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Technical Memorandum
Construction Restrictions For Navy Property

Naval Station Norfolk,
Norfolk, Virginia

Prepared For

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia

Contract No. N62470-95-D-6007
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February 2002

Prepared by

CH2M HILL

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CDM
Federal Programs Corp.

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TECHNICAL MEMORANDUM
CONSTRUCTION RESTRICTIONS FOR NAVY PROPERTY

NAVAL STATION NORFOLK
NORFOLK, VIRGINIA

CONTRACT TASK ORDER 0117

February 25, 2002

Prepared For:

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
Norfolk, Virginia

Under the:

LANTDIV CLEAN Program
Contract N62470-95-D-6007

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LIST OF ACRYONYMS AND ABBREVIATIONS

bgs	below ground surface
BTX	Benzene-Toluene-Xylene
CAL	Camp Allen Landfill
CASY	Camp Allen Salvage Yard
CATP	Camp Allen Treatment Plant
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Contaminants of Potential Concern
DPVE	Dual Phase Vapor Extraction
FFA	Federal Facilities Agreement
gpm	gallons per minute
HHRA	Human Health Risk Assessment
MCL	Maximum Contaminant Level
NPL	National Priorities List
OSHA	Occupational, Safety, and Health Administration
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
RCRA	Resource, Conservation, and Recovery Act
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act
SVOC	Semivolatile Organic Compound
TEGD	Technical Enforcement Guidance
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
VDEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This document outlines the environmental conditions and construction restrictions for design and construction projects conducted at the Camp Allen Landfill (CAL) and Camp Allen Salvage Yard (CASY). A brief background of the sites is presented, including historic and planned land uses. Environmental conditions, as well as assumptions regarding contamination at the sites in general are additionally outlined. Construction restrictions and requirements are also provided related to worker safety and performance standards that a contractor will be required to address when encountering CAL and CASY soils, groundwater, and/or sediments.

The goal of this technical memorandum is to provide an outline of the potential risks and restrictions associated with any construction work that impacts the CAL and CASY. Specifically, this document intends to:

- Provide a description of the CAL and CASY and their historic uses
- Outline known contamination in soils, groundwater, and sediment at the sites
- Provide requirements related to worker safety and construction requirements

The Navy is providing this information to Virginia Department of Transportation (VDOT) and its contractors involved in the I-564 Intermodal Connector project, the relocation of the ballfields from Fleet Recreation Park to the CASY, and any associated construction activities occurring on or near the boundaries of the CAL and CASY. However, the worker safety and construction requirements presented in this technical memorandum apply to any construction activities that impact these sites. All activities at the CAL and CASY shall address the potential for contaminant risks to human health and the environment.

2.0 SITE DESCRIPTION, BACKGROUND, AND HISTORY

The areas known as CAL and CASY are located within the property boundary of the Naval Station Norfolk. They are located south of the Naval Station airfield and Interstate 564 in the area known as Camp Allen. CASY lies between Areas A and B of the CAL. Ingersol Street divides the sites. Figure 1 shows the CAL and CASY and surrounding areas.

2.1 Camp Allen Landfill

During the early 1940s, landfilling operations commenced in the Camp Allen area. Disposal activities continued until about 1974 primarily in two areas, Area A and Area B. Area A of the CAL is a 45-acre site that was used for the disposal of wastes from the early 1940s to 1975. During this time, significant quantities of municipal, solid, and hazardous wastes were disposed including general refuse, demolition debris, sludges from metal plating processes, parts cleaning and paint stripping operations, overage chemicals, various chlorinated organic solvents, acids, caustics, paints and paint thinners, pesticides and asbestos.

In the mid-1940s, an incinerator was constructed in the southern portion of the Camp Allen area to burn combustible wastes. This incinerator operated until the mid-1960s. Materials too bulky for the incinerator were buried in Area A of the CAL. Area B, the eastern portion of the CAL, received wastes from a 1971 fire at the CASY. A wide portion of a drainage ditch located in the northeast portion of Area B, where water tends to pool, is referred to as the Pond Area. In May 1999, the U.S. Army Corps of Engineers inspected the site, and verified that the pond area is considered upland property, and therefore is not within the Army Corps jurisdiction as a wetland.

At present, the majority of the CAL is covered with soil and grass to minimize surface erosion. Area A incorporates the Navy Brig facility and a heliport built over a portion of the landfill during the mid-1970s. A residential area, Glenwood Park, is located to the west of the site, off of government property.

2.2 Camp Allen Salvage Yard

Historically, the CASY area was covered with strands of hardwoods and vast areas of tidal marsh. Development of the Naval Station has severely altered the original terrain. CASY has been an active salvage yard for over 50 years. Until 1995, the facility was dedicated to the salvaging and disposal of scrap materials generated by the U.S. Navy in the Tidewater area. Numerous pieces of spare military equipment, old vehicle parts, and discarded electronic equipment were stored at the site. Other materials stored or handled at the CASY included lubricating oil, organic solvents, paints and paint thinners, acids, caustics, and pesticides. In 1995, use of the facility for the handling of scrap material was discontinued. All of the site salvage and storage areas, structures, and buildings that were active during the salvaging process have been demolished and removed.

Currently, CASY is an area of approximately 22 acres of level, barren ground with little vegetation, surrounded by chain-link and barbed-wire fencing.

3.0 REGULATORY BACKGROUND

In 1997 Naval Station Norfolk was placed on USEPA's National Priorities List (NPL). The Navy and EPA then signed a Federal Facilities Agreement (FFA) in 1999 for Naval Station Norfolk. The FFA identified specific requirements that the Navy, USEPA, and Virginia Department of Environmental Quality (VDEQ) must follow in terms of managing Installation Restoration (IR) sites at the Naval Station. The CAL (Site 1) and the CASY (Site 22) were two of the ten IR sites which were identified in the FFA and are being administered through the Navy's IR program that follows the provisions and requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) in 1989. Changes to a sites with a remedy in place (Site 1), as well as investigations and remedial action that occur at the Navy's IR sites that are still under investigation (such as Site 22) must comply wit the requirements of the FFA and any other Records of Decision or Decision Document.

4.0 SUMMARY OF ENVIRONMENTAL CONDITIONS

Prior to Naval Station Norfolk's NPL listing in 1997, the Navy had completed or had started environmental investigations at the CAL and CASY. Based on the results of previous investigations, and findings from the Remedial Investigations (RI) performed from 1992 through 1996, contamination from prior disposal practices and operating procedures has impacted surface and subsurface soils, sediment, and shallow groundwater at the CAL and the CASY to various degrees. The primary constituents of concern at CAL are volatile organic compounds. Other organic and inorganic contaminants were detected; however, volatile organic compounds (VOCs) represent the majority of the contaminants of potential concern (COPCs). In general, the primary COPCs at CASY are several inorganic constituents (metals), and, to a lesser extent, semivolatile organic (SVOC) and pesticide/polychlorinated biphenyl (PCB) constituents.

Both the CAL and CASY RIs included Human Health Risk Assessments (HHRA), which considered exposure to the COPCs for several categories of potential users including future construction and utility workers. The CAL HHRA also considered exposures to Current Adult

Workers at Area B. Based on the scenarios evaluated, the HHRA for the CAL indicated that there were no risks posed to future construction workers or current adult workers from either Area A or B exposures via ingestion or dermal contact with subsurface soils or the inhalation of fugitive dusts. Potential risks to adult workers and construction workers from CAL groundwater were not evaluated, however. Workers were evaluated for incidental ingestion and dermal exposures to surface and subsurface soils, groundwater, surface water, and sediments, as well as the inhalation of fugitive dusts emanating from surface and excavated subsurface soils as part of the CASY HHRA. The results indicated that surface soils, subsurface soils, and to a lesser extent groundwater, each posed a potential risk due to accidental ingestion (PCBs, antimony, arsenic, and iron) and dermal exposure (PCBs, cadmium, chromium, and iron). Based on these findings and to minimize the potential for exposure, the Navy is presenting contamination profiles and outlining construction provisions below.

