB was detected at a concentration (2,300J μg/kg) that exceeded its residential soil RBC in sample 4-HA05-01. Aroclor-1260 was detected in five of the seven subsurface soil samples collected at Site 4. Aroclor-1260 was detected in 4-HA05-01 at a maximum concentration of 1,600K μg/kg that exceeded its residential soil RBC. This PCB was also detected in sample 4-HA04-01 at a concentration (330J μg/kg) that exceeded its residential soil RBC.

Again, similar to the surface soil results, it appears as if the pesticides at low concentrations may be a result of routine application rather than bulk disposal. There are no known sources of PCBs present at the site.

As shown on Table 4-9, TAL inorganics were detected in all subsurface soil samples (beryllium, sodium, and thallium were the only inorganics not detected). The maximum detected concentrations of most inorganics were found in samples 4-HA03-02 and 4-HA06-02. Arsenic was detected in all surface soil samples at concentrations (1.8L mg/kg – 4.2L mg/kg) exceeding the residential soil RBC. The maximum detected concentration of iron in sample 4-HA06-02 (28,000L mg/kg) also exceeded its residential soil RBC.

When compared with subsurface soil background data collected at WPNSTA, Yorktown, the concentrations of inorganics detected in the Site 4 subsurface soil samples generally fall in or around the ranges represented by background data. The maximum concentration for arsenic detected in Site 4 subsurface soil was 4.2 mg/kg. The range of WPNSTA arsenic background concentrations in subsurface soil is from 0.23J mg/kg to 42.7 mg/kg. The maximum concentration for iron detected in Site 4 subsurface soil was 28,000 mg/kg. The range of WPNSTA iron background concentrations in subsurface soil is from 3,810 mg/kg to 51,100J mg/kg.

Sediment

A total of nine sediment samples (including one duplicate sample) were collected during the 1999 SI and analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide. All sediment samples were collected from 0-4 inch and 4-8 inch depth intervals at each location. As indicated on Tables 4-10 and 4-11 and Figures 4-5 and 4-6, VOCs, SVOCs, pesticides, PCBs, and inorganics were detected in the sediment samples collected at Site 4, nitramines/nitroaromatics were not detected in the sediment.

Five VOCs (2-butanone, 4-methyl-2-pentanone, ethylbenzene, toluene, and total xylene) were detected in the sediment samples collected from Site 4. None of the detected VOCs exceeded their respective residential soil RBCs. Four of the five VOCs were detected in the sediment samples collected from the 0-4 inch depth interval. 2-Butanone was detected in sample 4-SED01-00 at a maximum concentration of 12J μg/kg. 2-Butanone is a common laboratory artifact; therefore, its presence is not suspected to be site related. The maximum concentrations of ethylbenzene and total xylene were detected in sample 4-SD04-00. The maximum concentration of toluene was detected in sample 4-SD02-00. Toluene is also a common laboratory artifact, and its presence is not suspected to be site related. These samples were collected from two areas into which the drainage channel flows. This drainage channel flows through the medical supplies disposal area. 4-Methyl-2-pentanone was detected once in sample 4-SD03-00, which is located between 4-SD02-00 and 4-SD04-00. A summary of the positively detected compounds compared to residential soil RBCs is presented in Table 4-10 and Figure 4-5.

SVOCs, which consisted of PAHs and phthalate compounds, were detected in all sediment samples. All detected concentrations of benzo(a)pyrene (110J µg/kg - 340J µg/kg) exceeded the residential soil RBC. The maximum concentrations of all SVOCs with the exception of fluoranthene were detected at sample location 4-SD04. The maximum concentration of fluoranthene was detected at sample location 4-SD02. The PAHs and phthalate compounds and the corresponding concentrations detected in the sediment samples collected from Site 4 are presented in Table 4-10.

Sediment sampling stations 4-SD02 and 4-SD04 are located adjacent to the disposal area near two areas into which drainage channels flow. All sediment sampling stations are located down gradient from the disposal area. The SVOCs detected in the sediment are similar in type and concentration to those detected in the surface and subsurface soil at this site indicating that contaminants from the disposal area may be reaching the sediment or that contaminants from the disposal area may be migrating into the sediment within the upstream pond. Runoff from off-site areas may also contribute to the contaminant load within the upstream pond.

As shown on Table 4-10, pesticides were detected in samples 4-SED01-01, 4-SD02-01, 4-SD03-01, and 4-SD04-00. 4,4-DDE was detected at a maximum concentration of 9L µg/kg in sample 4-SD04-00, and 4,4'-DDT was detected at a maximum concentration of 400 µg/kg in sample 4-SD03-01.

As shown on Table 4-10, two PCBs, Aroclor-1248 and Aroclor-1260 were detected in the sediment samples collected at Site 4. Aroclor-1248 was detected in two of nine samples with the maximum concentration (19L µg/kg) detected in sample 4-SD04-00. Aroclor-1260 was detected in seven of nine samples with the maximum concentration (270K µg/kg) detected in sample 4-SED01-01.

None of the detected pesticides or PCBs exceeded their corresponding residential soil RBCs. There are no known sources of pesticides or PCBs present at the site. It appears as if the pesticides at low concentrations may be a result of routine application rather then bulk disposal.

As shown on Table 4-11, TAL inorganics were detected in each of the sediment samples collected at Site 4. Cyanide, selenium, silver, and thallium were not detected in any of the sediment samples. The maximum detected concentrations of aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, iron, lead, mercury, nickel, and vanadium were detected in sampling station 4-SED-01. Arsenic exceeded its residential soil RBC value in all samples (0.98J mg/kg – 12.2L mg/kg). The range of WPNSTA arsenic background concentrations in sediment is from 0.27L mg/kg to 5.4L mg/kg. The maximum detected concentrations of beryllium and copper were found in sampling station 4-SD03, and the maximum detected concentration of manganese was found in sampling station 4-SD02. In general, the inorganic constituents were detected fairly uniformly throughout the sediment at this site with no discernable pattern and do not appear to be a result of site contamination. A summary of the positively detected inorganic constituents compared to residential soil RBCs is presented in Table 4-11 and Figure 4-6.

4.4.2 Area of Concern 1 – Scrap Metal Dump Analytical Results

This section presents the analytical results of the soil, surface water, and sediment investigations performed at AOC 1 – North Area and South Area. Positive detection summaries for AOC 1 are presented on Tables 4-12 through 4-19 and Figures 4-7 through 4-22. The discussions of the analytical results will be presented for the North and South areas as these are two distinct areas.

4.4.2.1 <u>AOC 1 – North Area</u>

Surface Soil

A total of three surface soil samples were collected in the North Area of AOC 1 during the 1999 SI. The surface soil samples were analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide. SVOCs, pesticides, and inorganics were detected in the surface soil samples collected in the North Area of AOC 1 as presented on Tables 4-12 and 4-13 and Figures 4-7 and 4-8. VOCs, PCBs, and nitramines/nitroaromatics were not detected in any surface soil samples collected in this area of AOC 1.

SVOCs, carcinogenic and noncarcinogenic PAHs and phthalate compounds, were detected in the three North Area surface soil samples. PAHs were detected in samples A1-HA01-00 and A1-HA02-00. Phthalate compounds only were detected in sample A1-HA03-00. Benzo(a)pyrene exceeded its residential soil RBC in samples A1-HA01-00 (870 µg/kg) and A1-HA02-00 (92J µg/kg). Benzo(b)fluoranthene and dibenz(a,h)anthracene exceeded their corresponding residential soil RBCs in sample A1-HA01-00 (1,700 µg/kg and 350 µg/kg, respectively). The carcinogenic PAHs benzo(a)anthracene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene were detected at concentrations less than their respective residential soil RBCs. Phthalate compounds were detected in A1-HA02-00 (di-n-butylphthalate) and A1-HA03-00 (bis[2-ethylhexyl]phthalate and di-n-butylphthalate) at concentrations that did not exceed corresponding comparison criteria. The positively detected noncarcinogenic PAHs (benzo(g,h,i)perylene, fluoranthene, phenanthrene, and pyrene) were detected at concentrations that did not exceed corresponding residential soil RBCs. A summary of the positively detected compounds compared to residential soil RBCs is presented in Table 4-12 and Figure 4-7.

The entire North Area is covered with metallic debris, concrete slabs, bricks, cinder blocks, and wood. Sample A1-HA01-00 exhibited the highest concentrations of PAHs. It was collected from an area adjacent to a drainage swale, approximately ten feet from a large pile of metallic debris. This location also exhibited trace amounts of slag. PAHs are a product of the combustion and incomplete combustion of carbonaceous materials (often resulting in ash). Therefore, the presence of PAHs in samples collected from areas containing slag and charred wood is expected. The PAHs may also be a result of runoff from the adjacent roadway or railroad tracks.

Four pesticides (4,4'-DDE, 4,4'-DDT, alpha-chlordane, and endosulfan sulfate) were detected one surface soil sample, A1-HA01-00, collected at AOC 1 – North Area. None of the aforementioned pesticides were detected at concentrations that exceeded their respective residential soil RBCs. Pesticides were not detected in any other surface soil samples collected at AOC 1– North Area. The presence of these pesticides is likely the result of routine applications.

As shown on Table 4-13, TAL inorganics were detected in all surface soil samples (antimony, beryllium, selenium, silver, and thallium were not detected). The maximum detected concentrations of most inorganics were found in sample A1-HA01-00. Arsenic was detected two surface soil samples at concentrations (7.6 mg/kg in sample A1-HA03-00 and 23.5 mg/kg in sample A1-HA01-00) exceeding the residential soil RBC. The maximum detected concentration of iron in sample A1-HA02-00 (35,200 mg/kg) also exceeded its residential soil RBC.

When compared with surface soil background data collected at WPNSTA Yorktown, the concentrations of inorganics detected in the AOC 1 surface soil samples generally fall in or around the ranges represented by background data. As previously mentioned, the maximum concentration for arsenic detected in AOC 1 – North Area surface soil was 23.5 mg/kg. The range of WPNSTA arsenic background concentrations is from 1L mg/kg to 14.8 mg/kg. The maximum concentration for iron detected in AOC 1 – North Area surface soil was 35,200 mg/kg. The range of WPNSTA iron background concentrations is from 2,070 mg/kg to 46,400 mg/kg. In general, the inorganic constituents were detected fairly uniformly throughout the surface soil in this portion of the AOC with no discernable pattern and do not appear to be a result of site contamination. A summary of the positively detected inorganic constituents compared to residential soil RBCs is presented in Table 4-13 and Figure 4-8.

Subsurface Soil

A total of two subsurface soil samples were collected during the 1999 SI. These samples were analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide. SVOCs and inorganics were detected in the subsurface soil samples at the North Area of AOC 1 as presented on Tables 4-14 and 4-15 and Figures 4-9 and 4-10. VOCs, pesticides, PCBs, and nitramines/nitroaromatics were not detected in the subsurface soil samples. It should be noted that a subsurface soil sample was not collected at location A1-HA01 due to the presence of concrete debris.

As shown on Table 4-14, bis(2-ethylhexyl)phthalate and di-n-butylphthalate were the only SVOCs detected in the subsurface soil samples collected from AOC 1 – North Area. The maximum concentration of bis(2-ethylhexyl)phthalate (76J μg/kg) was detected in sample A1-HA02-02, and the maximum concentration of di-n-butylphthalate (52J μg/kg)was detected in A1-HA03-02. These SVOCs were detected at concentrations that did not exceed their respective residential soil RBCs. No other organic compounds were detected in the subsurface soil samples collected at AOC 1 – North Area. These phthalate compounds are common laboratory contaminants and do not appear to be related to site contamination.

As shown in Table 4-15, TAL inorganics were detected in all subsurface soil samples (antimony, beryllium, cadmium, copper, mercury, selenium, silver, thallium, and zinc were not detected). Arsenic was detected in both A1-HA02-00 and A1-HA03-00 at concentrations (1.3J mg/kg – 5.2 mg/kg) that exceeded the residential soil RBC. The range of WPNSTA arsenic background concentrations in subsurface soil is from 0.23J mg/kg to 42.7 mg/kg. All other detected concentrations of inorganics were less than corresponding residential soil RBCs. In general, the inorganic constituents were detected fairly uniformly throughout the subsurface soil at this AOC with no discernable pattern and do not appear to be a result of site contamination.

Surface Water

A total of two surface water samples were collected during the 1999 SI and analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide (unfiltered). As indicated on Tables 4-16 through 4-17 and Figure 4-11 and 4-12, SVOCs and inorganics were detected in the surface water samples collected at AOC 1 – North Area. VOCs, pesticides, PCBs, and nitramines/nitroaromatics were not detected in the AOC 1 – North Area surface water samples.

Bis(2-ethylhexyl)phthalate was detected in one surface water sample (A1-SW02) at a concentration of 98 μg/L, which exceeded its comparison criterion (tap water RBC multiplied by ten). Di-n-octylphthalate was detected in one surface water sample (A1-SW01) at a concentration of 3J μg/L, which was less than the tap water RBC multiplied by ten.

TAL inorganics (unfiltered) were detected in each of the surface water samples collected at AOC 1 – North Area. Only iron and manganese were detected in the surface water samples collected from A1-SW01 and A1-SW02 at concentrations less than their respective tap water RBCs times ten. Iron was detected at a maximum concentration of 520 μg/L in sample A1-SW02. Manganese was detected at a maximum concentration of 108 μg/L in sample A1-SW01. In general, the inorganic constituents were detected infrequently in the surface water samples at this North Area of AOC 1 with no discernable pattern and do not appear to be a result of site contamination.

Sediment

A total of four sediment samples were collected from the North Area of AOC 1 during the 1999 SI and analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide. All sediment samples were collected from 0-4 inch and 4-8 inch depth intervals at each location. As indicated on Tables 4-18 and 4-19 and Figures 4-13 and 4-14, VOCs, SVOCs, and inorganics were detected in the sediment samples collected at AOC 1 – North Area. Pesticides, PCBs, and nitramines/nitroaromatics were not detected in the sediment samples.

As shown on Table 4-18, three VOCs (2-butanone, ethylbenzene, and total xylene) were detected in the sediment samples collected from AOC 1 – North Area. None of the detected VOCs exceeded corresponding residential soil RBCs. 2-Butanone was detected in all samples at concentrations of 3J μg/kg to 5J μg/kg. 2-Butanone is a common laboratory artifact; therefore, its presence is not suspected to be site related. Ethylbenzene was detected at a concentration of 2J μg/kg in samples collected from both depth intervals at location A1-SD01. Total xylene was detected in sample A1-SD01-00 at a maximum concentration of 6J μg/kg. The presence of ethylbenzene and xylene could possibly be due to wastes disposed at the site or from run off from the adjacent roadway or railroad tracks.

SVOCs, primarily phthalate compounds, were detected in all sediment samples collected from AOC 1 – North Area. Di-n-butylphthalate was detected in all samples at concentrations ranging from 81J μg/kg to 120 μg/kg. Bis(2-ethylhexyl)phthalate was detected in the samples collected from the 4-8 inch depth interval at concentrations of 48J μg/kg and 46J μg/kg. None of the detected SVOCs exceeded the comparison criteria (residential soil RBCs). The phthalate compounds and the corresponding concentrations detected in the sediment samples collected from AOC 1 – North Area are presented in Table 4-18.

As shown on Table 4-19, TAL inorganics were detected in each of the sediment samples collected at AOC 1 – North Area. Antimony, barium, cadmium, cyanide, copper, mercury, nickel, selenium, silver, thallium, and zinc were not detected in any of the sediment samples. The maximum detected concentrations of aluminum, arsenic, beryllium, chromium, cobalt, iron, lead, manganese, and vanadium were detected in sampling station A1-SD02-00. Only arsenic exceeded it residential soil RBC value at a maximum concentration of 1.6J mg/kg. The range of WPNSTA arsenic background concentrations in sediment is from 0.27L mg/kg to 5.4 mg/kg. In general, the inorganic constituents were detected fairly uniformly throughout the sediment samples collected at the North Area of AOC 1 with no discernable pattern and do not appear to be a result of site contamination.

4.4.2.2 AOC 1 – South Area

Surface Soil

A total of four surface soil samples (including one duplicate sample) were collected in the South Area of AOC 1 during the 1999 SI. The surface soil samples were analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide. VOCs, SVOCs, pesticides, PCBs, and inorganics were detected in the surface soil samples collected in the South Area of AOC 1 as presented on Tables 4-12 and 4-13 and Figures 4-15 and 4-16. Nitramines/nitroaromatics were not detected in any surface soil samples collected in this area of AOC 1.

As shown in Table 4-12, a total of six VOCs were detected in surface soil samples A1-HA05-00D and A1-HA06-00. 2-Butanone was detected once at a concentration of 5 μg/kg in sample A1-HA06-00. 2-Butanone is a known common laboratory contaminant. 1,1-Dichloroethene, benzene, chlorobenzene, toluene, and trichloroethene were detected at low concentrations in sample A1-HA05-00D. None of these VOCs were detected in the environmental sample.

SVOCs, carcinogenic and noncarcinogenic PAHs and phthalate compounds, were detected in the four South Area surface soil samples. PAHs were detected in samples A1-HA05-00 and A1-HA05-00D. The carcinogenic PAHs benzo(b)fluoranthene and chrysene were detected in samples A1-HA05-00 and A1-HA05-00D at concentrations less than their respective residential soil RBCs. The positively detected noncarcinogenic PAHs (fluoranthene and pyrene) were detected at concentrations that did not exceed their respective residential soil RBCs. Phthalate compounds (bis[2-ethylhexyl]phthalate and di-n-butylphthalate) were detected in all samples at concentrations that did not exceed corresponding residential soil RBCs. A summary of the positively detected compounds compared to residential soil RBCs is presented in Table 4-12 and Figure 4-15.

The entire South Area was covered with metallic debris, concrete slabs, bricks, cinder blocks, and wood. Sample A1-HA05-00 exhibited the most detections of SVOCs. It was collected from a location adjacent to a debris field that contained concrete and metallic debris. The presence of SVOCs in samples collected from areas containing various types of debris is not unexpected.

Two pesticides (4,4'-DDE and 4,4'-DDT) were detected in one surface soil sample, A1-HA04-00, collected at AOC 1 – South Area. These pesticides were detected at concentrations that did not exceed their respective residential soil RBCs. Pesticides were not detected in any other surface soil samples collected at AOC 1– South Area. The presence of these pesticides is likely the result of routine applications.

One PCB, Aroclor-1260, was detected once in sample A1-HA04-00 at a concentration of 220L μg/kg, which did not exceed its residential soil RBC. There were no other detections of PCBs at AOC 1.

As shown on Table 4-13, TAL inorganics were detected in all surface soil samples collected in the South Area of AOC 1 (beryllium, selenium, silver, and thallium were not detected). The maximum detected concentrations of most inorganics were found in sample A1-HA05-00 and A1-HA05-00D. Arsenic was detected all surface soil samples at concentrations ranging from 1.4 mg/kg to 2.4 mg/kg that exceeded the residential soil RBC. The concentrations of iron in samples A1-HA05-00 and A1-HA05-00D (34,900L mg/kg and 29,900L mg/kg, respectively) exceeded the residential soil RBC. Also, the concentrations of lead in samples A1-HA05-00 and A1-HA05-00D (493 mg/kg and 501 mg/kg, respectively) exceeded the Action Level of 400 mg/kg in soil.

When compared with surface soil background data collected at WPNSTA, Yorktown, the concentrations of inorganics detected in the AOC 1 surface soil samples generally fall in or around the ranges represented by background data. As previously mentioned, the maximum concentration for arsenic detected in AOC 1 – South Area surface soil was 2.4 mg/kg. The range of WPNSTA arsenic background concentrations is from 0.46L mg/kg to 63.9 mg/kg. The maximum concentration for iron detected in AOC 1 – South Area surface soil was 29,900 mg/kg. The range of WPNSTA iron background concentrations is from 1,440 mg/kg to 46,400 mg/kg. Lead was detected at concentrations similar to those presented in the Penniman Report. In general, the inorganic constituents were detected fairly uniformly throughout the surface soil at this AOC with no discernable pattern and, with the exception of lead, do not appear to be a result of site contamination. A summary of the positively detected inorganic constituents compared to residential soil RBCs is presented in Table 4-13 and Figure 4-16. The soil from which A1-HA05-00 was collected contained rusty wire and rock fragments. It appears that the lead contamination may be due to metallic debris or possibly slag.

Subsurface Soil

A total of four subsurface soil samples (including one duplicate sample) were collected during the 1999 SI. These samples were analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide. VOCs, SVOCs and inorganics were detected in the subsurface soil samples at the South Area of AOC 1 as presented on Tables 4-14 and 4-15 and Figures 4-17 and 4-18. Pesticides, PCBs, and nitramines/nitroaromatics were not detected in the subsurface soil samples.

One VOC, total xylene, was detected in samples A1-HA05-01 and A1-HA05-01D at concentrations of 2 μg/kg and 3 μg/kg, which did not exceed the residential soil RBC. There were no other detections of VOCs at AOC 1.

As shown on Table 4-14, SVOCs, primarily PAHs and phthalate compounds, were detected in the subsurface soil samples collected from AOC 1 – South Area. Carcinogenic and noncarcinogenic PAHs were detected in samples A1-HA05-01 and A1-HA05-01D at concentrations that did not exceed corresponding residential soil RBCs. Di-n-butylphthalate was detected in all subsurface soil samples collected from AOC 1 – South Area with a maximum concentration of 110J μg/kg detected in samples A1-HA05-01 and A1-HA05-01D. Bis(2-ethylhexyl)phthalate (46J μg/kg) was detected once in sample A1-HA04-02. These SVOCs were detected at concentrations that did not exceed their respective residential soil RBCs. A summary of the positively detected compounds compared to residential soil RBCs is presented in Table 4-14 and Figure 4-17.

The entire South Area was covered with metallic debris, concrete slabs, bricks, cinder blocks, and wood. Similar to the surface soil sample results, sample A1-HA05-01 exhibited the most detections of SVOCs. The detected concentrations of PAHs are slightly higher in the subsurface soil. It was collected from a location adjacent to a debris field that contained concrete and metallic debris. The presence of SVOCs in samples collected from areas containing various types of debris is not unexpected.

As shown in Table 4-15, TAL inorganics were detected in all subsurface soil samples (selenium and thallium were not detected). Arsenic was detected in all samples at concentrations (1.9J mg/kg – 33.3 mg/kg) that exceeded the residential soil RBC. The range of WPNSTA arsenic background concentrations in subsurface soil is from 0.23J mg/kg to 42.7 mg/kg. The maximum concentration for iron detected in AOC 1 – South Area subsurface soil was 39,700 mg/kg. The range of WPNSTA iron background concentrations in subsurface soil is from 1,440 mg/kg to 46,400 mg/kg. Lead was detected at concentrations of 483 mg/kg in sample A1-HA05-01. Due to the lack of other types of contaminants, it is suspected that the presence of lead is attributable to metallic debris or slag rather than other sources such as paint or fuel. In general, the inorganic constituents were detected fairly uniformly throughout the surface soil at this AOC with no discernable pattern and, with the exception of lead, do not appear to be a result of site contamination. A summary of the positively detected inorganic constituents compared to residential soil RBCs is presented in Table 4-15 and Figure 4-18.

Surface Water

A total of two surface water samples (including one duplicate sample) were collected during the 1999 SI and analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics (unfiltered). As indicated on Tables 4-16 through 4-17 and Figures 4-19 and 4-20, SVOCs and inorganics were detected in the surface water samples collected at AOC 1 – South Area. VOCs, pesticides, PCBs, and nitramines/nitroaromatics were not detected in the AOC 1 – South Area surface water samples.

As shown on Table 4-16 and Figure 4-19, bis(2-ethylhexyl)phthalate was detected in both surface water samples (A1-SW03 and A1-SW03D) at concentrations of 37J µg/L and 2J µg/L, respectively, which did not exceed the comparison criterion (tap water RBC multiplied by ten). This compound is a common laboratory contaminant and not likely related to site contamination.

As shown on Table 4-17 and Figure 4-20, TAL inorganics (unfiltered) were detected in both of the surface water samples collected at AOC 1 – South Area. Arsenic, barium, iron and manganese were detected in the surface water samples collected from A1-SW03 and A1-SW03D. Arsenic was detected in both samples at concentrations (17.1 µg/L and 19 µg/L, respectively) that exceeded the tap water RBC multiplied by ten. Arsenic was not detected in WPNSTA freshwater stream background samples. Barium was detected at a maximum concentration of 92J µg/L in sample A1-SW03D. Iron was detected at a maximum concentration of 25,900 µg/L in sample A1-SW03. Manganese was detected at a maximum concentration of 656 µg/L in sample A1-SW03D. In general, the inorganic constituents were detected infrequently in the surface water samples at this South Area of AOC 1 with no discernable pattern and do not appear to be a result of site contamination.

Sediment

A total of five sediment samples (including one duplicate sample) were collected from the South Area of AOC 1 during the 1999 SI and analyzed for TCL organics, nitramines/nitroaromatics, and TAL inorganics and cyanide. All sediment samples were collected from 0-4 inch and 4-8 inch depth intervals at each location. As indicated on Tables 4-18 and 4-19 and Figures 4-21 and 4-22, VOCs, SVOCs, one PCB, and inorganics were detected in the sediment samples collected at AOC 1 – South Area. Pesticides and nitramines/nitroaromatics were not detected in the sediment samples.

As shown on Table 4-18, three VOCs (acetone, ethylbenzene, and total xylene) were detected in the sediment samples collected from AOC 1 – South Area. None of the detected VOCs exceeded their respective residential soil RBCs. Acetone was detected in sample A1-SD03-01 at a concentration of 220 μg/kg. Acetone is a common laboratory artifact; therefore, its presence is not suspected to be site related. Ethylbenzene was detected at a concentration of 2J μg/kg in sample A1-SD04-01. Total xylene was detected in sample A1-SD04-01 at a concentration of 4J μg/kg.

SVOCs (PAHs and phthalate compounds) were detected in all sediment samples collected from AOC 1 – South Area. Di-n-butylphthalate was detected in all samples at concentrations ranging from 64J μg/kg to 110 μg/kg. Bis(2-ethylhexyl)phthalate was detected in three of the five samples at a maximum concentration of 63J μg/kg (sample A1-SD03-00). Chrysene was detected in sample A1-SD03-01 at a concentration of 63J μg/kg. Fluoranthene was detected in sample A1-SD04-00 at a concentration of 47J μg/kg. None of the detected SVOCs exceeded corresponding residential soil RBCs. Sample Station A1-SD04 is located upstream of the disposal area. Contaminants detected at this location (fluorahthene, ethylbenzene, xylene, and Aroclor-1260) are due to either runoff from the adjacent roadway or railroad tracks, or from water treatment plant discharge. The PAHs and phthalate compounds and the corresponding concentrations detected in the sediment samples collected from AOC 1 – South Area are presented in Table 4-18 and Figure 4-21.

As shown on Table 4-19 and Figure 4-22, TAL inorganics were detected in each of the sediment samples collected at AOC 1 – South Area. Antimony, cadmium, cyanide, silver, thallium, and zinc were not detected in any of the sediment samples. Only arsenic exceeded it residential soil RBC value. It was detected in all samples at concentrations ranging from 1.8J mg/kg to 10.5 mg/kg. The range of WPNSTA arsenic background mg/kg concentrations in sediment is from 0.27L mg/kg to 5.4L mg/kg. All other inorganics were detected at concentrations that did not exceed corresponding residential RBC value. In general, the inorganic constituents were detected fairly uniformly throughout the sediment samples collected at the South Area of AOC 1 with no discernable pattern and do not appear to be a result of site contamination.

SECTION 4.0
TABLES

TABLE 4-1
SUMMARY OF VOLATILE ORGANIC COMPOUNDS DETECTED - TRIP BLANKS
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-TB01 11/12/99	104-TB03 11/14/1999
Volatiles (ug/L)		
1,1,2,2-Tetrachloroethane	10.00 U	1.00 J
2-Butanone	2.00 J	10.00 U
2-Hexanone	10.00 U	1.00 J
4-Methyl-2-Pentanone	10.00 U	1.00 J
Acetone	2.00 J	7.00 J
Chloromethane	10.00 U	3.00 J
Methylene Chloride	3.00 J	12.00 B

TABLE 4-2
SUMMARY OF ORGANIC COMPOUNDS DETECTED - FIELD BLANKS
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-FB01 11/10/1999	104-FB02 11/10/1999
Volatiles (ug/L)		
Acetone	5 J	6 J
Methylene Chloride	2 J	2 J
Bis(2-Ethylhexyl)Phthalate	2 J	10 U

TABLE 4-3
SUMMARY OF UNFILTERED INORGANIC CONSTITUENTS DETECTED - FIELD BLANKS
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-FB01 11/10/1999	104-FB02 11/10/1999
Metal (ug/L)		
Aluminum	84.7 J	428
Antimony	2.2 U	2.2 U
Arsenic	3.4 U	3.4 U
Barium	4.1 U	6.9 J
Calcium	85.4 U	87.7 J
Copper	5.4 U	7.3 J
Iron	65.4 J	151
Silver	5.8 J	8.5 J
Sodium	236 J	194 J
Thallium	2.4 U	2.8 J
Zinc	40.7	64.3

TABLE 4-4
SUMMARY OF ORGANIC COMPOUNDS DETECTED - EQUIPMENT RINSATE BLANKS
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-RS01	104-RS02	104-RS03	104-RS04
	11/13/1999	11/13/1999	11/13/1999	11/13/1999
Volatiles (ug/L)				
Acetone	6 J	10 U	10 U	8 J
Methylene Chloride	2 J	2 J	2 J	2 J
Bis(2-Ethylhexyl)Phthalate	2 J	10 U	10 U	10 U

TABLE 4-5
SUMMARY OF UNFILTERED INORGANIC CONSTITUENTS DETECTED - EQUIPMENT RINDSATE BLANKS
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-RS01 11/13/1999	104-RS02 11/13/1999	104-RS03 11/13/1999	104-RS04 11/13/1999
Metal (ug/L)				
Aluminum	49.1 J	44 U	44 U	44 U
Antimony	2.2 U	2.3 J	2.2 U	2.2 U
Barium	11.3 J	4.1 U	4.1 U	4.1 U
Iron	37.5 J	58.3 J	27.4 J	57.6 J
Lead	1.4 U	1.4 U	1.4 U	1.5 J
Magnesium	143 J	117 U	117 U	182 J
Potassium	247 J	209 U	250 J	269 J
Sodium	86.5 J	42.3 U	42.3 U	42.3 U
Zinc	9.8 J	11.3 J	9.8 J	9.8 J

TABLE 4-6
SUMMARY OF ORGANIC COMPOUNDS DETECTED - SURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	4-HA01-00 11/12/1999	4-HA02-00 11/12/1999	4-HA02-00D 11/12/1999	4-HA03-00 11/12/1999	4-HA04-00 11/12/1999	4-HA05-00 11/12/1999	4-HA06-00 11/12/1999
Volatiles (ug/kg)								
Xylene (Total)	156,428,571	11.24 U	2 J	11.87 U	11.58 U	14.79 UL	14.79 UR	12.07 UL
Semivolatiles (ug/kg)								
Acenaphthene	4,692,857	380 U	330 J	2100 U	400 U	2600 U	5500 U	3900 U
Anthracene	23,464,286	380 U	530 J	2100 U	400 U	2600 U	5500 U	1700 J
Benzo(a)Anthracene	875	380 U	1100 J	290 J	400 U	2600 U	1100 J	8800
Benzo(a)Pyrene	87	380 U	950 J	440 J	400 U	2600 U	2300 J	7000
Benzo(b)Fluoranthene	875	380 U	1100 J	320 J	76 J	330 J	1700 J	6800
Benzo(g,h,i)Perylene	2,346,429 (1)	380 U	650 J	340 J	61 J	2600 U	1200 J	3400 J
Benzo(k)Fluoanthene	8,750	380 U	770 J	470 J	53 J	320 J	1700 J	6800
Bis(2-Ethylhexyl)Phthalate	45,623	49 B	16000	3000	100 B	11000	5500 U	3900 U
Carbazole	31,936	380 U	250 J	2100 U	400 U	2600 U	5500 U	3900 U
Chrysene	87,497	380 U	1300 J	520 J	75 J	410 J	2200 J	8600
Dibenz(a,h)Anthracene	87	380 U	2100 U	2100 U	400 U	2600 U	5500 U	1400 J
Di-n-Butylphthalate	7,821,429	380 U	2100 U	2100 U	41 B	9900	5500 U	3900 U
Fluoranthene	3,128,571	380 U	2700	660 J	49 J	510 J	1800 J	14000
Fluorene	3,128,571	380 U	250 J	2100 U	400 U	2600 U	5500 U	3900 U
Indeno(1,2,3-cd)Pyrene	875	380 U	600 J	250 J	48 J	2600 U	1300 J	3400 J
Phenanthrene	2,346,429 (1)	380 U	2400	560 J	400 U	2600 U	1400 J	5500
Pyrene	2,346,429	380 U	2300	800 J	46 J	440 J	3000 J	11000
Pesticides/PCBs (ug/kg)								
4,4'-DDD	2,661	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U	7.6 K
4,4'-DDE	1,879	3.8 U	9.6 J	4.2 U	4 U	43 J	27 U	3.9 U
4,4'-DDT	1,879	3.8 U	7 J	4.6 J	4 U	9.4	220 K	18 K
Aldrin	38	2 U	2.1 U	2.2 U	2.1 U	2.7 U	33 K	2 U
Aroclor-1242	319	38 U	42 U	42 U	40 U	52 U	1000 K	39 U
Aroclor-1260	319	53	64 J	75 J	53 J	600 J	2700 K	91 K
gamma-Chlordane	1,825 (2)	2 U	2.1 U	2.2 U	2.1 U	2.7 U	15 K	2 U
Endosulfan II	469,286 (3)	4.4 J	4.2 U	4.2 U	5.7 J	5.2 U	27 U	3.9 U
Endrin	23,464	6.3 J	4.2 U	4.2 U	4 U	5.2 U	28 K	3.9 U
Endrin Aldehyde	23,464 (4)	3.8 U	4.2 U	4.2 U	4 U	5.2 U	77 K	3.9 U
Endrin Ketone	23,464 (4)	3.8 U	4.2 U	4.5	4 U	5.2 U	87 K	3.9 U

Notes:

(1) Screening value for pyrene used as a surrogate.
(2) Screening value for chlordane used as a surrogate.
(3) Screening value for endosulfan used as a surrogate.
(4) Screening value for endrin used as a surrogate.

TABLE 4-7
SUMMARY OF INORGANIC CONSTITUENTS DETECTED - SURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	4-HA01-00 11/12/1999	4-HA02-00 11/12/1999	4-HA02-00D 11/12/1999	4-HA03-00 11/12/1999	4-HA04-00 11/12/1999	4-HA05-00 11/12/1999	4-HA06-00 11/12/1999
Inorganics (mg/kg)								
Aluminum	78,214	4560 L	5810 L	7160 L	6760 L	9560 L	6260 L	6320 L
Antimony	31	0.49 U	0.46 U	0.55 U	0.47 U	0.67 J	12.6	0.44 UJ
Arsenic	0.43	2.9 L	2.7 L	2.6 L	3 L	4.1 L	3.5 L	2.7 L
Barium	5,475	20.3 J	36.6 J	27.1 J	25.5 J	164	68	101 J
Cadmium	39	0.08 U	0.07 U	0.08 U	0.07 U	0.74 J	3.3	0.34 U
Calcium	N/A	3750	1440	1110 J	8420	7320	6670	2940
Chromium	235 (1)	9.4	8.7	9.6	11.8	16.9	19	56.6
Cobalt	4,693	1.4 U	2.8 J	3.7 J	1.7 J	4.1 J	4.6 J	8.8 J
Copper	3,129	4.5 B	10.5	12	3.8 B	26	150	77.8 J
Cyanide	1,564	0.02 UL	0.12 L	0.13 L	0.02 UL	0.03 UL	0.11 L	0.07 L
Iron	N/A	8900 L	9840 L	8570 L	8910 L	14600 L	14300 L	61700 L
Lead	400 (2)	12.8	22.7	24	11.6	39.5	129	105 J
Magnesium	N/A	619 J	514 J	669 J	800 J	1110 J	2010	2140
Manganese	1,564	48.7	233	127	43.2	151	175	302 J
Mercury	7,821 (3)	0.04 J	0.31	0.36	0.09 J	0.76	0.88	0.06 J
Nickel	1,564	2.2 B	3.8 B	4.1 B	4 B	10.1 J	12.1	39.6
Potassium	N/A	789 J	283 B	366 J	928 J	798 J	1420	961 J
Selenium	391	0.67 U	0.63 U	0.75 U	0.64 U	1 J	0.81 U	0.6 U
Silver	391	2.8 B	2.6 B	3 B	2.4 B	5.2 B	5.2 B	20.6 L
Thallium	5	0.54 UL	0.5 UL	0.6 UL	0.51 UL	0.72 UL	0.65 UL	1.1 L
Vanadium	548	13.9	13.9	15.1	16.6	22.2	23.5	35.7 J
Zinc	23,464	28.6 B	106	102	32.5 B	273	324	122 J

Notes:

(1) Screening value for chromium VI used

(2) Action level for lead

(3) Screening value for methylmercury used

TABLE 4-7
SUMMARY OF INORGANIC CONSTITUENTS DETECTED - SURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	4-HA01-00 11/12/1999	4-HA02-00 11/12/1999	4-HA02-00D 11/12/1999	4-HA03-00 11/12/1999	4-HA04-00 11/12/1999	4-HA05-00 11/12/1999	4-HA06-00 11/12/1999
Inorganics (mg/kg)								
Aluminum	78,214	4560 L	5810 L	7160 L	6760 L	9560 L	6260 L	6320 L
Antimony	31	0.49 U	0.46 U	0.55 U	0.47 U	0.67 J	12.6	0.44 UJ
Arsenic	0.43	2.9 L	2.7 L	2.6 L	3 L	4.1 L	3.5 L	2.7 L
Barium	5,475	20.3 J	36.6 J	27.1 J	25.5 J	164	68	101 J
Cadmium	39	0.08 U	0.07 U	0.08 U	0.07 U	0.74 J	3.3	0.34 U
Calcium	N/A	3750	1440	1110 J	8420	7320	6670	2940
Chromium	235 (1)	9.4	8.7	9.6	11.8	16.9	19	56.6
Cobalt	4,693	1.4 U	2.8 J	3.7 J	1.7 J	4.1 J	4.6 J	8.8 J
Copper	3,129	4.5 B	10.5	12	3.8 B	26	150	77.8 J
Cyanide	1,564	0.02 UL	0.12 L	0.13 L	0.02 UL	0.03 UL	0.11 L	0.07 L
Iron	23,464	8900 L	9840 L	8570 L	8910 L	14600 L	14300 L	61700 L
Lead	400 (2)	12.8	22.7	24	11.6	39.5	129	105 J
Magnesium	N/A	619 J	514 J	669 J	800 J	1110 J	2010	2140
Manganese	1,564	48.7	233	127	43.2	151	175	302 J
Mercury	7.82 (3)	0.04 J	0.31	0.36	0.09 J	0.76	0.88	0.06 J
Nickel	1,564	2.2 B	3.8 B	4.1 B	4 B	10.1 J	12.1	39.6
Potassium	N/A	789 J	283 B	366 J	928 J	798 J	1420	961 J
Selenium	391	0.67 U	0.63 U	0.75 U	0.64 U	1 J	0.81 U	0.6 U
Silver	391	2.8 B	2.6 B	3 B	2.4 B	5.2 B	5.2 B	20.6 L
Thallium	5	0.54 UL	0.5 UL	0.6 UL	0.51 UL	0.72 UL	0.65 UL	1.1 L
Vanadium	548	13.9	13.9	15.1	16.6	22.2	23.5	35.7 J
Zinc	23,464	28.6 B	106	102	32.5 B	273	324	122 J

Notes:

(1) Screening value for chromium VI used

(2) Action level for lead

(3) Screening value for methylmercury used

TABLE 4-9
SUMMARY OF INORGANIC CONSTITUENTS DETECTED - SUBSURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	4-HA01-02 11/12/1999	4-HA01-02D 11/12/1999	4-HA02-02 11/12/1999	4-HA03-02 11/12/1999	4-HA04-01 11/12/1999	4-HA05-01 11/12/1999	4-HA06-02 11/12/1999
Inorganics (mg/kg)								
Aluminum	78,214	8440 L	7450 L	3670 L	9660 L	7520 L	5850 L	3550 L
Antimony	31	0.46 U	0.44 U	0.53 U	0.53 U	0.69 U	1.1	1.1
Arsenic	0.43	2.7 L	2.2 L	1.8 L	2.9 L	3.9 L	3.7 L	4.2 L
Barium	5,475	34.2 J	29.5 J	20.2 J	48 J	247	30.6 J	33.2 J
Cadmium	39	0.07 U	0.07 U	0.08 U	0.08 U	0.96 J	1.2 J	0.15 U
Calcium	N/A	2940	3140	478 J	4060	5970	3240	2460
Chromium	235 (1)	11.5	12	6.9	15.9	13.4	17.4	29.2
Cobalt	4,693	1.9 J	2 J	1.6 J	4.3 J	3.8 J	2.8 J	3.6 J
Copper	3,129	9	4.6 B	4.4 B	40.4	30	30.1	19.4
Cyanide	1,564	0.02 UL	0.02 UL	0.03 UL	0.03 UL	0.44 L	0.03 UL	0.02 UL
Iron	23,464	8260 L	8660 L	4960 L	19300 L	12100 L	12700 L	28000 L
Lead	400 (2)	15.8	14.5	11.3	45.3	42.3	36.2	29.7
Magnesium	N/A	606 J	538 J	327 J	499 J	812 J	1310 J	1730
Manganese	1,564	49.1	71.3	28.3	120	105	40.4	114
Mercury	7.82 (3)	0.08 J	0.09 J	0.1 J	0.91	0.9	0.44	0.05 J
Nickel	1,564	3.4 B	3.2 B	3.5 B	17.3	13.6	7.7 B	20.4
Potassium	N/A	640 J	554 J	249 B	566 J	531 J	1700	920
Selenium	391	0.62 U	0.6 U	0.78 J	0.72 U	0.94 U	0.79 U	0.66 U
Silver	391	2.3 B	2.9 B	1.6 B	5.8 B	3.9 B	3.7 B	8.5 L
Vanadium	548	16.2	17.8	10.1 B	12.2	17.1	20.5	20.8
Zinc	23,464	643	198	28.6 B	334	373	150	236

Notes:

(1) Screening value for chromium VI used
(2) Action level for lead
(3) Screening value for methylmercury used

TABLE 4-11
SUMMARY OF INORGANIC CONSTITUENTS DETECTED - SEDIMENT
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	4-SD02-00 11/14/1999	4-SD02-01 11/14/1999	4-SD03-00 11/13/1999	4-SD03-01 11/13/1999	4-SD04-00 11/13/1999	4-SD04-00D 11/13/1999	4-SD04-01 11/13/1999	4-SED01-00 11/12/1999	4-SED01-01 11/12/1999
Inorganics (mg/kg)										
Aluminum	78,214	6070 L	2780 L	5950 L	1500 L	4210 L	4070 L	3370 L	8340 L	5120 L
Antimony	31	0.67 U	0.48 U	0.62 U	0.43 U	0.65 U	0.65 U	0.55 U	1.7 B	1 J
Arsenic	0.43	4.5	1.9 J	3.2	0.98 J	8.8	7.2	9.5	12.2 L	11.2
Barium	5,475	27.1 J	9.9 B	24.9 J	6.4 B	27.5 J	23.6 J	19.2 J	71.7 J	39.2 J
Beryllium	156	0.56 J	0.27 J	0.6 J	0.21 J	0.36 J	0.22 J	0.31 J	0.73 B	0.49 B
Cadmium	39	3.2	0.15 J	2.9	0.85 J	0.79 J	0.52 J	0.09 J	5.7	7.2
Calcium	N/A	4550 J	1670 J	3380 J	1360 J	4310 J	3400 J	15200 J	25200	7010
Chromium	235 (1)	17.9	9.3	17.2	7.7	9.5	7.7	7	35.8	25
Cobalt	4,693	3.9 J	1.3 U	2.9 J	1.2 U	1.8 U	1.8 U	1.5 U	4.6 J	3.1 J
Copper	3,129	62.7 J	3.8 B	65.3 J	7.3 B	33.5 J	21.2 J	5.1 B	30.7	10.1
Iron	23,464	14300 L	7840 L	14100	4540 L	9410 L	8490 L	4950 L	15400	9040
Lead	400 (2)	24.6	4.2	20.3	5.4	20.6	16	10.9	52.3	59.8
Magnesium	N/A	1730	859 J	1780	597 J	1070 J	912 J	410 J	2790	2000
Manganese	1,564	93.4	14.5	74.9	12.1	72.7	60	36	62	26.8
Mercury	7.82 (3)	0.04 UL	0.02 UL	0.03 UL	0.03 UL	0.04 UL	0.04 L	0.03 UL	0.07 J	0.04 U
Nickel	1,564	7.9 J	1.7 J	7.3 J	2 J	5 J	4.5 J	2.3 J	23.6	18.3
Potassium	N/A	1290 J	1440	1550	911 J	352 B	368 B	272 B	1210 J	673 J
Sodium	N/A	118 B	57 J	101 B	59.2 B	73.6 B	80.3 B	64.3 B	191 B	65.2 B
Vanadium	548	21.9	9.6 J	21.1	6.8 J	15.1	13.2 J	9.8 J	36.6	25.4
Zinc	23,464	145	30.2 B	130	44.4 B	228	180	307	147	87.6 B

Notes:

(1) Screening value for chromium VI used

(2) Action level for lead

(3) Screening value for methylmercury used

TABLE 4-12
SUMMARY OF ORGANIC COMPOUNDS DETECTED - SURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	A1-HA01-00 11/12/1999	A1-HA02-00 11/12/1999	A1-HA03-00 11/12/1999	A1-HA04-00 11/12/1999	A1-HA05-00 11/12/1999	A1-HA05-00D 11/12/1999	A1-HA06-00 11/14/1999
Volatiles (ug/kg)								
1,1-Dichloroethene	1,065	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	4 J	14.15 UL
2-Butanone	46,928,571	20.07 U	15.22 UL	18.18 U	15.64 U	4 B	3 B	5
Benzene	22,025	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	4 J	14.15 UL
Chlorobenzene	1,564,286	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	5 J	14.15 UL
Toluene	15,642,857	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	5 J	14.15 UL
Trichloroethene	58,066	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	4 J	14.15 UL
Semivolatiles (ug/kg)								
Benzo(a)Anthracene	875	280	65 J	600 U	490 U	580 U	610 U	450 U
Benzo(a)Pyrene	87	870	92 J	600 U	490 U	580 U	610 U	450 U
Benzo(b)Fluoranthene	875	1700	110 J	600 U	490 U	66 J	87 J	450 U
Benzo(g,h,i)Perylene	2,346,429 (1)	970	78 J	600 U	490 U	580 U	610 U	450 U
Benzo(k)Fluoanthene	8,750	970	96 J	600 U	490 U	580 U	610 U	450 U
Bis(2-Ethylhexyl)Phthalate	45,623	620 UL	450 U	1800	12000 J	69 J	88 J	47 J
Chrysene	87,497	830	92 J	600 U	490 U	67 J	73 J	450 U
Dibenz(a,h)Anthracene	87	350	450 U	600 U	490 U	580 U	610 U	450 U
Di-n-Butylphthalate	7,821,429	620 UL	72 J	130 J	100 J	78 J	170 J	110 J
Fluoranthene	3,128,571	250	150 J	600 U	490 U	61 J	610 U	450 U
Indeno(1,2,3-cd)Pyrene	875	810	74 J	600 U	490 U	580 U	610 U	450 U
Phenanthrene	2,346,429 (1)	78	71 J	600 U	490 U	580 U	610 U	450 U
Pyrene	2,346,429	360	100 J	600 U	490 U	65 J	610 U	450 U
Pesticides/PCBs (ug/kg)								
4,4'-DDE	1,879	18	4.5 U	6 U	1.5 L	5.7 UL	6.1 U	4.5 U
4,4'-DDT	1,879	15	4.5 U	6 U	120	5.7 UL	6.1 U	4.5 U
Aroclor-1260	319	62 UL	45 U	60 U	220 L	57 UL	61 U	45 U
alpha-Chlordane	1,825 (2)	4.3	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
Endosulfan Sulfate	469,286 (3)	14	4.5 U	6 U	4.8 UL	5.7 UL	6.1 U	4.5 U

Notes:

(1) Screening value for pyrene used as a surrogate.

(2) Screening value for chlordane used as a surrogate.

(3) Screening value for endosulfan used as a surrogate.

TABLE 4-13
SUMMARY OF INORGANIC CONSTITUENTS DETECTED - SURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	A1-HA01-00 11/12/1999	A1-HA02-00 11/12/1999	A1-HA03-00 11/12/1999	A1-HA04-00 11/12/1999	A1-HA05-00 11/12/1999	A1-HA05-00D 11/12/1999	A1-HA06-00 11/14/1999
Inorganics (mg/kg)								
Aluminum	78,214	9030 L	5620 L	8410 L	8400 L	3570 L	5200 L	6020 L
Antimony	31	2.5 B	1.3 B	1.4 B	13.9 U	5.7 J	5.9 J	0.53 U
Arsenic	0.43	23.5	2.3 U	7.6	2.4	1.4 J	1.8 J	1.7 J
Barium	5,475	151	147	116	70.3	91.6	94.9	38.2 J
Cadmium	39	0.89 J	2.3 U	1.4 U	1.2 U	1.5 U	1.3 U	0.52 J
Calcium	N/A	17900	11900	35900	8770	10600	11100	4480
Chromium	235 (1)	44.7	12.3	13	10	10.3	10.9	7.2
Cobalt	4,693	5.3 J	4.4 J	9.9 J	3.1 J	4.8 J	4.1 J	1.5 U
Copper	3,129	17.4	13.1	11.3 B	19.4	88.5	65	3.2 J
Cyanide	1,564	0.9 UL	0.08 J	0.9 UL	0.7 UL	0.2 J	0.2 J	0.03 UL
Iron	23,464	17300 L	35200 L	11200 L	12200 L	34900 L	29900 L	8050
Lead	400 (2)	194	86.3	46.2	35.2	493	501	16.2
Magnesium	N/A	1980	913 J	1390 J	1350	724 J	861 J	380 J
Manganese	1,564	523	291	481	460	375	389	122
Mercury	7.82 (3)	0.13 J	0.05 J	0.08 J	0.08 J	0.05 J	0.05 J	0.03 UL
Nickel	1,564	8.7 J	7.7 J	7.2 J	5.1 J	7 J	8.8 J	3.4 B
Potassium	N/A	652 J	622 J	579 J	385 B	308 B	383 B	250 B
Vanadium	548	26	18.8	21.6	15.5	15.4	17.1	14.6
Zinc	23,464	849	110	132	59 B	292	250	293

Notes:
(1) Screening value for chromium VI used
(2) Action level for lead
(3) Screening value for methylmercury used

TABLE 4-14
SUMMARY OF ORGANIC COMPOUNDS DETECTED - SUBSURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	A1-HA02-02 11/12/1999	A1-HA03-02 11/12/1999	A1-HA04-02 11/12/1999	A1-HA05-01 11/14/1999	A1-HA05-01D 11/14/1999	A1-HA06-02 11/14/1999
Volatiles (ug/kg)							
Xylene (Total)	156,428,571	11.76 U	12.5 U	11.49 U	2	3	13.26 U
Semivolatiles (ug/kg)							
Benzo(a)Anthracene	875	390 U	410 U	380 U	570 U	64 J	400 U
Benzo(a)Pyrene	87	390 U	410 U	380 U	570 U	59 J	400 U
Benzo(b)Fluoranthene	875	390 U	410 U	380 U	79 J	88 J	400 U
Benzo(g,h,i)Perylene	2,346,429 (1)	390 U	410 U	380 U	570 U	71 J	400 U
Benzo(k)Fluoanthene	8,750	390 U	410 U	380 U	74 J	65 J	400 U
Bis(2-Ethylhexyl)Phthalate	45,623	76 J	54 J	46 J	570 U	540 U	400 U
Chrysene	87,497	390 U	410 U	380 U	83 J	81 J	400 U
Di-n-Butylphthalate	7,821,429	49 J	52 J	79 J	110 J	110 J	73 J
Fluoranthene	3,128,571	390 U	410 U	380 U	100 J	140 J	400 U
Indeno(1,2,3-cd)Pyrene	875	390 U	410 U	380 U	570 U	55 J	400 U
Phenanthrene	2,346,429 (1)	390 U	410 U	380 U	570 U	97 J	400 U
Pyrene	2,346,429	390 U	410 U	380 U	78 J	110 J	400 U

Notes:
(1) Screening value for pyrene used as a surrogate.

TABLE 4-15
SUMMARY OF INORGANIC CONSTITUENTS DETECTED - SUBSURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	A1-HA02-02 11/12/1999	A1-HA03-02 11/12/1999	A1-HA04-02 11/12/1999	A1-HA05-01 11/14/1999	A1-HA05-01D 11/14/1999	A1-HA06-02 11/14/1999
Inorganics (mg/kg)							
Aluminum	78,214	4700 L	6240 L	5340 L	4410 L	4080 L	8830 L
Antimony	31	0.46 B	0.6 B	10.9 U	12 J	11.4 J	0.41 B
Arsenic	0.43	1.3 J	5.2	1.9	5.1	4.2	33.3
Barium	5,475	12.9 B	28.5 J	25.9 J	81.3	90.9	41.3
Beryllium	156	0.21 B	1.1 B	0.5 B	0.34 J	0.22 J	0.95
Cadmium	39	0.9 U	1 U	0.07 J	0.08 U	0.08 U	0.06 U
Calcium	N/A	1090	1960	1490	10200	10400	2920
Chromium	235 (1)	9.2	19.4	3.6	16.8	11.1	32.6
Cobalt	4,693	1.5 J	5.8 J	2.8 J	4.6 J	4.5 J	9.4
Copper	3,129	1.6 B	2.1 B	1.5 B	86	146	3.5 B
Cyanide	1,564	0.6 L	0.6 UL	0.6 UL	0.68 J	0.2 J	0.08 J
Iron	23,464	6590 L	19800 L	2630 L	30600	35300	39700
Lead	400 (2)	4.7	6.7	7.3	483	1120	7.7
Magnesium	N/A	1430	547 J	81.4 B	606 J	654 J	1040
Manganese	1,564	11	48.2	126	384	401	151
Mercury	7.82 (3)	0.1 U	0.1 U	0.02 J	0.06 L	0.04 UL	0.03 UL
Nickel	1,564	1.2 J	7.7 J	2.9 J	23.3 L	13.6 B	12.3 B
Potassium	N/A	226 B	690 J	117 B	472 B	279 B	1040
Silver	391	1.6 B	5.6 B	1.8 UB	7.6 B	9.7 B	11.3
Vanadium	548	19.5	20.2	6.9	16.7	14.4	40.8
Zinc	23,464	4.2 B	25.7 B	5.6 B	330	365	35.3 B

Notes:

(1) Screening value for chromium VI used

(2) Action level for lead

(3) Screening value for methylmercury used

TABLE 4-16
SUMMARY OF ORGANIC COMPOUNDS DETECTED - SURFACE WATER
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to 10x Tap Water RBCs	A1-SW01 11/14/1999	A1-SW02 11/14/1999	A1-SW03 11/14/1999	A1-SW03D 11/14/1999
Semivolatiles (ug/L)					
Bis(2-Ethylhexyl)Phthalate	48	10 U	98	37 J	2 J
Di-n-Octyl Phthalate	7,300	3 J	10 U	10 U	10 U

TABLE 4-17
SUMMARY OF UNFILTERED INORGANIC CONSTITUENTS DETECTED - SURFACE WATER
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to 10x Tap Water RBCs	A1-SW01 11/14/1999	A1-SW02 11/14/1999	A1-SW03 11/14/1999	A1-SW03D 11/14/1999
Inorganics (ug/L)					
Arsenic	0.45	3.4 U	3.4 U	17.1	19
Barium	25,550	55.6 B	33.8 B	89.8 J	92 J
Calcium	N/A	129000	94900	134000	141000
Iron	109,500	339	520	25900	25700
Magnesium	N/A	2870 J	1780 J	4170 J	4390 J
Manganese	7,300	108	26.1	631	656
Potassium	N/A	1710 J	1340 B	2360 J	2660 J
Sodium	N/A	6550 J	4570 J	6780 J	6970 J

TABLE 4-18
SUMMARY OF ORGANIC COMPOUNDS DETECTED - SEDIMENT
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	A1-SD01-00 11/14/1999	A1-SD01-01 11/14/1999	A1-SD02-00 11/14/1999	A1-SD02-01 11/14/1999	A1-SD03-00 11/14/1999	A1-SD03-00D 11/14/1999	A1-SD03-01 11/14/1999	A1-SD04-00 11/14/1999	A1-SD04-01 11/13/1999
Volatiles (ug/kg)										
2-Butanone	46,928,571	3 J	5 J	5 J	4 J	17 B	5 B	65 B	13.25 U	13.77 U
Acetone	7,821,429	7 B	14 B	15 B	13.2 U	45 B	11 B	220	13.25 U	4 B
Ethylbenzene	7,821,429	2 J	2 J	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	2 J
Xylene (Total)	156,428,571	6 J	5 B	12.95 U	2 J	15.94 U	16.39 U	17.9 U	13.25 U	4 J
Semivolatiles (ug/kg)										
Bis(2-Ethylhexyl)Phthalate	45,623	480 U	48 J	450 U	46 J	510 U	63 J	580 U	46 J	51 J
Chrysene	87,497	480 U	460 U	450 U	430 U	510 U	540 U	63 J	450 U	440 U
Di-n-Butylphthalate	7,821,429	120 J	120 J	93 J	81 J	110 J	85 J	80 J	98 J	64 J
Fluoranthene	3,128,571	480 U	460 U	450 U	430 U	510 U	540 U	580 U	47 J	440 U
Pesticides/PCBs (ug/kg)										
Aroclor-1260	319	47 U	46 U	45 U	43 U	47 UL	54 U	58 U	44 U	14 J

TABLE 4-19
SUMMARY OF INORGANIC CONSTITUENTS DETECTED - SEDIMENT
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Comparison to Residential RBCs	A1-SD01-00 11/14/1999	A1-SD01-01 11/14/1999	A1-SD02-00 11/14/1999	A1-SD02-01 11/14/1999	A1-SD03-00 11/14/1999	A1-SD03-00D 11/14/1999	A1-SD03-01 11/14/1999	A1-SD04-00 11/14/1999	A1-SD04-01 11/13/1999
Inorganics (mg/kg)										
Aluminum	78,214	1790 L	2970 L	4230 L	2060 L	2480 L	3510 L	4170 L	6740 L	4600 L
Arsenic	0.43	1.5 J	1.4 J	1.6 J	1.1 J	7.1	10.5	7.4	2.1 J	1.8 J
Barium	5,475	9.4 B	11.3 B	16.3 B	10.2 B	16 B	23.4 B	15.2 B	23.3 B	18.1 J
Beryllium	156	0.22 J	0.23 J	0.29 J	0.22 J	0.18 J	0.22 J	0.16 J	0.16 U	0.26 J
Calcium	N/A	1420	1250	1270	899 L	17900	19000	3630	1940 B	1760 J
Chromium	235 (1)	4.3	6.2	11.1	6.1	6.3	8.1	7.1	4.8	4.8
Cobalt	4,693	1.9 J	1.9 J	2.4 J	1.2 J	3.6 J	3.1 J	2.8 J	1.5 U	1.3 U
Copper	3,129	1.2 U	0.89 U	2.6 B	0.87 U	3.4 B	4.4 B	2.9 B	26.9 B	16 J
Iron	23,464	3490	3320	4690	3510	12600	18700	9230	4940	3730 L
Lead	400 (2)	3.8	3.6	4.8	3.1	12.6	12.6	11.4	10.3	7.5
Magnesium	N/A	76.9 B	177 B	304 J	154 B	266 B	325 J	211 B	299 B	216 J
Manganese	1,564	10	9	12.9	6.5	215	309	38.6	257	160
Mercury	7.82 (3)	0.03 UL	0.03 UL	0.02 UL	0.02 UL	0.03 UL	0.04 UL	0.03 UL	0.07 L	0.04 L
Nickel	1,564	2.1 B	3.1 B	8.2 B	2.6 B	5.1 B	3.1 B	2.5 B	2.9 B	2.1 J
Potassium	N/A	106 B	194 B	374 B	223 B	134 B	253 B	163 B	266 B	199 L
Selenium	391	0.65 U	0.49 U	0.63 U	0.48 U	0.8 J	0.77 U	0.7 U	0.71 U	0.63 U
Vanadium	548	5.6 J	8.1 J	11.2	7.5 J	9.9 B	12.4 J	14.8	7.7 J	7.4 J

Notes:
(1) Screening value for chromium VI used
(2) Action level for lead
(3) Screening value for methylmercury used

TABLE 4-20
DATA QUALIFIER DEFINITIONS
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

ORGANIC

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

B = Not detected substantially above the level reported in laboratory or field blanks.

J = Analyte present. Reported value may not be accurate or precise.

UJ = Not detected. Quantitation limit may be inaccurate or imprecise.

UR = Not detected. Quantitation limit is unreliable.

INORGANIC

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample.

B = Not detected substantially above the level reported in laboratory or field blanks.

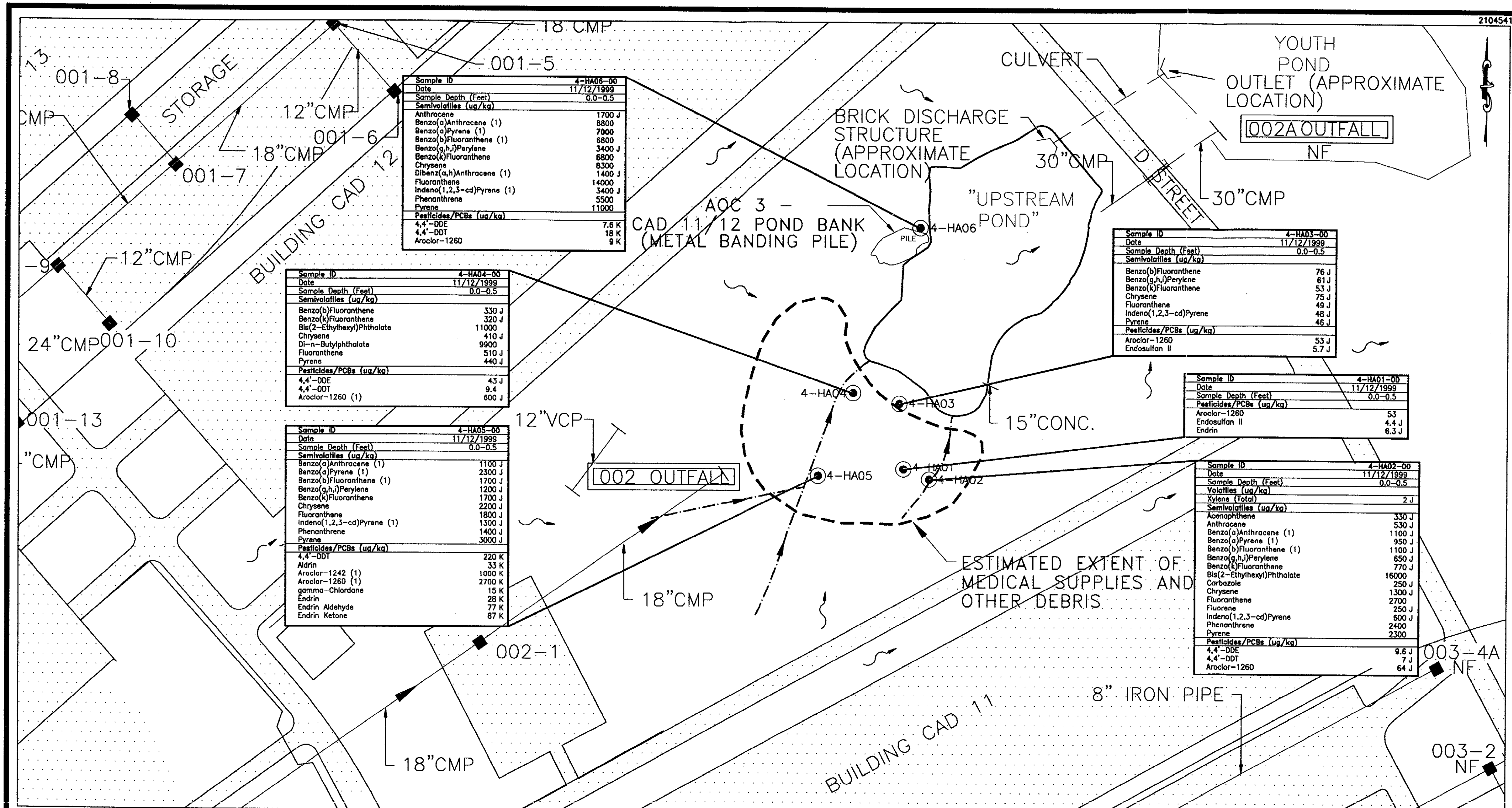
J = The associated value is an estimated quantity.

K = Analyte is present. The reported value may be biased high. The actual value is expected to be lower than reported.

L = Analyte is present. The reported values may be biased low. The actual value is expected to be higher than reported.

UL = The analyte was not detected, and the reported quantitation limit is probably higher than reported.

SECTION 4.0
FIGURES



Sample ID	4-HA06-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Semivolatiles (ug/kg)	
Anthracene	1700 J
Benzo(a)Anthracene (1)	8800
Benzo(a)Pyrene (1)	7000
Benzo(b)Fluoranthene (1)	6800
Benzo(g,h,i)Perylene	3400 J
Benzo(k)Fluoranthene	6800
Chrysene	8300
Dibenz(a,h)Anthracene (1)	1400 J
Fluoranthene	14000
Indeno(1,2,3-cd)Pyrene (1)	3400 J
Phenanthrene	5500
Pyrene	11000
Pesticides/PCBs (ug/kg)	
4,4'-DDE	7.6 K
4,4'-DDT	18 K
Aroclor-1260	9 K

Sample ID	4-HA04-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Semivolatiles (ug/kg)	
Benzo(b)Fluoranthene	330 J
Benzo(k)Fluoranthene	320 J
Bis(2-Ethylhexyl)Phthalate	11000
Chrysene	410 J
Di-n-Butylphthalate	9900
Fluoranthene	510 J
Pyrene	440 J
Pesticides/PCBs (ug/kg)	
4,4'-DDE	43 J
4,4'-DDT	9.4
Aroclor-1260 (1)	600 J

Sample ID	4-HA05-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Semivolatiles (ug/kg)	
Benzo(a)Anthracene (1)	1100 J
Benzo(a)Pyrene (1)	2300 J
Benzo(b)Fluoranthene (1)	1700 J
Benzo(g,h,i)Perylene	1200 J
Benzo(k)Fluoranthene	1700 J
Chrysene	2200 J
Fluoranthene	1800 J
Indeno(1,2,3-cd)Pyrene (1)	1300 J
Phenanthrene	1400 J
Pyrene	3000 J
Pesticides/PCBs (ug/kg)	
4,4'-DDT	220 K
Aldrin	33 K
Aroclor-1242 (1)	1000 K
Aroclor-1260 (1)	2700 K
gamma-Chlordane	15 K
Endrin	28 K
Endrin Aldehyde	77 K
Endrin Ketone	87 K

Sample ID	4-HA03-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Semivolatiles (ug/kg)	
Benzo(b)Fluoranthene	76 J
Benzo(g,h,i)Perylene	61 J
Benzo(k)Fluoranthene	53 J
Chrysene	75 J
Fluoranthene	49 J
Indeno(1,2,3-cd)Pyrene	48 J
Pyrene	46 J
Pesticides/PCBs (ug/kg)	
Aroclor-1260	53 J
Endosulfan II	5.7 J

Sample ID	4-HA01-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Pesticides/PCBs (ug/kg)	
Aroclor-1260	53
Endosulfan II	4.4 J
Endrin	6.3 J

Sample ID	4-HA02-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Volatiles (ug/kg)	
Xylene (Total)	2 J
Semivolatiles (ug/kg)	
Acenaphthene	330 J
Anthracene	530 J
Benzo(a)Anthracene (1)	1100 J
Benzo(a)Pyrene (1)	950 J
Benzo(b)Fluoranthene (1)	1100 J
Benzo(g,h,i)Perylene	650 J
Benzo(k)Fluoranthene	770 J
Bis(2-Ethylhexyl)Phthalate	16000
Carbazole	250 J
Chrysene	1300 J
Fluoranthene	2700
Fluorene	250 J
Indeno(1,2,3-cd)Pyrene	600 J
Phenanthrene	2400
Pyrene	2300
Pesticides/PCBs (ug/kg)	
4,4'-DDE	9.6 J
4,4'-DDT	7 J
Aroclor-1260	64 J

100 0 50 100
1 inch = 100 ft.

Baker
Baker Environmental, Inc.

NOTES
1) SAMPLES LOCATED BY GPS (BAKER, 11/99)
2) EDGE OF POND LOCATION APPROXIMATE

SOURCE: NAVFAC DRAWING 4255914 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 3".

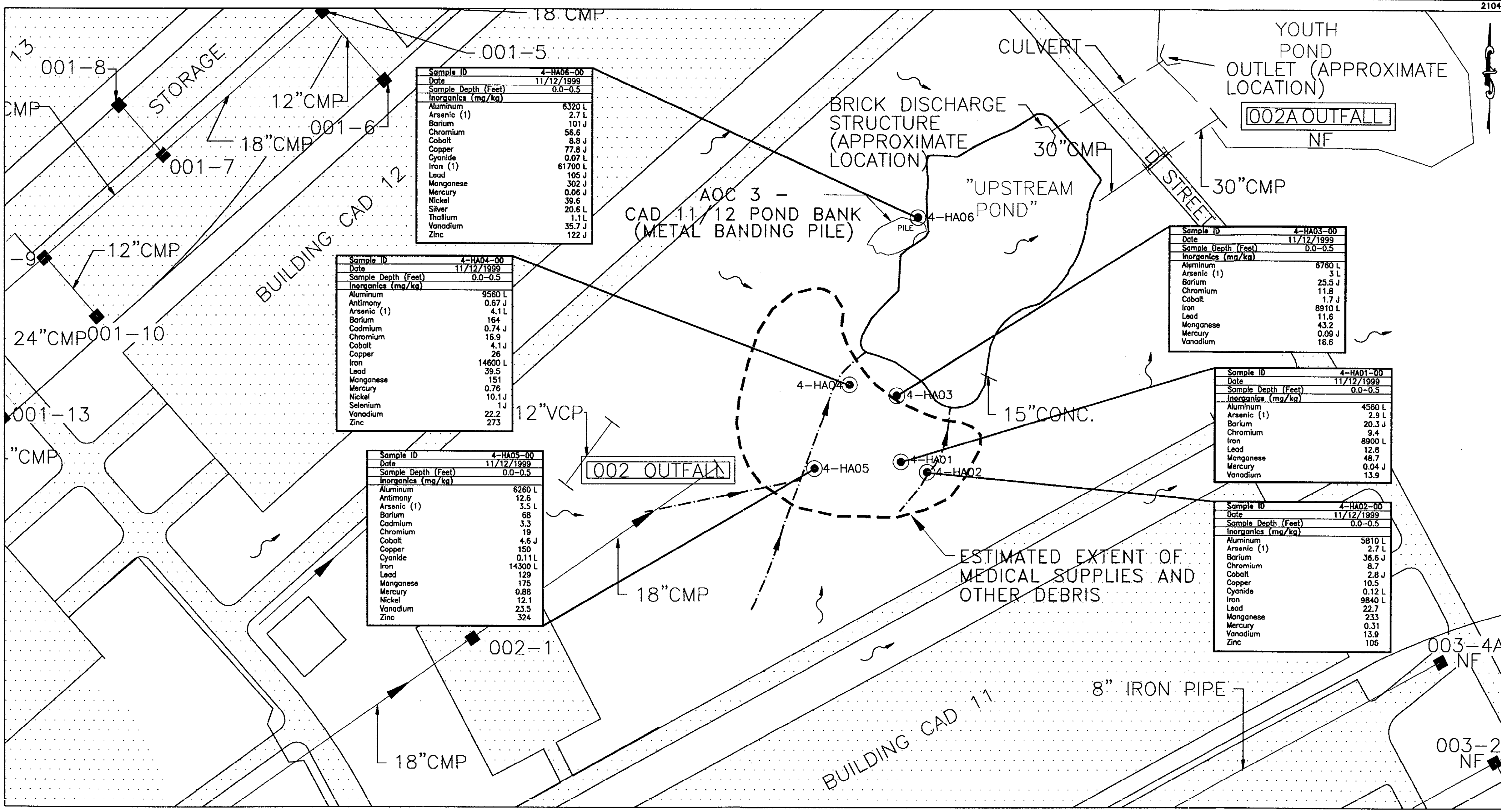
LEGEND

■ – DROP INLET
NF – NOT FOUND
– OVERLAND FLOW DIRECTION
CMP – CORRUGATED METAL PIPE
◉ – HAND AUGER BORING LOCATION
– DRAINAGE CHANNEL WITH FLOW DIRECTION

(1) – EXCEEDS RBC VALUE
ug/kg – MICROGRAMS PER KILOGRAM
J – ESTIMATED VALUE
K – ESTIMATED VALUE, BIASED HIGH

FIGURE 4-1
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SURFACE SOIL
SITE 4
CTO – 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

01291KB3Z



Sample ID	4-HA06-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	6320 L
Arsenic (1)	2.7 L
Barium	101 J
Chromium	56.6
Cobalt	8.8 J
Copper	77.8 J
Cyanide	0.07 L
Iron (1)	61700 L
Lead	105 J
Manganese	302 J
Mercury	0.06 J
Nickel	39.6
Silver	20.6 L
Thallium	1.1 L
Vanadium	35.7 J
Zinc	122 J

Sample ID	4-HA04-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	9560 L
Antimony	0.67 J
Arsenic (1)	4.1 L
Barium	164
Cadmium	0.74 J
Chromium	16.9
Cobalt	4.1 J
Copper	26
Iron	14600 L
Lead	39.5
Manganese	151
Mercury	0.76
Nickel	10.1 J
Selenium	1 J
Vanadium	22.2
Zinc	273

Sample ID	4-HA05-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	6260 L
Antimony	12.6
Arsenic (1)	3.5 L
Barium	68
Cadmium	3.3
Chromium	19
Cobalt	4.6 J
Copper	150
Cyanide	0.11 L
Iron	14300 L
Lead	129
Manganese	175
Mercury	0.88
Nickel	12.1
Vanadium	23.5
Zinc	324

Sample ID	4-HA03-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	6760 L
Arsenic (1)	3 L
Barium	25.5 J
Chromium	11.8
Cobalt	1.7 J
Iron	8910 L
Lead	11.6
Manganese	43.2
Mercury	0.09 J
Vanadium	16.6

Sample ID	4-HA01-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	4560 L
Arsenic (1)	2.9 L
Barium	20.3 J
Chromium	9.4
Iron	8900 L
Lead	12.8
Manganese	48.7
Mercury	0.04 J
Vanadium	13.9

Sample ID	4-HA02-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	5810 L
Arsenic (1)	2.7 L
Barium	36.6 J
Chromium	8.7
Cobalt	2.8 J
Copper	10.5
Cyanide	0.12 L
Iron	9840 L
Lead	22.7
Manganese	233
Mercury	0.31
Vanadium	13.9
Zinc	106

100 0 50 100
1 inch = 100 ft.

Baker
Baker Environmental, Inc.

NOTES
1) SAMPLES LOCATED BY GPS (BAKER, 11/99)
2) EDGE OF POND LOCATION APPROXIMATE

SOURCE: NAVFAC DRAWING 4255914 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 3".

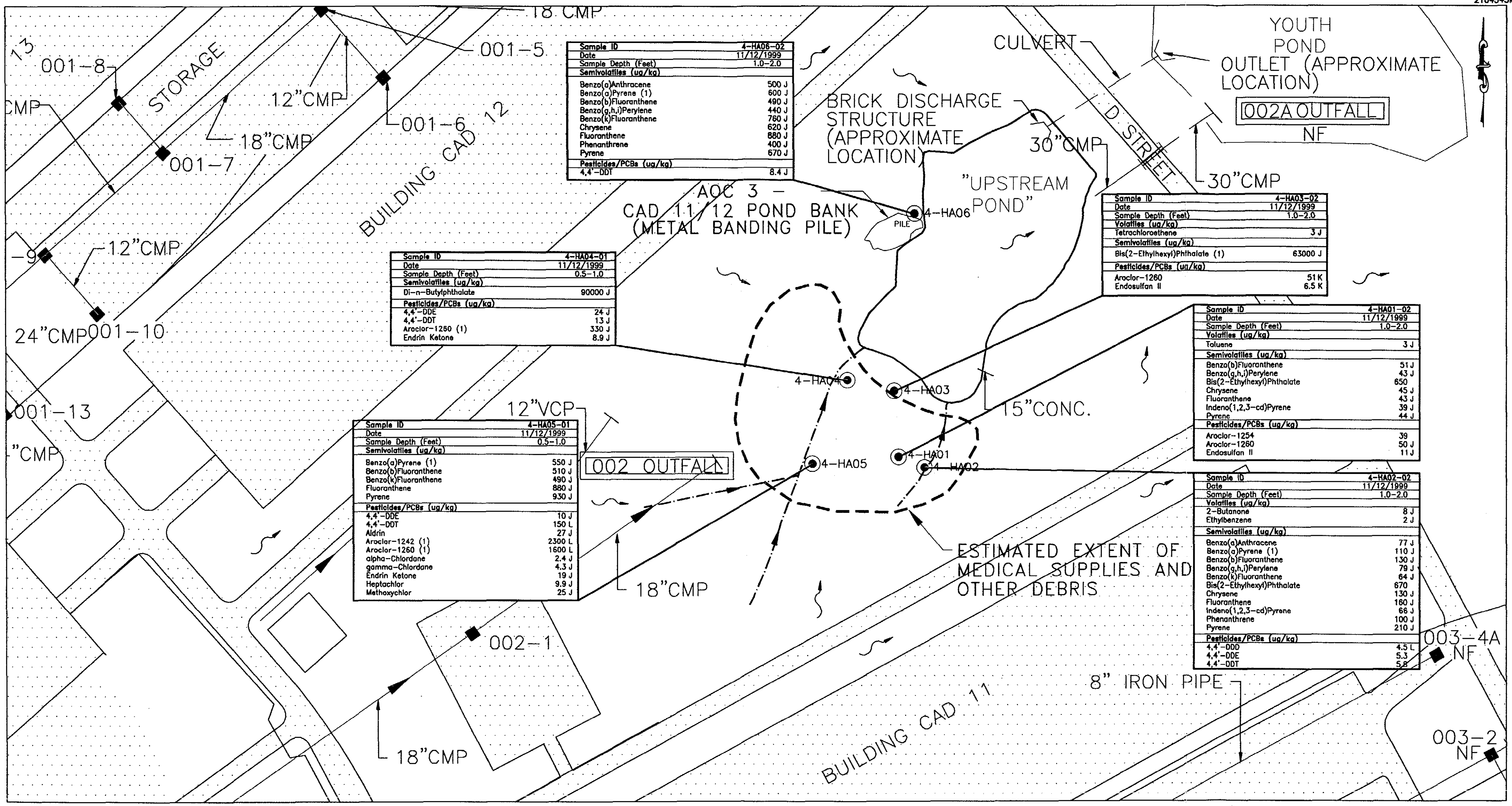
LEGEND

■ - DROP INLET
NF - NOT FOUND
- OVERLAND FLOW DIRECTION
CMP - CORRUGATED METAL PIPE
◉ - HAND AUGER BORING LOCATION
- DRAINAGE CHANNEL WITH FLOW DIRECTION

mg/kg - MILLIGRAMS PER KILOGRAM
J - ESTIMATED VALUE
L - ESTIMATED VALUE, BIASED LOW
(1) - EXCEEDS RBC VALUE

FIGURE 4-2
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SURFACE SOIL
SITE 4
CTO - 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

2104543M



Sample ID	4-HA06-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	500 J
Benzo(a)Pyrene (1)	600 J
Benzo(b)Fluoranthene	490 J
Benzo(g,h,i)Perylene	440 J
Benzo(k)Fluoranthene	760 J
Chrysene	620 J
Fluoranthene	880 J
Phenanthrene	400 J
Pyrene	670 J
Pesticides/PCBs (ug/kg)	
4,4'-DDT	8.4 J

Sample ID	4-HA04-01
Date	11/12/1999
Sample Depth (Feet)	0.5-1.0
Semivolatiles (ug/kg)	
Di-n-Butylphthalate	90000 J
Pesticides/PCBs (ug/kg)	
4,4'-DDE	24 J
4,4'-DDT	13 J
Aroclor-1260 (1)	330 J
Endrin Ketone	8.9 J

Sample ID	4-HA05-01
Date	11/12/1999
Sample Depth (Feet)	0.5-1.0
Semivolatiles (ug/kg)	
Benzo(a)Pyrene (1)	550 J
Benzo(b)Fluoranthene	510 J
Benzo(k)Fluoranthene	490 J
Fluoranthene	880 J
Pyrene	930 J
Pesticides/PCBs (ug/kg)	
4,4'-DDE	10 J
4,4'-DDT	150 L
Aldrin	27 J
Aroclor-1242 (1)	2300 L
Aroclor-1260 (1)	1600 L
alpha-Chlordane	2.4 J
gamma-Chlordane	4.3 J
Endrin Ketone	19 J
Heptachlor	9.9 J
Methoxychlor	25 J

Sample ID	4-HA03-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Volatiles (ug/kg)	
Tetrachloroethene	3 J
Semivolatiles (ug/kg)	
Bis(2-Ethylhexyl)Phthalate (1)	63000 J
Pesticides/PCBs (ug/kg)	
Aroclor-1260	51 K
Endosulfan II	6.5 K

Sample ID	4-HA01-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Volatiles (ug/kg)	
Toluene	3 J
Semivolatiles (ug/kg)	
Benzo(b)Fluoranthene	51 J
Benzo(g,h,i)Perylene	43 J
Bis(2-Ethylhexyl)Phthalate	650
Chrysene	45 J
Fluoranthene	43 J
Indeno(1,2,3-cd)Pyrene	39 J
Pyrene	44 J
Pesticides/PCBs (ug/kg)	
Aroclor-1254	39
Aroclor-1260	50 J
Endosulfan II	11 J

Sample ID	4-HA02-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Volatiles (ug/kg)	
2-Butanone	8 J
Ethylbenzene	2 J
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	77 J
Benzo(a)Pyrene (1)	110 J
Benzo(b)Fluoranthene	130 J
Benzo(g,h,i)Perylene	79 J
Benzo(k)Fluoranthene	64 J
Bis(2-Ethylhexyl)Phthalate	670
Chrysene	130 J
Fluoranthene	160 J
Indeno(1,2,3-cd)Pyrene	66 J
Phenanthrene	100 J
Pyrene	210 J
Pesticides/PCBs (ug/kg)	
4,4'-DDD	4.5 L
4,4'-DDE	5.3
4,4'-DDT	5.8

NOTES
1) SAMPLES LOCATED BY GPS (BAKER, 11/99)
2) EDGE OF POND LOCATION APPROXIMATE

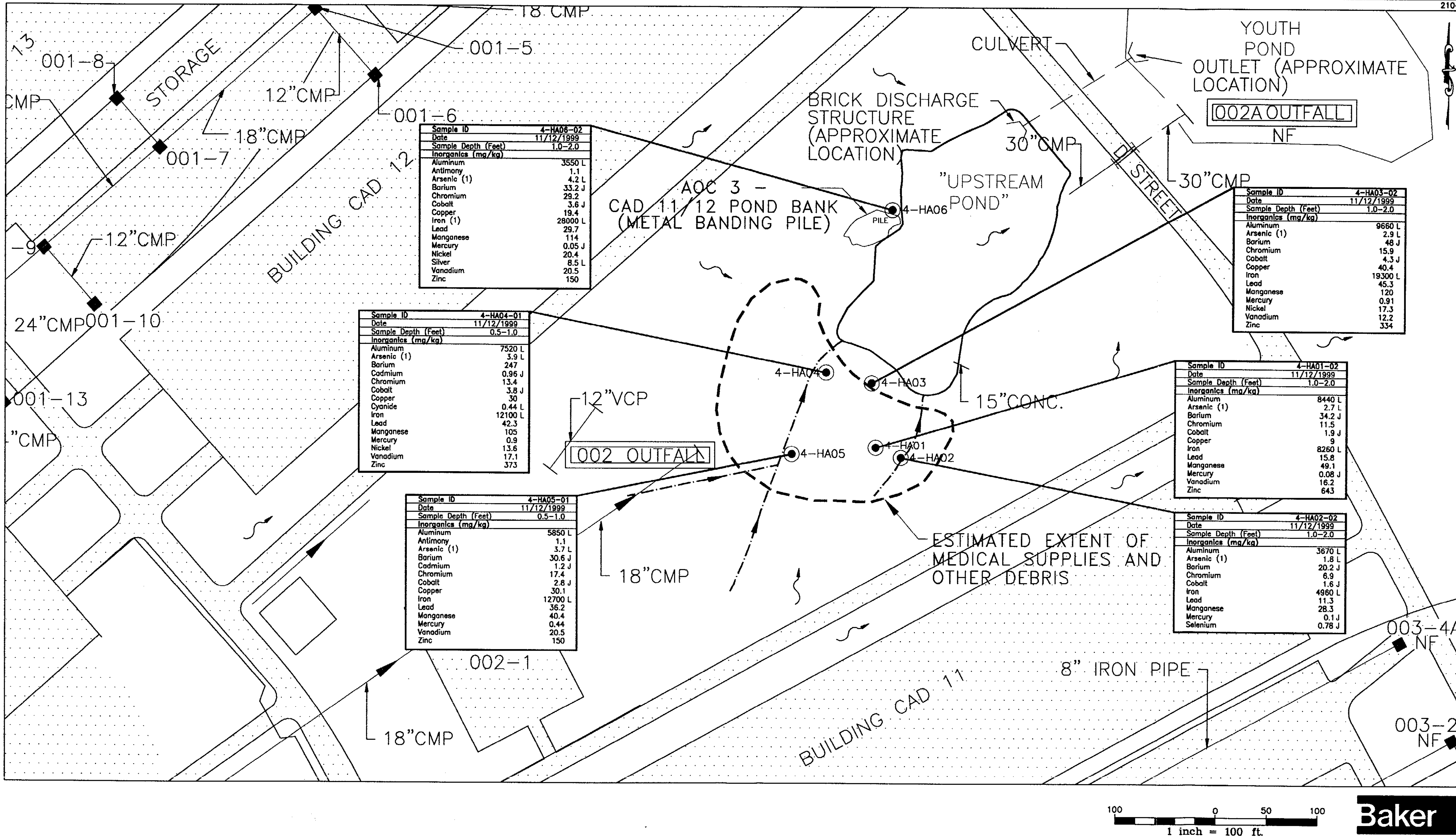
SOURCE: NAVFAC DRAWING 4255914 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 3".

LEGEND

■	DROP INLET
NF	NOT FOUND
	OVERLAND FLOW DIRECTION
CMP	CORRUGATED METAL PIPE
◉	HAND AUGER BORING LOCATION
	DRAINAGE CHANNEL WITH FLOW DIRECTION
ug/kg	MICROGRAMS PER KILOGRAM
J	ESTIMATED VALUE
K	ESTIMATED VALUE, BIASED HIGH
L	ESTIMATED VALUE, BIASED LOW
(1)	EXCEEDS RBC VALUE

FIGURE 4-3
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SUBSURFACE SOIL
SITE 4
CTO - 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

2104544M



Sample ID	4-HA06-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Inorganics (mg/kg)	
Aluminum	3550 L
Antimony	1.1
Arsenic (1)	4.2 L
Barium	33.2 J
Chromium	29.2
Cobalt	3.6 J
Copper	19.4
Iron (1)	28000 L
Lead	29.7
Manganese	114
Mercury	0.05 J
Nickel	20.4
Silver	8.5 L
Vanadium	20.5
Zinc	150

Sample ID	4-HA04-01
Date	11/12/1999
Sample Depth (Feet)	0.5-1.0
Inorganics (mg/kg)	
Aluminum	7520 L
Arsenic (1)	3.9 L
Barium	247
Cadmium	0.96 J
Chromium	13.4
Cobalt	3.8 J
Copper	30
Cyanide	0.44 L
Iron	12100 L
Lead	42.3
Manganese	105
Mercury	0.9
Nickel	13.6
Vanadium	17.1
Zinc	373

Sample ID	4-HA05-01
Date	11/12/1999
Sample Depth (Feet)	0.5-1.0
Inorganics (mg/kg)	
Aluminum	5850 L
Antimony	1.1
Arsenic (1)	3.7 L
Barium	30.6 J
Cadmium	1.2 J
Chromium	17.4
Cobalt	2.8 J
Copper	30.1
Iron	12700 L
Lead	36.2
Manganese	40.4
Mercury	0.44
Vanadium	20.5
Zinc	150

Sample ID	4-HA03-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Inorganics (mg/kg)	
Aluminum	9660 L
Arsenic (1)	2.9 L
Barium	48 J
Chromium	15.9
Cobalt	4.3 J
Copper	40.4
Iron	19300 L
Lead	45.3
Manganese	120
Mercury	0.91
Nickel	17.3
Vanadium	12.2
Zinc	334

Sample ID	4-HA01-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Inorganics (mg/kg)	
Aluminum	8440 L
Arsenic (1)	2.7 L
Barium	34.2 J
Chromium	11.5
Cobalt	1.9 J
Copper	9
Iron	8260 L
Lead	15.8
Manganese	49.1
Mercury	0.08 J
Vanadium	16.2
Zinc	643

Sample ID	4-HA02-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Inorganics (mg/kg)	
Aluminum	3670 L
Arsenic (1)	1.8 L
Barium	20.2 J
Chromium	6.9
Cobalt	1.6 J
Iron	4960 L
Lead	11.3
Manganese	28.3
Mercury	0.1 J
Selenium	0.78 J

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NOTES

1) SAMPLES LOCATED BY GPS (BAKER, 11/99)
2) EDGE OF POND LOCATION APPROXIMATE

SOURCE: NAVFAC DRAWING 4255914 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 3".