A brief summary of the nature and extent of contamination follows which focuses on the primary COPCs associated with each medium and is not intended to address all results in detail. Figure 2 shows the soil and sediment sampling locations at the sites; the locations of test trenches at the CAL; the locations of "hot-spot" areas of contamination at the CASY; and the locations of groundwater monitoring wells. Detailed findings and data evaluation are presented in the RI Reports (Baker, 1994, 1995a, 1999). Appendix A and B present contaminant summary tables for each medium.

4.1 Soils

The primary contaminants of concern from CAL Areas A and B surface soils are the PCB Aroclor-1260, and inorganic metals (arsenic, barium, cadmium, chromium, copper, lead, manganese, thallium, and vanadium). Subsurface soils from both CAL areas also showed significant though sporadic contamination from VOCs, SVOCs, pesticides, and PCBs. Although detected concentrations exceeded background criteria at various locations, significant inorganic source areas were not identified. Appendices A-1 through A-3 present contaminant summary tables for CAL soils. Additionally, geophysical investigations performed at the CAL Area A in 1983 and 1992 indicated that the area contained numerous buried metallic objects including sheet metal, crane cable, and reinforcing bars in concrete in the subsurface soils (see Figure 3).

Analytical sampling results at CASY indicated that surface and subsurface soil were nominally impacted by disposal activities. SVOCs, including polynuclear aromatic hydrocarbons (PAHs), pesticides, PCBs, and metals have all impacted the surface and subsurface soils to some extent. While most concentrations were below COPC screening values, PCB concentrations (Aroclor-1254 and 1260) exceeding COPC screening values were found in both surface and subsurface soils, primarily in the southern half of the site. Inorganic metal concentrations above COPC screening values were also found in surface and subsurface soils (principally antimony, arsenic, iron, and lead). Appendices B-1 and B-2 present contaminant summary tables for CASY soils.

Appendices B-3 and B-4 summarize data from five soil samples collected along the northern edge of the CASY in 2001 (see Figure 2). Based on current I-564 design drawings, this part of the CASY will be impacted by the new highway project.

4.2 Sediments

Figure 2 also shows the locations of sediment samples collected at the CAL and CASY. Analytical results from CAL RI indicated that contaminants may be migrating with groundwater and could be discharged into the surface water via seeps along the ponded area of the landfill. Sediments in the drainage ditches surrounding Areas A and B were found to contain isolated, elevated levels of organic and inorganic constituents. Concentrations correlated well with levels detected in surface soils and may be a result of surface particulate runoff and particle deposition in the drainage ditches. Several of the metals detected (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) exceeded sediment quality criteria in isolated areas of the Area A and B drainage ditches. Analytical summaries of the sediment data are presented in Appendices A-4 and A-5.

Further sampling of sediments in the CAL Area B pond and in the stormwater drain crossing the CASY indicated isolated, sporadic areas of various, inorganic (principally arsenic) and pesticide/PCB constituent concentrations (dieldrin, Aroclor-1260) at levels above COPC screening values and sediment screening values. Appendix A-6 presents a summary of these data. Surface water samples collected concurrently indicated that inorganic (principally arsenic and magnesium) constituent concentrations exceeding Federal Water Quality Criteria and Virginia Water Quality standards. These samples were collected from the storm drains located in the northern part of the site.

4.3 Groundwater

The Columbia Aquifer (water table) and, to some extent, the underlying Yorktown Aquifer, are the primary aquifer systems of concern at CAL and CASY. Shallow groundwater is present as an unconfined aquifer with a water level ranging from approximately four to six feet below ground surface. Groundwater moves across the site towards the northeast in general, usually flowing in relation to the drainage ditches bordering the northern and eastern portions of the site.

Figure 2 shows the locations of groundwater monitoring wells at the CAL and CASY. Analytical summaries of the groundwater monitoring data are presented in Appendix A-7. Samples from shallow groundwater wells (<25ft) from CAL Areas A and B have detected high levels of volatile contaminants including solvent-related compounds, vinyl chloride, ketone, and BTX (Benzene-Toluene-Xylene) compounds. SVOCs, pesticides, and PCBs were also detected irregularly. Samples from the Yorktown Aquifer (>60ft) also indicated sporadic contamination from VOCs, SVOCs, and pesticides. Total inorganic constituents detected in both aquifers in concentrations exceeding drinking water standards are believed to be associated with total suspended solids present in the wells and not representative of actual groundwater contamination.

Four shallow groundwater samples were collected from the CASY during the RI. Groundwater samples collected from four existing monitoring wells in CAL Area B, were also evaluated in the CASY RI. Neither pesticides nor PCBs were detected in the groundwater samples. At some locations, inorganic metals were detected in shallow groundwater at levels exceeding Maximum Contaminant Levels (MCLs), Virginia Groundwater Quality Standards, and Virginia Drinking Water Standards. Antimony, arsenic, lead, and iron were detected in concentrations exceeding MCLs or USEPA Region III tap water screening values. The deeper Yorktown aquifer was not characterized in the CASY RI.

5.0 SUMMARY OF SITE RESTORATION ACTIVITIES

Portions of these sites have undergone environmental restoration activities. In addition, the Navy has on-going and planned remedial activities for other portions of these sites. These environmental restoration activities are summarized below.

5.1 Camp Allen Landfill

Soil: At this time, soil remedial actions are complete at the CAL. As discussed in the Final Decision Document for the CAL (Baker, 1995b), the combined remedial actions including Dual Phase Vacuum Extraction and implementation of institutional controls are protective and effectively address potential risks posed by Area A soils. In 1996, the Navy removed contaminated soil and debris from Area B of the site.

Groundwater: As a result of past Navy operations, groundwater (both the shallow, Columbia aquifer, and the deep Yorktown aquifer) under the CASY and the CAL is currently contaminated with VOCs. In 1997, the Navy started the operation of the Camp Allen Treatment Plant (CATP), a groundwater remediation system that collects, treats, and discharges groundwater to the drainage ditch that flows to Bousch Creek. The purpose of the CATP is to both contain the contaminated groundwater plume on government property, as well as to treat the contaminated groundwater to levels that meet Federal and/or State groundwater or surface water standards prior to discharge. Due to the elevated levels of naturally occurring metals with the groundwater, the CATP requires the removal of metals from the groundwater prior to discharge. The heavy dashed lines shown on Figures 4 and 5 indicate the shallow and deep areas of influence of the CATP. The CATP is designed for an average flow of 150 gallons per minute (gpm), with design flows from Area A of 3 gpm for each of the two shallow wells, and 35 gpm for each of the three deep wells. The design flows for Area B of 3 gpm for each of the seven shallow wells, and 3 gpm for each of the four deep wells. In addition to the CATP, the CAL also has a Dual Phase Vapor Extraction (DPVE) system that is designed to address the localized VOC contamination in the soil and groundwater, which is designed to operate at 30 gpm from extractions wells that are 25' deep.

Sediments: The Navy is considering the excavation and disposal of approximately 550 cubic yards of contaminated sediments from the CAL Area B pond area. Approximately 50 cubic yards of sediment from the storm drain that crosses the CASY would also be removed and disposed of off-site. Clean backfill would be placed in the pond area and a suitable inlet structure will be added to the existing storm sewer piping.

5.2 Camp Allen Salvage Yard

In 1998, the Navy performed a non-time critical PCB removal action at the Camp Allen Salvage Yard. More than 4,100 tons of PCB-contaminated soils were removed from the southern portion of the site (Baker, 1998).