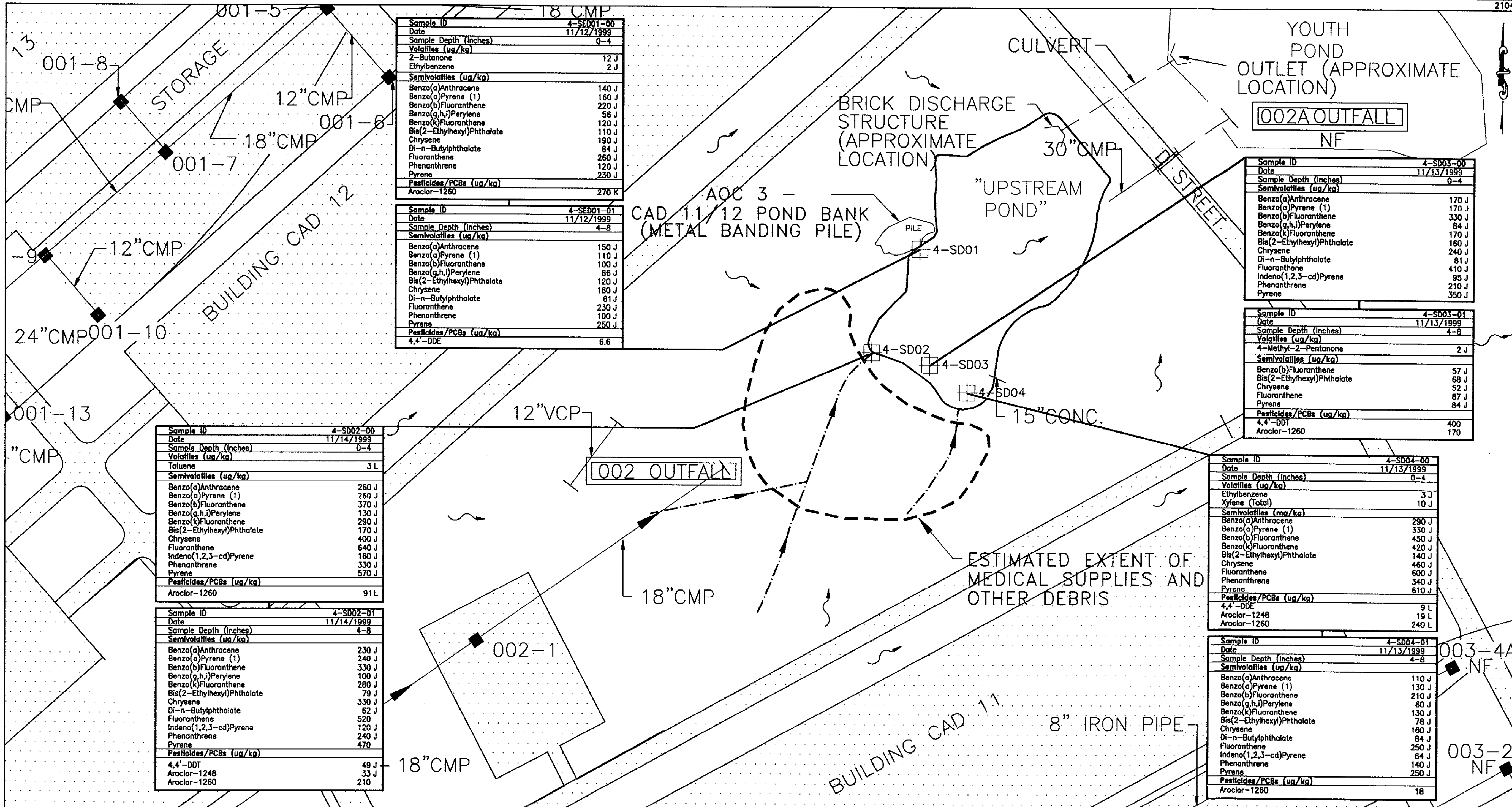
LEGEND

■ - DROP INLET
NF - NOT FOUND
~ - OVERLAND FLOW DIRECTION
CMP - CORRUGATED METAL PIPE
◉ - HAND AUGER BORING LOCATION
-·- - DRAINAGE CHANNEL WITH FLOW DIRECTION

mg/kg - MILLIGRAMS PER KILOGRAM
J - ESTIMATED VALUE
L - ESTIMATED VALUE, BIASED LOW
(1) - EXCEEDS RBC VALUE

FIGURE 4-4
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SUBSURFACE SOIL
SITE 4
CTO - 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

2104545M



Sample ID	4-SED01-00
Date	11/12/1999
Sample Depth (Inches)	0-4
Volatiles (ug/kg)	
2-Butanone	12 J
Ethylbenzene	2 J
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	140 J
Benzo(a)Pyrene (1)	160 J
Benzo(b)Fluoranthene	220 J
Benzo(g,h,i)Perylene	56 J
Benzo(k)Fluoranthene	120 J
Bis(2-Ethylhexyl)Phthalate	110 J
Chrysene	190 J
Di-n-Butylphthalate	64 J
Fluoranthene	260 J
Phenanthrene	120 J
Pyrene	230 J
Pesticides/PCBs (ug/kg)	
Aroclor-1260	270 K

Sample ID	4-SED01-01
Date	11/12/1999
Sample Depth (Inches)	4-8
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	150 J
Benzo(a)Pyrene (1)	110 J
Benzo(b)Fluoranthene	100 J
Benzo(g,h,i)Perylene	86 J
Bis(2-Ethylhexyl)Phthalate	120 J
Chrysene	180 J
Di-n-Butylphthalate	61 J
Fluoranthene	230 J
Phenanthrene	100 J
Pyrene	250 J
Pesticides/PCBs (ug/kg)	
4,4'-DDE	6.6

Sample ID	4-SD02-00
Date	11/14/1999
Sample Depth (Inches)	0-4
Volatiles (ug/kg)	
Toluene	3 L
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	260 J
Benzo(a)Pyrene (1)	260 J
Benzo(b)Fluoranthene	370 J
Benzo(g,h,i)Perylene	130 J
Benzo(k)Fluoranthene	290 J
Bis(2-Ethylhexyl)Phthalate	170 J
Chrysene	400 J
Fluoranthene	640 J
Indeno(1,2,3-cd)Pyrene	160 J
Phenanthrene	330 J
Pyrene	570 J
Pesticides/PCBs (ug/kg)	
Aroclor-1260	91 L

Sample ID	4-SD02-01
Date	11/14/1999
Sample Depth (Inches)	4-8
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	230 J
Benzo(a)Pyrene (1)	240 J
Benzo(b)Fluoranthene	330 J
Benzo(g,h,i)Perylene	100 J
Benzo(k)Fluoranthene	280 J
Bis(2-Ethylhexyl)Phthalate	79 J
Chrysene	330 J
Di-n-Butylphthalate	62 J
Fluoranthene	520
Indeno(1,2,3-cd)Pyrene	120 J
Phenanthrene	240 J
Pyrene	470
Pesticides/PCBs (ug/kg)	
4,4'-DDT	49 J
Aroclor-1248	33 J
Aroclor-1260	210

Sample ID	4-SD03-00
Date	11/13/1999
Sample Depth (Inches)	0-4
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	170 J
Benzo(a)Pyrene (1)	170 J
Benzo(b)Fluoranthene	330 J
Benzo(g,h,i)Perylene	84 J
Benzo(k)Fluoranthene	170 J
Bis(2-Ethylhexyl)Phthalate	160 J
Chrysene	240 J
Di-n-Butylphthalate	81 J
Fluoranthene	410 J
Indeno(1,2,3-cd)Pyrene	95 J
Phenanthrene	210 J
Pyrene	350 J

Sample ID	4-SD03-01
Date	11/13/1999
Sample Depth (Inches)	4-8
Volatiles (ug/kg)	
4-Methyl-2-Pentanone	2 J
Semivolatiles (ug/kg)	
Benzo(b)Fluoranthene	57 J
Bis(2-Ethylhexyl)Phthalate	68 J
Chrysene	52 J
Fluoranthene	87 J
Pyrene	84 J
Pesticides/PCBs (ug/kg)	
4,4'-DDT	400
Aroclor-1260	170

Sample ID	4-SD04-00
Date	11/13/1999
Sample Depth (Inches)	0-4
Volatiles (ug/kg)	
Ethylbenzene	3 J
Xylene (Total)	10 J
Semivolatiles (mg/kg)	
Benzo(a)Anthracene	290 J
Benzo(a)Pyrene (1)	330 J
Benzo(b)Fluoranthene	450 J
Benzo(k)Fluoranthene	420 J
Bis(2-Ethylhexyl)Phthalate	140 J
Chrysene	460 J
Fluoranthene	600 J
Phenanthrene	340 J
Pyrene	610 J
Pesticides/PCBs (ug/kg)	
4,4'-DDE	9 L
Aroclor-1248	19 L
Aroclor-1260	240 L

Sample ID	4-SD04-01
Date	11/13/1999
Sample Depth (Inches)	4-8
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	110 J
Benzo(a)Pyrene (1)	130 J
Benzo(b)Fluoranthene	210 J
Benzo(g,h,i)Perylene	60 J
Benzo(k)Fluoranthene	130 J
Bis(2-Ethylhexyl)Phthalate	78 J
Chrysene	160 J
Di-n-Butylphthalate	84 J
Fluoranthene	250 J
Indeno(1,2,3-cd)Pyrene	64 J
Phenanthrene	140 J
Pyrene	250 J
Pesticides/PCBs (ug/kg)	
Aroclor-1260	18

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NOTES

1) SAMPLES LOCATED BY GPS (BAKER, 11/99)
2) EDGE OF POND LOCATION APPROXIMATE

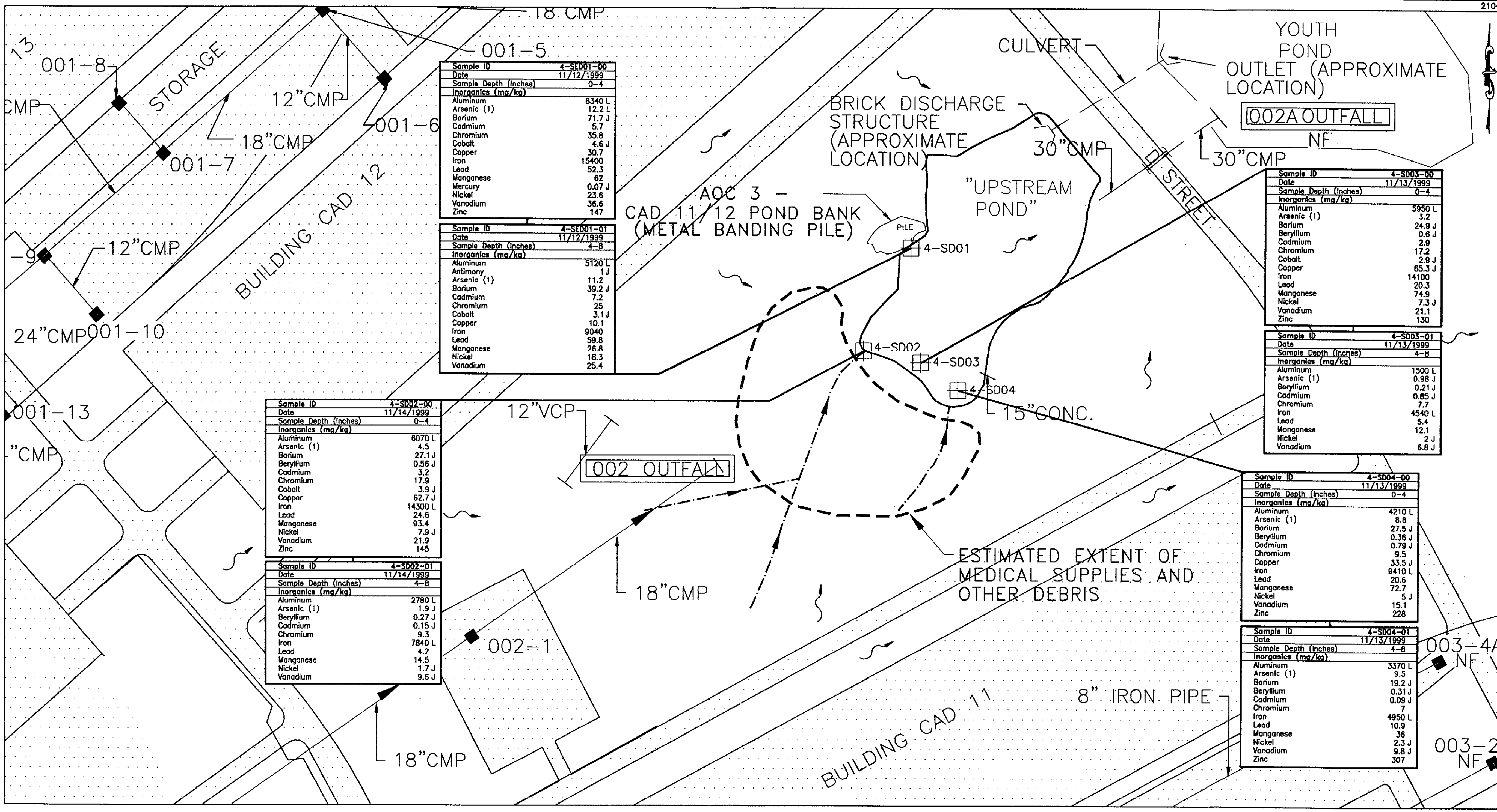
SOURCE: NAVFAC DRAWING 4255914 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 3".

LEGEND

■ - DROP INLET
NF - NOT FOUND
- OVERLAND FLOW DIRECTION
CMP - CORRUGATED METAL PIPE
- SEDIMENT SAMPLE LOCATION
- DRAINAGE CHANNEL WITH FLOW DIRECTION

ug/kg - MICROGRAMS PER KILOGRAM
J - ESTIMATED VALUE
K - ESTIMATED VALUE, BIASED HIGH
L - ESTIMATED VALUE, BIASED LOW
(1) - EXCEEDS RBC VALUE

FIGURE 4-5
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SEDIMENT
SITE 4
CTO - 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



Sample ID	4-SED01-00
Date	11/12/1999
Sample Depth (Inches)	0-4
Inorganics (mg/kg)	
Aluminum	8340 L
Arsenic (1)	12.2 L
Barium	71.7 J
Cadmium	5.7
Chromium	35.8
Cobalt	4.6 J
Copper	30.7
Iron	15400
Lead	52.3
Manganese	62
Mercury	0.07 J
Nickel	23.6
Vanadium	36.6
Zinc	147

Sample ID	4-SED01-01
Date	11/12/1999
Sample Depth (Inches)	4-8
Inorganics (mg/kg)	
Aluminum	5120 L
Antimony	1 J
Arsenic (1)	11.2
Barium	39.2 J
Cadmium	7.2
Chromium	25
Cobalt	3.1 J
Copper	10.1
Iron	9040
Lead	59.8
Manganese	26.8
Nickel	18.3
Vanadium	25.4

Sample ID	4-SD02-00
Date	11/14/1999
Sample Depth (Inches)	0-4
Inorganics (mg/kg)	
Aluminum	6070 L
Arsenic (1)	4.5
Barium	27.1 J
Beryllium	0.56 J
Cadmium	3.2
Chromium	17.9
Cobalt	3.9 J
Copper	62.7 J
Iron	14300 L
Lead	24.6
Manganese	93.4
Nickel	7.9 J
Vanadium	21.9
Zinc	145

Sample ID	4-SD02-01
Date	11/14/1999
Sample Depth (Inches)	4-8
Inorganics (mg/kg)	
Aluminum	2780 L
Arsenic (1)	1.9 J
Beryllium	0.27 J
Cadmium	0.15 J
Chromium	9.3
Iron	7840 L
Lead	4.2
Manganese	14.5
Nickel	1.7 J
Vanadium	9.6 J

Sample ID	4-SD03-00
Date	11/13/1999
Sample Depth (Inches)	0-4
Inorganics (mg/kg)	
Aluminum	5950 L
Arsenic (1)	3.2
Barium	24.9 J
Beryllium	0.6 J
Cadmium	2.9
Chromium	17.2
Cobalt	2.9 J
Copper	65.3 J
Iron	14100
Lead	20.3
Manganese	74.9
Nickel	7.3 J
Vanadium	21.1
Zinc	130

Sample ID	4-SD03-01
Date	11/13/1999
Sample Depth (Inches)	4-8
Inorganics (mg/kg)	
Aluminum	1500 L
Arsenic (1)	0.98 J
Beryllium	0.21 J
Cadmium	0.85 J
Chromium	7.7
Iron	4540 L
Lead	5.4
Manganese	12.1
Nickel	2 J
Vanadium	6.8 J

Sample ID	4-SD04-00
Date	11/13/1999
Sample Depth (Inches)	0-4
Inorganics (mg/kg)	
Aluminum	4210 L
Arsenic (1)	8.8
Barium	27.5 J
Beryllium	0.36 J
Cadmium	0.79 J
Chromium	9.5
Copper	33.5 J
Iron	9410 L
Lead	20.6
Manganese	72.7
Nickel	5 J
Vanadium	15.1
Zinc	228

Sample ID	4-SD04-01
Date	11/13/1999
Sample Depth (Inches)	4-8
Inorganics (mg/kg)	
Aluminum	3370 L
Arsenic (1)	9.5
Barium	19.2 J
Beryllium	0.31 J
Cadmium	0.09 J
Chromium	7
Iron	4950 L
Lead	10.9
Manganese	36
Nickel	2.3 J
Vanadium	9.8 J
Zinc	307

Baker
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NOTES
1) SAMPLES LOCATED BY GPS (BAKER, 11/99)
2) EDGE OF POND LOCATION APPROXIMATE

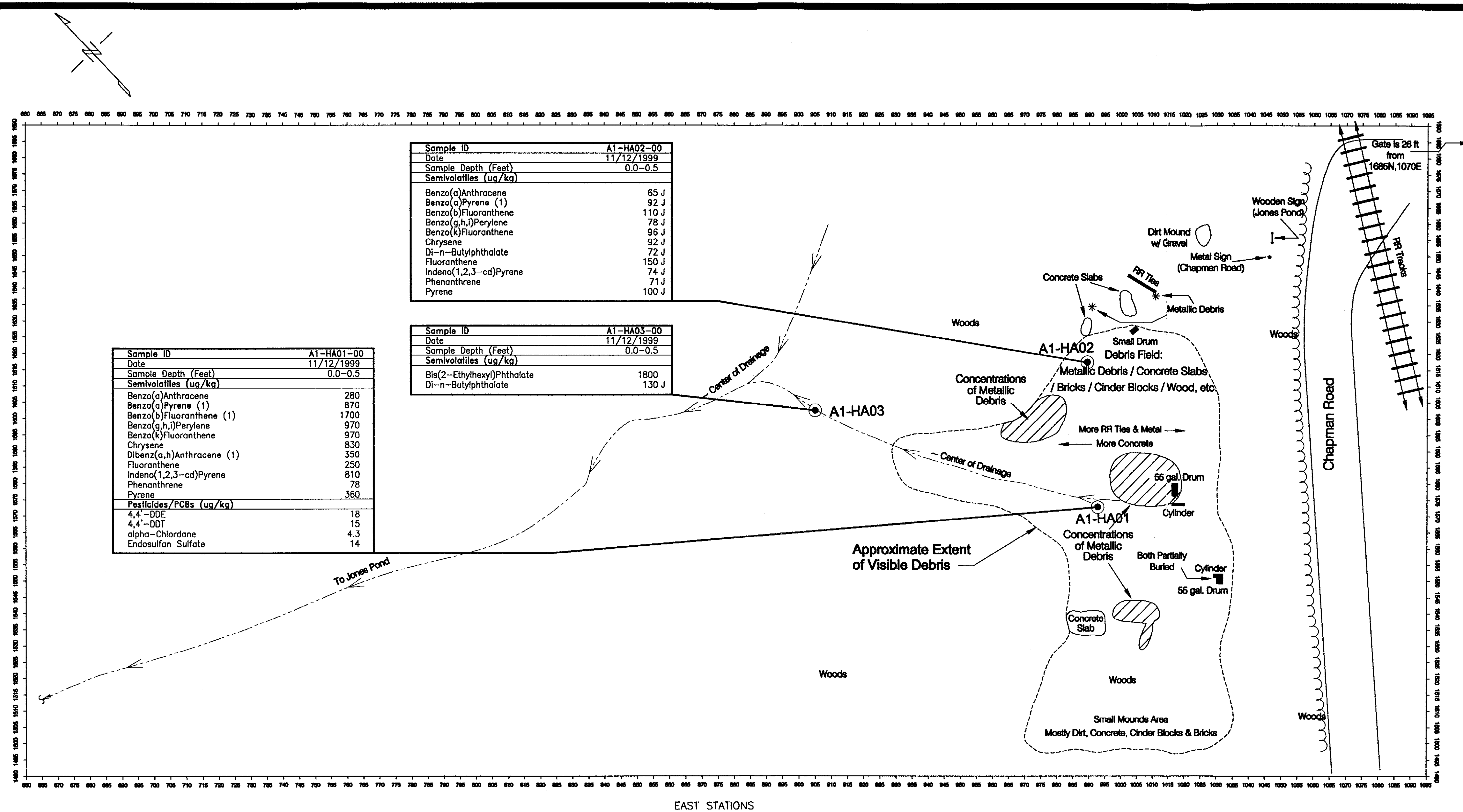
SOURCE: NAVFAC DRAWING 4255914 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 3".

LEGEND

■ - DROP INLET
NF - NOT FOUND
- OVERLAND FLOW DIRECTION
CMP - CORRUGATED METAL PIPE
⊞ - SEDIMENT SAMPLE LOCATION
- DRAINAGE CHANNEL WITH FLOW DIRECTION

mg/kg - MILLIGRAMS PER KILOGRAM
J - ESTIMATED VALUE
L - ESTIMATED VALUE, BIASED LOW
(1) - EXCEEDS RBC VALUE

FIGURE 4-6
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SEDIMENT
SITE 4
CTO - 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



Sample ID	A1-HA02-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	65 J
Benzo(a)Pyrene (1)	92 J
Benzo(b)Fluoranthene	110 J
Benzo(g,h,i)Perylene	78 J
Benzo(k)Fluoranthene	96 J
Chrysene	92 J
Di-n-Butylphthalate	72 J
Fluoranthene	150 J
Indeno(1,2,3-cd)Pyrene	74 J
Phenanthrene	71 J
Pyrene	100 J

Sample ID	A1-HA03-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Semivolatiles (ug/kg)	
Bis(2-Ethylhexyl)Phthalate	1800
Di-n-Butylphthalate	130 J

Sample ID	A1-HA01-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Semivolatiles (ug/kg)	
Benzo(a)Anthracene	280
Benzo(a)Pyrene (1)	870
Benzo(b)Fluoranthene (1)	1700
Benzo(g,h,i)Perylene	970
Benzo(k)Fluoranthene	970
Chrysene	830
Dibenz(a,h)Anthracene (1)	350
Fluoranthene	250
Indeno(1,2,3-cd)Pyrene	810
Phenanthrene	78
Pyrene	360
Pesticides/PCBs (ug/kg)	
4,4'-DDE	18
4,4'-DDT	15
alpha-Chlordane	4.3
Endosulfan Sulfate	14

LEGEND

◉ - HAND AUGER BORING LOCATION

⌒⌒⌒ - TREE LINE

ug/kg - MICROGRAMS PER KILOGRAM

J - ESTIMATED VALUE

(1) - EXCEEDS RBC VALUE

30 0 15 30

1 inch = 30 ft.

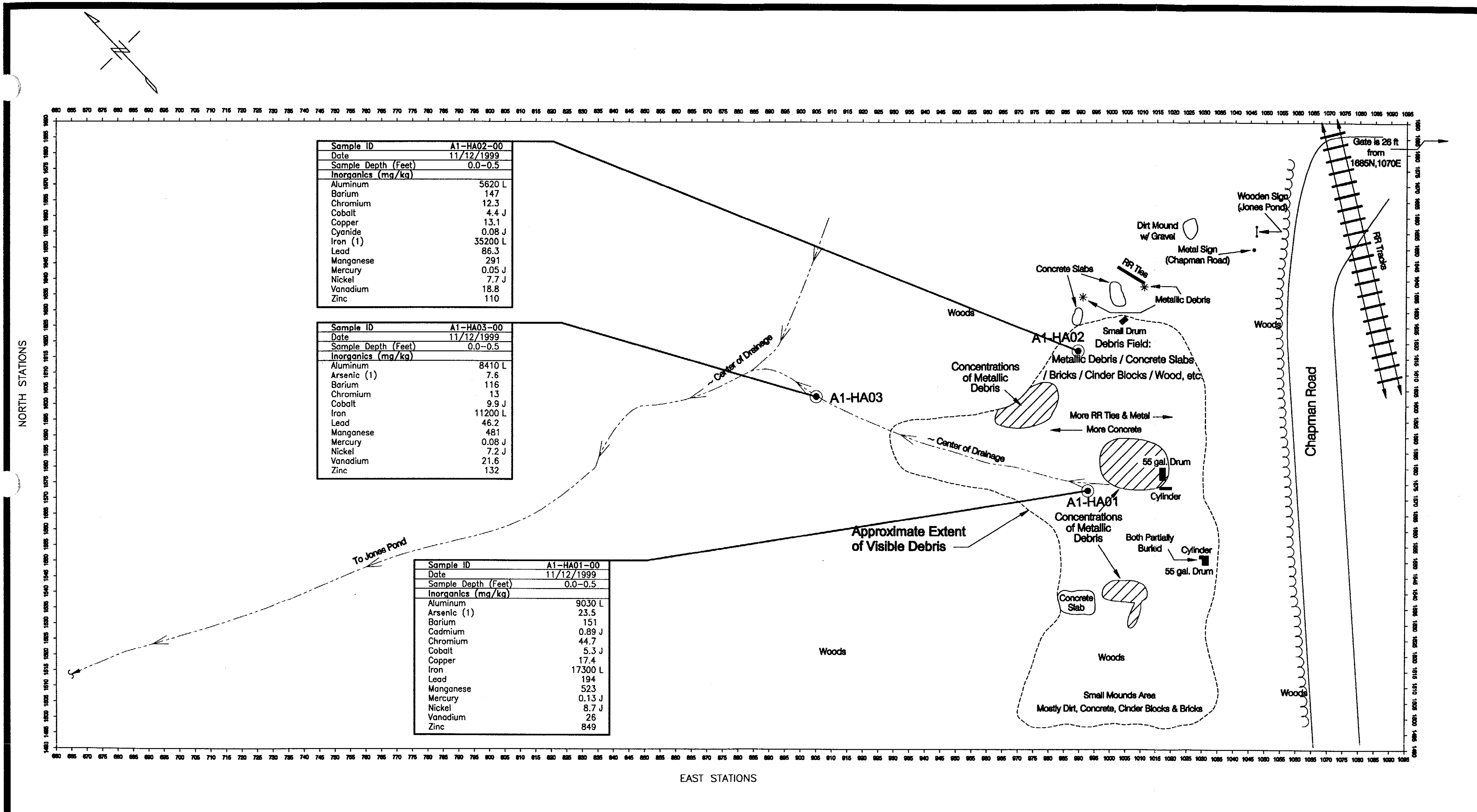
2104557M

Baker

Baker Environmental, Inc.

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-7
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SURFACE SOIL
AOC 1 (NORTH AREA)
CTO - 0104
NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



Sample ID	A1-HA02-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	5620 L
Barium	147
Chromium	12.3
Cobalt	4.4 J
Copper	13.1
Cyanide	0.08 J
Iron (1)	35200 L
Lead	86.3
Manganese	291
Mercury	0.05 J
Nickel	7.7 J
Vanadium	18.8
Zinc	110

Sample ID	A1-HA03-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	8410 L
Arsenic (1)	7.6
Barium	116
Chromium	13
Cobalt	9.9 J
Iron	11200 L
Lead	46.2
Manganese	481
Mercury	0.08 J
Nickel	7.2 J
Vanadium	21.6
Zinc	132

Sample ID	A1-HA01-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	9030 L
Arsenic (1)	23.5
Barium	151
Cadmium	0.89 J
Chromium	44.7
Cobalt	5.3 J
Copper	17.4
Iron	17300 L
Lead	194
Manganese	523
Mercury	0.13 J
Nickel	8.7 J
Vanadium	26
Zinc	849

30 0 15 30
1 inch = 30 ft.

2104555M

Baker
Baker Environmental, Inc.

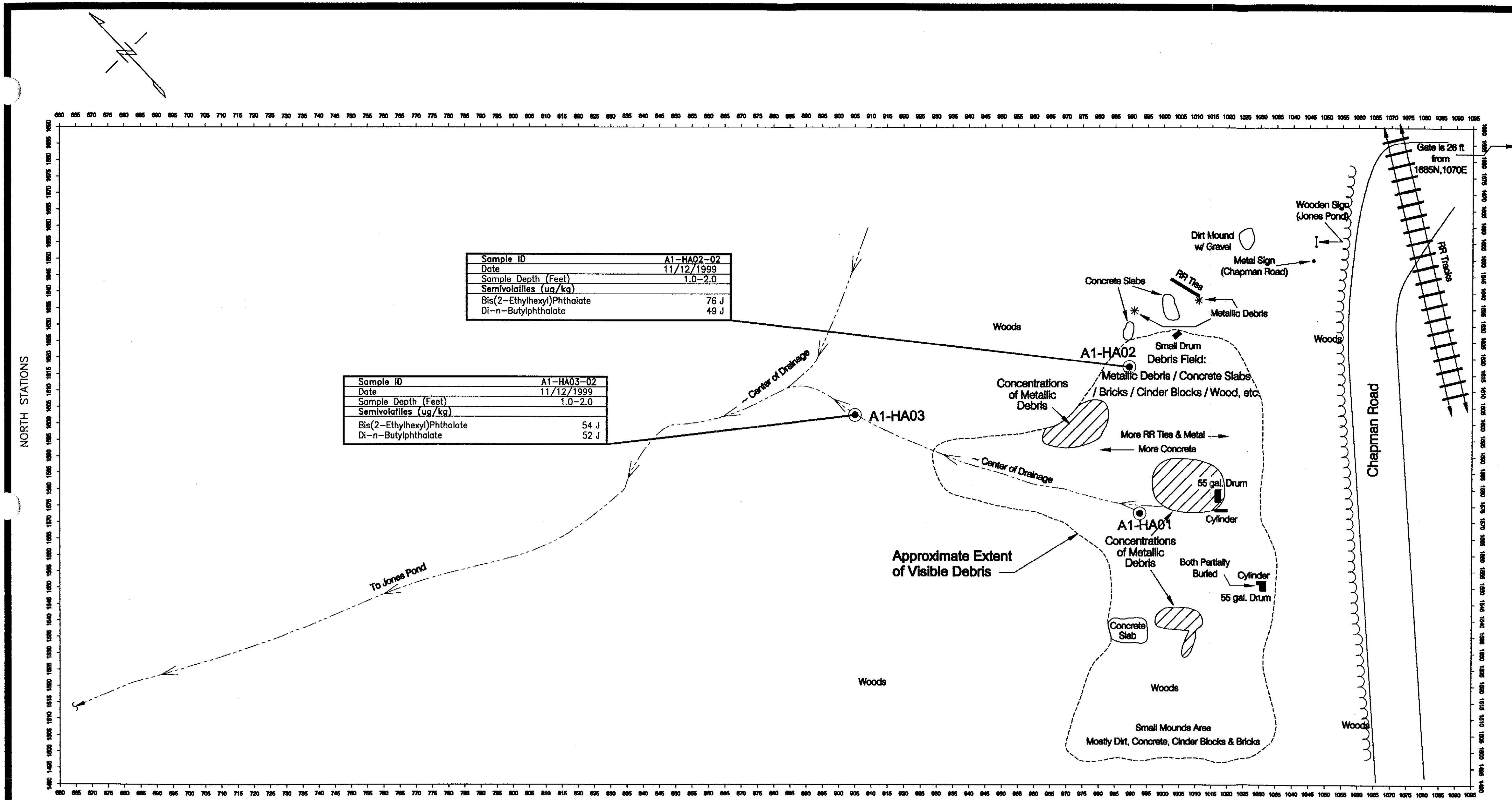
- HAND AUGER BORING LOCATION
- TREE LINE

LEGEND

mg/kg - MILLIGRAMS PER KILOGRAM
J - ESTIMATED VALUE
L - ESTIMATED VALUE, BIASED LOW
(1) - EXCEEDS RBC VALUE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-8
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SURFACE SOIL
AOC 1 (NORTH AREA)
CTO - 0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



Sample ID	A1-HA02-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Semivolatiles (ug/kg)	
Bis(2-Ethylhexyl)Phthalate	76 J
Di-n-Butylphthalate	49 J

Sample ID	A1-HA03-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Semivolatiles (ug/kg)	
Bis(2-Ethylhexyl)Phthalate	54 J
Di-n-Butylphthalate	52 J

NOTE: NO SUBSURFACE SOIL SAMPLE COLLECTED AT A1-HA01 DUE TO OBSTRUCTION

LEGEND

◉ - HAND AUGER BORING LOCATION

⌒⌒⌒ - TREE LINE

ug/kg - MICROGRAMS PER KILOGRAM

J - ESTIMATED VALUE

30 0 15 30

1 inch = 30 ft.

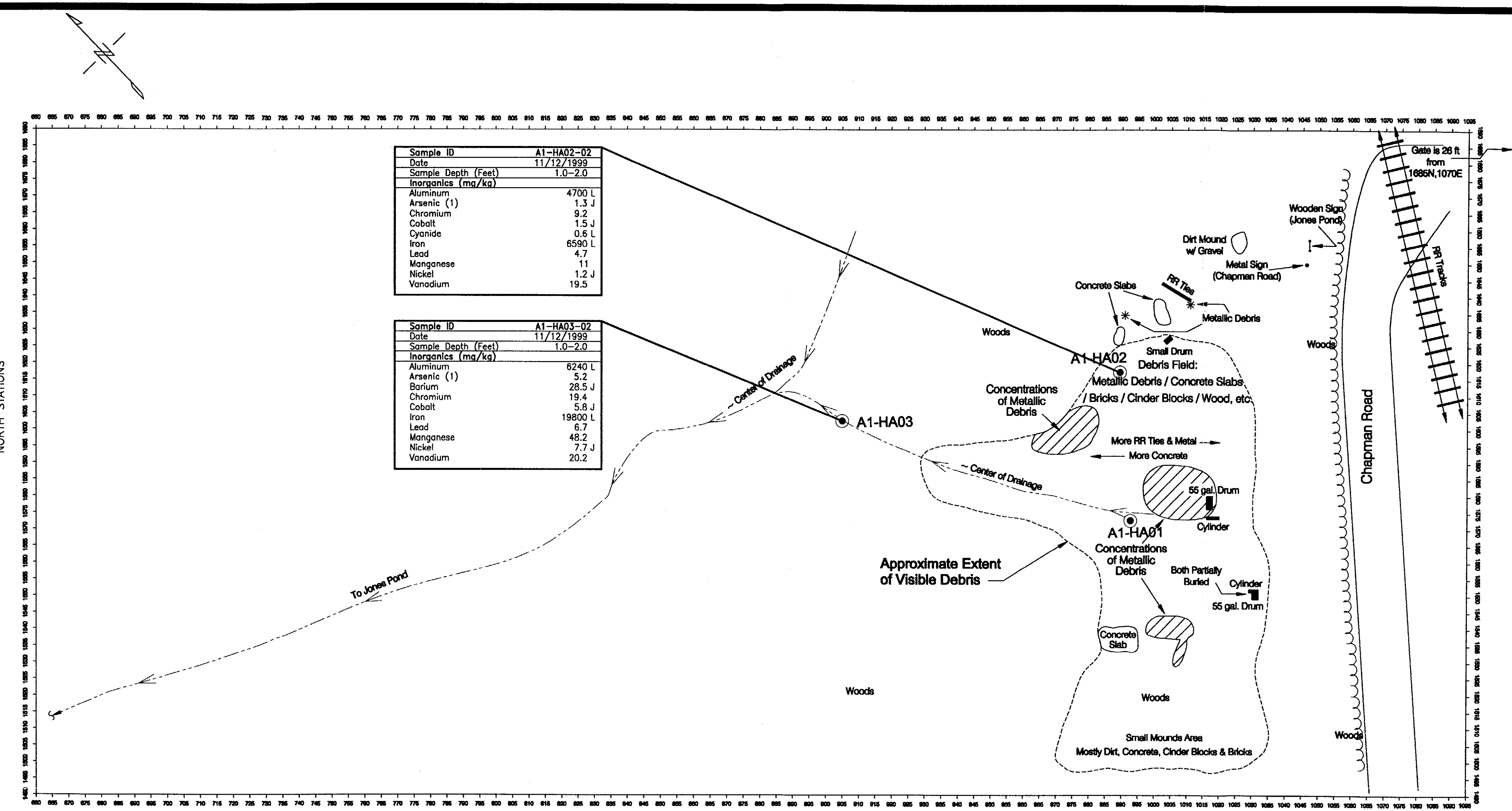
2104549M

Baker

Baker Environmental, Inc.

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-9
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SUBSURFACE SOIL
AOC 1 (NORTH AREA)
CTO - 0104
NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



Sample ID	A1-HA02-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Inorganics (mg/kg)	
Aluminum	4700 L
Arsenic (1)	1.3 J
Chromium	9.2
Cobalt	1.5 J
Cyanide	0.6 L
Iron	6590 L
Lead	4.7
Manganese	11
Nickel	1.2 J
Vanadium	19.5

Sample ID	A1-HA03-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Inorganics (mg/kg)	
Aluminum	6240 L
Arsenic (1)	5.2
Barium	28.5 J
Chromium	19.4
Cobalt	5.8 J
Iron	19800 L
Lead	6.7
Manganese	48.2
Nickel	7.7 J
Vanadium	20.2

NOTE: NO SUBSURFACE SOIL SAMPLE COLLECTED AT A1-HA01 DUE TO OBSTRUCTION

LEGEND

◉ - HAND AUGER BORING LOCATION

⌒⌒⌒ - TREE LINE

mg/kg - MILLIGRAMS PER KILOGRAM

J - ESTIMATED VALUE

L - ESTIMATED VALUE, BIASED LOW

(1) - EXCEEDS RBC VALUE

30 0 15 30

1 inch = 30 ft.

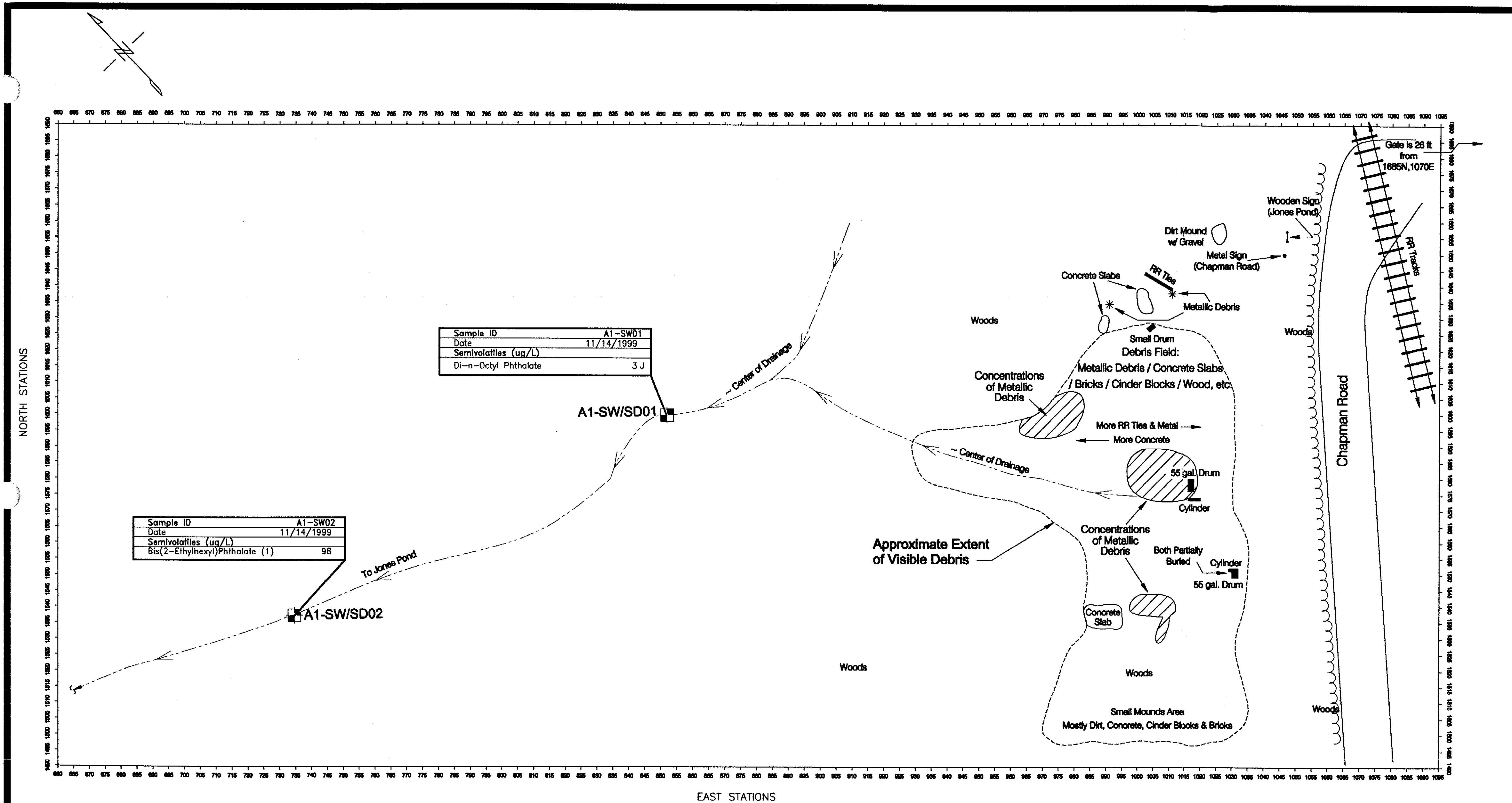
2104547M

Baker

Baker Environmental, Inc.

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-10
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SUBSURFACE SOIL
AOC 1 (NORTH AREA)
CTO - 0104
NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



30 0 15 30

1 inch = 30 ft.

2104566M

Baker

Baker Environmental, Inc.

LEGEND

- SURFACE WATER/SEDIMENT SAMPLE LOCATION
- TREE LINE

LEGEND

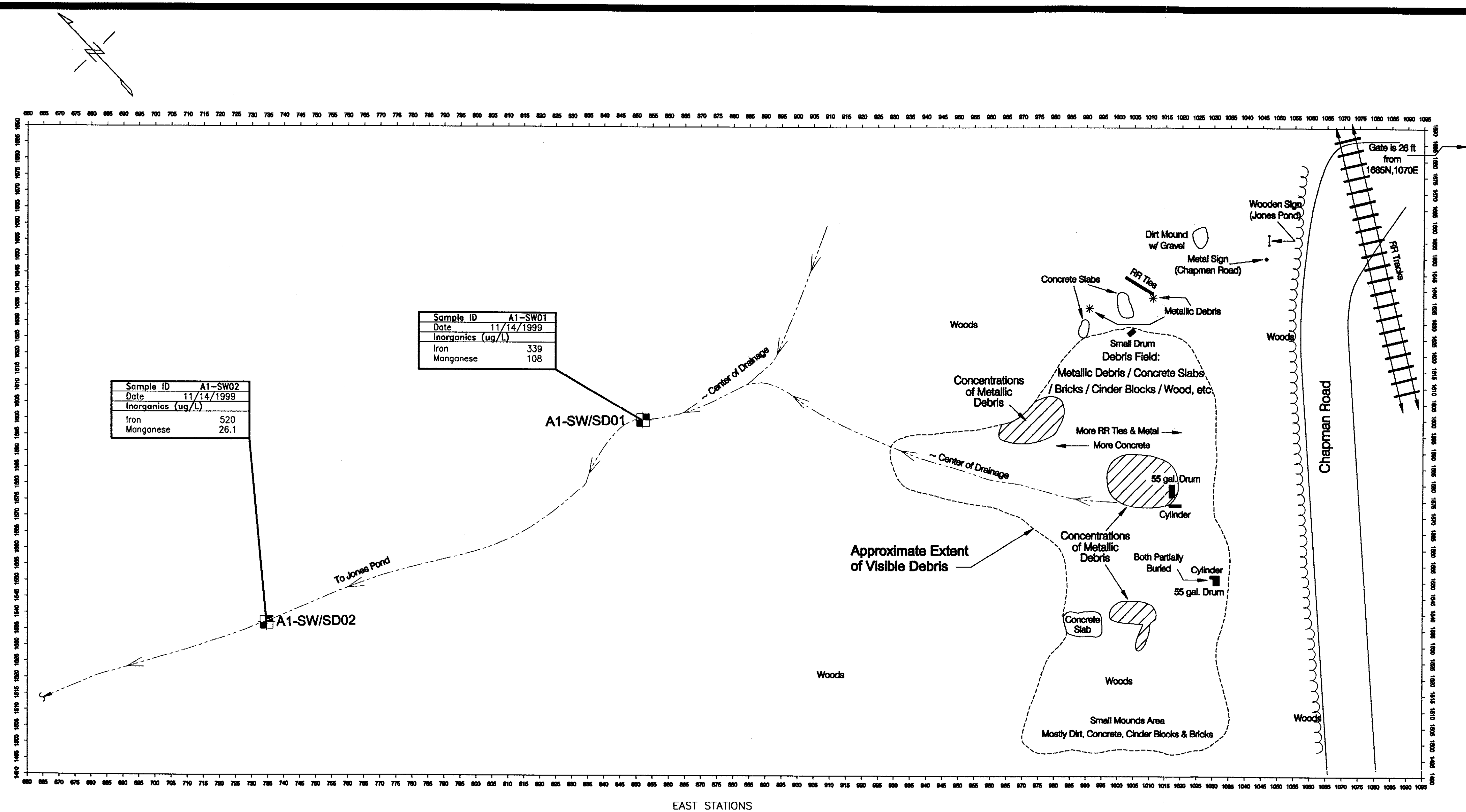
ug/L - MICROGRAMS PER LITER

J - ESTIMATED VALUE

(1) - EXCEEDS RBC VALUE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-11
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SURFACE WATER
AOC 1 (NORTH AREA)
CTO - 0104
NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



LEGEND

- SURFACE WATER/ SEDIMENT SAMPLE LOCATION
- TREE LINE

ug/L - MICROGRAMS PER LITER
J - ESTIMATED VALUE

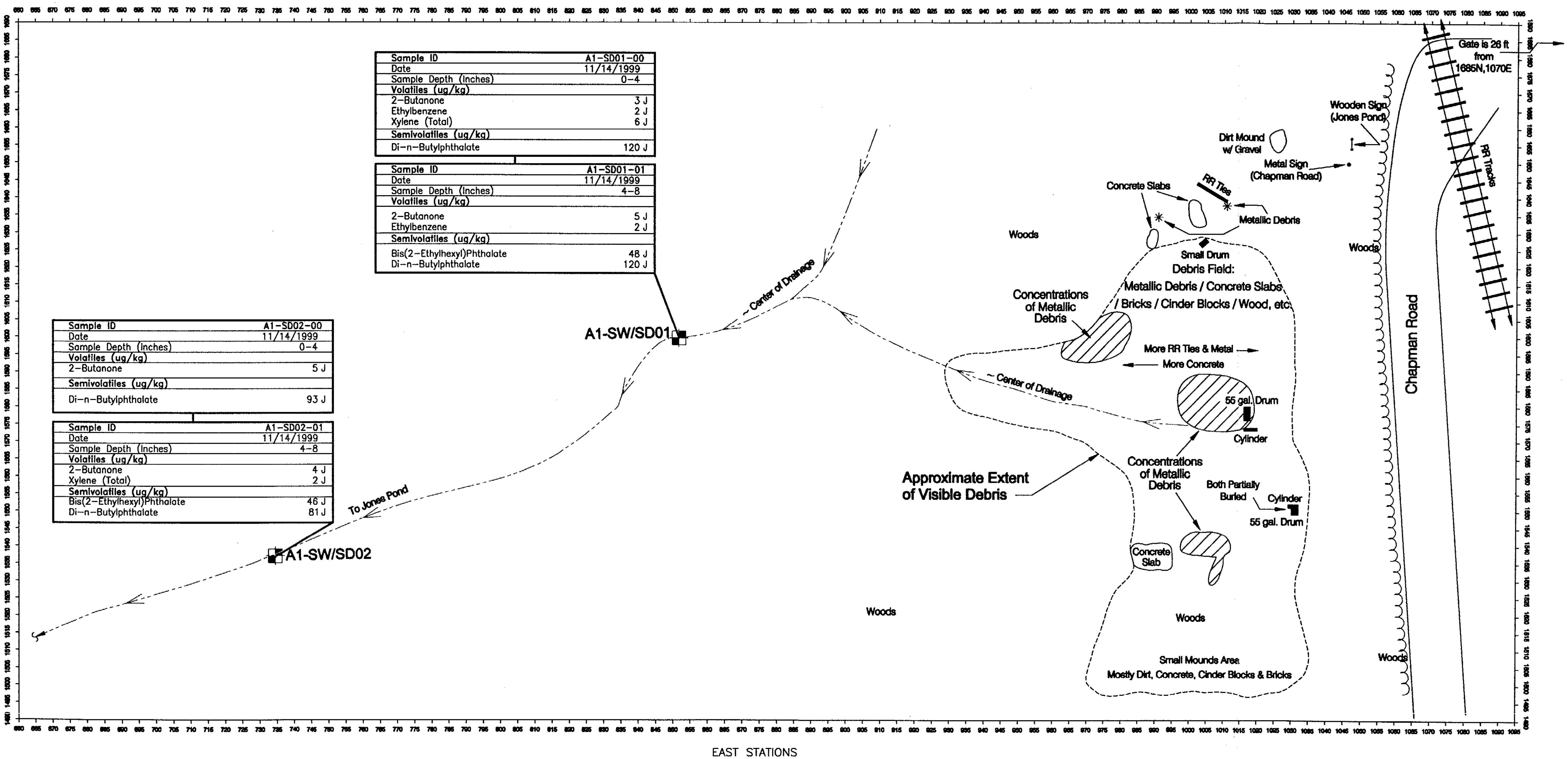
30 0 15 30
1 inch = 30 ft.

2104559M

Baker
Baker Environmental, Inc.

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-12
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SURFACE WATER
AOC 1 (NORTH AREA)
CTO - 0104
NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



Sample ID	A1-SD01-00
Date	11/14/1999
Sample Depth (Inches)	0-4
Volatiles (ug/kg)	
2-Butanone	3 J
Ethylbenzene	2 J
Xylene (Total)	6 J
Semivolatiles (ug/kg)	
Di-n-Butylphthalate	120 J

Sample ID	A1-SD01-01
Date	11/14/1999
Sample Depth (Inches)	4-8
Volatiles (ug/kg)	
2-Butanone	5 J
Ethylbenzene	2 J
Semivolatiles (ug/kg)	
Bis(2-Ethylhexyl)Phthalate	48 J
Di-n-Butylphthalate	120 J

Sample ID	A1-SD02-00
Date	11/14/1999
Sample Depth (Inches)	0-4
Volatiles (ug/kg)	
2-Butanone	5 J
Semivolatiles (ug/kg)	
Di-n-Butylphthalate	93 J

Sample ID	A1-SD02-01
Date	11/14/1999
Sample Depth (Inches)	4-8
Volatiles (ug/kg)	
2-Butanone	4 J
Xylene (Total)	2 J
Semivolatiles (ug/kg)	
Bis(2-Ethylhexyl)Phthalate	46 J
Di-n-Butylphthalate	81 J

30 0 15 30
1 inch = 30 ft.
2104553M

Baker
Baker Environmental, Inc.

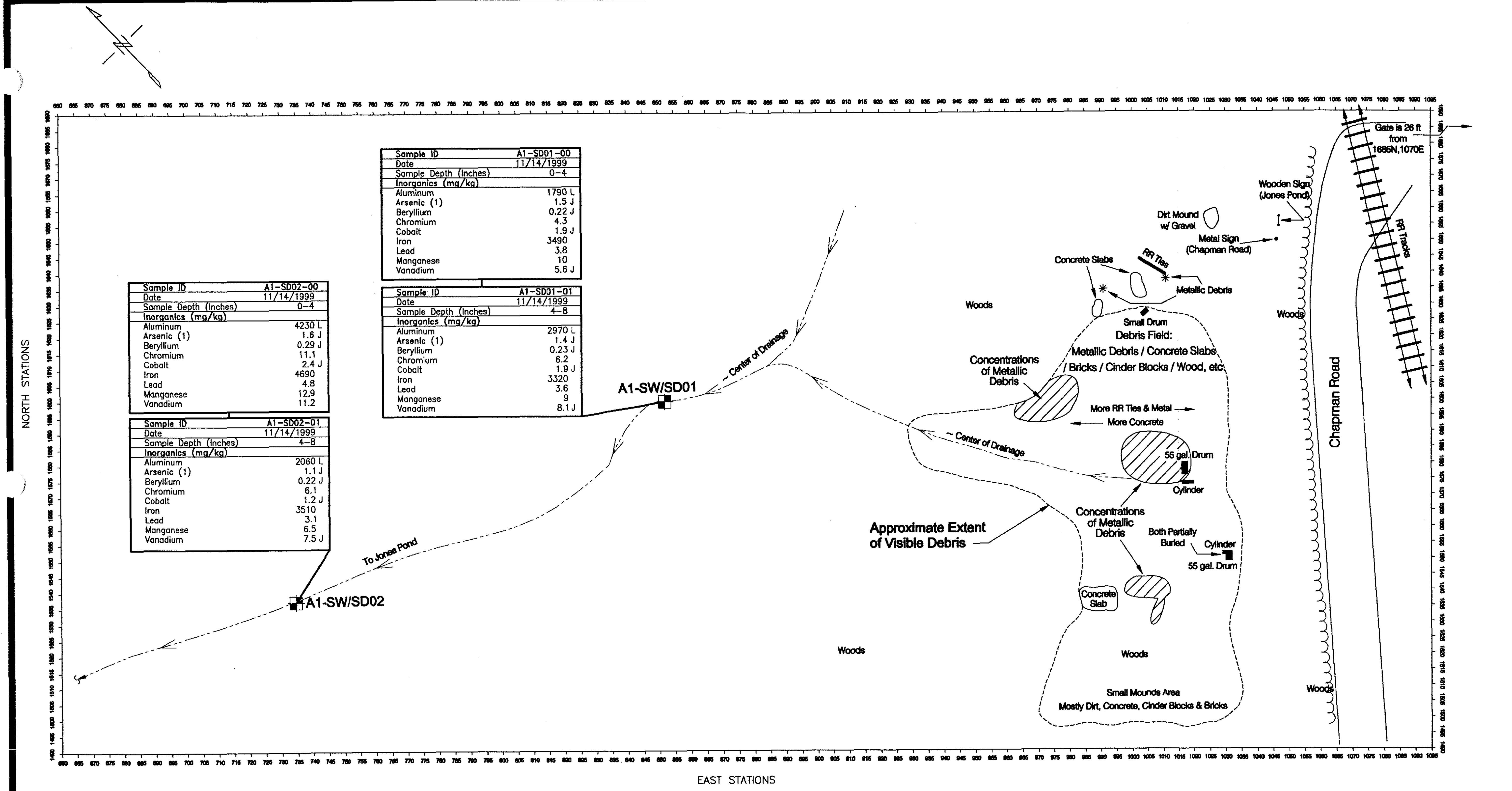
LEGEND

- SURFACE WATER/ SEDIMENT SAMPLE LOCATION
- TREE LINE

ug/kg - MICROGRAMS PER KILOGRAM
J - ESTIMATED VALUE

SOURCE: NAEVA GEOPHYSICS, INC., 11/99

FIGURE 4-13
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SEDIMENT
AOC 1 (NORTH AREA)
CTO - 0104
NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE



Sample ID	A1-SD01-00
Date	11/14/1999
Sample Depth (Inches)	0-4
Inorganics (mg/kg)	
Aluminum	1790 L
Arsenic (1)	1.5 J
Beryllium	0.22 J
Chromium	4.3
Cobalt	1.9 J
Iron	3490
Lead	3.8
Manganese	10
Vanadium	5.6 J

Sample ID	A1-SD01-01
Date	11/14/1999
Sample Depth (Inches)	4-8
Inorganics (mg/kg)	
Aluminum	2970 L
Arsenic (1)	1.4 J
Beryllium	0.23 J
Chromium	6.2
Cobalt	1.9 J
Iron	3320
Lead	3.6
Manganese	9
Vanadium	8.1 J

Sample ID	A1-SD02-00
Date	11/14/1999
Sample Depth (Inches)	0-4
Inorganics (mg/kg)	
Aluminum	4230 L
Arsenic (1)	1.6 J
Beryllium	0.29 J
Chromium	11.1
Cobalt	2.4 J
Iron	4690
Lead	4.8
Manganese	12.9
Vanadium	11.2

Sample ID	A1-SD02-01
Date	11/14/1999
Sample Depth (Inches)	4-8
Inorganics (mg/kg)	
Aluminum	2060 L
Arsenic (1)	1.1 J
Beryllium	0.22 J
Chromium	6.1
Cobalt	1.2 J
Iron	3510
Lead	3.1
Manganese	6.5
Vanadium	7.5 J

LEGEND

- SURFACE WATER/ SEDIMENT SAMPLE LOCATION
- TREE LINE

mg/kg - MILLIGRAMS PER KILOGRAM
J - ESTIMATED VALUE
L - ESTIMATED VALUE, BIASED LOW
(1) - EXCEEDS RBC VALUE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

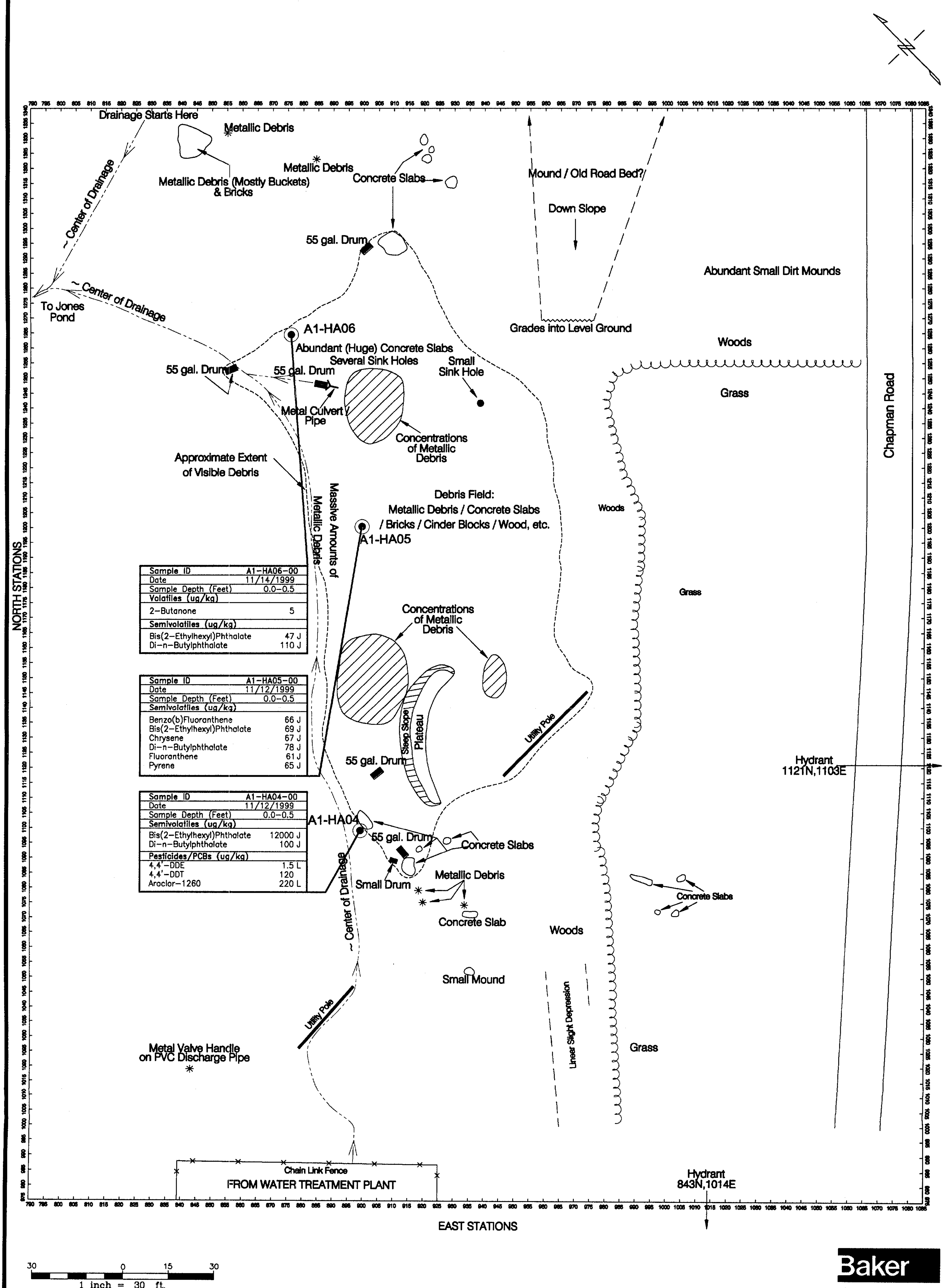
30 0 15 30
1 inch = 30 ft.

2104551M

Baker
Baker Environmental, Inc.

FIGURE 4-14
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SEDIMENT
AOC 1 (NORTH AREA)
CTO - 0104
NAVAL WEAPONS STATION YORTOWN
YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

2104558M



Sample ID	A1-HA06-00
Date	11/14/1999
Sample Depth (Feet)	0.0-0.5
Volatiles (ug/kg)	
2-Butanone	5
Semivolatiles (ug/kg)	
Bis(2-Ethylhexyl)Phthalate	47 J
Di-n-Butylphthalate	110 J

Sample ID	A1-HA05-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Semivolatiles (ug/kg)	
Benzo(b)Fluoranthene	66 J
Bis(2-Ethylhexyl)Phthalate	69 J
Chrysene	67 J
Di-n-Butylphthalate	78 J
Fluoranthene	61 J
Pyrene	65 J

Sample ID	A1-HA04-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Semivolatiles (ug/kg)	
Bis(2-Ethylhexyl)Phthalate	12000 J
Di-n-Butylphthalate	100 J
Pesticides/PCBs (ug/kg)	
4,4'-DDE	1.5 L
4,4'-DDT	120
Aroclor-1260	220 L

Baker
Baker Environmental, Inc.

LEGEND

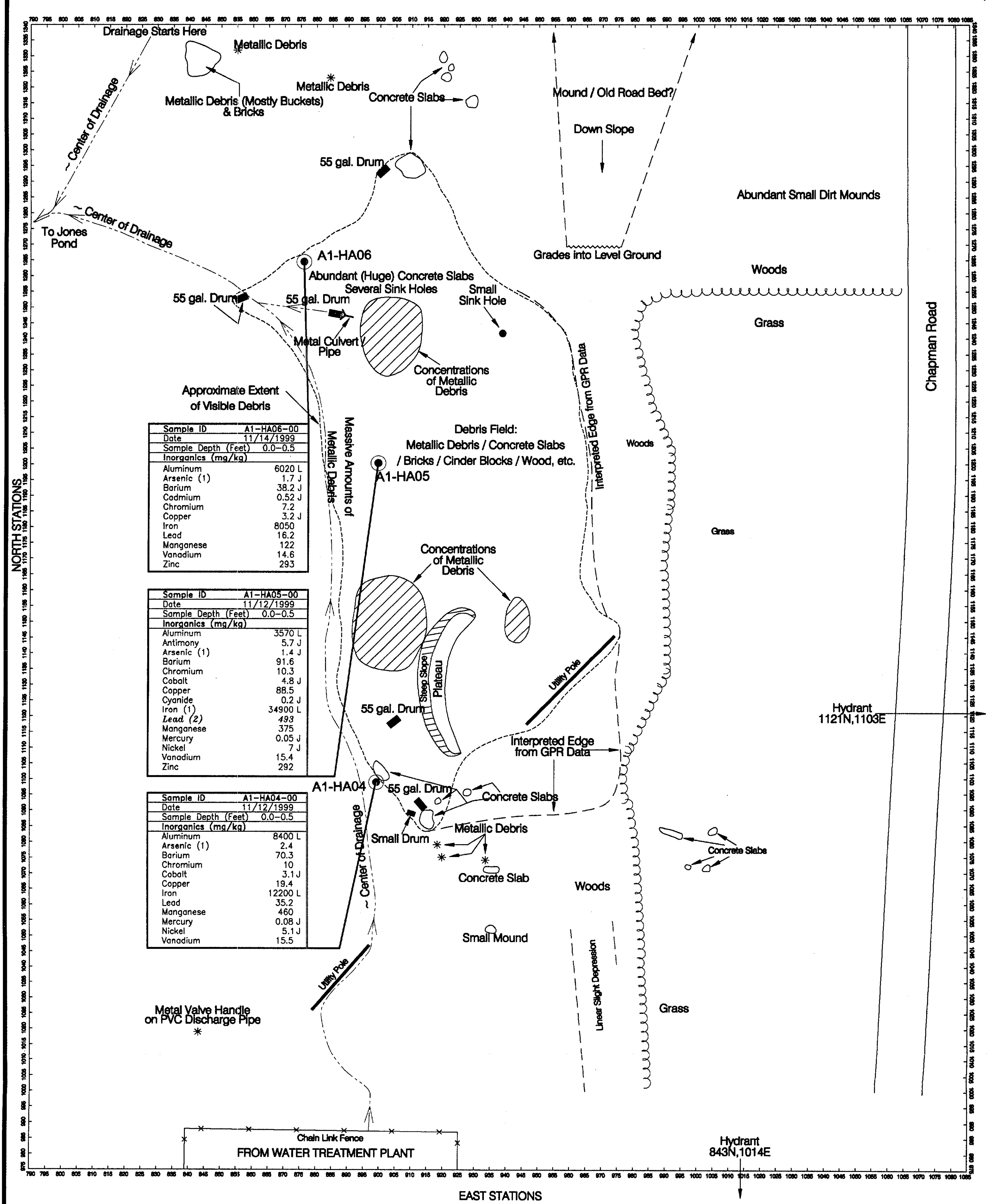
- TREE LINE
- HAND AUGER BORING LOCATION

ug/kg - MICROGRAMS PER KILOGRAM
J - ESTIMATED VALUE
L - ESTIMATED VALUE, BIASED LOW

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-15
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SURFACE SOIL
AOC 1 (SOUTH AREA)
CTO-0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE

2104556M



Sample ID	A1-HA06-00
Date	11/14/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	6020 L
Arsenic (1)	1.7 J
Barium	38.2 J
Cadmium	0.52 J
Chromium	7.2
Copper	3.2 J
Iron	8050
Lead	16.2
Manganese	122
Vanadium	14.6
Zinc	293

Sample ID	A1-HA05-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	3570 L
Antimony	5.7 J
Arsenic (1)	1.4 J
Barium	91.6
Chromium	10.3
Cobalt	4.8 J
Copper	88.5
Cyanide	0.2 J
Iron (1)	34900 L
Lead (2)	*493*
Manganese	375
Mercury	0.05 J
Nickel	7 J
Vanadium	15.4
Zinc	292

Sample ID	A1-HA04-00
Date	11/12/1999
Sample Depth (Feet)	0.0-0.5
Inorganics (mg/kg)	
Aluminum	8400 L
Arsenic (1)	2.4
Barium	70.3
Chromium	10
Cobalt	3.1 J
Copper	19.4
Iron	12200 L
Lead	35.2
Manganese	460
Mercury	0.08 J
Nickel	5.1 J
Vanadium	15.5

30 0 15 30
1 inch = 30 ft.

Baker
Baker Environmental, Inc.

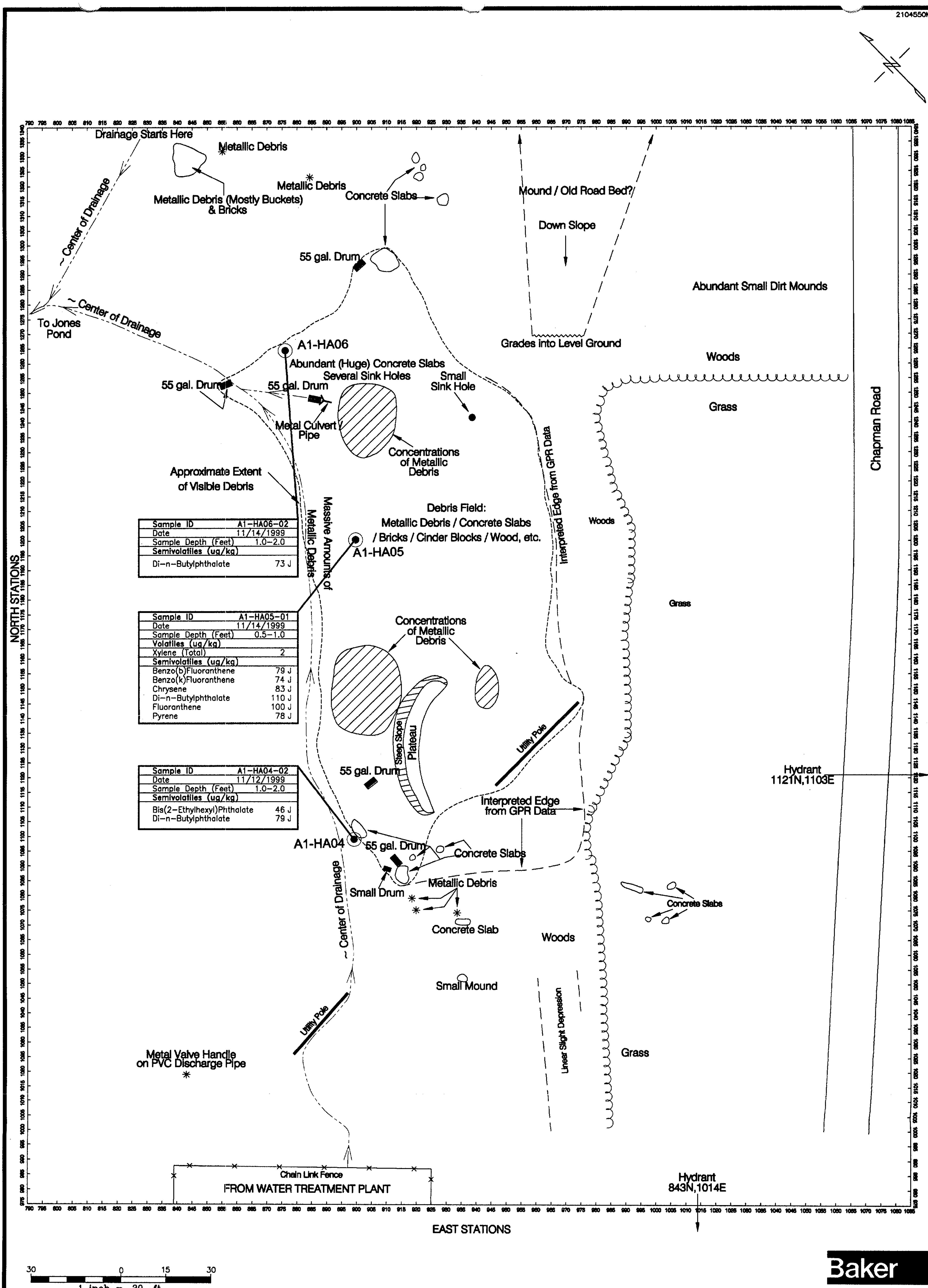
LEGEND

- TREE LINE
- HAND AUGER BORING LOCATION

mg/kg - MILLIGRAMS PER KILOGRAM
J - ESTIMATED VALUE
L - ESTIMATED VALUE, BIASED LOW
(1) - EXCEEDS RBC VALUE
(2) - EXCEEDS ACTION LEVEL FOR SOIL

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-16
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SURFACE SOIL
AOC 1 (SOUTH AREA)
CTO-0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE



Sample ID	A1-HA06-02
Date	11/14/1999
Sample Depth (Feet)	1.0-2.0
Semivolatiles (ug/kg)	
Di-n-Butylphthalate	73 J

Sample ID	A1-HA05-01
Date	11/14/1999
Sample Depth (Feet)	0.5-1.0
Volatiles (ug/kg)	
Xylene (Total)	2
Semivolatiles (ug/kg)	
Benzo(b)Fluoranthene	79 J
Benzo(k)Fluoranthene	74 J
Chrysene	83 J
Di-n-Butylphthalate	110 J
Fluoranthene	100 J
Pyrene	78 J

Sample ID	A1-HA04-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Semivolatiles (ug/kg)	
Bis(2-Ethylhexyl)Phthalate	46 J
Di-n-Butylphthalate	79 J

LEGEND

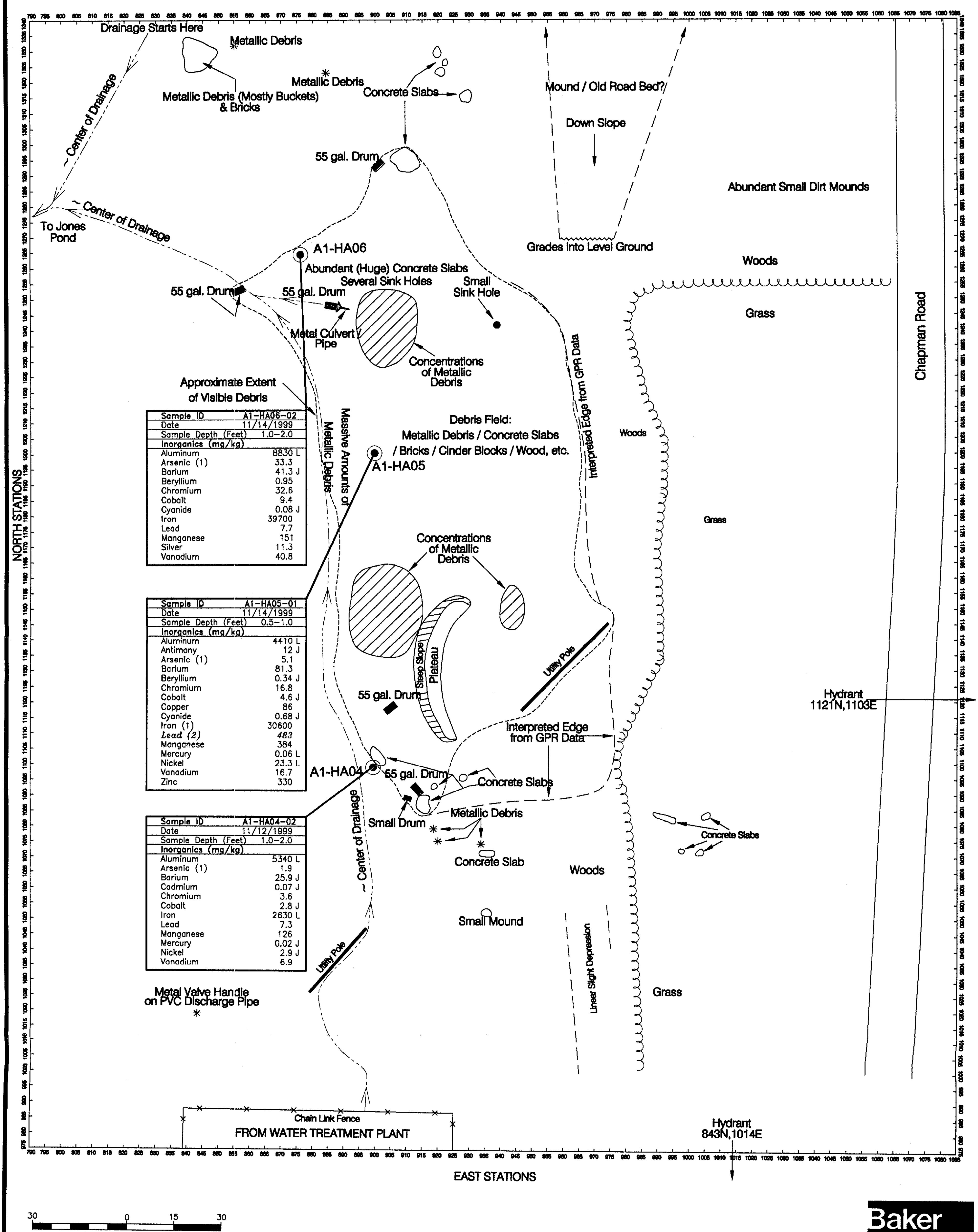
- TREE LINE
- HAND AUGER BORING LOCATION

ug/kg - MICROGRAMS PER KILOGRAM
J - ESTIMATED VALUE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-17
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SUBSURFACE SOIL
AOC 1 (SOUTH AREA)
CTO-0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE

2104548M



Sample ID	A1-HA06-02
Date	11/14/1999
Sample Depth (Feet)	1.0-2.0
Inorganics (mg/kg)	
Aluminum	8830 L
Arsenic (1)	33.3
Barium	41.3 J
Beryllium	0.95
Chromium	32.6
Cobalt	9.4
Cyanide	0.08 J
Iron	39700
Lead	7.7
Manganese	151
Silver	11.3
Vanadium	40.8

Sample ID	A1-HA05-01
Date	11/14/1999
Sample Depth (Feet)	0.5-1.0
Inorganics (mg/kg)	
Aluminum	4410 L
Antimony	12 J
Arsenic (1)	5.1
Barium	81.3
Beryllium	0.34 J
Chromium	16.8
Cobalt	4.6 J
Copper	86
Cyanide	0.68 J
Iron (1)	30600
Lead (2)	*483*
Manganese	384
Mercury	0.06 L
Nickel	23.3 L
Vanadium	16.7
Zinc	330

Sample ID	A1-HA04-02
Date	11/12/1999
Sample Depth (Feet)	1.0-2.0
Inorganics (mg/kg)	
Aluminum	5340 L
Arsenic (1)	1.9
Barium	25.9 J
Cadmium	0.07 J
Chromium	3.6
Cobalt	2.8 J
Iron	2630 L
Lead	7.3
Manganese	126
Mercury	0.02 J
Nickel	2.9 J
Vanadium	6.9

Baker
Baker Environmental, Inc.

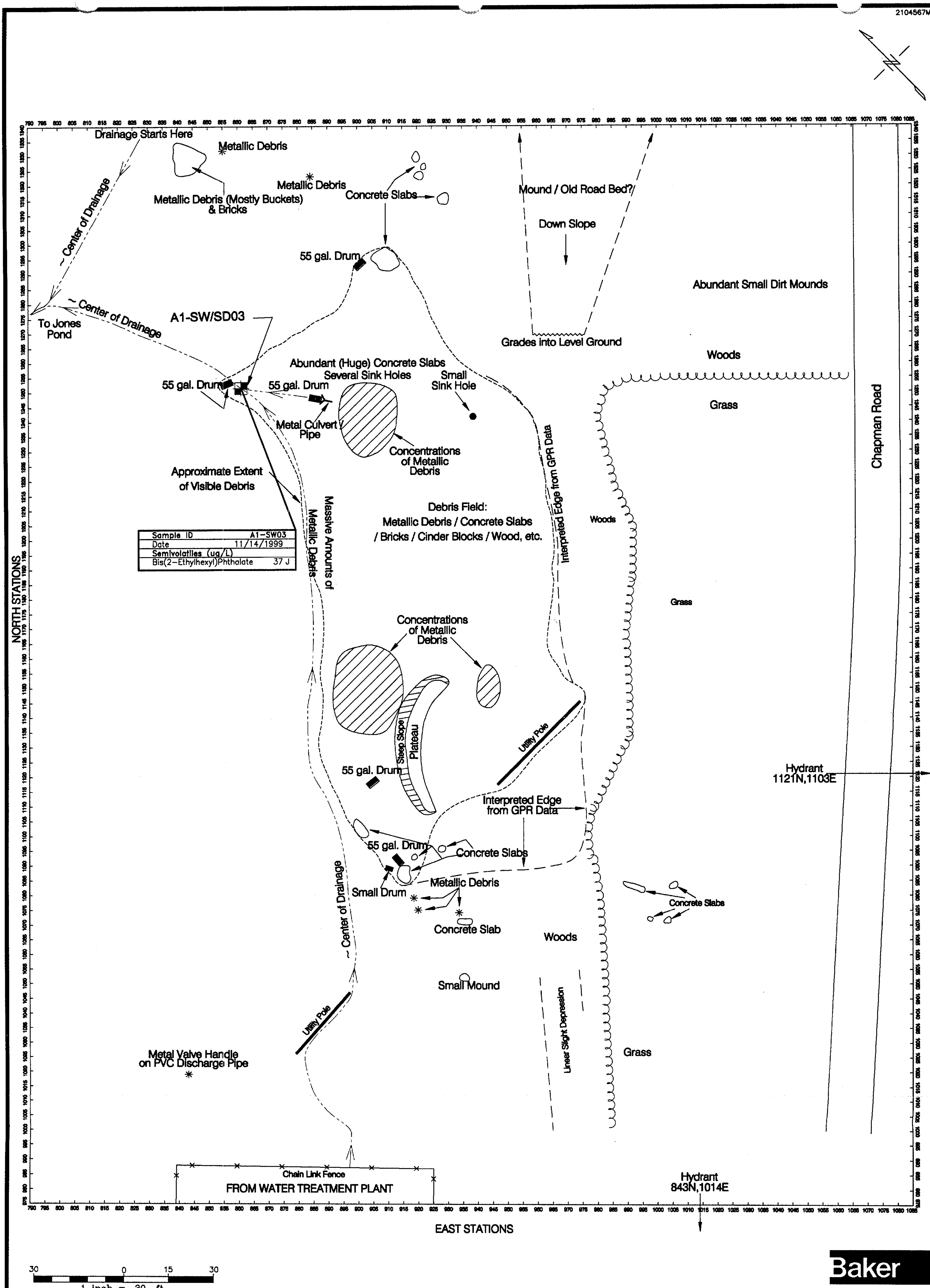
LEGEND

- TREE LINE
◉ - HAND AUGER BORING LOCATION

ug/kg - MICROGRAMS PER KILOGRAM
J - ESTIMATED VALUE
L - ESTIMATED VALUE, BIASED LOW
(1) - EXCEEDS RBC VALUE
(2) - EXCEEDS ACTION LEVEL FOR SOIL

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-18
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SUBSURFACE SOIL
AOC 1 (SOUTH AREA)
CTO-0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE

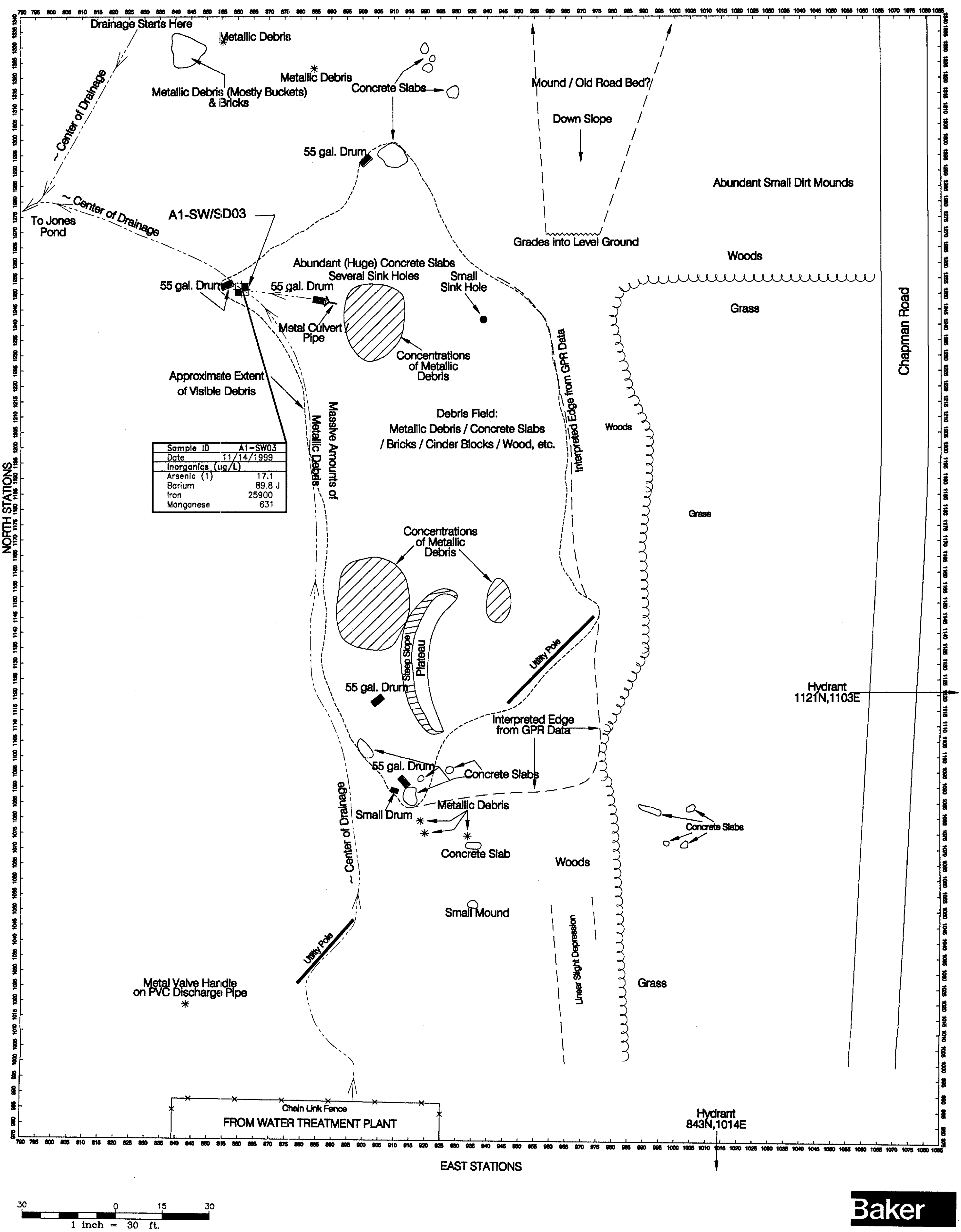


LEGEND

- TREE LINE
- SURFACE WATER/ SEDIMENT SAMPLE LOCATION
- ug/L - MICROGRAMS PER LITER
- J - ESTIMATED VALUE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-19
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SURFACE WATER
AOC 1 (SOUTH AREA)
CTO-0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE



Sample ID	A1-SW03
Date	11/14/1999
Inorganics (ug/L)	
Arsenic (1)	17.1
Barium	89.8 J
Iron	25900
Manganese	631

Baker
Baker Environmental, Inc.