Soil: The Navy has completed the removal of 4,800 cubic yards of metals-contaminated "hot spot" soil and over 14,000 cubic yards of PCB and metal contaminated soils exceeding the site cleanup goals (See Table 1). The Navy additionally plans to install a one-foot soil cover over the entire 22-acre site. The cover will be comprised of a minimum of 12 inches of fill material underlying 4 inches of topsoil. As some contaminated soils will remain in place under the cover, excavated materials exceeding either the site cleanup goals or Virginia Solid Waste Management regulations cannot be reused as fill material.

Table 1. CASY Soil Clean-up Goals

Contaminant	Clean-Up Goal (ppm)	Justification
Total PCBs	Surface soils (0 to 3 foot depth): 2 ppm Subsurface soils (>3 foot to top of GW): 5 ppm	Risk-based
Antimony	41 ppm	Risk-based
Arsenic	28 ppm	Background value
Iron	31,100 ppm	Risk-based
Lead	400 ppm	EPA Residential Action Level

Groundwater: The Navy intends to utilize its ongoing remediation program using the existing CATP to address groundwater issues at the CASY. The treatment system is designed to contain the groundwater plume and reduce contaminants to levels that meet Federal and/or State groundwater or surface water standards. The Navy also plans to implement institutional controls and a groundwater monitoring program to restrict groundwater use and ensure that clean-up goals are being met. The institutional controls will be incorporated into the Base Master Plan or Land Use Control Implementation Plan to prohibit the installation of water supply wells for either potable or non-potable use within the site.

6.0 FUTURE USE OF THE SITES

The Navy has no plans for improvements or upgrades at the CAL. Because this site is part of the Naval Station's IR Program, there are limitations on the uses of the site.

Following the completion of soil remedial activities at the CASY, the Navy intends to use the majority of CASY as a recreational area. This plan includes the construction of soccer and ball fields to replace some of the facilities at the Fleet Recreation Park that will be impacted by the planned construction of the I-564 Intermodal Connector by VDOT (see Figure 2). The I-564 Connector may also impact the northern edge of the CASY, as well as the portions of the CAL.

7.0 CONSTRUCTION RESTRICTIONS

As summarized in Section 4, environmental investigations have documented the general nature and extent of contamination at the CASY and CAL. Because the Navy is managing these sites as part of the IR Program for the Naval Station, subject to the requirements of the FFA, the Navy has placed restrictions on any construction activities. General construction restrictions for soils, groundwater, stormwater, and sediments are presented in this section.

7.1 Soils

Site Characterization

The locations of soil sampling points from the environmental investigations at the CAL and CASY were presented in Figure 2. Analytical results of the sampling are presented in Appendices A and B. Many of these soil samples were collected from 0 to 4 feet below ground surface (bgs). Based on this information and the results of the geophysical investigation, construction activities that encroach on the CASY or CAL may encounter contaminated soil as well as material buried in the landfill including metal objects (see Figure 3).

Construction Restrictions

The Navy will require the following construction restrictions:

- Areas should be characterized prior to construction activities to better define the exact nature of soil contamination and to determine how these soils can be safely excavated and managed in accordance with Virginia Solid Waste Management regulations, Virginia Hazardous Waste Management Regulations, and other ARARS (see Table 2).
- Standard ASTM methods or other state or EPA-approved methods (i.e. Virginia Solid Waste Management regulations, Superfund representative sampling guidance, RCRA Groundwater Monitoring Technical Enforcement Guidance (TEGD), SW-846, or TCLP analytical methods) with regard to environmental soil sampling, preservation, handling, and analysis procedures should be used for all characterization activities.
- A summary outlining all sampling and characterization activities shall be required in an approved Work Plan as described in Section 8.0.

Table 2. Soil/Sediment Characterization Methods

Analyte(s)	Analytical Method
Characterization Methods	
Total PCBs	8082
TAL Metals	6010B/7471A
Disposal Testing Methods	
TCLP	1311/8260B,8270C,8081A,8151A,6010B/7470A
Ignitability	1010, Modified 1010
Reactive Cyanide/Sulfide	SW-846 Section 7
Corrosivity	9040, 9045
Volatiles (BTEX[1])	8260B
TPH GRO/DRO[2]	8015B Modified
TOX[3]	9020B

[1] Benzene, Toluene, Ethylbenzene, Xylenes
[2] Gasoline, Diesel and Lubricant Range Total Petroleum Hydrocarbons
[3] Total Organic Halides

Worker Safety

Worker safety must additionally be considered in relation to potentially contaminated soils. Any work that is required where contact with soil is anticipated within the limits of the CAL and the CASY shall be supervised on site at all time by a person 29 CFR 1910.120 HAZWOPER certified as a site manager (i.e., 40 hours off site, 24 hours on site, and 8 hours of additional specialized training). All site workers that will come in contact with soil at the CAL & the CASY shall be 29 CFR 1910.120 HAZWOPER certified as a site worker.

7.2 Sediments

The locations of sediment sampling points from the environmental investigations at the CAL and CASY were presented in Figure 2. Sediment samples were typically collected to a depth of 8 inches below ground surface (bgs). Therefore, the Navy requires that any construction activities impacting these areas shall include a characterization of the sediments in accordance with Table 2 to define the exact nature of sediment contamination, and to determine how these sediments can be safely excavated and managed. It is VDOT's responsibility to determine the type and frequency of sampling required to be protective of human health and to determine proper disposal methods. All sampling and disposal activities must be in accordance with the appropriate regulatory requirements and the Navy's requirements. All activities are additionally subject to approval by the Navy, Virginia DEQ, and EPA via the review of site-specific work plans.

7.3 Groundwater and Storm Water

Site Characterization

The locations of groundwater sampling points from the environmental investigations at the CAL and CASY were presented in Figure 2. The area influenced by the CATP was presented in Figures 4 and 5. In addition, estimated 10 ppb contaminant contour maps are provided in Figures 6 and 7. Contractors should be aware of the potential for movement of the contaminated groundwater plume as a result of dewatering processes performed during construction. In addition, as mentioned above, the shallow water table can be encountered at depths of 4 to 6 ft bgs. Therefore, construction and excavation activities along the northern edge of CAL and CASY may encounter groundwater.

Groundwater Modeling

Since it is imperative that contaminated groundwater remain on government property, contractors dewatering operations in the area of the CAL and the CASY shall be monitored to ensure that the existing extraction well capture zones are not significantly altered. It is required that the contractor develop a Construction Plan as part of the overall Work Plan (see Section 8.0) and sequence his groundwater dewatering operations to minimize the amount of groundwater pumped. Modeling may be required during the construction designs to minimize withdrawal

rates and to reduce the potential for pulling contaminated groundwater off the site into other areas. It is VDOT's responsibility to demonstrate no impact to the capture zones and/or the VOC plumes.

Construction Restrictions

The Navy will require the following construction restrictions and monitoring activities:

- Measurement of groundwater elevations from existing monitoring wells to demonstrate that cone of depression of any dewatering well system does not mobilize the VOC plumes outside the extraction well capture zones shown on Figures 4 and 5.
- Sampling and analysis of dewatering wells and the Navy's existing monitoring wells for VOCs, before and after dewatering, to demonstrate the VOC plumes did not expand from their original configuration. VDOT may be required to install new monitoring wells especially if dewatering activities occur in areas not currently captured by the Navy's existing monitoring well system.
- Sampling and analysis of the effluent of the dewatering wells for VOCs and metals to assess the most appropriate disposal methodology for the dewatering effluent.
- All groundwater shall be collected, containerized, sampled, and tested prior to off-site disposal if the contractor has to dewater any area that may impact the CATP GW Capture Zones or VOC plumes shown on Figures 4 - 7. The contractor shall test on a batch basis, for the following Contaminants of Potential Concern (COPCs):
    - VOCs, using EPA Target Compound List methods
    - Total metals, using EPA Target Analyte List Methods and EPA's TCLP hazardous waste parameters.
    - Percent solids, as there may be pretreatment requirements proceeding discharge.
- Groundwater shall be treated and disposed of at a regulated and approved disposal facility based on the analytical results. Any contaminant concentrations that exceed EPA's TCLP limits will be considered as a hazardous waste and shall be treated as such in accordance with VDEQ Hazardous Waste Regulations pertaining to collection and storage activities. Any discharged groundwater that is encountered or results from construction activities shall meet all discharge permitting requirements of VDEQ.

* Contractors shall address the impacts from storm water runoff during construction activities. Contractors will be required to implement storm water management practices to minimize the impact of storm water on the CAL and CASY.

Worker Safety

As with soils, worker safety must additionally be considered in relation to potentially contaminated groundwater. Any work that is required to be performed by the contractor within the limits of the CAL and the CASY, where contact with groundwater is anticipated, shall be supervised on site at all time by a person 29 CFR 1910.120 HAZWOPER certified as a site manager (i.e., 40 hours off site, 24 hours on site, and 8 hours of additional specialized training). All site workers that will come in contact with groundwater at the CAL & the CASY shall be 29 CFR 1910.120 HAZWOPER certified as a site worker. In addition, VDOT and it's contractors will be required to address the potential need for air monitoring and will be required to determine the appropriate level of protective equipment in areas where groundwater contaminant levels exceed VDEQ screening levels and construction worker's breathing zones are within a hole or a trench.

Prior to performing any work that will include contact with groundwater in the CATP capture zone, the contractor shall develop a Health and Safety Plan. This plan shall be reviewed and approved by an industrial hygienist, prior to submittal to the Navy for approval. It is the Navy's intent that EPA and VDEQ shall review this plan to ensure that worker safety and health is addressed. The contractor shall assume that the government will require a minimum of 60 days to review and supply comments. Government approval is required prior to starting any work on site where contaminated groundwater will be encountered.

8.0 PERFORMANCE SPECIFICATIONS OR WORK PLANS

Based on the nature and extent of contamination at the CAL and CASY, and because these sites are being managed by the Navy as part of the IR Program for the Naval Station, subject to the requirements of a FFA, the Navy will require contractors to provide detailed performance specifications or work plans describing the approach and methodology for managing soils and groundwater during construction activities that impact the CAL and CASY. These plans should be prepared in advance and should be incorporated into standard procedures related to excavation,

dewatering, and all other practices not specifically outlined in this document. Of immediate concern should be the need for ensuring worker safety.

These performance specifications or work plans should include or require, at a minimum:

Health and Safety Plan: A site-specific Health and Safety Plan will be required in advance addressing OSHA requirements (29 CFR 1910.120) for individuals working with hazardous waste. The plan should describe safety precautions for each phase of the project as specifically related to excavation and dewatering. The plan should additionally identify safety equipment and procedures to be available and used during the project. It should also furnish the name and qualifications based on education, training, and work experience of the proposed Site Health and Safety Officers.

Excavation and Material Handling Plan: A material handling plan should be prepared prior to initiation of the work that includes a detailed explanation of the phases dealing with all soils, groundwater, and sediments, including the following: a schedule to be employed for the excavation, a sequence of operation, the method of dewatering (if necessary), excavation, hauling, proposed equipment, and handling of the contaminated materials, testing requirements, and safety precautions and requirements. The plan should also show proposed temporary storage structures and address the potential for solid waste permitting requirements.

Field Sampling and Laboratory Testing Plan for Soils and Groundwater: The plan should describe field sampling methods and quality control procedures. Confirmatory sampling and testing of soil used to determine suitability as clean fill shall be performed by a qualified laboratory and should be explained in detail. At a minimum, the source of any clean fill utilized shall be identified and all fill soils must meet the cleanup goals for the site-specific contaminants. Any on-site or off-site material exceeding the site cleanup goals or Virginia Solid Waste Management regulations shall not be used on-site as fill material (See Table 3).

Table 3. Clean Fill Testing Requirements

Analyte(s)	Analytical Method
Total PCBs	8082
Antimony, Arsenic, Iron, Lead	6010B/7471A
TCLP	1311/8260B,8270C,8081A,8151A,6010B/7470A
Ignitability	1010, Modified 1010
Reactive Cyanide/Sulfide	SW-846 Section 7
Corrosivity	9040, 9045
Volatiles (BTEX[1])	8260B
TPH GRO/DRO[2]	8015B Modified
TOX[3]	9020B

[1] Benzene, Toluene, Ethylbenzene, Xylenes
[2] Gasoline, Diesel and Lubricant Range Total Petroleum Hydrocarbons
[3] Total Organic Halides

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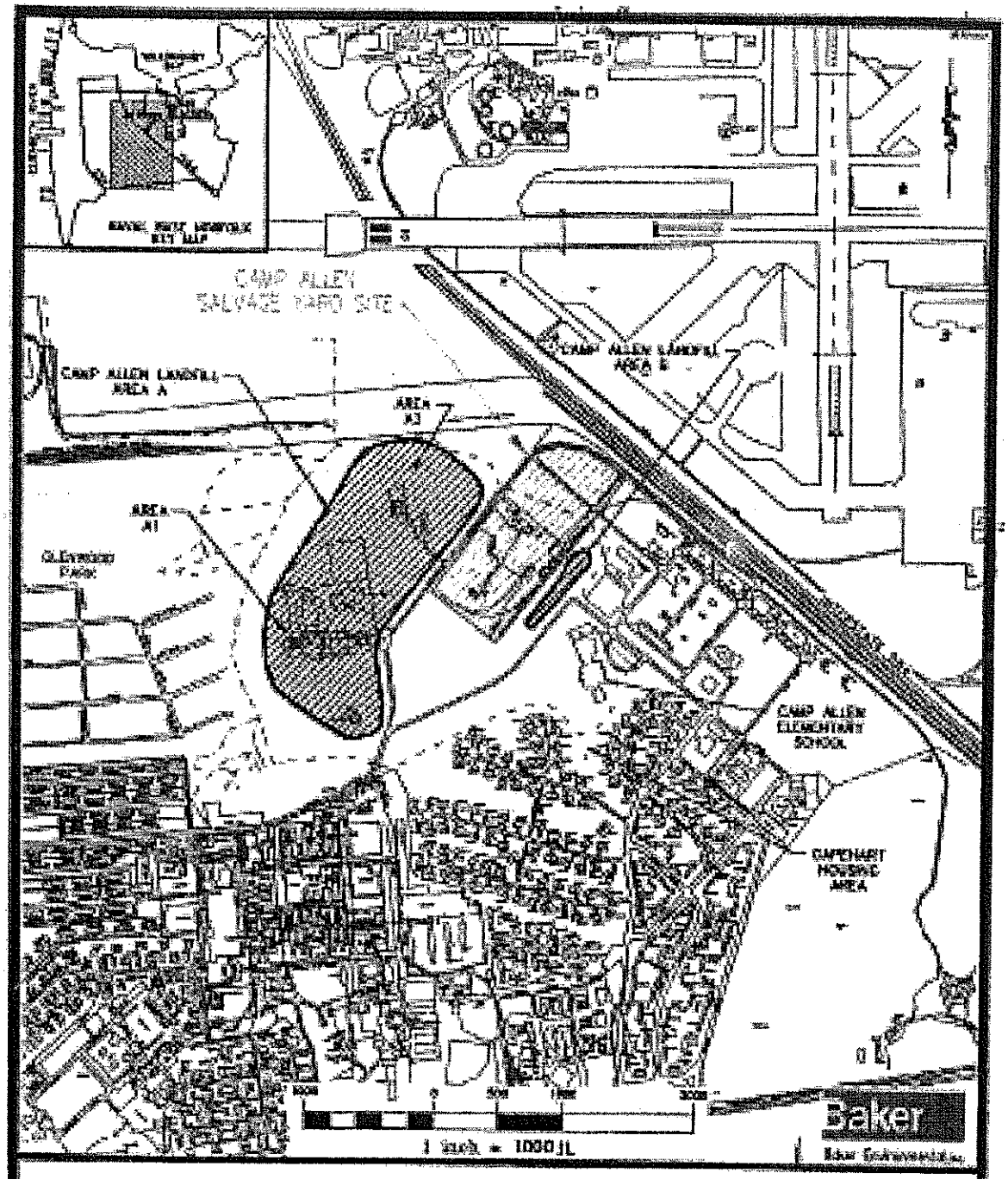