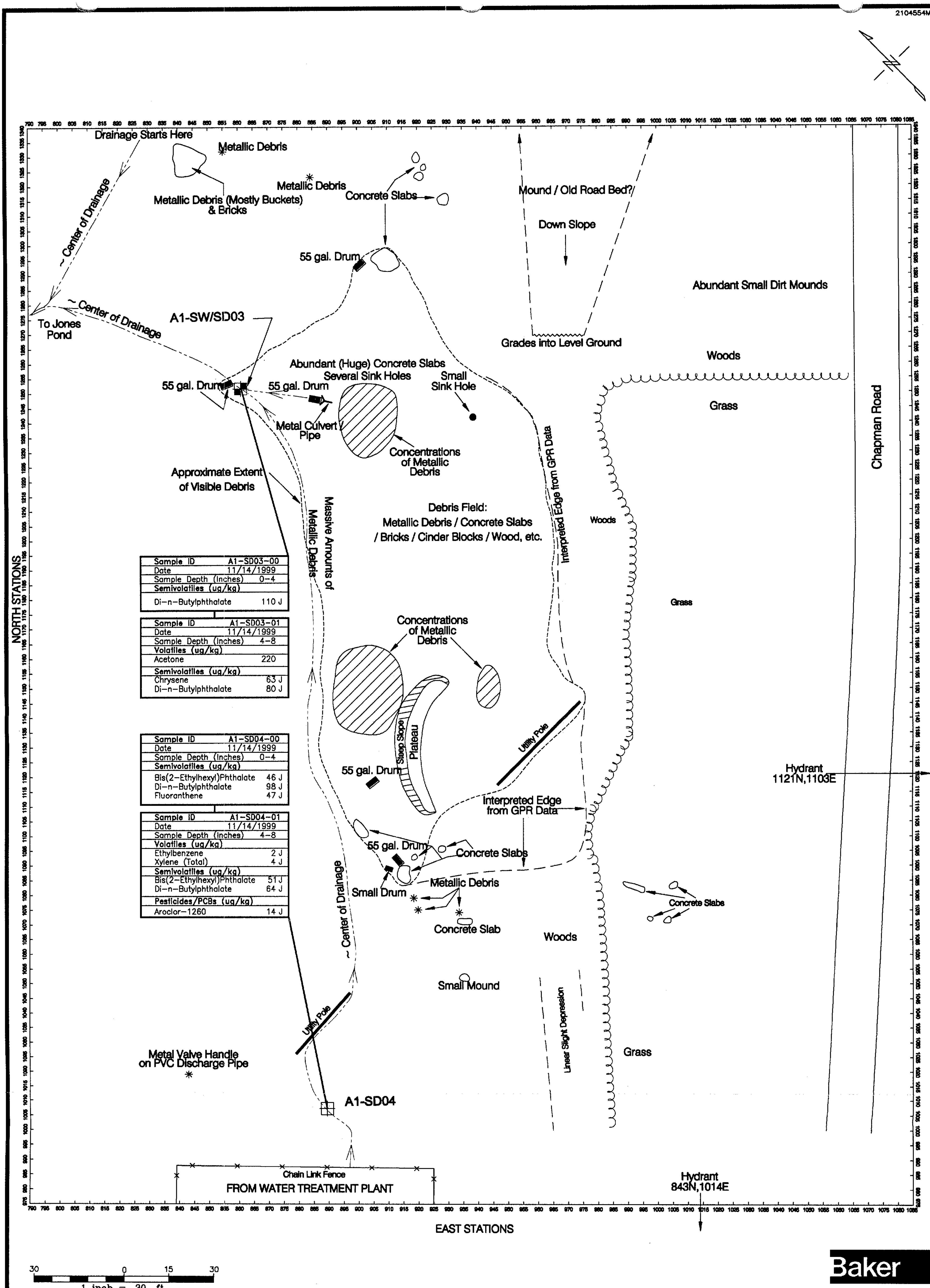
LEGEND

- TREE LINE
- SURFACE WATER/ SEDIMENT SAMPLE LOCATION

ug/L - MICROGRAMS PER LITER
J - ESTIMATED VALUE
(1) - EXCEEDS RBC VALUE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-20
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SURFACE WATER
AOC 1 (SOUTH AREA)
CTO-0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE



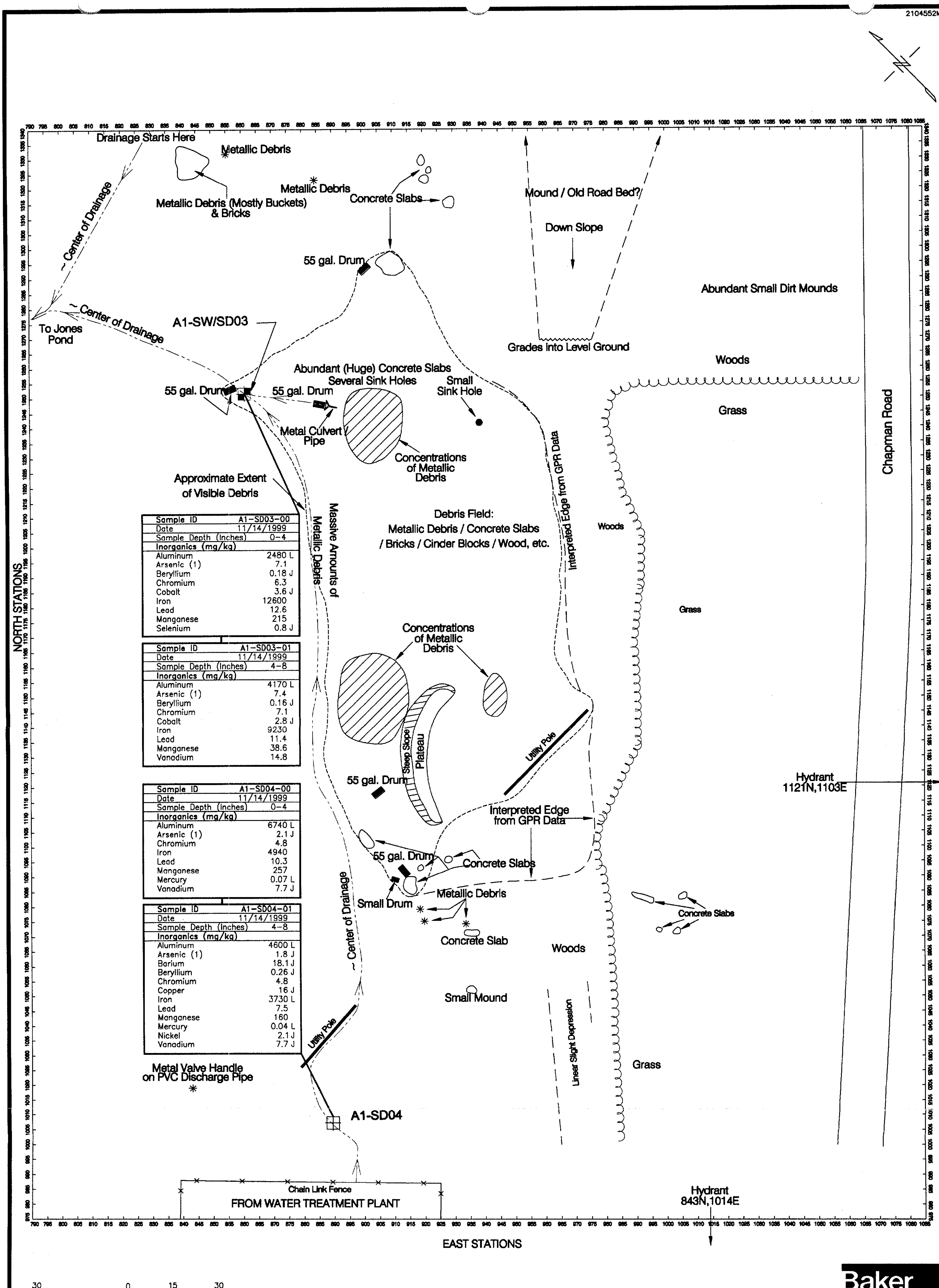
LEGEND

- TREE LINE
- SEDIMENT SAMPLE LOCATION
- SURFACE WATER/ SEDIMENT SAMPLE LOCATION
- ug/kg – MICROGRAMS PER KILOGRAM
- J – ESTIMATED VALUE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-21
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SEDIMENT
AOC 1 (SOUTH AREA)
CTO-0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE

2104552M



Sample ID	A1-SD03-00
Date	11/14/1999
Sample Depth (Inches)	0-4
Inorganics (mg/kg)	
Aluminum	2480 L
Arsenic (1)	7.1
Beryllium	0.18 J
Chromium	6.3
Cobalt	3.6 J
Iron	12600
Lead	12.6
Manganese	215
Selenium	0.8 J

Sample ID	A1-SD03-01
Date	11/14/1999
Sample Depth (Inches)	4-8
Inorganics (mg/kg)	
Aluminum	4170 L
Arsenic (1)	7.4
Beryllium	0.16 J
Chromium	7.1
Cobalt	2.8 J
Iron	9230
Lead	11.4
Manganese	38.6
Vanadium	14.8

Sample ID	A1-SD04-00
Date	11/14/1999
Sample Depth (Inches)	0-4
Inorganics (mg/kg)	
Aluminum	6740 L
Arsenic (1)	2.1 J
Chromium	4.8
Iron	4940
Lead	10.3
Manganese	257
Mercury	0.07 L
Vanadium	7.7 J

Sample ID	A1-SD04-01
Date	11/14/1999
Sample Depth (Inches)	4-8
Inorganics (mg/kg)	
Aluminum	4600 L
Arsenic (1)	1.8 J
Barium	18.1 J
Beryllium	0.26 J
Chromium	4.8
Copper	16 J
Iron	3730 L
Lead	7.5
Manganese	160
Mercury	0.04 L
Nickel	2.1 J
Vanadium	7.7 J

Baker

Baker Environmental, Inc.

LEGEND

- TREE LINE
- SEDIMENT SAMPLE LOCATION
- SURFACE WATER/ SEDIMENT SAMPLE LOCATION

mg/kg- MILLIGRAMS PER KILOGRAM
J - ESTIMATED VALUE
L - ESTIMATED VALUE, BIASED LOW
(1) - EXCEEDS RBC VALUE

SOURCE: NAEVA GEOPHYSICS,INC.,11/99

FIGURE 4-22
POSITIVE DETECTIONS OF INORGANIC CONSTITUENTS IN SEDIMENT
AOC 1 (SOUTH AREA)
CTO-0104
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN VIRGINIA
CHEATHAM ANNEX SITE

5.0 RISK SCREENING

This section presents the risk screening conducted at Site 4 – Medical Supplies Disposal Area and AOC 1 – Scrap Metal Dump at Naval Weapons Station Yorktown, Yorktown, Virginia CAX, Williamsburg, Virginia. The purpose of this risk screening is to determine whether contaminants detected in environmental media pose unacceptable risks to human receptors and/or the environment. Sites for which unacceptable human health and/or environmental risks are derived may be addressed further under the IRP. The risk screening process was done based on guidance from the Site Screening Process (SSP) Guidelines (Baker, 1994) and contains the same general steps as a baseline risk assessment, as follows:

- Selection of chemicals of potential concern
- Exposure assessment
- Toxicity assessment
- Risk characterization
- Uncertainty analysis

The Site Screening Process Guidelines (Baker, 1994) include surface water and sediment screening methodology for evaluating potential ecological effects to aquatic life. However, an ecological screening of surface water and sediment data for Site 4 and AOC 1 is not included as part this report since an in-depth evaluation of potential ecological risks at these two sites will be addressed by a future multi-site, screening-level ecological risk assessment (screening-level ERA). The screening-level ERA will be conducted using the process outlined in the USEPA document entitled Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final (USEPA, 1997) and the Chief of Naval Operations (CNO) document entitled Navy Policy for Conducting Ecological Risk Assessments (CNO, 1999). The specific components of the EPA and CNO guidance that will be addressed by the screening-level ERA are summarized below.

- Screening-level problem formulation and ecological effects evaluation
- Screening-level preliminary exposure estimate and risk calculation

5.1 Identification of Chemicals of Potential Concern

Chemicals of potential concern (COPCs) are defined as chemicals detected at a given site that are selected on a medium-specific basis to quantitatively and qualitatively estimate the potential for the occurrence of adverse effects to human receptors subsequent to exposure. COPCs were identified in soil (Site 4 and AOC 1) and surface water (AOC 1 only) for the purpose of performing a human health risk screening. Surface water is screened against human health risk-based criteria because the AOC 1 surface water samples were collected from a stream that flows into Jones Pond. Water is pumped from Jones Pond and treated for potable use at CAX. For this human health screening, COPCs were identified using selection criteria and methodologies that are consistent with the USEPA Region III technical guidance entitled: Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening (SCCRBS) dated January 1993 (USEPA, 1993) and Risk Assessment Guidance for Superfund (RAGS), Human Health Evaluation Manual, Volume I (Part A) Interim Final (USEPA, 1989). RAGS, Part D guidance (USEPA, 1998) was also utilized to the extent practicable in this risk screening.

The COPC selection criteria and methodologies for human health risk screening included comparisons of maximum detected concentrations of chemicals in soil and surface water to corresponding USEPA Region III Chemicals of Concern (COC) screening values. In addition to data comparisons to the aforementioned criteria, standards, and screening levels, the presence of chemicals detected in associated laboratory and field related blanks, site history and the historical use of chemicals at the site were also considered. Because toxicity data are unavailable for essential nutrients such as calcium, magnesium, potassium, and sodium these elements were not retained in the risk screening. The following section discusses the selection of chemicals of potential concern selection criteria in greater detail.

5.1.1 Chemicals of Potential Concern and Selection Criteria

USEPA Region III COC Screening Concentrations - Risk-Based COC Screening Concentrations (COC screening concentrations) were derived by USEPA Region III in January of 1993, and provided in tabular format to support selection of COPCs and address two major limitations in the COPC selection process presented in RAGS. First, using COC screening concentrations prioritizes chemical toxicity and focuses the risk assessment on those COPCs and potential exposure routes. Second, using the COC screening concentrations provides an absolute comparison of potential risks associated with the presence of a COPC in a given medium.

COC screening concentrations were derived using conservative USEPA promulgated default values and the most recent toxicological criteria available. COC screening concentrations for potentially carcinogenic and noncarcinogenic chemicals were individually derived based on a target incremental lifetime cancer risk (ILCR) of 1×10^{-6} and a target hazard quotient (HQ) of 0.1, respectively. For potential carcinogens, the toxicity criteria applicable to the derivation of COC screening concentrations are chronic oral and inhalation cancer slope factors; for noncarcinogens, they are oral and inhalation reference doses. These toxicity criteria are subject to change as more updated information and results from the most recent toxicological/epidemiological studies become available. Therefore, the use of toxicity criteria in the derivation of COC screening concentrations requires that the screening concentrations be updated periodically to reflect changes in the toxicity criteria.

In March of 1994, the USEPA Region III published a second COC Screening Table (COC values) which also were based on an ILCR of 1×10^{-6} and a target HQ of 0.1. Subsequent publications of the table (i.e., Risk-Based Concentrations [RBCs]) have included an ILCR of 1×10^{-6} but an HQ of 1.0, rather than 0.1. However, since the RBCs are derived using similar equations and USEPA promulgated default exposure assumptions that were used to derive the original set of COC screening concentrations and COC values (USEPA, 1993), updated COC values can be obtained by using the carcinogenic RBCs issued periodically by USEPA Region III and dividing the accompanying noncarcinogenic RBCs by a factor of 10. An updated set of COC values can, therefore, be obtained each time the RBC Tables are updated. The COC values used in this risk screening were derived from the RBC values issued by the USEPA Region III dated October 2000 (USEPA, 2000).

If the maximum concentration of a detected compound/constituent in a soil or surface water sample exceeded the corresponding COC value, that compound/constituent was retained as a COPC for further evaluation in the risk screening. If the maximum detected concentration was less than the COC value, that compound was eliminated from further consideration. However, in accordance with the SCCRBS guidelines, chemicals may have been re-included as COPCs if certain conditions warranted chemical re-inclusion such as related chemical toxicity (e.g., carcinogenic polyaromatic hydrocarbons [cPAHs]) and/or chemical potency.

Surface Water Screening Values – Human health risk-based screening values for surface water currently do not exist. In order to screen the data and be protective of human health, ten times the tap water COC screening value for a particular compound or constituent was used as comparison criteria for selecting COPCs. Surface water is evaluated in this risk screening because the stream that was sampled flows into Jones Pond. Jones Pond is a spring-fed water body with an area of 69 acres. Water from the plant is checked daily for turbidity and chlorine residual by on-site personnel. Fecal coliform counts are made once a week. As previously mentioned, water is pumped from Jones Pond and treated for potable use and meets public drinking water standards prior to distribution at CAX.

Blank Concentrations - If a chemical is detected in both the environmental sample and a blank sample, it may not be retained as a COPC in accordance with RAGS depending on the concentration of the chemical in the media. Therefore, blank data were compared with results from environmental samples. If the blanks contained detectable results for common laboratory contaminants (i.e., acetone, 2-butanone, methylene chloride, toluene, and phthalate esters), environmental sample results were considered as positive results only if they exceed 10 times the maximum amount detected in the associated blank. If the chemical detected in the blank(s) is not a common laboratory contaminant, environmental sample results were considered as positive results only if they exceeded five times the maximum amount detected in the associated blank(s). Furthermore, the elimination of an environmental sample result would directly correlate to a reduction in the prevalence of the contaminant in that media.

When assessing soil and sediment concentrations, the Contract Required Quantitation Limits (CRQLs) and percent moisture are accounted for in order to correlate solid and aqueous quantitation limits. For example, when assessing semivolatile, pesticide, PCB, and nitramine contaminants the CRQL for solid samples is 33 to 66 times (depending on the contaminant) that of the aqueous samples; this correction is not necessary for the evaluation of volatile contaminants. Therefore, in order to assess contaminant levels in solid samples using an aqueous blank concentration, the concentration was multiplied by 5 or 10 (noncommon or common laboratory contaminants, respectively) and then multiplied by 33 to correct for the variance in the CRQL. Accounting for multipliers greater than 33 or the percent moisture was not necessary for this data set. Associated blanks for Site 4 and AOC 1 included trip blanks, field blanks, and rinsate blanks.

The aforementioned methodologies for evaluating blanks are usually implemented during third party analytical data validation prior to the selection of COPCs in the risk screening.

Essential Nutrients - Despite their inherent toxicity, certain inorganic constituents are essential nutrients. Essential nutrients need not be considered further in the risk screening if they are present in relatively low concentrations (i.e., slightly elevated above naturally occurring levels), or if the constituent is toxic at doses much higher than those which could be assimilated through exposures at the site (USEPA, 1989). Elements evaluated as essential nutrients include calcium, magnesium, potassium and sodium. Although iron is considered an essential nutrient, it is evaluated quantitatively in this risk screening since toxicity criteria are available for this analyte.

The COC screening values compared with surface and/or subsurface soil concentrations detected at Site 4 and surface and/or subsurface soil concentrations and surface water concentrations detected at AOC 1 were those established for the protection of humans accidentally ingesting soil and/or surface water under a residential scenario. Surface water is evaluated in this human health screening since the stream from which the surface water samples were collected flows into Jones Pond. Currently, water is pumped from Jones Pond and treated for potable use at CAX. These screening values were utilized following SSP guidance and are not indicative of current conditions of the site/AOC as currently there is no residential development at either Site 4 or AOC 1 nor is residential development expected in the future.

5.1.2 Selection of Chemicals of Potential Concern

Three environmental media were investigated throughout Site 4 and AOC 1, namely soil, surface water, and sediment. The data for each site is presented in tabular format in Appendix E. COPCs were identified only for soil and surface water. The selection of soil COPCs was stratified to include the surface soil (0- to 6-inches bgs) and the subsurface soil (greater than 6-inches bgs); each of these two intervals was evaluated individually. All data utilized in this human health risk screening were collected during the 1999 SI; data collected under previous investigations were not utilized in the risk screening. COPCs were identified from analytical data acquired for surface soil and subsurface soil samples collected from Site 4, and surface soil, subsurface soil, and surface water samples collected from AOC 1.

Tables 5-1 through 5-5 present data and COPC selection summaries for all investigated environmental media. (Corresponding COPC selection summaries presented with the RAGS Part D table numbers are presented in Appendix E.1.) Each table presents ranges of detected concentrations, frequencies of detection, comparisons of sample concentrations with appropriate criteria/standards, frequencies of exceedences of appropriate criteria, and the selection of COPCs based on the previously mentioned information. Information is presented in these tables only for those constituents detected at least once, in the medium of interest.

The following paragraphs present the rationale for selection of COPCs. Sample locations, analytical results, and corresponding figures are presented in Section 4.0. In the sections below, frequencies of detection for those contaminants retained as COPCs are provided in parentheses as the number of positive detections over the total number of samples analyzed.

5.1.2.1 Site 4 - Human Health COPCs

COPCs were identified in surface soil and subsurface soil investigated at Site 4. Tables 5-1 and 5-2 present data and COPC selection summaries for these environmental media. Discussions of the selection of COPCs for each medium investigated at Site 4 are provided in the following paragraphs of this subsection.

Surface Soil

Surface soil samples were collected from the 0- to 6-inch interval and analyzed for VOCs, SVOCs, pesticides, PCBs, nitramines/nitroaromatics, and inorganics. Nitramines/nitroaromatics were not detected in the surface soil samples collected at this site. The COPC selection summary for the surface soil is presented on Table 5-1.

One VOC, total xylene, was detected in the surface soil at a maximum concentration that did not exceed residential soil COC screening values. Therefore, total xylene was not retained as a surface soil COPC for Site 4.

SVOCs including acenaphthene, anthracene, benzo(g,h,i)perylene, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, fluoranthene, fluorene, phenanthrene, and pyrene were detected in the surface soil at concentrations that did not exceed residential soil COC screening values. Therefore, these SVOCs were not retained as Site 4 surface soil COPCs. Benzo(a)anthracene (4/7), benzo(a)pyrene (4/7), benzo(b)fluoranthene (6/7), dibenzo(a,h)anthracene (1/7), and indeno(1,2,3-cd)pyrene (5/7) were detected at concentrations which exceeded their respective residential soil COC screening values and were retained as surface soil COPCs. Benzo(k)fluoranthene (6/7), carbazole (1/7), and chrysene (6/7) were detected at maximum concentrations less than their respective residential soil screening values. However, they were re-included as Site 4 surface soil COPCs because of the potential additive toxicity of carcinogenic polyaromatic hydrocarbons (cPAHs).

4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, gamma-chlordane, endosulfan II, endrin, endrin aldehyde, and endrin ketone were detected in the surface soil at concentrations that did not exceed residential soil COC screening values and were; therefore, not retained as surface soil COPCs. Therefore, pesticides were not retained as COPCs in Site 4 surface soil.

Aroclor-1242 (1/7) and Aroclor-1260 (7/7) were detected in the surface soil at Site 4. These PCBs were detected at maximum concentrations that exceeded their respective residential soil COC screening values. Therefore, these PCBs were retained as surface soil COPCs at Site 4.

Inorganics were detected in all surface soil samples collected at this site. The maximum detected concentrations of barium, cadmium, cobalt, copper, cyanide, lead, mercury, nickel, selenium, silver, vanadium, and zinc did not exceed corresponding residential soil COC screening values. Therefore, these inorganics were not retained as surface soil COPCs. Calcium, magnesium, potassium, and sodium were also detected in these samples; however, these constituents are considered to be essential nutrients and were not retained as COPCs. Aluminum (7/7), antimony (2/7), arsenic (7/7), chromium (7/7), iron (7/7), manganese (7/7), and thallium (1/7) were detected at concentrations greater than their respective residential soil COC screening value and; therefore, were retained as Site 4 surface soil COPCs.

Subsurface Soil

Subsurface soil samples were collected from depths greater than 6-inches bgs and analyzed for VOCs, SVOCs, pesticides, PCBs, nitramines/nitroaromatics, and inorganics. Nitramines/nitroaromatics were not detected in the subsurface soil samples. The COPC selection summary for subsurface soil is presented in Table 5-2.

VOCs including 2-butanone, ethylbenzene, tetrachloroethene, and toluene were detected in the subsurface soil at maximum concentrations that did not exceed corresponding residential soil COC screening values. Therefore, these VOCs were not retained as subsurface soil COPCs at Site 4.

SVOCs including benzo(g,h,i)perylene, di-n-butylphthalate, fluoranthene, phenanthrene, and pyrene were detected in the subsurface soil at concentrations that did not exceed corresponding residential soil COC screening values. Therefore, these SVOCs were not retained as subsurface soil COPCs. Bis(2-ethylhexyl)phthalate (4/7) was detected at a maximum concentration that exceeded its residential soil COC screening value and was retained as a subsurface soil COPC. Benzo(a)pyrene (4/7) was detected at a maximum concentration that exceeded its residential soil COC screening value and was retained as a subsurface soil COPC. Benzo(a)anthracene (2/7), benzo(b)fluoranthene (5/7), benzo(k)fluoranthene (4/7), chrysene (4/7), and indeno(1,2,3-cd)pyrene (3/7) were detected at concentrations less than their respective residential soil COC screening value; however, as other cPAHs were retained as COPCs and because of the potential additive toxicity of cPAHs, they were re-included as subsurface soil COPCs.

Pesticides including 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, aldrin, alpha-chlordane, gamma-chlordane, endosulfan II, endrin ketone, heptachlor, and methoxychlor were detected at concentrations that did not exceed residential soil COC screening values. Therefore, these pesticides were not retained as subsurface soil COPCs.

Aroclor-1254 was detected at a maximum concentration that did not exceed its residential soil COC screening value and was not retained as a subsurface soil COPC. Aroclor-1242 (1/7) and Aroclor-1260 (5/7) were detected at concentrations greater than their respective residential soil COC screening values and; therefore, were retained as Site 4 subsurface soil COPCs.

Inorganics were detected in all subsurface soil samples collected. The maximum detected concentrations of antimony, barium, cadmium, cobalt, copper, cyanide, manganese, mercury, nickel, selenium, silver, vanadium, and zinc did not exceed corresponding residential soil COC screening values. Therefore, these inorganics were not retained as subsurface soil COPCs. Lead was detected at a concentration that did not exceed its OSWER Action Level for soil, and was not retained as a COPC. Calcium, magnesium, potassium, and sodium were also detected in every sample; however, these constituents are considered to be essential nutrients and were not retained as COPCs. Aluminum (7/7), arsenic (7/7), chromium (7/7), and iron (7/7) were detected at concentrations greater than corresponding residential soil COC screening values and; therefore, were retained as Site 4 subsurface soil COPCs.

5.1.2.2 AOC 1 - Human Health COPCs

COPCs were identified in surface soil, subsurface soil, and surface water investigated at AOC 1. Tables 5-3 through 5-5 present data and COPC selection summaries for each of the aforementioned environmental media. Discussions of the selection of COPCs for each medium investigated at AOC 1 are provided in the following paragraphs of this subsection.

Surface Soil

Surface soil samples were collected from the 0- to 6-inch interval and analyzed for VOCs, SVOCs, pesticides, PCBs, nitramines/nitroaromatics, and inorganics. Nitramines/nitroaromatics were not detected in the surface soil samples collected at this site. The COPC selection summary for the surface soil is presented on Table 5-3.

Six VOCs (1,1-dichloroethene, 2-butanone, benzene, chlorobenzene, toluene, and trichloroethene) were detected in the surface soil at a maximum detected concentrations that did not exceed residential soil COC screening values. Therefore, VOCs were not retained as surface soil COPCs for AOC 1.

SVOCs including benzo(g,h,i)perylene, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, fluoranthene, phenanthrene, and pyrene were detected in the surface soil at concentrations that did not exceed residential soil COC screening values. Therefore, these SVOCs were not retained as AOC 1 surface soil COPCs. Benzo(a)pyrene (2/7), benzo(b)fluoranthene (4/7), and dibenz(a,h)anthracene (1/7) were detected at concentrations that exceeded their respective residential soil COC screening values and were retained as surface soil COPCs. Benzo(a)anthracene (2/7), benzo(k)fluoranthene (2/7), chrysene (4/7), and indeno(1,2,3-cd)pyrene (2/7) were detected at maximum concentrations less than their respective residential soil screening values. However, they were re-included as AOC 1 surface soil COPCs because of the potential additive toxicity of cPAHs.

4,4'-DDE, 4,4'-DDT, alpha-chlordane, and endosulfan sulfate were detected in the surface soil at concentrations that did not exceed residential soil COC screening values and were not retained as surface soil COPCs. Therefore, pesticides were not retained as COPCs in AOC 1 surface soil.

Aroclor-1260 was detected in the surface soil at AOC 1. This PCB was detected at a concentration less than its residential soil COC screening values. Therefore, this PCB was not retained as a surface soil COPC at AOC 1.

Inorganics were detected in all surface soil samples collected at this AOC. The maximum detected concentrations of barium, cadmium, cobalt, copper, cyanide, mercury, nickel, vanadium, and zinc did not exceed corresponding residential soil COC screening values. Therefore, these inorganics were not retained as surface soil COPCs. Calcium, magnesium, potassium, and sodium were also detected in these samples; however, these constituents are considered to be essential nutrients and were not retained as COPCs. Aluminum (7/7), antimony (2/7), arsenic (6/7), chromium (7/7), iron (7/7), and manganese (7/7) were detected at concentrations greater than their respective residential soil COC screening value and were retained as AOC 1 surface soil COPCs. Lead (7/7) was detected at a maximum concentration that exceeded the Action Level in soil of 400 mg/kg. Therefore, lead was also retained as a surface soil COPC.

Subsurface Soil

Subsurface soil samples were collected from depths greater than 6-inches bgs and analyzed for VOCs, SVOCs, pesticides, PCBs, nitramines/nitroaromatics, and inorganics. Nitramines/nitroaromatics, pesticides, and PCBs were not detected in the subsurface soil samples. The COPC selection summary for subsurface soil is presented in Table 5-4.

One VOC, total xylene, was detected in the subsurface soil at a maximum concentration that did not exceed its residential soil COC screening value. Therefore, total xylene was not retained as a subsurface soil COPC at AOC 1.

SVOCs including carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene, noncarcinogenic PAHs (benzo(g,h,i)perylene, fluoranthene, phenanthrene, and pyrene) and phthalate compounds (bis[2-ethylhexyl]phthalate and di-n-butylphalate) were detected in the subsurface soil. These SVOCs were detected at concentrations that did not exceed corresponding residential soil COC screening values. Therefore, these SVOCs were not retained as subsurface soil COPCs for AOC 1.

Inorganics were detected in all subsurface soil samples collected at AOC 1. The maximum detected concentrations of barium, beryllium, cadmium, cobalt, copper, cyanide, mercury, nickel, silver, vanadium and zinc did not exceed corresponding residential soil COC screening values. Therefore, these inorganics were not retained as subsurface soil COPCs. Calcium, magnesium, potassium, and sodium were also detected in every sample; however, these constituents are considered to be essential nutrients and were not retained as COPCs. Aluminum (6/6), antimony (2/6), arsenic (6/6), chromium (6/6), iron (6/6), and manganese (6/6) were detected at concentrations greater than corresponding residential soil COC screening values and; therefore, were retained as subsurface soil COPCs for quantitative evaluation in the SSP. Lead (6/6) was detected at concentrations greater than the OSWER screening level for soil and was also retained as a subsurface soil COPC.

Surface Water

Table 5-5 presents the data and human health COPC selection summary for the surface water samples collected at AOC 1. The surface water samples were collected from a stream that flows into Jones Pond. Water is pumped from Jones Pond to a treatment plant where it is treated for potable use at CAX. Therefore, to maintain a conservative approach surface water was screened against human health criteria (USEPA Region III tap water COC screening values multiplied by a factor of ten). These samples were analyzed for VOCs, SVOCs, pesticides, PCBs, nitramines/nitroaromatics, and total inorganics. There were no VOCs, pesticides, PCBs, or nitramines/nitroaromatics detected in AOC 1 surface water.

Bis(2-ethylhexyl)phthalate and di-n-octylphthate were the only SVOCs detected in the surface water samples collected at AOC 1. Di-n-butylphalate was detected at a maximum concentration below surface water screening criteria (i.e., ten times the tap water COC screening values) and was not retained as a surface water COPC. Bis(2-ethylhexyl)phthalate (3/4) was detected at a concentration that exceeded its surface water screening criteria and was retained as a AOC 1 surface water COPC.

Unfiltered barium and manganese were detected in AOC 1 surface water at concentrations below corresponding surface water screening criteria. Therefore, these unfiltered inorganics were not retained as surface water COPCs. Concentrations of unfiltered arsenic (2/4) and iron (4/4) at concentrations greater than surface water screening criteria and were retained as AOC 1 surface water COPCs. Calcium, magnesium, potassium, and sodium were also detected in almost every sample; however, these constituents are considered to be essential nutrients and were not retained as COPCs.

5.1.2.5 Summary of COPCs

The following paragraphs summarize by media the COPCs selected for quantitative evaluation at Site 4 and AOC 1. Since Cheatham Annex is located adjacent to Naval Weapons Station Yorktown, detected concentrations of inorganics were compared to background concentrations published in the Baker background report entitled: Final Summary of Background Constituent Concentrations and Characterization of the Biotic Community from the York River Drainage Basin (Baker, 1995). The "background" concentrations detected at Naval Weapons Station Yorktown are indicative of background concentrations expected to be found at CAX and are used for comparative purposes in this report. In the following paragraphs, italicized COPC names indicate that detected inorganic concentrations are within, or are comparable to the corresponding range of local background concentrations presented in the above-referenced background report.

Site 4

Surface Soil COPCs: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Carbazole, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Aroclor-1242, Aroclor-1260, *Aluminum*, Antimony, *Arsenic*, Chromium, Iron, Manganese, and Thallium.

Subsurface Soil COPCs: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Bis(2-ethylhexyl)phthalate, Indeno(1,2,3-cd)pyrene, Aroclor-1242, Aroclor-1260, *Aluminum*, *Arsenic*, *Chromium*, and *Iron*.

AOC 1

Surface Soil COPCs: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, *Aluminum*, Antimony, Arsenic, Chromium, Iron, Lead, and Manganese.

Subsurface Soil COPCs: *Aluminum, Antimony, Arsenic, Chromium, Iron,* Lead, and *Manganese.*

Surface Water COPCs: Bis(2-ethylhexyl)phthalate, Unfiltered Arsenic and Iron.

5.2 Exposure Assessment and Exposure Pathways

The exposure assessment identifies pathways and routes by which site related constituents may reach potential receptors. The following four elements were considered to ascertain whether a complete exposure pathway was present (USEPA, 1989):

- A source and potential mechanism of chemical release
- An environmental retention or transport medium
- A point of potential human contact with the contaminated medium
- An exposure route (e.g., ingestion) at the contact point

When all four of these components are present, the exposure pathway is considered complete. Complete exposure pathways, coupled with specific toxicological information, allow for the assessment of potential human health risk.

The following paragraphs discuss the exposure pathways considered as part of the risk screening conducted for Site 4 and AOC 1. Exposure pathways evaluated as part of the risk screening process do not consider total site risk or exposure by every possible human health receptor. The conservative nature of the risk screening should account for some of the receptors or pathways not otherwise considered.

5.2.1 Human Health Exposure Pathways

Potential human exposure pathways, evaluated as part of the risk screening process of Site 4 and AOC 1, are limited to the following pathways:

- Soil ingestion (residential)
- Surface water ingestion

Surface soil ingestion was evaluated based on the exposure pathways considered in the derivation of age-adjusted USEPA Region III RBC values for residential soil. Surface water ingestion was evaluated based on the exposure pathways considered in the derivation of age-adjusted USEPA Region III RBC values for tap water because there are no human health RBC values developed for surface water. Surface water ingestion was evaluated because of the connection of the stream that flows through AOC 1 to Jones Pond, which is a source of potable water at CAX. Jones Pond is a spring-fed water body with an area of 69 acres. Water from the plant is checked daily for turbidity and chlorine residual by on-site personnel. Fecal coliform counts are made once a week. The water from Jones Pond is treated and meets public drinking water standards prior to distribution. It should be noted that the tap water RBCs were multiplied by a factor of ten to account for the difference between an accidental surface water ingestion exposure scenario and a drinking water ingestion exposure scenario.

Human health exposure assumptions, as presented in the most recent RBC table (USEPA, 2000), will be used in the risk screening. USEPA Region III revises the RBC table on a regular basis to include changes in exposure assumptions that are ultimately expressed in the RBC values.

For the risk screening, the inhalation exposure pathway will not be addressed because the air pathway is not considered to be a primary pathway of concern based on site-specific conditions and the types of constituents detected at the site/AOC.

Furthermore, dermal contact with water and soil has not been considered by USEPA Region III in the development of RBCs. This pathway will, however, be addressed in the uncertainties section of the risk screening. However, not addressing dermal exposure is unlikely to impact the potential human health risk since dermal contact pathway risk results are usually lower than those associated with incidental ingestion.

Currently, human exposure to COPCs is limited to Cheatham Annex personnel who may, during the course of daily work assignments contact affected soil by accidental ingestion and dermal exposure pathways. Groundwater data was not collected for the SI. As a result, groundwater is not directly evaluated in this risk screening. However, it should be noted that current human exposure to COPCs in groundwater is negligible because groundwater at Cheatham Annex is not used for potable purposes. The risk screening does evaluate future residential exposure that includes soil and surface water ingestion. The surface water exposure pathway is considered in this risk screening because the stream that runs through AOC 1 flows into Jones Pond, which is the source for potable water at CAX. As a result, the risk screening presented herein is a conservative evaluation of potential human health risks (both current and future) despite the absence of the dermal exposure pathway component. The lack of a dermal exposure component and assessments of other environmental media exposure (i.e., dermal contact and accidental ingestion of sediment) will be addressed in Section 5.7.

5.3 Toxicity Assessment

The purpose of this section is to identify the potential human health effects associated with potential exposure to the COPCs.

A toxicological evaluation characterizes the inherent toxicity of a compound. It consists of the review of scientific data to determine the nature and extent of the potential human health and environmental effects associated with potential exposure to the various chemicals. The end product is a collection of toxicological profiles for the COPCs that are presented in Appendix F. These toxicological profiles provide the qualitative weight-of-evidence (WOE) that demonstrates whether the COPCs pose any actual or potential human health effects. The RBC values (USEPA, 2000) utilized for the COPCs identified at Site 4 and AOC 1 are presented on Tables 5-1 through 5-5. Further, Table 5-11 presents each constituent's toxicological criteria, WOE, and target organs/critical effects.

Lead was identified as a COPC in the soil at AOC 1. Currently, health-based criteria are not available for evaluating either the noncarcinogenic or carcinogenic effects of lead exposure. There are, however, some criteria available for lead level comparisons in the form of standards, criteria, and/or to-be-considered values. For example, there is an OSWER directive for lead in soil, this value is 400 mg/kg in residential soil (USEPA, 1994). This level was used for comparison purposes in the risk screening.

5.4 Risk Characterization

For the risk screening, risk characterization consisted of calculating a ratio between the exposure point concentration in the appropriate medium and corresponding RBC values, which were taken directly from the Region III RBC table dated April 2000. The noncarcinogenic values were not divided by a factor of 10, as was done during the selection of COPCs. For human health, carcinogenic and noncarcinogenic effects were evaluated separately for exposure to soil and surface water. The algorithms were taken from the risk screening approach presented in the Final Site Screening Process Guidelines (Baker, 1994b) and are presented in the following sections. Tables 5-1 through 5-5 present summaries of the RBC values while Tables 5-6 through 5-10 present the Exposure Point Concentrations by site/AOC and media. Finally, the WOE, target organ, and critical effect for each of the COPCs are presented on Table 5-11.

5.4.1 Human Health Effects - Carcinogens

Compounds potentially resulting in carcinogenic effects were evaluated using the following equation:

$$ILCR = \sum (C_m / RBC) \times 10^{-06}$$

Where:

ILCR	=	Incremental Lifetime Cancer Risk
C_m	=	The concentration term for a medium (mg/kg, mg/L)
RBC	=	Risk-Based Concentration value (mg/kg, mg/L)
10^{-6}	=	Risk assessment point of departure

Multiplying the C_m/RBC ratio by USEPA's point of departure risk level, 10^{-06}, produced a risk value for the detected chemical. The ILCR values for all COPCs were summed to account for potential carcinogenic effects associated with multiple chemical exposures. The human health risk assessment calculations are presented in Appendix F.1.

Carcinogenic effects are expressed as incremental lifetime risks (ILCRs) while noncarcinogenic effects are expressed as hazard indices. Cancer effects are expressed as risk (ILCRs) because the expression of cancer does not occur immediately after exposure but typically occurs years after the exposure. The total ILCR value was assessed relative to the USEPA's generally acceptable target cancer risk range of 10^{-04} to 10^{-06} (USEPA, 1990). The target risk range represents the range of acceptable human health cancer risks considered to be generally acceptable by USEPA. A 1×10^{-04} ILCR value corresponds to one potential additional cancer in an exposed population of ten thousand individuals; a 1×10^{-6} ILCR value indicates that one potential additional cancer could occur in an exposed population of one million individuals.

5.4.2 Human Health Effects - Noncarcinogens

Compounds potentially resulting in noncarcinogenic (systemic) effects were evaluated using the following equation:

$$HQ = C_m / RBC$$
$$HI = \sum HQ$$

Where:

HQ	=	Hazard Quotient
C_m	=	The concentration term for a medium (mg/kg, mg/L)
RBC	=	Risk-Based Concentration value (mg/kg, mg/L)
HI	=	Hazard Index

Noncarcinogenic health effects usually occur subsequent to exposure if a threshold intake level is exceeded. Therefore, the Hazard Index (HI) value for each environmental medium was compared to unity. An HI that is less than or equal to unity (1.0) indicates that noncarcinogenic effects are not expected to occur subsequent to exposure (USEPA, 1990). An HI value that exceeds unity indicates that noncarcinogenic health effects may occur subsequent to exposure. However, since the USEPA incorporates uncertainty ("safety") factors in the derivation of the RBC values to ensure that it is well below the dose at which adverse effects might be observed, the expression of adverse effects may not be observed even with an HI estimate greater than 1.0. Risk estimates and hazard indices are not intended as a true indication of actual exposure; they are intended to provide decision makers with useful information regarding the significance of the observed contamination.

5.4.3 The Concentration Term (Cm)

The manner in which environmental data are represented depends on the number of samples and sampling locations available for a given area and a given medium. As recommended in the SSP Guidelines (Baker, 1994), ninety-fifth percent (95%) Upper Confidence Limit (UCL) values for the arithmetic mean or maximum detected concentrations are to be used as exposure point concentrations for media. Summaries of exposure point concentrations by site/AOC and media are presented in Table 5-6 through 5-10. Analytical and frequency of detection summaries of the data are presented in Appendix E.

It should be noted that estimated concentrations also were used in the screening process, these estimated values included: "J"-qualified (estimated); "L"-qualified (estimated, biased low); and "K"-qualified (estimated, biased high) data. Reported concentrations qualified with an "R" (rejected) were not used in the statistical evaluation.

According to the USEPA Region III Modifications to the National Functional Guidelines (NFGs), reported organic and inorganic concentrations were evaluated against the available field and laboratory blanks. For constituents considered by RAGS to be common laboratory blanks, chemicals were qualified "B" if their concentration were less than or equal to 10 times the maximum blank concentration. For constituents not considered to be common laboratory contaminants, chemicals were qualified "B" if their concentration were less than or equal to 5 times the maximum blank concentration. Data qualified with a "B" were considered nondetects for this screening evaluation.

It should be noted that analytical results for the soil and surface water samples obtained during the 1999 SI were subjected to independent third party data validation.

5.5 Potential Human Health Effects

Table 5-12 presents a summary of total human health risks for Site 4 and AOC 1. Total ILCRs and HIs take into account the soil and surface water exposure pathways.

5.5.1 Site 4 - Human Health Risks

Table 5-12 shows that the total ILCR of 1.0×10^{-04} and HI value of 3.0 calculated for Site 4. The total ILCR approaches the upper bound of USEPA's acceptable risk criteria (i.e., the target risk range of 1×10^{-06} to 1×10^{-04} for carcinogens). The cumulative HI exceeds the target HI value of 1.0 for noncarcinogens (without considering target organ analysis). The individual HQ for iron was the only one to surpass unity. The unacceptable total site HI is primarily due to the HI associated with surface soil.

5.5.1.1 Surface Soil

The ILCR of 8.1 x 10^{-05} estimated for surface soil at Site 4 was within USEPA's acceptable risk range of 1.0 x 10^{-06} to 1.0 x 10^{-04}. The HI of 2.0 estimated for surface soil at Site 4 was due predominantly to the presence of iron, which contributed approximately 72 percent of the total HI value. The HQ value for iron was 1.4. However, as shown in Table 5-1, the maximum detected concentration of iron in Site 4 surface soil (43,400 mg/kg) falls within the range of local surface soil iron values (Baker, 1995).

5.5.1.2 Subsurface Soil

The ILCR of 2.3 x 10^{-05} estimated for subsurface soil at Site 4 was within USEPA's acceptable risk range of 1.0 x 10^{-06} to 1.0 x 10^{-04}. The HI of 1.0 estimated for subsurface soil at Site 4 did not exceed USEPA's acceptable hazard index value 1.0.

5.5.2 AOC 1 - Human Health Risks

Table 5-12 shows that the total ILCR of 1.1 x 10^{-04} estimated for AOC 1 exceeded USEPA's acceptable risk range (i.e., the target risk range of 1 x 10^{-06} to 1 x 10^{-04} for carcinogens). The HI value of 4.2 estimated for AOC 1 exceeded USEPA's acceptable risk criteria (i.e., a target HI value of 1.0 for noncarcinogens). The unacceptable carcinogenic risk and noncarcinogenic adverse health effects are due to the risk values and hazard indices associated with the sum total over all AOC media evaluated.

It should be noted that lead was detected in surface and subsurface soil at AOC 1 above the residential action level for soil (400 mg/kg) at sample location A1-HA05. All other detections of lead were well below the action level. Rusted wire and concrete debris were noted at this sample location. Lead in soil could be accidentally ingested or inhaled as fugitive dusts. The evidence shows that lead is a multitargeted toxicant, causing effects in the gastrointestinal tract, hematopoietic system, cardiovascular system, central and peripheral nervous systems, kidneys, immune system, and reproductive system. While lead exposure is not evaluated in this risk screening, exposure to lead via ingestion of soil or inhalation of fugitive dusts is considered unlikely because of the heavy vegetation at AOC 1. Furthermore, the elevated concentrations of lead were limited to one location.

5.5.2.1 Surface Soil

The ILCR of 2.7 x 10^{-05} estimated for surface soil at AOC 1 was within USEPA's acceptable risk range of 1.0 x 10^{-06} to 1.0 x 10^{-04}. The HI of 2.1 estimated for surface soil at AOC 1 was due predominantly to the presence of iron, which contributed approximately 66 percent of the total HI value. It should be noted that the individual HQ value for iron was 1.3. However, as shown in Table 5-3, the maximum detected concentration of iron in AOC 1 surface soil (35,200 mg/kg) falls within the range of local surface soil iron values (Baker, 1995). The carcinogenic risk values estimated for the surface soil were within acceptable criteria.

5.5.2.2 Subsurface Soil

The ILCR of 4.3 x 10^{-05} estimated for surface soil at AOC 1 was within USEPA's acceptable risk range of 1.0 x 10^{-06} to 1.0 x 10^{-04}. The HI of 2.0 estimated for subsurface soil at AOC 1 was due predominantly to the presence of iron, which contributed approximately 75 percent of the total HI.

Individually, the HQ value for iron was 1.5. As shown in Table 5-4, the maximum detected iron concentration (39,700 mg/kg) was within the range of local background values (Baker, 1995).

5.5.2.3 Surface Water

The ILCR of 4.4 x 10^{-05} estimated for surface water at AOC 1 was within USEPA's acceptable risk range of 1.0 x 10^{-06} to 1.0 x 10^{-04}. The HI of 0.24 estimated for surface water was below the acceptable hazard value of 1.0.

5.7 Uncertainty Analysis

The results of the risk screening are presented in terms of the potential for adverse effects based upon a number of very conservative assumptions. The tendency to be conservative is an effort to err on the side of the protection of health. The risks are indicators of possible risk, not a true measurement of actual risk. Risk screening is intended to contribute to the decision-making process and the management of the identified sites at Cheatham Annex.

Uncertainties are encountered throughout the process of performing the risk screening. This section discusses sources of uncertainty inherent in the following elements of the risk screening evaluation performed for Site 4 and AOC 1.

- Sampling and Analysis
- Selection of COPCs
- Toxicity Assessment
- Risk Screening Process
- COPCs Not Quantitatively Evaluated

General uncertainties associated with the risk screening will be qualitatively evaluated to determine the conservatism of the approach. Factors which may contribute to uncertainty include the use of RBC age-adjusted ingestion and inhalation rates, the use of toxicity information provided by National Center for Environmental Assessment (NCEA) when not available from the Integrated Risk Information System (IRIS) database or in Health Effects Assessment Summary Tables (HEAST), and the lack of dermal or inhalation estimates.

The variation of any factor used in the calculation of the exposure concentration will have an impact on the total carcinogenic risk and noncarcinogenic hazard index. Uncertainties associated with this risk screening are presented in Table 5-13 and discussed in the following paragraphs.

5.7.1 Sampling and Analysis

The development of a risk screening report depends on the reliability of, and uncertainties associated with, the analytical data available to the risk assessor. These, in turn, are dependent on the operating procedures and techniques applied to the collection of environmental samples in the field and their subsequent analyses in the laboratory. To minimize the uncertainties associated with sampling and analysis at Site 4 and AOC 1, USEPA approved sampling and analytical methods were employed. Data was generated following USEPA's Statement of Work for Contract Laboratory Program (CLP). Samples were collected from locations specified in an approved Work Plan along with the necessary QA/QC samples. All samples collected during the 1999 site investigation were analyzed for VOCs, SVOCs, pesticides, PCBs, nitramines/nitroaromatics, and inorganics (surface water samples were analyzed for unfiltered inorganics only).

Analytical data are limited by the precision and accuracy of the methods of analysis. Precision is reflected by the RPD of duplicate analyses. Accuracy is represented by the percent (%) recovery of spikes. In addition, the statistical methods used to compile and analyze the data (mean concentrations, detection frequencies) are subject to the overall uncertainty in data measurement. Furthermore, chemical concentrations in environmental media fluctuate over time and with respect to sampling location. Analytical data must be sufficient to consider the temporal and spatial characteristics of contamination at the site with respect to exposure.

Analytical results for the soil, surface water, and sediment samples obtained during the 1999 site investigation were subjected to an independent third party data validation. Data validation serves to reduce some of the inherent uncertainty associated with the analytical data by establishing the usability of the data to the risk assessor who may or may not choose to include the data point in the estimation of risk. Data qualified as "J" (estimated) were retained for the estimation of risk at Site 4 and AOC 1. Data can be qualified as estimated for many reasons including a slight exceedence of holding times, high or low surrogate recovery, or intra sample variability. Data qualified "B" (detected in blank) or "R" (unreliable) were not used in the estimation of risk due to the unusable nature of the data. Due to the sampling and analytical programs at Site 4 and AOC 1, the loss of some data points qualified "B" or "R" did not significantly increase the uncertainty in the estimation or risk. For a brief summary of "R" qualified data, refer to Section 4.1.

5.7.2 Selection of COPCs

The selection of COPCs is performed in a risk screening following the evaluation of data. Analytical data also must be comprehensive in order to address the COPCs associated with the site. A summary of the COPC selection criteria is presented below.

- Soil COPCs were selected based on comparisons of the maximum detected concentration with USEPA Region III residential soil COC values.

- Surface water COPCs were selected based on comparisons of the maximum detected concentration to USEPA Region III tap water COC values multiplied by a factor of ten.

USEPA Region III COC values are based on exposure assumptions and equations that are intended to introduce conservatism in the risk assessment process by changing the COPC screening method from a relative toxicity screen as presented in RAGS, to an absolute comparison of risk. However, the use of the USEPA Region III COC values which incorporate a set of non-site-specific assumptions in the selection of COPCs at Site 4 and AOC 1 adds conservatism to the site screening.

There is uncertainty inherent in screening surface water data against tap water RBC values. The use of tap water RBCs is further intended to introduce conservatism into the risk screening. Therefore, it is unlikely that this approach will underestimate potential risk.

Currently, no closures are planned for Cheatham Annex and future residential development is not considered an expected land use for the area. The application of the residential COC values to soil and surface water COPC selections would, therefore, tend to result in a list of COPCs that could be considered conservative for a military base. The use of conservative COPC selections in the site screening ensures the protection of public health in that the results of the risk screening are incorporated into the determination of remedial action.

5.7.3 Toxicity Assessment

In making quantitative estimates of the toxicity of varying dosages of compounds to human receptors, uncertainties arise from two sources. First, data related to human exposure and the subsequent effects are usually insufficient, if they are at all available. Human exposure data usually lack adequate concentration estimations and suffer from inherent temporal variability. Therefore, animal studies often are used and new uncertainties arise from the process of extrapolating animal results to humans. Second, to obtain observable effects with a manageable number of experimental animals, high doses of a compound often are used. In this situation, a high dose means that high exposures are used in the experiment with respect to most environmental exposures. Therefore, when applying the results of the animal experiment to the human condition, the effects at high doses must be extrapolated to approximate effects at lower doses.

5.7.4 Risk Screening Process

Risk screening produces conservative, but incomplete risk estimates posed by chemicals detected in limited sampling and analyses of environmental media. The conservatism is derived primarily by the use of maximum detected contaminant concentrations for comparison to residential RBCs despite the fact that current exposure to human receptors is limited to Cheatham Annex personnel. Furthermore, surface water ingestion exposure is not very likely, but risk screening assumes that this may occur. This conservatism may account for pathways not otherwise considered in risk screening such as dermal exposure to soil.

5.7.5 COPCs Not Quantitatively Evaluated

Lead was not evaluated in the soil at AOC 1. Lead is currently classified as a Group B2 carcinogen-probable human carcinogen, as well as a developmental toxin in young children. Lead has been known to affect various systems of the body including the hematopoietic system, the central nervous system, the cardiovascular system, and the human reproductive system. The lack of promulgated toxicological indices for lead does not have significant effects on the under estimation of risk due to the presence of other COPCs such as certain PAHs, PCBs, arsenic, and chromium, in environmental media. Although lead was not quantitatively evaluated, this risk screening has been performed using conservative exposure point concentrations, exposure scenarios (i.e., the evaluation of surface water in the human health risk screening), and currently available toxicological information. Additionally, human health toxicological profiles for lead have been provided in Appendix F.3.

SECTION 5.0
TABLES

TABLE 5-1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatiles (ug/kg)															
1330-20-7	Xylene (Total)	2	J	2	J	µg/kg	4-HA02-00	1/6	11.24U - 14.79UL	2	ND	1.56E+07 N	N/A	N/A	NO	BSL
	Semivolatiles (ug/kg)															
83-32-9	Acenaphthene	330	J	330	J	µg/kg	4-HA02-00	1/7	380U - 5500U	330	ND	4.69E+05 N	N/A	N/A	NO	BSL
120-12-7	Anthracene	530	J	1700	J	µg/kg	4-HA06-00	2/7	380U - 5500U	1700	ND	2.35E+06 N	N/A	N/A	NO	BSL
56-55-3	Benzo(a)Anthracene	290	J	8800		µg/kg	4-HA06-00	4/7	380U - 2600U	8800	120J - 240J	8.75E+02 C	N/A	N/A	YES	ASL
50-32-8	Benzo(a)Pyrene	440	J	7000		µg/kg	4-HA06-00	4/7	380U - 2600U	7000	140J - 180J	8.75E+01 C	N/A	N/A	YES	ASL
205-99-2	Benzo(b)Fluoranthene	76	J	6800		µg/kg	4-HA06-00	6/7	380U - 380U	6800	230J - 500	8.75E+02 C	N/A	N/A	YES	ASL
191-24-2	Benzo(g,h,i)Perylene	61	J	3400	J	µg/kg	4-HA06-00	5/7	380U - 2600U	3400	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)Fluoanthene	53	J	6800		µg/kg	4-HA06-00	6/7	380U - 380U	6800	120J - 130J	8.75E+03 C	N/A	N/A	YES	CHEM
117-81-7	Bis(2-Ethylhexyl)Phthalate	3000		16000		µg/kg	4-HA02-00	3/7	49B - 5500U	16000	ND	4.56E+04 C	N/A	N/A	NO	BSL
86-74-8	Carbazole	250	J	250	J	µg/kg	4-HA02-00	1/7	380U - 5500U	250	ND	3.19E+04 C	N/A	N/A	YES	CHEM
218-01-9	Chrysene	75	J	8600		µg/kg	4-HA06-00	6/7	380U - 380U	8600	150J - 270J	8.75E+04 C	N/A	N/A	YES	CHEM
53-70-3	Dibenz(a,h)Anthracene	1400	J	1400	J	µg/kg	4-HA06-00	1/7	380U - 5500U	1400	ND	8.75E+01 C	N/A	N/A	YES	ASL
84-74-2	Di-n-Butylphthalate	9900		9900		µg/kg	4-HA04-00	1/7	41B - 5500U	9900	ND	7.82E+05 N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	49	J	14000		µg/kg	4-HA06-00	6/7	380U - 380U	14000	120J - 430	3.13E+05 N	N/A	N/A	NO	BSL
86-73-7	Fluorene	250	J	250	J	µg/kg	4-HA02-00	1/7	380U - 5500U	250	ND	3.13E+05 N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	48	J	3400	J	µg/kg	4-HA06-00	5/7	380U - 2600U	3400	160J - 160J	8.75E+02 C	N/A	N/A	YES	ASL
85-01-8	Phenanthrene	560	J	5500		µg/kg	4-HA06-00	4/7	380U - 2600U	5500	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
129-00-0	Pyrene	46	J	11000		µg/kg	4-HA06-00	6/7	380U - 380U	11000	160J - 320J	2.35E+05 N	N/A	N/A	NO	BSL
	Pesticides/PCBs (ug/kg)															
72-54-8	4,4'-DDD	7.6	K	7.6	K	µg/kg	4-HA06-00	1/7	3.8U - 27U	7.6	ND	2.66E+03 C	N/A	N/A	NO	BSL
72-55-9	4,4'-DDE	9.6	J	43	J	µg/kg	4-HA04-00	2/7	3.8U - 27U	43	ND	1.88E+03 C	N/A	N/A	NO	BSL
50-29-3	4,4'-DDT	4.6	J	220	K	µg/kg	4-HA05-00	5/7	3.8U - 4U	220	ND	1.88E+03 C	N/A	N/A	NO	BSL
309-00-2	Aldrin	33	K	33	K	µg/kg	4-HA05-00	1/7	2U - 2.7U	33	ND	3.76E+01 C	N/A	N/A	NO	BSL
53469-21-9	Aroclor-1242	1000	K	1000	K	µg/kg	4-HA05-00	1/7	38U - 52U	1000	ND	3.19E+02 C	N/A	N/A	YES	ASL
11096-82-5	Aroclor-1260	53	J	2700	K	µg/kg	4-HA05-00	7/7	(5)	2700	ND	3.19E+02 C	N/A	N/A	YES	ASL
5103-74-2	gamma-Chlordane	15	K	15	K	µg/kg	4-HA05-00	1/7	2U - 2.7U	15	ND	1.82E+03 (7) C	N/A	N/A	NO	BSL
33213-65-9	Endosulfan II	4.4	J	5.7	J	µg/kg	4-HA03-00	2/7	3.9U - 27U	5.7	ND	4.69E+04 (8) N	N/A	N/A	NO	BSL
72-20-8	Endrin	6.3	J	28	K	µg/kg	4-HA05-00	2/7	3.9U - 5.2U	28	ND	2.35E+03 N	N/A	N/A	NO	BSL
7421-93-4	Endrin Aldehyde	77	K	77	K	µg/kg	4-HA05-00	1/7	3.8U - 5.2U	77	ND	2.35E+03 (9) N	N/A	N/A	NO	BSL
53494-70-5	Endrin Ketone	4.5		87	K	µg/kg	4-HA05-00	2/7	3.8U - 5.2U	87	ND	2.35E+03 (9) N	N/A	N/A	NO	BSL

TABLE 5-1 (Cont)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Inorganics (mg/kg)															
7429-90-5	Aluminum	4560	L	9560	L	mg/kg	4-HA04-00	7/7	(5)	9560	2690 - 24100	7.82E+03 N	N/A	N/A	YES	ASL
7440-36-0	Antimony	0.67	J	12.6		mg/kg	4-HA05-00	2/7	0.44UJ - 0.55U	12.6	ND	3.13E+00 N	N/A	N/A	YES	ASL
7440-38-2	Arsenic	2.6	L	4.1	L	mg/kg	4-HA04-00	7/7	(5)	4.1	1L - 14.8	4.26E-01 C	N/A	N/A	YES	ASL
7440-39-3	Barium	20.3	J	164		mg/kg	4-HA04-00	7/7	(5)	164	10.6J - 39.6J	5.48E+02 N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.74	J	3.3		mg/kg	4-HA05-00	2/7	0.07U - 0.34U	3.3	ND	3.91E+00 N	N/A	N/A	NO	BSL
7440-70-2	Calcium	1110	J	8420		mg/kg	4-HA03-00	7/7	(5)	8420	90.7J - 4320	N/A N	N/A	N/A	NO	NTX
7440-47-3	Chromium	8.7		56.6		mg/kg	4-HA06-00	7/7	(5)	56.6	3.5 - 33.5	2.35E+01 (10) N	N/A	N/A	YES	ASL
7440-48-4	Cobalt	1.7	J	8.8	J	mg/kg	4-HA06-00	6/7	1.4U - 1.4U	8.8	0.88J - 3J	4.69E+02 N	N/A	N/A	NO	BSL
7440-50-8	Copper	10.5		150		mg/kg	4-HA05-00	5/7	3.8B - 4.5B	150	1.2J - 7.3	3.13E+02 N	N/A	N/A	NO	BSL
57-12-5	Cyanide	0.07	L	0.13	L	mg/kg	4-HA02-00D	4/7	0.02UL - 0.03UL	0.13	ND	1.56E+02 N	N/A	N/A	NO	BSL
7439-89-6	Iron	8570	L	61700	L	mg/kg	4-HA06-00	7/7	(5)	61700	2070 - 46400	2.35E+03 N	N/A	N/A	YES	ASL
7439-92-1	Lead	11.6		129		mg/kg	4-HA05-00	7/7	(5)	129	2.1 - 16.7L	4.00E+02 (11) N	N/A	N/A	NO	BSL
7439-95-4	Magnesium	514	J	2140		mg/kg	4-HA06-00	7/7	(5)	2140	175J - 2700	N/A N	N/A	N/A	NO	NTX
7439-96-5	Manganese	43.2		302	J	mg/kg	4-HA06-00	7/7	(5)	302	8.7 - 161	1.56E+02 N	N/A	N/A	YES	ASL
7439-97-6	Mercury	0.04	J	0.88		mg/kg	4-HA05-00	7/7	(5)	0.88	0.05J - 0.05J	7.82E-01 (12) N	N/A	N/A	YES	ASL
7440-02-0	Nickel	10.1	J	39.6		mg/kg	4-HA06-00	3/7	2.2B - 4.1B	39.6	4.2J - 12.5	1.56E+02 N	N/A	N/A	NO	BSL
7440-09-7	Potassium	366	J	1420		mg/kg	4-HA05-00	6/7	283B - 283B	1420	387J - 1390	N/A N	N/A	N/A	NO	NTX
7782-49-2	Selenium	1	J	1	J	mg/kg	4-HA04-00	1/7	0.6U - 0.81U	1	0.21L - 0.61L	3.91E+01 N	N/A	N/A	NO	BSL
7440-22-4	Silver	20.6	L	20.6	L	mg/kg	4-HA06-00	1/7	2.4B - 5.2B	20.6	1J - 1.8J	3.91E+01 N	N/A	N/A	NO	BSL
7440-28-0	Thallium	1.1	L	1.1	L	mg/kg	4-HA06-00	1/7	0.5UL - 0.72UL	1.1	ND	5.48E-01 N	N/A	N/A	YES	ASL
7440-62-2	Vanadium	13.9		35.7	J	mg/kg	4-HA06-00	7/7	(5)	35.7	5.2J - 64.7	5.48E+01 N	N/A	N/A	NO	BSL
7440-66-6	Zinc	102		324		mg/kg	4-HA05-00	5/7	28.6B - 32.5B	324	4.9 - 20.1	2.35E+03 N	N/A	N/A	NO	BSL

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)

(4) Rationale Codes
Selection Reason:
Infrequent Detection but Associated Historically (HIST)
Frequent Detection (FD)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
Same chemical class (CHEM)

Deletion Reason:
Infrequent Detection (IFD)
Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No detection limits given; analyte detected in every sample.
(6) Screening value for pyrene used as a surrogate.
(7) Screening value for chlordane used as a surrogate.
(8) Screening value for endosulfan used as a surrogate.
(9) Screening value for endrin used as a surrogate.
(10) Screening value for chromium VI used.
(11) Action level for lead
(12) Screening values for methylmercury

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = Estimated Value
L = Estimated Value; Biased High
K = Estimated Value; Biased Low

C = Carcinogenic
N = Non-Carcinogenic

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 5-2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatiles (ug/kg)															
78-93-3	2-Butanone	8	J	8	J	µg/kg	4-HA02-02	1/7	2B - 20.41U	8	ND	4.69E+06 N	N/A	N/A	NO	BSL
100-41-4	Ethylbenzene	2	J	2	J	µg/kg	4-HA02-02	1/7	10.93U - 20.41U	2	ND	7.82E+05 N	N/A	N/A	NO	BSL
127-18-4	Tetrachloroethene	3	J	3	J	µg/kg	4-HA03-02	1/7	10.93U - 20.41U	3	ND	1.23E+04 C	N/A	N/A	NO	BSL
108-88-3	Toluene	2	J	3	J	µg/kg	4-HA01-02	2/7	12.75UL - 20.41U	3	ND	1.56E+06 N	N/A	N/A	NO	BSL
	Semivolatiles (ug/kg)															
56-55-3	Benzo(a)Anthracene	77	J	500	J	µg/kg	4-HA06-02	2/7	370U - 17000UJ	500	ND	8.75E+02 C	N/A	N/A	YES	CHEM
50-32-8	Benzo(a)Pyrene	52	J	600	J	µg/kg	4-HA06-02	4/7	370U - 17000UJ	600	ND	8.75E+01 C	N/A	N/A	YES	ASL
205-99-2	Benzo(b)Fluoranthene	51	J	510	J	µg/kg	4-HA05-01	5/7	11000UJ - 17000UJ	510	ND	8.75E+02 C	N/A	N/A	YES	CHEM
191-24-2	Benzo(g,h,i)Perylene	43	J	440	J	µg/kg	4-HA06-02	4/7	4300U - 17000UJ	440	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)Fluoanthene	59	J	760	J	µg/kg	4-HA06-02	4/7	370U - 17000UJ	760	ND	8.75E+03 C	N/A	N/A	YES	CHEM
117-81-7	Bis(2-Ethylhexyl)Phthalate	530		63000	J	µg/kg	4-HA03-02	4/7	2600B - 4300U	63000	ND	4.56E+04 C	N/A	N/A	YES	ASL
218-01-9	Chrysene	45	J	620	J	µg/kg	4-HA06-02	4/7	4300U - 17000UJ	620	ND	8.75E+04 C	N/A	N/A	YES	CHEM
84-74-2	Di-n-Butylphthalate	90000	J	90000	J	µg/kg	4-HA04-01	1/7	66B - 5700B	90000	ND	7.82E+05 N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	43	J	880	J	µg/kg	4-HA05-01,4-HA06-02	5/7	11000UJ - 17000UJ	880	ND	3.13E+05 N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	39	J	66	J	µg/kg	4-HA02-02	3/7	3800U - 17000UJ	66	ND	8.75E+02 C	N/A	N/A	YES	CHEM
85-01-8	Phenanthrene	100	J	400	J	µg/kg	4-HA06-02	2/7	370U - 17000UJ	400	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
129-00-0	Pyrene	44	J	930	J	µg/kg	4-HA05-01	5/7	11000UJ - 17000UJ	930	ND	2.35E+05 N	N/A	N/A	NO	BSL
	Pesticides/PCBs (ug/kg)															
72-54-8	4,4'-DDD	4.5	L	4.5	L	µg/kg	4-HA02-02	1/7	3.7U - 6.7U	4.5	ND	2.66E+03 C	N/A	N/A	NO	BSL
72-55-9	4,4'-DDE	5.3		24	J	µg/kg	4-HA04-01	3/7	3.7U - 4.6U	24	ND	1.88E+03 C	N/A	N/A	NO	BSL
50-29-3	4,4'-DDT	5.8		150	L	µg/kg	4-HA05-01	4/7	3.7U - 4.6U	150	ND	1.88E+03 C	N/A	N/A	NO	BSL
309-00-2	Aldrin	27	J	27	J	µg/kg	4-HA05-01	1/7	1.9U - 3.4U	27	ND	3.76E+01 C	N/A	N/A	NO	BSL
53469-21-9	Aroclor-1242	2300	L	2300	L	µg/kg	4-HA05-01	1/7	37U - 67U	2300	ND	3.19E+02 C	N/A	N/A	YES	ASL
11097-69-1	Aroclor-1254	39		49		µg/kg	4-HA01-02D	2/7	38U - 67U	49	ND	3.19E+02 C	N/A	N/A	NO	BSL
11096-82-5	Aroclor-1260	50	J	1600	L	µg/kg	4-HA05-01	5/7	38U - 48UL	1600	ND	3.19E+02 C	N/A	N/A	YES	ASL
5103-71-9	alpha-Chlordane	2.4	J	2.4	J	µg/kg	4-HA05-01	1/7	1.9U - 3.4U	2.4	ND	1.82E+03 (7) C	N/A	N/A	NO	BSL
5103-74-2	gamma-Chlordane	4.3	J	4.3	J	µg/kg	4-HA05-01	1/7	1.9U - 3.4U	4.3	ND	1.82E+03 (7) C	N/A	N/A	NO	BSL
33213-65-9	Endosulfan II	6.5	K	14	J	µg/kg	4-HA01-02D	3/7	3.8U - 6.7U	14	ND	4.69E+04 (8) N	N/A	N/A	NO	BSL
53494-70-5	Endrin Ketone	8.9	J	19	J	µg/kg	4-HA05-01	2/7	3.7U - 4.8UL	19	ND	2.35E+03 (9) N	N/A	N/A	NO	BSL
76-44-8	Heptachlor	9.9	J	9.9	J	µg/kg	4-HA05-01	1/7	1.9U - 3.4U	9.9	ND	1.42E+02 C	N/A	N/A	NO	BSL
72-43-5	Methoxychlor	25	J	25	J	µg/kg	4-HA05-01	1/7	19U - 34U	25	ND	3.91E+04 N	N/A	N/A	NO	BSL

TABLE 5-2 (Cont)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening Toxicity Value	(3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Inorganics (mg/kg)																
7429-90-5	Aluminum	3550	L	9660	L	mg/kg	4-HA03-02	7/7	(5)	9660	2710 - 28200	7.82E+03	N	N/A	N/A	YES	ASL
7440-36-0	Antimony	1.1		1.1		mg/kg	4-HA05-01,4-HA06-02	2/7	0.44U - 0.69U	1.1	8.5L - 31.3L	3.13E+00	N	N/A	N/A	NO	BSL
7440-38-2	Arsenic	1.8	L	4.2	L	mg/kg	4-HA06-02	7/7	(5)	4.2	0.23J - 42.7	4.26E-01	C	N/A	N/A	YES	ASL
7440-39-3	Barium	20.2	J	247		mg/kg	4-HA04-01	7/7	(5)	247	10.6J - 66.9	5.48E+02	N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.96	J	1.2	J	mg/kg	4-HA05-01	2/7	0.07U - 0.15U	1.2	ND	3.91E+00	N	N/A	N/A	NO	BSL
7440-70-2	Calcium	478	J	5970		mg/kg	4-HA04-01	7/7	(5)	5970	28.9J - 233000	N/A	N	N/A	N/A	NO	NTX
7440-47-3	Chromium	6.9		29.2		mg/kg	4-HA06-02	7/7	(5)	29.2	5.2L - 33.5	2.35E+01	(10) N	N/A	N/A	YES	ASL
7440-48-4	Cobalt	1.6	J	4.3	J	mg/kg	4-HA03-02	7/7	(5)	4.3	0.97J - 156	4.69E+02	N	N/A	N/A	NO	BSL
7440-50-8	Copper	9		40.4		mg/kg	4-HA03-02	5/7	4.4B - 4.6B	40.4	2J - 15	3.13E+02	N	N/A	N/A	NO	BSL
57-12-5	Cyanide	0.44	L	0.44	L	mg/kg	4-HA04-01	1/7	0.02UL - 0.03UL	0.44	ND	1.56E+02	N	N/A	N/A	NO	BSL
7439-89-6	Iron	4960	L	28000	L	mg/kg	4-HA06-02	7/7	(5)	28000	3810J - 51100J	2.35E+03	N	N/A	N/A	YES	ASL
7439-92-1	Lead	11.3		45.3		mg/kg	4-HA03-02	7/7	(5)	45.3	3.6L - 25.5L	4.00E+02	(11) N	N/A	N/A	NO	BSL
7439-95-4	Magnesium	327	J	1730		mg/kg	4-HA06-02	7/7	(5)	1730	136J - 2870	N/A	N	N/A	N/A	NO	NTX
7439-96-5	Manganese	28.3		120		mg/kg	4-HA03-02	7/7	(5)	120	3.5J - 2940	1.56E+02	N	N/A	N/A	NO	BSL
7439-97-6	Mercury	0.05	J	0.91		mg/kg	4-HA03-02	7/7	(5)	0.91	ND	7.82E-01	(12) N	N/A	N/A	YES	ASL
7440-02-0	Nickel	13.6		20.4		mg/kg	4-HA06-02	3/7	3.2B - 7.7B	20.4	4.2J - 145	1.56E+02	N	N/A	N/A	NO	BSL
7440-09-7	Potassium	531	J	1700		mg/kg	4-HA05-01	6/7	249B - 249B	1700	392J - 2560	N/A	N	N/A	N/A	NO	NTX
7782-49-2	Selenium	0.78	J	0.78	J	mg/kg	4-HA02-02	1/7	0.6U - 0.94U	0.78	0.26L - 0.75L	3.91E+01	N	N/A	N/A	NO	BSL
7440-22-4	Silver	8.5	L	8.5	L	mg/kg	4-HA06-02	1/7	1.6B - 5.8B	8.5	1.1J - 2.4J	3.91E+01	N	N/A	N/A	NO	BSL
7440-62-2	Vanadium	12.2		20.8		mg/kg	4-HA06-02	6/7	10.1B - 10.1B	20.8	7.8J - 70.3L	5.48E+01	N	N/A	N/A	NO	BSL
7440-66-6	Zinc	150		643		mg/kg	4-HA01-02	6/7	28.6B - 28.6B	643	3.6J - 330	2.35E+03	N	N/A	N/A	NO	BSL

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)

(4) Rationale Codes — Selection Reason: Infrequent Detection but Associated Historically (HIST)
Frequent Detection (FD)
Same chemical class (CHEM)
Above Screening Levels (ASL)

Deletion Reason: Infrequent Detection (IFD)
Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No detection limits given; analyte detected in every sample.
(6) Screening value for pyrene used as a surrogate.
(7) Screening value for chlordane used as a surrogate.
(8) Screening value for endosulfan used as a surrogate.
(9) Screening value for endrin used as a surrogate.
(10) Screening value for chromium VI used.
(11) Action level for lead
(12) Screening values for methylmercury

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = (Organics) Estimated Value
L = Estimated Value; Biased High
K = Estimated Value; Biased Low

C = Carcinogenic
N = Non-Carcinogenic

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 5-3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatiles (ug/kg)															
75-35-4	1,1-Dichloroethene	4	J	4	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07U	4	ND	1.06E+03 C	N/A	N/A	NO	BSL
78-93-3	2-Butanone	5		* 5		µg/kg	A1-HA06-00	1/7	3B - 20.07U	5	ND	4.69E+06 N	N/A	N/A	NO	BSL
71-43-2	Benzene	4	J	4	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07U	4	ND	1.16E+04 C	N/A	N/A	NO	BSL
108-90-7	Chlorobenzene	5	J	5	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07UL	5	ND	1.56E+05 N	N/A	N/A	NO	BSL
108-88-3	Toluene	5	J	5	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07UL	5	ND	1.56E+06 N	N/A	N/A	NO	BSL
79-01-6	Trichloroethene	4	J	4	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07U	4	ND	5.81E+04 C	N/A	N/A	NO	BSL
	Semivolatiles (ug/kg)															
56-55-3	Benzo(a)Anthracene	65	J	280		µg/kg	A1-HA01-00	2/7	450U - 610U	280	120J - 240J	8.75E+02 C	N/A	N/A	YES	CHEM
50-32-8	Benzo(a)Pyrene	92	J	870		µg/kg	A1-HA01-00	2/7	450U - 610U	870	140J - 180J	8.75E+01 C	N/A	N/A	YES	ASL
205-99-2	Benzo(b)Fluoranthene	66	J	1700		µg/kg	A1-HA01-00	4/7	450U - 600U	1700	230J - 500	8.75E+02 C	N/A	N/A	YES	ASL
191-24-2	Benzo(g,h,i)Perylene	78	J	970		µg/kg	A1-HA01-00	2/7	450U - 610U	970	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)Fluoanthene	96	J	970		µg/kg	A1-HA01-00	2/7	450U - 610U	970	120J - 130J	8.75E+03 C	N/A	N/A	YES	CHEM
117-81-7	Bis(2-Ethylhexyl)Phthalate	47	J	12000	J	µg/kg	A1-HA04-00	5/7	450U - 620UL	12000	ND	4.56E+04 C	N/A	N/A	NO	BSL
218-01-9	Chrysene	67	J	830		µg/kg	A1-HA01-00	4/7	450U - 600U	830	150J - 270J	8.75E+04 C	N/A	N/A	YES	CHEM
53-70-3	Dibenz(a,h)Anthracene	350		350		µg/kg	A1-HA01-00	1/7	450U - 610U	350	ND	8.75E+01 C	N/A	N/A	YES	ASL
84-74-2	Di-n-Butylphthalate	72	J	170	J	µg/kg	A1-HA05-00D	6/7	620UL - 620UL	170	ND	7.82E+05 N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	61	J	250		µg/kg	A1-HA01-00	3/7	450U - 610U	250	120J - 430	3.13E+05 N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	74	J	810		µg/kg	A1-HA01-00	2/7	450U - 610U	810	160J - 160J	8.75E+02 C	N/A	N/A	YES	CHEM
85-01-8	Phenanthrene	71	J	78		µg/kg	A1-HA01-00	2/7	450U - 610U	78	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
129-00-0	Pyrene	65	J	360		µg/kg	A1-HA01-00	3/7	450U - 610U	360	160J - 320J	2.35E+05 N	N/A	N/A	NO	BSL
	Pesticides/PCBs (ug/kg)															
72-55-9	4,4'-DDE	1.5	L	18		µg/kg	A1-HA01-00	2/7	4.5U - 6.1U	18	ND	1.88E+03 C	N/A	N/A	NO	BSL
50-29-3	4,4'-DDT	15		120		µg/kg	A1-HA04-00	2/7	4.5U - 6.1U	120	ND	1.88E+03 C	N/A	N/A	NO	BSL
11096-82-5	Aroclor-1260	220	L	220	L	µg/kg	A1-HA04-00	1/7	45U - 62UL	220	ND	3.19E+02 C	N/A	N/A	NO	BSL
5103-71-9	alpha-Chlordane	4.3		4.3		µg/kg	A1-HA01-00	1/7	2.3U - 3.1U	4.3	ND	1.82E+03 (7) C	N/A	N/A	NO	BSL
1031-07-8	Endosulfan Sulfate	14		14		µg/kg	A1-HA01-00	1/7	4.5U - 6.1U	14	ND	4.69E+04 (8) N	N/A	N/A	NO	BSL

TABLE 5-3 (Cont)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Inorganics (mg/kg)																
7429-90-5	Aluminum	3570	L	9030	L	mg/kg	A1-HA01-00	7/7	(5)	9030	2690 - 24100	7.82E+03	N	N/A	N/A	YES	ASL
7440-36-0	Antimony	5.7	J	5.9	J	mg/kg	A1-HA05-00D	2/7	0.53U - 13.9U	5.9	ND	3.13E+00	N	N/A	N/A	YES	ASL
7440-38-2	Arsenic	1.4	J	23.5		mg/kg	A1-HA01-00	6/7	2.3U - 2.3U	23.5	1L - 14.8	4.26E-01	C	N/A	N/A	YES	ASL
7440-39-3	Barium	38.2	J	151		mg/kg	A1-HA01-00	7/7	(5)	151	10.6J - 39.6J	5.48E+02	N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.52	J	0.89	J	mg/kg	A1-HA01-00	2/7	1.2U - 2.3U	0.89	ND	3.91E+00	N	N/A	N/A	NO	BSL
7440-70-2	Calcium	4480		35900		mg/kg	A1-HA03-00	7/7	(5)	35900	90.7J - 4320	N/A	N	N/A	N/A	NO	NTX
7440-47-3	Chromium	7.2		44.7		mg/kg	A1-HA01-00	7/7	(5)	44.7	3.5 - 33.5	2.35E+01	(9) N	N/A	N/A	YES	ASL
7440-48-4	Cobalt	3.1	J	9.9	J	mg/kg	A1-HA03-00	6/7	1.5U - 1.5U	9.9	0.88J - 3J	4.69E+02	N	N/A	N/A	NO	BSL
7440-50-8	Copper	3.2	J	88.5		mg/kg	A1-HA05-00	6/7	11.3B - 11.3B	88.5	1.2J - 7.3	3.13E+02	N	N/A	N/A	NO	BSL
57-12-5	Cyanide	0.08	J	0.2	J	mg/kg	A1-HA05-00,A1-HA05-00D	3/7	0.03UL - 0.9UL	0.2	ND	1.56E+02	N	N/A	N/A	NO	BSL
7439-89-6	Iron	8050		35200	L	mg/kg	A1-HA02-00	7/7	(5)	35200	2070 - 46400	2.35E+03	N	N/A	N/A	YES	ASL
7439-92-1	Lead	16.2		501		mg/kg	A1-HA05-00D	7/7	(5)	501	2.1 - 16.7L	4.00E+02	(10) N	N/A	N/A	YES	ASL
7439-95-4	Magnesium	380	J	1980		mg/kg	A1-HA01-00	7/7	(5)	1980	175J - 2700	N/A	N	N/A	N/A	NO	NTX
7439-96-5	Manganese	122		523		mg/kg	A1-HA01-00	7/7	(5)	523	8.7 - 161	1.56E+02	N	N/A	N/A	YES	ASL
7439-97-6	Mercury	0.05	J	0.13	J	mg/kg	A1-HA01-00	6/7	0.03UL - 0.03UL	0.13	0.05J - 0.05J	7.82E-01	(11) N	N/A	N/A	NO	BSL
7440-02-0	Nickel	5.1	J	8.8	J	mg/kg	A1-HA05-00D	6/7	3.4B - 3.4B	8.8	4.2J - 12.5	1.56E+02	N	N/A	N/A	NO	BSL
7440-09-7	Potassium	579	J	652	J	mg/kg	A1-HA01-00	3/7	250B - 385B	652	387J - 1390	N/A	N	N/A	N/A	NO	NTX
7440-62-2	Vanadium	14.6		26		mg/kg	A1-HA01-00	7/7	(5)	26	5.2J - 64.7	5.48E+01	N	N/A	N/A	NO	BSL
7440-66-6	Zinc	110		849		mg/kg	A1-HA01-00	6/7	59B - 59B	849	4.9 - 20.1	2.35E+03	N	N/A	N/A	NO	BSL

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)

(4) Rationale Codes
Selection Reason: Infrequent Detection but Associated Historically (HIST)
Frequent Detection (FD)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
Same chemical class (CHEM)
Deletion Reason: Infrequent Detection (IFD)
Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No detection limits given; analyte detected in every sample.
(6) Screening value for pyrene used as a surrogate.
(7) Screening value for chlordane used as a surrogate.
(8) Screening value for endosulfan used as a surrogate.
(9) Screening value for chromium VI used.
(10) Action level for lead
(11) Screening values for methylmercury

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = (Organics) Estimated Value
L = Estimated Value; Biased High

C = Carcinogenic
N = Non-Carcinogenic

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 5-4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatiles (ug/kg)																
1330-20-7	Xylene (Total)	2		3		µg/kg	A1-HA05-01D	2/6	11.49U - 13.26U	3	ND	1.56E+07	N	N/A	N/A	NO	BSL
	Semivolatiles (ug/kg)																
56-55-3	Benzo(a)Anthracene	64	J	64	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	64	ND	8.75E+02	C	N/A	N/A	NO	BSL
50-32-8	Benzo(a)Pyrene	59	J	59	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	59	ND	8.75E+01	C	N/A	N/A	NO	BSL
205-99-2	Benzo(b)Fluoranthene	79	J	88	J	µg/kg	A1-HA05-01D	2/6	380U - 410U	88	ND	8.75E+02	C	N/A	N/A	NO	BSL
191-24-2	Benzo(g,h,i)Perylene	71	J	71	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	71	ND	2.35E+05	(6) N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)Fluoanthene	65	J	74	J	µg/kg	A1-HA05-01	2/6	380U - 410U	74	ND	8.75E+03	C	N/A	N/A	NO	BSL
117-81-7	Bis(2-Ethylhexyl)Phthalate	46	J	76	J	µg/kg	A1-HA02-02	3/6	400U - 570U	76	ND	4.56E+04	C	N/A	N/A	NO	BSL
218-01-9	Chrysene	81	J	83	J	µg/kg	A1-HA05-01	2/6	380U - 410U	83	ND	8.75E+04	C	N/A	N/A	NO	BSL
84-74-2	Di-n-Butylphthalate	49	J	110	J	µg/kg	A1-HA05-01,A1-HA05-01D	6/6	(5)	110	ND	7.82E+05	N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	100	J	140	J	µg/kg	A1-HA05-01D	2/6	380U - 410U	140	ND	3.13E+05	N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	55	J	55	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	55	ND	8.75E+02	C	N/A	N/A	NO	BSL
85-01-8	Phenanthrene	97	J	97	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	97	ND	2.35E+05	(6) N	N/A	N/A	NO	BSL
129-00-0	Pyrene	78	J	110	J	µg/kg	A1-HA05-01D	2/6	380U - 410U	110	ND	2.35E+05	N	N/A	N/A	NO	BSL
	Inorganics (mg/kg)																
7429-90-5	Aluminum	4080	L	8830	L	mg/kg	A1-HA06-02	6/6	(5)	8830	2710 - 28200	7.82E+03	N	N/A	N/A	YES	ASL
7440-36-0	Antimony	11.4	J	12	J	mg/kg	A1-HA05-01	2/6	0.41B - 10.9U	12	8.5L - 31.3L	3.13E+00	N	N/A	N/A	YES	ASL
7440-38-2	Arsenic	1.3	J	33.3		mg/kg	A1-HA06-02	6/6	(5)	33.3	0.23J - 42.7	4.26E-01	C	N/A	N/A	YES	ASL
7440-39-3	Barium	25.9	J	90.9		mg/kg	A1-HA05-01D	5/6	12.9B - 12.9B	90.9	10.6J - 66.9	5.48E+02	N	N/A	N/A	NO	BSL
7440-41-7	Beryllium	0.22	J	0.95		mg/kg	A1-HA06-02	3/6	0.21B - 1.1B	0.95	0.3J - 9.8	1.56E+01	N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.07	J	0.07	J	mg/kg	A1-HA04-02	1/6	0.06U - 1U	0.07	ND	3.91E+00	N	N/A	N/A	NO	BSL
7440-70-2	Calcium	1090		10400		mg/kg	A1-HA05-01D	6/6	(5)	10400	28.9J - 233000	N/A	N	N/A	N/A	NO	NTX
7440-47-3	Chromium	3.6		32.6		mg/kg	A1-HA06-02	6/6	(5)	32.6	5.2L - 33.5	2.35E+01	(7) N	N/A	N/A	YES	ASL
7440-48-4	Cobalt	1.5	J	9.4		mg/kg	A1-HA06-02	6/6	(5)	9.4	0.97J - 156	4.69E+02	N	N/A	N/A	NO	BSL
7440-50-8	Copper	86		146		mg/kg	A1-HA05-01D	2/6	1.5B - 3.5B	146	2J - 15	3.13E+02	N	N/A	N/A	NO	BSL
57-12-5	Cyanide	0.08	J	0.68	J	mg/kg	A1-HA05-01	4/6	0.6UL - 0.6UL	0.68	ND	1.56E+02	N	N/A -	N/A	NO	BSL
7439-89-6	Iron	2630	L	39700		mg/kg	A1-HA06-02	6/6	(5)	39700	3810J - 51100J	2.35E+03	N	N/A	N/A	YES	ASL
7439-92-1	Lead	4.7		1120		mg/kg	A1-HA05-01D	6/6	(5)	1120	3.6L - 25.5L	4.00E+02	(8) N	N/A	N/A	YES	ASL
7439-95-4	Magnesium	547	J	1430		mg/kg	A1-HA02-02	5/6	81.4B - 81.4B	1430	136J - 2870	N/A	N	N/A	N/A	NO	NTX
7439-96-5	Manganese	11		401		mg/kg	A1-HA05-01D	6/6	(5)	401	3.5J - 2940	1.56E+02	N	N/A	N/A	YES	ASL
7439-97-6	Mercury	0.02	J	0.06	L	mg/kg	A1-HA05-01	2/6	0.03UL - 0.1U	0.06	ND	7.82E-01	(9) N	N/A	N/A	NO	BSL
7440-02-0	Nickel	1.2	J	23.3	L	mg/kg	A1-HA05-01	4/6	12.3B - 13.6B	23.3	4.2J - 145	1.56E+02	N	N/A	N/A	NO	BSL
7440-09-7	Potassium	690	J	1040		mg/kg	A1-HA06-02	2/6	117B - 472B	1040	392J - 2560	N/A	N	N/A	N/A	NO	NTX
7440-22-4	Silver	1.8	UB	11.3		mg/kg	A1-HA06-02	2/6	1.6B - 9.7B	11.3	1.1J - 2.4J	3.91E+01	N	N/A	N/A	NO	BSL
7440-62-2	Vanadium	6.9		40.8		mg/kg	A1-HA06-02	6/6	(5)	40.8	7.8J - 70.3L	5.48E+01	N	N/A	N/A	NO	BSL
7440-66-6	Zinc	330		365		mg/kg	A1-HA05-01D	2/6	4.2B - 35.3B	365	3.6J - 330	2.35E+03	N	N/A	N/A	NO	BSL

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)

(4) Rationale Codes
Selection Reason:
Infrequent Detection but Associated Historically (HIST)
Frequent Detection (FD)
Same chemical class (CHEM)
Above Screening Levels (ASL)
Deletion Reason:
Infrequent Detection (IFD)
Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No detection limits given; analyte detected in every sample.
(6) Screening value for pyrene used as a surrogate.
(7) Screening value for chromium VI used.
(8) Action level for lead
(9) Screening values for methylmercury

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = (Organics) Estimated Value
L = Estimated Value: Biased High
B = (Inorganics) Reported value is less than the Contract Required Detection Limit but greater tha

C = Carcinogenic
N = Non-Carcinogenic

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 5-5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Semivolatiles (ug/L)																
117-81-7	Bis(2-Ethylhexyl)Phthalate	2	J	98		µg/L	A1-SW02	3/4	10U - 10U	98	ND	4.78E+01	C	N/A	N/A	YES	ASL
117-84-0	Di-n-Octyl Phthalate	3	J	3	J	µg/L	A1-SW01	1/4	10U - 10U	3	ND	7.30E+02	N	N/A	N/A	NO	BSL
	Inorganics (ug/L)																
7440-38-2	Arsenic	17.1		19		µg/L	A1-SW03D	2/4	3.4U - 3.4U	19	ND	4.46E-01	C	N/A	N/A	YES	ASL
7440-39-3	Barium	89.8	J	92	J	µg/L	A1-SW03D	2/4	33.8B - 55.6B	92	30.4J - 41.5J	2.56E+03	N	N/A	N/A	NO	BSL
7440-70-2	Calcium	94900		141000		µg/L	A1-SW03D	4/4	(5)	141000	13000J - 97300	N/A	N	N/A	N/A	NO	NTX
7439-89-6	Iron	339		25900		µg/L	A1-SW03	4/4	(5)	25900	ND	1.10E+04	N	N/A	N/A	YES	ASL
7439-95-4	Magnesium	1780	J	4390	J	µg/L	A1-SW03D	4/4	(5)	4390	1380J - 2460J	N/A	N	N/A	N/A	NO	NTX
7439-96-5	Manganese	26.1		656		µg/L	A1-SW03D	4/4	(5)	656	15.4 - 85.9J	7.30E+02	N	N/A	N/A	NO	BSL
7440-09-7	Potassium	1710	J	2660	J	µg/L	A1-SW03D	3/4	1340B - 1340B	2660	1740J - 3210J	N/A	N	N/A	N/A	NO	NTX
7440-23-5	Sodium	4570	J	6970	J	µg/L	A1-SW03D	4/4	(5)	6970	5230 - 9390	N/A	N	N/A	N/A	NO	NTX

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) 10 * USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)
Based on phone conversation with a Region III toxicologist

(4) Rationale Codes

Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)

Deletion Reason:
- Infrequent Detection (IFD)
- Background Levels (BKG)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)

(5) No detection limits given; analyte detected in every sample.