FIGURE 1
SITE MAP

CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

SOURCE: LANTDIV, OCTOBER 1991

00891 DBJY

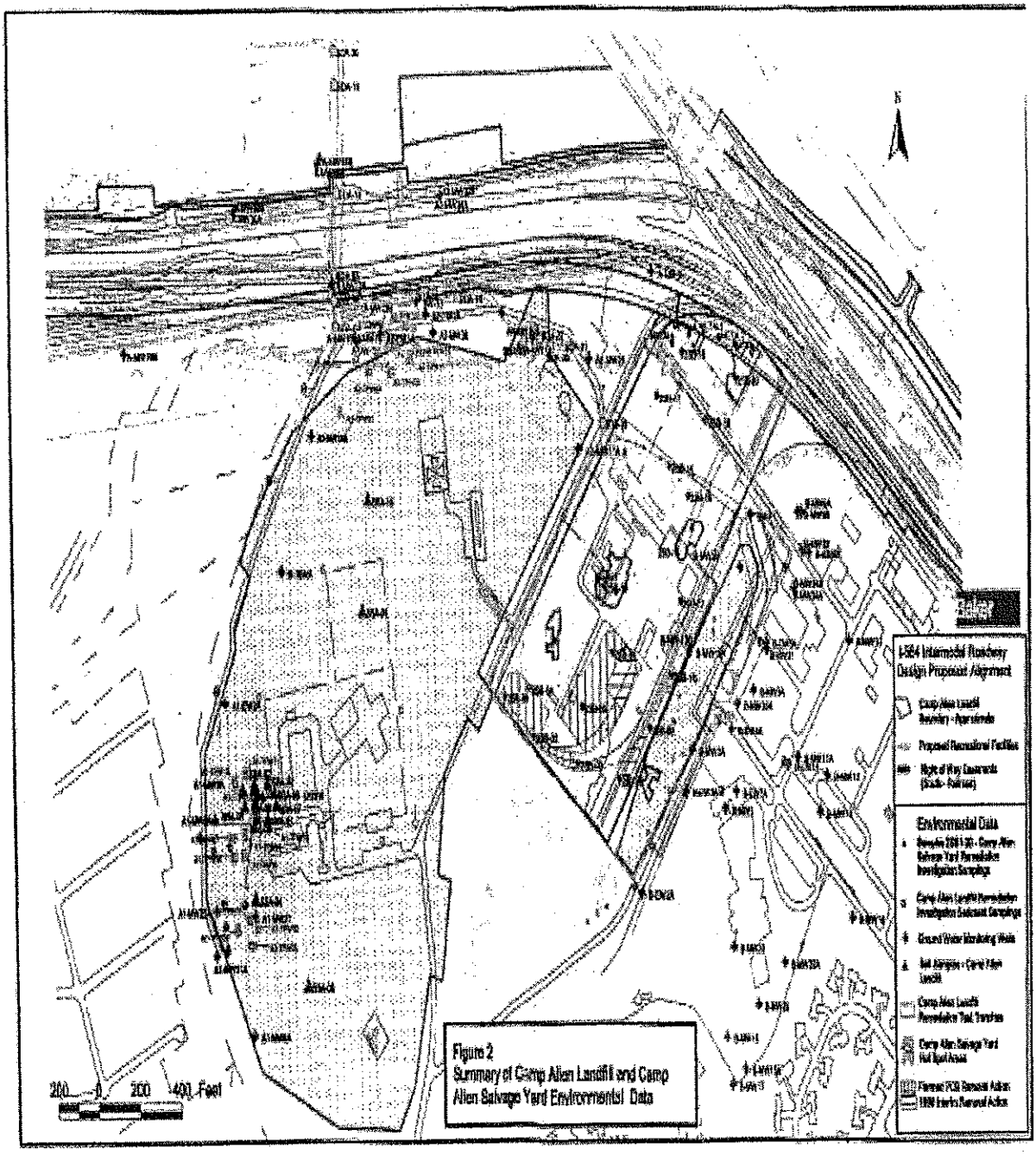
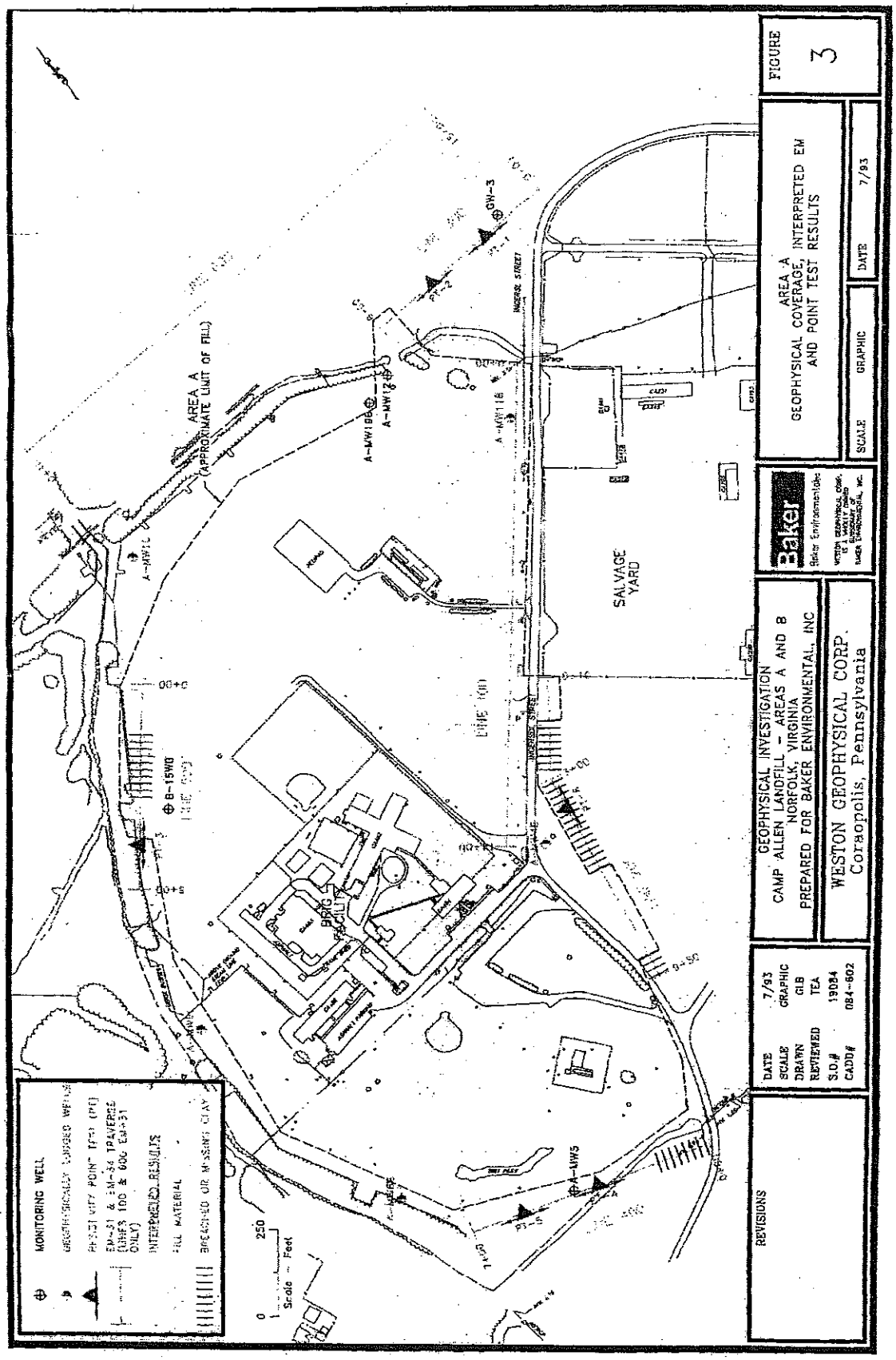


Figure 2
Summary of Camp Allen Landfill and Camp Allen Salvage Yard Environmental Data

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02



ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

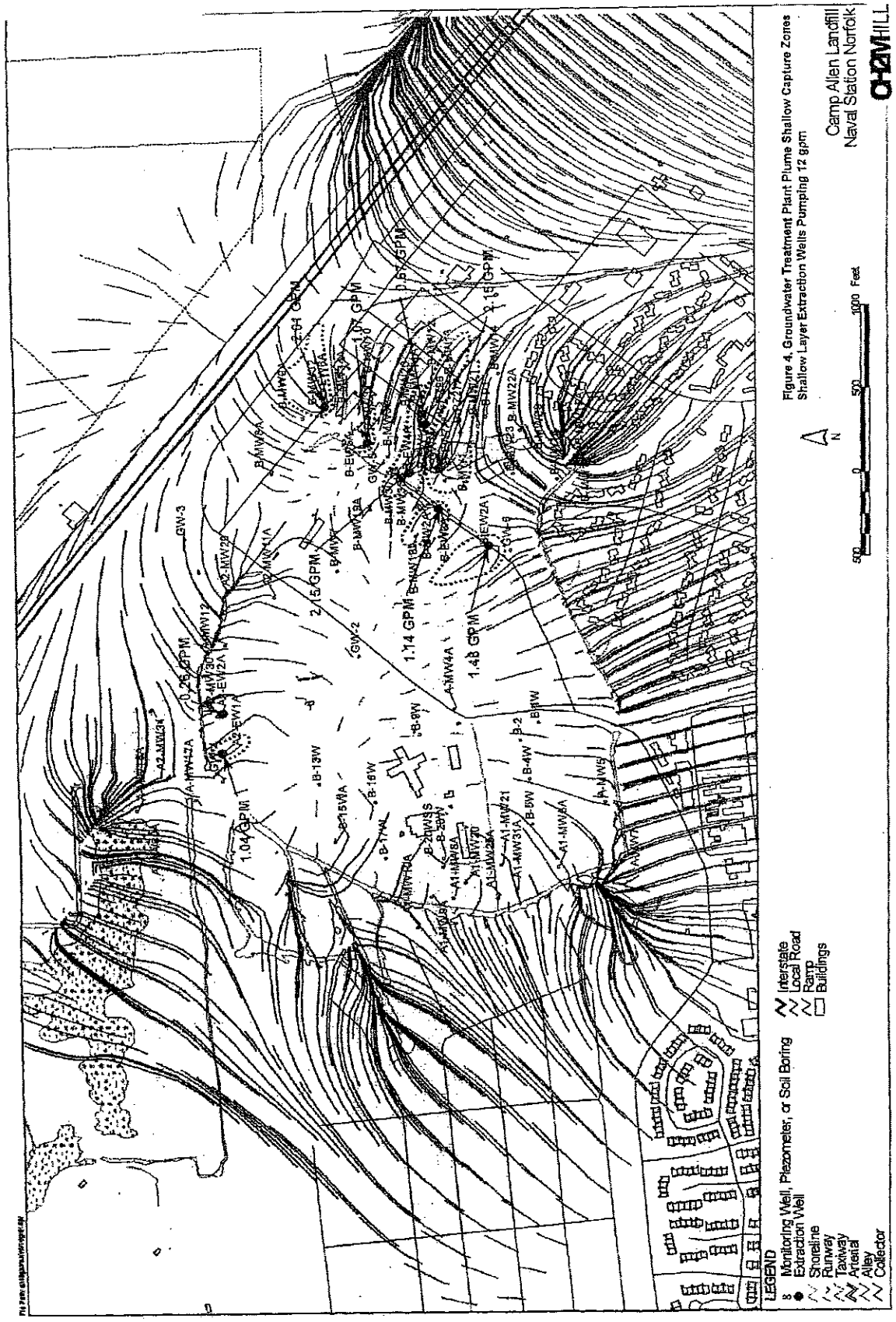


Figure 4. Groundwater Treatment Plant Plume Shallow Capture Zones
Shallow Layer Extraction Wells Pumping 12 gpm