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level

J = (Organics) Estimated Value

C = Carcinogenic
N = Non-Carcinogenic

µg/L = micrograms per liter

TABLE 5-6
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

Chemical of Potential Concern	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)Anthracene	mg/kg	1.8543	4.1307	8.8		mg/kg	4.1307	95% UCL	(1)	4.1307	95% UCL	(1)
Benzo(a)Pyrene	mg/kg	1.7686	3.5490	7		mg/kg	3.5490	95% UCL	(1)	3.5490	95% UCL	(1)
Benzo(b)Fluoranthene	mg/kg	1.5023	3.2710	6.8		mg/kg	3.2710	95% UCL	(1)	3.2710	95% UCL	(1)
Benzo(k)Fluoanthene	mg/kg	1.4719	3.2437	6.8		mg/kg	3.2437	95% UCL	(1)	3.2437	95% UCL	(1)
Carbazole	mg/kg	1.0986	1.8237	0.25	J	mg/kg	0.2500	Max	(2)	0.2500	Max	(2)
Chrysene	mg/kg	1.8993	4.1374	8.6		mg/kg	4.1374	95% UCL	(1)	4.1374	95% UCL	(1)
Dibenz(a,h)Anthracene	mg/kg	1.1343	1.7694	1.4	J	mg/kg	1.4000	Max	(2)	1.4000	Max	(2)
Indeno(1,2,3-cd)Pyrene	mg/kg	1.0126	1.8724	3.4	J	mg/kg	1.8724	95% UCL	(1)	1.8724	95% UCL	(1)
Aroclor-1242	mg/kg	0.1609	0.4327	1	K	mg/kg	0.4327	95% UCL	(1)	0.4327	95% UCL	(1)
Aroclor-1260	mg/kg	0.5194	1.2406	2.7	K	mg/kg	1.2406	95% UCL	(1)	1.2406	95% UCL	(1)
Aluminum	mg/kg	6633	7758	9560	L	mg/kg	7758	95% UCL	(1)	7758	95% UCL	(1)
Antimony	mg/kg	2.0679	5.4809	12.6		mg/kg	5.4809	95% UCL	(1)	5.4809	95% UCL	(1)
Arsenic	mg/kg	3.0714	3.4708	4.1	L	mg/kg	3.4708	95% UCL	(1)	3.4708	95% UCL	(1)
Chromium	mg/kg	18.8571	31.4234	56.6		mg/kg	31.4234	95% UCL	(1)	31.4234	95% UCL	(1)
Iron	mg/kg	18117	32358	61700	L	mg/kg	32358	95% UCL	(1)	32358	95% UCL	(1)
Manganese	mg/kg	154.2714	223.0963	302	J	mg/kg	223.0963	95% UCL	(1)	223.0963	95% UCL	(1)
Thallium	mg/kg	0.4086	0.6344	1.1	L	mg/kg	0.6344	95% UCL	(1)	0.6344	95% UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

TABLE 5-7
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical of Potential Concern	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)Anthracene	mg/kg	2.4424	4.8726	0.5	J	mg/kg	0.5000	Max	(2)	0.5000	Max	(2)
Benzo(a)Pyrene	mg/kg	2.2139	4.7028	0.6	J	mg/kg	0.6000	Max	(2)	0.6000	Max	(2)
Benzo(b)Fluoranthene	mg/kg	2.1814	4.6850	0.51	J	mg/kg	0.5100	Max	(2)	0.5100	Max	(2)
Benzo(k)Fluoanthene	mg/kg	2.2226	4.7093	0.76	J	mg/kg	0.7600	Max	(2)	0.7600	Max	(2)
Bis(2-Ethylhexyl)Phthalate	mg/kg	10.0286	27.1905	63	J	mg/kg	27.1905	95% UCL	(1)	27.1905	95% UCL	(1)
Chrysene	mg/kg	2.4306	4.8697	0.62	J	mg/kg	0.6200	Max	(2)	0.6200	Max	(2)
Indeno(1,2,3-cd)Pyrene	mg/kg	2.6004	4.9880	0.066	J	mg/kg	0.0660	Max	(2)	0.0660	Max	(2)
Aroclor-1242	mg/kg	0.3481	0.9802	2.3	L	mg/kg	0.9802	95% UCL	(1)	0.9802	95% UCL	(1)
Aroclor-1260	mg/kg	0.3071	0.7333	1.6	L	mg/kg	0.7333	95% UCL	(1)	0.7333	95% UCL	(1)
Aluminum	mg/kg	6591	8308	9660	L	mg/kg	8308	95% UCL	(1)	8308	95% UCL	(1)
Arsenic	mg/kg	3.0571	3.7206	4.2	L	mg/kg	3.7206	95% UCL	(1)	3.7206	95% UCL	(1)
Chromium	mg/kg	15.1857	20.3564	29.2		mg/kg	20.3564	95% UCL	(1)	20.3564	95% UCL	(1)
Iron	mg/kg	13426	19195	28000	L	mg/kg	19195	95% UCL	(1)	19195	95% UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

TABLE 5-8
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

Chemical of Potential Concern	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)Anthracene	mg/kg	0.2443	0.3062	0.28		mg/kg	0.2800	Max	(2)	0.2800	Max	(2)
Benzo(a)Pyrene	mg/kg	0.3324	0.5147	0.87		mg/kg	0.5147	95% UCL	(1)	0.5147	95% UCL	(1)
Benzo(b)Fluoranthene	mg/kg	0.3904	0.8195	1.7		mg/kg	0.82	95% UCL	(1)	0.82	95% UCL	(1)
Benzo(k)Fluoanthene	mg/kg	0.3473	0.5558	0.97		mg/kg	0.5558	95% UCL	(1)	0.5558	95% UCL	(1)
Chrysene	mg/kg	0.2617	0.4580	0.83		mg/kg	0.4580	95% UCL	(1)	0.4580	95% UCL	(1)
Dibenz(a,h)Anthracene	mg/kg	0.2771	0.3116	0.35		mg/kg	0.3116	95% UCL	(1)	0.3116	95% UCL	(1)
Indeno(1,2,3-cd)Pyrene	mg/kg	0.3213	0.4900	0.81		mg/kg	0.4900	95% UCL	(1)	0.4900	95% UCL	(1)
Aluminum	mg/kg	6607.14	8102.0860	9030	L	mg/kg	8102	95% UCL	(1)	8102	95% UCL	(1)
Antimony	mg/kg	3.06	5.2346	5.9	J	mg/kg	5.23	95% UCL	(1)	5.23	95% UCL	(1)
Arsenic	mg/kg	5.65	11.6597	23.5		mg/kg	11.66	95% UCL	(1)	11.66	95% UCL	(1)
Chromium	mg/kg	15.49	25.0452	44.7		mg/kg	25.0452	95% UCL	(1)	25.0452	95% UCL	(1)
Iron	mg/kg	21250.00	29880.4518	35200	L	mg/kg	29880	95% UCL	(1)	29880	95% UCL	(1)
Lead	mg/kg	195.99	352.9071	501		mg/kg	353	95% UCL	(1)	353	95% UCL	(1)
Manganese	mg/kg	377.29	477.4471	523		mg/kg	477	95% UCL	(1)	477	95% UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

TABLE 5-9
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical of Potential Concern	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aluminum	mg/kg	5600.00	7046	8830	L	mg/kg	7046	95% UCL	(1)	7046	95% UCL	(1)
Antimony	mg/kg	4.93	10	12	J	mg/kg	10	95% UCL	(1)	10	95% UCL	(1)
Arsenic	mg/kg	8.50	18.58	33.3		mg/kg	18.6	95% UCL	(1)	18.6	95% UCL	(1)
Chromium	mg/kg	15.45	23.7579	32.6		mg/kg	23.8	95% UCL	(1)	23.8	95% UCL	(1)
Iron	mg/kg	22436.67	35077	39700		mg/kg	35077	95% UCL	(1)	35077	95% UCL	(1)
Lead	mg/kg	271.57	648	1120		mg/kg	648	95% UCL	(1)	648	95% UCL	(1)
Manganese	mg/kg	186.87	324	401		mg/kg	324	95% UCL	(1)	324	95% UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.

TABLE 5-10
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water

Chemical of Potential Concern (3)	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Bis(2-Ethylhexyl)Phthalate	mg/L	0.0355	0	0.098		mg/L	0.10	Max	(3)	0.098	Max	(3)
Arsenic	mg/L	0.0099	0.0210	0.019		mg/L	0.02	Max	(3)	0.019	Max	(3)
Iron	mg/L	13.1148	30.3509	25.9		mg/L	25.90	Max	(3)	25.900	Max	(3)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.
(3) Data set contains fewer than five samples. Therefore, maximum concentration used for EPC.

TABLE 5-11

HUMAN HEALTH RISK ASSESSMENT TOXICITY FACTORS
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Constituents	Oral CSF (mg/kg/day)$^{-1}$	Inhalation CSF (mg/kg/day)$^{-1}$	Oral RfD (mg/kg/day)$^{-1}$	Inhalation RfD (mg/kg/day)$^{-1}$	Oral Absorption Factors [1]	WOE	Oral / Dermal (Systemic Toxicity)		Inhalation (Systemic Toxicity)	
							Target Organ	Critical Effect	Target Organ	Critical Effect
Semivolatiles										
Benzo(a)Anthracene	0.73 NCEA 04/26/2000	NA	NA	NA	50%	B2	NA	NA	NA	NA
Benzo(a)Pyrene	7.3 IRIS 06/09/1999	3.1 NCEA 04/26/2000	NA	NA	50%	B2	NA	NA	NA	NA
Benzo(b)Fluoranthene	0.73 NCEA 04/26/2000	NA	NA	NA	50%	B2	NA	NA	NA	NA
Benzo(k)Fluoanthene	0.073 NCEA 04/26/2000	NA	NA	NA	50%	B2	NA	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	0.014 IRIS 03/25/1999	0.014 NCEA 04/26/2000	0.02 IRIS 03/25/1999	NA	55%	B2	Liver	Increase in relative liver weight	NA	NA
Carbazole	0.02 NCEA 04/26/2000	NA	NA	NA	50%	B2	NA	NA	NA	NA
Chrysene	0.0073 NCEA 04/26/2000	NA	NA	NA	50%	B2	NA	NA	NA	NA
Dibenz(a,h)Anthracene	7.3 NCEA 04/26/2000	NA	NA	NA	50%	B2	NA	NA	NA	NA
Indeno(1,2,3-cd)Pyrene	0.73 NCEA 04/26/2000	NA	NA	NA	50%	B2	NA	NA	NA	NA
PCBs										
Aroclor-1242	2 IRIS 04/26/2000	2 IRIS 04/26/2000	NA	NA	89%	B2	NA	NA	NA	NA
Aroclor-1260	2 IRIS 02/26/1998	2 IRIS 02/26/1998	NA	NA	89%	B2	NA	NA	NA	NA
Inorganics										
Aluminum	NA	NA	1 NCEA 04/26/2000	0.001 NCEA 04/26/2000	27%	D	CNS	Developmental problems	CNS	Developmental problems
Antimony	NA	NA	0.0004 IRIS 02/26/1998	NA	10%	D	Whole Body	Longevity, blood glucose and cholesterol	NA	NA
Arsenic	1.5 IRIS 02/26/1998	15.1 IRIS 02/26/1998	0.0003 IRIS 02/26/1998	NA	95%	A	Skin / CVS	Hyperpigmentation, keratosis, vascular complications	NA	NA
Cadmium	NA	6.3 IRIS 02/26/1998	0.001 IRIS 02/26/1998	0.000057 NA NA	5%	B1	Kidney	Significant proteinuria	NA	NA

TABLE 5-11

HUMAN HEALTH RISK ASSESSMENT TOXICITY FACTORS
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Constituents	Oral CSF $(mg/kg/day)^{-1}$	Inhalation CSF $(mg/kg/day)^{-1}$	Oral RfD $(mg/kg/day)^{-1}$	Inhalation RfD $(mg/kg/day)^{-1}$	Oral Absorption Factors (1)	WOE	Oral / Dermal (Systemic Toxicity) Target Organ	Oral / Dermal (Systemic Toxicity) Critical Effect	Inhalation (Systemic Toxicity) Target Organ	Inhalation (Systemic Toxicity) Critical Effect
Inorganics (Cont)										
Chromium	NA	41 HEAST/ 07/01/1997 IRIS	0.003 IRIS 03/29/1999	0.00003 IRIS 03/29/1999	1%	D (o) A (i)	GIS	NOEL	RsS	Nasal septum atrophy (aerosols), lactate dehydrogenase in bronchioalveolar lavage fluid (particulates)
Iron	NA	NA	0.3 NCEA 04/26/2000	NA	20%	D	Liver / CVS / GIS	NA	NA	NA
Lead	NA	NA	NA	NA	20%	B2	NA	NA	NA	NA
Manganese	NA	NA	0.02 IRIS 03/29/1999	0.0000143 IRIS 03/29/1999	5%	D	CNS	CNS Effects	CNS	Impairment of neurobehavioral function
Thallium	NA	NA	0 00007 IRIS 03/29/1999	NA	100%	D	CVS	Increased levels of SGOT and LDH in blood	NA	NA

Notes:
CSF = Cancer Slope Factor
RfD = Reference Dose
WOE = Weight of Evidence
NOEL = No Obseved Effects Level
NA = Not Applicable

Sources:
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment, USEPA

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
RsS = Respiratory System

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

TABLE 5-12

RISK SCREENING SUMMARY
SITE INSPECTION REPORT
CHEATHAM ANNEX SITE
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Pathway	Site 4		AOC 1	
	ILCR	**HI**	**ILCR**	**HI**
Surface Soil	8.1×10^{-05}	2.0	2.7×10^{-05}	2.0
Subsurface Soil	2.3×10^{-05}	1.0	4.3×10^{-05}	2.1
Surface Water (Unfiltered Inorganics)	NA	NA	4.4×10^{-05}	0.24
TOTAL	1.0×10^{-04}	3.0	1.1×10^{-04}	4.3

Notes:
Shading indicates ILCR greater than 1×10^{-04} or HI greater than 1.0.
NA = Pathway Not Applicable

TABLE 5-13

SUMMARY OF UNCERTAINTIES IN THE RESULTS OF THE RISK SCREENING
SITE INSPECTION REPORT
FLEET INDUSTRIAL SUPPLY CENTER, CHEATHAM ANNEX
WILLIAMSBURG, VIRGINIA

	Potential Magnitude for Over-Estimation of Risks	Potential Magnitude for Under-Estimation of Risks	Potential Magnitude for Over or Under-Estimation of Risks
Environmental Sampling and Analysis Sufficient samples may not have been taken to characterize the media being evaluated.			High
Systematic or random errors in the chemical analysis may yield erroneous data.			Low
Selection of COPCs The use of USEPA Region III COC screening concentrations in selecting COCs in soil and surface water.			Low
Toxicological Assessment Toxicological indices derived from high dose animal studies, extrapolated to low dose human exposure.	Moderate		
Lack of promulgated toxicological indices for the inhalation pathway.		Low	
Risk Screening Process Using maximum concentration in media in the estimation of the exposure point concentration.	Moderate		
Assessing future residential property use when the likelihood of residential development is low.	High		
The use of RBC values to calculate potential risk.			Moderate
COPCs Not Quantitatively Evaluated Compounds not quantitatively evaluated.		Low	

Notes:

Low - Assumptions categorized as "low" may generally effect risk estimates by less than one order of magnitude.
Moderate - Assumptions categorized as "moderate" may generally effect estimates of risk by between one and two orders of magnitude.

High - Assumptions categorized as "high" may generally effect estimates of risk by more than two orders of magnitude.

Source: Risk Assessment Guidance for Superfund, Volume 1, Part A: Human Health Evaluation Manual. USEPA, 1989.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This section presents conclusions and recommendations formulated from performance of the November 1999 SI at Site 4 and AOC 1.

6.1 Conclusions

Site 4 Conclusions

Extensive debris is buried at the site. Buried medical supplies include I.V. injection tubing and needles packaged in plastic bags or foil. Other debris includes railroad ties, scrap metal, and to a lesser extent charred materials (identified near the metal banding pile only). The lateral extent of debris has not been determined. It can reasonably be assumed that vertically, the debris extends down to the level of groundwater, which is suspected to be less than 5 feet bgs throughout the area. Erosion along the face of the disposal area and within the drainage channels that transect the site is severe and acts to continuously expose debris and wash debris into the upstream pond. Subsequent to exposure, the debris that washes into the upstream pond settles and either stays on the pond bottom or, depending on material type and flow velocities, will be transported towards and eventually through the upstream pond discharge culvert. Significant volumes of tubing have been noted hanging from trees along the upstream bank of Youth Pond. Medical supplies have also been noted on the beach in the vicinity of the discharge point of the culvert that conveys flows from Youth Pond to the York River. Although the medical supplies are unused, they represent a solid waste source and could be hazardous to individuals that may come in contact with some of these supplies (specifically needles).

In addition to health hazards and possible violations (Virginia Open Dump Policy and solid waste regulations), the site also represents a source of significant liability and potential negative publicity, should an individual be exposed to or injured by a needle.

Nature and Extent of Contamination

The SI included sampling of surface soil, subsurface soil, and sediment within and immediately down-gradient of the disposal area and the scrap metal banding pile. Following is a summary of significant findings that pertain to detected contamination that is potentially site related.

- A limited number of volatile organics and pesticides were detected in soil and sediment. Concentrations were below USEPA Region III residential soil RBCs (residential soil RBCs) indicating that the human health risk associated with the detected concentrations is most likely minimal.
- Nitramines/nitroaromatics were not detected in any samples collected at Site 4.
- The most widespread contamination at the site is in the form of PAHs. The screening levels were exceeded for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd) pyrene, and dibenz(a,h)anthracene in either surface soil, subsurface soil, or sediment.
- The residential soil RBC for bis(2-ethylhexyl)phthalate was exceeded in one subsurface soil sample.

- Concentrations of the PCB congeners Aroclor-1242 and Aroclor-1260 exceeded their residential soil RBCs.

- Iron exceeded the range of background concentrations for WPNSTA Yorktown. The exceedence was limited to one surface soil sample that was collected immediately adjacent to the scrap metal banding pile.

- Arsenic exceeded the range of sediment background concentrations for WPNSTA Yorktown in two sediment sampling locations. The highest concentrations were detected in the sediment samples collected from the location immediately adjacent to the scrap metal banding pile. All concentrations of arsenic detected in soil were within range of background concentrations.

- The risk screening indicated potential (carcinogenic) human health risk from PAHs and potential (noncarcinogenic) adverse health effects from iron. However, these exceedences resulted from the sum total over all site media. The carcinogenic risk for each individual medium was within USEPA's acceptable risk criteria. Detected concentrations of iron were within range of background.

<u>*Sources of Contamination*</u>

- The extensive volume of I.V. injection set tubing and plastic packaging represent a significant source of phthalate contamination.

- The low levels of pesticide concentrations indicate routine application rather than disposal.

- The presence of the organic contaminants could be attributable to debris that is buried at the site. The site receives runoff from a large drainage area that includes warehouse storage and parking areas. Low levels of certain organics (e.g., PCBs) could possibly be transported to the site from these areas.

- Pieces of scrap metal were noted in the surface soil sample in which the iron concentration was elevated (in the sample collected immediately adjacent to the metal banding pile). Iron concentrations in the sediment sample that was collected within the upstream pond adjacent to scrap metal banding pile were similar to iron concentrations in the remaining sediment samples indicating that significant iron leaching to the pond has not occurred.

AOC 1 Conclusions

Significant volumes of debris were disposed of in both the northern and southern portions of the AOC. The dates of disposal are not known. It appears that the debris was dumped down the slopes of the ravines associated with the unnamed tributaries to Jones Pond. The pond, which is the raw source for the CAX water supply is located approximately 2500 feet down-gradient of the areas. The debris in the areas consists of scrap metal, wood, empty drums, cinder blocks, bricks, wood, and significant amounts of concrete and concrete slabs. The geophysical survey results indicate that the majority of the debris is exposed or partially exposed (i.e., only a small amount of the debris is completely buried and not visible at the surface). The areas of debris are approximately 0.4 acres (south area) and 0.2 acres (north area). Assuming an average thickness of 3 feet, the estimated in-place volume of debris is approximately 3,000 cubic yards. It should be stated that the depth of debris is not known. On April 25, 2000, ordnance experts from Reactives Management, Inc. inspected the two gas cylinders that were located in the northern portion of the AOC and determined that the cylinders are empty and originally contained carbon dioxide. IMS Environmental Services burned a 2 inch hole in each cylinder to demonstrate that they were empty and salvaged them as scrap metal at Jacobson Metal Company in Chesapeake, VA. A copy of the confirmation letter can be found in Appendix C.

Depending on VDEQ's assessment of conditions, the AOC could be in violation of Virginia Open Dump Policy or solid waste regulations.

Nature and Extent of Contamination

The SI included sampling of surface soil, subsurface soil, surface water and sediment within and immediately down-gradient of the disposal areas. Following is a summary of significant findings that pertain to detected contamination that is potentially site related.

- Volatile organics were detected in a limited number of soil and sediment samples and at concentrations well below residential soil RBCs indicating that the human health risk associated with the detected concentrations is most likely minimal. Volatiles were not detected in any surface water samples.

- In the north area, PAHs were fairly wide spread in surface soil, with concentrations exceeding residential soil RBCs for benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene. No PAHs were detected in subsurface soil, surface water, or sediment samples in the north area.

- In the south area, PAHs were detected in surface and subsurface soil and in sediment, but at relatively low concentrations (all below residential soil RBCs).

- Nitramines/nitroaromatics were not detected in any samples collected at AOC 1.

- Pesticides were detected at low concentrations (all below residential soil RBCs) in surface soil in the north and south areas.

- The PCB congener Aroclor-1260 was detected at low concentrations (below residential soil RBCs) in surface soil and sediment in the south area.

- Arsenic was detected at concentrations exceeding RBC values in all media sampled. However, with the exception of one detection in surface soil from the north area, maximum concentrations were within the detected ranges of concentrations for WPNSTA Yorktown background soil samples. The detected concentrations of arsenic in surface water and sediment that exceeded background were from the same sample location.

- Iron was detected at concentrations exceeding below residential soil RBCs in surface soil in the north and in surface soil and subsurface soil in the north and south areas.

- Lead was detected in surface soil and sediment in the south area at concentrations exceeding the OSWER's Action Level for soil of 400 mg/kg.

- The risk screening indicated potential (carcinogenic) human health risk from PAHs and potential (noncarcinogenic) adverse health effects from iron. However, these exceedences resulted from the sum total over all AOC media. The carcinogenic risk for each individual medium was within USEPA's acceptable risk criteria. Detected concentrations of iron were within range of background.

<u>*Sources of contamination*</u>

- The extensive volume of debris at the AOC is a potential source of contamination. However, the materials present are not typically very susceptible to leaching.

- The low levels of pesticide concentrations indicate routine application rather than disposal.

- The presence of the organic contaminants could be attributable to debris that is buried at the site. The site also receives runoff from the adjacent roadway and railroad tracks, which could also be sources of contaminants (especially PAHs).

- The elevated levels of lead in surface soil and subsurface soil in the south area are most likely attributable to pieces of metal or slag in the samples. Lead was not detected in the surface water sample collected down-gradient of the disposal area in the south portion of the AOC. Lead concentrations in sediment were very low in this area. It can be surmised, therefore, that significant migration of lead has not occurred.

6.2 Recommendations

Site 4 Recommendations

The following actions are recommended for Site 4:

- Implement an inspection program that includes periodic site visits with perimeter walks to locate medical supplies within and around Youth Pond and the York River shoreline. As part of the program, the locations of the supplies should be documented with provisions made to collect and dispose of the materials.

- Install inlet protection controls to prevent medical supplies from entering the culvert that conveys flows from the upstream pond to Youth Pond. Installing a chain link fence (strung between posts) around the inlet, and securing silt fence to the upstream face of the wire is one alternative. The fence and silt fence would need to be keyed in to the pond bottom to prevent materials from migrating under the fence. The structure should be periodically inspected and cleaned to prevent the silt fence pores from clogging and to remove debris that has collected in front of the structure. The height of the fence should be set so that water within the upstream pond will back up to tolerable levels in the event that the silt fence pores become clogged. Allowing the water level to increase too high could be problematic for upstream structures (flooding) and for the embankment (stability issues due to saturation).

- Perform a limited investigation to define the lateral extent of debris at the site. Due to access limitations it is recommended that hand augers or shovels be used to dig test holes throughout the area. Additional samples should be collected to assess up-gradient conditions and evaluate disposal parameters.

- Complete an Engineering Evaluation/Cost Analysis (EE/CA) to evaluate the most appropriate means of removing or covering the debris that is present at the site.

AOC 1 Recommendations

The following actions are recommended for AOC 1:

- Perform a limited investigation to evaluate disposal parameters. Due to access limitations it is recommended that hand augers or shovels be used to dig test holes throughout the area.

- Complete an Engineering Evaluation/Cost Analysis (EE/CA) to evaluate the most appropriate means of removing or covering the debris that is present at the site.

- Low levels of fluoranthene, ethylbenzene, xylene, and Aroclor-1260 were detected in the up-gradient sediment sample that was collected immediately down-gradient of the water treatment plant discharge. It is recommended that the treatment plant effluent and analytical requirements be checked to verify that these contaminants are not present in unacceptable levels in either the distributed water or the effluent.

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APPENDIX A - 1998 REMOVAL CLOSEOUT REPORT (SITE 4)

Fleet & Industrial Supply Center

Cheatham Annex

IV Bottle & Bag Sites

Final Report

This report discusses operations and findings in reference to work performed by Reactives Management Corporation (RMC) in Area of Concern (AOC) 2, the Dextrose Dump site, and Installation Restoration (IR) Site 4, the Medical Supplies Disposal Area at Cheatham Annex. Operations were carried out May 18, 1998 through May 22, 1998. A Quality Control inspection was performed on May 26, 1998 with FISC personnel Christopher Creighton and Glen Folsom.

I. AREA OF CONCERN (AOC) 2, THE DEXTROSE DUMP SITE

As stated in the Work Plan, the dextrose dump site was found in December, 1997 during a site visit of the Penniman property by Environmental Protection Agency (EPA) and Virginia Department of Environmental Quality (DEQ) officials. No history of this site is available. This site appears to have been a disposal site for dextrose intravenous (IV) bottles. It is located down the gravel road closest to Colonial Parkway, east of the main gate (one-third of the way down between the gate at the end of the gravel road and the cable pole with number "31" on it).

Operations

On May 18, 1998, a two-man crew from Reactives Management arrived at the site to perform routine housekeeping operations. The weather was hot and sunny. The boundaries of an area approximately 70' x 140' were marked. Boundaries were logically selected based on topography and location of the visible bottles. A site-specific Safety and Health Plan was then completed. Personal protective equipment consisted of safety glasses, steel-toed work boots, leather gloves, and Tyvek (as desired for cleanliness.) The area was searched using the modified drop-flag technique that was described in the Work Plan. Intact IV bottles were packed into plastic-lined cardboard boxes. On average, eight bottles were put in each box. Any box that did not contain exactly eight bottles was labeled with the quantity it contained. By the end of the day, all bottles had been either packed in boxes or at least moved to the top of the hill for packing the next day. Broken bottles were placed in a plastic tub. The bottles were taken back to RMC's facility and unloaded for further processing.

On May 19, 1998, the RMC crew returned to the site. All bottles that had not been packed on the first day were counted and placed in a thick-walled plastic fish pond. The pond is the backyard type that is available at lawn and garden centers.

A total of 470 bottles were collected, including three from the South Site. Twenty-four bottles (5%) were randomly selected for sampling. The results showed that each bottle sampled contained greater than 2000 ppm glucose. The remaining bottles were opened using an awl and pliers. The contents of all bottles were emptied into the sanitary sewer system. Permission for this activity had been previously obtained from Bernie Strohmeyer at the Hampton Roads Sanitation District. The bottles were rinsed, allowed to dry, re-packaged and re-loaded into RMC's truck. The glass (232 pounds) was taken to a local glass recycler on May 27, 1998.

Discussion

Reactives Management personnel had been given specific instructions via e-mail documents that all work to be performed was to be surface clean-up only. There was to be no soil-intrusive work. Specifically for the bottle site, RMC was to remove bottles from the surface, but not any bottle(s) that may have been under the initial surface bottle(s). Following these instructions, RMC personnel picked up 470 bottles as noted above. Currently, however, there are numerous bottles on the new "surface" that was created when the first layer of bottles was removed. Also visible are numerous bottles that do not protrude above the gradient of the earth, but that are nevertheless plainly visible. It is not entirely clear (to RMC) if this is the desired result. The RMC Project Manager felt it was best to err on the side of conservatism. It is easier to pick up additional bottles than to replace bottles that have been removed.

II. IR SITE 4, MEDICAL SUPPLIES DISPOSAL AREA

The following background information is reprinted from the Work Plan. The original source document was the *Initial Assessment Study of Naval Supply Center (Norfolk) Cheatham Annex & Yorktown Fuels Division* dated February, 1984 by Naval Energy and Environmental Support Activity).

In 1968 or 1969, medical supplies (syringes and empty IV bottles) and one-inch metal banding were unloaded down a bank in this area, and covered with earth. It was reported that as much as 7,000 cubic yards of material was disposed of at this site. No drugs were disposed of at this site. A considerable amount of these materials were removed because deer were getting the needles from the syringes in their hooves. After a heavy rain, syringes could sometimes be seen floating in the waters of the pond in front of the disposal site and the pond across D street. During a site visit on May 4, 1998 with DEQ officials, packages of unused needles wrapped in aluminum foil were found at the northeast end of this site in a small drainage ditch near the pond.

Operations

On May 19, 1998, the two-man crew from Reactives Management arrived at the site to perform routine housekeeping operations by removing surface contamination of IV bags and injection sets. The weather was hot, sunny, and humid. The site is located within an rectangle bordered on two sides by C Street and Warehouse 11. The rectangle measures approximately 520' x 975'. The boundaries were slightly inside the rectangle border and were marked at the direction of Glen Folsom of the Cheatham Annex Environmental Department.

Upon inspection of the site, it was necessary to modify the QA/QC portion of the Work Plan. The original plan specified searching two lanes at a time, then re-checking them immediately after they had been cleared. Because of the following two factors, a modification was desired:

- The site was originally thought to be about 200' by 600' and was actually much larger.

- The vegetation in some areas was extremely heavy. In these heavily-vegetated areas, the plants were predominantly greenbrier and wild roses and raspberries, which made searching difficult and often painful.

The RMC Project Manager felt the plan could be modified without jeopardizing safety or quality for the following reasons:

- The areas of extremely heavy vegetation were areas of higher elevation and were mostly on the borders of the site. These areas were unlikely to contain medical debris (based on experience walking the site). No sharps were encountered in other higher elevation, border areas. Sharps were only encountered in marshy/ wet areas and the three hot spots. Therefore, the physical hazard posed by any missed debris would be nearly non-existent.

- If RMC personnel could not walk through the area, other people couldn't either, so it is unlikely that any debris missed would be encountered by humans. It seems likely that large animals would avoid those areas also. Even in winter, the briars and thorns are still there, just without leaves.

- To adequately and thoroughly search those areas, brush-cutting equipment would be needed, adding significant additional labor and equipment expense. Again, this seems unwarranted based on the minimal physical hazards in these areas.

Approval for the change was granted by Christopher Creighton of FISC.

A site-specific Safety and Health Plan was completed before work began. Personal protective equipment consisted of safety glasses, steel-toed, rubber, knee-high work boots, and leather gloves. Rubber gloves were used on top of the leather gloves when removing items by hand from wet areas. The area was searched using the modified drop-flag technique whenever possible. In some areas the vegetation was so heavy the searchers walked side-by-side without dropping flags. In many areas, debris could be picked up by hand. In other areas such as creek beds and marshy areas, rakes were needed to safety reach and remove debris.

Numerous sharps, both metal and plastic, were encountered. These were placed in plastic, puncture-resistant containers daily, then dumped into a plastic 5-gallon pail at the end of each day. Contrary to the background report which states that no drugs were dumped here, small quantities of injectable drugs were also found. No IV bottles or true IV bags were found at this site. The bags originally thought to be IV bags were actually IV injection sets. Some were wrapped in aluminum foil and some were in plastic bags. Work at this site was completed on May 22, 1998.

Discussion

As with the IV bottle site, all work to be performed was to be surface clean-up only: there was to be no soil-intrusive work. For most of the site (about 97%), this posed no problems as the debris was truly on the surface with nothing buried under it. For the other 3% of the area ("hot spots"), the problems were similar to the bottle site. Once debris was removed from the surface, more debris, sometimes multiple layers, was found underneath. In some areas, plastic tubing was either inaccessible or stuck in and amongst other debris such as railroad timbers; some debris could be seen but not removed. In some cases, trees had grown up through the tubing, and in one case, tubing was actually protruding through the trunk of a tree.

The three hot spots are areas where multiple layers of debris were found. Two of these areas are in creek beds and their banks, and the third is at the bottom of the hill where the marshy area and pond begin. Of the two creek beds, the eastern one is dry at its uphill portion and is wet at the bottom. The western creek bed is wet with water up to 18" in some places. The hot spot areas of the creek beds were marked with fluorescent yellow surveyor's tape and are marked on the map with yellow highlighter.

In creeks, the surface of the creek bed was raked to remove debris. Each time an area was raked, the water was allowed to settle, then the creek bed was re-checked. Each time the water settled, more debris was seen: the more you raked, the more debris was loosened and brought to the surface. This problem was similar in the dry areas of the creek bed. After the top layer of debris was removed, more was exposed. If that was removed, more was exposed. As with the IV bottles, technicians had to make the subjective decision of when to stop raking.

Approximately 200 pounds of debris and 13 pounds of sharps were recovered from this site. This debris will be incinerated and a certificate of destruction will be provided. Incineration is tentatively scheduled for May 29, 1998.

III. General Information

• Numerous photographs were taken. The pictures should be back no later than June 3, 1998. They will be mailed to FISC as soon as possible.

• A hard copy of this report that includes a hand-sketched map of IR Site 4 will be mailed to FISC as soon as possible.

• Both sites contained debris other than medical-related. The IV bottle site had some corroded drums and containers that are apparently empty. IR Site 4 had a great deal of metal banding, railroad ties, aluminum, corroded drums, alcoholic beverage containers, and other debris. One collar from a compressed gas cylinder was found.

IV. Conclusion

Both sites contain areas where removing surface debris has revealed buried debris. The decision of what to pick up and what to leave was very difficult and very subjective. For the future, every time it rains or every time the creek beds are disturbed, debris at both sites will be further exposed and new debris will be uncovered. It may be possible to fill the areas with soil and grade them so water runs off. This technique is better suited to the IV bottle site since the hazards are not so great as the IV bag site, where sharps are definitely present in fairly large quantities — greater than 6.5% of the debris from the IV bag site is sharps. It may be better for that site to fence the area to keep people and large animals out. Currently, the area is fenced on two sides. The cost of fencing would very likely be less than using heavy equipment to excavate the entire site, refill it and dispose of the debris.

Reactives Management Corporation

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24-hour emergency: (757) 498-2539

DATE: September 28, 1998

TO: Christopher Creighton
COMPANY: FISC

PHONE: 443-1130
FAX: 443-1105

FROM: Cherie

1. We now have a Global Positioning System (GPS) system, so in the future we can do a more precise job of marking corners and boundaries.

2. In reference to our telephone conversation earlier today, the following information is provided:

Addendum to Final Report
IR Site 4, Medical Supplies Disposal Area

Fifteen injectable medication containers were found in various areas at this site. All were either labeled illegibly or were completely unlabeled. Some had small amounts of red, yellow, or white dry, caked material in them. Some had a few milliliters of clear liquid in them. Approximately 5 - 7 bottles contained something; most of them were empty.

The bottles were destroyed by incineration. No analysis was performed to determine the contents. The decision to destroy the waste without analysis was based upon the following factors:

- The bottles could not have held a poison or reactive or other highly energetic material because those materials are not found in injectable medications. It is true that some poisons are used in medicine, but the quantities are such that they are safe for use with humans.

- If any metals were present, the quantity would have been minimal, again, because they must be at a level safe for human use.

- The total amount of waste in all the bottles combined was only a few ounces at most, which represented less than 0.3% of the total waste stream that was sent for incineration.

- The waste was non-regulated medical waste.

- No hazardous or municipal waste incineration can occur without prior knowledge and consent of the facility operator. SPSA is permitted to accept non-regulated medical waste for incineration and has incinerated other medicines for the Navy (specifically FISC) in the past.

- Incineration is the most efficient means of destruction for this type of waste. It also significantly reduces future liability issues. Analysis would have increased costs with no increase in environmental or human safety.

I hope this information is helpful. Please call me if you need anything else.

Fifteen injectable medication containers

01291K044

APPENDIX B – SITE PHOTOGRAPHS

SITE 4 PHOTOGRAPHS


Debris at 4-HA03 location (11/13/99)


Sample 4-SD04 location (11/13/99)

Sample 4-HA02 location (in swale) (11/13/99)

Sample Collection at 4-SD03 (11/13/99)

Wood debris between sample locations 4-HA04 and 4-HA05 (11/13/99)

Looking toward pond to location of 4-SD02 (11/13/99)

Looking northeast. Metal banding pile (11/13/99)

Looking east. Sample 4-HA05 location across swale (11/13/99)

Looking south. 4HA03 location (11/13/99)

Closeup of injection set tubing, vial, and packaging. (11/13/99)

AOC 1 PHOTOGRAPHS

Looking northwest. Sample A1-HA04 location and drum (11/14/99)

Utility pole in swale (11/14/99)

Looking upstream at A1-SD04 location. WTP fence in background (11/14/99)

Sample collection at A1-HA06 location (11/14/99)

Looking southeast. A1-HA05 location (11/14/99)

Looking southeast. Sample collection at A1-HA06 (11/14/99)

Close up of A1-HA06 location (11/14/99)

Looking southeast. A1-HA02 location

Partially exposed cylinder and drum (11/14/99)

Fully exposed drum (11/14/99)

Looking upslope to location of cylinders - north area (11/14/99)

Looking downstream A1-SD01 location (11/14/99)

APPENDIX C
SUPPLEMENTAL DOCUMENTATION - AOC 1

NAeVA GEOPHYSICS INC.
A SUBSIDIARY OF NORTH AMERICAN EXPLORATION OF VIRGINIA INC.
Subsurface Geophysical Surveys

GPR
MAGNETICS
ELECTROMAGNETICS
SEISMICS
RESISTIVITY
UTILITY LOCATION
BOREHOLE LOGGING
BOREHOLE CAMERA
STAFF SUPPORT

Results of Subsurface Investigation

AOC 1, Cheatham Annex
Williamsburg, Virginia

Prepared for: **Baker Environmental**
Coraopolis, Pennsylvania

Date of Investigation: November 9 - 11, 1999

Prepared by: Mark Howard (EDW)

Mark Howard
Project Manager

Contents

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Results of Subsurface Investigation
AOC 1, Cheatham Annex
Williamsburg, Virginia

Introduction

On November 9 - 11, 1999, NAEVA Geophysics Inc. conducted a subsurface investigation in two areas that lie within "AOC 1", west of Chapman Road in Cheatham Annex. The areas are referred to as the Northern Debris Area, and the Southern Debris Area. The debris areas contain a mixture of construction materials, such as concrete, bricks, soil, and metallic refuse, including a few drums, gas cylinders, fencing, and metal scrap.

The larger of the two areas is the southern area, which occupies a deep ravine, in mature hardwoods with some brush, vines and deadfall. Debris lies at the surface in an area roughly 220 feet long, ranging in width from approximately 40 to 90 feet. Scattered debris lies outside the dimensions given. While the lower end of the dumped material is visible near the center of the ravine, its upper edge is not apparent from a visual inspection. The smaller northern area is very similar in nature to the southern area, including the same type of debris. The topography in the northern area is less pronounced than in the southern area, with gentler slopes. It appears that most of the dumped material in the northern area lies at the surface, although the eastern edge (by Chapman Road) of the debris may be covered. The purpose of this investigation was to attempt to delineate the extent of the landfill areas, particularly the eastern edges.

Methods

The equipment used by NAEVA for this survey included a Geonics EM-31 terrain conductivity meter, and Sensors and Software pulse EKKO ground penetrating radar (GPR) system.

The EM-31 provides an output of both the quadrature-phase (conductivity) and in-phase components of the induced electromagnetic field, which are recorded simultaneously. The quadrature-phase is a measurement of the conductivity in milliSiemens per meter. Terrain conductivity is a function of porosity, degree of saturation, and the conductivity of subsurface materials. The absolute values of terrain conductivity are not usually diagnostic, but their spatial variations are important. The ability to identify lateral variations in the shallow subsurface geology makes quadrature-phase EM-31 data very useful in the delineation of disposal areas.

The in-phase component of the EM-31 data is primarily used in searching for buried metal, and is measured in units of relative parts per thousand (ppt) of the magnetic field. A negative instrument response is usually expected over areas containing shallow buried metal (both ferrous and nonferrous). Data is stored in a palmtop computer, then downloaded to a laptop computer for processing and contouring.

Ground penetrating radar utilizes the propagation and reflection of high frequency electromagnetic (EM) energy to image subsurface structures and objects. A pulse is emitted by the GPR transmitter, which then travels through the ground and is partially reflected when it encounters an interface of two materials with differing electrical properties. The remaining energy continues downward, perhaps encountering other reflectors, or eventually dissipating due to spreading losses or attenuation in conductive materials. The GPR receiving antenna is connected to console electronics which then digitize the signal. The travel time of the reflected energy is very accurately measured (in nanoseconds), as well as the relative amplitude of the signal. The amplitude of the returning signal is a function of the contrast in electrical properties of the materials, and the depth. Conductive materials such as clay very rapidly attenuate GPR energy, limiting depth penetration.

NAEVA Geophysics employed a Sensors and Software pulse EKKO 100 GPR system, equipped with 100 MHz antennas to perform the survey at the Cheatham Annex. The system records data digitally to a personal computer, allowing for a variety of post-collection processing, including selection of type and degree of gain applied, and application of horizontal and vertical filters. Additionally, signal stacking during data acquisition can be used to reduce noise and attain greater depths of penetration. The GPR antennas were mounted on a cart, equipped with an odometer set to trigger the system at 10 centimeter intervals along the survey lines.

Final processing of data takes place in NAEVA's Charlottesville, Virginia office. EM-31data from this site were contoured using Geosoft for the final maps. GPR data were processed with Sensors and Software's pulse EKKO program.

Survey Design

A grid system was emplaced over both the southern and northern areas, arranged with the baseline direction parallel to the deep ravine in the southern area. Survey lines were placed perpendicular to the baseline, utilizing a 50 foot spacing in the southern area, and a 20 foot spacing in the northern area. The two areas were tied to a common grid. EM-31data were collected at 5 foot intervals along the lines in both areas. Due to the rough terrain and vegetation, the areas available for GPR surveying were limited to the eastern edge of the two debris areas. GPR data were collected where adequate space existed between trees, and topography permitted passage of the GPR cart.

Results

Northern Area

The surface culture map (Figure 1) illustrates the areas of visible surface debris, the interpreted eastern edge of the landfill, the locations of the drainage centers, the woods/grass edge, and the road. Also depicted are the locations of the most significant EM anomalies. The EM-31 conductivity and inphase data from the northern area are presented in Figures 2 and 3 of this report. One of the most striking features visible in the EM-31 conductivity and inphase data is the linear area of negative readings that clearly define the location of a pipeline, west of Chapman Road. The inphase component of the EM-31 is most commonly used to identify the presence of buried metal, although it is less responsive to buried pipelines than the quadrature phase (conductivity). Within the area of visible surface debris, three nearly circular areas of negative values (shown in blue) contain concentrations of metallic debris. The bulk of the response is due to surface metal in these areas, however some buried metal may be present as well. Please note that while the east-west dimensions of these areas of metallic debris are accurate, the north-south dimensions are interpolated between lines spaced 20 feet apart, therefore exhibit some exaggerated width. Surface metal exists outside these three areas but primarily as scattered, individual objects. The lack of negative inphase and conductivity values outside the visible debris field indicates the absence of significant quantities of buried metal outside this area.

The zone of high conductivity in the northwestern portion of the survey mirrors topography at the site, as the high readings result from an increase in soil moisture toward the drainage. High conductivity adjacent to the pipeline is more likely an effect of the pipeline, where "shoulders" of high values occur to either side of the pronounced low.

Ground penetrating radar data were collected on four traverses on the eastern margin of the area, in an attempt to image the eastern edge of the debris area. An assumed velocity of 0.1 m/ns was used to establish the depth axes on the GPR plots. GPR profiles were run on lines 1520N, 1580N, 1620N, and 1640N. The profiles are included in the Appendix of this report, and are highlighted to emphasize significant features. On each traverse, the GPR showed strong hyperbolic reflectors coinciding with the EM response over the pipeline, confirming its existence and location. Areas of disturbed ground were also imaged by the GPR, possibly indicating the existence of buried debris west of the pipeline.

Southern Area

The surface culture map (Figure 4) images of the geophysical survey lines, and the visible extent of the debris field, the interpreted eastern edge of the landfill, and the most significant EM anomalies. The contoured EM-31 conductivity and inphase data (Figures 5 and 6) clearly illustrate anomalous zones caused by areas of fill.

The conductivity data depicts a number of interesting features, including what appears to be a pipeline parallel to Chapman Road, and a large area of low conductivity, which closely resembles the plan view of surficial debris in Figure 4. The discontinuous appearance of the response over the pipeline is an effect of the contouring, due to the widely spaced survey lines. More subtle areas of slightly elevated conductivity along the trend of the pipeline are visible to the north, and may be a function of increased depth northward. The areas of negative conductivity occur east of the creek bottom, where metallic debris and other refuse are apparent at the surface. High conductivity in the northwestern portion of the survey area are coincident with low topography, with two of the highest amplitude readings collected directly over the creek.

Surface and buried metal are responsible for the areas of negative inphase values in Figure 6. Metallic debris is most concentrated near the center of the surveyed area in a linear pattern east of the creek. The greatest volume of metal appears to lie between 1160N and 1230N, from 890E to 940E. Although scattered surface metal lies outside the areas exhibiting a negative inphase response, the data does not indicate any significant amount of metal outside the visible debris field.

The GPR profiles (Lines 1000N – 1280N, in Appendix) for the southern area provide additional evidence of a buried pipeline along the eastern margin of the survey area. The GPR was also successful in imaging areas of disturbed ground, that in places indicate areas of fill.

On Profile 1000N, the strong hyperbolic reflector at 979E coincides with an EM conductivity anomaly, both caused by a buried pipeline. A smaller reflector can be seen at ~992E, possibly representing another, smaller pipeline. A change in character in the deeper reflectors can be seen at ~965E. The near surface appears to be disturbed from the start of the line to 965E, however this may be a result of surface clearance rather than buried materials. No buried metal is evident in this area from the EM data. Profile 1050N displays hyperbolic reflectors at 970E and at 987E. Both locations coincide with EM anomalies. The reflector at 970E appears to be the result of the buried pipeline, as evidenced by the negative conductivity over this point. The feature at 987E may also represent a pipeline, however the EM response is less pronounced. The last line to definitively image the pipeline is 1100N, with a strong reflector at ~982E. Disturbed zones are evident between 961E – 975E, and 932E – 944E. These areas show discontinuous reflectors that may indicate areas of fill.

The GPR profile on Line 1172N images more subtle reflectors at 998E, 989E, and an area of disturbance between 970E and 980E that may be related to the pipeline. A reflector at a depth of roughly 8', at 971.5E may be a result of the pipeline. The most northerly of the GPR profiles in the southern area lies at 1240N. The line started immediately east of a sinkhole in the fill. The GPR record shows a disturbed subsurface from 940E to ~956E. A weak reflector occurs at 962E, and a strong reflector can be seen at 970E. The strong reflector lies only slightly east of a subtle EM conductivity response, that suggests the pipeline is the source of the anomalies. This same subtle EM response occurs on Line 1280N at ~972E.

Conclusions

The EM-31 data from the two debris areas clearly defines the extent of significant metallic refuse in AOC 1. The data indicates no significant metal debris outside the visible debris fields. The eastern edges of the debris fields appear to contain little metal and are not well defined by the EM data. More information regarding the eastern edges of the fill is provided by the GPR profiles. Some inferences may be drawn from the location of disturbed ground as relating to areas of fill, however it is possible that ground was disturbed by clearing activities or emplacement of utilities and pipelines rather than landfilling in some locations.

In the northern debris area, the interpreted eastern edge of the debris field extends roughly 10 to 12 feet east of the visible debris, based on disturbed ground visible in the GPR records. The disturbed ground imaged by the radar lies just west of the buried pipeline. Elsewhere, the EM data indicates the debris to be within the area defined by sight.

In the southern debris field, the eastern extent of buried debris also appears to be limited by the presence of a pipeline. Relatively flatlying reflectors and more limited depth penetration east of the pipeline suggest this area to be undisturbed. As in the northern area, the location of significant metal is illustrated in the EM data. Due to the wide line spacing in the southern area, some effects on the data contouring can be seen, which make north-south oriented features appear discontinuous (such as the pipeline), and anomalies encountered on an east-west line appear wider than is probably accurate. Despite these effects, it is evident that the anomalous zones in the southern debris field lie east of the creek bottom, in the central portion of the surveyed area.

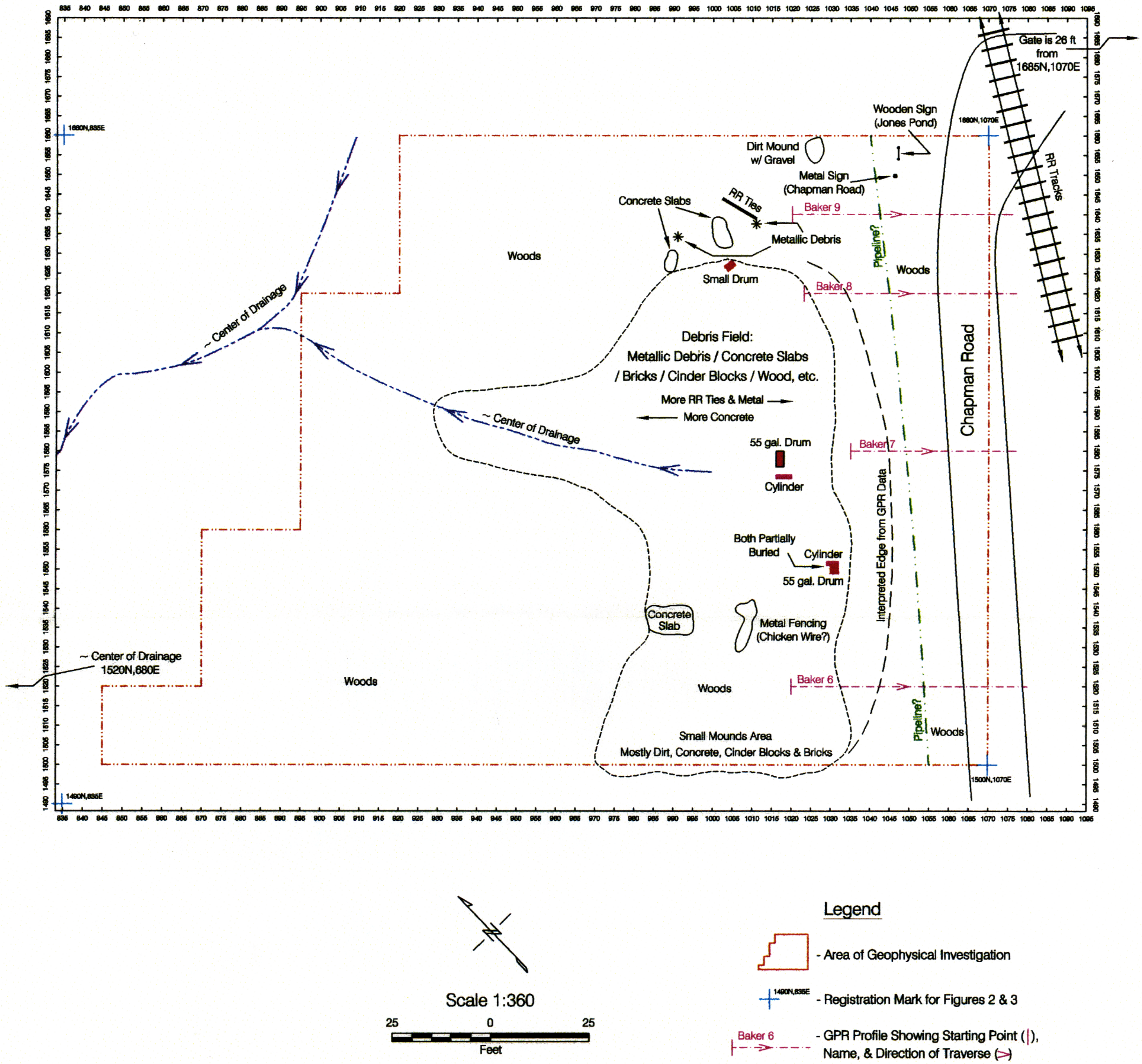

Figure 1

NAEVA GEOPHYSICS INC.
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Baker Environmental

Area of Geophysical Investigation
Cheatham Annex: AOC1 - Northern Area
Chapman Road, Williamsburg, Virginia

Date of Survey: November 9 - 11, 1999

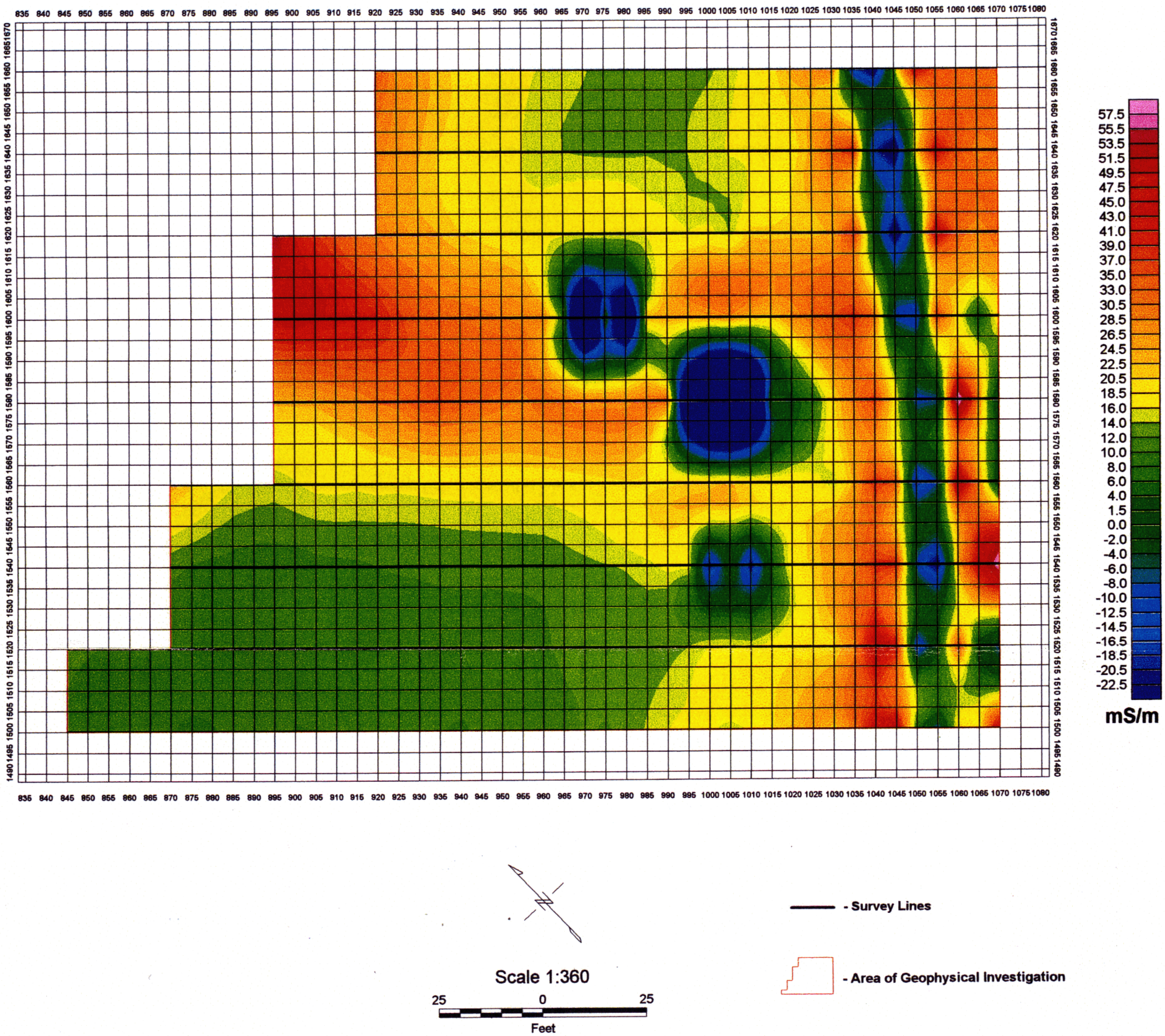

Figure 2

NAEVA GEOPHYSICS INC.
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Baker Environmental

EM - 31 Terrain Conductivity
Cheatham Annex: AOC1 - Northern Area
Chapman Road, Williamsburg, Virginia

Date of Survey: November 9 - 11, 1999

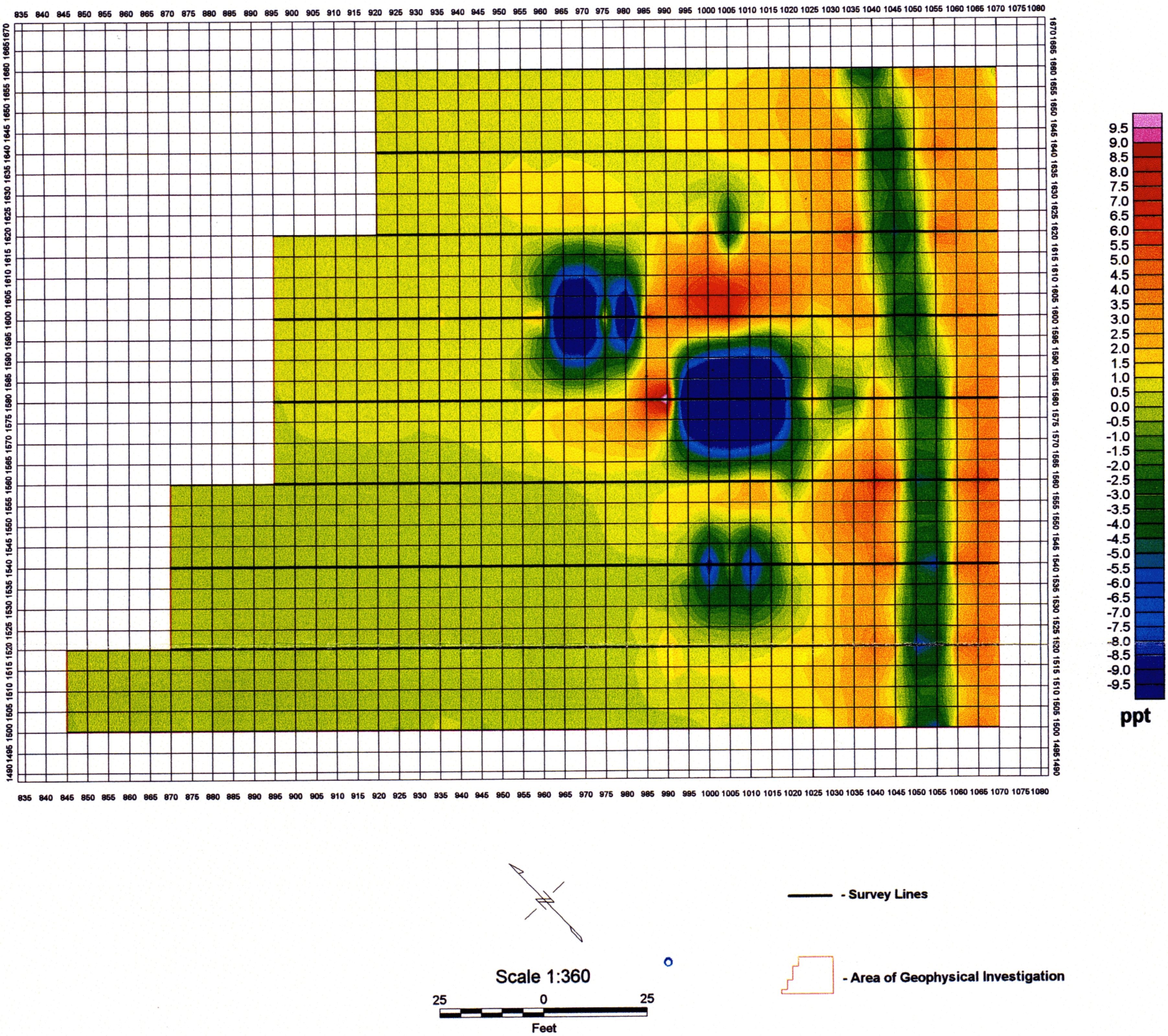

Figure 3

NAEVA GEOPHYSICS INC.
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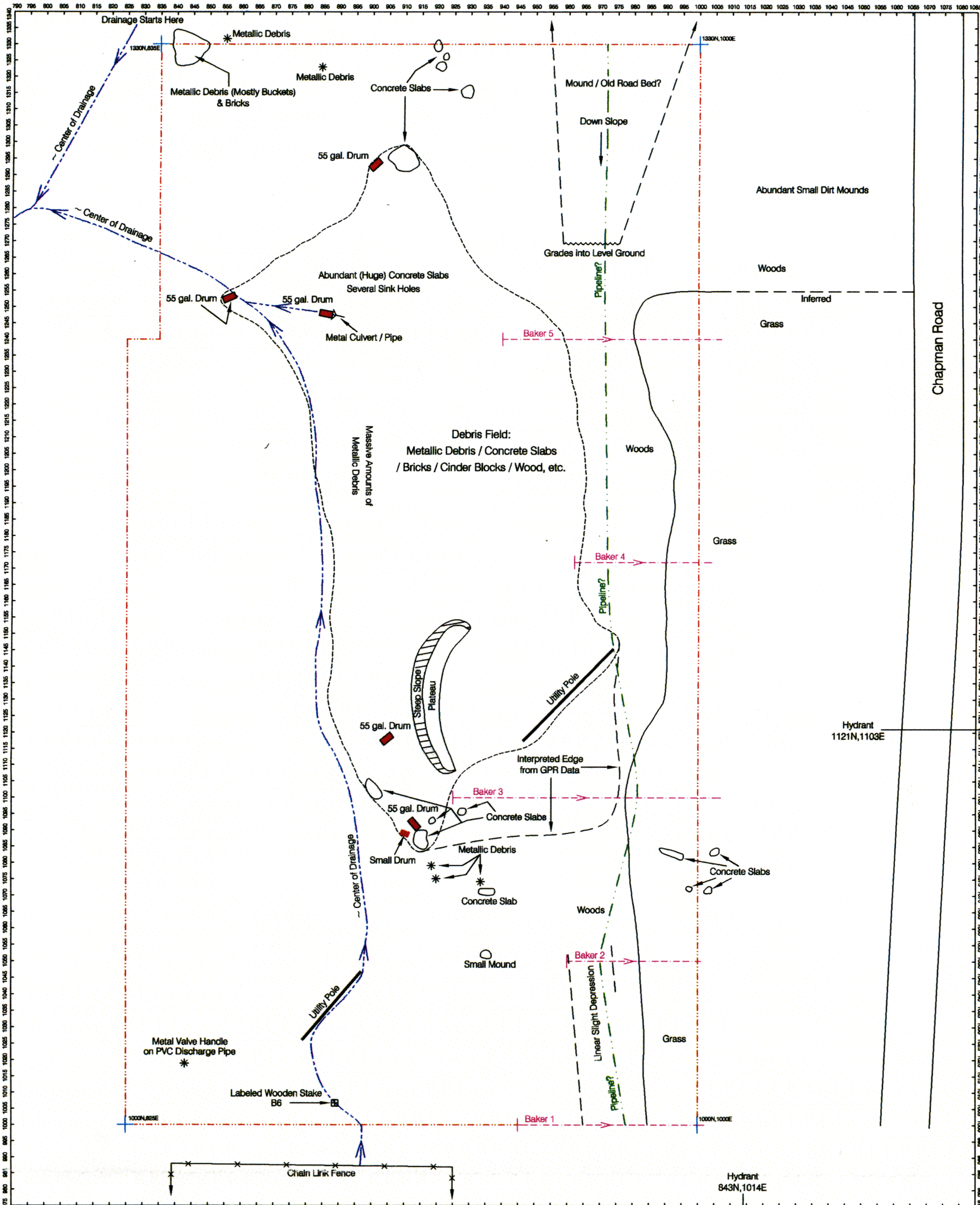
Baker Environmental

EM - 31 In-Phase
Cheatham Annex: AOC1 - Northern Area
Chapman Road, Williamsburg, Virginia

Date of Survey: November 9 - 11, 1999



Legend

- Area of Geophysical Investigation

1000N,1000E - Registration Mark for Figures 5 & 6

Baker 1 - GPR Profile Showing Starting Point (|), Name, & Direction of Traverse (>)

Scale 1:360

25 0 25

Feet

Figure 4

NAEVA GEOPHYSICS INC.
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Baker Environmental

Area of Geophysical Investigation
Cheatham Annex: AOC1 - Southern Area
Chapman Road, Williamsburg, Virginia

Date of Survey: November 9 - 11, 1999

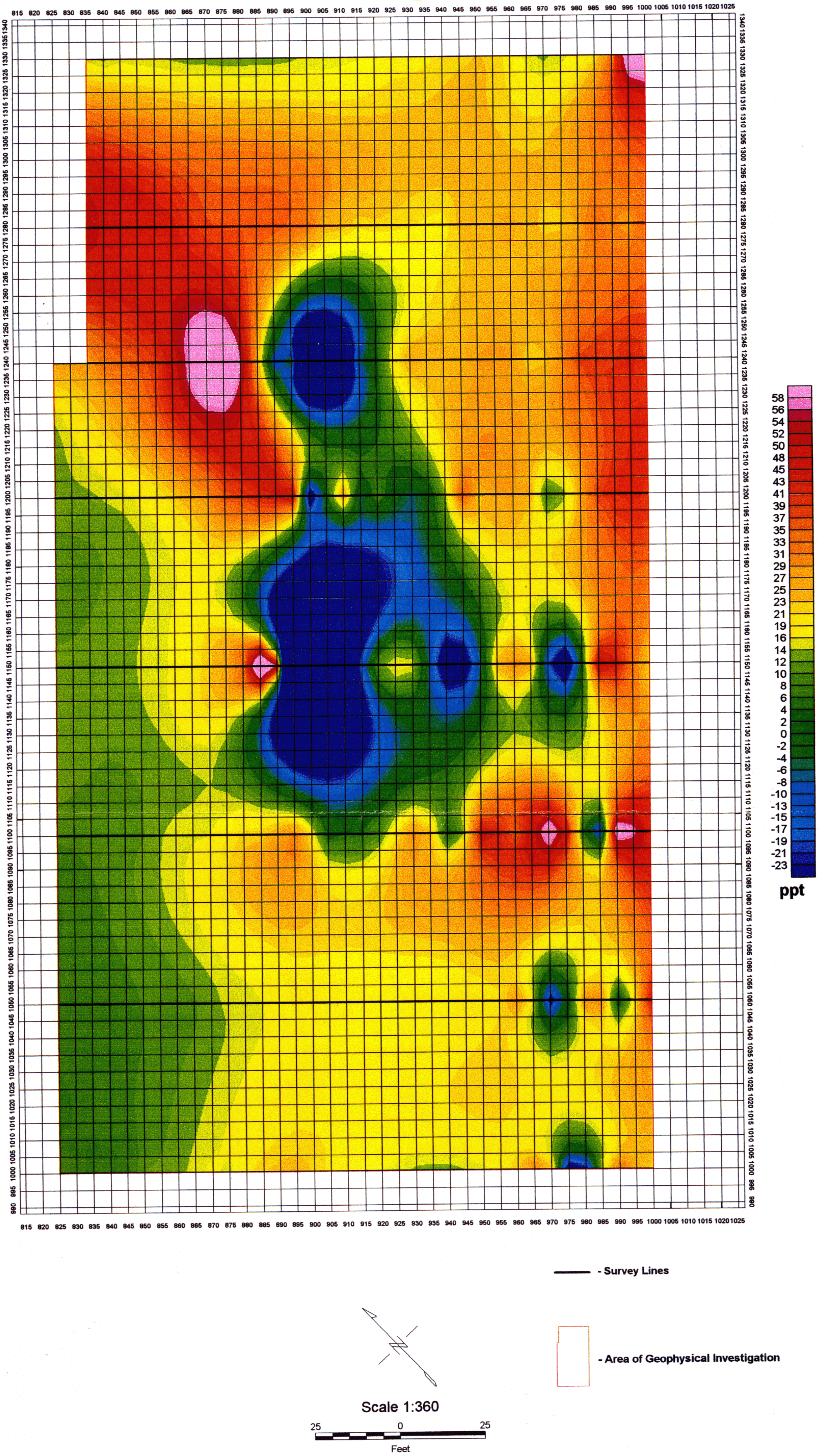

Figure 5

NAEVA GEOPHYSICS INC.
A SUBSIDIARY OF NORTH AMERICAN EXPLORATION OF VIRGINIA INC.
Subsurface Geophysical Surveys
P.O. BOX 7325, CHARLOTTESVILLE, VA 22906
(804) 978-3187 (804) 973-9791 FAX

Baker Environmental

EM-31 Terrain Conductivity
Cheatham Annex: AOC1 - Southern Area
Chapman Road, Williamsburg, Virginia

Date of Survey: November 9 - 11, 1999

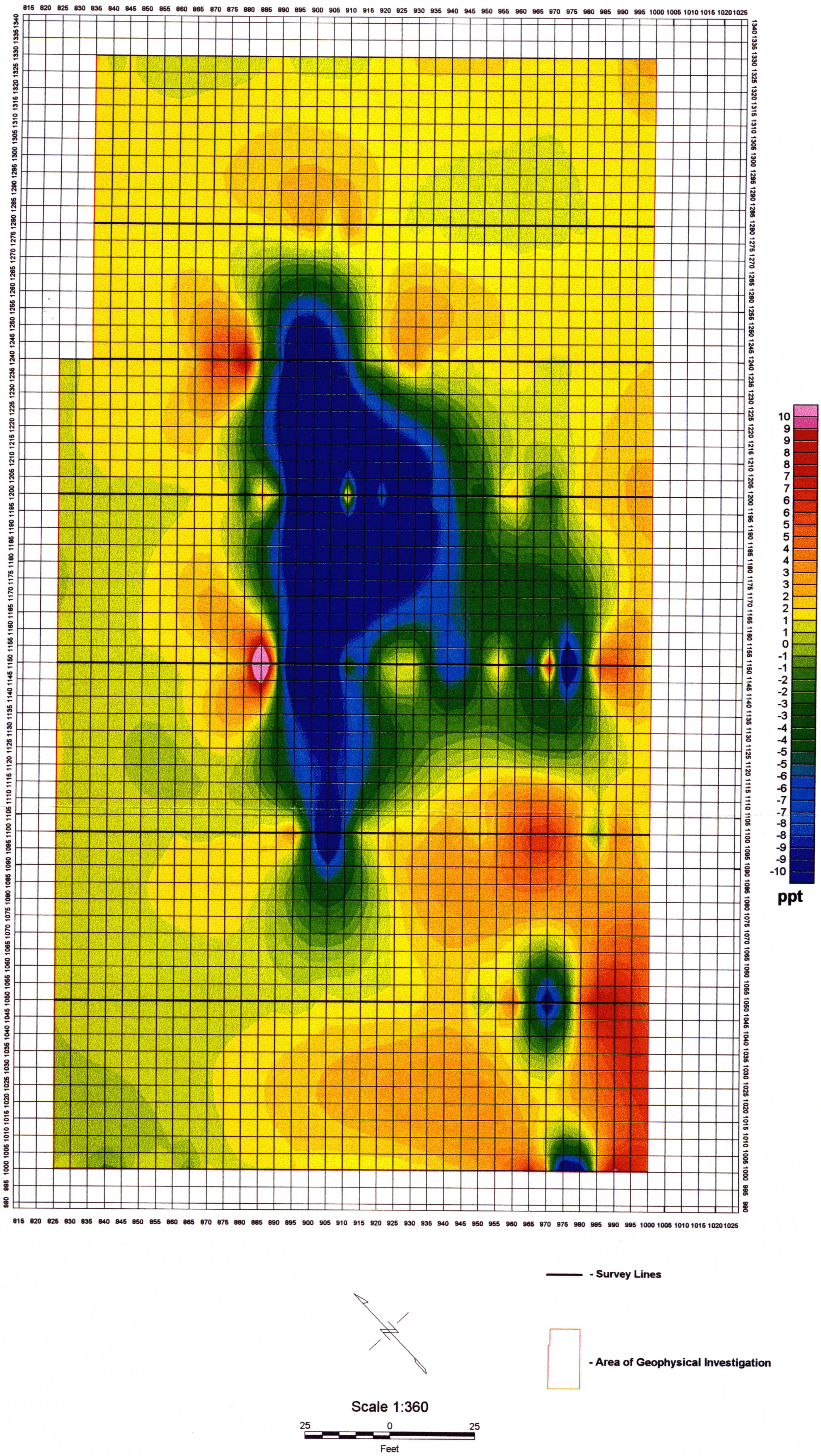

Figure 6

NAEVA GEOPHYSICS INC.
A SUBSIDIARY OF NORTH AMERICAN EXPLORATION OF VIRGINIA INC.
Subsurface Geophysical Surveys
P.O. BOX 7325, CHARLOTTESVILLE, VA 22906
(804) 978-3187 (804) 973-9791 FAX

Baker Environmental

EM-31 In-Phase
Cheatham Annex: AOC1 - Southern Area
Chapman Road, Williamsburg, Virginia

Date of Survey: November 9 - 11, 1999

APPENDIX C.1
GEOPHYSICAL REPORT

APPENDIX C.2
CHEATHAM ANNEX CYLINDERS

Mailing Address:P.O.Box 1779
Norfolk, VA 23501-1779
Shipping Address: 929 Professional Place
Chesapeake, VA 23320

24 Hours: (757) 436-3000
1-800-989-4467
Fax: (757) 436-5266

IMS
ENVIRONMENTAL SERVICES

June 8, 2000

Mr. Martin Taube
Baker Environmental, Inc.
Airport Office Park – Building 3
420 Rouser Road
Coraopolis, PA 15108

RE: Cheatham Annex Cylinders

Dear Mr. Taube:

IMS Environmental Services (IMS) removed two empty compressed gas cylinders from Cheatham Annex property on May 18, 2000. The cylinders were transported to the IMS office in Chesapeake, VA and a 2 inch hole was burned into them to make it obvious that the cylinders were empty. The cylinders were subsequently salvaged as scrap metal at Jacobson Metal Company in Chesapeake, VA.

If you have any questions or require additional information, please feel free to call me at (757) 436-3000.

Very truly yours,
IMS Environmental Services

Robert Reali, P.E.
Project Manager

APPENDIX D
CHAIN-OF-CUSTODY FORMS

Cooler 1 0007

Chain of Custody

Original Chain of Custody goes to Laboratory

Project #	Project Name	Cooler Temp.
26007-104	CAX	
Samplers (please print): Martin Taube, Pete Mosley		Cooler #

Lab ID	Date	Time	Comp. Grab	Sample Identification	Sample Matrix	No. of Containers	VOA	pH	NITRAMINES	pH	SVOA	pH	PEST/PCB	pH	METALS	pH	CN	pH		pH	Remarks
	11/12/99	0930	G	4-HA01-00	SOIL	3	X		X		X		X		X		X				28-DAY
		0950	G	4-HA01-02			X		X		X		X		X		X				
		0950	G	4-HA01-02D			X		X		X		X		X		X				
		0950	G	4-HA01-02 (MS)			X		X		X		X		X		X				
		0950	G	4-HA01-02 (MSD)			X		X		X		X		X		X				
		1030	G	4-HA02-00			X		X		X		X		X		X				
		1030	G	4-HA02-00D			X		X		X		X		X		X				
		1030	G	4-HA02-00 (MS)			X		X		X		X		X		X				
		1030	G	4-HA02-00 (MSD)			X		X		X		X		X		X				
		1100	G	4-HA02-02			X		X		X		X		X		X				

Ceimic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/12/99 1800		
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Ceimic (signature)	Date/Time

Remarks: WATCH FOR TINY SHARDS OF GLASS

▪ = Lab Use Only

Cooler 1 0003

Chain of Custody

Original Chain of Custody goes to Laboratory

Project #	Project Name	Cooler Temp.	Cooler #
26007-104	CAX		1

Samplers (please print): Martin Taube, Pete Monday

Lab ID	Date	Time	Comp./Grab	Sample Identification	Sample Matrix	No. of Containers	VOA	pH		pH		pH		pH		pH		pH		pH	Remarks
	11/12/99	1550	G	104-TB01	WATER	3	X														28 DAY

K.W. 11/12/99

Ceimic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/12/99 1800		
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Ceimic (signature)	Date/Time

Remarks:

▒ = Lab Use Only

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 2

Project #	Project Name	Cooler Temp.	Cooler #	Samplers (please print)
26007-104	CAX			MARTIN TAUBE, PETE MONDAY

Lab ID	Date	Time	Comp./Grab	Sample Identification	Sample Matrix	No. of Containers	VOA	pH	SVOA	pH	PEST/PCB	pH	METALS	pH	CN	pH		pH		pH	Remarks
	11/12/99	1115	G	4-HA03-00	SOIL	2	X		X		X		X		X						28DAY
	↓	1140	↓	4-HA03-02	↓	2	X		X		X		X		X						↓
		1330		4-HA04-00		2	X		X		X		X		X						
		1345		4-HA04-01		2	X		X		X		X		X						
		1410		4-HA05-00		2	X		X		X		X		X						
		1420		4-HA05-01		2	X		X		X		X		X						
		1435		4-HA06-00		2	X		X		X		X		X						
		1500		4-HA06-02		2	X		X		X		X		X						
		1510		4-SED01-00	SEDIMENT	2	X		X		X		X		X						
		1530		4-SED01-01	SEDIMENT	2	X		X		X		X		X						

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/12/99 1800		
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks:
WATCH FOR TINY GLASS SHARDS IN "HA" SAMPLES

] = Lab Use Only

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 2

0011

Page 3 of 3

Project #	Project Name	Cooler Temp.
260007-104	CAX	

Samplers (please print): MARTIN TAUBE, PETE MONDAY

Cooler #:

Analyses: VOA

Lab ID	Date	Time	Comp./Grab	Sample Identification	Sample Matrix	No. of Containers	VOA	pH	pH	pH	pH	pH	pH	pH	Remarks
	11/10/99	1600	G	104-FB02	WATER	3	X								28 DAY
	11/10/99	1550	G	104-FB01	WATER	3	X								
	11/12/99	1555	G	104-TB02	WATER	3	X								
	11/11/99	1240	G	7-SD01	~~Soil~~ SEDIMENT	1	X								

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/12/99 1800		
	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
Storage Location	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks:

= Lab Use Only

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 3

Page 1 of 2

0012

Project #	Project Name	Cooler Temp.
26607-104	CAX	

Samplers (please print): MARTIN TAUBE, PETE MONDAY

Cooler #:

Analyses: NITRAMINES, SVOA, PEST/PCB, METALS, CN

Lab ID	Date	Time	Comp./Grab	Sample Identification	Sample Matrix	No. of Containers	NITRAMINES	pH	SVOA	pH	PEST/PCB	pH	METALS	pH	CN	pH		pH		pH	Remarks
	11/11/99	1240	G	7-SD01	SEDIMENT	2	X		X		X		X		X						28 DAY
	11/12/99	1115		4-HA03-00	SOIL	1	X														
		1140		4-HA03-02		1	X														
		1330		4-HA04-00		1	X														
		1345		4-HA04-01		1	X														
		1410		4-HA05-00		1	X														
		1420		4-HA05-01		1	X														
		1435		4-HA06-00		1	X														
		1500		4-HA06-02		1	X														
		1510		4-SED01-00	SEDIMENT	1	X														

Ceimic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/12/99 1800		
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Ceimic (signature)	Date/Time

Remarks: WATCH FOR TINY GLASS SHARDS IN "HA" SAMPLES

= Lab Use Only

Chain of Custody
Original Chain of Custody goes to Laboratory

COOLER 3

Project #	Project Name	Cooler Temp.
26007-104	CAX	

Samplers (please print)	Cooler #
MARTIN TAUBE, PETE MONDAY	

Lab ID	Date	Time	Comp. / Grab	Sample Identification	Sample Matrix	No. of Containers	NITROAMINES	pH	SVOA	pH	PEST/PCB	pH	METALS	pH	CN	pH		pH		pH	Remarks
	11/12/99	1530	G	4-SED01-01	SEDIMENT	1	X														28DAY
		1645		A2-TP01-N	SOIL	1			X		X		X		X						
		1640		A2-TP02-N		1			X		X		X		X						
		1310		A2-TP03-N		1			X		X		X		X						
		1340		A2-TP04-N		1			X		X		X		X						
		1220		A2-TP05-N		1			X		X		X		X						
		1220		A2-TP05-ND		1			X		X		X		X						
		1220		A2-TP05-N (MS)		1			X		X		X		X						
		1220		A2-TP05-N (MSD)		1			X		X		X		X						
		1110 ~~1135~~ MKI		A2-TP06-N		1			X		X		X		X						

Ceimic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/12/99 1800		
	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
Storage Location	Relinquished by (signature)	Date/Time	Received by Ceimic (signature)	Date/Time

Remarks:

▒ = Lab Use Only

Ceimic Corporation, 10 Dean Knauss Drive, Narragansett, RI 02882 - Tel: (401) 782-8900, Fax: (401) 782-8905

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 4

0014

Page 1 of 1

Project #	Project Name	Cooler Temp.
20007-104	CAX	

Samplers (please print): MARTIN TAUBE, PETE MONDAY

Cooler #

Lab ID	Date	Time	Comp./Grab	Sample Identification	Sample Matrix	No. of Containers	NITR/ANILINES	pH	SVOA	pH	PEST/PCB	pH	METALS	pH	CN	pH		pH		pH	Remarks
	11/10/99	1550	G	104-FB01	WATER	6	X		X		X		X		X						28 DAY
	11/10/99	1600	G	104-FB02	WATER	6	X		X		X		X		X						↓

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/12/99 1800		
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks:

▇ = Lab Use Only

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 1 (SHIPMENT 1)

Project #	Project Name	Cooler Temp.	Cooler #
260007-104	CAX		

Samplers (please print): MARTIN TAUBE, PETE MONDAY

Lab ID	Date	Time	Comp. Grab	Sample Identification	Sample Matrix	No. of Containers	VOA	pH	pH	pH	pH	pH	pH	pH	Remarks
	11/13/99	1130	G	104-RS01	WATER	3	X								28 DAY
	11/13/99	1205	G	104-RS02			X								
	11/13/99	1225	G	104-RS03			X								
	11/13/99	1240	G	104-RS04			X								
	11/14/99	1240	G	A1-SW01			X								
	11/14/99	1141	G	A1-SW02			X								
	11/14/99	1336	G	A1-SW03			X								
	11/14/99	1336	G	A1-SW03D			X								
	11/14/99	1336	G	A1-SW03 (MS)			X								
	11/14/99	1336	G	A1-SW03 (MSD)			X								

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/15/99 1800		
	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
Storage Location	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks: TOTAL THIS COOLER: 33 40ML WATER
BOTTLES 63 4OZ SOIL
96 TOTAL

■ = Lab Use Only

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 1 (SHIPMENT 1)

0016

Project #	Project Name	Cooler Temp.	Analyses
26007-104	CAX		

Samplers (please print): MARTIN TABE PETE MONDAY

Cooler #

Lab ID	Date	Time	Comp. Grab	Sample Identification	Sample Matrix	No. of Containers	VOA	pH		pH		pH		pH		pH		pH		pH	Remarks
	11/14/99	1250	G	A1-SD01-00	SEDIMENT	1	X														28 DAY
	11/14/99	1252	G	A1-SD01-01	↓	1	X														↓
	11/14/99	1204	G	A1-SD02-00		1	X														
	11/14/99	1206	G	A1-SD02-01		1	X														
	11/14/99	1408	G	A1-SD03-00		1	X														
	11/14/99	1408	G	A1-SD03-00D		1	X														
	11/14/99	1408	G	A1-SD03-00 (MS)		1	X														
	11/14/99	1408	G	A1-SD03-00 (MSD)		1	X														
	11/14/99	1403	G	A1-SD03-01		1	X														
	11/14/99	1535	G	A1-SD04-00	↓	1	X														↓

Ceimic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Marlene Dresser	11/15/99 1800		
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Ceimic (signature)	Date/Time

Remarks:

▇ = Lab Use Only

Ceimic Corporation, 10 Dean Knauss Drive, Narragansett, RI 02882 - Tel: (401) 782-8900, Fax: (401) 782-8905

Chain of Custody

Original Chain of Custody goes to Laboratory

(COOLER 1 (SHIPMENT 1)

0017

Project #	Project Name	Cooler Temp.
26007-104	CAX	

Samplers (please print)	Cooler #
MARTIN TAUBE, PETE MONDAY	

Lab ID	Date	Time	Comp. / Grab	Sample Identification	Sample Matrix	No. of Containers	VOA	pH	pH	pH	pH	pH	pH	pH	Remarks
	11/14/99	1545	G	A1-SD04-01	SEDIMENT	1	X								28 DAY
	11/13/99	1130	G	4-SD02-00	SEDIMENT	1	X								
	11/13/99	1129	G	4-SD02-01	SEDIMENT	1	X								
	11/13/99	1100	G	4-SD03-00	SEDIMENT	1	X								
	11/13/99	1059	G	4-SD03-01	SEDIMENT	1	X								
	11/13/99	1000	G	4-SD04-00	SEDIMENT	1	X								
	11/13/99	1000	G	4-SD04-00D	SEDIMENT	1	X								
	11/13/99	1000	G	4-SD04-00 (MS)	SEDIMENT	1	X								
	11/13/99	1000	G	4-SD04-00 (MSD)	SEDIMENT	1	X								
	11/13/99	0959	G	4-SD04-01	SEDIMENT	1	X								

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/15/99 1800		
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks:

▒ = Lab Use Only

Celmic Corporation, 10 Dean Knauss Drive, Narragansett, RI 02882 - Tel: (401) 782-8900, Fax: (401) 782-8905

(COOLER 1 (SHIPMENT 1))

5 0019

Chain of Custody

Original Chain of Custody goes to Laboratory

Project #	Project Name	Cooler Temp.
26007-104	CAX	

Samplers (please print): MARTIN TAUBE, PETE MONDAY

Cooler #:

Lab ID	Date	Time	Comp./Grab	Sample Identification	Sample Matrix	No. of Containers	VOA	pH	pH	pH	pH	pH	pH	pH	Remarks
	11/14/99	0830	COMP	A2-TP01-FD	SOIL	1	X								28 DAY
	11/14/99	0835	COMP	A2-TP02-F	SOIL	1	X								
	11/14/99	0840	COMP	A2-TP03-F		1	X								
	11/14/99	0845	COMP	A2-TP04-F		1	X								
	11/14/99	0850	COMP	A2-TP05-F		1	X								
	11/14/99	0900	COMP	A2-TP06-F		1	X								
	11/14/99	0910	COMP	A2-TPCOMP-01		1	X								
	11/14/99	1155	G	A1-HA01-00		1	X								
	11/14/99	1230	G	A1-HA02-00		1	X								
	11/14/99	1245	G	A1-HA02-02		1	X								
	11/14/99	1315	G	A1-HA03-00		1	X								
	11/14/99	1330	G	A1-HA03-02		1	X								
	11/14/99	1603	G	A1-HA04-00		1	X								
	11/14/99	1608	G	A1-HA04-02		1	X								
	11/14/99	1515	G	A1-HA05-00		1	X								
	11/14/99	1515	G	A1-HA05-00D		1	X								
	11/14/99	1515	G	A1-HA05-00 (MS)		1	X								
	11/14/99	1515	G	A1-HA05-00 (MSD)		1	X								
	11/14/99	1530	G	A1-HA05-01		1	X								
	11/14/99	1530	G	A1-HA05-01D		1	X								

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/15/99 1800		
	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
Storage Location	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks:

▇ = Lab Use Only

Chain of Custody

Original Chain of Custody goes to Laboratory COOLER 1 SHIPMENT 1

Project #	Project Name	Cooler Temp.
26007-104	CAX	

Samplers (please print)	Cooler #
MARTIN TAUBE, PETE MONDAY	

Lab ID	Date	Time	Comp. / Grab	Sample Identification	Sample Matrix	No. of Containers	VOA	pH	pH	pH	pH	pH	pH	pH	Remarks
	11/14/99	1530	G	A1-HA05-01 (MS)	SOIL	1	X								
	11/14/99	1530	G	A1-HA05-01 (MSD)	SOIL	1	X								28 DAY
	11/14/99	1625	G	A1-HA06-00	SOIL	1	X								
	11/14/99	1630	G	A1-HA06-02	SOIL	1	X								
	11/15/99	1650	G	104-TB02 SHOULD BE 03	WATER	3	X								
															MK D

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Marlene Dues	11/15/99 1800		
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks:

▪ = Lab Use Only

COOLER 2 (SHIPMENT 2)

Chain of Custody

Original Chain of Custody goes to Laboratory

Project #	Project Name	Cooler Temp.	Cooler #
26007-104	CAX		

Samplers (please print): MARTIN TAUBE, PETE MONDAY

Lab ID	Date	Time	Comp. Grab	Sample Identification	Sample Matrix	No. of Containers	SVOA	pH	PEST/PCB	pH	NITRAMINES	pH	METALS	pH	CN	pH	FULL TCLP	pH	RCRA CHAR. REACT, CORROS, IGNITE	pH	Remarks
	11/14/99	0835	COMP	A2-TP02-F	SOIL	1	X		X				X		X						28DAY
	11/14/99	0840	COMP	A2-TP03-F	SOIL	1	X		X				X		X						
	11/14/99	0845	COMP	A2-TP04-F	SOIL	1	X		X				X		X						
	11/14/99	0850	COMP	A2-TP05-F	SOIL	1	X		X				X		X						
	11/14/99	0900	COMP	A2-TP06-F	SOIL	1	X		X				X		X						
	11/14/99	0910	COMP	A2-TPCOMP-01	SOIL	2											X		X		
	11/14/99	1155	G	A1-HA01-00	SOIL	2	X		X		X		X		X						
	11/14/99	1230	G	A1-HA02-00	SOIL	2	X		X		X		X		X						
	11/14/99	1245	G	A1-HA02-02	SOIL	2	X		X		X		X		X						
	11/14/99	1315	G	A1-HA03-00	SOIL	2	X		X		X		X		X						
	11/14/99	1330	G	A1-HA03-02	SOIL	2	X		X		X		X		X						
	11/14/99	1603	G	A1-HA04-00	SOIL	2	X		X		X		X		X						
	11/14/99	1608	G	A1-HA04-02	SOIL	2	X		X		X		X		X						
	11/14/99	1515	G	A1-HA05-00	SOIL	2	X		X		X		X		X						
	11/14/99	1515	G	A1-HA05-00 (MS AND MSD)	SOIL	4	X		X		X		X		X						
	11/14/99	1515	G	A1-HA05-00D	SOIL	2	X		X		X		X		X						
	11/14/99	1530	G	A1-HA05-~~00~~01	SOIL	6	X		X		X		X		X						(SEE NOTE)
	11/14/99	1530	G	A1-HA05-01D	SOIL	2	X		X		X		X		X						
	11/14/99	1625	G	A1-HA06-00	SOIL	2	X		X		X		X		X						
	11/14/99	1630	G	A1-HA06-02	SOIL	2	X		X		X		X		X						

41

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/15/99 1800		
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks: FOR A1-HA05-00, A1-HA05-00D, A1-HA05-00 (MS AND MSD), A1-HA05-01, A1-HA05-01D, AND A1-HA05-00 (MS AND MSD) NITRAMINES IN (1) 4OZ AND SVOA, PEST/PCB, METALS, AND CN IN (1) 8OZ

▇ = Lab Use Only

* A1-HA05-01 INCLUDES (MS AND (MSD) FOR A TOTAL OF 3 BOTTLE SETS FOR 3 SEPARATE

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 2 (SHIPMENT 1)

0022

Page 1 of 1

Project #	Project Name	Cooler Temp.
26007-104	CAX	

Samplers (please print)	Cooler #
MARTIN TAUBE, PETE MONDAY	

Analyses

Lab ID	Date	Time	Comp. Grab	Sample Identification	Sample Matrix	No. of Containers	SVOA	pH	PEST/PCB	pH	NITRAMINES	pH	METALS	pH	CN	pH		pH		pH	Remarks
	11/14/99	1240	G	A1-SW01	WATER	6	X		X		X		X		X						28 DAY
	11/14/99	1141	G	A1-SW02	WATER	6	X		X		X		X		X						
	11/14/99	1250	G	A1-SD01-00	SEDIMENT	2	X		X		X		X		X						
	11/14/99	1252	G	A1-SD01-01	SEDIMENT	2	X		X		X		X		X						
	11/14/99	1204	G	A1-SD02-00	SEDIMENT	2	X		X		X		X		X						
	11/14/99	1206	G	A1-SD02-01	SEDIMENT	2	X		X		X		X		X						

MKD

Ceimic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/15/99 1800		
	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
Storage Location	Relinquished by (signature)	Date/Time	Received by Ceimic (signature)	Date/Time

Remarks:

▒ = Lab Use Only

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 3 (SHIPMENT 1)

0023

Page 1 of 1

Project #	Project Name	Cooler Temp.
26007-104	CAL	
Samplers (please print)		**Cooler #**
MARTIN TAUBE PETE MONDAY		

Lab ID	Date	Time	Comp./Grab	Sample Identification	Sample Matrix	No. of Containers	SVOA	pH	PEST/PCB	pH	NITRAMINES	pH	METALS	pH	CN	pH		pH		pH	Remarks
	11/14/99	1336	G	A1-SW03	WATER	6	X		X		X		X		X						28 DAY
	11/14/99	1336	G	A1-SW03D	WATER	6	X		X		X		X		X						
	11/14/99	1408	G	A1-SD03-00	SEDIMENT	2	X		X		X		X		X						
	11/14/99	1408	G	A1-SD03-00D	SEDIMENT	2	X		X		X		X		X						
	11/14/99	1408	G	A1-SD03-00 (MS)	SEDIMENT	2	X		X		X		X		X						
	11/14/99	1408	G	A1-SD03-00 (MSD)	SEDIMENT	2	X		X		X		X		X						
						20															

Ceimic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/15/99/1800		
	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
Storage Location	Relinquished by (signature)	Date/Time	Received by Ceimic (signature)	Date/Time

Remarks:

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 4 (SHIPMENT 1)

0024

Project #	Project Name	Cooler Temp.
26007-104	CAX	

Samplers (please print): MARTIN TALBE, PETE MONDAY

Cooler #:

Lab ID	Date	Time	Comp. / Grab	Sample Identification	Sample Matrix	No. of Containers	SVOA	pH	PEST/PCB	pH	NITRAMINE	pH	METALS	pH	CN	pH		pH		pH	Remarks
	11/14/99	1330	G	A1-SW03 (MS)	WATER	6	X		X		X		X		X						28 DAY
	11/14/99	1336	G	A1-SW03 (MSD)	WATER	6	X		X		X		X		X						↓
	11/14/99	1403	G	A1-SD03-01	SEDIMENT	2	X		X		X		X		X						↓
	11/14/99	1535	G	A1-SD04-00	SEDIMENT	2	X		X		X		X		X						↓
	11/14/99	1545	G	A1-SD04-01	SEDIMENT	2	X		X		X		X		X						↓
	11/13/99	1130	G	~~A1~~ MA1 4-SD02-00	SEDIMENT	2	X		X		X		X		X						↓
						20															
																					ME

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Marlene K Presh	11/15/99 1800		
	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
Storage Location	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks:

▇ = Lab Use Only

Chain of Custody
Original Chain of Custody goes to Laboratory

COOLER 5 (SHIPMENT 1)

Project #	Project Name	Cooler Temp.
26007-104	CAX	

Samplers (please print)	Cooler #
MARTIN TAUBE, PETE MONDAY	

Lab ID	Date	Time	Comp. Grab	Sample Identification	Sample Matrix	No. of Containers	SVOA	pH	PEST/PCB	pH	NITRAMINES	pH	METALS	pH	CN	pH		pH		pH	Remarks
	11/13/99	1130	G	104-RS01	WATER	6	X		X		X		X		X						28 DAY
	11/13/99	1205	G	104-RS02	WATER	6	X		X		X		X		X						
	11/13/99	1129	G	4-SD02-01	SEDIMENT	2	X		X		X		X		X						
	11/13/99	1100	G	4-SD03-00	SEDIMENT	2	X		X		X		X		X						
	11/13/99	1059	G	4-SD03-01	SEDIMENT	2	X		X		X		X		X						
	11/13/99	1000	G	4-SD04-00	SEDIMENT	2	X		X		X		X		X						
						20															

Ceimic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/15/99 1800		M-1
Storage Location	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	Relinquished by (signature)	Date/Time	Received by Ceimic (signature)	Date/Time

Remarks: NOTE: THERE IS A CRACK IN THE LID OF 4-SD04-00.