Camp Allen Landfill
Naval Station Norfolk

CH2MHILL

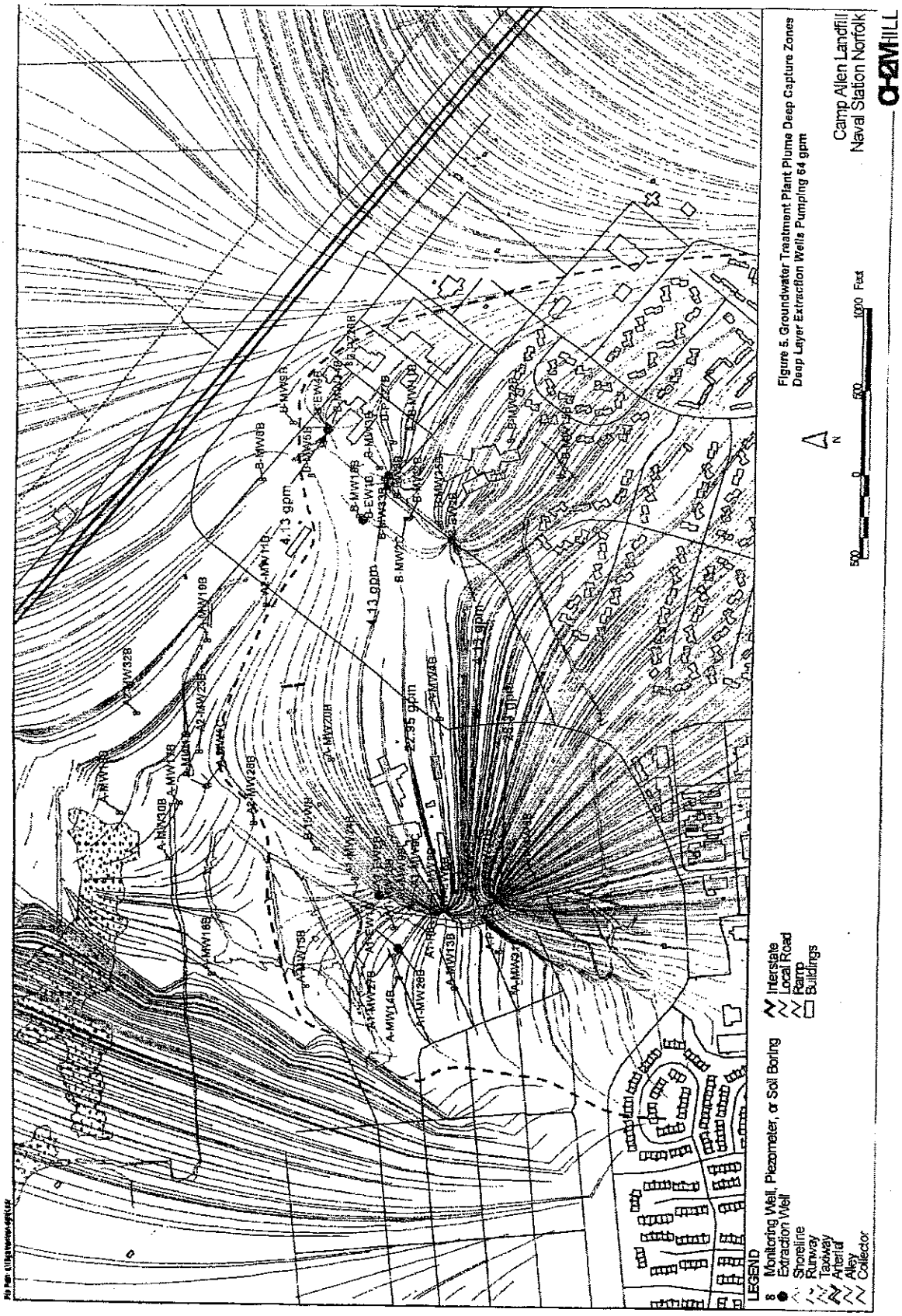
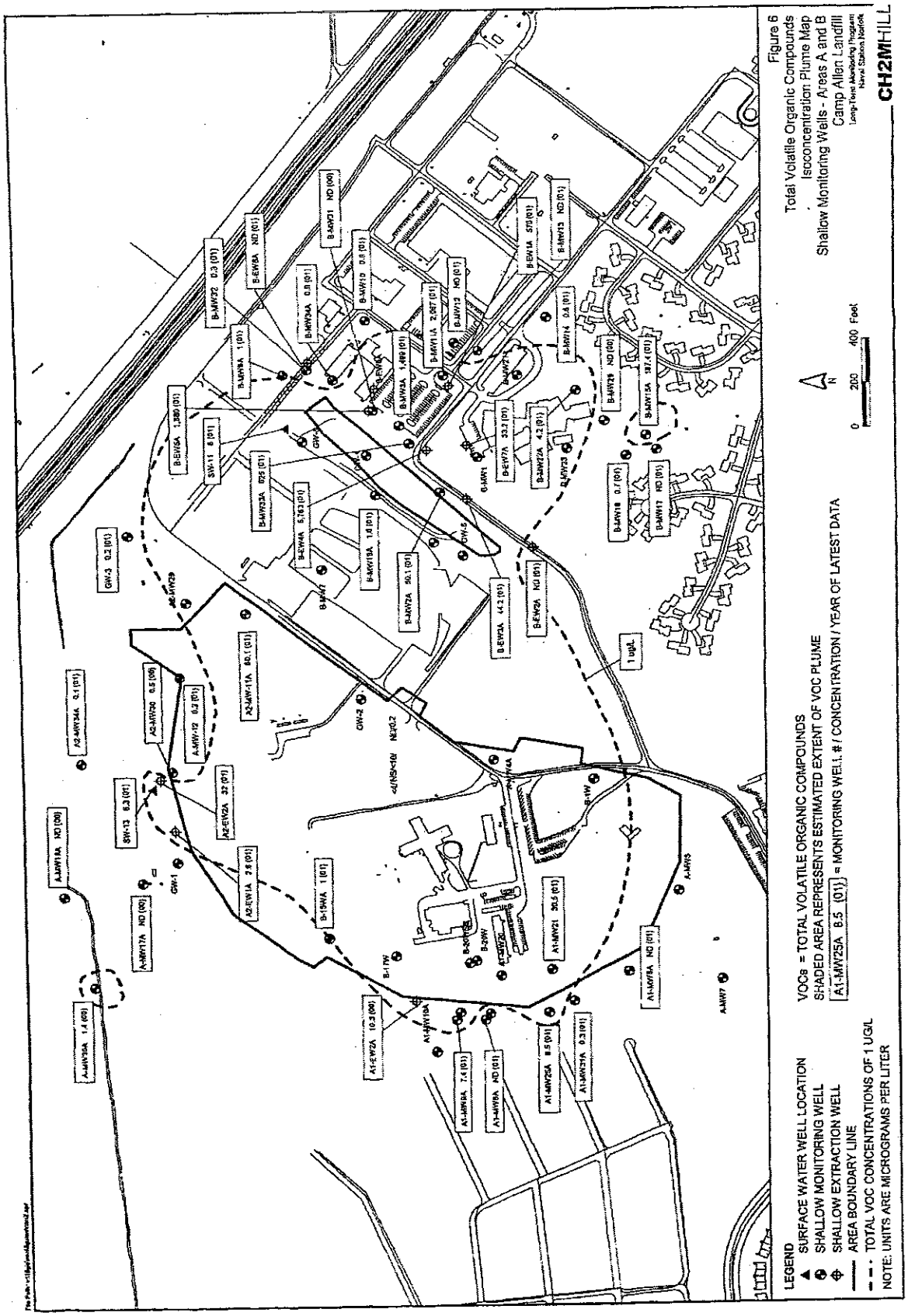


Figure 5. Groundwater Treatment Plant Plume Deep Capture Zones
Deep Layer Extraction Wells Pumping 64 gpm


LEGEND
SURFACE WATER WELL LOCATION
SHALLOW MONITORING WELL
SHALLOW EXTRACTION WELL
AREA BOUNDARY LINE
TOTAL VOC CONCENTRATIONS OF 1 UG/L
NOTE: UNITS ARE MICROGRAMS PER LITER
VOCs = TOTAL VOLATILE ORGANIC COMPOUNDS
SHADED AREA REPRESENTS ESTIMATED EXTENT OF VOC PLUME
A1-MW25A 8.5 (01) = MONITORING WELL # / CONCENTRATION / YEAR OF LATEST DATA
0 200 400 Feet
N
Figure 6
Total Volatile Organic Compounds
Isoconcentration Plume Map
Shallow Monitoring Wells - Areas A and B
Camp Allen Landfill
Long-Term Monitoring Program
Naval Station Norfolk
CH2MHILL