= Lab Use Only

Chain of Custody

Original Chain of Custody goes to Laboratory

COOLER 6 (SHIPMENT 1)

0026

Page 1 of 1

Project #	Project Name	Cooler Temp.
260007-104	CAX	
Samplers (please print): MARTIN TAUBE, PETE MONDAY		Cooler #

Lab ID	Date	Time	Comp. Grab	Sample Identification	Sample Matrix	No. of Containers	SVOA	pH	PEST/PCB	pH	NITROAMINES	pH	METALS	pH	CN	pH		pH		pH	Remarks
	11/13/99	1225	G	104-RS03	WATER	6	X		X		X		X		X						28DAY
	11/13/99	1240	G	104-RS04	WATER	6	X		X		X		X		X						
	11/13/99	1000	G	4-SD04-00D	SEDIMENT	2	X		X		X		X		X						
	11/13/99	1000	G	4-SD04-00 (MS)	SEDIMENT	2	X		X		X		X		X						
	11/13/99	1000	G	4-SD04-00 (MSD)	SEDIMENT	2	X		X		X		X		X						
	11/13/99	0959	G	4-SD04-01	SEDIMENT	2	X		X		X		X		X						
						20															
																					MH

Celmic Project #	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
	[signature]	11/15/99 1800		
	Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
Storage Location	Relinquished by (signature)	Date/Time	Received by Celmic (signature)	Date/Time

Remarks:

▒ = Lab Use Only

Celmic Corporation, 10 Dean Knauss Drive, Narragansett, RI 02882 - Tel: (401) 782-8900, Fax: (401) 782-8905

ENVIRON

BAK
CAM
420
COR
Pho

Post-it® Fax Note 7671

Date 11/28/94	# of pages ▶
To Martin Taube	From Glen Sarchy
Co./Dept.	Co.
Phone #	Phone #
Fax #	Fax #

37809260 85

LabCorp

Analytics Division
8040 VILLA PARK DRIVE SUITE 250
RICHMOND, VIRGINIA 23228
(804) 264-7100
TOLL FREE (800) 888-8061

DATE SHIPPED	# OF SAMPLES	PROJECT NAME OR NUMBER	
11/23/94	2	~~Chatham~~ Cheltham Annex	
PURCHASE ORDER NO.		CONTACT Martin Taube	TELEPHONE NUMBER (412) 269-4687

PRIORITY ANALYSIS
☐ 1 DAY
☐ 3 DAY
EXTRA CHARGE

SPECIAL INSTRUCTIONS:

☐ RETURN SAMPLE
☐ DISPOSE OF SAMPLE (EXTRA CHARGE)

EXPLANATION OF PRESERVATIVE *

DATE RESULTS REQUESTED

ANALYSIS REQUESTED
(Enter an "X" in the box below to indicate request; Enter a "P" if Preservative added.*)

DATE	SAMPLE IDENTIFICATION	Number of Containers	TCLP VOA	TCLP SVOA	TCLP Pest	TCLP PCB	TCLP Metals	Ignitability		Full TCLP				MATRIX
11/23/94	A2-AQWT-01	9	X	X	X	X	X	✓						Water
11/23/94	A1-CAAT-01	1								X				Metal

CHAIN OF CUSTODY RECORD

SAMPLES HAVE BEEN SEALED FOR TRANSPORT AND DELIVERED TO LABORATORY VIA:

CARRIER

IF LABCORP COURIER SIGN HERE

SIGN HERE TO INITIATE CHAIN OF CUSTODY

DATE

DATE/TIME	CONDITION OF SAMPLE	SAMPLES RECEIVED BY:	SAMPLES RELEASED BY:
1		SIGNATURE (SAMPLE RECEIVING)	SIGNATURE (SAMPLE RECEIVING)
2		SIGNATURE (SAMPLE ADMINISTRATION)	SIGNATURE (SAMPLE ADMINISTRATION)
3		SIGNATURE (LAB)	SIGNATURE (LAB)
4		SIGNATURE (LAB)	SIGNATURE (LAB)

PLEASE RETAIN PART 3 FOR YOUR RECORDS.

APPENDIX E
ANALYTICAL DATA

APPENDIX E.1
ANALYTICAL DATA SUMMARIES

QA/QC Data

SUMMARY OF VOLATILE ORGANIC COMPOUNDS - TRIP BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-TB01 11/12/99	104-TB03 11/14/1999
Volatiles (ug/L)		
1,1,1-Trichloroethane	10.00 U	10.00 U
1,1,2,2-Tetrachloroethane	10.00 U	1.00 J
1,1,2-Trichloroethane	10.00 U	10.00 U
1,1-Dichloroethane	10.00 U	10.00 U
1,1-Dichloroethene	10.00 U	10.00 U
1,2-Dichloroethane	10.00 U	10.00 U
1,2-Dichloroethene (total)	10.00 U	10.00 U
1,2-Dichloropropane	10.00 U	10.00 U
2-Butanone	2.00 J	10.00 U
2-Hexanone	10.00 U	1.00 J
4-Methyl-2-Pentanone	10.00 U	1.00 J
Acetone	2.00 J	7.00 J
Benzene	10.00 U	10.00 U
Bromodichloromethane	10.00 U	10.00 U
Bromoform	10.00 U	10.00 U
Bromomethane	10.00 U	11.00 B
Carbon Disulfide	10.00 U	10.00 U
Carbon Tetrachloride	10.00 U	10.00 U
Chlorobenzene	10.00 U	10.00 U
Chloroethane	10.00 U	10.00 U
Chloroform	10.00 U	10.00 U
Chloromethane	10.00 U	3.00 J
Dibromochloromethane	10.00 U	10.00 U
Ethylbenzene	10.00 U	10.00 U
Methylene Chloride	3.00 J	12.00 B
Styrene	10.00 U	10.00 U
Tetrachloroethene	10.00 U	10.00 U
Toluene	10.00 U	10.00 U
Trichloroethene	10.00 U	10.00 U
Vinyl Chloride	10.00 U	10.00 U
Xylene (Total)	10.00 U	10.00 U
cis-1,3-Dichloropropene	10.00 U	10.00 U
trans-1,3-Dichloropropene	10.00 U	10.00 U

SUMMARY OF ORGANIC COMPOUNDS - FIELD BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-FB01 11/10/1999	104-FB02 11/10/1999
Volatiles (ug/L)		
1,1,1-Trichloroethane	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U
1,1-Dichloroethane	10 U	10 U
1,1-Dichloroethene	10 U	10 U
1,2-Dichloroethane	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U
1,2-Dichloropropane	10 U	10 U
2-Butanone	10 U	10 U
2-Hexanone	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U
Acetone	5 J	6 J
Benzene	10 U	10 U
Bromodichloromethane	10 U	10 U
Bromoform	10 U	10 U
Bromomethane	10 U	10 U
Carbon Disulfide	10 U	10 U
Carbon Tetrachloride	10 U	10 U
Chlorobenzene	10 U	10 U
Chloroethane	10 U	10 U
Chloroform	10 U	10 U
Chloromethane	10 U	10 U
Dibromochloromethane	10 U	10 U
Ethylbenzene	10 U	10 U
Methylene Chloride	2 J	2 J
Styrene	10 U	10 U
Tetrachloroethene	10 U	10 U
Toluene	10 U	10 U
Trichloroethene	10 U	10 U
Vinyl Chloride	10 U	10 U
Xylene (Total)	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U

SUMMARY OF ORGANIC COMPOUNDS - FIELD BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-FB01 11/10/1999	104-FB02 11/10/1999
Semivolatiles (ug/L)		
1,2,4-Trichlorobenzene	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U
2,2'-oxybis(1-Chloropropan	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 U
2,4,6-Trichlorophenol	10 U	10 U
2,4-Dichlorophenol	10 U	10 U
2,4-Dimethylphenol	10 U	10 U
2,4-Dinitrophenol	25 U	25 U
2,4-Dinitrotoluene	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U
2-Chloronaphthalene	10 U	10 U
2-Chlorophenol	10 U	10 U
2-Methylnaphthalene	10 U	10 U
2-Methylphenol	10 U	10 U
2-Nitroaniline	25 U	25 U
2-Nitrophenol	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U
3-Nitroaniline	25 U	25 U
4,6-Dinitro-2-Methylphenol	25 U	25 U
4-Bromophenyl phenylether	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 U
4-Chloroaniline	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U
4-Methylphenol	10 U	10 U
4-Nitroaniline	25 U	25 U
4-Nitrophenol	25 U	25 U
Acenaphthene	10 U	10 U
Acenaphthylene	10 U	10 U
Anthracene	10 U	10 U
Benzo(a)Anthracene	10 U	10 U
Benzo(a)Pyrene	10 U	10 U

SUMMARY OF ORGANIC COMPOUNDS - FIELD BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-FB01 11/10/1999	104-FB02 11/10/1999
Semivolatiles (ug/L) (Cont)		
Benzo(b)Fluoranthene	10 U	10 U
Benzo(g,h,i)Perylene	10 U	10 U
Benzo(k)Fluoanthene	10 U	10 U
Bis(2-Ethylhexyl)Phthalate	2.00 J	10 U
Bis(2-chloroethoxy)Methane	10 U	10 U
Bis(2-chloroethyl)Ether	10 U	10 U
Butylbenzylphthalate	10 U	10 U
Carbazole	10 U	10 U
Chrysene	10 U	10 U
Di-n-Butylphthalate	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U
Dibenz(a,h)Anthracene	10 U	10 U
Dibenzofuran	10 U	10 U
Diethylphthalate	10 U	10 U
Dimethyl Phthalate	10 U	10 U
Fluoranthene	10 U	10 U
Fluorene	10 U	10 U
Hexachlorobenzene	10 U	10 U
Hexachlorobutadiene	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U
Hexachloroethane	10 U	10 U
Indeno(1,2,3-cd)Pyrene	10 U	10 U
Isophorone	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U
Naphthalene	10 U	10 U
Nitrobenzene	10 U	10 U
Pentachlorophenol	25 U	25 U
Phenanthrene	10 U	10 U
Phenol	10 U	10 U
Pyrene	10 U	10 U

SUMMARY OF ORGANIC COMPOUNDS - FIELD BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-FB01 11/10/1999	104-FB02 11/10/1999
Pesticide/PCB (ug/L)		
4,4'-DDD	0.10 U	0.10 U
4,4'-DDE	0.10 U	0.10 U
4,4'-DDT	0.10 U	0.10 U
Aldrin	0.050 U	0.050 U
Aroclor-1016	1.0 U	1.0 U
Aroclor-1221	2.0 U	2.0 U
Aroclor-1232	1.0 U	1.0 U
Aroclor-1242	1.0 U	1.0 U
Aroclor-1248	1.0 U	1.0 U
Aroclor-1254	1.0 U	1.0 U
Aroclor-1260	1.0 U	1.0 U
Dieldrin	0.10 U	0.10 U
Endosulfan I	0.050 U	0.050 U
Endosulfan II	0.10 U	0.10 U
Endosulfan Sulfate	0.10 U	0.10 U
Endrin	0.10 U	0.10 U
Endrin Aldehyde	0.10 U	0.10 U
Endrin Ketone	0.10 U	0.10 U
Heptachlor	0.050 U	0.050 U
Heptachlor Epoxide	0.050 U	0.050 U
Methoxychlor	0.50 U	0.50 U
Toxaphene	5.0 U	5.0 U
alpha-BHC	0.050 U	0.050 U
alpha-Chlordane	0.050 U	0.050 U
beta-BHC	0.050 U	0.050 U
delta-BHC	0.050 U	0.050 U
gamma-BHC	0.050 U	0.050 U
gamma-Chlordane	0.050 U	0.050 U

SUMMARY OF ORGANIC COMPOUNDS - FIELD BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-FB01	104-FB02
	11/10/1999	11/10/1999
Explosives (NG)		
1,3,5-TNB	1.0 U	1.0 U
1,3-DNB	1.0 U	1.0 U
2,4,6-TNT	1.0 U	1.0 U
2,4-DNT	1.0 U	1.0 U
2,6-DNT	1.0 U	1.0 U
2-NT	1.0 U	1.0 U
2-am-4,6-DNT	1.0 U	1.0 U
3-NT	1.0 U	1.0 U
4-NT	1.0 U	1.0 U
4-am-2,6-DNT	1.0 U	1.0 U
HMX	1.0 U	1.0 U
NB	1.0 U	1.0 U
RDX	1.0 U	1.0 U
TETRYL	1.0 U	1.0 U

SUMMARY OF UNFILTERED INORGANIC CONSTITUENTS - FIELD BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-FB01 11/10/1999	104-FB02 11/10/1999
Metal (ug/L)		
Aluminum	84.70 J	428.00
Antimony	2.2 U	2.2 U
Arsenic	3.4 U	3.4 U
Barium	4.1 U	6.90 J
Beryllium	0.66 U	0.66 U
Cadmium	0.34 U	0.34 U
Calcium	85.4 U	87.70 J
Chromium	6.2 U	6.2 U
Cobalt	6.2 U	6.2 U
Copper	5.4 U	7.30 J
Cyanide	0.2 U	0.2 U
Iron	65.40 J	151.00
Lead	1.4 U	1.4 U
Magnesium	117 U	117 U
Manganese	3.9 U	3.9 U
Mercury	0.07 U	0.06 U
Nickel	6 U	6 U
Potassium	209 U	209 U
Selenium	3 U	3 U
Silver	5.80 J	8.50 J
Sodium	236.00 J	194.00 J
Thallium	2.4 U	2.80 J
Vanadium	5.7 U	5.7 U
Zinc	40.70	64.30

SUMMARY OF ORGANIC COMPOUNDS - EQUIPMENT RINSATE BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-RS01 11/13/1999	104-RS02 11/13/1999	104-RS03 11/13/1999	104-RS04 11/13/1999
Volatiles (ug/L)				
1,1,1-Trichloroethane	10.00 U	10.00 U	10.00 U	10.00 U
1,1,2,2-Tetrachloroethane	10.00 U	10.00 U	10.00 U	10.00 U
1,1,2-Trichloroethane	10.00 U	10.00 U	10.00 U	10.00 U
1,1-Dichloroethane	10.00 U	10.00 U	10.00 U	10.00 U
1,1-Dichloroethene	10.00 U	10.00 U	10.00 U	10.00 U
1,2-Dichloroethane	10.00 U	10.00 U	10.00 U	10.00 U
1,2-Dichloroethene (total)	10.00 U	10.00 U	10.00 U	10.00 U
1,2-Dichloropropane	10.00 U	10.00 U	10.00 U	10.00 U
2-Butanone	10.00 U	10.00 U	10.00 U	10.00 U
2-Hexanone	10.00 U	10.00 U	10.00 U	10.00 U
4-Methyl-2-Pentanone	10.00 U	10.00 U	10.00 U	10.00 U
Acetone	6.00 J	10.00 U	10.00 U	8.00 J
Benzene	10.00 U	10.00 U	10.00 U	10.00 U
Bromodichloromethane	10.00 U	10.00 U	10.00 U	10.00 U
Bromoform	10.00 U	10.00 U	10.00 U	10.00 U
Bromomethane	10.00 U	10.00 U	10.00 U	10.00 U
Carbon Disulfide	10.00 U	10.00 U	10.00 U	10.00 U
Carbon Tetrachloride	10.00 U	10.00 U	10.00 U	10.00 U
Chlorobenzene	10.00 U	10.00 U	10.00 U	10.00 U
Chloroethane	10.00 U	10.00 U	10.00 U	10.00 U
Chloroform	10.00 U	10.00 U	10.00 U	10.00 U
Chloromethane	10.00 U	10.00 U	10.00 U	10.00 U
Dibromochloromethane	10.00 U	10.00 U	10.00 U	10.00 U
Ethylbenzene	10.00 U	10.00 U	10.00 U	10.00 U
Methylene Chloride	2.00 J	2.00 J	2.00 J	2.00 J
Styrene	10.00 U	10.00 U	10.00 U	10.00 U
Tetrachloroethene	10.00 U	10.00 U	10.00 U	10.00 U
Toluene	10.00 U	10.00 U	10.00 U	10.00 U
Trichloroethene	10.00 U	10.00 U	10.00 U	10.00 U
Vinyl Chloride	10.00 U	10.00 U	10.00 U	10.00 U
Xylene (Total)	10.00 U	10.00 U	10.00 U	10.00 U
cis-1,3-Dichloropropene	10.00 U	10.00 U	10.00 U	10.00 U
trans-1,3-Dichloropropene	10.00 U	10.00 U	10.00 U	10.00 U

SUMMARY OF ORGANIC COMPOUNDS - EQUIPMENT RINSATE BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-RS01 11/13/1999	104-RS02 11/13/1999	104-RS03 11/13/1999	104-RS04 11/13/1999
Semivolatiles (ug/L)				
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropan	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2-Nitroaniline	25 U	25 U	25 U	25 U
2-Nitrophenol	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U
3-Nitroaniline	25 U	25 U	25 U	25 U
4,6-Dinitro-2-Methylphenol	25 U	25 U	25 U	25 U
4-Bromophenyl phenylether	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
4-Nitroaniline	25 U	25 U	25 U	25 U
4-Nitrophenol	25 U	25 U	25 U	25 U
Acenaphthene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Benzo(a)Anthracene	10 U	10 U	10 U	10 U
Benzo(a)Pyrene	10 U	10 U	10 U	10 U

SUMMARY OF ORGANIC COMPOUNDS - EQUIPMENT RINSATE BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-RS01 11/13/1999	104-RS02 11/13/1999	104-RS03 11/13/1999	104-RS04 11/13/1999
Semivolatiles (ug/L) (Cont)				
Benzo(b)Fluoranthene	10 U	10 U	10 U	10 U
Benzo(g,h,i)Perylene	10 U	10 U	10 U	10 U
Benzo(k)Fluoanthene	10 U	10 U	10 U	10 U
Bis(2-Ethylhexyl)Phthalate	2.00 J	10 U	10 U	10 U
Bis(2-chloroethoxy)Methane	10 U	10 U	10 U	10 U
Bis(2-chloroethyl)Ether	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 U
Dibenz(a,h)Anthracene	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U
Dimethyl Phthalate	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)Pyrene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
Pentachlorophenol	25 U	25 U	25 U	25 U
Phenanthrene	10 U	10 U	10 U	10 U
Phenol	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U

SUMMARY OF ORGANIC COMPOUNDS - EQUIPMENT RINSATE BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	104-RS01 11/13/1999	104-RS02 11/13/1999	104-RS03 11/13/1999	104-RS04 11/13/1999
Pesticide/PCB (ug/L)				
4,4'-DDD	0.10 U	0.10 U	0.10 U	0.12 U
4,4'-DDE	0.10 U	0.10 U	0.10 U	0.12 U
4,4'-DDT	0.10 U	0.10 U	0.10 U	0.12 U
Aldrin	0.050 U	0.050 U	0.050 U	0.062 U
Aroclor-1016	1.0 U	1.0 U	1.0 U	1.2 U
Aroclor-1221	2.0 U	2.0 U	2.0 U	2.5 U
Aroclor-1232	1.0 U	1.0 U	1.0 U	1.2 U
Aroclor-1242	1.0 U	1.0 U	1.0 U	1.2 U
Aroclor-1248	1.0 U	1.0 U	1.0 U	1.2 U
Aroclor-1254	1.0 U	1.0 U	1.0 U	1.2 U
Aroclor-1260	1.0 U	1.0 U	1.0 U	1.2 U
Dieldrin	0.10 U	0.10 U	0.10 U	0.12 U
Endosulfan I	0.050 U	0.050 U	0.050 U	0.062 U
Endosulfan II	0.10 U	0.10 U	0.10 U	0.12 U
Endosulfan Sulfate	0.10 U	0.10 U	0.10 U	0.12 U
Endrin	0.10 U	0.10 U	0.10 U	0.12 U
Endrin Aldehyde	0.10 U	0.10 U	0.10 U	0.12 U
Endrin Ketone	0.10 U	0.10 U	0.10 U	0.12 U
Heptachlor	0.050 U	0.050 U	0.050 U	0.062 U
Heptachlor Epoxide	0.050 U	0.050 U	0.050 U	0.062 U
Methoxychlor	0.50 U	0.50 U	0.50 U	0.62 U
Toxaphene	5.0 U	5.0 U	5.0 U	6.2 U
alpha-BHC	0.050 U	0.050 U	0.050 U	0.062 U
alpha-Chlordane	0.050 U	0.050 U	0.050 U	0.062 U
beta-BHC	0.050 U	0.050 U	0.050 U	0.062 U
delta-BHC	0.050 U	0.050 U	0.050 U	0.062 U
gamma-BHC	0.050 U	0.050 U	0.050 U	0.062 U
gamma-Chlordane	0.050 U	0.050 U	0.050 U	0.062 U

SUMMARY OF ORGANIC COMPOUNDS - EQUIPMENT RINSATE BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-RS01 11/13/1999	104-RS02 11/13/1999	104-RS03 11/13/1999	104-RS04 11/13/1999
Explosives (NG)				
1,3,5-TNB	1.0 U	1.0 U	1.0 U	1.0 U
1,3-DNB	1.0 U	1.0 U	1.0 U	1.0 U
2,4,6-TNT	1.0 U	1.0 U	1.0 U	1.0 U
2,4-DNT	1.0 U	1.0 U	1.0 U	1.0 U
2,6-DNT	1.0 U	1.0 U	1.0 U	1.0 U
2-NT	1.0 U	1.0 U	1.0 U	1.0 U
2-am-4,6-DNT	1.0 U	1.0 U	1.0 U	1.0 U
3-NT	1.0 U	1.0 U	1.0 U	1.0 U
4-NT	1.0 U	1.0 U	1.0 U	1.0 U
4-am-2,6-DNT	1.0 U	1.0 U	1.0 U	1.0 U
HMX	1.0 U	1.0 U	1.0 U	1.0 U
NB	1.0 U	1.0 U	1.0 U	1.0 U
RDX	1.0 U	1.0 U	1.0 U	1.0 U
TETRYL	1.0 U	1.0 U	1.0 U	1.0 U

SUMMARY OF UNFILTERED INORGANIC CONSTITUENTS - EQUIPMENT RINDSATE BLANKS
SITE INVESTIGATION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	104-RS01 11/13/1999	104-RS02 11/13/1999	104-RS03 11/13/1999	104-RS04 11/13/1999
Metal (ug/L)				
Aluminum	49.10 J	44 U	44 U	44 U
Antimony	2.2 U	2.30 J	2.2 U	2.2 U
Arsenic	3.4 U	3.4 U	3.4 U	3.4 U
Barium	11.30 J	4.1 U	4.1 U	4.1 U
Beryllium	0.66 U	0.66 U	0.66 U	0.66 U
Cadmium	0.34 U	0.34 U	0.34 U	0.34 U
Calcium	85.4 U	85.4 U	85.4 U	85.4 U
Chromium	6.2 U	6.2 U	6.2 U	6.2 U
Cobalt	6.2 U	6.2 U	6.2 U	6.2 U
Copper	5.4 U	5.4 U	5.4 U	5.4 U
Cyanide	0.2 U	0.2 U	0.2 U	0.2 U
Iron	37.50 J	58.30 J	27.40 J	57.60 J
Lead	1.4 U	1.4 U	1.4 U	1.50 J
Magnesium	143.00 J	117 U	117 U	182.00 J
Manganese	3.9 U	3.9 U	3.9 U	3.9 U
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	6 U	6 U	6 U	6 U
Potassium	247.00 J	209 U	250.00 J	269.00 J
Selenium	3 U	3 U	3 U	3 U
Silver	3.9 U	3.9 U	3.9 U	3.9 U
Sodium	86.50 J	42.3 U	42.3 U	42.3 U
Thallium	2.4 U	2.4 U	2.4 U	2.4 U
Vanadium	5.7 U	5.7 U	5.7 U	5.7 U
Zinc	9.80 J	11.30 J	9.80 J	9.80 J

AOC 1 – Scrap Metal Dump

SURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-00	4-HA02-00	4-HA02-00D	4-HA03-00	4-HA04-00	4-HA05-00	4-HA06-00
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Volatiles (ug/kg)							
1,1,1-Trichloroethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
1,1,2,2-Tetrachloroethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 UL	14.79 UR	12.07 UL
1,1,2-Trichloroethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
1,1-Dichloroethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
1,1-Dichloroethene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
1,2-Dichloroethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
1,2-Dichloroethene (total)	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
1,2-Dichloropropane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
cis-1,3-Dichloropropene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
trans-1,3-Dichloropropene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
2-Butanone	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
2-Hexanone	11.24 U	13.42 U	11.87 U	11.58 U	14.79 UL	14.79 UR	12.07 UL
4-Methyl-2-Pentanone	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Acetone	5 B	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Benzene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Bromodichloromethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Bromoform	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Bromomethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Carbon Disulfide	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Carbon Tetrachloride	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Chlorobenzene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 UL	14.79 UR	12.07 UL
Chloroethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Chloroform	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Chloromethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Dibromochloromethane	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Ethylbenzene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 UL	14.79 UR	12.07 UL
Methylene Chloride	7 B	8 B	11.87 U	9 B	11 B	11 B	12.07 UL
Styrene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 UL	14.79 UR	12.07 UL
Tetrachloroethene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 UL	14.79 UR	12.07 UL
Toluene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 UL	14.79 UR	12.07 UL
Trichloroethene	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Vinyl Chloride	11.24 U	13.42 U	11.87 U	11.58 U	14.79 U	14.79 UR	12.07 UL
Xylene (Total)	11.24 U	2 J	11.87 U	11.58 U	14.79 UL	14.79 UR	12.07 UL

SURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-00 11/12/1999	4-HA02-00 11/12/1999	4-HA02-00D 11/12/1999	4-HA03-00 11/12/1999	4-HA04-00 11/12/1999	4-HA05-00 11/12/1999	4-HA06-00 11/12/1999
Semivolatiles (ug/kg)							
1,2,4-Trichlorobenzene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
1,2-Dichlorobenzene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
1,3-Dichlorobenzene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
1,4-Dichlorobenzene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2,2'-oxybis(1-Chloropropan	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2,4,5-Trichlorophenol	960 U	5200 U	5200 U	1000 U	6600 U	14000 U	9700 U
2,4,6-Trichlorophenol	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2,4-Dichlorophenol	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2,4-Dimethylphenol	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2,4-Dinitrophenol	960 U	5200 U	5200 U	1000 U	6600 U	14000 U	9700 U
2,4-Dinitrotoluene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2,6-Dinitrotoluene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2-Chloronaphthalene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2-Chlorophenol	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2-Methylnaphthalene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2-Methylphenol	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
2-Nitroaniline	960 U	5200 U	5200 U	1000 U	6600 U	14000 U	9700 U
2-Nitrophenol	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
3,3'-Dichlorobenzidine	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
3-Nitroaniline	960 U	5200 U	5200 U	1000 U	6600 U	14000 U	9700 U
4,6-Dinitro-2-Methylphenol	960 U	5200 U	5200 U	1000 U	6600 U	14000 U	9700 U
4-Bromophenyl phenylether	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
4-Chloro-3-Methylphenol	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
4-Chloroaniline	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
4-Chlorophenyl-phenylether	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
4-Methylphenol	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
4-Nitroaniline	960 U	5200 U	5200 U	1000 U	6600 U	14000 U	9700 U
4-Nitrophenol	960 U	5200 U	5200 U	1000 U	6600 U	14000 U	9700 U
Acenaphthene	380 U	330 J	2100 U	400 U	2600 U	5500 U	3900 U
Acenaphthylene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Anthracene	380 U	530 J	2100 U	400 U	2600 U	5500 U	1700 J
Benzo(a)Anthracene	380 U	1100 J	290 J	400 U	2600 U	1100 J	8800
Benzo(a)Pyrene	380 U	950 J	440 J	400 U	2600 U	2300 J	7000

SURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
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NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	4-HA01-00	4-HA02-00	4-HA02-00D	4-HA03-00	4-HA04-00	4-HA05-00	4-HA06-00
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Semivolatiles (ug/kg) (Cont)							
Benzo(b)Fluoranthene	380 U	1100 J	320 J	76 J	330 J	1700 J	6800
Benzo(g,h,i)Perylene	380 U	650 J	340 J	61 J	2600 U	1200 J	3400 J
Benzo(k)Fluoanthene	380 U	770 J	470 J	53 J	320 J	1700 J	6800
Bis(2-chloroethoxy)Methane	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Bis(2-chloroethyl)Ether	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Bis(2-Ethylhexyl)Phthalate	49 B	16000	3000	100 B	11000	5500 U	3900 U
Butylbenzylphthalate	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Carbazole	380 U	250 J	2100 U	400 U	2600 U	5500 U	3900 U
Chrysene	380 U	1300 J	520 J	75 J	410 J	2200 J	8600
Dibenz(a,h)Anthracene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	1400 J
Dibenzofuran	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Diethylphthalate	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Dimethyl Phthalate	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Di-n-Butylphthalate	380 U	2100 U	2100 U	41 B	9900	5500 U	3900 U
Di-n-Octyl Phthalate	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Fluoranthene	380 U	2700	660 J	49 J	510 J	1800 J	14000
Fluorene	380 U	250 J	2100 U	400 U	2600 U	5500 U	3900 U
Hexachlorobenzene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Hexachlorobutadiene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Hexachlorocyclopentadiene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Hexachloroethane	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Indeno(1,2,3-cd)Pyrene	380 U	600 J	250 J	48 J	2600 U	1300 J	3400 J
Isophorone	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Naphthalene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Nitrobenzene	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
N-Nitroso-Di-n-Propylamine	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
N-Nitrosodiphenylamine	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Pentachlorophenol	960 U	5200 U	5200 U	1000 U	6600 U	14000 U	9700 U
Phenanthrene	380 U	2400	560 J	400 U	2600 U	1400 J	5500
Phenol	380 U	2100 U	2100 U	400 U	2600 U	5500 U	3900 U
Pyrene	380 U	2300	800 J	46 J	440 J	3000 J	11000

SURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-00	4-HA02-00	4-HA02-00D	4-HA03-00	4-HA04-00	4-HA05-00	4-HA06-00
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Pesticides/PCBs (ug/kg)							
4,4'-DDD	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U	7.6 K
4,4'-DDE	3.8 U	9.6 J	4.2 U	4 U	43 J	27 U	3.9 U
4,4'-DDT	3.8 U	7 J	4.6 J	4 U	9.4	220 K	18 K
Aldrin	2 U	2.1 U	2.2 U	2.1 U	2.7 U	33 K	2 U
Aroclor-1016	38 U	42 U	42 U	40 U	52 U	270 U	39 U
Aroclor-1221	77 U	85 U	85 U	82 U	110 U	560 U	79 U
Aroclor-1232	38 U	42 U	42 U	40 U	52 U	270 U	39 U
Aroclor-1242	38 U	42 U	42 U	40 U	52 U	1000 K	39 U
Aroclor-1248	38 U	42 U	42 U	40 U	52 U	270 U	39 U
Aroclor-1254	38 U	42 U	42 U	40 U	52 U	270 U	39 U
Aroclor-1260	53	64 J	75 J	53 J	600 J	2700 K	91 K
alpha-BHC	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	2 U
beta-BHC	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	2 U
delta-BHC	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	2 U
gamma-BHC	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	2 U
alpha-Chlordane	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	2 U
gamma-Chlordane	2 U	2.1 U	2.2 U	2.1 U	2.7 U	15 K	2 U
Dieldrin	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U	3.9 U
Endosulfan I	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	2 U
Endosulfan II	4.4 J	4.2 U	4.2 U	5.7 J	5.2 U	27 U	3.9 U
Endosulfan Sulfate	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U	3.9 U
Endrin	6.3 J	4.2 U	4.2 U	4 U	5.2 U	28 K	3.9 U
Endrin Aldehyde	3.8 U	4.2 U	4.2 U	4 U	5.2 U	77 K	3.9 U
Endrin Ketone	3.8 U	4.2 U	4.5	4 U	5.2 U	87 K	3.9 U
Heptachlor	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	2 U
Heptachlor Epoxide	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	2 U
Methoxychlor	20 U	21 U	22 U	21 U	27 U	140 U	20 U
Toxaphene	200 U	210 U	220 U	210 U	270 U	1400 U	200 U

SURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-00	4-HA02-00	4-HA02-00D	4-HA03-00	4-HA04-00	4-HA05-00	4-HA06-00
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Explosives (ug/kg)							
1,3,5-Trinitrobenzene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
1,3-Dinitrobenzene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
2,4,6-Trinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
2,4-Dinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
2,6-Dinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
2-Amino-4,6-dinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
4-Amino-2,6-dinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
2-Nitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
3-Nitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
4-Nitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
HMX	500 U	500 U	500 U	450 U	450 U	500 U	480 U
Nitrobenzene	500 U	500 U	500 U	450 U	450 U	500 U	480 U
RDX	500 U	500 U	500 U	450 U	450 U	500 U	480 U
Tetryl	500 U	500 U	500 U	450 U	450 U	500 U	480 U

SURFACE SOIL - INORGANIC CONSTITUENTS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-00 11/12/1999	4-HA02-00 11/12/1999	4-HA02-00D 11/12/1999	4-HA03-00 11/12/1999	4-HA04-00 11/12/1999	4-HA05-00 11/12/1999	4-HA06-00 11/12/1999
Inorganics (mg/kg)							
Aluminum	4560 L	5810 L	7160 L	6760 L	9560 L	6260 L	6320 L
Antimony	0.49 U	0.46 U	0.55 U	0.47 U	0.67 J	12.6	0.44 UJ
Arsenic	2.9 L	2.7 L	2.6 L	3 L	4.1 L	3.5 L	2.7 L
Barium	20.3 J	36.6 J	27.1 J	25.5 J	164	68	101 J
Beryllium	0.33 B	0.64 B	0.36 B	0.35 B	0.68 B	0.65 B	0.32 B
Cadmium	0.08 U	0.07 U	0.08 U	0.07 U	0.74 J	3.3	0.34 U
Calcium	3750	1440	1110 J	8420	7320	6670	2940
Chromium	9.4	8.7	9.6	11.8	16.9	19	56.6
Cobalt	1.4 U	2.8 J	3.7 J	1.7 J	4.1 J	4.6 J	8.8 J
Copper	4.5 B	10.5	12	3.8 B	26	150	77.8 J
Cyanide	0.02 UL	0.12 L	0.13 L	0.02 UL	0.03 UL	0.11 L	0.07 L
Iron	8900 L	9840 L	8570 L	8910 L	14600 L	14300 L	61700 L
Lead	12.8	22.7	24	11.6	39.5	129	105 J
Magnesium	619 J	514 J	669 J	800 J	1110 J	2010	2140
Manganese	48.7	233	127	43.2	151	175	302 J
Mercury	0.04 J	0.31	0.36	0.09 J	0.76	0.88	0.06 J
Nickel	2.2 B	3.8 B	4.1 B	4 B	10.1 J	12.1	39.6
Potassium	789 J	283 B	366 J	928 J	798 J	1420	961 J
Selenium	0.67 U	0.63 U	0.75 U	0.64 U	1 J	0.81 U	0.6 U
Silver	2.8 B	2.6 B	3 B	2.4 B	5.2 B	5.2 B	20.6 L
Sodium	24.4 B	23.1 B	22.6 B	72.9 B	73.8 B	60.5 B	73.1 B
Thallium	0.54 UL	0.5 UL	0.6 UL	0.51 UL	0.72 UL	0.65 UL	1.1 L
Vanadium	13.9	13.9	15.1	16.6	22.2	23.5	35.7 J
Zinc	28.6 B	106	102	32.5 B	273	324	122 J

SUBSURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-02	4-HA01-02D	4-HA02-02	4-HA03-02	4-HA04-01	4-HA05-01	4-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Volatiles (ug/kg)							
1,1,1-Trichloroethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
1,1,2,2-Tetrachloroethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 UL
1,1,2-Trichloroethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
1,1-Dichloroethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
1,1-Dichloroethene	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
1,2-Dichloroethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
1,2-Dichloroethene (total)	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
1,2-Dichloropropane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
cis-1,3-Dichloropropene	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
trans-1,3-Dichloropropene	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
2-Butanone	10.93 U	2 B	8 J	14.17 U	20.41 U	13.04 U	12.75 U
2-Hexanone	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 UL
4-Methyl-2-Pentanone	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Acetone	10.93 U	3 B	43 B	14.17 U	20.41 U	13.04 U	12.75 U
Benzene	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Bromodichloromethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Bromoform	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Bromomethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Carbon Disulfide	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Carbon Tetrachloride	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Chlorobenzene	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 UL
Chloroethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Chloroform	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Chloromethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Dibromochloromethane	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Ethylbenzene	10.93 U	11.36 U	2 J	14.17 U	20.41 U	13.04 U	12.75 UL
Methylene Chloride	7 B	7 B	7 B	17 B	13 B	12 B	20 B
Styrene	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 UL
Tetrachloroethene	10.93 U	11.36 U	13.72 U	3 J	20.41 U	13.04 U	12.75 UL
Toluene	3 J	2 J	13.72 U	14.17 U	20.41 U	13.04 U	12.75 UL
Trichloroethene	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Vinyl Chloride	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 U
Xylene (Total)	10.93 U	11.36 U	13.72 U	14.17 U	20.41 U	13.04 U	12.75 UL

SUBSURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-02	4-HA01-02D	4-HA02-02	4-HA03-02	4-HA04-01	4-HA05-01	4-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Semivolatiles (ug/kg)							
1,2,4-Trichlorobenzene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
1,2-Dichlorobenzene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
1,3-Dichlorobenzene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
1,4-Dichlorobenzene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2,2'-oxybis(1-Chloropropane)	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2,4,5-Trichlorophenol	930 U	940 U	1200 U	29000 UJ	42000 UJ	11000 U	9500 U
2,4,6-Trichlorophenol	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2,4-Dichlorophenol	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2,4-Dimethylphenol	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2,4-Dinitrophenol	930 U	940 U	1200 U	29000 UJ	42000 UJ	11000 U	9500 U
2,4-Dinitrotoluene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2,6-Dinitrotoluene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2-Chloronaphthalene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2-Chlorophenol	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2-Methylnaphthalene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2-Methylphenol	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
2-Nitroaniline	930 U	940 U	1200 U	29000 UJ	42000 UJ	11000 U	9500 U
2-Nitrophenol	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
3,3'-Dichlorobenzidine	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
3-Nitroaniline	930 U	940 U	1200 U	29000 UJ	42000 UJ	11000 U	9500 U
4,6-Dinitro-2-Methylphenol	930 U	940 U	1200 U	29000 UJ	42000 UJ	11000 U	9500 U
4-Bromophenyl phenylether	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
4-Chloro-3-Methylphenol	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
4-Chloroaniline	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
4-Chlorophenyl-phenylether	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
4-Methylphenol	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
4-Nitroaniline	930 U	940 U	1200 U	29000 UJ	42000 UJ	11000 U	9500 U
4-Nitrophenol	930 U	940 U	1200 U	29000 UJ	42000 UJ	11000 U	9500 U
Acenaphthene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Acenaphthylene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Anthracene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Benzo(a)Anthracene	370 U	370 U	77 J	11000 UJ	17000 UJ	4300 U	500 J
Benzo(a)Pyrene	370 U	52 J	110 J	11000 UJ	17000 UJ	550 J	600 J

SUBSURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-02	4-HA01-02D	4-HA02-02	4-HA03-02	4-HA04-01	4-HA05-01	4-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Semivolatiles (ug/kg) (Cont)							
Benzo(b)Fluoranthene	51 J	89 J	130 J	11000 UJ	17000 UJ	510 J	490 J
Benzo(g,h,i)Perylene	43 J	44 J	79 J	11000 UJ	17000 UJ	4300 U	440 J
Benzo(k)Fluoanthene	370 U	59 J	64 J	11000 UJ	17000 UJ	490 J	760 J
Bis(2-chloroethoxy)Methane	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Bis(2-chloroethyl)Ether	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Bis(2-Ethylhexyl)Phthalate	650	530	670	63000 J	2600 B	4300 U	3800 U
Butylbenzylphthalate	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Carbazole	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Chrysene	45 J	69 J	130 J	11000 UJ	17000 UJ	4300 U	620 J
Dibenz(a,h)Anthracene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Dibenzofuran	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Diethylphthalate	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Dimethyl Phthalate	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Di-n-Butylphthalate	370 U	370 U	66 B	5700 B	90000 J	4300 U	3800 U
Di-n-Octyl Phthalate	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Fluoranthene	43 J	57 J	160 J	11000 UJ	17000 UJ	880 J	880 J
Fluorene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Hexachlorobenzene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Hexachlorobutadiene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Hexachlorocyclopentadiene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Hexachloroethane	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Indeno(1,2,3-cd)Pyrene	39 J	48 J	66 J	11000 UJ	17000 UJ	4300 U	3800 U
Isophorone	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Naphthalene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Nitrobenzene	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
N-Nitroso-Di-n-Propylamine	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
N-Nitrosodiphenylamine	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Pentachlorophenol	930 U	940 U	1200 U	29000 UJ	42000 UJ	11000 U	9500 U
Phenanthrene	370 U	370 U	100 J	11000 UJ	17000 UJ	4300 U	400 J
Phenol	370 U	370 U	480 U	11000 UJ	17000 UJ	4300 U	3800 U
Pyrene	44 J	59 J	210 J	11000 UJ	17000 UJ	930 J	670 J

SUBSURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-02	4-HA01-02D	4-HA02-02	4-HA03-02	4-HA04-01	4-HA05-01	4-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Pesticides/PCBs (ug/kg)							
4,4'-DDD	3.7 U	3.7 U	4.5 L	4.6 U	6.7 U	4.3 U	3.8 U
4,4'-DDE	3.7 U	3.7 U	5.3	4.6 U	24 J	10 J	3.8 U
4,4'-DDT	3.7 U	3.7 U	5.8	4.6 U	13 J	150 L	8.4 J
Aldrin	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	27 J	1.9 U
Aroclor-1016	37 U	37 U	48 UL	46 U	67 U	43 U	38 U
Aroclor-1221	75 U	76 U	97 UL	93 U	140 U	87 U	76 U
Aroclor-1232	37 U	37 U	48 UL	46 U	67 U	43 U	38 U
Aroclor-1242	37 U	37 U	48 UL	46 U	67 U	2300 L	38 U
Aroclor-1248	37 U	37 U	48 UL	46 U	67 U	43 U	38 U
Aroclor-1254	39	49	48 UL	46 U	67 U	43 U	38 U
Aroclor-1260	50 J	76 J	48 UL	51 K	330 J	1600 L	38 U
alpha-BHC	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 U
beta-BHC	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 U
delta-BHC	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 U
gamma-BHC	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 U
alpha-Chlordane	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	2.4 J	1.9 U
gamma-Chlordane	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	4.3 J	1.9 U
Dieldrin	3.7 U	3.7 U	4.8 UL	4.6 U	6.7 U	4.3 U	3.8 U
Endosulfan I	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 U
Endosulfan II	11 J	14 J	4.8 UL	6.5 K	6.7 U	4.3 U	3.8 U
Endosulfan Sulfate	3.7 U	3.7 U	4.8 UL	4.6 U	6.7 U	4.3 U	3.8 U
Endrin	3.7 U	3.7 U	4.8 UL	4.6 U	6.7 U	4.3 U	3.8 U
Endrin Aldehyde	3.7 U	3.7 U	4.8 UL	4.6 U	6.7 U	4.3 U	3.8 U
Endrin Ketone	3.7 U	3.7 U	4.8 UL	4.6 U	8.9 J	19 J	3.8 U
Heptachlor	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	9.9 J	1.9 U
Heptachlor Epoxide	1.9 U	1.9 U	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 U
Methoxychlor	19 U	19 U	25 UL	24 U	34 U	25 J	19 U
Toxaphene	190 U	190 U	250 UL	240 U	340 U	220 U	190 U

SUBSURFACE SOIL - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-02	4-HA01-02D	4-HA02-02	4-HA03-02	4-HA04-01	4-HA05-01	4-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Explosives (ug/kg)							
1,3,5-Trinitrobenzene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
1,3-Dinitrobenzene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
2,4,6-Trinitrotoluene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
2,4-Dinitrotoluene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
2,6-Dinitrotoluene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
2-Amino-4,6-dinitrotoluene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
4-Amino-2,6-dinitrotoluene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
2-Nitrotoluene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
3-Nitrotoluene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
4-Nitrotoluene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
HMX	500 U	500 U	500 U	450 U	450 U	450 U	480 U
Nitrobenzene	500 U	500 U	500 U	450 U	450 U	450 U	480 U
RDX	500 U	500 U	500 U	450 U	450 U	450 U	480 U
Tetryl	500 U	500 U	500 U	450 U	450 U	450 U	480 U

SUBSURFACE SOIL - INORGANIC CONSTITUENTS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-HA01-02	4-HA01-02D	4-HA02-02	4-HA03-02	4-HA04-01	4-HA05-01	4-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999
Inorganics (mg/kg)							
Aluminum	8440 L	7450 L	3670 L	9660 L	7520 L	5850 L	3550 L
Antimony	0.46 U	0.44 U	0.53 U	0.53 U	0.69 U	1.1	1.1
Arsenic	2.7 L	2.2 L	1.8 L	2.9 L	3.9 L	3.7 L	4.2 L
Barium	34.2 J	29.5 J	20.2 J	48 J	247	30.6 J	33.2 J
Beryllium	0.47 B	0.38 B	0.31 B	0.39 B	0.4 B	0.55 B	0.35 B
Cadmium	0.07 U	0.07 U	0.08 U	0.08 U	0.96 J	1.2 J	0.15 U
Calcium	2940	3140	478 J	4060	5970	3240	2460
Chromium	11.5	12	6.9	15.9	13.4	17.4	29.2
Cobalt	1.9 J	2 J	1.6 J	4.3 J	3.8 J	2.8 J	3.6 J
Copper	9	4.6 B	4.4 B	40.4	30	30.1	19.4
Cyanide	0.02 UL	0.02 UL	0.03 UL	0.03 UL	0.44 L	0.03 UL	0.02 UL
Iron	8260 L	8660 L	4960 L	19300 L	12100 L	12700 L	28000 L
Lead	15.8	14.5	11.3	45.3	42.3	36.2	29.7
Magnesium	606 J	538 J	327 J	499 J	812 J	1310 J	1730
Manganese	49.1	71.3	28.3	120	105	40.4	114
Mercury	0.08 J	0.09 J	0.1 J	0.91	0.9	0.44	0.05 J
Nickel	3.4 B	3.2 B	3.5 B	17.3	13.6	7.7 B	20.4
Potassium	640 J	554 J	249 B	566 J	531 J	1700	920
Selenium	0.62 U	0.6 U	0.78 J	0.72 U	0.94 U	0.79 U	0.66 U
Silver	2.3 B	2.9 B	1.6 B	5.8 B	3.9 B	3.7 B	8.5 L
Sodium	36.8 B	22.3 B	11.6 B	37.4 B	57.1 B	48.7 B	31 B
Thallium	0.5 UL	0.48 UL	0.58 UL	0.58 UL	0.75 UL	0.63 UL	0.53 UL
Vanadium	16.2	17.8	10.1 B	12.2	17.1	20.5	20.8
Zinc	643	198	28.6 B	334	373	150	236

SEDIMENT - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
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	4-SD02-00	4-SD02-01	4-SD03-00	4-SD03-01	4-SD04-00	4-SD04-00D	4-SD04-01	4-SED01-00	4-SED01-01
	11/14/1999	11/14/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/12/1999	11/12/1999
Volatiles (ug/kg)									
1,1,1-Trichloroethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
1,1,2,2-Tetrachloroethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
1,1,2-Trichloroethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
1,1-Dichloroethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
1,1-Dichloroethene	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
1,2-Dichloroethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
1,2-Dichloroethene (total)	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
1,2-Dichloropropane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
cis-1,3-Dichloropropene	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
trans-1,3-Dichloropropene	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
2-Butanone	15 B	14.88 U	17.53 U	13.89 U	10 B	12 B	15.98 U	12 J	7 B
2-Hexanone	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
4-Methyl-2-Pentanone	20.49 UL	14.88 U	17.53 U	2 J	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Acetone	44 B	27 B	17 B	24 B	23 B	36 B	22 B	37 B	26 B
Benzene	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Bromodichloromethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Bromoform	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Bromomethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Carbon Disulfide	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Carbon Tetrachloride	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Chlorobenzene	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Chloroethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Chloroform	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Chloromethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Dibromochloromethane	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Ethylbenzene	20.49 UL	14.88 U	17.53 U	13.89 U	3 J	26.4 U	15.98 U	2 J	16.9 U
Methylene Chloride	18 B	16 B	39 B	36 B	12 B	15 B	36 B	24 B	21 B
Styrene	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Tetrachloroethene	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Toluene	3 L	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Trichloroethene	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Vinyl Chloride	20.49 UL	14.88 U	17.53 U	13.89 U	19.85 U	26.4 U	15.98 U	15.81 U	16.9 U
Xylene (Total)	20.49 UL	14.88 U	17.53 U	13.89 U	10 J	26.4 U	15.98 U	15.81 U	16.9 U

SEDIMENT - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
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	4-SD02-00	4-SD02-01	4-SD03-00	4-SD03-01	4-SD04-00	4-SD04-00D	4-SD04-01	4-SED01-00	4-SED01-01
	11/14/1999	11/14/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/12/1999	11/12/1999
Semivolatiles (ug/kg)									
1,2,4-Trichlorobenzene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
1,2-Dichlorobenzene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
1,3-Dichlorobenzene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
1,4-Dichlorobenzene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2,2'-oxybis(1-Chloropropan	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2,4,5-Trichlorophenol	3100 U	1200 U	1300 U	1000 U	3000 U	4000 U	1200 U	1400 U	1500 U
2,4,6-Trichlorophenol	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2,4-Dichlorophenol	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2,4-Dimethylphenol	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2,4-Dinitrophenol	3100 U	1200 U	1300 U	1000 U	3000 U	4000 U	1200 U	1400 U	1500 U
2,4-Dinitrotoluene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2,6-Dinitrotoluene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2-Chloronaphthalene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2-Chlorophenol	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2-Methylnaphthalene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2-Methylphenol	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
2-Nitroaniline	3100 U	1200 U	1300 U	1000 U	3000 U	4000 U	1200 U	1400 U	1500 U
2-Nitrophenol	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
3,3'-Dichlorobenzidine	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
3-Nitroaniline	3100 U	1200 U	1300 U	1000 U	3000 U	4000 U	1200 U	1400 U	1500 U
4,6-Dinitro-2-Methylphenol	3100 U	1200 U	1300 U	1000 U	3000 U	4000 U	1200 U	1400 U	1500 U
4-Bromophenyl phenylether	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
4-Chloro-3-Methylphenol	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
4-Chloroaniline	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
4-Chlorophenyl-phenylether	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
4-Methylphenol	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
4-Nitroaniline	3100 U	1200 U	1300 U	1000 U	3000 U	4000 U	1200 U	1400 U	1500 U
4-Nitrophenol	3100 U	1200 U	1300 U	1000 U	3000 U	4000 U	1200 U	1400 U	1500 U
Acenaphthene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Acenaphthylene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Anthracene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Benzo(a)Anthracene	260 J	230 J	170 J	410 U	290 J	270 J	110 J	140 J	150 J
Benzo(a)Pyrene	260 J	240 J	170 J	410 U	330 J	340 J	130 J	160 J	110 J

SEDIMENT - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
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	4-SD02-00	4-SD02-01	4-SD03-00	4-SD03-01	4-SD04-00	4-SD04-00D	4-SD04-01	4-SED01-00	4-SED01-01
	11/14/1999	11/14/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/12/1999	11/12/1999
Semivolatiles (ug/kg) (Cont)									
Benzo(b)Fluoranthene	370 J	330 J	330 J	57 J	450 J	550 J	210 J	220 J	100 J
Benzo(g,h,i)Perylene	130 J	100 J	84 J	410 U	1200 U	180 J	60 J	56 J	600 U
Benzo(k)Fluoanthene	290 J	280 J	170 J	410 U	420 J	440 J	130 J	120 J	86 J
Bis(2-chloroethoxy)Methane	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Bis(2-chloroethyl)Ether	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Bis(2-Ethylhexyl)Phthalate	170 J	79 J	160 J	68 J	140 J	280 J	78 J	110 J	120 J
Butylbenzylphthalate	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Carbazole	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Chrysene	400 J	330 J	240 J	52 J	460 J	490 J	160 J	190 J	180 J
Dibenz(a,h)Anthracene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Dibenzofuran	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Diethylphthalate	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Dimethyl Phthalate	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Di-n-Butylphthalate	1200 U	62 J	81 J	410 U	1200 U	1600 U	84 J	64 J	61 J
Di-n-Octyl Phthalate	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Fluoranthene	640 J	520	410 J	87 J	600 J	580 J	250 J	260 J	230 J
Fluorene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Hexachlorobenzene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Hexachlorobutadiene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Hexachlorocyclopentadiene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Hexachloroethane	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Indeno(1,2,3-cd)Pyrene	160 J	120 J	95 J	410 U	1200 U	210 J	64 J	550 U	600 U
Isophorone	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Naphthalene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Nitrobenzene	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
N-Nitroso-Di-n-Propylamine	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
N-Nitrosodiphenylamine	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Pentachlorophenol	3100 U	1200 U	1300 U	1000 U	3000 U	4000 U	1200 U	1400 U	1500 U
Phenanthrene	330 J	240 J	210 J	410 U	340 J	330 J	140 J	120 J	100 J
Phenol	1200 U	470 U	530 U	410 U	1200 U	1600 U	490 U	550 U	600 U
Pyrene	570 J	470	350 J	84 J	610 J	590 J	250 J	230 J	250 J

SEDIMENT - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
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	4-SD02-00	4-SD02-01	4-SD03-00	4-SD03-01	4-SD04-00	4-SD04-00D	4-SD04-01	4-SED01-00	4-SED01-01
	11/14/1999	11/14/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/12/1999	11/12/1999
Pesticides/PCBs (ug/kg)									
4,4'-DDD	6 UL	4.6 U	5.2 U	4.1 U	6 UL	7.8 UL	4.9 UL	5.5 U	6 U
4,4'-DDE	6 UL	4.6 U	5.2 U	4.1 U	9 L	7.8 UL	4.9 UL	5.5 U	6.6
4,4'-DDT	6 UL	49 J	5.2 U	400	6 UL	7.8 UL	4.9 UL	5.5 U	6 U
Aldrin	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
Aroclor-1016	60 UL	46 U	52 U	41 U	60 UL	78 UL	49 UL	55 U	60 U
Aroclor-1221	120 UL	94 U	110 U	82 U	120 UL	160 UL	99 UL	110 U	120 U
Aroclor-1232	60 UL	46 U	52 U	41 U	60 UL	78 UL	49 UL	55 U	60 U
Aroclor-1242	60 UL	46 U	52 U	41 U	60 UL	78 UL	49 UL	55 U	60 U
Aroclor-1248	60 UL	33 J	52 U	41 U	19 L	78 UL	49 UL	55 U	60 U
Aroclor-1254	60 UL	46 U	52 U	41 U	60 UL	78 UL	49 UL	55 U	60 U
Aroclor-1260	91 L	210	52 U	170	240 L	25	18	270 K	60 U
alpha-BHC	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
beta-BHC	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
delta-BHC	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
gamma-BHC	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
alpha-Chlordane	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
gamma-Chlordane	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
Dieldrin	6 UL	4.6 U	5.2 U	4.1 U	6 UL	7.8 UL	4.9 UL	5.5 U	6 U
Endosulfan I	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
Endosulfan II	6 UL	4.6 U	5.2 U	4.1 U	6 UL	7.8 UL	4.9 UL	5.5 U	6 U
Endosulfan Sulfate	6 UL	4.6 U	5.2 U	4.1 U	6 UL	7.8 UL	4.9 UL	5.5 U	6 U
Endrin	6 UL	4.6 U	5.2 U	4.1 U	6 UL	7.8 UL	4.9 UL	5.5 U	6 U
Endrin Aldehyde	6 UL	4.6 U	5.2 U	4.1 U	6 UL	7.8 UL	4.9 UL	5.5 U	6 U
Endrin Ketone	6 UL	4.6 U	5.2 U	4.1 U	6 UL	7.8 UL	4.9 UL	5.5 U	6 U
Heptachlor	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
Heptachlor Epoxide	3.1 UL	2.4 U	2.7 U	2.1 U	3.1 UL	4 UL	2.5 UL	2.8 U	3.1 U
Methoxychlor	31 UL	24 U	27 U	21 U	31 UL	40 UL	25 UL	28 U	31 U
Toxaphene	310 UL	240 U	270 U	210 U	310 UL	400 UL	250 UL	280 U	310 U

SEDIMENT - ORGANIC COMPOUNDS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
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	4-SD02-00	4-SD02-01	4-SD03-00	4-SD03-01	4-SD04-00	4-SD04-00D	4-SD04-01	4-SED01-00	4-SED01-01
	11/14/1999	11/14/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/12/1999	11/12/1999
Explosives (ug/kg)									
1,3,5-Trinitrobenzene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
1,3-Dinitrobenzene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
2,4,6-Trinitrotoluene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
2,4-Dinitrotoluene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
2,6-Dinitrotoluene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
2-Amino-4,6-dinitrotoluene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
4-Amino-2,6-dinitrotoluene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
2-Nitrotoluene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
3-Nitrotoluene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
4-Nitrotoluene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
HMX	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
Nitrobenzene	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
RDX	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U
Tetryl	480 U	430 U	480 U	450 U	480 U	500 U	450 U	480 U	430 U

SEDIMENT - INORGANIC CONSTITUENTS
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	4-SD02-00	4-SD02-01	4-SD03-00	4-SD03-01	4-SD04-00	4-SD04-00D	4-SD04-01	4-SED01-00	4-SED01-01
	11/14/1999	11/14/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/13/1999	11/12/1999	11/12/1999
Inorganics (mg/kg)									
Aluminum	6070 L	2780 L	5950 L	1500 L	4210 L	4070 L	3370 L	8340 L	5120 L
Antimony	0.67 U	0.48 U	0.62 U	0.43 U	0.65 U	0.65 U	0.55 U	1.7 B	1 J
Arsenic	4.5	1.9 J	3.2	0.98 J	8.8	7.2	9.5	12.2 L	11.2
Barium	27.1 J	9.9 B	24.9 J	6.4 B	27.5 J	23.6 J	19.2 J	71.7 J	39.2 J
Beryllium	0.56 J	0.27 J	0.6 J	0.21 J	0.36 J	0.22 J	0.31 J	0.73 B	0.49 B
Cadmium	3.2	0.15 J	2.9	0.85 J	0.79 J	0.52 J	0.09 J	5.7	7.2
Calcium	4550 J	1670 J	3380 J	1360 J	4310 J	3400 J	15200 J	25200	7010
Chromium	17.9	9.3	17.2	7.7	9.5	7.7	7	35.8	25
Cobalt	3.9 J	1.3 U	2.9 J	1.2 U	1.8 U	1.8 U	1.5 U	4.6 J	3.1 J
Copper	62.7 J	3.8 B	65.3 J	7.3 B	33.5 J	21.2 J	5.1 B	30.7	10.1
Cyanide	0.04 UL	0.03 UL	0.03 UL	0.02 UL	0.04 UL	0.04 UL	0.03 UL	0.04 UL	0.04 UL
Iron	14300 L	7840 L	14100	4540 L	9410 L	8490 L	4950 L	15400	9040
Lead	24.6	4.2	20.3	5.4	20.6	16	10.9	52.3	59.8
Magnesium	1730	859 J	1780	597 J	1070 J	912 J	410 J	2790	2000
Manganese	93.4	14.5	74.9	12.1	72.7	60	36	62	26.8
Mercury	0.04 UL	0.02 UL	0.03 UL	0.03 UL	0.04 UL	0.04 L	0.03 UL	0.07 J	0.04 U
Nickel	7.9 J	1.7 J	7.3 J	2 J	5 J	4.5 J	2.3 J	23.6	18.3
Potassium	1290 J	1440	1550	911 J	352 B	368 B	272 B	1210 J	673 J
Selenium	0.91 U	0.65 U	0.84 U	0.59 U	0.89 U	0.88 U	0.75 U	1.1 U	1 U
Silver	5.1 B	2.3 B	3.9 B	1.5 B	2.8 B	2 B	0.97 U	5.6 B	2.1 B
Sodium	118 B	57 J	101 B	59.2 B	73.6 B	80.3 B	64.3 B	191 B	65.2 B
Thallium	0.73 UL	0.52 UL	0.67 UL	0.47 UL	0.71 UL	0.71 UL	0.6 UL	0.91 UL	0.81 UL
Vanadium	21.9	9.6 J	21.1	6.8 J	15.1	13.2 J	9.8 J	36.6	25.4
Zinc	145	30.2 B	130	44.4 B	228	180	307	147	87.6 B

Site 4 – Medical Supplies Disposal Area

SURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	A1-HA01-00	A1-HA02-00	A1-HA03-00	A1-HA04-00	A1-HA05-00	A1-HA05-00D	A1-HA06-00
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/14/1999
Volatiles (ug/kg)							
1,1,1-Trichloroethane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
1,1,2,2-Tetrachloroethane	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
1,1,2-Trichloroethane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
1,1-Dichloroethane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
1,1-Dichloroethene	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	4 J	14.15 UL
1,2-Dichloroethane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
1,2-Dichloroethene (total)	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
1,2-Dichloropropane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
cis-1,3-Dichloropropene	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
trans-1,3-Dichloropropene	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
2-Butanone	20.07 U	15.22 UL	18.18 U	15.64 U	4 B	3 B	5
2-Hexanone	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
4-Methyl-2-Pentanone	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Acetone	20.07 U	15.22 UL	6 B	15.64 U	16.87 U	20.13 U	9 B
Benzene	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	4 J	14.15 UL
Bromodichloromethane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Bromoform	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Bromomethane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Carbon Disulfide	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Carbon Tetrachloride	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Chlorobenzene	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	5 J	14.15 UL
Chloroethane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Chloroform	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Chloromethane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Dibromochloromethane	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Ethylbenzene	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Methylene Chloride	20.07 U	7 B	34 B	8 B	16.87 U	20.13 U	9 B
Styrene	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Tetrachloroethene	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Toluene	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	5 J	14.15 UL
Trichloroethene	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	4 J	14.15 UL
Vinyl Chloride	20.07 U	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL
Xylene (Total)	20.07 UL	15.22 UL	18.18 U	15.64 U	16.87 U	20.13 U	14.15 UL

SURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	A1-HA01-00 11/12/1999	A1-HA02-00 11/12/1999	A1-HA03-00 11/12/1999	A1-HA04-00 11/12/1999	A1-HA05-00 11/12/1999	A1-HA05-00D 11/12/1999	A1-HA06-00 11/14/1999
Semivolatiles (ug/kg)							
1,2,4-Trichlorobenzene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
1,2-Dichlorobenzene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
1,3-Dichlorobenzene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
1,4-Dichlorobenzene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2,2'-oxybis(1-Chloropropan	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2,4,5-Trichlorophenol	1600 UL	1100 U	1500 U	1200 U	1500 U	1500 U	1100 U
2,4,6-Trichlorophenol	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2,4-Dichlorophenol	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2,4-Dimethylphenol	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2,4-Dinitrophenol	1600 UL	1100 U	1500 U	1200 U	1500 U	1500 U	1100 U
2,4-Dinitrotoluene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2,6-Dinitrotoluene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2-Chloronaphthalene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2-Chlorophenol	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2-Methylnaphthalene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2-Methylphenol	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
2-Nitroaniline	1600 UL	1100 U	1500 U	1200 U	1500 U	1500 U	1100 U
2-Nitrophenol	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
3,3'-Dichlorobenzidine	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
3-Nitroaniline	1600 UL	1100 U	1500 U	1200 U	1500 U	1500 U	1100 U
4,6-Dinitro-2-Methylphenol	1600 UL	1100 U	1500 U	1200 U	1500 U	1500 U	1100 U
4-Bromophenyl phenylether	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
4-Chloro-3-Methylphenol	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
4-Chloroaniline	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
4-Chlorophenyl-phenylether	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
4-Methylphenol	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
4-Nitroaniline	1600 UL	1100 U	1500 U	1200 U	1500 U	1500 U	1100 U
4-Nitrophenol	1600 UL	1100 UJ	1500 UJ	1200 UJ	1500 UJ	1500 UJ	1100 U
Acenaphthene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Acenaphthylene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Anthracene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Benzo(a)Anthracene	280	65 J	600 U	490 U	580 U	610 U	450 U
Benzo(a)Pyr...	870	92 J	600 U	490 U	580 U	610 U	450 U

SURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
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NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-HA01-00	A1-HA02-00	A1-HA03-00	A1-HA04-00	A1-HA05-00	A1-HA05-00D	A1-HA06-00
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/14/1999
Semivolatiles (ug/kg) (Cont)							
Benzo(b)Fluoranthene	1700	110 J	600 U	490 U	66 J	87 J	450 U
Benzo(g,h,i)Perylene	970	78 J	600 U	490 U	580 U	610 U	450 U
Benzo(k)Fluoanthene	970	96 J	600 U	490 U	580 U	610 U	450 U
Bis(2-chloroethoxy)Methane	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Bis(2-chloroethyl)Ether	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Bis(2-Ethylhexyl)Phthalate	620 UL	450 U	1800	12000 J	69 J	88 J	47 J
Butylbenzylphthalate	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Carbazole	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Chrysene	830	92 J	600 U	490 U	67 J	73 J	450 U
Dibenz(a,h)Anthracene	350	450 U	600 U	490 U	580 U	610 U	450 U
Dibenzofuran	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Diethylphthalate	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Dimethyl Phthalate	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Di-n-Butylphthalate	620 UL	72 J	130 J	100 J	78 J	170 J	110 J
Di-n-Octyl Phthalate	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Fluoranthene	250	150 J	600 U	490 U	61 J	610 U	450 U
Fluorene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Hexachlorobenzene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Hexachlorobutadiene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Hexachlorocyclopentadiene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Hexachloroethane	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Indeno(1,2,3-cd)Pyrene	810	74 J	600 U	490 U	580 U	610 U	450 U
Isophorone	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Naphthalene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Nitrobenzene	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
N-Nitroso-Di-n-Propylamine	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
N-Nitrosodiphenylamine	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Pentachlorophenol	1600 UL	1100 U	1500 U	1200 U	1500 U	1500 U	1100 U
Phenanthrene	78	71 J	600 U	490 U	580 U	610 U	450 U
Phenol	620 UL	450 U	600 U	490 U	580 U	610 U	450 U
Pyrene	360	100 J	600 U	490 U	65 J	610 U	450 U

SURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-HA01-00 11/12/1999	A1-HA02-00 11/12/1999	A1-HA03-00 11/12/1999	A1-HA04-00 11/12/1999	A1-HA05-00 11/12/1999	A1-HA05-00D 11/12/1999	A1-HA06-00 11/14/1999
Pesticides/PCBs (ug/kg)							
4,4'-DDD	6.2 UL	4.5 U	6 U	4.8 UL	5.7 UL	6.1 U	4.5 U
4,4'-DDE	18	4.5 U	6 U	1.5 L	5.7 UL	6.1 U	4.5 U
4,4'-DDT	15	4.5 U	6 U	120	5.7 UL	6.1 U	4.5 U
Aldrin	3.2 UL	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
Aroclor-1016	62 UL	45 U	60 U	48 UL	57 UL	61 U	45 U
Aroclor-1221	130 UL	92 U	120 U	98 UL	120 UL	120 U	92 U
Aroclor-1232	62 UL	45 U	60 U	48 UL	57 UL	61 U	45 U
Aroclor-1242	62 UL	45 U	60 U	48 UL	57 UL	61 U	45 U
Aroclor-1248	62 UL	45 U	60 U	48 UL	57 UL	61 U	45 U
Aroclor-1254	62 UL	45 U	60 U	48 UL	57 UL	61 U	45 U
Aroclor-1260	62 UL	45 U	60 U	220 L	57 UL	61 U	45 U
alpha-BHC	3.2 UL	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
beta-BHC	3.2 UL	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
delta-BHC	3.2 UL	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
gamma-BHC	3.2 UL	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
alpha-Chlordane	4.3	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
gamma-Chlordane	3.2 UL	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
Dieldrin	6.2 UL	4.5 U	6 U	4.8 UL	5.7 UL	6.1 U	4.5 U
Endosulfan I	3.2 UL	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
Endosulfan II	6.2 UL	4.5 U	6 U	4.8 UL	5.7 UL	6.1 U	4.5 U
Endosulfan Sulfate	14	4.5 U	6 U	4.8 UL	5.7 UL	6.1 U	4.5 U
Endrin	6.2 UL	4.5 U	6 U	4.8 UL	5.7 UL	6.1 U	4.5 U
Endrin Aldehyde	6.2 UL	4.5 U	6 U	4.8 UL	5.7 UL	6.1 U	4.5 U
Endrin Ketone	6.2 UL	4.5 U	6 U	4.8 UL	5.7 UL	6.1 U	4.5 U
Heptachlor	3.2 UL	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
Heptachlor Epoxide	3.2 UL	2.3 U	3.1 U	2.5 UL	2.9 UL	3.1 U	2.3 U
Methoxychlor	32 UL	23 U	31 U	25 UL	29 UL	31 U	23 U
Toxaphene	320 UL	230 U	310 U	250 UL	290 UL	310 U	230 U

SURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
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	A1-HA01-00 11/12/1999	A1-HA02-00 11/12/1999	A1-HA03-00 11/12/1999	A1-HA04-00 11/12/1999	A1-HA05-00 11/12/1999	A1-HA05-00D 11/12/1999	A1-HA06-00 11/14/1999
Explosives (ug/kg)							
1,3,5-Trinitrobenzene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
1,3-Dinitrobenzene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
2,4,6-Trinitrotoluene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
2,4-Dinitrotoluene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
2,6-Dinitrotoluene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
2-Amino-4,6-dinitrotoluene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
4-Amino-2,6-dinitrotoluene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
2-Nitrotoluene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
3-Nitrotoluene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
4-Nitrotoluene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
HMX	480 U	480 U	500 U	420 U	480 U	430 U	430 U
Nitrobenzene	480 U	480 U	500 U	420 U	480 U	430 U	430 U
RDX	480 U	480 U	500 U	420 U	480 U	430 U	430 U
Tetryl	480 U	480 U	500 U	420 U	480 U	430 U	430 U

SURFACE SOIL - INORGANIC CONSTITUENTS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	A1-HA01-00	A1-HA02-00	A1-HA03-00	A1-HA04-00	A1-HA05-00	A1-HA05-00D	A1-HA06-00
	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/14/1999
Inorganics (mg/kg)							
Aluminum	9030 L	5620 L	8410 L	8400 L	3570 L	5200 L	6020 L
Antimony	2.5 B	1.3 B	1.4 B	13.9 U	5.7 J	5.9 J	0.53 U
Arsenic	23.5	2.3 U	7.6	2.4	1.4 J	1.8 J	1.7 J
Barium	151	147	116	70.3	91.6	94.9	38.2 J
Beryllium	0.75 B	0.48 B	0.84 B	0.58 B	0.44 B	0.39 B	0.16 U
Cadmium	0.89 J	2.3 U	1.4 U	1.2 U	1.5 U	1.3 U	0.52 J
Calcium	17900	11900	35900	8770	10600	11100	4480
Chromium	44.7	12.3	13	10	10.3	10.9	7.2
Cobalt	5.3 J	4.4 J	9.9 J	3.1 J	4.8 J	4.1 J	1.5 U
Copper	17.4	13.1	11.3 B	19.4	88.5	65	3.2 J
Cyanide	0.9 UL	0.08 J	0.9 UL	0.7 UL	0.2 J	0.2 J	0.03 UL
Iron	17300 L	35200 L	11200 L	12200 L	34900 L	29900 L	8050
Lead	194	86.3	46.2	35.2	493	501	16.2
Magnesium	1980	913 J	1390 J	1350	724 J	861 J	380 J
Manganese	523	291	481	460	375	389	122
Mercury	0.13 J	0.05 J	0.08 J	0.08 J	0.05 J	0.05 J	0.03 UL
Nickel	8.7 J	7.7 J	7.2 J	5.1 J	7 J	8.8 J	3.4 B
Potassium	652 J	622 J	579 J	385 B	308 B	383 B	250 B
Selenium	1.5 U	1.2 U	1.4 U	1.2 U	1.5 U	1.3 U	0.72 U
Silver	4.3 B	9.3 B	3 B	2.2 B	8.6 B	7.6 B	1.4 B
Sodium	43.3 B	34.2 B	82.6 B	39.2 B	26.1 B	37.7 B	33.4 B
Thallium	3 UL	0.71 B	2.9 UL	2.3 UL	3 UL	2.7 UL	0.68 B
Vanadium	26	18.8	21.6	15.5	15.4	17.1	14.6
Zinc	849	110	132	59 B	292	250	293

SUBSURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-HA02-02	A1-HA03-02	A1-HA04-02	A1-HA05-01	A1-HA05-01D	A1-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/14/1999	11/14/1999	11/14/1999
Volatiles (ug/kg)						
1,1,1-Trichloroethane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
1,1,2,2-Tetrachloroethane	11.76 U	12.5 U	11.49 U	18.58 UL	18.13 UL	13.26 U
1,1,2-Trichloroethane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
1,1-Dichloroethane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
1,1-Dichloroethene	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
1,2-Dichloroethane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
1,2-Dichloroethene (total)	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
1,2-Dichloropropane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
cis-1,3-Dichloropropene	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
trans-1,3-Dichloropropene	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
2-Butanone	2 B	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
2-Hexanone	11.76 U	12.5 U	11.49 U	18.58 UL	18.13 UL	13.26 U
4-Methyl-2-Pentanone	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Acetone	8 B	9 B	12 B	14 B	18.13 U	13.26 U
Benzene	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Bromodichloromethane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Bromoform	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Bromomethane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Carbon Disulfide	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Carbon Tetrachloride	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Chlorobenzene	11.76 U	12.5 U	11.49 U	18.58 UL	18.13 UL	13.26 U
Chloroethane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Chloroform	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Chloromethane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Dibromochloromethane	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Ethylbenzene	11.76 U	12.5 U	11.49 U	18.58 UL	18.13 UL	13.26 U
Methylene Chloride	22 B	15 B	15 B	17 B	16 B	8 B
Styrene	11.76 U	12.5 U	11.49 U	18.58 UL	18.13 UL	13.26 U
Tetrachloroethene	11.76 U	12.5 U	11.49 U	18.58 UL	18.13 UL	13.26 U
Toluene	11.76 U	12.5 U	11.49 U	18.58 UL	18.13 UL	13.26 U
Trichloroethene	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Vinyl Chloride	11.76 U	12.5 U	11.49 U	18.58 U	18.13 U	13.26 U
Xylene (Total)	11.76 U	12.5 U	11.49 U	2	3	13.26 U

SUBSURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
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	A1-HA02-02	A1-HA03-02	A1-HA04-02	A1-HA05-01	A1-HA05-01D	A1-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/14/1999	11/14/1999	11/14/1999
Semivolatiles (ug/kg)						
1,2,4-Trichlorobenzene	390 U	410 U	380 U	570 U	540 U	400 U
1,2-Dichlorobenzene	390 U	410 U	380 U	570 U	540 U	400 U
1,3-Dichlorobenzene	390 U	410 U	380 U	570 U	540 U	400 U
1,4-Dichlorobenzene	390 U	410 U	380 U	570 U	540 U	400 U
2,2'-oxybis(1-Chloropropan	390 U	410 U	380 U	570 U	540 U	400 U
2,4,5-Trichlorophenol	970 U	1000 U	950 U	1400 U	1400 U	1000 U
2,4,6-Trichlorophenol	390 U	410 U	380 U	570 U	540 U	400 U
2,4-Dichlorophenol	390 U	410 U	380 U	570 U	540 U	400 U
2,4-Dimethylphenol	390 U	410 U	380 U	570 U	540 U	400 U
2,4-Dinitrophenol	970 U	1000 U	950 U	1400 U	1400 U	1000 U
2,4-Dinitrotoluene	390 U	410 U	380 U	570 U	540 U	400 U
2,6-Dinitrotoluene	390 U	410 U	380 U	570 U	540 U	400 U
2-Chloronaphthalene	390 U	410 U	380 U	570 U	540 U	400 U
2-Chlorophenol	390 U	410 U	380 U	570 U	540 U	400 U
2-Methylnaphthalene	390 U	410 U	380 U	570 U	540 U	400 U
2-Methylphenol	390 U	410 U	380 U	570 U	540 U	400 U
2-Nitroaniline	970 U	1000 U	950 U	1400 U	1400 U	1000 U
2-Nitrophenol	390 U	410 U	380 U	570 U	540 U	400 U
3,3'-Dichlorobenzidine	390 U	410 U	380 U	570 U	540 U	400 U
3-Nitroaniline	970 U	1000 U	950 U	1400 U	1400 U	1000 U
4,6-Dinitro-2-Methylphenol	970 U	1000 U	950 U	1400 U	1400 U	1000 U
4-Bromophenyl phenylether	390 U	410 U	380 U	570 U	540 U	400 U
4-Chloro-3-Methylphenol	390 U	410 U	380 U	570 U	540 U	400 U
4-Chloroaniline	390 U	410 U	380 U	570 U	540 U	400 U
4-Chlorophenyl-phenylether	390 U	410 U	380 U	570 U	540 U	400 U
4-Methylphenol	390 U	410 U	380 U	570 U	540 U	400 U
4-Nitroaniline	970 U	1000 U	950 U	1400 U	1400 U	1000 U
4-Nitrophenol	970 U	1000 U	950 UJ	1400 U	1400 U	1000 U
Acenaphthene	390 U	410 U	380 U	570 U	540 U	400 U
Acenaphthylene	390 U	410 U	380 U	570 U	540 U	400 U
Anthracene	390 U	410 U	380 U	570 U	540 U	400 U
Benzo(a)Anthracene	390 U	410 U	380 U	570 U	64 J	400 U
Benzo(a)Pyr[illegible]	390 U	410 U	380 U	570 U	59 J	400 U

SUBSURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
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	A1-HA02-02 11/12/1999	A1-HA03-02 11/12/1999	A1-HA04-02 11/12/1999	A1-HA05-01 11/14/1999	A1-HA05-01D 11/14/1999	A1-HA06-02 11/14/1999
Semivolatiles (ug/kg) (Cont)						
Benzo(b)Fluoranthene	390 U	410 U	380 U	79 J	88 J	400 U
Benzo(g,h,i)Perylene	390 U	410 U	380 U	570 U	71 J	400 U
Benzo(k)Fluoanthene	390 U	410 U	380 U	74 J	65 J	400 U
Bis(2-chloroethoxy)Methane	390 U	410 U	380 U	570 U	540 U	400 U
Bis(2-chloroethyl)Ether	390 U	410 U	380 U	570 U	540 U	400 U
Bis(2-Ethylhexyl)Phthalate	76 J	54 J	46 J	570 U	540 U	400 U
Butylbenzylphthalate	390 U	410 U	380 U	570 U	540 U	400 U
Carbazole	390 U	410 U	380 U	570 U	540 U	400 U
Chrysene	390 U	410 U	380 U	83 J	81 J	400 U
Dibenz(a,h)Anthracene	390 U	410 U	380 U	570 U	540 U	400 U
Dibenzofuran	390 U	410 U	380 U	570 U	540 U	400 U
Diethylphthalate	390 U	410 U	380 U	570 U	540 U	400 U
Dimethyl Phthalate	390 U	410 U	380 U	570 U	540 U	400 U
Di-n-Butylphthalate	49 J	52 J	79 J	110 J	110 J	73 J
Di-n-Octyl Phthalate	390 U	410 U	380 U	570 U	540 U	400 U
Fluoranthene	390 U	410 U	380 U	100 J	140 J	400 U
Fluorene	390 U	410 U	380 U	570 U	540 U	400 U
Hexachlorobenzene	390 U	410 U	380 U	570 U	540 U	400 U
Hexachlorobutadiene	390 U	410 U	380 U	570 U	540 U	400 U
Hexachlorocyclopentadiene	390 U	410 U	380 U	570 U	540 U	400 U
Hexachloroethane	390 U	410 U	380 U	570 U	540 U	400 U
Indeno(1,2,3-cd)Pyrene	390 U	410 U	380 U	570 U	55 J	400 U
Isophorone	390 U	410 U	380 U	570 U	540 U	400 U
Naphthalene	390 U	410 U	380 U	570 U	540 U	400 U
Nitrobenzene	390 U	410 U	380 U	570 U	540 U	400 U
N-Nitroso-Di-n-Propylamine	390 U	410 U	380 U	570 U	540 U	400 U
N-Nitrosodiphenylamine	390 U	410 U	380 U	570 U	540 U	400 U
Pentachlorophenol	970 U	1000 U	950 U	1400 U	1400 U	1000 U
Phenanthrene	390 U	410 U	380 U	570 U	97 J	400 U
Phenol	390 U	410 U	380 U	570 U	540 U	400 U
Pyrene	390 U	410 U	380 U	78 J	110 J	400 U

SUBSURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
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	A1-HA02-02	A1-HA03-02	A1-HA04-02	A1-HA05-01	A1-HA05-01D	A1-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/14/1999	11/14/1999	11/14/1999
Pesticides/PCBs (ug/kg)						
4,4'-DDD	3.9 UL	4.1 U	3.8 UL	5.6 U	5.2 U	4 UL
4,4'-DDE	3.9 UL	4.1 U	3.8 UL	5.6 U	5.2 U	4 UL
4,4'-DDT	3.9 UL	4.1 U	3.8 UL	5.6 U	5.2 U	4 UL
Aldrin	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
Aroclor-1016	39 UL	41 U	38 UL	56 U	52 U	40 UL
Aroclor-1221	79 UL	83 U	76 UL	110 U	110 U	81 UL
Aroclor-1232	39 UL	41 U	38 UL	56 U	52 U	40 UL
Aroclor-1242	39 UL	41 U	38 UL	56 U	52 U	40 UL
Aroclor-1248	39 UL	41 U	38 UL	56 U	52 U	40 UL
Aroclor-1254	39 UL	41 U	38 UL	56 U	52 U	40 UL
Aroclor-1260	39 UL	41 U	38 UL	56 U	52 U	40 UL
alpha-BHC	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
beta-BHC	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
delta-BHC	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
gamma-BHC	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
alpha-Chlordane	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
gamma-Chlordane	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
Dieldrin	3.9 UL	4.1 U	3.8 UL	5.6 U	5.2 U	4 UL
Endosulfan I	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
Endosulfan II	3.9 UL	4.1 U	3.8 UL	5.6 U	5.2 U	4 UL
Endosulfan Sulfate	3.9 UL	4.1 U	3.8 UL	5.6 U	5.2 U	4 UL
Endrin	3.9 UL	4.1 U	3.8 UL	5.6 U	5.2 U	4 UL
Endrin Aldehyde	3.9 UL	4.1 U	3.8 UL	5.6 U	5.2 U	4 UL
Endrin Ketone	3.9 UL	4.1 U	3.8 UL	5.6 U	5.2 U	4 UL
Heptachlor	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
Heptachlor Epoxide	2 UL	2.1 U	1.9 UL	2.9 U	2.7 U	2.1 UL
Methoxychlor	20 UL	21 U	19 UL	29 U	27 U	21 UL
Toxaphene	200 UL	210 U	190 UL	290 U	270 U	210 UL

SUBSURFACE SOIL - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
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	A1-HA02-02	A1-HA03-02	A1-HA04-02	A1-HA05-01	A1-HA05-01D	A1-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/14/1999	11/14/1999	11/14/1999
Explosives (ug/kg)						
1,3,5-Trinitrobenzene	430 U	450 U	450 U	480 U	430 U	480 U
1,3-Dinitrobenzene	430 U	450 U	450 U	480 U	430 U	480 U
2,4,6-Trinitrotoluene	430 U	450 U	450 U	480 U	430 U	480 U
2,4-Dinitrotoluene	430 U	450 U	450 U	480 U	430 U	480 U
2,6-Dinitrotoluene	430 U	450 U	450 U	480 U	430 U	480 U
2-Amino-4,6-dinitrotoluene	430 U	450 U	450 U	480 U	430 U	480 U
4-Amino-2,6-dinitrotoluene	430 U	450 U	450 U	480 U	430 U	480 U
2-Nitrotoluene	430 U	450 U	450 U	480 U	430 U	480 U
3-Nitrotoluene	430 U	450 U	450 U	480 U	430 U	480 U
4-Nitrotoluene	430 U	450 U	450 U	480 U	430 U	480 U
HMX	430 U	450 U	450 U	480 U	430 U	480 U
Nitrobenzene	430 U	450 U	450 U	480 U	430 U	480 U
RDX	430 U	450 U	450 U	480 U	430 U	480 U
Tetryl	430 U	450 U	450 U	480 U	430 U	480 U

SUBSURFACE SOIL - INORGANIC CONSTITUENTS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-HA02-02	A1-HA03-02	A1-HA04-02	A1-HA05-01	A1-HA05-01D	A1-HA06-02
	11/12/1999	11/12/1999	11/12/1999	11/14/1999	11/14/1999	11/14/1999
Inorganics (mg/kg)						
Aluminum	4700 L	6240 L	5340 L	4410 L	4080 L	8830 L
Antimony	0.46 B	0.6 B	10.9 U	12 J	11.4 J	0.41 B
Arsenic	1.3 J	5.2	1.9	5.1	4.2	33.3
Barium	12.9 B	28.5 J	25.9 J	81.3	90.9	41.3
Beryllium	0.21 B	1.1 B	0.5 B	0.34 J	0.22 J	0.95
Cadmium	0.9 U	1 U	0.07 J	0.08 U	0.08 U	0.06 U
Calcium	1090	1960	1490	10200	10400	2920
Chromium	9.2	19.4	3.6	16.8	11.1	32.6
Cobalt	1.5 J	5.8 J	2.8 J	4.6 J	4.5 J	9.4
Copper	1.6 B	2.1 B	1.5 B	86	146	3.5 B
Cyanide	0.6 L	0.6 UL	0.6 UL	0.68 J	0.2 J	0.08 J
Iron	6590 L	19800 L	2630 L	30600	35300	39700
Lead	4.7	6.7	7.3	483	1120	7.7
Magnesium	1430	547 J	81.4 B	606 J	654 J	1040
Manganese	11	48.2	126	384	401	151
Mercury	0.1 U	0.1 U	0.02 J	0.06 L	0.04 UL	0.03 UL
Nickel	1.2 J	7.7 J	2.9 J	23.3 L	13.6 B	12.3 B
Potassium	226 B	690 J	117 B	472 B	279 B	1040
Selenium	0.9 U	1 U	0.9 U	0.73 U	0.75 U	0.55 U
Silver	1.6 B	5.6 B	1.8 UB	7.6 B	9.7 B	11.3
Sodium	25.4 B	27.2 B	17.2 B	44.5 B	36.7 B	48.2 B
Thallium	1.9 UL	1.9 UL	1.8 UL	0.59 U	1.3 B	1.1 B
Vanadium	19.5	20.2	6.9	16.7	14.4	40.8
Zinc	4.2 B	25.7 B	5.6 B	330	365	35.3 B

SURFACE WATER - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-SW01	A1-SW02	A1-SW03	A1-SW03D
	11/14/1999	11/14/1999	11/14/1999	11/14/1999
Volatiles (ug/L)				
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U
2-Butanone	10 U	10 B	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U
Acetone	7 B	11 B	4 B	6 B
Benzene	10 U	10 U	10 U	10 U
Bromodichloromethane	10 U	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U
Carbon Disulfide	10 U	10 U	10 U	10 U
Carbon Tetrachloride	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U
Chloromethane	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U
Methylene Chloride	2 B	2 B	2 B	2 B
Styrene	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U
Trichloroethene	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U
Xylene (Total)	10 U	10 U	10 U	10 U

SURFACE WATER - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-SW01 11/14/1999	A1-SW02 11/14/1999	A1-SW03 11/14/1999	A1-SW03D 11/14/1999
Semivolatiles (ug/L)				
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropan	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2-Nitroaniline	25 U	25 U	25 U	25 U
2-Nitrophenol	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U
3-Nitroaniline	25 U	25 U	25 U	25 U
4,6-Dinitro-2-Methylphenol	25 U	25 U	25 U	25 U
4-Bromophenyl phenylether	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
4-Nitroaniline	25 U	25 U	25 U	25 U
4-Nitrophenol	25 U	25 U	25 U	25 U
Acenaphthene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Benzo(a)Anthracene	10 U	10 U	10 U	10 U
Benzo(a)Pyrene	10 U	10 U	10 U	10 U

SURFACE WATER - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	A1-SW01	A1-SW02	A1-SW03	A1-SW03D
	11/14/1999	11/14/1999	11/14/1999	11/14/1999
Semivolatiles (ug/kg) (Cont)				
Benzo(b)Fluoranthene	10 U	10 U	10 U	10 U
Benzo(g,h,i)Perylene	10 U	10 U	10 U	10 U
Benzo(k)Fluoanthene	10 U	10 U	10 U	10 U
Bis(2-chloroethoxy)Methane	10 U	10 U	10 U	10 U
Bis(2-chloroethyl)Ether	10 U	10 U	10 U	10 U
Bis(2-Ethylhexyl)Phthalate	10 U	98	37 J	2 J
Butylbenzylphthalate	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U
Dibenz(a,h)Anthracene	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U
Dimethyl Phthalate	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	10 U	1 B	10 U	10 U
Di-n-Octyl Phthalate	3 J	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)Pyrene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U
Pentachlorophenol	25 U	25 U	25 U	25 U
Phenanthrene	10 U	10 U	10 U	10 U
Phenol	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U

SURFACE WATER - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-SW01	A1-SW02	A1-SW03	A1-SW03D
	11/14/1999	11/14/1999	11/14/1999	11/14/1999
Pesticides/PCBs (ug/L)				
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.2 UL
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.2 UL
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.2 UL
Aldrin	0.05 U	0.05 U	0.05 U	0.1 UL
Aroclor-1016	1 U	1 U	1 U	2 UL
Aroclor-1221	2 U	2 U	2 U	4 UL
Aroclor-1232	1 U	1 U	1 U	2 UL
Aroclor-1242	1 U	1 U	1 U	2 UL
Aroclor-1248	1 U	1 U	1 U	2 UL
Aroclor-1254	1 U	1 U	1 U	2 UL
Aroclor-1260	1 U	1 U	1 U	2 UL
alpha-BHC	0.05 U	0.05 U	0.05 U	0.1 UL
beta-BHC	0.05 U	0.05 U	0.05 U	0.1 UL
delta-BHC	0.05 U	0.05 U	0.05 U	0.1 UL
gamma-BHC	0.05 U	0.05 U	0.05 U	0.1 UL
alpha-Chlordane	0.05 U	0.05 U	0.05 U	0.1 UL
gamma-Chlordane	0.05 U	0.05 U	0.05 U	0.1 UL
Dieldrin	0.1 U	0.1 U	0.1 U	0.2 UL
Endosulfan I	0.05 U	0.05 U	0.05 U	0.1 UL
Endosulfan II	0.1 U	0.1 U	0.1 U	0.2 UL
Endosulfan Sulfate	0.1 U	0.1 U	0.1 U	0.2 UL
Endrin	0.1 U	0.1 U	0.1 U	0.2 UL
Endrin Aldehyde	0.1 U	0.1 U	0.1 U	0.2 UL
Endrin Ketone	0.1 U	0.1 U	0.1 U	0.2 UL
Heptachlor	0.05 U	0.05 U	0.05 U	0.1 UL
Heptachlor Epoxide	0.05 U	0.05 U	0.05 U	0.1 UL
Methoxychlor	0.5 U	0.5 U	0.5 U	1 UL
Toxaphene	5 U	5 U	5 U	10 UL

SURFACE WATER - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-SW01	A1-SW02	A1-SW03	A1-SW03D
	11/14/1999	11/14/1999	11/14/1999	11/14/1999
Explosives (ug/kg)				
1,3,5-Trinitrobenzene	1 U	1 U	1 U	1 U
1,3-Dinitrobenzene	1 U	1 U	1 U	1 U
2,4,6-Trinitrotoluene	1 U	1 U	1 U	1 U
2,4-Dinitrotoluene	1 U	1 U	1 U	1 U
2,6-Dinitrotoluene	1 U	1 U	1 U	1 U
2-Amino-4,6-dinitrotoluene	1 U	1 U	1 U	1 U
4-Amino-2,6-dinitrotoluene	1 U	1 U	1 U	1 U
2-Nitrotoluene	1 U	1 U	1 U	1 U
3-Nitrotoluene	1 U	1 U	1 U	1 U
4-Nitrotoluene	1 U	1 U	1 U	1 U
HMX	1 U	1 U	1 U	1 U
Nitrobenzene	1 U	1 U	1 U	1 U
RDX	1 U	1 U	1 U	1 U
Tetryl	1 U	1 U	1 U	1 U

SURFACE WATER - UNFILTERED INORGANIC CONSTITUENTS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-SW01	A1-SW02	A1-SW03	A1-SW03D
	11/14/1999	11/14/1999	11/14/1999	11/14/1999
Inorganics (ug/L)				
Aluminum	80.8 B	44 U	44 U	55.7 B
Antimony	2.2 U	3.4 B	2.2 U	2.2 U
Arsenic	3.4 U	3.4 U	17.1	19
Barium	55.6 B	33.8 B	89.8 J	92 J
Beryllium	0.66 U	0.66 U	0.66 U	0.66 U
Cadmium	0.34 U	0.34 U	0.34 U	0.34 U
Calcium	129000	94900	134000	141000
Chromium	6.2 U	6.2 U	6.2 U	6.2 U
Cobalt	6.2 U	6.2 U	6.2 U	6.2 U
Copper	5.4 U	5.4 U	5.4 U	5.4 U
Cyanide	0.2 Ul	0.2 UL	0.2 UL	0.2 UL
Iron	339	520	25900	25700
Lead	1.4 U	1.4 U	1.4 U	1.4 U
Magnesium	2870 J	1780 J	4170 J	4390 J
Manganese	108	26.1	631	656
Mercury	0.06 UL	0.06 UL	0.06 UL	0.06 UL
Nickel	6 U	6 U	6 U	6 U
Potassium	1710 J	1340 B	2360 J	2660 J
Selenium	3 U	3 U	3 U	3 U
Silver	3.9 UL	3.9 UL	4.7 B	6.7 B
Sodium	6550 J	4570 J	6780 J	6970 J
Thallium	2.4 U	2.4 U	2.4 U	2.4 U
Vanadium	5.7 U	5.7 U	5.7 U	5.7 U
Zinc	9.7 B	11.3 B	42.8 B	45.1 B

SEDIMENT - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-SD01-00	A1-SD01-01	A1-SD02-00	A1-SD02-01	A1-SD03-00	A1-SD03-00D	A1-SD03-01	A1-SD04-00	A1-SD04-01
	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/13/1999
Volatiles (ug/kg)									
1,1,1-Trichloroethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
1,1,2,2-Tetrachloroethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
1,1,2-Trichloroethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
1,1-Dichloroethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
1,1-Dichloroethene	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
1,2-Dichloroethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
1,2-Dichloroethene (total)	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
1,2-Dichloropropane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
cis-1,3-Dichloropropene	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
trans-1,3-Dichloropropene	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
2-Butanone	3 J	5 J	5 J	4 J	17 B	5 B	65 B	13.25 U	13.77 U
2-Hexanone	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
4-Methyl-2-Pentanone	14.13 U	1 B	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Acetone	7 B	14 B	15 B	13.2 U	45 B	11 B	220	13.25 U	4 B
Benzene	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Bromodichloromethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Bromoform	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Bromomethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Carbon Disulfide	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Carbon Tetrachloride	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Chlorobenzene	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Chloroethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Chloroform	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Chloromethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Dibromochloromethane	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Ethylbenzene	2 J	2 J	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	2 J
Methylene Chloride	12 B	14 B	7 B	11 B	15.94 U	16.39 U	17.9 U	13.25 U	14 B
Styrene	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Tetrachloroethene	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Toluene	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Trichloroethene	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Vinyl Chloride	14.13 U	13.78 U	12.95 U	13.2 U	15.94 U	16.39 U	17.9 U	13.25 U	13.77 U
Xylene (Total)	6 J	5 B	12.95 U	2 J	15.94 U	16.39 U	17.9 U	13.25 U	4 J

SEDIMENT - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
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NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-SD01-00	A1-SD01-01	A1-SD02-00	A1-SD02-01	A1-SD03-00	A1-SD03-00D	A1-SD03-01	A1-SD04-00	A1-SD04-01
	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/13/1999
Semivolatiles (ug/kg)									
1,2,4-Trichlorobenzene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
1,2-Dichlorobenzene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
1,3-Dichlorobenzene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
1,4-Dichlorobenzene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2,2'-oxybis(1-Chloropropan	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2,4,5-Trichlorophenol	1200 U	1200 U	1100 U	1100 U	1300 U	1400 U	1500 U	1100 U	1100 U
2,4,6-Trichlorophenol	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2,4-Dichlorophenol	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2,4-Dimethylphenol	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2,4-Dinitrophenol	1200 U	1200 U	1100 U	1100 U	1300 U	1400 U	1500 U	1100 U	1100 U
2,4-Dinitrotoluene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2,6-Dinitrotoluene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2-Chloronaphthalene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2-Chlorophenol	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2-Methylnaphthalene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2-Methylphenol	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
2-Nitroaniline	1200 U	1200 U	1100 U	1100 U	1300 U	1400 U	1500 U	1100 U	1100 U
2-Nitrophenol	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
3,3'-Dichlorobenzidine	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
3-Nitroaniline	1200 U	1200 U	1100 U	1100 U	1300 U	1400 U	1500 U	1100 U	1100 U
4,6-Dinitro-2-Methylphenol	1200 U	1200 U	1100 U	1100 U	1300 U	1400 U	1500 U	1100 U	1100 U
4-Bromophenyl phenylether	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
4-Chloro-3-Methylphenol	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
4-Chloroaniline	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
4-Chlorophenyl-phenylether	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
4-Methylphenol	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
4-Nitroaniline	1200 U	1200 U	1100 U	1100 U	1300 U	1400 U	1500 U	1100 U	1100 U
4-Nitrophenol	1200 U	1200 U	1100 U	1100 U	1300 U	1400 U	1500 U	1100 U	1100 U
Acenaphthene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Acenaphthylene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Anthracene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Benzo(a)Anthracene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Benzo(a)Pyr	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U

SEDIMENT - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-SD01-00 11/14/1999	A1-SD01-01 11/14/1999	A1-SD02-00 11/14/1999	A1-SD02-01 11/14/1999	A1-SD03-00 11/14/1999	A1-SD03-00D 11/14/1999	A1-SD03-01 11/14/1999	A1-SD04-00 11/14/1999	A1-SD04-01 11/13/1999
Semivolatiles (ug/kg) (Cont)									
Benzo(b)Fluoranthene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Benzo(g,h,i)Perylene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Benzo(k)Fluoanthene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Bis(2-chloroethoxy)Methane	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Bis(2-chloroethyl)Ether	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Bis(2-Ethylhexyl)Phthalate	480 U	48 J	450 U	46 J	510 U	63 J	580 U	46 J	51 J
Butylbenzylphthalate	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Carbazole	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Chrysene	480 U	460 U	450 U	430 U	510 U	540 U	63 J	450 U	440 U
Dibenz(a,h)Anthracene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Dibenzofuran	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Diethylphthalate	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Dimethyl Phthalate	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Di-n-Butylphthalate	120 J	120 J	93 J	81 J	110 J	85 J	80 J	98 J	64 J
Di-n-Octyl Phthalate	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Fluoranthene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	47 J	440 U
Fluorene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Hexachlorobenzene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Hexachlorobutadiene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Hexachlorocyclopentadiene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Hexachloroethane	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Indeno(1,2,3-cd)Pyrene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Isophorone	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Naphthalene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Nitrobenzene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
N-Nitroso-Di-n-Propylamine	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
N-Nitrosodiphenylamine	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Pentachlorophenol	1200 U	1200 U	1100 U	1100 U	1300 U	1400 U	1500 U	1100 U	1100 U
Phenanthrene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Phenol	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U
Pyrene	480 U	460 U	450 U	430 U	510 U	540 U	580 U	450 U	440 U

SEDIMENT - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
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NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
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	A1-SD01-00	A1-SD01-01	A1-SD02-00	A1-SD02-01	A1-SD03-00	A1-SD03-00D	A1-SD03-01	A1-SD04-00	A1-SD04-01
	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/13/1999
Pesticides/PCBs (ug/kg)									
4,4'-DDD	4.7 U	4.6 U	4.5 U	4.3 U	4.7 UL	5.4 U	5.8 U	4.4 U	4.4 U
4,4'-DDE	4.7 U	4.6 U	4.5 U	4.3 U	4.7 UL	5.4 U	5.8 U	4.4 U	4.4 U
4,4'-DDT	4.7 U	4.6 U	4.5 U	4.3 U	4.7 UL	5.4 U	5.8 U	4.4 U	4.4 U
Aldrin	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
Aroclor-1016	47 U	46 U	45 U	43 U	47 UL	54 U	58 U	44 U	44 U
Aroclor-1221	96 U	93 U	92 U	86 U	95 UL	110 U	120 U	90 U	89 U
Aroclor-1232	47 U	46 U	45 U	43 U	47 UL	54 U	58 U	44 U	44 U
Aroclor-1242	47 U	46 U	45 U	43 U	47 UL	54 U	58 U	44 U	44 U
Aroclor-1248	47 U	46 U	45 U	43 U	47 UL	54 U	58 U	44 U	44 U
Aroclor-1254	47 U	46 U	45 U	43 U	47 UL	54 U	58 U	44 U	44 U
Aroclor-1260	47 U	46 U	45 U	43 U	47 UL	54 U	58 U	44 U	14 J
alpha-BHC	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
beta-BHC	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
delta-BHC	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
gamma-BHC	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
alpha-Chlordane	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
gamma-Chlordane	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
Dieldrin	4.7 U	4.6 U	4.5 U	4.3 U	4.7 UL	5.4 U	5.8 U	4.4 U	4.4 U
Endosulfan I	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
Endosulfan II	4.7 U	4.6 U	4.5 U	4.3 U	4.7 UL	5.4 U	5.8 U	4.4 U	4.4 U
Endosulfan Sulfate	4.7 U	4.6 U	4.5 U	4.3 U	4.7 UL	5.4 U	5.8 U	4.4 U	4.4 U
Endrin	4.7 U	4.6 U	4.5 U	4.3 U	4.7 UL	5.4 U	5.8 U	4.4 U	4.4 U
Endrin Aldehyde	4.7 U	4.6 U	4.5 U	4.3 U	4.7 UL	5.4 U	5.8 U	4.4 U	4.4 U
Endrin Ketone	4.7 U	4.6 U	4.5 U	4.3 U	4.7 UL	5.4 U	5.8 U	4.4 U	4.4 U
Heptachlor	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
Heptachlor Epoxide	2.4 U	2.4 U	2.3 U	2.2 U	2.4 UL	2.8 U	3 U	2.3 U	2.3 U
Methoxychlor	24 U	24 U	23 U	22 U	24 UL	28 U	30 U	23 U	23 U
Toxaphene	240 U	240 U	230 U	220 U	240 UL	280 U	300 U	230 U	230 U

SEDIMENT - ORGANIC COMPOUNDS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	A1-SD01-00	A1-SD01-01	A1-SD02-00	A1-SD02-01	A1-SD03-00	A1-SD03-00D	A1-SD03-01	A1-SD04-00	A1-SD04-01
	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/13/1999
Explosives (ug/kg)									
1,3,5-Trinitrobenzene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
1,3-Dinitrobenzene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
2,4,6-Trinitrotoluene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
2,4-Dinitrotoluene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
2,6-Dinitrotoluene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
2-Amino-4,6-dinitrotoluene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
4-Amino-2,6-dinitrotoluene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
2-Nitrotoluene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
3-Nitrotoluene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
4-Nitrotoluene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
HMX	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
Nitrobenzene	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
RDX	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U
Tetryl	420 U	430 U	450 U	430 U	480 U	450 U	480 U	450 U	430 U

SEDIMENT - INORGANIC CONSTITUENTS
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	A1-SD01-00	A1-SD01-01	A1-SD02-00	A1-SD02-01	A1-SD03-00	A1-SD03-00D	A1-SD03-01	A1-SD04-00	A1-SD04-01
	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/14/1999	11/13/1999
Inorganics (mg/kg)									
Aluminum	1790 L	2970 L	4230 L	2060 L	2480 L	3510 L	4170 L	6740 L	4600 L
Antimony	0.47 U	0.36 U	0.46 U	0.36 U	0.56 U	0.56 U	0.51 U	0.52 U	0.46 U
Arsenic	1.5 J	1.4 J	1.6 J	1.1 J	7.1	10.5	7.4	2.1 J	1.8 J
Barium	9.4 B	11.3 B	16.3 B	10.2 B	16 B	23.4 B	15.2 B	23.3 B	18.1 J
Beryllium	0.22 J	0.23 J	0.29 J	0.22 J	0.18 J	0.22 J	0.16 J	0.16 U	0.26 J
Cadmium	0.07 U	0.06 U	0.07 U	0.05 U	0.09 U	0.09 U	0.08 U	0.08 U	0.07 U
Calcium	1420	1250	1270	899 L	17900	19000	3630	1940 B	1760 J
Chromium	4.3	6.2	11.1	6.1	6.3	8.1	7.1	4.8	4.8
Cobalt	1.9 J	1.9 J	2.4 J	1.2 J	3.6 J	3.1 J	2.8 J	1.5 U	1.3 U
Copper	1.2 U	0.89 U	2.6 B	0.87 U	3.4 B	4.4 B	2.9 B	26.9 B	16 J
Cyanide	0.03 UL	0.02 UL	0.03 UL	0.02 UL	0.03 UL	0.03 UL	0.03 UL	0.03 UL	0.03 UL
Iron	3490	3320	4690	3510	12600	18700	9230	4940	3730 L
Lead	3.8	3.6	4.8	3.1	12.6	12.6	11.4	10.3	7.5
Magnesium	76.9 B	177 B	304 J	154 B	266 B	325 J	211 B	299 B	216 J
Manganese	10	9	12.9	6.5	215	309	38.6	257	160
Mercury	0.03 UL	0.03 UL	0.02 UL	0.02 UL	0.03 UL	0.04 UL	0.03 UL	0.07 L	0.04 L
Nickel	2.1 B	3.1 B	8.2 B	2.6 B	5.1 B	3.1 B	2.5 B	2.9 B	2.1 J
Potassium	106 B	194 B	374 B	223 B	134 B	253 B	163 B	266 B	199 L
Selenium	0.65 U	0.49 U	0.63 U	0.48 U	0.8 J	0.77 U	0.7 U	0.71 U	0.63 U
Silver	0.89 B	0.69 B	1.4 B	1.1 B	3 B	5.2 B	3.2 B	1.6 B	1.5 B
Sodium	35.2 B	32.1 B	52.5 B	26.4 B	64.2 B	95.2 B	80.9 B	74.9 B	55.5 B
Thallium	0.52 U	0.39 U	0.5 U	0.39 U	0.62 UJ	0.71 B	0.56 U	0.57 U	0.5 UL
Vanadium	5.6 J	8.1 J	11.2	7.5 J	9.9 B	12.4 J	14.8	7.7 J	7.4 J
Zinc	9.6 B	9.7 B	10.3 B	8.1 B	47.6 B	74.1 B	29.7 B	79.8 B	51 B

APPENDIX E.2
FREQUENCY OF DETECTION SUMMARIES

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Volatiles (ug/kg)						
1,1,1-Trichloroethane	11.24 U	14.79 U	ND	ND		0/6
1,1,2,2-Tetrachloroethane	11.24 U	14.79 UL	ND	ND		0/6
1,1,2-Trichloroethane	11.24 U	14.79 U	ND	ND		0/6
1,1-Dichloroethane	11.24 U	14.79 U	ND	ND		0/6
1,1-Dichloroethene	11.24 U	14.79 U	ND	ND		0/6
1,2-Dichloroethane	11.24 U	14.79 U	ND	ND		0/6
1,2-Dichloroethene (total)	11.24 U	14.79 U	ND	ND		0/6
1,2-Dichloropropane	11.24 U	14.79 U	ND	ND		0/6
cis-1,3-Dichloropropene	11.24 U	14.79 U	ND	ND		0/6
trans-1,3-Dichloropropene	11.24 U	14.79 U	ND	ND		0/6
2-Butanone	11.24 U	14.79 U	ND	ND		0/6
2-Hexanone	11.24 U	14.79 UL	ND	ND		0/6
4-Methyl-2-Pentanone	11.24 U	14.79 U	ND	ND		0/6
Acetone	5 B	14.79 U	ND	ND		0/6
Benzene	11.24 U	14.79 U	ND	ND		0/6
Bromodichloromethane	11.24 U	14.79 U	ND	ND		0/6
Bromoform	11.24 U	14.79 U	ND	ND		0/6
Bromomethane	11.24 U	14.79 U	ND	ND		0/6
Carbon Disulfide	11.24 U	14.79 U	ND	ND		0/6
Carbon Tetrachloride	11.24 U	14.79 U	ND	ND		0/6
Chlorobenzene	11.24 U	14.79 UL	ND	ND		0/6
Chloroethane	11.24 U	14.79 U	ND	ND		0/6
Chloroform	11.24 U	14.79 U	ND	ND		0/6
Chloromethane	11.24 U	14.79 U	ND	ND		0/6
Dibromochloromethane	11.24 U	14.79 U	ND	ND		0/6
Ethylbenzene	11.24 U	14.79 UL	ND	ND		0/6
Methylene Chloride	7 B	12.07 UL	ND	ND		0/7
Styrene	11.24 U	14.79 UL	ND	ND		0/6
Tetrachloroethene	11.24 U	14.79 UL	ND	ND		0/6
Toluene	11.24 U	14.79 UL	ND	ND		0/6
Trichloroethene	11.24 U	14.79 U	ND	ND		0/6
Vinyl Chloride	11.24 U	14.79 U	ND	ND		0/6
Xylene (Total)	11.24 U	14.79 UL	2 J	2 J	4-HA02-00	1/6

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg)						
1,2,4-Trichlorobenzene	380 U	5500 U	ND	ND		0/7
1,2-Dichlorobenzene	380 U	5500 U	ND	ND		0/7
1,3-Dichlorobenzene	380 U	5500 U	ND	ND		0/7
1,4-Dichlorobenzene	380 U	5500 U	ND	ND		0/7
2,2'-oxybis(1-Chloropropan	380 U	5500 U	ND	ND		0/7
2,4,5-Trichlorophenol	960 U	14000 U	ND	ND		0/7
2,4,6-Trichlorophenol	380 U	5500 U	ND	ND		0/7
2,4-Dichlorophenol	380 U	5500 U	ND	ND		0/7
2,4-Dimethylphenol	380 U	5500 U	ND	ND		0/7
2,4-Dinitrophenol	960 U	14000 U	ND	ND		0/7
2,4-Dinitrotoluene	380 U	5500 U	ND	ND		0/7
2,6-Dinitrotoluene	380 U	5500 U	ND	ND		0/7
2-Chloronaphthalene	380 U	5500 U	ND	ND		0/7
2-Chlorophenol	380 U	5500 U	ND	ND		0/7
2-Methylnaphthalene	380 U	5500 U	ND	ND		0/7
2-Methylphenol	380 U	5500 U	ND	ND		0/7
2-Nitroaniline	960 U	14000 U	ND	ND		0/7
2-Nitrophenol	380 U	5500 U	ND	ND		0/7
3,3'-Dichlorobenzidine	380 U	5500 U	ND	ND		0/7
3-Nitroaniline	960 U	14000 U	ND	ND		0/7
4,6-Dinitro-2-Methylphenol	960 U	14000 U	ND	ND		0/7
4-Bromophenyl phenylether	380 U	5500 U	ND	ND		0/7
4-Chloro-3-Methylphenol	380 U	5500 U	ND	ND		0/7
4-Chloroaniline	380 U	5500 U	ND	ND		0/7
4-Chlorophenyl-phenylether	380 U	5500 U	ND	ND		0/7
4-Methylphenol	380 U	5500 U	ND	ND		0/7
4-Nitroaniline	960 U	14000 U	ND	ND		0/7
4-Nitrophenol	960 U	14000 U	ND	ND		0/7
Acenaphthene	380 U	5500 U	330 J	330 J	4-HA02-00	1/7
Acenaphthylene	380 U	5500 U	ND	ND		0/7
Anthracene	380 U	5500 U	530 J	1700 J	4-HA06-00	2/7
Benzo(a)Anthracene	380 U	2600 U	290 J	8800	4-HA06-00	4/7
Benzo(a)Pyrene	380 U	2600 U	440 J	7000	4-HA06-00	4/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg) (Cont)						
Benzo(b)Fluoranthene	380 U	380 U	76 J	6800	4-HA06-00	6/7
Benzo(g,h,i)Perylene	380 U	2600 U	61 J	3400 J	4-HA06-00	5/7
Benzo(k)Fluoanthene	380 U	380 U	53 J	6800	4-HA06-00	6/7
Bis(2-chloroethoxy)Methane	380 U	5500 U	ND	ND		0/7
Bis(2-chloroethyl)Ether	380 U	5500 U	ND	ND		0/7
Bis(2-Ethylhexyl)Phthalate	49 B	5500 U	3000	16000	4-HA02-00	3/7
Butylbenzylphthalate	380 U	5500 U	ND	ND		0/7
Carbazole	380 U	5500 U	250 J	250 J	4-HA02-00	1/7
Chrysene	380 U	380 U	75 J	8600	4-HA06-00	6/7
Dibenz(a,h)Anthracene	380 U	5500 U	1400 J	1400 J	4-HA06-00	1/7
Dibenzofuran	380 U	5500 U	ND	ND		0/7
Diethylphthalate	380 U	5500 U	ND	ND		0/7
Dimethyl Phthalate	380 U	5500 U	ND	ND		0/7
Di-n-Butylphthalate	41 B	5500 U	9900	9900	4-HA04-00	1/7
Di-n-Octyl Phthalate	380 U	5500 U	ND	ND		0/7
Fluoranthene	380 U	380 U	49 J	14000	4-HA06-00	6/7
Fluorene	380 U	5500 U	250 J	250 J	4-HA02-00	1/7
Hexachlorobenzene	380 U	5500 U	ND	ND		0/7
Hexachlorobutadiene	380 U	5500 U	ND	ND		0/7
Hexachlorocyclopentadiene	380 U	5500 U	ND	ND		0/7
Hexachloroethane	380 U	5500 U	ND	ND		0/7
Indeno(1,2,3-cd)Pyrene	380 U	2600 U	48 J	3400 J	4-HA06-00	5/7
Isophorone	380 U	5500 U	ND	ND		0/7
Naphthalene	380 U	5500 U	ND	ND		0/7
Nitrobenzene	380 U	5500 U	ND	ND		0/7
N-Nitroso-Di-n-Propylamine	380 U	5500 U	ND	ND		0/7
N-Nitrosodiphenylamine	380 U	5500 U	ND	ND		0/7
Pentachlorophenol	960 U	14000 U	ND	ND		0/7
Phenanthrene	380 U	2600 U	560 J	5500	4-HA06-00	4/7
Phenol	380 U	5500 U	ND	ND		0/7
Pyrene	380 U	380 U	46 J	11000	4-HA06-00	6/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Pesticides/PCBs (ug/kg)						
4,4'-DDD	3.8 U	27 U	7.6 K	7.6 K	4-HA06-00	1/7
4,4'-DDE	3.8 U	27 U	9.6 J	43 J	4-HA04-00	2/7
4,4'-DDT	3.8 U	4 U	4.6 J	220 K	4-HA05-00	5/7
Aldrin	2 U	2.7 U	33 K	33 K	4-HA05-00	1/7
Aroclor-1016	38 U	270 U	ND	ND		0/7
Aroclor-1221	77 U	560 U	ND	ND		0/7
Aroclor-1232	38 U	270 U	ND	ND		0/7
Aroclor-1242	38 U	52 U	1000 K	1000 K	4-HA05-00	1/7
Aroclor-1248	38 U	270 U	ND	ND		0/7
Aroclor-1254	38 U	270 U	ND	ND		0/7
Aroclor-1260	ND	ND	53 J	2700 K	4-HA05-00	7/7
alpha-BHC	2 U	14 U	ND	ND		0/7
beta-BHC	2 U	14 U	ND	ND		0/7
delta-BHC	2 U	14 U	ND	ND		0/7
gamma-BHC	2 U	14 U	ND	ND		0/7
alpha-Chlordane	2 U	14 U	ND	ND		0/7
gamma-Chlordane	2 U	2.7 U	15 K	15 K	4-HA05-00	1/7
Dieldrin	3.8 U	27 U	ND	ND		0/7
Endosulfan I	2 U	14 U	ND	ND		0/7
Endosulfan II	3.9 U	27 U	4.4 J	5.7 J	4-HA03-00	2/7
Endosulfan Sulfate	3.8 U	27 U	ND	ND		0/7
Endrin	3.9 U	5.2 U	6.3 J	28 K	4-HA05-00	2/7
Endrin Aldehyde	3.8 U	5.2 U	77 K	77 K	4-HA05-00	1/7
Endrin Ketone	3.8 U	5.2 U	4.5	87 K	4-HA05-00	2/7
Heptachlor	2 U	14 U	ND	ND		0/7
Heptachlor Epoxide	2 U	14 U	ND	ND		0/7
Methoxychlor	20 U	140 U	ND	ND		0/7
Toxaphene	200 U	1400 U	ND	ND		0/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Explosives (ug/kg)						
1,3,5-Trinitrobenzene	450 U	500 U	ND	ND		0/7
1,3-Dinitrobenzene	450 U	500 U	ND	ND		0/7
2,4,6-Trinitrotoluene	450 U	500 U	ND	ND		0/7
2,4-Dinitrotoluene	450 U	500 U	ND	ND		0/7
2,6-Dinitrotoluene	450 U	500 U	ND	ND		0/7
2-Amino-4,6-dinitrotoluene	450 U	500 U	ND	ND		0/7
4-Amino-2,6-dinitrotoluene	450 U	500 U	ND	ND		0/7
2-Nitrotoluene	450 U	500 U	ND	ND		0/7
3-Nitrotoluene	450 U	500 U	ND	ND		0/7
4-Nitrotoluene	450 U	500 U	ND	ND		0/7
HMX	450 U	500 U	ND	ND		0/7
Nitrobenzene	450 U	500 U	ND	ND		0/7
RDX	450 U	500 U	ND	ND		0/7
Tetryl	450 U	500 U	ND	ND		0/7

FREQUENCY OF DETECTION SUMMARY - INORGANIC CONSTITUENTS IN SURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Inorganics (mg/kg)						
Aluminum	ND	ND	4560 L	9560 L	4-HA04-00	7/7
Antimony	0.44 UJ	0.55 U	0.67 J	12.6	4-HA05-00	2/7
Arsenic	ND	ND	2.6 L	4.1 L	4-HA04-00	7/7
Barium	ND	ND	20.3 J	164	4-HA04-00	7/7
Beryllium	0.32 B	0.68 B	ND	ND		0/7
Cadmium	0.07 U	0.34 U	0.74 J	3.3	4-HA05-00	2/7
Calcium	ND	ND	1110 J	8420	4-HA03-00	7/7
Chromium	ND	ND	8.7	56.6	4-HA06-00	7/7
Cobalt	1.4 U	1.4 U	1.7 J	8.8 J	4-HA06-00	6/7
Copper	3.8 B	4.5 B	10.5	150	4-HA05-00	5/7
Cyanide	0.02 UL	0.03 UL	0.07 L	0.13 L	4-HA02-00D	4/7
Iron	ND	ND	8570 L	61700 L	4-HA06-00	7/7
Lead	ND	ND	11.6	129	4-HA05-00	7/7
Magnesium	ND	ND	514 J	2140	4-HA06-00	7/7
Manganese	ND	ND	43.2	302 J	4-HA06-00	7/7
Mercury	ND	ND	0.04 J	0.88	4-HA05-00	7/7
Nickel	2.2 B	4.1 B	10.1 J	39.6	4-HA06-00	3/7
Potassium	283 B	283 B	366 J	1420	4-HA05-00	6/7
Selenium	0.6 U	0.81 U	1 J	1 J	4-HA04-00	1/7
Silver	2.4 B	5.2 B	20.6 L	20.6 L	4-HA06-00	1/7
Sodium	22.6 B	73.8 B	ND	ND		0/7
Thallium	0.5 UL	0.72 UL	1.1 L	1.1 L	4-HA06-00	1/7
Vanadium	ND	ND	13.9	35.7 J	4-HA06-00	7/7
Zinc	28.6 B	32.5 B	102	324	4-HA05-00	5/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Volatiles (ug/kg)						
1,1,1-Trichloroethane	10.93 U	20.41 U	ND	ND		0/7
1,1,2,2-Tetrachloroethane	10.93 U	20.41 U	ND	ND		0/7
1,1,2-Trichloroethane	10.93 U	20.41 U	ND	ND		0/7
1,1-Dichloroethane	10.93 U	20.41 U	ND	ND		0/7
1,1-Dichloroethene	10.93 U	20.41 U	ND	ND		0/7
1,2-Dichloroethane	10.93 U	20.41 U	ND	ND		0/7
1,2-Dichloroethene (total)	10.93 U	20.41 U	ND	ND		0/7
1,2-Dichloropropane	10.93 U	20.41 U	ND	ND		0/7
cis-1,3-Dichloropropene	10.93 U	20.41 U	ND	ND		0/7
trans-1,3-Dichloropropene	10.93 U	20.41 U	ND	ND		0/7
2-Butanone	2 B	20.41 U	8 J	8 J	4-HA02-02	1/7
2-Hexanone	10.93 U	20.41 U	ND	ND		0/7
4-Methyl-2-Pentanone	10.93 U	20.41 U	ND	ND		0/7
Acetone	3 B	43 B	ND	ND		0/7
Benzene	10.93 U	20.41 U	ND	ND		0/7
Bromodichloromethane	10.93 U	20.41 U	ND	ND		0/7
Bromoform	10.93 U	20.41 U	ND	ND		0/7
Bromomethane	10.93 U	20.41 U	ND	ND		0/7
Carbon Disulfide	10.93 U	20.41 U	ND	ND		0/7
Carbon Tetrachloride	10.93 U	20.41 U	ND	ND		0/7
Chlorobenzene	10.93 U	20.41 U	ND	ND		0/7
Chloroethane	10.93 U	20.41 U	ND	ND		0/7
Chloroform	10.93 U	20.41 U	ND	ND		0/7
Chloromethane	10.93 U	20.41 U	ND	ND		0/7
Dibromochloromethane	10.93 U	20.41 U	ND	ND		0/7
Ethylbenzene	10.93 U	20.41 U	2 J	2 J	4-HA02-02	1/7
Methylene Chloride	7 B	20 B	ND	ND		0/7
Styrene	10.93 U	20.41 U	ND	ND		0/7
Tetrachloroethene	10.93 U	20.41 U	3 J	3 J	4-HA03-02	1/7
Toluene	12.75 UL	20.41 U	2 J	3 J	4-HA01-02	2/7
Trichloroethene	10.93 U	20.41 U	ND	ND		0/7
Vinyl Chloride	10.93 U	20.41 U	ND	ND		0/7
Xylene (Total)	10.93 U	20.41 U	ND	ND		0/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg)						
1,2,4-Trichlorobenzene	370 U	17000 UJ	ND	ND		0/7
1,2-Dichlorobenzene	370 U	17000 UJ	ND	ND		0/7
1,3-Dichlorobenzene	370 U	17000 UJ	ND	ND		0/7
1,4-Dichlorobenzene	370 U	17000 UJ	ND	ND		0/7
2,2'-oxybis(1-Chloropropane)	370 U	17000 UJ	ND	ND		0/7
2,4,5-Trichlorophenol	930 U	42000 UJ	ND	ND		0/7
2,4,6-Trichlorophenol	370 U	17000 UJ	ND	ND		0/7
2,4-Dichlorophenol	370 U	17000 UJ	ND	ND		0/7
2,4-Dimethylphenol	370 U	17000 UJ	ND	ND		0/7
2,4-Dinitrophenol	930 U	42000 UJ	ND	ND		0/7
2,4-Dinitrotoluene	370 U	17000 UJ	ND	ND		0/7
2,6-Dinitrotoluene	370 U	17000 UJ	ND	ND		0/7
2-Chloronaphthalene	370 U	17000 UJ	ND	ND		0/7
2-Chlorophenol	370 U	17000 UJ	ND	ND		0/7
2-Methylnaphthalene	370 U	17000 UJ	ND	ND		0/7
2-Methylphenol	370 U	17000 UJ	ND	ND		0/7
2-Nitroaniline	930 U	42000 UJ	ND	ND		0/7
2-Nitrophenol	370 U	17000 UJ	ND	ND		0/7
3,3'-Dichlorobenzidine	370 U	17000 UJ	ND	ND		0/7
3-Nitroaniline	930 U	42000 UJ	ND	ND		0/7
4,6-Dinitro-2-Methylphenol	930 U	42000 UJ	ND	ND		0/7
4-Bromophenyl phenylether	370 U	17000 UJ	ND	ND		0/7
4-Chloro-3-Methylphenol	370 U	17000 UJ	ND	ND		0/7
4-Chloroaniline	370 U	17000 UJ	ND	ND		0/7
4-Chlorophenyl-phenylether	370 U	17000 UJ	ND	ND		0/7
4-Methylphenol	370 U	17000 UJ	ND	ND		0/7
4-Nitroaniline	930 U	42000 UJ	ND	ND		0/7
4-Nitrophenol	930 U	42000 UJ	ND	ND		0/7
Acenaphthene	370 U	17000 UJ	ND	ND		0/7
Acenaphthylene	370 U	17000 UJ	ND	ND		0/7
Anthracene	370 U	17000 UJ	ND	ND		0/7
Benzo(a)Anthracene	370 U	17000 UJ	77 J	500 J	4-HA06-02	2/7
Benzo(a)Pyrene	370 U	17000 UJ	52 J	600 J	4-HA06-02	4/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg) (Cont)						
Benzo(b)Fluoranthene	11000 UJ	17000 UJ	51 J	510 J	4-HA05-01	5/7
Benzo(g,h,i)Perylene	4300 U	17000 UJ	43 J	440 J	4-HA06-02	4/7
Benzo(k)Fluoanthene	370 U	17000 UJ	59 J	760 J	4-HA06-02	4/7
Bis(2-chloroethoxy)Methane	370 U	17000 UJ	ND	ND		0/7
Bis(2-chloroethyl)Ether	370 U	17000 UJ	ND	ND		0/7
Bis(2-Ethylhexyl)Phthalate	2600 B	4300 U	530	63000 J	4-HA03-02	4/7
Butylbenzylphthalate	370 U	17000 UJ	ND	ND		0/7
Carbazole	370 U	17000 UJ	ND	ND		0/7
Chrysene	4300 U	17000 UJ	45 J	620 J	4-HA06-02	4/7
Dibenz(a,h)Anthracene	370 U	17000 UJ	ND	ND		0/7
Dibenzofuran	370 U	17000 UJ	ND	ND		0/7
Diethylphthalate	370 U	17000 UJ	ND	ND		0/7
Dimethyl Phthalate	370 U	17000 UJ	ND	ND		0/7
Di-n-Butylphthalate	66 B	5700 B	90000 J	90000 J	4-HA04-01	1/7
Di-n-Octyl Phthalate	370 U	17000 UJ	ND	ND		0/7
Fluoranthene	11000 UJ	17000 UJ	43 J	880 J	4-HA05-01,4-HA06-02	5/7
Fluorene	370 U	17000 UJ	ND	ND		0/7
Hexachlorobenzene	370 U	17000 UJ	ND	ND		0/7
Hexachlorobutadiene	370 U	17000 UJ	ND	ND		0/7
Hexachlorocyclopentadiene	370 U	17000 UJ	ND	ND		0/7
Hexachloroethane	370 U	17000 UJ	ND	ND		0/7
Indeno(1,2,3-cd)Pyrene	3800 U	17000 UJ	39 J	66 J	4-HA02-02	3/7
Isophorone	370 U	17000 UJ	ND	ND		0/7
Naphthalene	370 U	17000 UJ	ND	ND		0/7
Nitrobenzene	370 U	17000 UJ	ND	ND		0/7
N-Nitroso-Di-n-Propylamine	370 U	17000 UJ	ND	ND		0/7
N-Nitrosodiphenylamine	370 U	17000 UJ	ND	ND		0/7
Pentachlorophenol	930 U	42000 UJ	ND	ND		0/7
Phenanthrene	370 U	17000 UJ	100 J	400 J	4-HA06-02	2/7
Phenol	370 U	17000 UJ	ND	ND		0/7
Pyrene	11000 UJ	17000 UJ	44 J	930 J	4-HA05-01	5/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Pesticides/PCBs (ug/kg)						
4,4'-DDD	3.7 U	6.7 U	4.5 L	4.5 L	4-HA02-02	1/7
4,4'-DDE	3.7 U	4.6 U	5.3	24 J	4-HA04-01	3/7
4,4'-DDT	3.7 U	4.6 U	5.8	150 L	4-HA05-01	4/7
Aldrin	1.9 U	3.4 U	27 J	27 J	4-HA05-01	1/7
Aroclor-1016	37 U	67 U	ND	ND		0/7
Aroclor-1221	75 U	140 U	ND	ND		0/7
Aroclor-1232	37 U	67 U	ND	ND		0/7
Aroclor-1242	37 U	67 U	2300 L	2300 L	4-HA05-01	1/7
Aroclor-1248	37 U	67 U	ND	ND		0/7
Aroclor-1254	38 U	67 U	39	49	4-HA01-02D	2/7
Aroclor-1260	38 U	48 UL	50 J	1600 L	4-HA05-01	5/7
alpha-BHC	1.9 U	3.4 U	ND	ND		0/7
beta-BHC	1.9 U	3.4 U	ND	ND		0/7
delta-BHC	1.9 U	3.4 U	ND	ND		0/7
gamma-BHC	1.9 U	3.4 U	ND	ND		0/7
alpha-Chlordane	1.9 U	3.4 U	2.4 J	2.4 J	4-HA05-01	1/7
gamma-Chlordane	1.9 U	3.4 U	4.3 J	4.3 J	4-HA05-01	1/7
Dieldrin	3.7 U	6.7 U	ND	ND		0/7
Endosulfan I	1.9 U	3.4 U	ND	ND		0/7
Endosulfan II	3.8 U	6.7 U	6.5 K	14 J	4-HA01-02D	3/7
Endosulfan Sulfate	3.7 U	6.7 U	ND	ND		0/7
Endrin	3.7 U	6.7 U	ND	ND		0/7
Endrin Aldehyde	3.7 U	6.7 U	ND	ND		0/7
Endrin Ketone	3.7 U	4.8 UL	8.9 J	19 J	4-HA05-01	2/7
Heptachlor	1.9 U	3.4 U	9.9 J	9.9 J	4-HA05-01	1/7
Heptachlor Epoxide	1.9 U	3.4 U	ND	ND		0/7
Methoxychlor	19 U	34 U	25 J	25 J	4-HA05-01	1/7
Toxaphene	190 U	340 U	ND	ND		0/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Explosives (ug/kg)						
1,3,5-Trinitrobenzene	450 U	500 U	ND	ND		0/7
1,3-Dinitrobenzene	450 U	500 U	ND	ND		0/7
2,4,6-Trinitrotoluene	450 U	500 U	ND	ND		0/7
2,4-Dinitrotoluene	450 U	500 U	ND	ND		0/7
2,6-Dinitrotoluene	450 U	500 U	ND	ND		0/7
2-Amino-4,6-dinitrotoluene	450 U	500 U	ND	ND		0/7
4-Amino-2,6-dinitrotoluene	450 U	500 U	ND	ND		0/7
2-Nitrotoluene	450 U	500 U	ND	ND		0/7
3-Nitrotoluene	450 U	500 U	ND	ND		0/7
4-Nitrotoluene	450 U	500 U	ND	ND		0/7
HMX	450 U	500 U	ND	ND		0/7
Nitrobenzene	450 U	500 U	ND	ND		0/7
RDX	450 U	500 U	ND	ND		0/7
Tetryl	450 U	500 U	ND	ND		0/7

FREQUENCY OF DETECTION SUMMARY - INORGANIC CONSTITUENTS IN SUBSURFACE SOIL
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Inorganics (mg/kg)						
Aluminum	ND	ND	3550 L	9660 L	4-HA03-02	7/7
Antimony	0.44 U	0.69 U	1.1	1.1	4-HA05-01,4-HA06-02	2/7
Arsenic	ND	ND	1.8 L	4.2 L	4-HA06-02	7/7
Barium	ND	ND	20.2 J	247	4-HA04-01	7/7
Beryllium	0.31 B	0.55 B	ND	ND		0/7
Cadmium	0.07 U	0.15 U	0.96 J	1.2 J	4-HA05-01	2/7
Calcium	ND	ND	478 J	5970	4-HA04-01	7/7
Chromium	ND	ND	6.9	29.2	4-HA06-02	7/7
Cobalt	ND	ND	1.6 J	4.3 J	4-HA03-02	7/7
Copper	4.4 B	4.6 B	9	40.4	4-HA03-02	5/7
Cyanide	0.02 UL	0.03 UL	0.44 L	0.44 L	4-HA04-01	1/7
Iron	ND	ND	4960 L	28000 L	4-HA06-02	7/7
Lead	ND	ND	11.3	45.3	4-HA03-02	7/7
Magnesium	ND	ND	327 J	1730	4-HA06-02	7/7
Manganese	ND	ND	28.3	120	4-HA03-02	7/7
Mercury	ND	ND	0.05 J	0.91	4-HA03-02	7/7
Nickel	3.2 B	7.7 B	13.6	20.4	4-HA06-02	3/7
Potassium	249 B	249 B	531 J	1700	4-HA05-01	6/7
Selenium	0.6 U	0.94 U	0.78 J	0.78 J	4-HA02-02	1/7
Silver	1.6 B	5.8 B	8.5 L	8.5 L	4-HA06-02	1/7
Sodium	11.6 B	57.1 B	ND	ND		0/7
Thallium	0.48 UL	0.75 UL	ND	ND		0/7
Vanadium	10.1 B	10.1 B	12.2	20.8	4-HA06-02	6/7
Zinc	28.6 B	28.6 B	150	643	4-HA01-02	6/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SEDIMENT
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Volatiles (ug/kg)						
1,1,1-Trichloroethane	13.89 U	26.4 U	ND	ND		0/9
1,1,2,2-Tetrachloroethane	13.89 U	26.4 U	ND	ND		0/9
1,1,2-Trichloroethane	13.89 U	26.4 U	ND	ND		0/9
1,1-Dichloroethane	13.89 U	26.4 U	ND	ND		0/9
1,1-Dichloroethene	13.89 U	26.4 U	ND	ND		0/9
1,2-Dichloroethane	13.89 U	26.4 U	ND	ND		0/9
1,2-Dichloroethene (total)	13.89 U	26.4 U	ND	ND		0/9
1,2-Dichloropropane	13.89 U	26.4 U	ND	ND		0/9
cis-1,3-Dichloropropene	13.89 U	26.4 U	ND	ND		0/9
trans-1,3-Dichloropropene	13.89 U	26.4 U	ND	ND		0/9
2-Butanone	7 B	17.53 U	12 J	12 J	4-SED01-00	1/9
2-Hexanone	13.89 U	26.4 U	ND	ND		0/9
4-Methyl-2-Pentanone	14.88 U	26.4 U	2 J	2 J	4-SD03-01	1/9
Acetone	17 B	44 B	ND	ND		0/9
Benzene	13.89 U	26.4 U	ND	ND		0/9
Bromodichloromethane	13.89 U	26.4 U	ND	ND		0/9
Bromoform	13.89 U	26.4 U	ND	ND		0/9
Bromomethane	13.89 U	26.4 U	ND	ND		0/9
Carbon Disulfide	13.89 U	26.4 U	ND	ND		0/9
Carbon Tetrachloride	13.89 U	26.4 U	ND	ND		0/9
Chlorobenzene	13.89 U	26.4 U	ND	ND		0/9
Chloroethane	13.89 U	26.4 U	ND	ND		0/9
Chloroform	13.89 U	26.4 U	ND	ND		0/9
Chloromethane	13.89 U	26.4 U	ND	ND		0/9
Dibromochloromethane	13.89 U	26.4 U	ND	ND		0/9
Ethylbenzene	13.89 U	26.4 U	2 J	3 J	4-SD04-00	2/9
Methylene Chloride	12 B	39 B	ND	ND		0/9
Styrene	13.89 U	26.4 U	ND	ND		0/9
Tetrachloroethene	13.89 U	26.4 U	ND	ND		0/9
Toluene	13.89 U	26.4 U	3 L	3 L	4-SD02-00	1/9
Trichloroethene	13.89 U	26.4 U	ND	ND		0/9
Vinyl Chloride	13.89 U	26.4 U	ND	ND		0/9
Xylene (Total)	13.89 U	26.4 U	10 J	10 J	4-SD04-00	1/9

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SEDIMENT
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg)						
1,2,4-Trichlorobenzene	410 U	1600 U	ND	ND		0/9
1,2-Dichlorobenzene	410 U	1600 U	ND	ND		0/9
1,3-Dichlorobenzene	410 U	1600 U	ND	ND		0/9
1,4-Dichlorobenzene	410 U	1600 U	ND	ND		0/9
2,2'-oxybis(1-Chloropropan	410 U	1600 U	ND	ND		0/9
2,4,5-Trichlorophenol	1000 U	4000 U	ND	ND		0/9
2,4,6-Trichlorophenol	410 U	1600 U	ND	ND		0/9
2,4-Dichlorophenol	410 U	1600 U	ND	ND		0/9
2,4-Dimethylphenol	410 U	1600 U	ND	ND		0/9
2,4-Dinitrophenol	1000 U	4000 U	ND	ND		0/9
2,4-Dinitrotoluene	410 U	1600 U	ND	ND		0/9
2,6-Dinitrotoluene	410 U	1600 U	ND	ND		0/9
2-Chloronaphthalene	410 U	1600 U	ND	ND		0/9
2-Chlorophenol	410 U	1600 U	ND	ND		0/9
2-Methylnaphthalene	410 U	1600 U	ND	ND		0/9
2-Methylphenol	410 U	1600 U	ND	ND		0/9
2-Nitroaniline	1000 U	4000 U	ND	ND		0/9
2-Nitrophenol	410 U	1600 U	ND	ND		0/9
3,3'-Dichlorobenzidine	410 U	1600 U	ND	ND		0/9
3-Nitroaniline	1000 U	4000 U	ND	ND		0/9
4,6-Dinitro-2-Methylphenol	1000 U	4000 U	ND	ND		0/9
4-Bromophenyl phenylether	410 U	1600 U	ND	ND		0/9
4-Chloro-3-Methylphenol	410 U	1600 U	ND	ND		0/9
4-Chloroaniline	410 U	1600 U	ND	ND		0/9
4-Chlorophenyl-phenylether	410 U	1600 U	ND	ND		0/9
4-Methylphenol	410 U	1600 U	ND	ND		0/9
4-Nitroaniline	1000 U	4000 U	ND	ND		0/9
4-Nitrophenol	1000 U	4000 U	ND	ND		0/9
Acenaphthene	410 U	1600 U	ND	ND		0/9
Acenaphthylene	410 U	1600 U	ND	ND		0/9
Anthracene	410 U	1600 U	ND	ND		0/9
Benzo(a)Anthracene	410 U	410 U	110 J	290 J	4-SD04-00	8/9
Benzo(a)Pyrene	410 U	410 U	110 J	340 J	4-SD04-00D	8/9

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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg) (Cont)						
Benzo(b)Fluoranthene	ND	ND	57 J	550 J	4-SD04-00D	9/9
Benzo(g,h,i)Perylene	410 U	1200 U	56 J	180 J	4-SD04-00D	6/9
Benzo(k)Fluoanthene	410 U	410 U	86 J	440 J	4-SD04-00D	8/9
Bis(2-chloroethoxy)Methane	410 U	1600 U	ND	ND		0/9
Bis(2-chloroethyl)Ether	410 U	1600 U	ND	ND		0/9
Bis(2-Ethylhexyl)Phthalate	ND	ND	68 J	280 J	4-SD04-00D	9/9
Butylbenzylphthalate	410 U	1600 U	ND	ND		0/9
Carbazole	410 U	1600 U	ND	ND		0/9
Chrysene	ND	ND	52 J	490 J	4-SD04-00D	9/9
Dibenz(a,h)Anthracene	410 U	1600 U	ND	ND		0/9
Dibenzofuran	410 U	1600 U	ND	ND		0/9
Diethylphthalate	410 U	1600 U	ND	ND		0/9
Dimethyl Phthalate	410 U	1600 U	ND	ND		0/9
Di-n-Butylphthalate	410 U	1600 U	61 J	84 J	4-SD04-01	5/9
Di-n-Octyl Phthalate	410 U	1600 U	ND	ND		0/9
Fluoranthene	ND	ND	87 J	640 J	4-SD02-00	9/9
Fluorene	410 U	1600 U	ND	ND		0/9
Hexachlorobenzene	410 U	1600 U	ND	ND		0/9
Hexachlorobutadiene	410 U	1600 U	ND	ND		0/9
Hexachlorocyclopentadiene	410 U	1600 U	ND	ND		0/9
Hexachloroethane	410 U	1600 U	ND	ND		0/9
Indeno(1,2,3-cd)Pyrene	410 U	1200 U	64 J	210 J	4-SD04-00D	5/9
Isophorone	410 U	1600 U	ND	ND		0/9
Naphthalene	410 U	1600 U	ND	ND		0/9
Nitrobenzene	410 U	1600 U	ND	ND		0/9
N-Nitroso-Di-n-Propylamine	410 U	1600 U	ND	ND		0/9
N-Nitrosodiphenylamine	410 U	1600 U	ND	ND		0/9
Pentachlorophenol	1000 U	4000 U	ND	ND		0/9
Phenanthrene	410 U	410 U	100 J	340 J	4-SD04-00	8/9
Phenol	410 U	1600 U	ND	ND		0/9
Pyrene	ND	ND	84 J	610 J	4-SD04-00	9/9

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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Pesticides/PCBs (ug/kg)						
4,4'-DDD	4.1 U	7.8 UL	ND	ND		0/9
4,4'-DDE	4.1 U	7.8 UL	6.6	9 L	4-SD04-00	2/9
4,4'-DDT	4.9 UL	7.8 UL	49 J	400	4-SD03-01	2/9
Aldrin	2.1 U	4 UL	ND	ND		0/9
Aroclor-1016	41 U	78 UL	ND	ND		0/9
Aroclor-1221	82 U	160 UL	ND	ND		0/9
Aroclor-1232	41 U	78 UL	ND	ND		0/9
Aroclor-1242	41 U	78 UL	ND	ND		0/9
Aroclor-1248	41 U	78 UL	19 L	33 J	4-SD02-01	2/9
Aroclor-1254	41 U	78 UL	ND	ND		0/9
Aroclor-1260	52 U	60 U	18	270 K	4-SED01-00	7/9
alpha-BHC	2.1 U	4 UL	ND	ND		0/9
beta-BHC	2.1 U	4 UL	ND	ND		0/9
delta-BHC	2.1 U	4 UL	ND	ND		0/9
gamma-BHC	2.1 U	4 UL	ND	ND		0/9
alpha-Chlordane	2.1 U	4 UL	ND	ND		0/9
gamma-Chlordane	2.1 U	4 UL	ND	ND		0/9
Dieldrin	4.1 U	7.8 UL	ND	ND		0/9
Endosulfan I	2.1 U	4 UL	ND	ND		0/9
Endosulfan II	4.1 U	7.8 UL	ND	ND		0/9
Endosulfan Sulfate	4.1 U	7.8 UL	ND	ND		0/9
Endrin	4.1 U	7.8 UL	ND	ND		0/9
Endrin Aldehyde	4.1 U	7.8 UL	ND	ND		0/9
Endrin Ketone	4.1 U	7.8 UL	ND	ND		0/9
Heptachlor	2.1 U	4 UL	ND	ND		0/9
Heptachlor Epoxide	2.1 U	4 UL	ND	ND		0/9
Methoxychlor	21 U	40 UL	ND	ND		0/9
Toxaphene	210 U	400 UL	ND	ND		0/9

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SEDIMENT
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Explosives (ug/kg)						
1,3,5-Trinitrobenzene	430 U	500 U	ND	ND		0/9
1,3-Dinitrobenzene	430 U	500 U	ND	ND		0/9
2,4,6-Trinitrotoluene	430 U	500 U	ND	ND		0/9
2,4-Dinitrotoluene	430 U	500 U	ND	ND		0/9
2,6-Dinitrotoluene	430 U	500 U	ND	ND		0/9
2-Amino-4,6-dinitrotoluene	430 U	500 U	ND	ND		0/9
4-Amino-2,6-dinitrotoluene	430 U	500 U	ND	ND		0/9
2-Nitrotoluene	430 U	500 U	ND	ND		0/9
3-Nitrotoluene	430 U	500 U	ND	ND		0/9
4-Nitrotoluene	430 U	500 U	ND	ND		0/9
HMX	430 U	500 U	ND	ND		0/9
Nitrobenzene	430 U	500 U	ND	ND		0/9
RDX	430 U	500 U	ND	ND		0/9
Tetryl	430 U	500 U	ND	ND		0/9

FREQUENCY OF DETECTION SUMMARY - INORGANIC CONSTITUENTS IN SEDIMENT
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Inorganics (mg/kg)						
Aluminum	ND	ND	1500 L	8340 L	4-SED01-00	9/9
Antimony	0.43 U	1.7 B	1 J	1 J	4-SED01-01	1/9
Arsenic	ND	ND	0.98 J	12.2 L	4-SED01-00	9/9
Barium	6.4 B	9.9 B	19.2 J	71.7 J	4-SED01-00	7/9
Beryllium	0.49 B	0.73 B	0.21 J	0.6 J	4-SD03-00	7/9
Cadmium	ND	ND	0.09 J	7.2	4-SED01-01	9/9
Calcium	ND	ND	1360 J	25200	4-SED01-00	9/9
Chromium	ND	ND	7	35.8	4-SED01-00	9/9
Cobalt	1.2 U	1.8 U	2.9 J	4.6 J	4-SED01-00	4/9
Copper	3.8 B	7.3 B	10.1	65.3 J	4-SD03-00	6/9
Cyanide	0.02 UL	0.04 UL	ND	ND		0/9
Iron	ND	ND	4540 L	15400	4-SED01-00	9/9
Lead	ND	ND	4.2	59.8	4-SED01-01	9/9
Magnesium	ND	ND	410 J	2790	4-SED01-00	9/9
Manganese	ND	ND	12.1	93.4	4-SD02-00	9/9
Mercury	0.02 UL	0.04 U	0.04 L	0.07 J	4-SED01-00	2/9
Nickel	ND	ND	1.7 J	23.6	4-SED01-00	9/9
Potassium	272 B	368 B	673 J	1550	4-SD03-00	6/9
Selenium	0.59 U	1.1 U	ND	ND		0/9
Silver	0.97 U	5.6 B	ND	ND		0/9
Sodium	59.2 B	191 B	57 J	57 J	4-SD02-01	1/9
Thallium	0.47 UL	0.91 UL	ND	ND		0/9
Vanadium	ND	ND	6.8 J	36.6	4-SED01-00	9/9
Zinc	30.2 B	87.6 B	130	307	4-SD04-01	6/9

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Volatiles (ug/kg)						
1,1,1-Trichloroethane	14.15 UL	20.13 U	ND	ND		0/7
1,1,2,2-Tetrachloroethane	14.15 UL	20.13 U	ND	ND		0/7
1,1,2-Trichloroethane	14.15 UL	20.13 U	ND	ND		0/7
1,1-Dichloroethane	14.15 UL	20.13 U	ND	ND		0/7
1,1-Dichloroethene	14.15 UL	20.07 U	4 J	4 J	A1-HA05-00D	1/7
1,2-Dichloroethane	14.15 UL	20.13 U	ND	ND		0/7
1,2-Dichloroethene (total)	14.15 UL	20.13 U	ND	ND		0/7
1,2-Dichloropropane	14.15 UL	20.13 U	ND	ND		0/7
cis-1,3-Dichloropropene	14.15 UL	20.13 U	ND	ND		0/7
trans-1,3-Dichloropropene	14.15 UL	20.13 U	ND	ND		0/7
2-Butanone	3 B	20.07 U	5	5	A1-HA06-00	1/7
2-Hexanone	14.15 UL	20.13 U	ND	ND		0/7
4-Methyl-2-Pentanone	14.15 UL	20.13 U	ND	ND		0/7
Acetone	6 B	20.13 U	ND	ND		0/7
Benzene	14.15 UL	20.07 U	4 J	4 J	A1-HA05-00D	1/7
Bromodichloromethane	14.15 UL	20.13 U	ND	ND		0/7
Bromoform	14.15 UL	20.13 U	ND	ND		0/7
Bromomethane	14.15 UL	20.13 U	ND	ND		0/7
Carbon Disulfide	14.15 UL	20.13 U	ND	ND		0/7
Carbon Tetrachloride	14.15 UL	20.13 U	ND	ND		0/7
Chlorobenzene	14.15 UL	20.07 UL	5 J	5 J	A1-HA05-00D	1/7
Chloroethane	14.15 UL	20.13 U	ND	ND		0/7
Chloroform	14.15 UL	20.13 U	ND	ND		0/7
Chloromethane	14.15 UL	20.13 U	ND	ND		0/7
Dibromochloromethane	14.15 UL	20.13 U	ND	ND		0/7
Ethylbenzene	14.15 UL	20.13 U	ND	ND		0/7
Methylene Chloride	7 B	34 B	ND	ND		0/7
Styrene	14.15 UL	20.13 U	ND	ND		0/7
Tetrachloroethene	14.15 UL	20.13 U	ND	ND		0/7
Toluene	14.15 UL	20.07 UL	5 J	5 J	A1-HA05-00D	1/7
Trichloroethene	14.15 UL	20.07 U	4 J	4 J	A1-HA05-00D	1/7
Vinyl Chloride	14.15 UL	20.13 U	ND	ND		0/7
Xylene (Total)	14.15 UL	20.13 U	ND	ND		0/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg)						
1,2,4-Trichlorobenzene	450 U	620 UL	ND	ND		0/7
1,2-Dichlorobenzene	450 U	620 UL	ND	ND		0/7
1,3-Dichlorobenzene	450 U	620 UL	ND	ND		0/7
1,4-Dichlorobenzene	450 U	620 UL	ND	ND		0/7
2,2'-oxybis(1-Chloropropan	450 U	620 UL	ND	ND		0/7
2,4,5-Trichlorophenol	1100 U	1600 UL	ND	ND		0/7
2,4,6-Trichlorophenol	450 U	620 UL	ND	ND		0/7
2,4-Dichlorophenol	450 U	620 UL	ND	ND		0/7
2,4-Dimethylphenol	450 U	620 UL	ND	ND		0/7
2,4-Dinitrophenol	1100 U	1600 UL	ND	ND		0/7
2,4-Dinitrotoluene	450 U	620 UL	ND	ND		0/7
2,6-Dinitrotoluene	450 U	620 UL	ND	ND		0/7
2-Chloronaphthalene	450 U	620 UL	ND	ND		0/7
2-Chlorophenol	450 U	620 UL	ND	ND		0/7
2-Methylnaphthalene	450 U	620 UL	ND	ND		0/7
2-Methylphenol	450 U	620 UL	ND	ND		0/7
2-Nitroaniline	1100 U	1600 UL	ND	ND		0/7
2-Nitrophenol	450 U	620 UL	ND	ND		0/7
3,3'-Dichlorobenzidine	450 U	620 UL	ND	ND		0/7
3-Nitroaniline	1100 U	1600 UL	ND	ND		0/7
4,6-Dinitro-2-Methylphenol	1100 U	1600 UL	ND	ND		0/7
4-Bromophenyl phenylether	450 U	620 UL	ND	ND		0/7
4-Chloro-3-Methylphenol	450 U	620 UL	ND	ND		0/7
4-Chloroaniline	450 U	620 UL	ND	ND		0/7
4-Chlorophenyl-phenylether	450 U	620 UL	ND	ND		0/7
4-Methylphenol	450 U	620 UL	ND	ND		0/7
4-Nitroaniline	1100 U	1600 UL	ND	ND		0/7
4-Nitrophenol	1100 U	1600 UL	ND	ND		0/7
Acenaphthene	450 U	620 UL	ND	ND		0/7
Acenaphthylene	450 U	620 UL	ND	ND		0/7
Anthracene	450 U	620 UL	ND	ND		0/7
Benzo(a)Anthracene	450 U	610 U	65 J	280	A1-HA01-00	2/7
Benzo(a)Pyrene	450 U	610 U	92 J	870	A1-HA01-00	2/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg) (Cont)						
Benzo(b)Fluoranthene	450 U	600 U	66 J	1700	A1-HA01-00	4/7
Benzo(g,h,i)Perylene	450 U	610 U	78 J	970	A1-HA01-00	2/7
Benzo(k)Fluoanthene	450 U	610 U	96 J	970	A1-HA01-00	2/7
Bis(2-chloroethoxy)Methane	450 U	620 UL	ND	ND		0/7
Bis(2-chloroethyl)Ether	450 U	620 UL	ND	ND		0/7
Bis(2-Ethylhexyl)Phthalate	450 U	620 UL	47 J	12000 J	A1-HA04-00	5/7
Butylbenzylphthalate	450 U	620 UL	ND	ND		0/7
Carbazole	450 U	620 UL	ND	ND		0/7
Chrysene	450 U	600 U	67 J	830	A1-HA01-00	4/7
Dibenz(a,h)Anthracene	450 U	610 U	350	350	A1-HA01-00	1/7
Dibenzofuran	450 U	620 UL	ND	ND		0/7
Diethylphthalate	450 U	620 UL	ND	ND		0/7
Dimethyl Phthalate	450 U	620 UL	ND	ND		0/7
Di-n-Butylphthalate	620 UL	620 UL	72 J	170 J	A1-HA05-00D	6/7
Di-n-Octyl Phthalate	450 U	620 UL	ND	ND		0/7
Fluoranthene	450 U	610 U	61 J	250	A1-HA01-00	3/7
Fluorene	450 U	620 UL	ND	ND		0/7
Hexachlorobenzene	450 U	620 UL	ND	ND		0/7
Hexachlorobutadiene	450 U	620 UL	ND	ND		0/7
Hexachlorocyclopentadiene	450 U	620 UL	ND	ND		0/7
Hexachloroethane	450 U	620 UL	ND	ND		0/7
Indeno(1,2,3-cd)Pyrene	450 U	610 U	74 J	810	A1-HA01-00	2/7
Isophorone	450 U	620 UL	ND	ND		0/7
Naphthalene	450 U	620 UL	ND	ND		0/7
Nitrobenzene	450 U	620 UL	ND	ND		0/7
N-Nitroso-Di-n-Propylamine	450 U	620 UL	ND	ND		0/7
N-Nitrosodiphenylamine	450 U	620 UL	ND	ND		0/7
Pentachlorophenol	1100 U	1600 UL	ND	ND		0/7
Phenanthrene	450 U	610 U	71 J	78	A1-HA01-00	2/7
Phenol	450 U	620 UL	ND	ND		0/7
Pyrene	450 U	610 U	65 J	360	A1-HA01-00	3/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Pesticides/PCBs (ug/kg)						
4,4'-DDD	4.5 U	6.2 UL	ND	ND		0/7
4,4'-DDE	4.5 U	6.1 U	1.5 L	18	A1-HA01-00	2/7
4,4'-DDT	4.5 U	6.1 U	15	120	A1-HA04-00	2/7
Aldrin	2.3 U	3.2 UL	ND	ND		0/7
Aroclor-1016	45 U	62 UL	ND	ND		0/7
Aroclor-1221	92 U	130 UL	ND	ND		0/7
Aroclor-1232	45 U	62 UL	ND	ND		0/7
Aroclor-1242	45 U	62 UL	ND	ND		0/7
Aroclor-1248	45 U	62 UL	ND	ND		0/7
Aroclor-1254	45 U	62 UL	ND	ND		0/7
Aroclor-1260	45 U	62 UL	220 L	220 L	A1-HA04-00	1/7
alpha-BHC	2.3 U	3.2 UL	ND	ND		0/7
beta-BHC	2.3 U	3.2 UL	ND	ND		0/7
delta-BHC	2.3 U	3.2 UL	ND	ND		0/7
gamma-BHC	2.3 U	3.2 UL	ND	ND		0/7
alpha-Chlordane	2.3 U	3.1 U	4.3	4.3	A1-HA01-00	1/7
gamma-Chlordane	2.3 U	3.2 UL	ND	ND		0/7
Dieldrin	4.5 U	6.2 UL	ND	ND		0/7
Endosulfan I	2.3 U	3.2 UL	ND	ND		0/7
Endosulfan II	4.5 U	6.2 UL	ND	ND		0/7
Endosulfan Sulfate	4.5 U	6.1 U	14	14	A1-HA01-00	1/7
Endrin	4.5 U	6.2 UL	ND	ND		0/7
Endrin Aldehyde	4.5 U	6.2 UL	ND	ND		0/7
Endrin Ketone	4.5 U	6.2 UL	ND	ND		0/7
Heptachlor	2.3 U	3.2 UL	ND	ND		0/7
Heptachlor Epoxide	2.3 U	3.2 UL	ND	ND		0/7
Methoxychlor	23 U	32 UL	ND	ND		0/7
Toxaphene	230 U	320 UL	ND	ND		0/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Explosives (ug/kg)						
1,3,5-Trinitrobenzene	420 U	500 U	ND	ND		0/7
1,3-Dinitrobenzene	420 U	500 U	ND	ND		0/7
2,4,6-Trinitrotoluene	420 U	500 U	ND	ND		0/7
2,4-Dinitrotoluene	420 U	500 U	ND	ND		0/7
2,6-Dinitrotoluene	420 U	500 U	ND	ND		0/7
2-Amino-4,6-dinitrotoluene	420 U	500 U	ND	ND		0/7
4-Amino-2,6-dinitrotoluene	420 U	500 U	ND	ND		0/7
2-Nitrotoluene	420 U	500 U	ND	ND		0/7
3-Nitrotoluene	420 U	500 U	ND	ND		0/7
4-Nitrotoluene	420 U	500 U	ND	ND		0/7
HMX	420 U	500 U	ND	ND		0/7
Nitrobenzene	420 U	500 U	ND	ND		0/7
RDX	420 U	500 U	ND	ND		0/7
Tetryl	420 U	500 U	ND	ND		0/7

FREQUENCY OF DETECTION SUMMARY - INORGANIC CONSTITUENTS IN SURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Inorganics (mg/kg)						
Aluminum	ND	ND	3570 L	9030 L	A1-HA01-00	7/7
Antimony	0.53 U	13.9 U	5.7 J	5.9 J	A1-HA05-00D	2/7
Arsenic	2.3 U	2.3 U	1.4 J	23.5	A1-HA01-00	6/7
Barium	ND	ND	38.2 J	151	A1-HA01-00	7/7
Beryllium	0.16 U	0.84 B	ND	ND		0/7
Cadmium	1.2 U	2.3 U	0.52 J	0.89 J	A1-HA01-00	2/7
Calcium	ND	ND	4480	35900	A1-HA03-00	7/7
Chromium	ND	ND	7.2	44.7	A1-HA01-00	7/7
Cobalt	1.5 U	1.5 U	3.1 J	9.9 J	A1-HA03-00	6/7
Copper	11.3 B	11.3 B	3.2 J	88.5	A1-HA05-00	6/7
Cyanide	0.03 UL	0.9 UL	0.08 J	0.2 J	A1-HA05-00,A1-HA05-00D	3/7
Iron	ND	ND	8050	35200 L	A1-HA02-00	7/7
Lead	ND	ND	16.2	501	A1-HA05-00D	7/7
Magnesium	ND	ND	380 J	1980	A1-HA01-00	7/7
Manganese	ND	ND	122	523	A1-HA01-00	7/7
Mercury	0.03 UL	0.03 UL	0.05 J	0.13 J	A1-HA01-00	6/7
Nickel	3.4 B	3.4 B	5.1 J	8.8 J	A1-HA05-00D	6/7
Potassium	250 B	385 B	579 J	652 J	A1-HA01-00	3/7
Selenium	0.72 U	1.5 U	ND	ND		0/7
Silver	1.4 B	9.3 B	ND	ND		0/7
Sodium	26.1 B	82.6 B	ND	ND		0/7
Thallium	0.68 B	3 UL	ND	ND		0/7
Vanadium	ND	ND	14.6	26	A1-HA01-00	7/7
Zinc	59 B	59 B	110	849	A1-HA01-00	6/7

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Volatiles (ug/kg)						
1,1,1-Trichloroethane	11.49 U	18.58 U	ND	ND		0/6
1,1,2,2-Tetrachloroethane	11.49 U	18.58 UL	ND	ND		0/6
1,1,2-Trichloroethane	11.49 U	18.58 U	ND	ND		0/6
1,1-Dichloroethane	11.49 U	18.58 U	ND	ND		0/6
1,1-Dichloroethene	11.49 U	18.58 U	ND	ND		0/6
1,2-Dichloroethane	11.49 U	18.58 U	ND	ND		0/6
1,2-Dichloroethene (total)	11.49 U	18.58 U	ND	ND		0/6
1,2-Dichloropropane	11.49 U	18.58 U	ND	ND		0/6
cis-1,3-Dichloropropene	11.49 U	18.58 U	ND	ND		0/6
trans-1,3-Dichloropropene	11.49 U	18.58 U	ND	ND		0/6
2-Butanone	2 B	18.58 U	ND	ND		0/6
2-Hexanone	11.49 U	18.58 UL	ND	ND		0/6
4-Methyl-2-Pentanone	11.49 U	18.58 U	ND	ND		0/6
Acetone	8 B	18.13 U	ND	ND		0/6
Benzene	11.49 U	18.58 U	ND	ND		0/6
Bromodichloromethane	11.49 U	18.58 U	ND	ND		0/6
Bromoform	11.49 U	18.58 U	ND	ND		0/6
Bromomethane	11.49 U	18.58 U	ND	ND		0/6
Carbon Disulfide	11.49 U	18.58 U	ND	ND		0/6
Carbon Tetrachloride	11.49 U	18.58 U	ND	ND		0/6
Chlorobenzene	11.49 U	18.58 UL	ND	ND		0/6
Chloroethane	11.49 U	18.58 U	ND	ND		0/6
Chloroform	11.49 U	18.58 U	ND	ND		0/6
Chloromethane	11.49 U	18.58 U	ND	ND		0/6
Dibromochloromethane	11.49 U	18.58 U	ND	ND		0/6
Ethylbenzene	11.49 U	18.58 UL	ND	ND		0/6
Methylene Chloride	8 B	22 B	ND	ND		0/6
Styrene	11.49 U	18.58 UL	ND	ND		0/6
Tetrachloroethene	11.49 U	18.58 UL	ND	ND		0/6
Toluene	11.49 U	18.58 UL	ND	ND		0/6
Trichloroethene	11.49 U	18.58 U	ND	ND		0/6
Vinyl Chloride	11.49 U	18.58 U	ND	ND		0/6
Xylene (Total)	11.49 U	13.26 U	2	3	A1-HA05-01D	2/6

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
AOC 1 - SCRAP METAL DUMP
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg)						
1,2,4-Trichlorobenzene	380 U	570 U	ND	ND		0/6
1,2-Dichlorobenzene	380 U	570 U	ND	ND		0/6
1,3-Dichlorobenzene	380 U	570 U	ND	ND		0/6
1,4-Dichlorobenzene	380 U	570 U	ND	ND		0/6
2,2'-oxybis(1-Chloropropan	380 U	570 U	ND	ND		0/6
2,4,5-Trichlorophenol	950 U	1400 U	ND	ND		0/6
2,4,6-Trichlorophenol	380 U	570 U	ND	ND		0/6
2,4-Dichlorophenol	380 U	570 U	ND	ND		0/6
2,4-Dimethylphenol	380 U	570 U	ND	ND		0/6
2,4-Dinitrophenol	950 U	1400 U	ND	ND		0/6
2,4-Dinitrotoluene	380 U	570 U	ND	ND		0/6
2,6-Dinitrotoluene	380 U	570 U	ND	ND		0/6
2-Chloronaphthalene	380 U	570 U	ND	ND		0/6
2-Chlorophenol	380 U	570 U	ND	ND		0/6
2-Methylnaphthalene	380 U	570 U	ND	ND		0/6
2-Methylphenol	380 U	570 U	ND	ND		0/6
2-Nitroaniline	950 U	1400 U	ND	ND		0/6
2-Nitrophenol	380 U	570 U	ND	ND		0/6
3,3'-Dichlorobenzidine	380 U	570 U	ND	ND		0/6
3-Nitroaniline	950 U	1400 U	ND	ND		0/6
4,6-Dinitro-2-Methylphenol	950 U	1400 U	ND	ND		0/6
4-Bromophenyl phenylether	380 U	570 U	ND	ND		0/6
4-Chloro-3-Methylphenol	380 U	570 U	ND	ND		0/6
4-Chloroaniline	380 U	570 U	ND	ND		0/6
4-Chlorophenyl-phenylether	380 U	570 U	ND	ND		0/6
4-Methylphenol	380 U	570 U	ND	ND		0/6
4-Nitroaniline	950 U	1400 U	ND	ND		0/6
4-Nitrophenol	950 UJ	1400 U	ND	ND		0/6
Acenaphthene	380 U	570 U	ND	ND		0/6
Acenaphthylene	380 U	570 U	ND	ND		0/6
Anthracene	380 U	570 U	ND	ND		0/6
Benzo(a)Anthracene	380 U	570 U	64 J	64 J	A1-HA05-01D	1/6
Benzo(a)Pyrene	380 U	570 U	59 J	59 J	A1-HA05-01D	1/6

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg) (Cont)						
Benzo(b)Fluoranthene	380 U	410 U	79 J	88 J	A1-HA05-01D	2/6
Benzo(g,h,i)Perylene	380 U	570 U	71 J	71 J	A1-HA05-01D	1/6
Benzo(k)Fluoanthene	380 U	410 U	65 J	74 J	A1-HA05-01	2/6
Bis(2-chloroethoxy)Methane	380 U	570 U	ND	ND		0/6
Bis(2-chloroethyl)Ether	380 U	570 U	ND	ND		0/6
Bis(2-Ethylhexyl)Phthalate	400 U	570 U	46 J	76 J	A1-HA02-02	3/6
Butylbenzylphthalate	380 U	570 U	ND	ND		0/6
Carbazole	380 U	570 U	ND	ND		0/6
Chrysene	380 U	410 U	81 J	83 J	A1-HA05-01	2/6
Dibenz(a,h)Anthracene	380 U	570 U	ND	ND		0/6
Dibenzofuran	380 U	570 U	ND	ND		0/6
Diethylphthalate	380 U	570 U	ND	ND		0/6
Dimethyl Phthalate	380 U	570 U	ND	ND		0/6
Di-n-Butylphthalate	ND	ND	49 J	110 J	A1-HA05-01,A1-HA05-01D	6/6
Di-n-Octyl Phthalate	380 U	570 U	ND	ND		0/6
Fluoranthene	380 U	410 U	100 J	140 J	A1-HA05-01D	2/6
Fluorene	380 U	570 U	ND	ND		0/6
Hexachlorobenzene	380 U	570 U	ND	ND		0/6
Hexachlorobutadiene	380 U	570 U	ND	ND		0/6
Hexachlorocyclopentadiene	380 U	570 U	ND	ND		0/6
Hexachloroethane	380 U	570 U	ND	ND		0/6
Indeno(1,2,3-cd)Pyrene	380 U	570 U	55 J	55 J	A1-HA05-01D	1/6
Isophorone	380 U	570 U	ND	ND		0/6
Naphthalene	380 U	570 U	ND	ND		0/6
Nitrobenzene	380 U	570 U	ND	ND		0/6
N-Nitroso-Di-n-Propylamine	380 U	570 U	ND	ND		0/6
N-Nitrosodiphenylamine	380 U	570 U	ND	ND		0/6
Pentachlorophenol	950 U	1400 U	ND	ND		0/6
Phenanthrene	380 U	570 U	97 J	97 J	A1-HA05-01D	1/6
Phenol	380 U	570 U	ND	ND		0/6
Pyrene	380 U	410 U	78 J	110 J	A1-HA05-01D	2/6

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Pesticides/PCBs (ug/kg)						
4,4'-DDD	3.8 UL	5.6 U	ND	ND		0/6
4,4'-DDE	3.8 UL	5.6 U	ND	ND		0/6
4,4'-DDT	3.8 UL	5.6 U	ND	ND		0/6
Aldrin	1.9 UL	2.9 U	ND	ND		0/6
Aroclor-1016	38 UL	56 U	ND	ND		0/6
Aroclor-1221	76 UL	110 U	ND	ND		0/6
Aroclor-1232	38 UL	56 U	ND	ND		0/6
Aroclor-1242	38 UL	56 U	ND	ND		0/6
Aroclor-1248	38 UL	56 U	ND	ND		0/6
Aroclor-1254	38 UL	56 U	ND	ND		0/6
Aroclor-1260	38 UL	56 U	ND	ND		0/6
alpha-BHC	1.9 UL	2.9 U	ND	ND		0/6
beta-BHC	1.9 UL	2.9 U	ND	ND		0/6
delta-BHC	1.9 UL	2.9 U	ND	ND		0/6
gamma-BHC	1.9 UL	2.9 U	ND	ND		0/6
alpha-Chlordane	1.9 UL	2.9 U	ND	ND		0/6
gamma-Chlordane	1.9 UL	2.9 U	ND	ND		0/6
Dieldrin	3.8 UL	5.6 U	ND	ND		0/6
Endosulfan I	1.9 UL	2.9 U	ND	ND		0/6
Endosulfan II	3.8 UL	5.6 U	ND	ND		0/6
Endosulfan Sulfate	3.8 UL	5.6 U	ND	ND		0/6
Endrin	3.8 UL	5.6 U	ND	ND		0/6
Endrin Aldehyde	3.8 UL	5.6 U	ND	ND		0/6
Endrin Ketone	3.8 UL	5.6 U	ND	ND		0/6
Heptachlor	1.9 UL	2.9 U	ND	ND		0/6
Heptachlor Epoxide	1.9 UL	2.9 U	ND	ND		0/6
Methoxychlor	19 UL	29 U	ND	ND		0/6
Toxaphene	190 UL	290 U	ND	ND		0/6

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SUBSURFACE SOIL
AOC 1 - SCRAP METAL DUMP
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Explosives (ug/kg)						
1,3,5-Trinitrobenzene	430 U	480 U	ND	ND		0/6
1,3-Dinitrobenzene	430 U	480 U	ND	ND		0/6
2,4,6-Trinitrotoluene	430 U	480 U	ND	ND		0/6
2,4-Dinitrotoluene	430 U	480 U	ND	ND		0/6
2,6-Dinitrotoluene	430 U	480 U	ND	ND		0/6
2-Amino-4,6-dinitrotoluene	430 U	480 U	ND	ND		0/6
4-Amino-2,6-dinitrotoluene	430 U	480 U	ND	ND		0/6
2-Nitrotoluene	430 U	480 U	ND	ND		0/6
3-Nitrotoluene	430 U	480 U	ND	ND		0/6
4-Nitrotoluene	430 U	480 U	ND	ND		0/6
HMX	430 U	480 U	ND	ND		0/6
Nitrobenzene	430 U	480 U	ND	ND		0/6
RDX	430 U	480 U	ND	ND		0/6
Tetryl	430 U	480 U	ND	ND		0/6

FREQUENCY OF DETECTION SUMMARY - INORGANIC CONSTITUENTS IN SUBSURFACE SOIL
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Inorganics (mg/kg)						
Aluminum	ND	ND	4080 L	8830 L	A1-HA06-02	6/6
Antimony	0.41 B	10.9 U	11.4 J	12 J	A1-HA05-01	2/6
Arsenic	ND	ND	1.3 J	33.3	A1-HA06-02	6/6
Barium	12.9 B	12.9 B	25.9 J	90.9	A1-HA05-01D	5/6
Beryllium	0.21 B	1.1 B	0.22 J	0.95	A1-HA06-02	3/6
Cadmium	0.06 U	1 U	0.07 J	0.07 J	A1-HA04-02	1/6
Calcium	ND	ND	1090	10400	A1-HA05-01D	6/6
Chromium	ND	ND	3.6	32.6	A1-HA06-02	6/6
Cobalt	ND	ND	1.5 J	9.4	A1-HA06-02	6/6
Copper	1.5 B	3.5 B	86	146	A1-HA05-01D	2/6
Cyanide	0.6 UL	0.6 UL	0.08 J	0.68 J	A1-HA05-01	4/6
Iron	ND	ND	2630 L	39700	A1-HA06-02	6/6
Lead	ND	ND	4.7	1120	A1-HA05-01D	6/6
Magnesium	81.4 B	81.4 B	547 J	1430	A1-HA02-02	5/6
Manganese	ND	ND	11	401	A1-HA05-01D	6/6
Mercury	0.03 UL	0.1 U	0.02 J	0.06 L	A1-HA05-01	2/6
Nickel	12.3 B	13.6 B	1.2 J	23.3 L	A1-HA05-01	4/6
Potassium	117 B	472 B	690 J	1040	A1-HA06-02	2/6
Selenium	0.55 U	1 U	ND	ND		0/6
Silver	1.6 B	9.7 B	1.8 UB	11.3	A1-HA06-02	2/6
Sodium	17.2 B	48.2 B	ND	ND		0/6
Thallium	0.59 U	1.9 UL	ND	ND		0/6
Vanadium	ND	ND	6.9	40.8	A1-HA06-02	6/6
Zinc	4.2 B	35.3 B	330	365	A1-HA05-01D	2/6

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE WATER
AOC 1 - SCRAP METAL DUMP
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Volatiles (ug/L)						
1,1,1-Trichloroethane	10 U	10 U	ND	ND		0/4
1,1,2,2-Tetrachloroethane	10 U	10 U	ND	ND		0/4
1,1,2-Trichloroethane	10 U	10 U	ND	ND		0/4
1,1-Dichloroethane	10 U	10 U	ND	ND		0/4
1,1-Dichloroethene	10 U	10 U	ND	ND		0/4
1,2-Dichloroethane	10 U	10 U	ND	ND		0/4
1,2-Dichloroethene (total)	10 U	10 U	ND	ND		0/4
1,2-Dichloropropane	10 U	10 U	ND	ND		0/4
cis-1,3-Dichloropropene	10 U	10 U	ND	ND		0/4
trans-1,3-Dichloropropene	10 U	10 U	ND	ND		0/4
2-Butanone	10 U	10 U	ND	ND		0/4
2-Hexanone	10 U	10 U	ND	ND		0/4
4-Methyl-2-Pentanone	10 U	10 U	ND	ND		0/4
Acetone	4 B	11 B	ND	ND		0/4
Benzene	10 U	10 U	ND	ND		0/4
Bromodichloromethane	10 U	10 U	ND	ND		0/4
Bromoform	10 U	10 U	ND	ND		0/4
Bromomethane	10 U	10 U	ND	ND		0/4
Carbon Disulfide	10 U	10 U	ND	ND		0/4
Carbon Tetrachloride	10 U	10 U	ND	ND		0/4
Chlorobenzene	10 U	10 U	ND	ND		0/4
Chloroethane	10 U	10 U	ND	ND		0/4
Chloroform	10 U	10 U	ND	ND		0/4
Chloromethane	10 U	10 U	ND	ND		0/4
Dibromochloromethane	10 U	10 U	ND	ND		0/4
Ethylbenzene	10 U	10 U	ND	ND		0/4
Methylene Chloride	2 B	2 B	ND	ND		0/4
Styrene	10 U	10 U	ND	ND		0/4
Tetrachloroethene	10 U	10 U	ND	ND		0/4
Toluene	10 U	10 U	ND	ND		0/4
Trichloroethene	10 U	10 U	ND	ND		0/4
Vinyl Chloride	10 U	10 U	ND	ND		0/4
Xylene (Total)	10 U	10 U	ND	ND		0/4

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE WATER
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/L)						
1,2,4-Trichlorobenzene	10 U	10 U	ND	ND		0/4
1,2-Dichlorobenzene	10 U	10 U	ND	ND		0/4
1,3-Dichlorobenzene	10 U	10 U	ND	ND		0/4
1,4-Dichlorobenzene	10 U	10 U	ND	ND		0/4
2,2'-oxybis(1-Chloropropan	10 U	10 U	ND	ND		0/4
2,4,5-Trichlorophenol	25 U	25 U	ND	ND		0/4
2,4,6-Trichlorophenol	10 U	10 U	ND	ND		0/4
2,4-Dichlorophenol	10 U	10 U	ND	ND		0/4
2,4-Dimethylphenol	10 U	10 U	ND	ND		0/4
2,4-Dinitrophenol	25 U	25 U	ND	ND		0/4
2,4-Dinitrotoluene	10 U	10 U	ND	ND		0/4
2,6-Dinitrotoluene	10 U	10 U	ND	ND		0/4
2-Chloronaphthalene	10 U	10 U	ND	ND		0/4
2-Chlorophenol	10 U	10 U	ND	ND		0/4
2-Methylnaphthalene	10 U	10 U	ND	ND		0/4
2-Methylphenol	10 U	10 U	ND	ND		0/4
2-Nitroaniline	25 U	25 U	ND	ND		0/4
2-Nitrophenol	10 U	10 U	ND	ND		0/4
3,3'-Dichlorobenzidine	10 U	10 U	ND	ND		0/4
3-Nitroaniline	25 U	25 U	ND	ND		0/4
4,6-Dinitro-2-Methylphenol	25 U	25 U	ND	ND		0/4
4-Bromophenyl phenylether	10 U	10 U	ND	ND		0/4
4-Chloro-3-Methylphenol	10 U	10 U	ND	ND		0/4
4-Chloroaniline	10 U	10 U	ND	ND		0/4
4-Chlorophenyl-phenylether	10 U	10 U	ND	ND		0/4
4-Methylphenol	10 U	10 U	ND	ND		0/4
4-Nitroaniline	25 U	25 U	ND	ND		0/4
4-Nitrophenol	25 U	25 U	ND	ND		0/4
Acenaphthene	10 U	10 U	ND	ND		0/4
Acenaphthylene	10 U	10 U	ND	ND		0/4
Anthracene	10 U	10 U	ND	ND		0/4
Benzo(a)Anthracene	10 U	10 U	ND	ND		0/4
Benzo(a)Pyrene	10 U	10 U	ND	ND		0/4

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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg) (Cont)						
Benzo(b)Fluoranthene	10 U	10 U	ND	ND		0/4
Benzo(g,h,i)Perylene	10 U	10 U	ND	ND		0/4
Benzo(k)Fluoanthene	10 U	10 U	ND	ND		0/4
Bis(2-chloroethoxy)Methane	10 U	10 U	ND	ND		0/4
Bis(2-chloroethyl)Ether	10 U	10 U	ND	ND		0/4
Bis(2-Ethylhexyl)Phthalate	10 U	10 U	2 J	98	A1-SW02	3/4
Butylbenzylphthalate	10 U	10 U	ND	ND		0/4
Carbazole	10 U	10 U	ND	ND		0/4
Chrysene	10 U	10 U	ND	ND		0/4
Dibenz(a,h)Anthracene	10 U	10 U	ND	ND		0/4
Dibenzofuran	10 U	10 U	ND	ND		0/4
Diethylphthalate	10 U	10 U	ND	ND		0/4
Dimethyl Phthalate	10 U	10 U	ND	ND		0/4
Di-n-Butylphthalate	1 B	10 U	ND	ND		0/4
Di-n-Octyl Phthalate	10 U	10 U	3 J	3 J	A1-SW01	1/4
Fluoranthene	10 U	10 U	ND	ND		0/4
Fluorene	10 U	10 U	ND	ND		0/4
Hexachlorobenzene	10 U	10 U	ND	ND		0/4
Hexachlorobutadiene	10 U	10 U	ND	ND		0/4
Hexachlorocyclopentadiene	10 U	10 U	ND	ND		0/4
Hexachloroethane	10 U	10 U	ND	ND		0/4
Indeno(1,2,3-cd)Pyrene	10 U	10 U	ND	ND		0/4
Isophorone	10 U	10 U	ND	ND		0/4
Naphthalene	10 U	10 U	ND	ND		0/4
Nitrobenzene	10 U	10 U	ND	ND		0/4
N-Nitroso-Di-n-Propylamine	10 U	10 U	ND	ND		0/4
N-Nitrosodiphenylamine	10 U	10 U	ND	ND		0/4
Pentachlorophenol	25 U	25 U	ND	ND		0/4
Phenanthrene	10 U	10 U	ND	ND		0/4
Phenol	10 U	10 U	ND	ND		0/4
Pyrene	10 U	10 U	ND	ND		0/4

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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Pesticides/PCBs (ug/L)						
4,4'-DDD	0.1 U	0.2 UL	ND	ND		0/4
4,4'-DDE	0.1 U	0.2 UL	ND	ND		0/4
4,4'-DDT	0.1 U	0.2 UL	ND	ND		0/4
Aldrin	0.05 U	0.1 UL	ND	ND		0/4
Aroclor-1016	1 U	2 UL	ND	ND		0/4
Aroclor-1221	2 U	4 UL	ND	ND		0/4
Aroclor-1232	1 U	2 UL	ND	ND		0/4
Aroclor-1242	1 U	2 UL	ND	ND		0/4
Aroclor-1248	1 U	2 UL	ND	ND		0/4
Aroclor-1254	1 U	2 UL	ND	ND		0/4
Aroclor-1260	1 U	2 UL	ND	ND		0/4
alpha-BHC	0.05 U	0.1 UL	ND	ND		0/4
beta-BHC	0.05 U	0.1 UL	ND	ND		0/4
delta-BHC	0.05 U	0.1 UL	ND	ND		0/4
gamma-BHC	0.05 U	0.1 UL	ND	ND		0/4
alpha-Chlordane	0.05 U	0.1 UL	ND	ND		0/4
gamma-Chlordane	0.05 U	0.1 UL	ND	ND		0/4
Dieldrin	0.1 U	0.2 UL	ND	ND		0/4
Endosulfan I	0.05 U	0.1 UL	ND	ND		0/4
Endosulfan II	0.1 U	0.2 UL	ND	ND		0/4
Endosulfan Sulfate	0.1 U	0.2 UL	ND	ND		0/4
Endrin	0.1 U	0.2 UL	ND	ND		0/4
Endrin Aldehyde	0.1 U	0.2 UL	ND	ND		0/4
Endrin Ketone	0.1 U	0.2 UL	ND	ND		0/4
Heptachlor	0.05 U	0.1 UL	ND	ND		0/4
Heptachlor Epoxide	0.05 U	0.1 UL	ND	ND		0/4
Methoxychlor	0.5 U	1 UL	ND	ND		0/4
Toxaphene	5 U	10 UL	ND	ND		0/4

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SURFACE WATER
AOC 1 - SCRAP METAL DUMP
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	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Explosives (ug/kg)						
1,3,5-Trinitrobenzene	1 U	1 U	ND	ND		0/4
1,3-Dinitrobenzene	1 U	1 U	ND	ND		0/4
2,4,6-Trinitrotoluene	1 U	1 U	ND	ND		0/4
2,4-Dinitrotoluene	1 U	1 U	ND	ND		0/4
2,6-Dinitrotoluene	1 U	1 U	ND	ND		0/4
2-Amino-4,6-dinitrotoluene	1 U	1 U	ND	ND		0/4
4-Amino-2,6-dinitrotoluene	1 U	1 U	ND	ND		0/4
2-Nitrotoluene	1 U	1 U	ND	ND		0/4
3-Nitrotoluene	1 U	1 U	ND	ND		0/4
4-Nitrotoluene	1 U	1 U	ND	ND		0/4
HMX	1 U	1 U	ND	ND		0/4
Nitrobenzene	1 U	1 U	ND	ND		0/4
RDX	1 U	1 U	ND	ND		0/4
Tetryl	1 U	1 U	ND	ND		0/4

FREQUENCY OF DETECTION SUMMARY - INORGANIC CONSTITUENTS IN SURFACE WATER
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Inorganics (ug/L)						
Aluminum	44 U	80.8 B	ND	ND		0/4
Antimony	2.2 U	3.4 B	ND	ND		0/4
Arsenic	3.4 U	3.4 U	17.1	19	A1-SW03D	2/4
Barium	33.8 B	55.6 B	89.8 J	92 J	A1-SW03D	2/4
Beryllium	0.66 U	0.66 U	ND	ND		0/4
Cadmium	0.34 U	0.34 U	ND	ND		0/4
Calcium	ND	ND	94900	141000	A1-SW03D	4/4
Chromium	6.2 U	6.2 U	ND	ND		0/4
Cobalt	6.2 U	6.2 U	ND	ND		0/4
Copper	5.4 U	5.4 U	ND	ND		0/4
Cyanide	0.2 UL	0.2 UL	0.2 Ul	0.2 Ul	A1-SW01	1/4
Iron	ND	ND	339	25900	A1-SW03	4/4
Lead	1.4 U	1.4 U	ND	ND		0/4
Magnesium	ND	ND	1780 J	4390 J	A1-SW03D	4/4
Manganese	ND	ND	26.1	656	A1-SW03D	4/4
Mercury	0.06 UL	0.06 UL	ND	ND		0/4
Nickel	6 U	6 U	ND	ND		0/4
Potassium	1340 B	1340 B	1710 J	2660 J	A1-SW03D	3/4
Selenium	3 U	3 U	ND	ND		0/4
Silver	3.9 UL	6.7 B	ND	ND		0/4
Sodium	ND	ND	4570 J	6970 J	A1-SW03D	4/4
Thallium	2.4 U	2.4 U	ND	ND		0/4
Vanadium	5.7 U	5.7 U	ND	ND		0/4
Zinc	9.7 B	45.1 B	ND	ND		0/4

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SEDIMENT
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Volatiles (ug/kg)						
1,1,1-Trichloroethane	12.95 U	17.9 U	ND	ND		0/9
1,1,2,2-Tetrachloroethane	12.95 U	17.9 U	ND	ND		0/9
1,1,2-Trichloroethane	12.95 U	17.9 U	ND	ND		0/9
1,1-Dichloroethane	12.95 U	17.9 U	ND	ND		0/9
1,1-Dichloroethene	12.95 U	17.9 U	ND	ND		0/9
1,2-Dichloroethane	12.95 U	17.9 U	ND	ND		0/9
1,2-Dichloroethene (total)	12.95 U	17.9 U	ND	ND		0/9
1,2-Dichloropropane	12.95 U	17.9 U	ND	ND		0/9
cis-1,3-Dichloropropene	12.95 U	17.9 U	ND	ND		0/9
trans-1,3-Dichloropropene	12.95 U	17.9 U	ND	ND		0/9
2-Butanone	5 B	65 B	3 J	5 J	A1-SD01-01,A1-SD02-00	4/9
2-Hexanone	12.95 U	17.9 U	ND	ND		0/9
4-Methyl-2-Pentanone	1 B	17.9 U	ND	ND		0/9
Acetone	4 B	45 B	220	220	A1-SD03-01	1/9
Benzene	12.95 U	17.9 U	ND	ND		0/9
Bromodichloromethane	12.95 U	17.9 U	ND	ND		0/9
Bromoform	12.95 U	17.9 U	ND	ND		0/9
Bromomethane	12.95 U	17.9 U	ND	ND		0/9
Carbon Disulfide	12.95 U	17.9 U	ND	ND		0/9
Carbon Tetrachloride	12.95 U	17.9 U	ND	ND		0/9
Chlorobenzene	12.95 U	17.9 U	ND	ND		0/9
Chloroethane	12.95 U	17.9 U	ND	ND		0/9
Chloroform	12.95 U	17.9 U	ND	ND		0/9
Chloromethane	12.95 U	17.9 U	ND	ND		0/9
Dibromochloromethane	12.95 U	17.9 U	ND	ND		0/9
Ethylbenzene	12.95 U	17.9 U	2 J	2 J	A1-SD01-00,A1-SD01-01,A1-SD04-01	3/9
Methylene Chloride	7 B	17.9 U	ND	ND		0/9
Styrene	12.95 U	17.9 U	ND	ND		0/9
Tetrachloroethene	12.95 U	17.9 U	ND	ND		0/9
Toluene	12.95 U	17.9 U	ND	ND		0/9
Trichloroethene	12.95 U	17.9 U	ND	ND		0/9
Vinyl Chloride	12.95 U	17.9 U	ND	ND		0/9
Xylene (Total)	5 B	17.9 U	2 J	6 J	A1-SD01-00	3/9

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SEDIMENT
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg)						
1,2,4-Trichlorobenzene	430 U	580 U	ND	ND		0/9
1,2-Dichlorobenzene	430 U	580 U	ND	ND		0/9
1,3-Dichlorobenzene	430 U	580 U	ND	ND		0/9
1,4-Dichlorobenzene	430 U	580 U	ND	ND		0/9
2,2'-oxybis(1-Chloropropan	430 U	580 U	ND	ND		0/9
2,4,5-Trichlorophenol	1100 U	1500 U	ND	ND		0/9
2,4,6-Trichlorophenol	430 U	580 U	ND	ND		0/9
2,4-Dichlorophenol	430 U	580 U	ND	ND		0/9
2,4-Dimethylphenol	430 U	580 U	ND	ND		0/9
2,4-Dinitrophenol	1100 U	1500 U	ND	ND		0/9
2,4-Dinitrotoluene	430 U	580 U	ND	ND		0/9
2,6-Dinitrotoluene	430 U	580 U	ND	ND		0/9
2-Chloronaphthalene	430 U	580 U	ND	ND		0/9
2-Chlorophenol	430 U	580 U	ND	ND		0/9
2-Methylnaphthalene	430 U	580 U	ND	ND		0/9
2-Methylphenol	430 U	580 U	ND	ND		0/9
2-Nitroaniline	1100 U	1500 U	ND	ND		0/9
2-Nitrophenol	430 U	580 U	ND	ND		0/9
3,3'-Dichlorobenzidine	430 U	580 U	ND	ND		0/9
3-Nitroaniline	1100 U	1500 U	ND	ND		0/9
4,6-Dinitro-2-Methylphenol	1100 U	1500 U	ND	ND		0/9
4-Bromophenyl phenylether	430 U	580 U	ND	ND		0/9
4-Chloro-3-Methylphenol	430 U	580 U	ND	ND		0/9
4-Chloroaniline	430 U	580 U	ND	ND		0/9
4-Chlorophenyl-phenylether	430 U	580 U	ND	ND		0/9
4-Methylphenol	430 U	580 U	ND	ND		0/9
4-Nitroaniline	1100 U	1500 U	ND	ND		0/9
4-Nitrophenol	1100 U	1500 U	ND	ND		0/9
Acenaphthene	430 U	580 U	ND	ND		0/9
Acenaphthylene	430 U	580 U	ND	ND		0/9
Anthracene	430 U	580 U	ND	ND		0/9
Benzo(a)Anthracene	430 U	580 U	ND	ND		0/9
Benzo(a)Pyrene	430 U	580 U	ND	ND		0/9

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SEDIMENT
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Semivolatiles (ug/kg) (Cont)						
Benzo(b)Fluoranthene	430 U	580 U	ND	ND		0/9
Benzo(g,h,i)Perylene	430 U	580 U	ND	ND		0/9
Benzo(k)Fluoanthene	430 U	580 U	ND	ND		0/9
Bis(2-chloroethoxy)Methane	430 U	580 U	ND	ND		0/9
Bis(2-chloroethyl)Ether	430 U	580 U	ND	ND		0/9
Bis(2-Ethylhexyl)Phthalate	450 U	580 U	46 J	63 J	A1-SD03-00D	5/9
Butylbenzylphthalate	430 U	580 U	ND	ND		0/9
Carbazole	430 U	580 U	ND	ND		0/9
Chrysene	430 U	540 U	63 J	63 J	A1-SD03-01	1/9
Dibenz(a,h)Anthracene	430 U	580 U	ND	ND		0/9
Dibenzofuran	430 U	580 U	ND	ND		0/9
Diethylphthalate	430 U	580 U	ND	ND		0/9
Dimethyl Phthalate	430 U	580 U	ND	ND		0/9
Di-n-Butylphthalate	ND	ND	64 J	120 J	A1-SD01-00,A1-SD01-01	9/9
Di-n-Octyl Phthalate	430 U	580 U	ND	ND		0/9
Fluoranthene	430 U	580 U	47 J	47 J	A1-SD04-00	1/9
Fluorene	430 U	580 U	ND	ND		0/9
Hexachlorobenzene	430 U	580 U	ND	ND		0/9
Hexachlorobutadiene	430 U	580 U	ND	ND		0/9
Hexachlorocyclopentadiene	430 U	580 U	ND	ND		0/9
Hexachloroethane	430 U	580 U	ND	ND		0/9
Indeno(1,2,3-cd)Pyrene	430 U	580 U	ND	ND		0/9
Isophorone	430 U	580 U	ND	ND		0/9
Naphthalene	430 U	580 U	ND	ND		0/9
Nitrobenzene	430 U	580 U	ND	ND		0/9
N-Nitroso-Di-n-Propylamine	430 U	580 U	ND	ND		0/9
N-Nitrosodiphenylamine	430 U	580 U	ND	ND		0/9
Pentachlorophenol	1100 U	1500 U	ND	ND		0/9
Phenanthrene	430 U	580 U	ND	ND		0/9
Phenol	430 U	580 U	ND	ND		0/9
Pyrene	430 U	580 U	ND	ND		0/9

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SEDIMENT
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Pesticides/PCBs (ug/kg)						
4,4'-DDD	4.3 U	5.8 U	ND	ND		0/9
4,4'-DDE	4.3 U	5.8 U	ND	ND		0/9
4,4'-DDT	4.3 U	5.8 U	ND	ND		0/9
Aldrin	2.2 U	3 U	ND	ND		0/9
Aroclor-1016	43 U	58 U	ND	ND		0/9
Aroclor-1221	86 U	120 U	ND	ND		0/9
Aroclor-1232	43 U	58 U	ND	ND		0/9
Aroclor-1242	43 U	58 U	ND	ND		0/9
Aroclor-1248	43 U	58 U	ND	ND		0/9
Aroclor-1254	43 U	58 U	ND	ND		0/9
Aroclor-1260	43 U	58 U	14 J	14 J	A1-SD04-01	1/9
alpha-BHC	2.2 U	3 U	ND	ND		0/9
beta-BHC	2.2 U	3 U	ND	ND		0/9
delta-BHC	2.2 U	3 U	ND	ND		0/9
gamma-BHC	2.2 U	3 U	ND	ND		0/9
alpha-Chlordane	2.2 U	3 U	ND	ND		0/9
gamma-Chlordane	2.2 U	3 U	ND	ND		0/9
Dieldrin	4.3 U	5.8 U	ND	ND		0/9
Endosulfan I	2.2 U	3 U	ND	ND		0/9
Endosulfan II	4.3 U	5.8 U	ND	ND		0/9
Endosulfan Sulfate	4.3 U	5.8 U	ND	ND		0/9
Endrin	4.3 U	5.8 U	ND	ND		0/9
Endrin Aldehyde	4.3 U	5.8 U	ND	ND		0/9
Endrin Ketone	4.3 U	5.8 U	ND	ND		0/9
Heptachlor	2.2 U	3 U	ND	ND		0/9
Heptachlor Epoxide	2.2 U	3 U	ND	ND		0/9
Methoxychlor	22 U	30 U	ND	ND		0/9
Toxaphene	220 U	300 U	ND	ND		0/9

FREQUENCY OF DETECTION SUMMARY - ORGANIC COMPOUNDS IN SEDIMENT
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Explosives (ug/kg)						
1,3,5-Trinitrobenzene	420 U	480 U	ND	ND		0/9
1,3-Dinitrobenzene	420 U	480 U	ND	ND		0/9
2,4,6-Trinitrotoluene	420 U	480 U	ND	ND		0/9
2,4-Dinitrotoluene	420 U	480 U	ND	ND		0/9
2,6-Dinitrotoluene	420 U	480 U	ND	ND		0/9
2-Amino-4,6-dinitrotoluene	420 U	480 U	ND	ND		0/9
4-Amino-2,6-dinitrotoluene	420 U	480 U	ND	ND		0/9
2-Nitrotoluene	420 U	480 U	ND	ND		0/9
3-Nitrotoluene	420 U	480 U	ND	ND		0/9
4-Nitrotoluene	420 U	480 U	ND	ND		0/9
HMX	420 U	480 U	ND	ND		0/9
Nitrobenzene	420 U	480 U	ND	ND		0/9
RDX	420 U	480 U	ND	ND		0/9
Tetryl	420 U	480 U	ND	ND		0/9

FREQUENCY OF DETECTION SUMMARY - INORGANIC CONSTITUENTS IN SEDIMENT
AOC 1 - SCRAP METAL DUMP
SITE INSPECTION REPORT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Location of Maximum Detect	Frequency of Detection
Inorganics (mg/kg)						
Aluminum	ND	ND	1790 L	6740 L	A1-SD04-00	9/9
Antimony	0.36 U	0.56 U	ND	ND		0/9
Arsenic	ND	ND	1.1 J	10.5	A1-SD03-00D	9/9
Barium	9.4 B	23.4 B	18.1 J	18.1 J	A1-SD04-01	1/9
Beryllium	0.16 U	0.16 U	0.16 J	0.29 J	A1-SD02-00	8/9
Cadmium	0.05 U	0.09 U	ND	ND		0/9
Calcium	1940 B	1940 B	899 L	19000	A1-SD03-00D	8/9
Chromium	ND	ND	4.3	11.1	A1-SD02-00	9/9
Cobalt	1.3 U	1.5 U	1.2 J	3.6 J	A1-SD03-00	7/9
Copper	0.87 U	26.9 B	16 J	16 J	A1-SD04-01	1/9
Cyanide	0.02 UL	0.03 UL	ND	ND		0/9
Iron	ND	ND	3320	18700	A1-SD03-00D	9/9
Lead	ND	ND	3.1	12.6	A1-SD03-00,A1-SD03-00D	9/9
Magnesium	76.9 B	299 B	216 J	325 J	A1-SD03-00D	3/9
Manganese	ND	ND	6.5	309	A1-SD03-00D	9/9
Mercury	0.02 UL	0.04 UL	0.04 L	0.07 L	A1-SD04-00	2/9
Nickel	2.1 B	8.2 B	2.1 J	2.1 J	A1-SD04-01	1/9
Potassium	106 B	374 B	199 L	199 L	A1-SD04-01	1/9
Selenium	0.48 U	0.77 U	0.8 J	0.8 J	A1-SD03-00	1/9
Silver	0.69 B	5.2 B	ND	ND		0/9
Sodium	26.4 B	95.2 B	ND	ND		0/9
Thallium	0.39 U	0.71 B	ND	ND		0/9
Vanadium	9.9 B	9.9 B	5.6 J	14.8	A1-SD03-01	8/9
Zinc	8.1 B	79.8 B	ND	ND		0/9

APPENDIX F
RISK SCREENING DATA

APPENDIX F.1
RISK SCREENING SPREADSHEETS

SITE 4 - INCIDENTAL INGESTION OF SURFACE SOILS (1)
HUMAN HEALTH RISK SCREENING
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
FUTURE RESIDENTS
FISC CHEATHAM ANNEX, WILLIAMSBURG, VIRGINIA

Carcinogens:
ILCRi = (Ci/RBCi) x 1E-06
TOTAL ILCR = ILCR1 + ILCR2 ... ILCRn

Noncarcinogens:
HQ1 = Ci/RBCi
HI = HQ1 + HQ2 ... HQn

Where:
ILCRi = Incremental Lifetime Cancer Risk for COPCi
Ci = Detected Concentration of COPCi in Soil (mg/kg)
RBCi = Region III Risk-Based Concentration for COPCi (mg/kg)
1E-06 = Risk Assessment Point of Departure for Carcinogens
HQi = Hazard Quotient for COPCi
HI = Hazard Index

COPC	Ci (mg/kg)	Residential Soil RBCs (mg/kg) Carcinogens	Residential Soil RBCs (mg/kg) Noncarcinogens	Carcinogens ILCR	Carcinogens ILCR Percent Contrib.	Noncarcinogens HQ	Noncarcinogens HI Percent Contrib.
Benzo(a)anthracene	4.1307	0.87	NA	4.7E-06	5.8%	--	--
Benzo(a)pyrene	3.549	0.087	NA	4.1E-05	50.2%	--	--
Benzo(b)fluoranthene	3.271	0.87	NA	3.8E-06	4.6%	--	--
Benzo(k)fluoranthene	3.2437	8.7	NA	3.7E-07	0.5%	--	--
Carbazole	0.25	32	NA	7.8E-09	0.0%	--	--
Chrysene	4.1374456	87	NA	4.8E-08	0.1%	--	--
Dibenzo(a,h)anthracene	1.4	0.087	NA	1.6E-05	19.8%	--	--
Indeno(1,2,3-cd)pyrene	1.8724255	0.87	NA	2.2E-06	2.6%	--	--
Aroclor-1242	0.4326785	0.32	NA	1.4E-06	1.7%	--	--
Aroclor-1260	1.2406016	0.32	NA	3.9E-06	4.8%	--	--
Aluminum	7757.672	NA	78000	--	--	9.9E-02	5.1%
Antimony	5.4809	NA	31	--	--	1.8E-01	9.0%
Arsenic	3.4708	0.43	NA	8.1E-06	9.9%	--	--
Chromium	31.4234	NA	230	--	--	1.4E-01	7.0%
Iron	32358.067	NA	23000	--	--	1.4E+00	71.8%
Manganese	223.0963	NA	1600	--	--	1.4E-01	7.1%
Thallium	0.6344	NA	23000	--	--	2.8E-05	0.0%
			TOTAL:	8.1E-05	100%	2.0E+00	100%

Notes:
(1) Concentrations are 95% UCL or maximum detected concentration, if the 95% UCL is greater than the maximum.
NA - Not available.

SITE 4 - INCIDENTAL INGESTION OF SUBSURFACE SOILS (1)
HUMAN HEALTH RISK SCREENING
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
FUTURE RESIDENTS
FISC CHEATHAM ANNEX, WILLIAMSBURG, VIRGINIA

Carcinogens:
ILCRi = (Ci/RBCi) x 1E-06
TOTAL ILCR = ILCR1 + ILCR2 ... ILCRn

Noncarcinogens:
HQ1 = Ci/RBCi
HI = HQ1 + HQ2 ... HQn

Where:

ILCRi = Incremental Lifetime Cancer Risk for COPCi
Ci = Detected Concentration of COPCi in Soil (mg/kg)
RBCi = Region III Risk-Based Concentration for COPCi (mg/kg)
1E-06 = Risk Assessment Point of Departure for Carcinogens
HQi = Hazard Quotient for COPCi
HI = Hazard Index

COPC	Ci (mg/kg)	Residential Soil RBCs (mg/kg) Carcinogens	Residential Soil RBCs (mg/kg) Noncarcinogens	Carcinogens ILCR	Carcinogens ILCR Percent Contrib.	Noncarcinogens HQ	Noncarcinogens HI Percent Contrib.
Benzo(a)anthracene	0.5	0.87	NA	5.7E-07	2.5%	--	--
Benzo(a)pyrene	0.6	0.087	NA	6.9E-06	30.2%	--	--
Benzo(b)fluoranthene	0.51	0.87	NA	5.9E-07	2.6%	--	--
Benzo(k)fluoranthene	0.76	8.7	NA	8.7E-08	0.4%	--	--
Bis(2-ethylhexyl)phthalate	27.1904614	46	NA	5.9E-07	2.6%	--	--
Chrysene	0.62	87	NA	7.1E-09	0.0%	--	--
Indeno(1,2,3-cd)pyrene	0.066	0.87	NA	7.6E-08	0.3%	--	--
Aroclor-1242	0.9802417	0.32	NA	3.1E-06	13.4%	--	--
Aroclor-1260	0.7333323	0.32	NA	2.3E-06	10.0%	--	--
Aluminum	8307.7955	NA	78000	--	--	1.1E-01	10.3%
Arsenic	3.7206	0.43	NA	8.7E-06	37.9%	--	--
Chromium	20.3564	NA	230	--	--	8.9E-02	8.6%
Iron	19195.313	NA	23000	--	--	8.3E-01	81.1%
			TOTAL:	2.3E-05	100%	1.0E+00	100%

Notes:
(1) Concentrations are 95% UCL or maximum detected concentration, if the 95% UCL is greater than the maximum.
NA - Not available.

AOC 1 - INCIDENTAL INGESTION OF SURFACE SOILS (1)
HUMAN HEALTH RISK SCREENING
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
FUTURE RESIDENTS
FISC CHEATHAM ANNEX, WILLIAMSBURG, VIRGINIA

Carcinogens:
ILCRi = (Ci/RBCi) x 1E-06
TOTAL ILCR = ILCR1 + ILCR2 ... ILCRn

Noncarcinogens:
HQ1 = Ci/RBCi
HI = HQ1 + HQ2 ... HQn

Where:

ILCRi = Incremental Lifetime Cancer Risk for COPCi
Ci = Detected Concentration of COPCi in Soil (mg/kg)
RBCi = Region III Risk-Based Concentration for COPCi (mg/kg)
1E-06 = Risk Assessment Point of Departure for Carcinogens
HQi = Hazard Quotient for COPCi
HI = Hazard Index

COPC	Ci (mg/kg)	Residential Soil RBCs (mg/kg) Carcinogens	Residential Soil RBCs (mg/kg) Noncarcinogens	Carcinogens ILCR	Carcinogens ILCR Percent Contrib.	Noncarcinogens HQ	Noncarcinogens HI Percent Contrib.
Benzo(a)anthracene	0.28	0.87	NA	3.2E-07	1.2%	--	--
Benzo(a)pyrene	0.5147096	0.087	NA	5.9E-06	21.8%	--	--
Benzo(b)fluoranthene	0.8194853	0.87	NA	9.4E-07	3.5%	--	--
Benzo(k)fluoranthene	0.5558066	8.7	NA	6.4E-08	0.2%	--	--
Chrysene	0.4579594	87	NA	5.3E-09	0.0%	--	--
Dibenzo(a,h)anthracene	0.3116477	0.087	NA	3.6E-06	13.2%	--	--
Indeno(1,2,3-cd)pyrene	0.4900447	0.87	NA	5.6E-07	2.1%	--	--
Aluminum	8102.086	NA	78000	--	--	1.0E-01	5.2%
Antimony	5.2346	NA	31			1.7E-01	8.5%
Arsenic	11.6597	0.43	NA	2.7E-05	100.0%	--	--
Chromium	25.0452	NA	230	--	--	1.1E-01	5.5%
Iron	29880.4518	NA	23000	--	--	1.3E+00	65.6%
Lead	352.9071	NA	NA			--	--
Manganese	477.4471	NA	1600	--	--	3.0E-01	15.1%
			TOTAL:	2.7E-05	100%	2.0E+00	100%

Notes:
(1) Concentrations are 95% UCL or maximum detected concentration, if the 95% UCL is greater than the maximum.
NA - Not available.

AOC 1 - INCIDENTAL INGESTION OF SUBSURFACE SOILS (1)
HUMAN HEALTH RISK SCREENING
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
FUTURE RESIDENTS
FISC CHEATHAM ANNEX, WILLIAMSBURG, VIRGINIA

Carcinogens:

ILCRi = (Ci/RBCi) x 1E-06

TOTAL ILCR = ILCR1 + ILCR2 ... ILCRn

Noncarcinogens:

HQ1 = Ci/RBCi

HI = HQ1 + HQ2 ... HQn

Where:

ILCRi =	Incremental Lifetime Cancer Risk for COPCi
Ci =	Detected Concentration of COPCi in Soil (mg/kg)
RBCi =	Region III Risk-Based Concentration for COPCi (mg/kg)
1E-06 =	Risk Assessment Point of Departure for Carcinogens
HQi =	Hazard Quotient for COPCi
HI =	Hazard Index

COPC	Ci (mg/kg)	Residential Soil RBCs (mg/kg)		Carcinogens		Noncarcinogens	
		Carcinogens	Noncarcinogens	ILCR	ILCR Percent Contrib.	HQ	HI Percent Contrib.
Aluminum	7045.9107	NA	78000	--	--	9.0E-02	4.4%
Antimony	10	NA	31	--	--	3.2E-01	15.7%
Arsenic	18.5845	0.43	NA	4.3E-05	100.0%	--	--
Chromium	23.7579	NA	230	--	--	1.0E-01	5.0%
Iron	35076.9902	NA	23000	--	--	1.5E+00	74.2%
Lead	647.7172	NA	NA	--	--	--	--
Manganese	324.4536	NA	23000	--	--	1.4E-02	0.7%
			TOTAL:	4.3E-05	100%	2.1E+00	100%

Notes:

(1) Concentrations are 95% UCL or maximum detected concentration, if the 95% UCL is greater than the maximum.

NA - Not available.

AOC 1 - INCIDENTAL INGESTION OF SURFACE WATER (1)
HUMAN HEALTH RISK SCREENING
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
FUTURE RESIDENTS
FISC CHEATHAM ANNEX, WILLIAMSBURG, VIRGINIA

Carcinogens:
ILCRi = (Ci/RBCi) x 1E-06
TOTAL ILCR = ILCR1 + ILCR2 ... ILCRn

Noncarcinogens:
HQ1 = Ci/RBCi
HI = HQ1 + HQ2 ... HQn

Where:

ILCRi = Incremental Lifetime Cancer Risk for COPCi
Ci = Detected Concentration of COPCi in Groundwater (mg/L)
RBCi = Region III Risk-Based Concentration for COPCi (mg/L)
1E-06 = Risk Assessment Point of Departure for Carcinogens
HQi = Hazard Quotient for COPCi
HI = Hazard Index

COPC	Ci (mg/L)	10*Tap Water RBCs (mg/L)		Carcinogens		Noncarcinogens	
		Carcinogens	Noncarcinogens	ILCR	ILCR Percent Contrib.	HQ	HI Percent Contrib.
Bis(2-ethylhexyl)phthalate	0.098	0.048	NA	2.0E-06	4.6%	--	--
Arsenic	0.019	0.00045	NA	4.2E-05	95.4%	--	--
Iron	25.9	NA	110	--	--	2.4E-01	100.0%
			TOTAL:	4.4E-05	100%	2.4E-01	100%

Notes:
(1) Concentrations are maximum detected total concentration
NA - Not available.

APPENDIX F.2
RAGS PART D TABLES

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatiles (ug/kg)															
1330-20-7	Xylene (Total)	2	J	2	J	µg/kg	4-HA02-00	1/6	11.24U - 14.79UL	2	ND	1.56E+07 N	N/A	N/A	NO	BSL
	Semivolatiles (ug/kg)															
83-32-9	Acenaphthene	330	J	330	J	µg/kg	4-HA02-00	1/7	380U - 5500U	330	ND	4.69E+05 N	N/A	N/A	NO	BSL
120-12-7	Anthracene	530	J	1700	J	µg/kg	4-HA06-00	2/7	380U - 5500U	1700	ND	2.35E+06 N	N/A	N/A	NO	BSL
56-55-3	Benzo(a)Anthracene	290	J	8800		µg/kg	4-HA06-00	4/7	380U - 2600U	8800	120J - 240J	8.75E+02 C	N/A	N/A	YES	ASL
50-32-8	Benzo(a)Pyrene	440	J	7000		µg/kg	4-HA06-00	4/7	380U - 2600U	7000	140J - 180J	8.75E+01 C	N/A	N/A	YES	ASL
205-99-2	Benzo(b)Fluoranthene	76	J	6800		µg/kg	4-HA06-00	6/7	380U - 380U	6800	230J - 500	8.75E+02 C	N/A	N/A	YES	ASL
191-24-2	Benzo(g,h,i)Perylene	61	J	3400	J	µg/kg	4-HA06-00	5/7	380U - 2600U	3400	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)Fluoanthene	53	J	6800		µg/kg	4-HA06-00	6/7	380U - 380U	6800	120J - 130J	8.75E+03 C	N/A	N/A	YES	CHEM
117-81-7	Bis(2-Ethylhexyl)Phthalate	3000		16000		µg/kg	4-HA02-00	3/7	49B - 5500U	16000	ND	4.56E+04 C	N/A	N/A	NO	BSL
86-74-8	Carbazole	250	J	250	J	µg/kg	4-HA02-00	1/7	380U - 5500U	250	ND	3.19E+04 C	N/A	N/A	YES	CHEM
218-01-9	Chrysene	75	J	8600		µg/kg	4-HA06-00	6/7	380U - 380U	8600	150J - 270J	8.75E+04 C	N/A	N/A	YES	CHEM
53-70-3	Dibenz(a,h)Anthracene	1400	J	1400	J	µg/kg	4-HA06-00	1/7	380U - 5500U	1400	ND	8.75E+01 C	N/A	N/A	YES	ASL
84-74-2	Di-n-Butylphthalate	9900		9900		µg/kg	4-HA04-00	1/7	41B - 5500U	9900	ND	7.82E+05 N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	49	J	14000		µg/kg	4-HA06-00	6/7	380U - 380U	14000	120J - 430	3.13E+05 N	N/A	N/A	NO	BSL
86-73-7	Fluorene	250	J	250	J	µg/kg	4-HA02-00	1/7	380U - 5500U	250	ND	3.13E+05 N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	48	J	3400	J	µg/kg	4-HA06-00	5/7	380U - 2600U	3400	160J - 160J	8.75E+02 C	N/A	N/A	YES	ASL
85-01-8	Phenanthrene	560	J	5500		µg/kg	4-HA06-00	4/7	380U - 2600U	5500	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
129-00-0	Pyrene	46	J	11000		µg/kg	4-HA06-00	6/7	380U - 380U	11000	160J - 320J	2.35E+05 N	N/A	N/A	NO	BSL
	Pesticides/PCBs (ug/kg)															
72-54-8	4,4'-DDD	7.6	K	7.6	K	µg/kg	4-HA06-00	1/7	3.8U - 27U	7.6	ND	2.66E+03 C	N/A	N/A	NO	BSL
72-55-9	4,4'-DDE	9.6	J	43	J	µg/kg	4-HA04-00	2/7	3.8U - 27U	43	ND	1.88E+03 C	N/A	N/A	NO	BSL
50-29-3	4,4'-DDT	4.6	J	220	K	µg/kg	4-HA05-00	5/7	3.8U - 4U	220	ND	1.88E+03 C	N/A	N/A	NO	BSL
309-00-2	Aldrin	33	K	33	K	µg/kg	4-HA05-00	1/7	2U - 2.7U	33	ND	3.76E+01 C	N/A	N/A	NO	BSL
53469-21-9	Aroclor-1242	1000	K	1000	K	µg/kg	4-HA05-00	1/7	38U - 52U	1000	ND	3.19E+02 C	N/A	N/A	YES	ASL
11096-82-5	Aroclor-1260	53	J	2700	K	µg/kg	4-HA05-00	7/7	(5)	2700	ND	3.19E+02 C	N/A	N/A	YES	ASL
5103-74-2	gamma-Chlordane	15	K	15	K	µg/kg	4-HA05-00	1/7	2U - 2.7U	15	ND	1.82E+03 (7) C	N/A	N/A	NO	BSL
33213-65-9	Endosulfan II	4.4	J	5.7	J	µg/kg	4-HA03-00	2/7	3.9U - 27U	5.7	ND	4.69E+04 (8) N	N/A	N/A	NO	BSL
72-20-8	Endrin	6.3	J	28	K	µg/kg	4-HA05-00	2/7	3.9U - 5.2U	28	ND	2.35E+03 N	N/A	N/A	NO	BSL
7421-93-4	Endrin Aldehyde	77	K	77	K	µg/kg	4-HA05-00	1/7	3.8U - 5.2U	77	ND	2.35E+03 (9) N	N/A	N/A	NO	BSL
53494-70-5	Endrin Ketone	4.5		87	K	µg/kg	4-HA05-00	2/7	3.8U - 5.2U	87	ND	2.35E+03 (9) N	N/A	N/A	NO	BSL

TABLE 2.1 (Cont)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Inorganics (mg/kg)																
7429-90-5	Aluminum	4560	L	9560	L	mg/kg	4-HA04-00	7/7	(5)	9560	2690 - 24100	7.82E+03	N	N/A	N/A	YES	ASL
7440-36-0	Antimony	0.67	J	12.6		mg/kg	4-HA05-00	2/7	0.44UJ - 0.55U	12.6	ND	3.13E+00	N	N/A	N/A	YES	ASL
7440-38-2	Arsenic	2.6	L	4.1	L	mg/kg	4-HA04-00	7/7	(5)	4.1	1L - 14.8	4.26E-01	C	N/A	N/A	YES	ASL
7440-39-3	Barium	20.3	J	164		mg/kg	4-HA04-00	7/7	(5)	164	10.6J - 39.6J	5.48E+02	N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.74	J	3.3		mg/kg	4-HA05-00	2/7	0.07U - 0.34U	3.3	ND	3.91E+00	N	N/A	N/A	NO	BSL
7440-70-2	Calcium	1110	J	8420		mg/kg	4-HA03-00	7/7	(5)	8420	90.7J - 4320	N/A	N	N/A	N/A	NO	NTX
7440-47-3	Chromium	8.7		56.6		mg/kg	4-HA06-00	7/7	(5)	56.6	3.5 - 33.5	2.35E+01	(10) N	N/A	N/A	YES	ASL
7440-48-4	Cobalt	1.7	J	8.8	J	mg/kg	4-HA06-00	6/7	1.4U - 1.4U	8.8	0.88J - 3J	4.69E+02	N	N/A	N/A	NO	BSL
7440-50-8	Copper	10.5		150		mg/kg	4-HA05-00	5/7	3.8B - 4.5B	150	1.2J - 7.3	3.13E+02	N	N/A	N/A	NO	BSL
57-12-5	Cyanide	0.07	L	0.13	L	mg/kg	4-HA02-00D	4/7	0.02UL - 0.03UL	0.13	ND	1.56E+02	N	N/A	N/A	NO	BSL
7439-89-6	Iron	8570	L	61700	L	mg/kg	4-HA06-00	7/7	(5)	61700	2070 - 46400	2.35E+03	N	N/A	N/A	YES	ASL
7439-92-1	Lead	11.6		129		mg/kg	4-HA05-00	7/7	(5)	129	2.1 - 16.7L	4.00E+02	(11) N	N/A	N/A	NO	BSL
7439-95-4	Magnesium	514	J	2140		mg/kg	4-HA06-00	7/7	(5)	2140	175J - 2700	N/A	N	N/A	N/A	NO	NTX
7439-96-5	Manganese	43.2		302	J	mg/kg	4-HA06-00	7/7	(5)	302	8.7 - 161	1.56E+02	N	N/A	N/A	YES	ASL
7439-97-6	Mercury	0.04	J	0.88		mg/kg	4-HA05-00	7/7	(5)	0.88	0.05J - 0.05J	7.82E-01	(12) N	N/A	N/A	YES	ASL
7440-02-0	Nickel	10.1	J	39.6		mg/kg	4-HA06-00	3/7	2.2B - 4.1B	39.6	4.2J - 12.5	1.56E+02	N	N/A	N/A	NO	BSL
7440-09-7	Potassium	366	J	1420		mg/kg	4-HA05-00	6/7	283B - 283B	1420	387J - 1390	N/A	N	N/A	N/A	NO	NTX
7782-49-2	Selenium	1	J	1	J	mg/kg	4-HA04-00	1/7	0.6U - 0.81U	1	0.21L - 0.61L	3.91E+01	N	N/A	N/A	NO	BSL
7440-22-4	Silver	20.6	L	20.6	L	mg/kg	4-HA06-00	1/7	2.4B - 5.2B	20.6	1J - 1.8J	3.91E+01	N	N/A	N/A	NO	BSL
7440-28-0	Thallium	1.1	L	1.1	L	mg/kg	4-HA06-00	1/7	0.5UL - 0.72UL	1.1	ND	5.48E-01	N	N/A	N/A	YES	ASL
7440-62-2	Vanadium	13.9		35.7	J	mg/kg	4-HA06-00	7/7	(5)	35.7	5.2J - 64.7	5.48E+01	N	N/A	N/A	NO	BSL
7440-66-6	Zinc	102		324		mg/kg	4-HA05-00	5/7	28.6B - 32.5B	324	4.9 - 20.1	2.35E+03	N	N/A	N/A	NO	BSL

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)

(4) Rationale Codes

Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- Same chemical class (CHEM)

Deletion Reason:
- Infrequent Detection (IFD)
- Background Levels (BKG)
- No Toxicity Information (NTX)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)

(5) No detection limits given; analyte detected in every sample.
(6) Screening value for pyrene used as a surrogate.
(7) Screening value for chlordane used as a surrogate.
(8) Screening value for endosulfan used as a surrogate.
(9) Screening value for endrin used as a surrogate.
(10) Screening value for chromium VI used.
(11) Action level for lead
(12) Screening values for methylmercury

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = Estimated Value
L = Estimated Value; Biased High
K = Estimated Value; Biased Low

C = Carcinogenic
N = Non-Carcinogenic

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatiles (ug/kg)															
78-93-3	2-Butanone	8	J	8	J	µg/kg	4-HA02-02	1/7	2B - 20.41U	8	ND	4.69E+06 N	N/A	N/A	NO	BSL
100-41-4	Ethylbenzene	2	J	2	J	µg/kg	4-HA02-02	1/7	10.93U - 20.41U	2	ND	7.82E+05 N	N/A	N/A	NO	BSL
127-18-4	Tetrachloroethene	3	J	3	J	µg/kg	4-HA03-02	1/7	10.93U - 20.41U	3	ND	1.23E+04 C	N/A	N/A	NO	BSL
108-88-3	Toluene	2	J	3	J	µg/kg	4-HA01-02	2/7	12.75UL - 20.41U	3	ND	1.56E+06 N	N/A	N/A	NO	BSL
	Semivolatiles (ug/kg)															
56-55-3	Benzo(a)Anthracene	77	J	500	J	µg/kg	4-HA06-02	2/7	370U - 17000UJ	500	ND	8.75E+02 C	N/A	N/A	YES	CHEM
50-32-8	Benzo(a)Pyrene	52	J	600	J	µg/kg	4-HA06-02	4/7	370U - 17000UJ	600	ND	8.75E+01 C	N/A	N/A	YES	ASL
205-99-2	Benzo(b)Fluoranthene	51	J	510	J	µg/kg	4-HA05-01	5/7	11000UJ - 17000UJ	510	ND	8.75E+02 C	N/A	N/A	YES	CHEM
191-24-2	Benzo(g,h,i)Perylene	43	J	440	J	µg/kg	4-HA06-02	4/7	4300U - 17000UJ	440	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)Fluoanthene	59	J	760	J	µg/kg	4-HA06-02	4/7	370U - 17000UJ	760	ND	8.75E+03 C	N/A	N/A	YES	CHEM
117-81-7	Bis(2-Ethylhexyl)Phthalate	530		63000	J	µg/kg	4-HA03-02	4/7	2600B - 4300U	63000	ND	4.56E+04 C	N/A	N/A	YES	ASL
218-01-9	Chrysene	45	J	620	J	µg/kg	4-HA06-02	4/7	4300U - 17000UJ	620	ND	8.75E+04 C	N/A	N/A	YES	CHEM
84-74-2	Di-n-Butylphthalate	90000	J	90000	J	µg/kg	4-HA04-01	1/7	66B - 5700B	90000	ND	7.82E+05 N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	43	J	880	J	µg/kg	4-HA05-01,4-HA06-02	5/7	11000UJ - 17000UJ	880	ND	3.13E+05 N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	39	J	66	J	µg/kg	4-HA02-02	3/7	3800U - 17000UJ	66	ND	8.75E+02 C	N/A	N/A	YES	CHEM
85-01-8	Phenanthrene	100	J	400	J	µg/kg	4-HA06-02	2/7	370U - 17000UJ	400	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
129-00-0	Pyrene	44	J	930	J	µg/kg	4-HA05-01	5/7	11000UJ - 17000UJ	930	ND	2.35E+05 N	N/A	N/A	NO	BSL
	Pesticides/PCBs (ug/kg)															
72-54-8	4,4'-DDD	4.5	L	4.5	L	µg/kg	4-HA02-02	1/7	3.7U - 6.7U	4.5	ND	2.66E+03 C	N/A	N/A	NO	BSL
72-55-9	4,4'-DDE	5.3		24	J	µg/kg	4-HA04-01	3/7	3.7U - 4.6U	24	ND	1.88E+03 C	N/A	N/A	NO	BSL
50-29-3	4,4'-DDT	5.8		150	L	µg/kg	4-HA05-01	4/7	3.7U - 4.6U	150	ND	1.88E+03 C	N/A	N/A	NO	BSL
309-00-2	Aldrin	27	J	27	J	µg/kg	4-HA05-01	1/7	1.9U - 3.4U	27	ND	3.76E+01 C	N/A	N/A	NO	BSL
53469-21-9	Aroclor-1242	2300	L	2300	L	µg/kg	4-HA05-01	1/7	37U - 67U	2300	ND	3.19E+02 C	N/A	N/A	YES	ASL
11097-69-1	Aroclor-1254	39		49		µg/kg	4-HA01-02D	2/7	38U - 67U	49	ND	3.19E+02 C	N/A	N/A	NO	BSL
11096-82-5	Aroclor-1260	50	J	1600	L	µg/kg	4-HA05-01	5/7	38U - 48UL	1600	ND	3.19E+02 C	N/A	N/A	YES	ASL
5103-71-9	alpha-Chlordane	2.4	J	2.4	J	µg/kg	4-HA05-01	1/7	1.9U - 3.4U	2.4	ND	1.82E+03 (7) C	N/A	N/A	NO	BSL
5103-74-2	gamma-Chlordane	4.3	J	4.3	J	µg/kg	4-HA05-01	1/7	1.9U - 3.4U	4.3	ND	1.82E+03 (7) C	N/A	N/A	NO	BSL
33213-65-9	Endosulfan II	6.5	K	14	J	µg/kg	4-HA01-02D	3/7	3.8U - 6.7U	14	ND	4.69E+04 (8) N	N/A	N/A	NO	BSL
53494-70-5	Endrin Ketone	8.9	J	19	J	µg/kg	4-HA05-01	2/7	3.7U - 4.8UL	19	ND	2.35E+03 (9) N	N/A	N/A	NO	BSL
76-44-8	Heptachlor	9.9	J	9.9	J	µg/kg	4-HA05-01	1/7	1.9U - 3.4U	9.9	ND	1.42E+02 C	N/A	N/A	NO	BSL
72-43-5	Methoxychlor	25	J	25	J	µg/kg	4-HA05-01	1/7	19U - 34U	25	ND	3.91E+04 N	N/A	N/A	NO	BSL

TABLE 2.2 (Cont)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Inorganics (mg/kg)															
7429-90-5	Aluminum	3550	L	9660	L	mg/kg	4-HA03-02	7/7	(5)	9660	2710 - 28200	7.82E+03 N	N/A	N/A	YES	ASL
7440-36-0	Antimony	1.1		1.1		mg/kg	4-HA05-01,4-HA06-02	2/7	0.44U - 0.69U	1.1	8.5L - 31.3L	3.13E+00 N	N/A	N/A	NO	BSL
7440-38-2	Arsenic	1.8	L	4.2	L	mg/kg	4-HA06-02	7/7	(5)	4.2	0.23J - 42.7	4.26E-01 C	N/A	N/A	YES	ASL
7440-39-3	Barium	20.2	J	247		mg/kg	4-HA04-01	7/7	(5)	247	10.6J - 66.9	5.48E+02 N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.96	J	1.2	J	mg/kg	4-HA05-01	2/7	0.07U - 0.15U	1.2	ND	3.91E+00 N	N/A	N/A	NO	BSL
7440-70-2	Calcium	478	J	5970		mg/kg	4-HA04-01	7/7	(5)	5970	28.9J - 233000	N/A N	N/A	N/A	NO	NTX
7440-47-3	Chromium	6.9		29.2		mg/kg	4-HA06-02	7/7	(5)	29.2	5.2L - 33.5	2.35E+01 (10) N	N/A	N/A	YES	ASL
7440-48-4	Cobalt	1.6	J	4.3	J	mg/kg	4-HA03-02	7/7	(5)	4.3	0.97J - 156	4.69E+02 N	N/A	N/A	NO	BSL
7440-50-8	Copper	9		40.4		mg/kg	4-HA03-02	5/7	4.4B - 4.6B	40.4	2J - 15	3.13E+02 N	N/A	N/A	NO	BSL
57-12-5	Cyanide	0.44	L	0.44	L	mg/kg	4-HA04-01	1/7	0.02UL - 0.03UL	0.44	ND	1.56E+02 N	N/A	N/A	NO	BSL
7439-89-6	Iron	4960	L	28000	L	mg/kg	4-HA06-02	7/7	(5)	28000	3810J - 51100J	2.35E+03 N	N/A	N/A	YES	ASL
7439-92-1	Lead	11.3		45.3		mg/kg	4-HA03-02	7/7	(5)	45.3	3.6L - 25.5L	4.00E+02 (11) N	N/A	N/A	NO	BSL
7439-95-4	Magnesium	327	J	1730		mg/kg	4-HA06-02	7/7	(5)	1730	136J - 2870	N/A N	N/A	N/A	NO	NTX
7439-96-5	Manganese	28.3		120		mg/kg	4-HA03-02	7/7	(5)	120	3.5J - 2940	1.56E+02 N	N/A	N/A	NO	BSL
7439-97-6	Mercury	0.05	J	0.91		mg/kg	4-HA03-02	7/7	(5)	0.91	ND	7.82E-01 (12) N	N/A	N/A	YES	ASL
7440-02-0	Nickel	13.6		20.4		mg/kg	4-HA06-02	3/7	3.2B - 7.7B	20.4	4.2J - 145	1.56E+02 N	N/A	N/A	NO	BSL
7440-09-7	Potassium	531	J	1700		mg/kg	4-HA05-01	6/7	249B - 249B	1700	392J - 2560	N/A N	N/A	N/A	NO	NTX
7782-49-2	Selenium	0.78	J	0.78	J	mg/kg	4-HA02-02	1/7	0.6U - 0.94U	0.78	0.26L - 0.75L	3.91E+01 N	N/A	N/A	NO	BSL
7440-22-4	Silver	8.5	L	8.5	L	mg/kg	4-HA06-02	1/7	1.6B - 5.8B	8.5	1.1J - 2.4J	3.91E+01 N	N/A	N/A	NO	BSL
7440-62-2	Vanadium	12.2		20.8		mg/kg	4-HA06-02	6/7	10.1B - 10.1B	20.8	7.8J - 70.3L	5.48E+01 N	N/A	N/A	NO	BSL
7440-66-6	Zinc	150		643		mg/kg	4-HA01-02	6/7	28.6B - 28.6B	643	3.6J - 330	2.35E+03 N	N/A	N/A	NO	BSL

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)

(4) Rationale Codes

Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Frequent Detection (FD)
- Same chemical class (CHEM)
- Above Screening Levels (ASL)

Deletion Reason:
- Infrequent Detection (IFD)
- Background Levels (BKG)
- No Toxicity Information (NTX)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)

(5) No detection limits given; analyte detected in every sample.
(6) Screening value for pyrene used as a surrogate.
(7) Screening value for chlordane used as a surrogate.
(8) Screening value for endosulfan used as a surrogate.
(9) Screening value for endrin used as a surrogate.
(10) Screening value for chromium VI used.
(11) Action level for lead
(12) Screening values for methylmercury

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = (Organics) Estimated Value
L = Estimated Value; Biased High
K = Estimated Value; Biased Low

C = Carcinogenic
N = Non-Carcinogenic

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatiles (ug/kg)															
75-35-4	1,1-Dichloroethene	4	J	4	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07U	4	ND	1.06E+03 C	N/A	N/A	NO	BSL
78-93-3	2-Butanone	5		5		µg/kg	A1-HA06-00	1/7	3B - 20.07U	5	ND	4.69E+06 N	N/A	N/A	NO	BSL
71-43-2	Benzene	4	J	4	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07U	4	ND	1.16E+04 C	N/A	N/A	NO	BSL
108-90-7	Chlorobenzene	5	J	5	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07UL	5	ND	1.56E+05 N	N/A	N/A	NO	BSL
108-88-3	Toluene	5	J	5	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07UL	5	ND	1.56E+06 N	N/A	N/A	NO	BSL
79-01-6	Trichloroethene	4	J	4	J	µg/kg	A1-HA05-00D	1/7	14.15UL - 20.07U	4	ND	5.81E+04 C	N/A	N/A	NO	BSL
	Semivolatiles (ug/kg)															
56-55-3	Benzo(a)Anthracene	65	J	280		µg/kg	A1-HA01-00	2/7	450U - 610U	280	120J - 240J	8.75E+02 C	N/A	N/A	YES	CHEM
50-32-8	Benzo(a)Pyrene	92	J	870		µg/kg	A1-HA01-00	2/7	450U - 610U	870	140J - 180J	8.75E+01 C	N/A	N/A	YES	ASL
205-99-2	Benzo(b)Fluoranthene	66	J	1700		µg/kg	A1-HA01-00	4/7	450U - 600U	1700	230J - 500	8.75E+02 C	N/A	N/A	YES	ASL
191-24-2	Benzo(g,h,i)Perylene	78	J	970		µg/kg	A1-HA01-00	2/7	450U - 610U	970	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)Fluoanthene	96	J	970		µg/kg	A1-HA01-00	2/7	450U - 610U	970	120J - 130J	8.75E+03 C	N/A	N/A	YES	CHEM
117-81-7	Bis(2-Ethylhexyl)Phthalate	47	J	12000	J	µg/kg	A1-HA04-00	5/7	450U - 620UL	12000	ND	4.56E+04 C	N/A	N/A	NO	BSL
218-01-9	Chrysene	67	J	830		µg/kg	A1-HA01-00	4/7	450U - 600U	830	150J - 270J	8.75E+04 C	N/A	N/A	YES	CHEM
53-70-3	Dibenz(a,h)Anthracene	350		350		µg/kg	A1-HA01-00	1/7	450U - 610U	350	ND	8.75E+01 C	N/A	N/A	YES	ASL
84-74-2	Di-n-Butylphthalate	72	J	170	J	µg/kg	A1-HA05-00D	6/7	620UL - 620UL	170	ND	7.82E+05 N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	61	J	250		µg/kg	A1-HA01-00	3/7	450U - 610U	250	120J - 430	3.13E+05 N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	74	J	810		µg/kg	A1-HA01-00	2/7	450U - 610U	810	160J - 160J	8.75E+02 C	N/A	N/A	YES	CHEM
85-01-8	Phenanthrene	71	J	78		µg/kg	A1-HA01-00	2/7	450U - 610U	78	ND	2.35E+05 (6) N	N/A	N/A	NO	BSL
129-00-0	Pyrene	65	J	360		µg/kg	A1-HA01-00	3/7	450U - 610U	360	160J - 320J	2.35E+05 N	N/A	N/A	NO	BSL
	Pesticides/PCBs (ug/kg)															
72-55-9	4,4'-DDE	1.5	L	18		µg/kg	A1-HA01-00	2/7	4.5U - 6.1U	18	ND	1.88E+03 C	N/A	N/A	NO	BSL
50-29-3	4,4'-DDT	15		120		µg/kg	A1-HA04-00	2/7	4.5U - 6.1U	120	ND	1.88E+03 C	N/A	N/A	NO	BSL
11096-82-5	Aroclor-1260	220	L	220	L	µg/kg	A1-HA04-00	1/7	45U - 62UL	220	ND	3.19E+02 C	N/A	N/A	NO	BSL
5103-71-9	alpha-Chlordane	4.3		4.3		µg/kg	A1-HA01-00	1/7	2.3U - 3.1U	4.3	ND	1.82E+03 (7) C	N/A	N/A	NO	BSL
1031-07-8	Endosulfan Sulfate	14		14		µg/kg	A1-HA01-00	1/7	4.5U - 6.1U	14	ND	4.69E+04 (8) N	N/A	N/A	NO	BSL

TABLE 2.3 (Cont)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Inorganics (mg/kg)																
7429-90-5	Aluminum	3570	L	9030	L	mg/kg	A1-HA01-00	7/7	(5)	9030	2690 - 24100	7.82E+03	N	N/A	N/A	YES	ASL
7440-36-0	Antimony	5.7	J	5.9	J	mg/kg	A1-HA05-00D	2/7	0.53U - 13.9U	5.9	ND	3.13E+00	N	N/A	N/A	YES	ASL
7440-38-2	Arsenic	1.4	J	23.5		mg/kg	A1-HA01-00	6/7	2.3U - 2.3U	23.5	1L - 14.8	4.26E-01	C	N/A	N/A	YES	ASL
7440-39-3	Barium	38.2	J	151		mg/kg	A1-HA01-00	7/7	(5)	151	10.6J - 39.6J	5.48E+02	N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.52	J	0.89	J	mg/kg	A1-HA01-00	2/7	1.2U - 2.3U	0.89	ND	3.91E+00	N	N/A	N/A	NO	BSL
7440-70-2	Calcium	4480		35900		mg/kg	A1-HA03-00	7/7	(5)	35900	90.7J - 4320	N/A	N	N/A	N/A	NO	NTX
7440-47-3	Chromium	7.2		44.7		mg/kg	A1-HA01-00	7/7	(5)	44.7	3.5 - 33.5	2.35E+01	(9) N	N/A	N/A	YES	ASL
7440-48-4	Cobalt	3.1	J	9.9	J	mg/kg	A1-HA03-00	6/7	1.5U - 1.5U	9.9	0.88J - 3J	4.69E+02	N	N/A	N/A	NO	BSL
7440-50-8	Copper	3.2	J	88.5		mg/kg	A1-HA05-00	6/7	11.3B - 11.3B	88.5	1.2J - 7.3	3.13E+02	N	N/A	N/A	NO	BSL
57-12-5	Cyanide	0.08	J	0.2	J	mg/kg	A1-HA05-00,A1-HA05-00D	3/7	0.03UL - 0.9UL	0.2	ND	1.56E+02	N	N/A	N/A	NO	BSL
7439-89-6	Iron	8050		35200	L	mg/kg	A1-HA02-00	7/7	(5)	35200	2070 - 46400	2.35E+03	N	N/A	N/A	YES	ASL
7439-92-1	Lead	16.2		501		mg/kg	A1-HA05-00D	7/7	(5)	501	2.1 - 16.7L	4.00E+02	(10) N	N/A	N/A	YES	ASL
7439-95-4	Magnesium	380	J	1980		mg/kg	A1-HA01-00	7/7	(5)	1980	175J - 2700	N/A	N	N/A	N/A	NO	NTX
7439-96-5	Manganese	122		523		mg/kg	A1-HA01-00	7/7	(5)	523	8.7 - 161	1.56E+02	N	N/A	N/A	YES	ASL
7439-97-6	Mercury	0.05	J	0.13	J	mg/kg	A1-HA01-00	6/7	0.03UL - 0.03UL	0.13	0.05J - 0.05J	7.82E-01	(11) N	N/A	N/A	NO	BSL
7440-02-0	Nickel	5.1	J	8.8	J	mg/kg	A1-HA05-00D	6/7	3.4B - 3.4B	8.8	4.2J - 12.5	1.56E+02	N	N/A	N/A	NO	BSL
7440-09-7	Potassium	579	J	652	J	mg/kg	A1-HA01-00	3/7	250B - 385B	652	387J - 1390	N/A	N	N/A	N/A	NO	NTX
7440-62-2	Vanadium	14.6		26		mg/kg	A1-HA01-00	7/7	(5)	26	5.2J - 64.7	5.48E+01	N	N/A	N/A	NO	BSL
7440-66-6	Zinc	110		849		mg/kg	A1-HA01-00	6/7	59B - 59B	849	4.9 - 20.1	2.35E+03	N	N/A	N/A	NO	BSL

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)

(4) Rationale Codes
Selection Reason: Infrequent Detection but Associated Historically (HIST)
Frequent Detection (FD)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
Same chemical class (CHEM)
Deletion Reason: Infrequent Detection (IFD)
Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No detection limits given; analyte detected in every sample.
(6) Screening value for pyrene used as a surrogate.
(7) Screening value for chlordane used as a surrogate.
(8) Screening value for endosulfan used as a surrogate.
(9) Screening value for chromium VI used.
(10) Action level for lead
(11) Screening values for methylmercury

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = (Organics) Estimated Value
L = Estimated Value; Biased High

C = Carcinogenic
N = Non-Carcinogenic

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatiles (ug/kg)																
1330-20-7	Xylene (Total)	2		3		µg/kg	A1-HA05-01D	2/6	11.49U - 13.26U	3	ND	1.56E+07	N	N/A	N/A	NO	BSL
	Semivolatiles (ug/kg)																
56-55-3	Benzo(a)Anthracene	64	J	64	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	64	ND	8.75E+02	C	N/A	N/A	NO	BSL
50-32-8	Benzo(a)Pyrene	59	J	59	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	59	ND	8.75E+01	C	N/A	N/A	NO	BSL
205-99-2	Benzo(b)Fluoranthene	79	J	88	J	µg/kg	A1-HA05-01D	2/6	380U - 410U	88	ND	8.75E+02	C	N/A	N/A	NO	BSL
191-24-2	Benzo(g,h,i)Perylene	71	J	71	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	71	ND	2.35E+05	(6) N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)Fluoranthene	65	J	74	J	µg/kg	A1-HA05-01	2/6	380U - 410U	74	ND	8.75E+03	C	N/A	N/A	NO	BSL
117-81-7	Bis(2-Ethylhexyl)Phthalate	46	J	76	J	µg/kg	A1-HA02-02	3/6	400U - 570U	76	ND	4.56E+04	C	N/A	N/A	NO	BSL
218-01-9	Chrysene	81	J	83	J	µg/kg	A1-HA05-01	2/6	380U - 410U	83	ND	8.75E+04	C	N/A	N/A	NO	BSL
84-74-2	Di-n-Butylphthalate	49	J	110	J	µg/kg	A1-HA05-01,A1-HA05-01D	6/6	(5)	110	ND	7.82E+05	N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	100	J	140	J	µg/kg	A1-HA05-01D	2/6	380U - 410U	140	ND	3.13E+05	N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	55	J	55	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	55	ND	8.75E+02	C	N/A	N/A	NO	BSL
85-01-8	Phenanthrene	97	J	97	J	µg/kg	A1-HA05-01D	1/6	380U - 570U	97	ND	2.35E+05	(6) N	N/A	N/A	NO	BSL
129-00-0	Pyrene	78	J	110	J	µg/kg	A1-HA05-01D	2/6	380U - 410U	110	ND	2.35E+05	N	N/A	N/A	NO	BSL
	Inorganics (mg/kg)																
7429-90-5	Aluminum	4080	L	8830	L	mg/kg	A1-HA06-02	6/6	(5)	8830	2710 - 28200	7.82E+03	N	N/A	N/A	YES	ASL
7440-36-0	Antimony	11.4	J	12	J	mg/kg	A1-HA05-01	2/6	0.41B - 10.9U	12	8.5L - 31.3L	3.13E+00	N	N/A	N/A	YES	ASL
7440-38-2	Arsenic	1.3	J	33.3		mg/kg	A1-HA06-02	6/6	(5)	33.3	0.23J - 42.7	4.26E-01	C	N/A	N/A	YES	ASL
7440-39-3	Barium	25.9	J	90.9		mg/kg	A1-HA05-01D	5/6	12.9B - 12.9B	90.9	10.6J - 66.9	5.48E+02	N	N/A	N/A	NO	BSL
7440-41-7	Beryllium	0.22	J	0.95		mg/kg	A1-HA06-02	3/6	0.21B - 1.1B	0.95	0.3J - 9.8	1.56E+01	N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.07	J	0.07	J	mg/kg	A1-HA04-02	1/6	0.06U - 1U	0.07	ND	3.91E+00	N	N/A	N/A	NO	BSL
7440-70-2	Calcium	1090		10400		mg/kg	A1-HA05-01D	6/6	(5)	10400	28.9J - 233000	N/A	N	N/A	N/A	NO	NTX
7440-47-3	Chromium	3.6		32.6		mg/kg	A1-HA06-02	6/6	(5)	32.6	5.2L - 33.5	2.35E+01	(7) N	N/A	N/A	YES	ASL
7440-48-4	Cobalt	1.5	J	9.4		mg/kg	A1-HA06-02	6/6	(5)	9.4	0.97J - 156	4.69E+02	N	N/A	N/A	NO	BSL
7440-50-8	Copper	86		146		mg/kg	A1-HA05-01D	2/6	1.5B - 3.5B	146	2J - 15	3.13E+02	N	N/A	N/A	NO	BSL
57-12-5	Cyanide	0.08	J	0.68	J	mg/kg	A1-HA05-01	4/6	0.6UL - 0.6UL	0.68	ND	1.56E+02	N	N/A	N/A	NO	BSL
7439-89-6	Iron	2630	L	39700		mg/kg	A1-HA06-02	6/6	(5)	39700	3810J - 51100J	2.35E+03	N	N/A	N/A	YES	ASL
7439-92-1	Lead	4.7		1120		mg/kg	A1-HA05-01D	6/6	(5)	1120	3.6L - 25.5L	4.00E+02	(8) N	N/A	N/A	YES	ASL
7439-95-4	Magnesium	547	J	1430		mg/kg	A1-HA02-02	5/6	81.4B - 81.4B	1430	136J - 2870	N/A	N	N/A	N/A	NO	NTX
7439-96-5	Manganese	11		401		mg/kg	A1-HA05-01D	6/6	(5)	401	3.5J - 2940	1.56E+02	N	N/A	N/A	YES	ASL
7439-97-6	Mercury	0.02	J	0.06	L	mg/kg	A1-HA05-01	2/6	0.03UL - 0.1U	0.06	ND	7.82E-01	(9) N	N/A	N/A	NO	BSL
7440-02-0	Nickel	1.2	J	23.3	L	mg/kg	A1-HA05-01	4/6	12.3B - 13.6B	23.3	4.2J - 145	1.56E+02	N	N/A	N/A	NO	BSL
7440-09-7	Potassium	690	J	1040		mg/kg	A1-HA06-02	2/6	117B - 472B	1040	392J - 2560	N/A	N	N/A	N/A	NO	NTX
7440-22-4	Silver	1.8	UB	11.3		mg/kg	A1-HA06-02	2/6	1.6B - 9.7B	11.3	1.1J - 2.4J	3.91E+01	N	N/A	N/A	NO	BSL
7440-62-2	Vanadium	6.9		40.8		mg/kg	A1-HA06-02	6/6	(5)	40.8	7.8J - 70.3L	5.48E+01	N	N/A	N/A	NO	BSL
7440-66-6	Zinc	330		365		mg/kg	A1-HA05-01D	2/6	4.2B - 35.3B	365	3.6J - 330	2.35E+03	N	N/A	N/A	NO	BSL

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)

(4) Rationale Codes — Selection Reason: Infrequent Detection but Associated Historically (HIST)
Frequent Detection (FD)
Same chemical class (CHEM)
Above Screening Levels (ASL)
Deletion Reason: Infrequent Detection (IFD)
Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No detection limits given: analyte detected in every sample.
(6) Screening value for pyrene used as a surrogate.
(7) Screening value for chromium VI used.
(8) Action level for lead
(9) Screening values for methylmercury

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = (Organics) Estimated Value
L = Estimated Value: Biased High
B = (Inorganics) Reported value is less than the Contract Required Detection Limit but greater tha

C = Carcinogenic
N = Non-Carcinogenic

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Semivolatiles (ug/L)																
117-81-7	Bis(2-Ethylhexyl)Phthalate	2	J	98		µg/L	A1-SW02	3/4	10U - 10U	98	ND	4.78E+01	C	N/A	N/A	YES	ASL
117-84-0	Di-n-Octyl Phthalate	3	J	3	J	µg/L	A1-SW01	1/4	10U - 10U	3	ND	7.30E+02	N	N/A	N/A	NO	BSL
	Inorganics (ug/L)																
7440-38-2	Arsenic	17.1		19		µg/L	A1-SW03D	2/4	3.4U - 3.4U	19	ND	4.46E-01	C	N/A	N/A	YES	ASL
7440-39-3	Barium	89.8	J	92	J	µg/L	A1-SW03D	2/4	33.8B - 55.6B	92	30.4J - 41.5J	2.56E+03	N	N/A	N/A	NO	BSL
7440-70-2	Calcium	94900		141000		µg/L	A1-SW03D	4/4	(5)	141000	13000J - 97300	N/A	N	N/A	N/A	NO	NTX
7439-89-6	Iron	339		25900		µg/L	A1-SW03	4/4	(5)	25900	ND	1.10E+04	N	N/A	N/A	YES	ASL
7439-95-4	Magnesium	1780	J	4390	J	µg/L	A1-SW03D	4/4	(5)	4390	1380J - 2460J	N/A	N	N/A	N/A	NO	NTX
7439-96-5	Manganese	26.1		656		µg/L	A1-SW03D	4/4	(5)	656	15.4 - 85.9J	7.30E+02	N	N/A	N/A	NO	BSL
7440-09-7	Potassium	1710	J	2660	J	µg/L	A1-SW03D	3/4	1340B - 1340B	2660	1740J - 3210J	N/A	N	N/A	N/A	NO	NTX
7440-23-5	Sodium	4570	J	6970	J	µg/L	A1-SW03D	4/4	(5)	6970	5230 - 9390	N/A	N	N/A	N/A	NO	NTX

(1) Minimum/maximum detected concentration.
(2) WPNSTA Background Study (Baker, 1995)
Background values = Range of Detections
(3) 10 * USEPA Region III COC Screening Value (derived from USEPA Region III RBC Table, April 2000)
Based on phone conversation with a Region III toxicologist

(4) Rationale Codes
Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)

Deletion Reason:
- Infrequent Detection (IFD)
- Background Levels (BKG)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)

(5) No detection limits given; analyte detected in every sample.

Definitions:
N/A = Not Applicable
ND = Not Detected
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level

J = (Organics) Estimated Value

C = Carcinogenic
N = Non-Carcinogenic

µg/L = micrograms per liter

TABLE 3.1
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

Chemical of Potential Concern	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)Anthracene	mg/kg	1.8543	4.1307	8.8		mg/kg	4.1307	95% UCL	(1)	4.1307	95% UCL	(1)
Benzo(a)Pyrene	mg/kg	1.7686	3.5490	7		mg/kg	3.5490	95% UCL	(1)	3.5490	95% UCL	(1)
Benzo(b)Fluoranthene	mg/kg	1.5023	3.2710	6.8		mg/kg	3.2710	95% UCL	(1)	3.2710	95% UCL	(1)
Benzo(k)Fluoanthene	mg/kg	1.4719	3.2437	6.8		mg/kg	3.2437	95% UCL	(1)	3.2437	95% UCL	(1)
Carbazole	mg/kg	1.0986	1.8237	0.25	J	mg/kg	0.2500	Max	(2)	0.2500	Max	(2)
Chrysene	mg/kg	1.8993	4.1374	8.6		mg/kg	4.1374	95% UCL	(1)	4.1374	95% UCL	(1)
Dibenz(a,h)Anthracene	mg/kg	1.1343	1.7694	1.4	J	mg/kg	1.4000	Max	(2)	1.4000	Max	(2)
Indeno(1,2,3-cd)Pyrene	mg/kg	1.0126	1.8724	3.4	J	mg/kg	1.8724	95% UCL	(1)	1.8724	95% UCL	(1)
Aroclor-1242	mg/kg	0.1609	0.4327	1	K	mg/kg	0.4327	95% UCL	(1)	0.4327	95% UCL	(1)
Aroclor-1260	mg/kg	0.5194	1.2406	2.7	K	mg/kg	1.2406	95% UCL	(1)	1.2406	95% UCL	(1)
Aluminum	mg/kg	6633	7758	9560	L	mg/kg	7758	95% UCL	(1)	7758	95% UCL	(1)
Antimony	mg/kg	2.0679	5.4809	12.6		mg/kg	5.4809	95% UCL	(1)	5.4809	95% UCL	(1)
Arsenic	mg/kg	3.0714	3.4708	4.1	L	mg/kg	3.4708	95% UCL	(1)	3.4708	95% UCL	(1)
Chromium	mg/kg	18.8571	31.4234	56.6		mg/kg	31.4234	95% UCL	(1)	31.4234	95% UCL	(1)
Iron	mg/kg	18117	32358	61700	L	mg/kg	32358	95% UCL	(1)	32358	95% UCL	(1)
Manganese	mg/kg	154.2714	223.0963	302	J	mg/kg	223.0963	95% UCL	(1)	223.0963	95% UCL	(1)
Thallium	mg/kg	0.4086	0.6344	1.1	L	mg/kg	0.6344	95% UCL	(1)	0.6344	95% UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

TABLE 3.2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical of Potential Concern	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)Anthracene	mg/kg	2.4424	4.8726	0.5	J	mg/kg	0.5000	Max	(2)	0.5000	Max	(2)
Benzo(a)Pyrene	mg/kg	2.2139	4.7028	0.6	J	mg/kg	0.6000	Max	(2)	0.6000	Max	(2)
Benzo(b)Fluoranthene	mg/kg	2.1814	4.6850	0.51	J	mg/kg	0.5100	Max	(2)	0.5100	Max	(2)
Benzo(k)Fluoanthene	mg/kg	2.2226	4.7093	0.76	J	mg/kg	0.7600	Max	(2)	0.7600	Max	(2)
Bis(2-Ethylhexyl)Phthalate	mg/kg	10.0286	27.1905	63	J	mg/kg	27.1905	95% UCL	(1)	27.1905	95% UCL	(1)
Chrysene	mg/kg	2.4306	4.8697	0.62	J	mg/kg	0.6200	Max	(2)	0.6200	Max	(2)
Indeno(1,2,3-cd)Pyrene	mg/kg	2.6004	4.9880	0.066	J	mg/kg	0.0660	Max	(2)	0.0660	Max	(2)
Aroclor-1242	mg/kg	0.3481	0.9802	2.3	L	mg/kg	0.9802	95% UCL	(1)	0.9802	95% UCL	(1)
Aroclor-1260	mg/kg	0.3071	0.7333	1.6	L	mg/kg	0.7333	95% UCL	(1)	0.7333	95% UCL	(1)
Aluminum	mg/kg	6591	8308	9660	L	mg/kg	8308	95% UCL	(1)	8308	95% UCL	(1)
Arsenic	mg/kg	3.0571	3.7206	4.2	L	mg/kg	3.7206	95% UCL	(1)	3.7206	95% UCL	(1)
Chromium	mg/kg	15.1857	20.3564	29.2		mg/kg	20.3564	95% UCL	(1)	20.3564	95% UCL	(1)
Iron	mg/kg	13426	19195	28000	L	mg/kg	19195	95% UCL	(1)	19195	95% UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

TABLE 3.3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

Chemical of Potential Concern	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)Anthracene	mg/kg	0.2443	0.3062	0.28		mg/kg	0.2800	Max	(2)	0.2800	Max	(2)
Benzo(a)Pyrene	mg/kg	0.3324	0.5147	0.87		mg/kg	0.5147	95% UCL	(1)	0.5147	95% UCL	(1)
Benzo(b)Fluoranthene	mg/kg	0.3904	0.8195	1.7		mg/kg	0.82	95% UCL	(1)	0.82	95% UCL	(1)
Benzo(k)Fluoanthene	mg/kg	0.3473	0.5558	0.97		mg/kg	0.5558	95% UCL	(1)	0.5558	95% UCL	(1)
Chrysene	mg/kg	0.2617	0.4580	0.83		mg/kg	0.4580	95% UCL	(1)	0.4580	95% UCL	(1)
Dibenz(a,h)Anthracene	mg/kg	0.2771	0.3116	0.35		mg/kg	0.3116	95% UCL	(1)	0.3116	95% UCL	(1)
Indeno(1,2,3-cd)Pyrene	mg/kg	0.3213	0.4900	0.81		mg/kg	0.4900	95% UCL	(1)	0.4900	95% UCL	(1)
Aluminum	mg/kg	6607.14	8102.0860	9030	L	mg/kg	8102	95% UCL	(1)	8102	95% UCL	(1)
Antimony	mg/kg	3.06	5.2346	5.9	J	mg/kg	5.23	95% UCL	(1)	5.23	95% UCL	(1)
Arsenic	mg/kg	5.65	11.6597	23.5		mg/kg	11.66	95% UCL	(1)	11.66	95% UCL	(1)
Chromium	mg/kg	15.49	25.0452	44.7		mg/kg	25.0452	95% UCL	(1)	25.0452	95% UCL	(1)
Iron	mg/kg	21250.00	29880.4518	35200	L	mg/kg	29880	95% UCL	(1)	29880	95% UCL	(1)
Lead	mg/kg	195.99	352.9071	501		mg/kg	353	95% UCL	(1)	353	95% UCL	(1)
Manganese	mg/kg	377.29	477.4471	523		mg/kg	477	95% UCL	(1)	477	95% UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

TABLE 3.4
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical of Potential Concern	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aluminum	mg/kg	5600.00	7046	8830	L	mg/kg	7046	95% UCL	(1)	7046	95% UCL	(1)
Antimony	mg/kg	4.93	10	12	J	mg/kg	10	95% UCL	(1)	10	95% UCL	(1)
Arsenic	mg/kg	8.50	18.58	33.3		mg/kg	18.6	95% UCL	(1)	18.6	95% UCL	(1)
Chromium	mg/kg	15.45	23.7579	32.6		mg/kg	23.8	95% UCL	(1)	23.8	95% UCL	(1)
Iron	mg/kg	22436.67	35077	39700		mg/kg	35077	95% UCL	(1)	35077	95% UCL	(1)
Lead	mg/kg	271.57	648	1120		mg/kg	648	95% UCL	(1)	648	95% UCL	(1)
Manganese	mg/kg	186.87	324	401		mg/kg	324	95% UCL	(1)	324	95% UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.

TABLE 3.5
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water

Chemical of Potential Concern (3)	Units	Arithmetic Mean of Normal Data	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Bis(2-Ethylhexyl)Phthalate	mg/L	0.0355	0	0.098		mg/L	0.10	Max	(3)	0.098	Max	(3)
Arsenic	mg/L	0.0099	0.0210	0.019		mg/L	0.02	Max	(3)	0.019	Max	(3)
Iron	mg/L	13.1148	30.3509	25.9		mg/L	25.90	Max	(3)	25.900	Max	(3)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); Mean of Normal Data (Mean-N).

(1) Conservative estimate of the arithmetic average concentration.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.
(3) Data set contains fewer than five samples. Therefore, maximum concentration used for EPC.

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
Benzo(a)Anthracene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Benzo(a)Pyrene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Benzo(b)Fluoranthene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Benzo(k)Fluoanthene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	Chronic	2.00E-02	(mg/kg/day)	55%	1.10E-02	(mg/kg/day)	Liver	1000/1	IRIS	03/25/1999
Carbazole	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Chrysene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Dibenz(a,h)Anthracene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Indeno(1,2,3-cd)Pyrene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Aroclor-1242	NA	NA	(mg/kg/day)	89%	NA	(mg/kg/day)	NA	NA	NA	NA
Aroclor-1260	NA	NA	(mg/kg/day)	89%	NA	(mg/kg/day)	NA	NA	NA	NA
Aluminum	Chronic	1.00E+00	(mg/kg/day)	27%	2.70E-01	(mg/kg/day)	CNS	100/1	NCEA	04/26/2000
Antimony	Chronic	4.00E-04	(mg/kg/day)	10%	4.00E-05	(mg/kg/day)	Whole Body	1000/1	IRIS	02/26/1998
Arsenic	Chronic	3.00E-04	(mg/kg/day)	95%	2.85E-04	(mg/kg/day)	Skin / CVS	3/1	IRIS	02/26/1998
Cadmium	Chronic	1.00E-03	(mg/kg/day)	5%	5.00E-05	(mg/kg/day)	Kidney	10/1	IRIS	02/26/1998
Chromium	Chronic	3.00E-03	(mg/kg/day)	1%	3.00E-05	(mg/kg/day)	GIS	300/3	IRIS	03/29/1999
Iron	Chronic	3.00E-01	(mg/kg/day)	20%	6.00E-02	(mg/kg/day)	Liver / CVS / GIS	NA	NCEA	04/26/2000
Manganese	Chronic	2.00E-02	(mg/kg/day)	5%	1.00E-03	(mg/kg/day)	CNS	1/1	IRIS	03/29/1999
Thallium	Subchronic	7.00E-05	(mg/kg/day)	100%	7.00E-05	(mg/kg/day)	CVS	3000/1	IRIS	03/29/1999

Notes:

(1) Refer to RAGS, Part A
(2) Adjusted dermal RfD = Oral RfD * Adj Factor
(3) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide the date of the article provided by NCEA.

NA = Not Applicable

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System

Sources:
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment, USEPA

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
Benzo(a)Anthracene	NA			NA	mg/kg/day	NA	NA	NA	NA
Benzo(a)Pyrene	NA			NA	mg/kg/day	NA	NA	NA	NA
Benzo(b)Fluoranthene	NA			NA	mg/kg/day	NA	NA	NA	NA
Benzo(k)Fluoanthene	NA			NA	mg/kg/day	NA	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	NA			NA	mg/kg/day	NA	NA	NA	NA
Carbazole	NA			NA	mg/kg/day	NA	NA	NA	NA
Chrysene	NA			NA	mg/kg/day	NA	NA	NA	NA
Dibenz(a,h)Anthracene	NA			NA	mg/kg/day	NA	NA	NA	NA
Indeno(1,2,3-cd)Pyrene	NA			NA	mg/kg/day	NA	NA	NA	NA
Aroclor-1242	NA			NA	mg/kg/day	NA	NA	NA	NA
Aroclor-1260	NA			NA	mg/kg/day	NA	NA	NA	NA
Aluminum	Chronic			1.00E-03	mg/kg/day	CNS	100/1	NCEA	04/26/2000
Antimony	NA			NA	mg/kg/day	NA	NA	NA	NA
Arsenic	NA			NA	mg/kg/day	NA	NA	NA	NA
Cadmium	NA			5.70E-05	mg/kg/day	NA	NA	NA	NA
Chromium	Chronic			3.00E-05	mg/kg/day	RsS	90/1 (aerosols), 300/1 (particulates)	IRIS	03/29/1999
Iron	NA			NA	mg/kg/day	NA	NA	NA	NA
Manganese	Chronic			1.43E-05	mg/kg/day	CNS	1000/1	IRIS	03/29/1999
Thallium	NA			NA	mg/kg/day	NA	NA	NA	NA

Notes:

(1) Provide equation used for derivation in text.
(2) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide the date of the article provided by NCEA.

Target Organ Abbreviations:
CNS = Central Nervous System
RsS = Respiratory System

Sources:
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment, USEPA

NA = Not Applicable

TABLE 5.3
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
Benzo(a)Anthracene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Benzo(a)Pyrene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Benzo(b)Fluoranthene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Benzo(k)Fluoanthene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	Chronic	2.00E-02	(mg/kg/day)	55%	1.10E-02	(mg/kg/day)	Liver	1000/1	IRIS	03/25/1999
Chrysene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Dibenz(a,h)Anthracene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Indeno(1,2,3-cd)Pyrene	NA	NA	(mg/kg/day)	50%	NA	(mg/kg/day)	NA	NA	NA	NA
Aluminum	Chronic	1.00E+00	(mg/kg/day)	27%	2.70E-01	(mg/kg/day)	CNS	100/1	NCEA	04/26/2000
Antimony	Chronic	4.00E-04	(mg/kg/day)	10%	4.00E-05	(mg/kg/day)	Whole Body	1000/1	IRIS	02/26/1998
Arsenic	Chronic	3.00E-04	(mg/kg/day)	95%	2.85E-04	(mg/kg/day)	Skin / CVS	3/1	IRIS	02/26/1998
Chromium	Chronic	3.00E-03	(mg/kg/day)	1%	3.00E-05	(mg/kg/day)	GIS	300/3	IRIS	03/29/1999
Iron	Chronic	3.00E-01	(mg/kg/day)	20%	6.00E-02	(mg/kg/day)	Liver / CVS / GIS	NA	NCEA	04/26/2000
Lead	NA	NA	(mg/kg/day)	20%	NA	(mg/kg/day)	NA	NA	NA	NA
Manganese	Chronic	2.00E-02	(mg/kg/day)	5%	1.00E-03	(mg/kg/day)	CNS	1/1	IRIS	03/29/1999

Notes:

(1) Refer to RAGS, Part A
(2) Adjusted dermal RfD = Oral RfD * Adj Factor
(3) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide the date of the article provided by NCEA.

NA = Not Applicable

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System

Sources:
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment, USEPA

TABLE 5.4
NON-CANCER TOXICITY DATA -- INHALATION
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
Benzo(a)Anthracene	NA			NA	mg/kg/day	NA	NA	NA	NA
Benzo(a)Pyrene	NA			NA	mg/kg/day	NA	NA	NA	NA
Benzo(b)Fluoranthene	NA			NA	mg/kg/day	NA	NA	NA	NA
Benzo(k)Fluoanthene	NA			NA	mg/kg/day	NA	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	NA			NA	mg/kg/day	NA	NA	NA	NA
Chrysene	NA			NA	mg/kg/day	NA	NA	NA	NA
Dibenz(a,h)Anthracene	NA			NA	mg/kg/day	NA	NA	NA	NA
Indeno(1,2,3-cd)Pyrene	NA			NA	mg/kg/day	NA	NA	NA	NA
Aluminum	Chronic			1.00E-03	mg/kg/day	CNS	100/1	NCEA	04/26/2000
Antimony	NA			NA	mg/kg/day	NA	NA	NA	NA
Arsenic	NA			NA	mg/kg/day	NA	NA	NA	NA
Chromium	Chronic			3.00E-05	mg/kg/day	RsS	90/1 (aerosols), 300/1 (particulates)	IRIS	03/29/1999
Iron	NA			NA	mg/kg/day	NA	NA	NA	NA
Lead	NA			NA	mg/kg/day	NA	NA	NA	NA
Manganese	Chronic			1.43E-05	mg/kg/day	CNS	1000/1	IRIS	03/29/1999

Notes:

(1) Provide equation used for derivation in text.
(2) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide the date of the article provided by NCEA.

Target Organ Abbreviations:
CNS = Central Nervous System
RsS = Respiratory System

Sources:
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment, USEPA

NA = Not Applicable

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Benzo(a)Anthracene	7.30E-01	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Benzo(a)Pyrene	7.30E+00	50%	NA	$(mg/kg/day)^{-1}$	B2	IRIS	06/09/1999
Benzo(b)Fluoranthene	7.30E-01	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Benzo(k)Fluoanthene	7.30E-02	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Bis(2-Ethylhexyl)Phthalate	1.40E-02	55%	2.55E-02	$(mg/kg/day)^{-1}$	B2	IRIS	03/25/1999
Carbazole	2.00E-02	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Chrysene	7.30E-03	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Dibenz(a,h)Anthracene	7.30E+00	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Indeno(1,2,3-cd)Pyrene	7.30E-01	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Aroclor-1242	2.00E+00	89%	2.25E+00	$(mg/kg/day)^{-1}$	B2	IRIS	04/26/2000
Aroclor-1260	2.00E+00	89%	2.25E+00	$(mg/kg/day)^{-1}$	B2	IRIS	02/26/1998
Aluminum	NA	27%	NA	$(mg/kg/day)^{-1}$	D	NA	NA
Antimony	NA	10%	NA	$(mg/kg/day)^{-1}$	D	NA	NA
Arsenic	1.50E+00	95%	1.58E+00	$(mg/kg/day)^{-1}$	A	IRIS	02/26/1998
Cadmium	NA	5%	NA	$(mg/kg/day)^{-1}$	B1	NA	NA
Chromium	NA	1%	NA	$(mg/kg/day)^{0}$	D (o) A (i)	IRIS	03/29/1999
Iron	NA	20%	NA	$(mg/kg/day)^{1}$	D	NA	NA
Manganese	NA	5%	NA	$(mg/kg/day)^{2}$	D	NA	NA
Thallium	NA	100%	NA	$(mg/kg/day)^{3}$	D	NA	NA

Notes:

(1) Adjusted dermal CSF = Oral CSF / Adj Factor
(2) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide article date provided by NCEA.

NA = Not Applicable

Sources:
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment, USEPA

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

Weight of Evidence:
Known/Likely
Cannot be Determined
Not Likely

(o) Oral
(i) Inhalation

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Chemical of Potential Concern	Unit Risk	Units	Adjustment (1)	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Benzo(a)Anthracene				NA	mg/kg/day	B2	NA	NA
Benzo(a)Pyrene				3.10E+00	mg/kg/day	B2	NCEA	04/26/2000
Benzo(b)Fluoranthene				NA	mg/kg/day	B2	NA	NA
Benzo(k)Fluoanthene				NA	mg/kg/day	B2	NA	NA
Bis(2-Ethylhexyl)Phthalate				1.40E-02	mg/kg/day	B2	NCEA	04/26/2000
Carbazole				NA	mg/kg/day	B2	NA	NA
Chrysene				NA	mg/kg/day	B2	NA	NA
Dibenz(a,h)Anthracene				NA	mg/kg/day	B2	NA	NA
Indeno(1,2,3-cd)Pyrene				NA	mg/kg/day	B2	NA	NA
Aroclor-1242				2.00E+00	mg/kg/day	B2	IRIS	04/26/2000
Aroclor-1260				2.00E+00	mg/kg/day	B2	IRIS	02/26/1998
Aluminum				NA	mg/kg/day	D	NA	NA
Antimony				NA	mg/kg/day	D	NA	NA
Arsenic				1.51E+01	mg/kg/day	A	IRIS	02/26/1998
Cadmium				6.30E+00	mg/kg/day	B1	IRIS	02/26/1998
Chromium				4.10E+01	mg/kg/day	D (o) A (i)	HEAST/IRIS	07/01/1997
Iron				NA	mg/kg/day	D	NA	NA
Manganese				NA	mg/kg/day	D	NA	NA
Thallium				NA	mg/kg/day	D	NA	NA

Notes:

(1) Adjustment Factor applied to Unit Risk to calculate Inhalation Slope Factor = 70kg x 1/20m3/day x 1000ug/mg
(2) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide the date of the article provided by NCEA.

NA = Not Applicable

Sources:
IRIS = Integrated Risk Information System
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A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data a
B2 - Probable human carcinogen - indicates sufficient evidence in ani
inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carci
E - Evidence of noncarcinogenicity

Weight of Evidence:
Known/Likely
Cannot be Determined
Not Likely

(o) Oral
(i) Inhalation

TABLE 6.3
CANCER TOXICITY DATA -- ORAL/DERMAL
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Benzo(a)Anthracene	7.30E-01	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Benzo(a)Pyrene	7.30E+00	50%	NA	$(mg/kg/day)^{-1}$	B2	IRIS	06/09/1999
Benzo(b)Fluoranthene	7.30E-01	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Benzo(k)Fluoanthene	7.30E-02	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Bis(2-Ethylhexyl)Phthalate	1.40E-02	55%	2.55E-02	$(mg/kg/day)^{-1}$	B2	IRIS	03/25/1999
Chrysene	7.30E-03	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Dibenz(a,h)Anthracene	7.30E+00	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Indeno(1,2,3-cd)Pyrene	7.30E-01	50%	NA	$(mg/kg/day)^{-1}$	B2	NCEA	04/26/2000
Aluminum	NA	27%	NA	$(mg/kg/day)^{-1}$	D	NA	NA
Antimony	NA	10%	NA	$(mg/kg/day)^{-1}$	D	NA	NA
Arsenic	1.50E+00	95%	1.58E+00	$(mg/kg/day)^{-1}$	A	IRIS	02/26/1998
Chromium	NA	1%	NA	$(mg/kg/day)^{-1}$	D (o) A (i)	IRIS	03/29/1999
Iron	NA	20%	NA	$(mg/kg/day)^{-1}$	D	NA	NA
Lead	NA	20%	NA	$(mg/kg/day)^{-1}$	B2	NA	NA
Manganese	NA	5%	NA	$(mg/kg/day)^{-1}$	D	NA	NA

Notes:

(1) Adjusted dermal CSF = Oral CSF / Adj Factor
(2) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide article date provided by NCEA.

NA = Not Applicable

Sources:
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
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A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

Weight of Evidence:
Known/Likely
Cannot be Determined
Not Likely

(o) Oral
(i) Inhalation

TABLE 6.4
CANCER TOXICITY DATA -- INHALATION
AOC 1 - SCRAP METAL DUMP
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA
CHEATHAM ANNEX SITE

Chemical of Potential Concern	Unit Risk	Units	Adjustment (1)	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Benzo(a)Anthracene				NA	mg/kg/day	B2	NA	NA
Benzo(a)Pyrene				3.10E+00	mg/kg/day	B2	NCEA	04/26/2000
Benzo(b)Fluoranthene				NA	mg/kg/day	B2	NA	NA
Benzo(k)Fluoanthene				NA	mg/kg/day	B2	NA	NA
Bis(2-Ethylhexyl)Phthalate				1.40E-02	mg/kg/day	B2	NCEA	04/26/2000
Chrysene				NA	mg/kg/day	B2	NA	NA
Dibenz(a,h)Anthracene				NA	mg/kg/day	B2	NA	NA
Indeno(1,2,3-cd)Pyrene				NA	mg/kg/day	B2	NA	NA
Aluminum				NA	mg/kg/day	D	NA	NA
Antimony				NA	mg/kg/day	D	NA	NA
Arsenic				1.51E+01	mg/kg/day	A	IRIS	02/26/1998
Chromium				4.10E+01	mg/kg/day	D (o) A (i)	HEAST/IRIS	07/01/1997
Iron				NA	mg/kg/day	D	NA	NA
Lead				NA	mg/kg/day	B2	NA	NA
Manganese				NA	mg/kg/day	D	NA	NA

Notes:

(1) Adjustment Factor applied to Unit Risk to calculate Inhalation Slope Factor = 70kg x 1/20m3/day x 1000ug/mg
(2) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide the date of the article provided by NCEA.

NA = Not Applicable

Sources:
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
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EPA Group:
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B2 - Probable human carcinogen - indicates sufficient evidence in ani
inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carci
E - Evidence of noncarcinogenicity

Weight of Evidence:
Known/Likely
Cannot be Determined
Not Likely

(o) Oral
(i) Inhalation

APPENDIX F.3
HUMAN HEALTH TOXICOLOGICAL PROFILES

Date of Last Revision: 3/24/99
Revisor: Denise Hluhan

BIS (2-ETHYLHEXYL) PHTHALATE

INTRODUCTION

Chemical Name: Bis (2-ethylhexyl) phthalate
CAS Number (1): 117-81-7
Molecular Formula (1): $C_{24}H_{38}O_4$
Molecular Weight (1): 390.5 g/mole

Bis (2-ethylhexyl) phthalate (BEHP) is a man-made chemical that is added to plastics to increase their flexibility. This compound is essentially a colorless liquid. BEHP is also known by the tradenames of Palatinol AH, Octoil, Sicol 150, Bisoflex 81, and Eviplast 80. It is present in a variety of plastics, especially vinyl materials, which have BEHP contents as high as 40 percent. Materials containing BEHP include rainwear, footwear, upholstery materials, imitation leather, waterproof gloves, tablecloths, shower curtains, food packaging materials, floor tiles, paints, flexible tubing, and plastic bags. BEHP has been detected in commercial organic solvents (2).

FATE AND TRANSPORT

Log K_{ow} (1):	5.11
Surface Water $t_{1/2}$: (2):	2-3 weeks
Log K_{oc} (1):	4 to 5
Henry's Law Constant (1):	1.1×10^{-5} atm·m^3/mole
BCF (1):	100 to 10,000 for fish and invertebrates
Water Solubility (1):	0.3 mg/L at 25° C
Vapor Pressure (1):	6.45×10^{-6} mm Hg at 25° C

BEHP is released into the atmosphere through emissions from manufacturers and other industries and will exist in the gaseous phase. It is also released to the atmosphere via volatilization from plastic materials and the burning of plastics (2). BEHP released to the air will be carried for significant distances in the troposphere with wash out by rain being a significant removal process (1).

If released into a water system, BEHP biodegrades fairly rapidly with a half-life of approximately 2-3 weeks. BEHP also will strongly adsorb to soils and sediments and accumulate in aquatic organisms (1). As a result, evaporation and hydrolysis are not significant removal processes in the aquatic environment.

As mentioned above, BEHP has a strong tendency to adhere to soils and sediments. Therefore, when BEHP comes into contact with surface soils, release via evaporation or leaching into groundwater is negligible. Some studies suggest that BEHP may biodegrade in soil under aerobic conditions following acclimation.

PHARMACOKINETICS

The absorption of BEHP following inhalation, dermal contact, and oral exposure has been studied in humans and/or animals. Absorption following exposure to airborne BEHP has not been quantified in either humans or animals although data suggest it is absorbed via this route (2). Oral exposure in humans has resulted in urinary excretion of 11-15% of the administered dose. However, the total oral absorption rate is probably higher (approximately 20-25%) since it has been demonstrated in animals that 15-20% of the absorbed dose is eliminated via the bile (2). In terms of dermal absorption, the available animal studies indicate that absorption is poor via this pathway. One study suggests a dermal absorption rate of BEHP of approximately five percent. No data are available on the absorption of BEHP following dermal exposure in man (2).

No studies are available describing the distribution of BEHP and its metabolites following exposure in man. The tissue distribution in rats and monkeys is mainly to the liver, kidney, blood, and testes following oral exposure to BEHP. Dermal contact in rats resulted in the largest accumulation in the muscle, followed by the liver, kidney, and fat. No data were available regarding distribution of BEHP in animals after inhalation exposure (2).

In terms of BEHP metabolism, the available data in both humans and animals suggest that a complex series of reactions occur resulting in the production of 30 or more metabolites. The initial metabolic stop involves the lipolytic cleavage of DEHP to mono(2-ethylhexyl)phthalate (MEHP) and, after a series of primary metabolic reactions, the oxidized derivatives of MEHP undergo glucuronidation prior to excretion. It should be noted that the integrity of the aromatic phthalic acid moiety is maintained during these metabolic conversions (2).

The excretion of BEHP varies with the route of primary exposure. Following oral exposure to BEHP, a majority of the metabolites are excreted in the urine with lesser quantities eliminated via the bile in both humans and animals. A similar pattern of excretion was evident following dermal exposure in rats. No data are available regarding BEHP excretion following inhalation exposure in humans or animals (2).

HUMAN HEALTH EFFECTS

Noncarcinogenic Effects

There are currently no data available suggesting that human exposure to BEHP results in the development of systemic effects. However, animal data suggest that exposure may affect the liver, testes, kidney, thyroid, and pancreas (2).

Oral exposure of rodents to BEHP has resulted in significant effects on the liver. Hepatic effects of BEHP in rodent systems includes increased hyperplasia, decreased cholesterol synthesis and degradation, alterations in the morphology of bile ducts, and appearance of precancerous altered cell foci, nodules, and tumors of the liver. The degree of liver perturbation is a function of both the dose and duration of exposure (2).

A number of studies in rats have demonstrated that BEHP exposure results in increased weight of the testes, prostate, seminal vesicles, and epididymus. The severity of testicular damage appears to be greater in younger than older male rats (2).

Chronic exposure to BEHP in animals has resulted in focal cystic changes of the kidney cells, decreased creatinine clearance, and an accumulation of lipofuscin deposits in the tubular epithelial cells (2).

The U.S. EPA has developed an oral reference dose (RfD) for BEHP based on an increased relative liver weight in guinea pigs (3). The guinea pigs were orally fed BEHP-containing feed and a lowest observed adverse effect level (LOAEL) of 19 mg/kg/day was established. An uncertainty factor of 1,000 was applied to the LOAEL to derived an oral RfD of 2×10^{-2} mg/kg/day for BEHP (3).

Carcinogenic Effects

The U.S. EPA has classified BEHP as a Group B2 carcinogen -- probable human carcinogen. This classification is based on sufficient evidence of carcinogenicity in animals and inadequate evidence in humans (3).

Based upon an NTP study involving Fisher 344 rats and B6C3F1 mice, an oral slope factor for BEHP was derived. Male and female rats were fed doses of 0, 6,000 and 12,000 ppm BEHP for 103 weeks and examined histologically for evidence of carcinogenicity. The histological examination revealed a statistically significant increase in the incidence of hepatocellular carcinomas and combined incidence of carcinomas and adenomas. A positive trend between increasing dose and increased cancer incidence also was apparent. An oral slope factor of 1.4×10^{-2} $(mg/kg/day)^{-1}$ was developed by the U.S. EPA using the linearized multistage model (3). There is currently no slope factor available for assessing carcinogenicity of BEHP by the inhalation route. The oral CSF will therefore be used to evaluate inhalation exposures.

SUMMARY OF REGULATORY LEVELS AND CRITERIA

EPA Carcinogenic Classification (3): B2 carcinogen - probable human carcinogen
AWQC (4):
    Water and Fish Consumption = 1.8 μg/L
    Fish Consumption only = 5.9 μg/L
MCL (5): 0.006 mg/L

SUMMARY OF CRITERIA

EPA Carcinogenic Classification (3):	B2 carcinogen - probable human carcinogen
Cancer Slope Factor (Oral) (3):	0.014 $(mg/kg/day)^{-1}$
Cancer Slope Factor (Inhalation) (3):	0.014 $(mg/kg/day)^{-1}$
Oral RfD (3):	0.02 mg/kg/day
Inhalation RfD (3):	Not Available

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POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

INTRODUCTION

The PAHs are a diverse class of compounds consisting of two or more substituted and unsubstituted polycyclic aromatic rings formed by the incomplete combustion of carbonaceous materials. PAHs are ubiquitous in the modern environment and commonly are constituents of coal tar, soot, vehicular exhausts, cigarette smoke, certain petroleum products, road tar, mineral oils, creosote and many cooked foods.

The physiochemical properties of the various PAHs are shown on Table 1.

FATE AND TRANSPORT

Other than naphthalene, the PAHs can be separated into two major groups based on chemical and physical properties relevant to their fate and transport. Table 2 lists the PAHs belonging to the anthracene group and benzo(a)pyrene group. The following paragraphs discuss the groups' fate and environmental pathways.

<u>The Anthracene Group: (anthracene, acenaphthene, acenaphthalene, fluoranthene, fluorene, phenanthrene and pyrene)</u>: The majority of the information presented below is specific to anthracene. However, the properties and fate characteristics of anthracene are considered to be representative of the other PAHs in this group.

Under ambient conditions, atmospheric anthracene will exist predominantly (approximately 90%) in the vapor phase with very little adsorption to aerosols. Anthracene can be returned to aquatic and terrestrial systems by wet and dry deposition; however, the majority of the deposition will be dry. A significant amount of airborne anthracene may be removed and deposited near combustion sources. The anthracene remaining in the air will probably undergo photoxidation to quinones and other oxygenated compounds (8).

Dissolved anthracene can undergo some removal from surface waters via volatilization, but its low vapor pressure (2.4×10^{-4} torr at 25°C) prevents this from being a significant transport pathway. A half-life of 16 hours for anthracene was reported in the aquatic environment under maximum volatilization conditions (6). With a log octanol-water partition coefficient of 4.45, anthracene has a very strong tendency to partition from water to other environmental media. Adsorption and sedimentation are the primary environmental fates in aquatic systems with absorption both organic and non-organic particulate matter (6).

Anthracene in the aquatic system will tend to accumulate preferentially in the sediment and remain there unless considerable mixing at the sediment/water column interface occurs. In rivers, the major fate pathway is transport of sediment-adsorbed anthracene to the oceans, since neither photolysis or anaerobic degradation are important fate pathways. Depending on the actual conditions in the environment, biotransformation could be an important fate process (6).

Biological processes such as uptake, depuration, and biodegradation are considered potential environmental fate mechanisms for anthracene. Bioaccumulation of anthracene is probably short-term, especially for vertebrates. Biodegradation by microorganisms may also be a significant fate process (6). Half-lives on the order of 1-2 weeks under laboratory conditions were reported for the anthracene group.

The Benzo[a]pyrene Group: (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, indeno[1,2,3-c,d]pyrene): The majority of the information presented below is specific to benzo[a]pyrene; however, the properties and fate characteristics of benzo[a]pyrene are considered to be representative of the other PAHs in this group.

Under ambient conditions, atmospheric benzo[a]pyrene will exist predominantly (approximately 99%) adsorbed to aerosols. Benzo[a]pyrene can be returned to aquatic and terrestrial systems by wet and dry deposition; however, the majority of the deposition will be dry. A significant amount of airborne benzo[a]pyrene may be removed and deposited near combustion sources. The physical removal mechanisms are expected to be significant with an atmospheric residence time of approximately eight days (6).

Dissolved benzo[a]pyrene can undergo some removal from surface waters via volatilization, but its very low vapor pressure (5.6×10^{-9} torr at 25°C) prevents this from being significant. A half-life of 430 hours for benzo[a]pyrene was reported in aquatic environments under maximum volatilization conditions (6).

With a log octanol-water partition coefficient of 6.08, benzo[a]pyrene has a very strong tendency for water-lipid and water-sediment partitioning. Adsorption and sedimentation represent primary environmental pathways in aquatic systems through adsorption both organic and non-organic particulate matter (6).

Benzo[a]pyrene in aquatic systems will accumulate preferentially in sediments and tend to remain there unless considerable mixing occurs at the sediment/water column interface. In rivers, the major fate pathway is transport of adsorbed benzo[a]pyrene to oceans. Photolysis and biotransformation can also be important fate processes (6).

Biological processes such as uptake, depuration, and biodegradation are considered potential environmental fate mechanisms for benzo[a]pyrene. Bioaccumulation of benzo[a]pyrene is probably short-term, especially for vertebrates. Biodegradation by microorganisms is slower and not as extensive in the benzo[a]pyrene group as in the lower-molecular-weight PAHs (6). Half-lives on the order of months or longer under laboratory conditions were reported for the benzo[a]pyrene group.

PHARMACOKINETICS

No studies have been located concerning the absorption of PAHs via inhalation and oral ingestion. However, it can be inferred from the presence of urinary metabolites in workers exposed to PAHs that absorption occurs via inhalation. Rats orally administered PAHs showed elevated concentrations in the liver, lung and kidneys (11). In terms of dermal exposure, measurable quantities of PAHs were detected in blood after percutaneous exposure in humans (11).

PAHs were distributed to the lung, kidney, liver and gastrointestinal tract of rats following exposure via inhalation. Orally administered PAHs in the same species were detected in the liver, lung and kidney. Very little of the PAHs absorbed through the skin are distributed to tissues (11).

The lipophilicity of PAHs enables them to readily penetrate cellular membranes and circulate in the body indefinitely. However, metabolic processes alter PAHs both chemically and structurally producing more water-soluble and excretable compounds. These metabolic processes occur in all tissues. The following metabolic pathway is that of benzo[a]pyrene and is similar to that of the other PAHs. Benzo[a]pyrene is initially metabolized by the microsomal P-450 system to form an arene oxide. Once the arene oxide is formed, it undergoes hydration via epoxide hydrolase to form a dihydrodiol. Further metabolic activity can lead to the generation of diol epoxides which are believed responsible for BaPs toxic effects. Benzo[a]pyrene can also be oxidized spontaneously or metabolically to quinones (11).

In terms of elimination, animal studies suggest that PAHs are eliminated rapidly from the lung when the animals are exposed via inhalation (11). Rats orally exposed to PAHs excreted the compounds in the feces (11). PAHs applied to the skin of rats were determined to be excreted in the urine and feces equally (11).

HUMAN HEALTH EFFECTS

For practical purposes, PAHs are often separated into two categories, the carcinogenic and non-carcinogenic PAHs. This is a somewhat misleading categorization as some evidence exists that many of the non-carcinogenic PAHs have some, albeit weak, carcinogenic activity or act as promoters or co-carcinogens. Another factor complicating PAH categorization is that they do not occur alone in nature but as complex mixtures containing numerous PAHs of varying carcinogenic potencies. The potential interactions of the individual PAHs present as components of these mixtures must be addressed in attempting to quantify the carcinogenic and non-carcinogenic risks (7).

The USEPA, in reviewing the carcinogenicity of several PAHs, indicated those for which there was sufficient, limited, or inadequate, evidence of carcinogenicity. These classifications are presented in Table 3.

Benzo[a]anthracene, benzo[a]pyrene, benzo(b)fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, chrysene, indeno[1,2,3-c,d]pyrene, and dibenzo[a,h]anthracene are probable human carcinogens. Acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene and pyrene are either possible human carcinogens, the evidence is inadequate to assess carcinogenic potential, or there is no evidence for carcinogenicity (6).

<u>Non-carcinogenic effects</u>: Acute effects from direct contact with PAHs are generally limited to phototoxicity. Percutaneous exposure to PAHs, followed by exposure to sunlight, can result in dermatitis consisting of erythema, itching, and burning. Dermatitis can result from a single 90-minute exposure to a one-percent solution of coal tar. Chronic exposure to PAHs may result in chronic dermatitis, hyperkeratoses, and other skin disorders (1,2,3,4). PAHs have also been shown to cause cytotoxicity in rapidly proliferating cells throughout the body with the hematopoietic system, lymphoid system, and testes frequently noted as targets (10). This effect appears to result from PAH mediated inhibition of DNA replication (6).

The PAHs can also cause systemic toxicity at high doses. The liver and kidney of rats have exhibited slight morphological changes following oral administration of acenaphthene. The major effects linked to naphthalene exposure include cataracts with accompanying retinopathy and hemolytic anemia (6).

Carcinogenic effects: Most carcinogenic PAHs are not direct carcinogens but require metabolic activation before carcinogenesis is initiated (6). The metabolites of carcinogenic PAHs have been found to bind to DNA in every tissue examined regardless of species, dose, or route of administration (6).

In mice, carcinogenic PAHs can produce hepatomas and lung adenomas following repeated oral administration and bladder tumors following implantation. In addition, they can produce tumors in mice following subcutaneous injection (6). Lung tumors have developed in hamsters and mice following intratracheal and intravenous administration, respectively (8).

REGULATORY LEVELS AND CRITERIA

OSHA PEL (1):	0.2 mg/m^3 (coal tar pitch volatiles - benzene soluble fraction)
ACGIH TLV TWA (11):	0.2 mg/m^3 (coal tar pitch volatiles - benzene soluble fraction)
NIOSH REL TWA (11):	0.1 mg/m^3 (benzene soluble PAH)
IDLH (11):	400 mg/m^3 (coal tar pitch volatiles)
Reportable Quantity (11):	1 lb

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TABLE 1

POLYNUCLEAR AROMATIC HYDROCARBON PHYSICAL AND CHEMICAL INFORMATION

	Formula	Water Solubility* (mg/L)	Vapor Pressure* (torr)	Henry's Law Constant (atm-m^3/mole)	Log K_{oc}	Log K_{ow}
Anthracene	$C_{14}H_{10}$	0.045	2.4×10^{-4}	1.25×10^{-3}	4.20	4.45
Acenaphthene	$C_{12}H_{10}$	3.47	1.5×10^{-3}	1.5×10^{-4}	1.25	3.97
Acenaphthylene	$C_{12}H_8$	3.42	1.6×10^{-3}	9.33×10^{-5}	3.72	4.33
Fluoranthene	$C_{16}H_{10}$	0.26	5×10^{-6}	5.12×10^{-6}	4.64	5.33
Fluorene	$C_{13}H_{10}$	1.69	1×10^{-2}	1.29×10^{-3}	3.65	4.18
Phenanthrene	$C_{14}H_{10}$	1.0	9.6×10^{-4}	2.25×10^{-4}	4.20	4.46
Pyrene	$C_{16}H_{10}$	0.14	2.5×10^{-6}	4.75×10^{-6}	4.64	5.32
Benzo[a]pyrene	$C_{20}H_{12}$	3.8×10^{-3}	5.6×10^{-9}	4.89×10^{-7}	--	6.08
Benzo[a]anthracene	$C_{18}H_{12}$	5.7×10^{-3}	2.2×10^{-8}	7.34×10^{-7}	5.34	5.61
Benzo[b)fluoranthene	$C_{20}H_{12}$	1.0×10^{-3}	5.0×10^{-7}	1.66×10^{-4}	--	6.08
Benzo[k]fluoranthene	$C_{20}H_{12}$	5.5×10^{-4}	5.0×10^{-7}	3.02×10^{-4}	--	6.08
Benzo[g,h,i]perylene	$C_{22}H_{12}$	3.0×10^{-4}	1.0×10^{-10}	1.21×10^{-7}	--	6.51
Chrysene	$C_{12}H_{12}$	1.8×10^{-3}	6.3×10^{-9}	1.05×10^{-6}	5.34	5.61
Indeno[1,2,3-c,d]pyrene	$C_{22}H_{12}$	5.0×10^{-4}	1.0×10^{-10}	6.0×10^{-10}	--	6.51

*Values expressed at 25°C.
Source: Ref. 8

TABLE 2

MAJOR GROUPINGS OF POLYNUCLEAR AROMATIC HYDROCARBONS*

THE ANTHRACENE GROUP

- Anthracene
- Acenaphthene
- Acenaphthylene
- Fluoranthene
- Fluorene
- Phenanthrene
- Pyrene

THE BENZO[a]PYRENE GROUP

- Benzo[a]anthracene
- Benzo[a]pyrene
- Benzo[b]fluoranthene
- Benzo[g,h,i]perylene
- Benzo[k]fluoranthene
- Chrysene
- Dibenzo[a,h]anthracene
- Indeno[1,2,3-c,d]pyrene

* Note: Naphthalene is addressed in a separate toxicity profile.

TABLE 3

CLASSIFICATION OF PAHS ACCORDING TO EVIDENCE FOR CARCINOGENICITY

Chemicals for which there is sufficient evidence that they are carcinogens:

Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Chrysene
Dibenz(a,h)anthracene
Indeno(1,2,3-c,d)pyrene

Chemicals for which the evidence is inadequate to assess their carcinogenicity:

Acenaphthylene
Anthracene
Benzo(g,h,i)perylene
Fluoranthene
Fluorene
Naphthalene
Phenanthrene
Pyrene

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POLYCHLORINATED BIPHENYLS (PCBS)

INTRODUCTION

Chemical Name:	Polychlorinated Biphenyls (PCBs)
Synonyms and Trade Names:	Aroclor, Kanechlor, Clophen
CAS Numbers:	Aroclor 1242: 53469-21-9
	Aroclor 1248: 12672-29-6
	Aroclor 1254: 11097-69-1
	Aroclor 1260: 001336-36-3
Molecular Formula:	$C_6H_xCl_xC_6H_xClx$
Molecular Weights:	Aroclor 1242: 266.5 g/mole
	Aroclor 1248: 299.5 g/mole
	Aroclor 1254: 328.4 g/mole
	Aroclor 1260: 377.8 g/mole

The term polychlorinated biphenyls (PCBs) commonly refers to a variety of mixtures of individual biphenyl isomers, each consisting of two joined benzene rings and up to ten chlorine atoms. Mixtures of these isomers are known by their commercial designation of Aroclor. This trade name is followed by a four-digit number; the first two numbers indicate the type of isomer mixture and the last two numbers indicate the approximate weight percent of chlorine in the mixture (3).

PCBs are man-made chemicals that were used widely in transformers, electrical equipment and as lubricants (2). Because of their persistence and toxicity in the environment, their manufacture was discontinued in the United States in 1977 (1). However, PCB equipment manufactured before 1977 is currently still being used in the U.S. and this use is being regulated by the Environmental Protection Agency.

PCBs are very stable chemically and tend to be persistent in the environment. Persistence and bioaccumulation in living organisms also occur due to the high lipophilicity of these compounds (2).

CHEMICAL AND PHYSICAL PROPERTIES

Aroclor	**1242**	**1248**	**1254**	**1260**
Log K_{oc}	3.8	5.75	5.51	6.3
Log K_{ow} (2):	5.6	6.11	6.03	7.15
Henry's Law Constant(2): (atm-m^3/mol at 25° C)	$5.7x10^{-4}$	$3.5x10^{-3}$	$8.4x10^{-3}$	$7.1x10^{-3}$
Water Solubility (mg/L):	0.24	0.054	0.012	0.0027
Vapor Pressure(2): (mm Hg at 25° C)	$4.06x10^{-4}$	$4.94x10^{-4}$	$7.71x10^{-5}$	$4.0x10^{-5}$
Density (2):	1.35	1.41	1.50	1.57

FATE AND TRANSPORT

PCBs can be found in the atmosphere, water, and soil. Adsorption to sediments is the major fate process for PCBs in water. Because of lower water solubilities and higher octanol-water partition coefficients, higher chlorinated isomers will adsorb more strongly than the lower chlorinated isomers. This also indicates that significant leaching should not occur in soil under most conditions (2).

For PCBs that exist in the dissolved state in water, volatilization becomes the primary fate process. Therefore, the volatilization process is the major removal mechanism of PCBs from water sources. However, the rate of volatilization is dependent upon PCB adsorption to sediment (2).

In the atmosphere, PCBs exist in the vapor phase and can be removed by wet and dry deposition. A typical range of PCB concentrations in the atmosphere is between 1 and 250 μg/L (2).

Degradation of PCBs in the environment is dependent upon the degree of chlorination. Generally, the more chlorinated the PCB molecule, the more persistent it will be in the environment. Factors which determine biodegradability include the amount of chlorination, concentration, type of microbial population, available nutrients, and temperature (2). The dominant degradation process in the atmosphere is dependent upon the vapor phase reaction of PCBs with hydroxyl radicals (2).

Photolysis is thought to be the only transformation process in the aquatic environment. However, the process is extremely slow. It appears the hydrolysis and oxidation do not degrade PCBs (2).

In the atmosphere, typical airborne concentrations of PCBs are as follows (2):

Location	Concentration Range (mg/m^3)
Urban	0.5 to 30
Rural	0.1 to 2.0
Great Lakes	0.4 to 3.0
Marine	0.05 to 2.0
Remote	0.02 to 0.5

The concentrations of PCBs in the open waters of oceans and lakes are shown below (2):

Location	Concentration Range (μg/L)
North Pacific	0.04 to 0.59
Antarctic	0.035 to 0.069
North Atlantic	0.02 to 0.20
Lake Superior	0.63 to 3.30
Lake Michigan	3.0 to 9.0
Lake Huron	0.49 to 17.15

PCBs are found in the soils from different areas of the world in the following concentrations (2):

Location	Concentration Range (ppb)
Great Britain	2.3 to 444
South Wales/Scotland	4.5 to 47.7
Japan	<10 to 100
United States	
Everglades National Forest, Florida	<1 to 33
U.S. Urban areas	0.02 to 11.94
Rocky Mountain National Park	0.098 to 0.54
Great Lakes	2.5 to 251.7

PHARMACOKINETICS

PCBs are absorbed primarily through inhalation and dermal contact in occupational environments. However, the general public absorbs PCBs primarily through oral exposure, such as the ingestion of PCB contaminated fish (2).

Animal studies have shown that PCBs are readily absorbed, but studies to quantify the rate of absorption are needed. Studies indicate that PCBs are absorbed by the gastrointestinal tract, and have been found in the serum and breast milk of woman orally exposed to PCBs (2).

PCBs accumulate in human plasma and adipose tissue with the extent of accumulation dependent on the positions of chlorines on the PCB congeners. Congeners with chlorines in both 4 positions as opposed to the 3 ,4 positions were found in greater concentrations (2). Also, PCBs have been shown to accumulate in human breast milk. The extent of accumulation is approximately 4 to 10 times less than the concentration in maternal blood (2).

Animal studies have indicated maximum concentrations in the liver, brain, and adipose tissue. Studies show that distribution occurs in a biphasic manner. First, PCBs accumulate in the liver and muscle from the blood stream. Following this accumulation, PCBs are either stored in the adipose tissue or metabolized by the liver. It has been suggested that PCBs concentrate in the adipose tissue regardless of the route of exposure (2).

The metabolism of PCBs depends on chlorine content and on the site of chlorination. The major metabolic products are phenolic in nature. Other identified end products are sulfur-containing compounds, trans-dehydrodiols, polyhydroxylated PCBs and methyl ether derivatives (2).

Data regarding the excretion of PCBs following inhalation or dermal exposure are not available. When oral exposure occurs, excretion is dependent upon the metabolism of PCBs to more polar compounds (2).

HUMAN HEALTH EFFECTS

Noncarcinogenic Effects

The evaluation of the toxicity of PCBs is complicated by a number of factors including differences in isomer/congener/mixture composition, differences in species susceptibility, quantitatively inconsistent data, and varying degrees of contamination from other chemicals such as chlorinated dibenzofurans. Also, it should be noted that because of changes in congener and impurity composition resulting from environmental and/or biological transformations, PCBs currently in the environment may differ from the original PCB mixture (2).

Inhalation Exposure

There are no human data available regarding the lethality/decreased longevity of humans due to acute or chronic inhalation exposure. However, the primary target organs associated with PCB inhalation are the liver and cutaneous tissue. Occupational exposure has been associated with elevated serum levels in the liver and enzyme and dermatologic effects such as chloracne and skin rashes (2).

Human developmental studies have proved inconclusive and lack monitoring data. However, there were suggestions that mothers occupationally exposed to PCBs exhibited a slight decrease in birth weight and gestational age of offspring. No animal studies were available concerning developmental toxicity (2).

In animals, the liver and skin are unequivocal targets of PCB toxicity, especially in terms of chronic toxicity. The range of toxicity for dermal and hepatic effects is from 0.007 to 11.0 mg/m^3 (2).

Oral Exposure

There are no studies which address oral PCB exposure in humans. However, animal studies have established a single dose LD50s for rats and mice. The levels are 1,010 mg/kg for Aroclor 1254 and 750 mg/kg for Aroclor 1221, respectively (2).

Systemic effects in animals include perturbations of the liver and cutaneous tissues. Rats fed 0, 4, 8, and 16 ppm of Aroclor 1254 for 4 days resulted in an increase in liver weight at concentrations greater than 8 ppm and an increase of serum HDL cholesterol levels at 16 ppm. A lowest observed adverse effect level (LOAEL) of 5 ppm was identified in rats based on hepatic effects. At this level, hepatic microsomal enzyme activities increased, production of liver lipid content increased, and frank degenerative liver alterations were observed (2).

Developmental effects in humans from oral exposure to PCB contaminated fish include effects on birth weight, head circumference, gestational age and/or neonatal behavior. For animals, a LOAEL of 50 ppm in female rats has been identified based on fetotoxicity. At this level, effects such as reduced litter size, ultrastructural lesions in the thyroid follicular cells of neonates and weanlings and reduced serum levels of thyroid hormone were observed (2).

The only study relating PCBs to reproduction demonstrated that doses of >2 ppm Aroclor 1254 administered to mink for 4 months prior to mating and during gestation were lethal to fetuses and caused reproductive failure (2).

Dermal Exposure

Dermal exposure is a major route of PCB absorption. However, the current data does not allow for the quantification of dermal absorption to the total body burden of PCBs (2).

A study involving capacitor workers does not show clear evidence of liver disease. However, a correlation can be made between the PCB exposure and liver enzyme induction in the workers. It is not clear to what extent the dermal absorption affected the hepatic changes since inhalation exposure also occurred (2).

A study involving dermal exposure of Aroclor 1260 to female New Zealand rabbits for 5 days/week at a dose of 118 mg/day for 38 days produced degenerative lesions of the liver and kidneys, increased fetal porphyrin elimination and hyperplasia and hyperkeratosis of the follicular and epidermal epithelium (2). Other studies indicate that the median lethal dose for single dermal exposure for rabbits was >1269 mg/kg for Aroclor 1242 and 1248 to <3,169 for Aroclor 1221 (2).
No studies have been located which address immunological, neurological, developmental or reproductive effects of PCBs on humans or animals (2).

__Carcinogenic Effects__

The EPA has classified PCBs as a Group B2 carcinogen - a probable human carcinogen. This classification is based on the evidence of hepatocellular carcinomas in three strains of rats and two strains of mice. There is suggestive evidence that links PCBs to liver cancer in humans by the ingestion, inhalation, or dermal pathways. However, this evidence is inadequate due to confounding factors and lack of exposure quantification (4).

There have been several studies attempting to associate PCB exposure with carcinogenicity. In New Jersey, a petrochemical plant reported a statistically significant increase in malignant melanomas among 31 research and development employees and 41 refinery workers. Because the study failed to report quantified exposure levels and to identify the presence of other potential or known carcinogens, it was discredited (4).

Two outbreaks of poisoning following accidental consumption of PCB-contaminated rice oil (also containing polychlorinated dibenzofurans and polychlorinated quinones) occurred in Japan in 1968 (Yusho) and in Taiwan in 1979 (Yu-Cheng). A 16-year mortality study was completed which identified an increase in liver cancer in both males and females. There is strong evidence indicating the health effects were attributable to the polychlorinated dibenzofurans in the oil as opposed to the PCBs. Therefore, this study only suggests carcinogenicity of PCBs (4).

ENVIRONMENTAL HEALTH EFFECTS

Aquatic

PCBs have the capability to bioaccumulate and biomagnify. For rainbow trout, bluegills and channel catfish, the 96-hour LC50 values were approximately 20 mg/liter. When the exposure was increased to 10 to 20 days, the average LC50 value was 0.1 mg/liter. Studies indicate that juvenile organisms appear to be more susceptible to PCBs than either eggs or adults (3).

A study which experimentally determined the bioconcentration factors of various Aroclors in aquatic species found bioconcentration factors ranging from 26,000 to 660,000 (2).

In a study conducted by the U.S. Fish and Wildlife Service, 315 fish from 107 stations nationwide were analyzed for PCBs. Results showed that 94% of all fish were found to contain PCB residues. The geometric mean concentration of all Aroclors was found to be 0.53 μg/g. It should be noted that this study included the analyses of whole fish samples which include both the edible and non-edible portions of the fish. Therefore, the concentration will not reflect the actual human exposure through oral consumption (2).

Subsequent studies have shown PCB levels in fish collected and analyzed from Lake Huron to contain 600 to 72,000 μg/g PCBs on a lipid basis. Analyses of 62 samples of commercial fish collected from Lake Ontario revealed PCB levels ranging from 0.11 to 4.90 ppm (2).

The Ambient Water Quality Criteria for the protection of aquatic organisms are as follows (6):

Freshwater:

Chronic toxicity:	0.014 μg/L

Marine:

Chronic toxicity:	0.030 μg/L

Terrestrial and Avian

PCBs can affect terrestrial wildlife in three primary ways: mortality, adversely affecting reproduction, and changing behavior. Behavioral effects include increased activity, decreased avoidance response, and decreased nesting (3).

In sensitive bird species, PCB levels of greater than 200 ppm in the diet or 10 mg/kg body weight caused some mortality. When the doses were increased to 1,500 ppm or 100 mg/kg body weight, extensive mortality was exhibited (3).

In studies in which chicken were fed levels of 20 ppm PCBs in the diet, lower egg production, deformities, decreased hatchability, lower growth, and survival were observed (3).

REGULATORY LEVELS AND CRITERIA

OSHA Advisory TWA (2):	Aroclor 1242 - 1.0 mg/m3
	Aroclor 1254 - 0.5 mg/m3
FDA Temporary Tolerances (2):	Foods - 0.2-3.0 ppm
	Packaging - 10.0 ppm
ACGIH (2):	
TLV-TWA for Aroclor 1242:	1.0 mg/m3
TLV-TWA for Aroclor 1254:	0.5 mg/m3
Ambient Water Quality Criteria (2):	0.79 to 0.0079 ng/L for carcinogenicity at 10^{-5} to 10^{-7} risk levels
Drinking Water Criteria (2):	MCLG: 0 μg/L
	MCL: 0.5 μg/L
Reportable Quantity (2):	10 lbs. (statutory)
	1 lb. (proposed)
AWQC:	
Water and Fish Consumption (6):	4.4×10^{-5} μg/L
Fish Consumption Only (6):	4.5×10^{-5} μg/L

SUMMARY OF TOXICOLOGICAL INDICES

EPA Carcinogenic Classification (4) Group: B2-Probable human carcinogen

Carcinogenic Effects:

<u>High Risk and Persistence</u>
Oral CSF (4):

Upper-bound Slope Factor:	2.0 $(mg/kg/day)^{-1}$
Central-estimate Slope Factor:	1.0 $(mg/kg/day)^{-1}$

<u>Low Risk and Persistence</u>
Oral CSF (4):

Upper-bound Slope Factor:	0.4 $(mg/kg/day)^{-1}$
Central-estimate Slope Factor:	0.3 $(mg/kg/day)^{-1}$

<u>Lowest risk and Persistence</u>
Oral CSF (4):

Upper-bound Slope Factor:	0.07 $(mg/kg/day)^{-1}$
Central-estimate Slope Factor:	0.04 $(mg/kg/day)^{-1}$

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ALUMINUM

INTRODUCTION

Chemical Name:	Aluminum
Synonyms (1):	Alaun; Alumina Fibre; Aluminum Dehydrated; Aluminum Flake
CAS Number (1):	7429-90-5
Molecular Formula (1):	Al
Molecular Weight (1):	26.98 g/mole

Aluminum is a silvery white, crystalline solid which is the most abundant component of the earth's crust. It is the third most abundant of all chemicals and does not occur free in nature. Fine powder forms of aluminum are flammable and form explosive mixtures in the air.

HUMAN HEALTH EFFECTS

Aluminum compounds can affect absorption of other elements in the gastrointestinal tract and thereby alter intestinal function. Aluminum inhibits fluoride absorption and may decrease the absorption of calcium and iron compounds and possibly the absorption of cholesterol. It may alter gastrointestinal tract motility through inhibition of acetylcholine-induced contractions which may explain why aluminum-containing antacids often produce constipation.

A progressively fatal neurologic syndrome also has been reported in patients on long-term intermittent hemodialysis treatment for chronic renal failure. The disorder, which typically arises after three to seven years of dialysis treatment, may be due to aluminum intoxication. Sources of excess aluminum may be from oral aluminum hydroxide commonly given to these patients or from aluminum in dialysis fluid derived from tap water used to prepare the dialysis fluid.

ENVIRONMENTAL HEALTH EFFECTS

Aquatic

The chemistry of aluminum in surface water is complex due to the following five properties:

- aluminum is amphoteric; it is more soluble in acidic solutions than basic solutions;
- ions such as chloride and sulfate form soluble complexes with aluminum;
- aluminum can form strong complexes with fulvic and humic acids;
- hydroxide ions can connect aluminum ions to form soluble and insoluble polymers; and,
- under some environmental conditions, aluminum solutions slowly reach equilibrium (4).

Acute tests have been conducted on aluminum at pH values ranging between 6.5 and 9.0 with freshwater species in fourteen genera. In many tests, less than 50% were affected at the highest concentration tested. Some studies found that the acute toxicity of aluminum increased with pH, whereas others found the opposite to be true. Three studies have been conducted on the chronic toxicity of aluminum to aquatic animals. The chronic values of Daphnia magna, Ceriodaphnia dubia, and the fathead minnow were 742.2, 1,908, and 3,288 µg/L, respectively. The diatom, Cyclotella meneghiniana, and the green alga, Selenastrum capricornutum were affected by concentrations of aluminum in the range of 400 to 900 µg/L. Bioconcentration factors from 50 to 231 were obtained in tests with young brook trout and striped bass. At a pH of 6.5 to 6.6, 169 μg/L caused a 24% reduction in the growth of young brook trout, and 174 μg/L killed 58% of the exposed striped bass.

The Ambient Water Quality Criteria indicates that, except possibly where a locally important species is very sensitive, freshwater aquatic organisms and their uses should not be affected adversely, when pH is between 6.5 to 9.0 if the four-day average concentration of aluminum does not exceed 87 μg/L more than once every three years on the average, and if the one-hour average concentration does not exceed 750 μg/L more than once every three years on average (7).

Terrestrial and Avian

Information regarding the toxicity of aluminum to terrestrial and avian wildlife or domestic animals was not available.

REGULATORY LEVELS AND CRITERIA

ACGIH TLV-TWA (5):

2 mg/m^3 (soluble salts)
2 mg/m^3 (alkyls)
5 mg/m^3 (welding fumes)

OSHA PEL-TWA (6):

15 mg/m^3 (total dust)
5 mg/m^3 (respirable fraction)

Chronic Oral RfD: 1.0 mg/kg/day [7]
Inhalation RfD: 1.0×10^{-3} mg/kg/day [7]

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ANTIMONY

INTRODUCTION

Chemical Name:	Antimony
CAS Number (1):	7440-36-0
Molecular Formula (1):	Sb
Molecular Weight (1):	151.18 g/mole

Antimony is a silvery or gray lustrous metal that comes from the ores stibnite, dermasite, tetrahedrite, livingstonite, and jamisonite (1). Stibnite is the most common naturally occurring form of antimony. Antimony is used as a hardening alloy for lead, solder, sheet and pipe, semiconductor technology, production of fireproofing chemicals, ceramics, glassware, and pigments, and pyrotechnics (2,3). Antimony exists in four valence states (-3, 0, +3, and +5) (4). Antimony is a common air pollutant from industrial emissions but exposure in the general population is largely from food (3).

FATE AND TRANSPORT

Antimony occurs as a soluble oxide or as antinomite (+3) salt in most natural water systems. It may change to volatile stibine in a reducing environment. Stibine is very soluble in water, but it is not stable in under aerobic conditions. Sediment beds offer a reducing environment allowing for remobilization of antimony previously removed from solution. Sorption to clays and minerals is the most important mechanism resulting in the removal of antimony from solution. Insoluble forms of antimony compounds may be formed when heavy metals in solution react with antimonite or antimonate. Bioaccumulation represents a minor fate process for antimony. (4)

PHARMACOKINETICS

Antimony is slowly absorbed from the gastrointestinal tract. The metal accumulates in lung tissue when humans are exposed to antimony dust in an occupational setting. Trivalent antimony is concentrated in red blood cells and the liver. Pentavalent antimony is mostly found in plasma. Both trivalent and pentavalent antimony are excreted in feces and urine. More trivalent antimony is excreted in the urine, where more pentavalent antimony is excreted in the feces (3).

HUMAN HEALTH EFFECTS

Noncarcinogenic Effects

Studies have reported that antimony trioxide, antimony trichloride, and antimony pentachloride may be mutagenic. Reproductive studies have indicated that female workers exposed to metallic antimony dust, antimony trioxide, and pentoxide had an increase in incident of gynecological disorders and late spontaneous abortions. Antimony was found in the breast milk, placental tissue, amniotic tissue, and blood of the umbilical cord in exposed workers. Intraperitoneal administration of antimony in rats supported the findings of the human reproductive effects (4).

Cardiovascular effects in humans consist of changes in electrocardiograms, cardiac edema, myocardial fibrosis, and other signs of myocardial structural damage when exposed to either trivalent or pentavalent antimonial compounds. Animal studies have supported these findings (4).

Antimony and/or its compounds are known to cause pneumoconiosis upon inhalation exposure. Chronic exposure by inhalation causes rhinitis, pharyngitis, tracheitis, and bronchitis. Dermatitis may occur in humans dermally exposed to antimony (4). Also transient skin eruptions, termed "antimony spots", may occur in workers with chronic exposure to antimony (3).

An oral RfD of 4.0×10^{-4} has been established by EPA. An uncertainty factor of 1000 was incorporated to account for uncertainties in extrapolating animal data to humans (factor of 10), to protect sensitive individuals (factor of 10), and because the effect level was a LOAEL rather than a NOAEL (factor of 10) was applied to the LOAEL of 0.35 mg/kg bw/day (7).

Carcinogenic Effects

Antimony production workers have demonstrated higher incidences of lung cancer. Also, animal studies involving rats have indicated that antimony trioxide may produce lung and liver tumors (4).

ENVIRONMENTAL HEALTH EFFECTS

Aquatic

Although criteria have not been established for antimony, the lowest values known to be toxic in aquatic organisms have been reported. These values are as follows (5):

Freshwater:

Acute toxicity:	88 μg/L (proposed criteria)
Chronic toxicity:	30 μg/L (proposed criteria)

Marine:

Acute toxicity:	1,500 μg/L (proposed criteria)
Chronic toxicity:	500 μg/L (proposed criteria)

These values were established from a study involving the exposure of antimony potassium tartrate and antimony trichloride to Daphnia magna. The LC_{50} and EC_{50} values for Daphnia magna and the fathead minnow ranged from 9,000 to 21,900 μg/L. The chronic value for the fathead minnow and Daphnia magna are 1,600 and 5,400 μg/L, respectively. No detectable bioconcentration of antimony by the bluegill was observed (4).

Terrestrial and Avian

Studies regarding the toxicity of antimony to wildlife and domestic animals were not located in the available literature (4).

REGULATORY LEVELS AND CRITERIA

Oral RfD (7):	4×10^{-4} mg/kg/day
EPA Carcinogenic Classification (7):	Group D - not classified as a carcinogen

Ambient Water Quality Criteria (5):	
Water and Organisms	14 µg/L
Organisms Only	4,300 µg/L
MCL:	0.006 mg/L
MCLG:	0.006 mg/L
OSHA PEL-TWA:	0.5 mg/m^3 (antimony and its compounds as Sb)
ACGIH TLV-TWA:	0.5 mg/m^3 (antimony and its compounds as Sb)

SUMMARY OF CRITERIA

The Oral RfD for antimony was reported as 4.0×10^{-04}. The study supporting this value involved the exposure of 5 ppm of antimony potassium tartrate in drinking water to rats (7).

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ARSENIC

INTRODUCTION

Chemical Name:	Arsenic
CAS Number:	7440-38-2
Molecular Formula:	As
Molecular Weight:	74.92 g/mole
Chemical Structure:	As

Arsenic (elemental) exists as a silvery to black, brittle, crystalline and amorphous metalloid. Arsenic is used in the production of glass, enamels, ceramics, oil, cloth, linoleum, electrical semiconductors, pigments, fireworks, pesticides, fungicides, veterinary pharmaceuticals and wood preservatives. Arsenic also has been shown to occur in municipal sewage (7).

FATE AND TRANSPORT

BCF (1):	Accumulates to toxic levels in food chain organisms
Degradation Products:	None
Solubility:	
In Water (5):	Insoluble
In Organics (6):	Unknown (5); soluble in nitric acid
Vapor Pressure (6):	1 mm Hg @ 372° C (sublimes)
Specific Gravity (5):	5.727

Arsenic can occur in soil, water, or air. Since it is an element, it cannot be degraded by environmental processes. However, transformation from one arsenic compound to another is possible.

In the environment, arsenic can occur in four different oxidation states (-3, 0, +3, +5). The particular chemical speciation is important in determining mobility. Interconversions between the +3 and +5 states, as well as organic complexation, are most important (8).

In the soil, the concentration and chemical form in which arsenic occurs is affected by pH, soil type and iron and aluminum content of the soil. Lowered pH and reducing conditions tend to favor the development of arsine, a toxic gas comprised of arsenic and oxygen (7).

In the aquatic environment, volatilization is an important mechanism when biological activity or highly reducing conditions favor the production of arsine or methylarsenics. Sorption of arsenic onto sediments is also an important process in aquatic transport processes. While arsenic may cycle considerably in the environment given its mobility, the deep ocean probably serves as a sink for most inorganic arsenic (7).

PHARMACOKINETICS

Human and animal studies have shown that gastrointestinal absorption of arsenic is very high (>90 to 95 percent). Absorption of arsenic via the inhalation and dermal routes is limited in both animal and human studies. In terms of the developing fetus, inorganic arsenic has been shown to rapidly cross the transplacental barrier after oral administration to mice and rats (5).

Most animals and humans tend to clear arsenic rapidly from the blood and other tissues (including the liver, kidneys, and lungs). Arsenic has been shown to be retained in the brain of experimental animals (5). Arsenic has a tendency to accumulate in the skin and desquamous tissues, such as hair and nails of animals (2).

The main route of excretion for absorbed arsenic is via the urine. Studies demonstrate that only six to nine percent of ingested arsenic appears in the feces, indicating nearly complete gastrointestinal absorption of the metal. The biological half-life is on the order of ten hours, with 50 to 80 percent excreted in about three days (2).

HUMAN HEALTH EFFECTS

Noncarcinogenic Effects

Trivalent compounds of arsenic are the principal toxic forms. Arsenic's principal mode of toxic action is at the cellular level, where it affects mitochondrial enzymes that are critical in tissue respiration (2).

Ingestion of large doses of arsenic can be acutely fatal. Symptoms include fever, anorexia, cardiac arrhythmia and eventual cardiovascular failure. Additionally, central nervous system (CNS) effects, including peripheral neuropathy and sensory loss, are usually noted (2).

Chronic long-term exposure is characterized by liver injury. This is usually reflected as jaundice, and may progress to cirrhosis. Also, peripheral vascular disease has been observed in persons chronically exposed to arsenic (2).

USEPA has established an oral RfD of 3×10^{-4} mg/kg/day for arsenic. This is based on keratosis and hyperpigmentation (1).

Carcinogenic Effects

Arsenic has been implicated as a carcinogen by the inhalation route in both animal and human studies.

Studies of populations living near arsenic-using pesticide manufacturing plants were shown to have an increased incidence of lung cancer. Also, case reports of arsenical pesticide applicators have demonstrated an association between arsenic exposure and lung cancer (1).

Evidence for the carcinogenicity of arsenic via oral exposure comes from an epidemiological study where an arsenic-contaminated water supply was associated with a significant increase in cancer of the bladder, lung, liver, kidney, skin and colon (1).

Because of arsenic□s carcinogenic potential in humans, the EPA has classified it as a Group A carcinogen-human carcinogen. The carcinogenic slope factor for arsenic by inhalation exposure is 15.1 $(mg/kg/day)^{-1}$. Also, a carcinogenic slope factor of 1.50 $(mg/kg/day)^{-1}$ has been derived for ingestion exposure to this element (1,4).

ENVIRONMENTAL HEALTH EFFECTS

Aquatic

While various forms of inorganic arsenic seem to have roughly similar toxicities in aquatic organisms, they all seem to be much more toxic than the organic forms. Acute toxicity of adult freshwater animals has been shown to occur at arsenic trioxide levels as low as 812 μg/L and as low as 40 μg/L in early life stage organisms (8).

Ambient Water Quality Criteria for the protection of aquatic organisms are as follows: (1)

Freshwater:

Acute Toxicity:	360 μg/L
Chronic Toxicity:	190 μg/L

Marine:

Acute Toxicity:	69 μg/L
Chronic Toxicity:	36 μg/L

Terrestrial and Avian

Information on arsenic toxicity among terrestrial wildlife is very limited. However, arsenic poisoning has been known to occur on rare occasions in domestic animals. Arsenic poisoning in domestic animals leads to hyperemia and edema of the gastrointestinal tract, hemorrhage of the cardiac serosal surfaces and peritoneum, and pulmonary congestion and edema (8).

REGULATORY LEVELS AND CRITERIA

The following regulatory levels and criteria have been established for arsenic:

OSHA PEL-TWA (9):	10 $\mu g/m^3$ (inorganic)
ACGIH TLV-TWA (10):	0.01 mg/m^3
MCL(1):	0.05 mg/L
EPA Ambient Water Quality Criteria (11):	
Ingestion of Water and Aquatic Organisms:	0.018 μg/L
Ingestion of Organisms Only:	0.14 μg/L

SUMMARY OF CRITERIA

EPA Carcinogenic Classification (1):	Group A - human carcinogen
Cancer Slope Factor (Inhalation) (1):	15.1 $(mg/kg/day)^{-1}$
Cancer Slope Factor (Oral) (1):	1.5 $(mg/kg/day)^{-1}$
Oral RfD (1):	3×10^{-4} mg/kg/day
Inhalation RfD (1):	Not Determined
NOAEL (4):	0.009 mg/L

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CHROMIUM

INTRODUCTION

Chemical Name:	Chromium
CAS Number:	Chromium (VI) 7440-47-3; Chromium (III) 16065-83-1
Molecular Formula:	Cr
Molecular Weight:	52 g/mole
Chemical Structure:	Cr

Chromium is a semi-gray heavy metal that generally exists in either a trivalent (III) or hexavalent (VI) state. Chromium occurs naturally in soil; however, it is no longer mined in the United States.

FATE AND TRANSPORT

BCF:	16 (2)
Degradation Products:	None
Solubility:	Metallic chromium is not soluble in water, but it is soluble in some acids and strong alkalies (4). Some chromium salts are water soluble (3).
Specific Gravity (3):	7.20 @ 28°C

Chromium and compounds can be present in air, water, and soil. In air, chromium is primarily associated with particulate matter which results from surface soil dispersion or particulate emission from industrial sources (3). Transport of chromium from water to air is not likely because chromium compounds do not volatilize from water. In the atmosphere, Cr(VI) can be reduced to Cr(III) at a significant rate by V^{+2}, V^{+3}, VO_2^+, Fe^{+2}, HSO^-_3, and As^{+3}. The residence time of atmospheric chromium is expected to be less than 10 days (1).

Cr(VI) as a component of a complex anion is quite soluble in water. Consequently, it is not adsorbed to any significant degree by clays or hydrous metal oxides. The anionic form of Cr(VI), therefore, is mobile in the aquatic environment (3). Cr(VI) is a moderately strong oxidizing agent. In water, it will react with a reducing agent to form Cr(III) which will subsequently hydrolyze to chromium hydroxide and precipitate out of solution. This Cr(III) precipitate tends to adsorb to sediment. Air deposition, runoff, and leaching from soil can introduce chromium into surface and groundwater. The residence time of Cr(III) in lake water is approximately 4.5 to 18 years (1).

Chromium probably occurs as insoluble $Cr_2O_3 \cdot nH_2O$ in soil, since the organic matter in soil is expected to convert soluble chromate into insoluble Cr_2O_3 (1). Cr(III), as an insoluble salt, tends to strongly adhere to clay particles and organic matter, whereas soluble Cr(VI) is not strongly adsorbed to soil (3).

PHARMACOKINETICS

The primary route of entry of chromium into the body is through the gastrointestinal tract. Inhalation and dermal absorption are the primary routes of entry into the body for occupational exposure (7). Chromium is distributed in humans following inhalation to the lungs, lymph nodes, kidney, liver, bladder, and bone. Distribution of chromium after oral exposure resulted in accumulation in the lymph nodes and lungs followed by the spleen, liver, kidney, and heart. There was no information available among the reviewed literature concerning the distribution of chromium after dermal exposure (7).

In vitro studies indicate that chromium (VI) is reduced to chromium (III). During this process an intermediate, chromium V, appears to be formed which may represent the form of chromium that interacts with cellular macromolecules (7).

HUMAN HEALTH EFFECTS

Noncarcinogenic Effects

Human studies have identified chromium as a nephrotoxin that produces renal tubular necrosis. There is not sufficient evidence, however to quantitatively describe the effects. Limited data suggest that exposure by inhalation to chromium compounds can result in hepatic effects in humans and animals. Sufficient evidence is not available to relate chromium exposure to adverse reproductive or developmental effects. It should be noted that Cr(III) by the oral route is an essential trace element (1).

Chromium (III)

The verified chronic oral RfD for metallic Cr(III) (insoluble salts) is 1.5 mg/kg-day. The RfD is based on a no observed adverse effects level (NOAEL) derived from a study in which 60 male and female rats were fed chromic oxide baked in bread at a dietary level of 5 percent. They were fed bread 5 days/week for 600 feedings (840 total days). It was determined that the average amount of chromic oxide ingested was 1,800 g/kg body weight. An uncertainty factor of 100 and a modifying factor of 10 were applied to the NOAEL when calculating the RfD. The modifying factor was derived to address factors that if determined would lower the RfD (1,5). The confidence in the RfD is low; however, it is a conservative number. No effects due to chromic oxide were observed at any dose level (1). An Inhalation RfD for Chromium III is currently under review by the EPA (5).

Chromium (VI)

The EPA has established an oral RfD for Chromium VI of 3.0×10^{-3} mg/kg/day. No LOAEL was identified in the supporting study. However, a NOAEL of 2.5 mg/kg/day was reported. The supporting study involved the administration of drinking water containing 1 to 11 ppm chromium VI to Sprague-Dawley rats for one year. No significant adverse effects were seen on appearance, weight gain, or food consumption, and there were no pathologic changes in the blood or other tissues (5).

An inhalation RfC of 8.0×10^{-6} mg/kg/day has been established by the EPA for chromic acid mists and dissolved chromium VI aerosols. This was based on a human subchronic occupational study in which nasal mucosal irritation, atrophy, and perforation were widely reported following occupational exposures to chromic acid mists and dissolved hexavalent chromium aerosols.

An inhalation RfC of 1.0×10^{-4} mg/kg/day has been established by the EPA for chromium VI particulates based on a rat subchronic study in which resulted in lowered respiratory effects. The resulting inhalation RfD from these studies was established at 3.0×10^{-5}.

Carcinogenic Effects

Chromium (III)

Cr(III) has been classified by the EPA as a Group D carcinogen (1). This means the chemical has not been classified because there is inadequate evidence of carcinogenicity in animals (5).

Chromium (VI)

The verified cancer unit risk for lifetime exposure by inhalation to Cr(VI) is 1.2×10^{-2} $(\mu g/m^3)^{-1}$. Inhaled Cr(VI) has been classified by EPA as a Group A-human carcinogen (1). There is sufficient evidence to support an association between exposure by inhalation and cancer (2). The potency factor is based on an epidemiology study in which chromate plant workers were studied and showed an increased incidence of lung cancer. The study documented total chromium exposure and did not differentiate between Cr(III) and Cr(VI) and consequently, the health risk may be underestimated (1,5). Although CR(VI) is carcinogenic by the inhalation route, there is no evidence that it is carcinogenic by the oral route (1). The resulting inhalation CSF is 41 mg/kg-day.

ENVIRONMENTAL HEALTH EFFECTS

Aquatic

Chromium is an essential nutrient. It is accumulated in a variety of aquatic and marine biota to levels quite higher than in ambient water. Therefore, it appears that the food chain is a more efficient pathway for chromium uptake than direct uptake from seawater (1).

Water and aquatic species characteristics modify the toxic effects of chromium on aquatic life. Cr(III) appears to be more acutely toxic to fish than Cr(VI); however, the reverse is true in chronic exposure studies (1).

The Ambient Water Quality Criteria for the level of chromium that will not affect aquatic organisms and their uses include the following:

- Chronic: 4-day averages that should not be exceeded more than once every three years (12).

	Freshwater	Saltwater
Cr(VI)	11 µg/L	50 µg/L
Cr(III)	$e^{(0.8190\,[\ln\,[\text{hardness}]+1.561])}$ or 210 µg/L (hardness dependent)	--

- Acute: 1-hour average that should not be exceeded more than once every 3 years (12).

	Freshwater	Saltwater
Cr(VI)	16 µg/L	1,100 µg/L
Cr(III)	$e^{(0.8190\,[\ln\,[\text{hardness}]+3.688])}$ or 1,700 µg/L (hardness dependent)	--

Terrestrial

No plants typically used as food or animal feed are chromium accumulators. Plants that absorb chromium do so through root uptake and do not efficiently transport it to the leaves. Also, there is little tendency for inorganic Cr(III) to accumulate along the food chain. No data are available for organochromium compounds (3).

REGULATORY LEVELS AND CRITERIA

OSHA PEL-TWA (10): 0.5 mg/m^3 (Chromium III)
1.0 mg/m^3 (insoluble salts or chromium metal)
OSHA Ceiling Level (10): 1 mg/10 m^3 (chromic acid and chromates)
MCL (11): 0.1 mg/L
ACGIH TLV-TWA (9): 0.5 mg/m^3 (chromium metal)
0.5 mg/m^3 (Chromium II and III compounds)
0.05 mg/m^3 (water soluble Chromium VI)

Health Advisories (11):

One-day (Chromium VI):	Use 10-day valve
10-day (Child) (Chromium VI):	1.4 mg/L
Longer-Term (Child) (Chromium VI):	0.24 mg/L
Longer-Term (Adult) (Chromium VI):	0.84 mg/L
Lifetime (Adult) (Chromium VI):	0.120 mg/L

Ingestion of water and fish (Chromium VI) (6):	170 mg/L
Ingestion of organisms only (Chromium VI) (6):	3,400 mg/L
Ingestion of water and fish (Chromium III) (6):	33,000 mg/L
Ingestion of organisms only (Chromium III) (6):	670,000 mg/L

SUMMARY OF CRITERIA

Cr(III) -	EPA Carcinogenic Classification (1):	Group D-Not Classified
Cr(VI) -	EPA Carcinogenic Classification (1):	Group A-Human Carcinogen (Inhalation)

Cancer Slope Factor (1,5)

Cr(III): Not Applicable
Cr(VI): 1.2×10^{-2} $(\mu g/m^3)^{-1}$ (Inhalation unit risk)
41 $(mg/kg/day)^{-1}$ (Inhalation slope factor)

RfD (Oral) (1,5)

Cr(III): 1.5 mg/kg/day
Cr(VI): 3×10^{-3} mg/kg/day

RfD (Inhalation) (1,5)
Cr(III): Not Applicable
Cr(VI): 3×10^{-5} mg/kg/day

Oral Drinking Water (7)
Cr (VI): 2×10^{-2} mg/kg/day
NOAEL (7)
Cr (III): 5%
Cr (VI): 2.4 mg/kg/day

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IRON

INTRODUCTION

Chemical Name: Iron
CAS Number (1): 7439-89-6
Molecular Formula (1): Fe
Molecular Weight (1): 55.847 g/mole

Iron is a silvery white, malleable metal. It is the fourth most abundant (by weight) of the elements that compose the earth's crust and is a major constituent of clay soils. Iron (III) hydroxide [$Fe(OH)3$] is formed in the environment through the corrosion of aluminum in the presence of moisture and oxygen. Iron in water may be present in varying quantities dependent upon the geology of the area and other chemical components of the waterway. (2,3).

HUMAN HEALTH EFFECTS

There is some evidence that high concentrations of certain soluble iron salts may be teratogenic in animals. The ingestion of excess amounts of iron can irritate the gastrointestinal tract. A dose of approximately 30 grams of a soluble ferric salt is likely to be fatal in humans. Long-term inhalation exposure in an occupational setting to iron-containing dusts and fumes, especially iron oxide, can cause siderosis, a type of benign pneumoconiosis. Exposure to aerosols and mists of soluble iron salts may produce respiratory and skin irritation (3). An oral RfD of 0.30 mg/kg/d has been established (4).

ENVIRONMENTAL HEALTH EFFECTS

Aquatic

The bivalent and trivalent irons are the primary forms of concern in the aquatic environment. The ferrous or bivalent form can persist in waters void of dissolved oxygen and typically originate from groundwater or mines where these are pumped or drained. The ferric or trivalent form is insoluble. Iron can exist in natural organometallic or humic compounds and colloidal forms. Black or brown swamp waters may contain iron concentrations of several milligrams per liter in the presence or absence of dissolved oxygen, but this iron form has little effect on aquatic life (2).

Much of the iron present in aquatic systems tends to partition into the bottom sediments. Iron has relative low mobility in soil. Atmospheric transport of iron is also possible (3).

The ambient water quality criteria for iron is 0.3 mg/L for domestic water supplies and 1.0 mg/L for freshwater aquatic life (2).

Terrestrial and Avian

Information regarding the toxicity of iron to terrestrial and avian wildlife and domestic animals was not located in the available literature (3).

REGULATORY LEVELS AND CRITERIA

OSHA Standard (3):	10 mg/m^3 TWA (iron oxide fume)
ACGIH TLV (3):	5 mg/m^3 TWA (iron dust and fume, as Fe)
	1 mg/m^3 TWA (soluble iron salts, as Fe)
Oral RfD (4):	0.3 mg/kg/day

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LEAD

INTRODUCTION

Chemical Name: Lead	
CAS Number:	7439-92-1
Molecular Formula:	Pb
Molecular Weight:	207 g/mole
Chemical Structure:	Pb

Elemental lead is a heavy, ductile, bluish-gray solid at ambient conditions. It is used widely in industry because of its softness, resistance to corrosion and radiation, and high density. Lead is also used as a paint pigment, in solder, and in storage batteries.

FATE AND TRANSPORT

BCF:	49 (1)
Degradation Products:	None
Solubility:	Lead is insoluble in water and organic solvents. It does dissolve in dilute nitric acid (2), and hot, concentrated sulfuric acid (3).
Specific Gravity (2):	11.35 @ 20°C

Lead and lead compounds can be present in air, water, and soil and are extremely persistent in water and soil (4). Metallic lead and common lead minerals are insoluble in water while manufactured alkyl lead compounds are water soluble. A major transport process for inorganic and organic lead compounds is atmospheric dispersion as particulate matter. Lead is removed from air by either wet or dry deposition. Photolysis of atmospheric organic lead compounds occurs rapidly (3). The average residence time of atmospheric lead is 7 to 30 days (4).

Natural lead compounds are not mobile in normal surface and groundwater because lead leached from ore is adsorbed by ferric hydroxide. It also readily combines with hydroxide, carbonate, and sulfate ions to form insoluble compounds. These compounds precipitate and settle in the bed sediment. Lead is not volatile, therefore, volatilization is not an important transport process from aquatic environments (3).

Sorption is a dominant effect on the distribution of lead in soil. Lead readily adsorbs to inorganic solids, organic material and hydrous iron and manganese oxides. Because of its affinity for other materials and its solubility characteristics, the mobility of lead in soil is low. (3). Most lead is retained in soil and not transported via leaching or runoff to surface water (4).

Lead is not readily taken up by plants. Consequently, its availability to terrestrial life forms is limited (3). Lead does not appear to significantly bioaccumulate in most fish (4). Microcosm studies indicate that lead is not biomagnified through the food chain (3).

PHARMACOKINETICS

Lead primarily enters the body by inhalation and ingestion. For all practical purposes, it will not enter the body by dermal contact. Approximately 30-50 percent of all inhaled lead particulate is deposited in the respiratory tract. Almost all of the lead present will be absorbed by the lungs. The primary site of absorption by ingestion in children is the gastrointestinal tract. Fifty percent of all dietary lead ingested by children is absorbed, whereas only 8-15 percent is absorbed by adults. Studies have also demonstrated that transplacental transfer of lead is possible.

Lead is not homogeneously distributed upon entering the body. It concentrates in the following three organs: bone, blood, and soft tissue. The lead in each of these compartments has a different rate of intercompartmental movement and residence time (4).

Inorganic lead is not metabolized in the body; rather it is absorbed, distributed and excreted. However, organic alkyl lead is metabolized in the liver via an oxidative dealkylation reaction which is catalyzed by cytochrome P-450 in animals (4).

Lead that is not absorbed by the respiratory or gastrointestinal tract is excreted in the feces. Blood lead not retained by the body is eliminated by the kidney or bile (4).

HUMAN HEALTH EFFECTS

Noncarcinogenic Effects

Numerous studies have been conducted on the toxic effects of lead. The data present dose-effect relationships and are expressed in terms of internal exposure measured in blood lead levels (4).

Lead affects various systems of the body. The endpoints elicited at low level exposure are neurobehavioral impairment, growth retardation in children, and hypertension in middle-aged men. High exposure levels produce encephalopathy, gastrointestinal effects, anemia, nephropathy, and electrocardiographic abnormalities (4).

Lead affects the hematopoietic system by interfering with heme biosynthesis and ferrochelatase. This interference results in a reduction of the hemoglobin concentration in blood and an increase in erythrocyte (red blood cell) destruction. The combination of these two effects produce hypochromic, normocytic anemia with associated reticulocytosis. The impairment of heme synthesis has a far ranging impact that is not limited to the hematopoietic system.

Lead exposure also affects the central nervous system. Overt neurological signs have been documented in adults with blood lead levels ranging as low as 40 to 60 μg/dl. Encephalopathy can occur at blood lead levels of 100 to 200 μg/dl and 80 to 100 μg/dl for adults and children, respectively. As indicated by these levels, children are much more sensitive to neurological effects of lead. Death or irreversible health effects may occur as a result of central nervous system impairment (4).

The cardiovascular system is also impacted by lead exposure. Common effects from high level exposure include cardiac lesions and electrocardiographic abnormalities. Hypertension has been clearly related to lead exposure. Studies suggest that high blood pressure resulting from lead exposure may be mediated through effects on the kidney (4).

A direct relationship has been drawn between blood lead level and children's height, weight, and chest circumference. The strongest relationship was drawn with height. As the blood lead level increases the child's growth is retarded (4).

Exposure to lead has significantly effected the human reproductive system. Because lead accumulates in the bones and is sporadically released into the blood, exposure prior to pregnancy may affect the fetus. Blood lead reaches the fetus by crossing through the placental barrier. It was observed in animals that exposure to lead by non-natural routes (e.g., intravenous or intraperitoneal injection) resulted in malformations of the fetus (4).

In the body, lead can interact with other chemicals. Calcium and phosphorus reduce the amount of lead taken up by the body while zinc helps to reduce the toxic effects of lead. Cadmium increases the toxic effects of lead; and lead increases the toxic effects of mercury. Due to the effect of lead on the hemapoietic system, iron deficiency increases as blood lead increases (4).

Derivation of Oral Reference Dose for Lead

In a review of available toxicological data on the potentially adverse effects associated with various blood lead (PbB) levels in adults and children, Marcus (1986) has concluded that the effects on the enzymes of heme synthesis necessary for red blood cell formation occur at low PbB levels of about 10 micrograms per decaliter (µg/dL). Further, the author noted that neurotoxicity in children begins to appear at 15 to 20 µg/L and at 25 to 30 µg/dL in adults. According to the author, the data suggests, "that PbB values of 15 µg/dL should not be exceeded in children and values of 25 µg/dL should not be exceeded in adults".

In order to protect the fetus, it is necessary to set the PbB level in adults at 15 µg/dL since studies have indicated that the ratio of fetal/maternal PbB values can be approximated at a ratio of one to one (Marcus, 1986). It should be noted that this position is consistent with current EPA's conclusions that "PbB levels of 10 to 15 µg/dL constitute an appropriate range of concern for health effects that warrant avoidance" (Federal Register 50, No. 10, 26460-26550, June 7, 1991).

The acceptable daily intake (ADI) of lead via oral ingestion by adults has been determined to be 48 µg/day (Marcus, 1986). This value is equivalent to a PbB level (15 µg/dL) at which no adverse effects are observed to occur in humans.

<u>Carcinogenic Effects</u>

The EPA has stated that "little can be concluded from available epidemiological studies" concerning the carcinogenic potential of lead (4). However, the carcinogenicity of lead salts (primarily phosphates and acetates) administered via injection or the oral route has been demonstrated in rats and mice in several studies. In most of the investigations, the carcinogenic response has been demonstrated only at the highest dose. Although the EPA has stated that animal data are sufficient to conclude carcinogenicity in animals, the Agency has further stated that available toxicity data on metallic lead and lead compounds are inadequate for quantitative risk assessment (6).

ENVIRONMENTAL HEALTH EFFECTS

Aquatic

Freshwater species are more sensitive to lead contamination in soft water than hard water for both acute and chronic exposure. The ambient water quality criteria for aquatic life are as follows (5):
Four-day average concentration that should not be exceeded more than one time per year.

Freshwater chronic	Salt Water chronic
$e^{(1.273\ (\ln\ (\text{hardness}))-4.705)}$ μg/L or 3.2 μg/L	8.5 μg/L

One-hour average concentration that should not be exceeded more than one time per year.

Freshwater acute	Salt Water acute
$e^{(1.273\ (\ln\ (\text{hardness}))-4.460)}$ μg/L or 82 μg/L	220 μg/L

The BCF for saltwater species ranges from 17.5 to 2570 μg/L (3).

Terrestrial

Lead occurs in the tissues of many wildlife species. Lead poisoning has also been reported for a variety of domestic animals including cattle, horses, dogs, and cats. Cattle appear to experience lead poisoning more often because of their indiscriminate eating habits (3).

REGULATORY LEVELS AND CRITERIA

Ambient Air Quality Standard (4):	1.5 $\mu g/m^3$
OSHA PEL-TWA (4):	50 $\mu g/m^3$
MCL (4):	0.015 mg/L (Action Level)
MCLG (4):	0 mg/L
Reportable Quantity (metallic) (4):	1 lb
ACGIH TLV-TWA (4):	0.15 mg/m^3 (inorganic lead, dust, and fumes)
	0.15 mg/m^3 (lead arsenate)
	0.05 mg/m^3 (lead chromate)
Ambient Water Quality Criterion:	50 μg/L

SUMMARY OF CRITERIA

EPA Carcinogenic Classification (4):	Group B2-probable human carcinogen
RfD (oral) (1)	Not Available
Cancer Slope Factor (oral, inhalation)	Not Available

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MANGANESE

INTRODUCTION

Chemical Name:	Manganese
CAS Number:	7439-96-5
Molecular Formula:	Mn
Molecular Weight:	54.94 g/mole

Manganese is a brittle silvery metal which usually occurs as a complex with other metals such as iron. Manganese and its compounds are used in the making of steel alloys, dry-cell batteries, electrical coils, and other metallic fabrication applications. Other manganese uses include use as an oxidizing agent and as a food additive (3,4).

FATE AND TRANSPORT

Solubility:	
In Water:	Decomposes to ionic forms (1)
In Organics:	Readily dissolves in dilute mineral acids (4)
Specific Gravity:	7.20 (1)

Manganese can occur in soil, water, or air. Because it is an element, manganese cannot be degraded by environmental processes. However, it may transform from one manganese compound to another. While manganese can be transported in dusts or in water, the main source of routine manganese exposure is through ingestion of food. Vegetables, the germinal portions of grains, fruits, nuts, tea, and some spices are rich in manganese (3).

In the soil, the concentration and chemical form in which manganese can occur is affected by pH, cation exchange capacity, drainage, and other factors. Lowered pH and reducing conditions tend to favor solubility and hence, the mobility of manganese. Manganese often occurs at higher concentrations in the bottom of stratified lakes as a result of its release from bottom sediments as manganous ion under reducing conditions (1).

The presence of high concentrations of chlorides, nitrates, and sulfates may also increase manganese solubility. Under these conditions, manganese is more easily taken up by plants. Also, soils with limited cation exchange capacity have a poor ability to bind and retain manganese (1).

Atmospheric transport of manganese fumes or dusts is also possible. These materials can be returned to the earth by wet or dry deposition (1).

PHARMACOKINETICS

Manganese can enter the body through the ingestion of manganese-bearing food or through the inhalation of air containing manganese fumes or dusts. It is considered to be an essential element and cofactor in a number of enzymatic reactions with daily intakes ranging from two to nine milligrams. Gastrointestinal absorption of the metal is less than five percent. Manganese is transported by a plasma-bound β1-globulin protein (probably transferrin). It is widely distributed throughout the body, concentrating in cells rich in mitochondria. Consequently, tissues such as the pancreas, liver, kidney, and intestines, which contain high numbers of these organelles, tend to be deposits for manganese (3).

The biological half-life for manganese in the body is 37 days. Manganese readily crosses the blood-brain barrier, with its half-life in the brain being somewhat longer than in the body as a whole (3).

Manganese is eliminated in the bile and is resorbed through an enterohepatic pathway through the intestine. The principal means of elimination is through the feces (3).

HUMAN HEALTH EFFECTS

Noncarcinogenic Effects

Noncarcinogenic effects in humans are most pronounced following inhalation exposure. The types of effects observed fall into two categories, depending upon the severity and duration of the exposure (3). The first type of effect observed, manganese pneumonitis, is the result of acute exposure. Individuals acutely exposed exhibit a lung condition characterized by pathologic changes including epithelial necrosis, followed by mononuclear proliferation (3). The second, and more serious effect observed following chronic manganese exposure, is characterized by neurologic symptoms. Chronic manganese poisoning is characterized by psychiatric disorders manifested as irritability, difficulty walking, speech disturbances and compulsive behaviors. Long-term etiology includes development of a mask-like face and a Parkinsonian-like syndrome (3).

An inhalation reference concentration (RfC) of 5×10^{-5} mg/m^3 (1.43×10^{-5} mg/kg/day) for manganese has been developed (2). The basis for this value is impairment of neurobahavioral function. An uncertainty factor of 1, 000 was incorporated to protect sensitive individuals (factor of 10), for use of a LOAEL (factor of 10), and for database limitations reflecting both the less-than-chronic periods of exposure and the lack of developmental data, as well as potential but unquantified differences in the toxicity of different forms of Mn (factor of 10).

Manganese is considered to be one of the least toxic of the trace elements via the ingestion exposure route. Certain sub-populations, such as the elderly, children, pregnant women, and iron-deficient individuals, may have in increased potential to accumulate excess manganese. However, toxicity from ingested manganese is rarely observed (2).

EPA has established an oral Reference Dose (RfD) for manganese of 1.4×10^{-1} mg/kg/day, based on central nervous system effects (2). The information used to determine the RfD for manganese was taken from many large populations consuming normal diets over an extended period of time with no adverse health effects. Based on the information providing a chronic NOAEL in many cross-sections of human populations, taken in conjunction with the essentiality of manganese, there is an uncertainty factor of 1.

Carcinogenic Effects

There are no epidemiological studies to suggest that manganese or its compounds are carcinogenic. Manganese is classified as a Group "D" carcinogen, indicating that it is not classifiable as a human carcinogen. The basis for this determination is the lack of existing studies to assess this material (2).

The evidence for rating manganese as a carcinogen in animals is considered to be inadequate. Most studies that have shown some evidence of carcinogenicity have failed to demonstrate a dose-response relationship (2).

ENVIRONMENTAL HEALTH EFFECTS

Aquatic

Adequate data to develop ambient water quality criteria are not available at this time. A 48-hour LC_{50} value of 16 mg/L of manganese is reported for embryos of the oyster Crassostrea virginica. For the softshell clam, Mya arenaria, a 168-hour LC_{50} value of 300 mg/L is reported (1).

Terrestrial and Avian

Adequate data for characterization of the toxicity of manganese to wildlife or domestic animals are not available (1).

REGULATORY LEVELS AND CRITERIA

OSHA Ceiling Level (1): 5 mg/m^3	
ACGIH TLV-TWA (1):	1 mg/m^3 (Fume)
STEL (1):	3 mg/m^3 (Fume)
TLV-TWA (1):	5 mg/m^3 (Dust and Compounds)

SUMMARY OF CRITERIA

EPA Carcinogenic Classification (2)	Group D-Not Classifiable
Inhalation RfD (2)	1.43×10^{-5} mg/kg/day
Oral RfD (2):	2.00×10^{-2} mg/kg/day
Secondary Maximum Contaminant Level (2)	0.05 mg/L
NOAEL (oral) (2):	0.14 mg/kg-day
LOAEL (inhalation) (2):	0.15 mg/cu m
AWQC (5):	
Water and Organisms:	50 µg/L
Organisms Only:	100 µg/L

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THALLIUM

INTRODUCTION

Acute exposure to soluble thallium compounds has been associated in humans with gastrointestinal irritation; damage of the liver, kidneys, and central and peripheral nervous systems; pulmonary edema; degenerative changes in the adrenals; and ocular effects.

CAS Number:	7440-28-0
Chemical Formula:	Tl
IUPAC Name:	Thallium

CHEMICAL AND PHYSICAL PROPERTIES

Atomic Weight: 204.37	
Boiling Point:	1,457°C
Melting Point:	303.5°C
Specific Gravity:	11.85
Solubility in Water:	Insoluble (many compounds are soluble)

FATE AND TRANSPORT

In reducing environments, thallium may be precipitated as the metal or as thallium sulfide. However, much of the thallium present in aquatic systems is likely to remain in solution and be transported to the oceans. Active removal of some dissolved thallium by sorption to clay minerals and hydrous metal oxides present in bed sediments is probably an important environmental fate process. Thallium is readily taken up by aquatic organisms, and bioaccumulation may also be an important fate process. Results of limited studies with algae suggest that thallium may also be available for food chain magnification. There is no evidence to suggest that photolysis or volatilization are important environmental processes. Although there is speculation that thallium can be methylated under aerobic conditions by electrophilic attack, biotransformation does not appear to be an important process in aquatic systems.

HUMAN HEALTH EFFECTS

There is no evidence that thallium is carcinogenic in humans or experimental animals, and it does not appear to have significant mutagenic activity. Exposure to thallium salts during critical developmental stages is reported to produce achondioplasia in chickens and rats. No other significant teratogenic effects are reported.

Thallium, in the form of soluble compounds, is readily absorbed through the skin and gastrointestinal tract. Symptoms associated with acute poisoning in humans include gastrointestinal irritation; liver and kidney damage; pulmonary edema; degenerative change in the adrenals, peripheral nervous system, and central nervous system; and ocular effects, including optic neuritis and, rarely, cataracts. The estimated lethal dose for humans is 8 to 12 mg/kg. In experimental animals, thallium compounds produce effects similar to those seen in humans. Rats appear to be particularly sensitive to the cataractogenic activity of thallium. Regardless of the specific thallium compound tested, rate of intake, or route of administration, LD_{50} values for a variety of species range from about 3 to 92 mg/kg.

The EPA has established an oral RfD of 8×10^{-5} mg/kg/day for thallium carbonate, chloride or sulfate. It is based on a subchronic (90D), gavage study, using thallium sulfate in Sprague-Dawley rats. The NOAEL determined in the study was 0.25 mg/kg/day. Target organs included the liver, blood and hair. Critical effects were increased SGOT, increased serum LDH an alopecia (3). The oral RfD for thallium is 7×10^{-5} mg/kg/day (9).

Toxicity to Wildlife and Domestic Animals

Acute and chronic toxicity of thallium to freshwater aquatic life occurs at concentrations as low as 1,400 and 40 μg/liter, respectively. Acute toxicity to saltwater aquatic life occurs at concentrations as low as 2,130 μg/liter. Toxic effects would be expected to occur at lower concentrations among species more sensitive than those tested. Bioconcentration factors ranged from about 11 for the mussel Mytilus edulis to about 1.5×10^5 for other freshwater and marine invertebrates. Values of about 1×10^5 are reported for marine and freshwater fish.

REGULATORY LEVELS AND CRITERIA

Aquatic Life

Ambient Water Quality Criteria for the protection of aquatic organisms are as follows: (10)

Freshwater:	
Acute Toxicity:	1,400 μg/L
Chronic Toxicity:	40 μg/L
Marine:	
Acute Toxicity:	2,130 μg/L
Chronic Toxicity:	Not Available

Human Health

Ambient Water Quality Criteria (7):

Water and Fish Consumption = 1.7 μg/L

Fish Consumption only = 6.3 μg/L

EPA Carcinogenic Classification: D--not classified as a carcinogen

Criterion:	13 μg/liter
OSHA PEL-TWA:	0.1 mg (soluable compounds as Tl)
ACGIH TLV:	0.1 mg/m^3 (elemental and soluble compounds, as T1)
Oral Reference Dose (RfD):	7×10^{-5} mg/kg/day for thallium

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