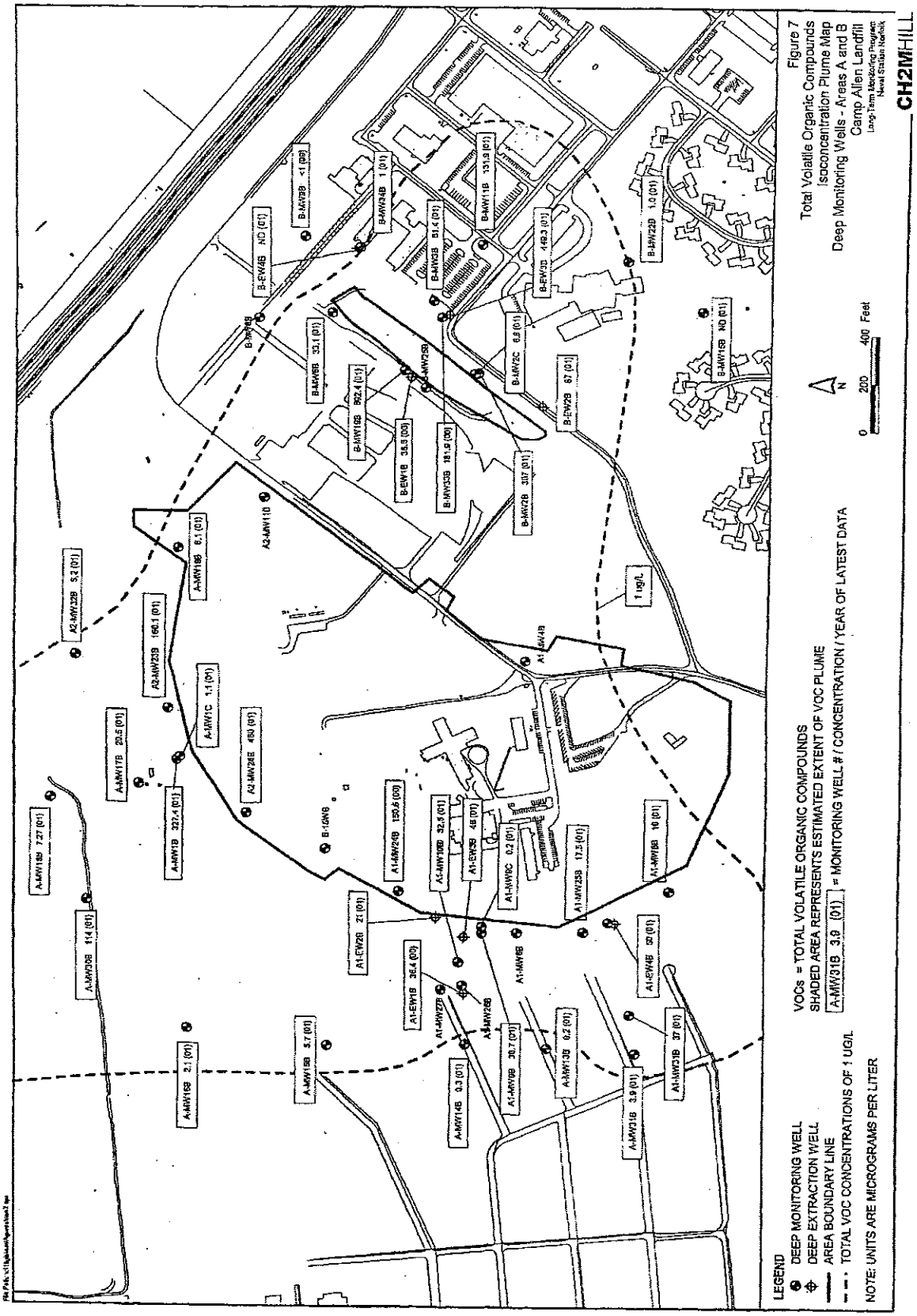


Figure 7
Total Volatile Organic Compounds
Isoconcentration Plume Map
Deep Monitoring Wells - Areas A and B
Camp Allen Landfill
Long-Term Monitoring Program
Naval Station Norfolk
CH2MHILL
0 200 400 Feet
N
1 ug/L
VOCs = TOTAL VOLATILE ORGANIC COMPOUNDS
SHADED AREA REPRESENTS ESTIMATED EXTENT OF VOC PLUME
A-MW31B 3.9 (01) = MONITORING WELL # / CONCENTRATION / YEAR OF LATEST DATA
LEGEND
DEEP MONITORING WELL
DEEP EXTRACTION WELL
AREA BOUNDARY LINE
TOTAL VOC CONCENTRATIONS OF 1 UG/L
NOTE: UNITS ARE MICROGRAMS PER LITER

APPENDIX A-1

SURFACE SOILS SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Semivolatiles (ug/kg)							
Benzo(a)anthracene	784	88	4/5	21 J - 69 J	SSA-03	0	0
Benzo(a)pyrene	78	9	4/5	19 J - 48 J	SSA-04	0	4
Benzo(b)fluoranthene	784	88	4/5	27 J - 110 J	SSA-04	0	2
Benzo(k)fluoranthene	7,840	875	2/5	37 J - 51 J	SSA-04	0	0
Chrysene	78,400	8,750	4/5	20 - 76 J	SSA-03	0	0
Fluoranthene	8,176,000	312,857	5/5	23 J - 96 J	SSA-04	0	0
Indeno(1,2,3-cd)pyrene	784	88	1/5	25 J	SSA-04	0	0
Phenanthrene[4]	4,088,000	156,429	2/5	25 J - 36 J	SSA-04	0	0
Pyrene	6,132,000	234,643	5/5	29 J - 89 J	SSA-03	0	0
Pesticides/PCBs (ug/kg)						0	0
4,4'-DDD	2,385	266	3/5	4 J - 6.2 L	SSA-01	0	0
4,4'-DDE	1,683	188	5/5	0.5 J - 14	SSA-02	0	0
4,4'-DDT	1,683	188	2/5	1.7 J - 3.9 J	SSA-02	0	0
Aldrin	34	4	1/5	9 J	SSA-02	0	1
alpha-Chlordane[5]	1,635	183	5/5	0.46 J - 3.1 K	SSA-04	0	0
Aroclor-1260	286	32	4/5	13 J - 420 L	SSA-03	0	3
Dieldrin	36	4	2/5	1.1 J - 27 K	SSA-04	0	1
Endosulfan I[6]	1,226,400	46,929	1/5	0.61 J	SSA-01	0	0
gamma-Chlordane[5]	1,635	183	2/5	1.4 J - 3.8 K	SSA-04	0	0
Heptachlor epoxide	63	7	2/5	0.69 J - 2.4 J	SSA-04	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-1

SURFACE SOILS SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Inorganics (mg/kg)							
Aluminum	204,400	7,821	5/5	3640 - 9880	SSA-03	0	0
Arsenic[7]	0.400	0.043	5/5	15 K - 70	SSA-03	5	5
Barium[8]	14,308	548	5/5	38.2 J - 1050 J	SSA-03	0	1
Cadmium[9]	102	4	3/5	22.2 J - 88.9	SSA-03	0	3
Calcium[+]	NE	NE	5/5	896 - 20200	SSA-05	0	0
Chromium[8]	613	24	5/5	8.9 - 121	SSA-03	0	3
Cobalt	4,088	156	2/5	7.7 - 18.3	SSA-03	0	0
Copper	8,176	313	3/5	104 - 477	SSA-02	0	1
Iron	61,320	2,346	5/5	4920 - 20800	SSA-02	0	5
Lead[9]	NE	400	5/5	13.2 - 683	SSA-03	0	1
Manganese	4,088	156	5/5	39.5 - 128	SSA-03	0	0
Mercury	NE	NE	3/5	0.29 - 0.77	SSA-04	0	0
Nickel	4,088	156	4/5	7.1 - 84.1	SSA-03	0	0
Thallium[10]	14	1	3/5	0.52 - 0.92	SSA-04	0	0
Vanadium	1,431	55	5/5	15.2 - 78.7	SSA-03	0	1
Zinc	61,320	2,346	3/5	204 - 916	SSA-02	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-2

SUBSURFACE SOIL BORING SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Volatiles (ug/kg)							
1,1,1-Trichloroethane	57,232,000	2,190,000	1/10	63	SBA-06	0	0
1,2-Dichloroethene[12]	6,289	702	1/10	384 J	SBA-07DUP	0	0
1,1-Dichloroethene[12]	20,440,000	782,143	1/10	17	SBA-07DUP	0	0
2-Butanone	122,640,000	4,692,857	1/10	17000 J	SBA-08	0	0
Acetone	20,440,000	782,143	1/10	490 J	SBA-06	0	0
Carbon disulfide	20,440,000	782,143	3/10	4 J - 22	SBA-07DUP	0	0
Ethylbenzene	20,440,000	782,143	3/10	21 J - 45000 J	SBA-01	0	0
Methylene chloride	76,309	8,516	1/10	4 J	SBA-07DUP	0	0
Toluene	40,880,000	1,564,286	5/10	15 J - 3000000	SBA-01	0	1
Xylenes(total)	408,800,000	15,642,857	5/10	30 - 340000	SBA-01	0	0
Semivolatiles (ug/kg)						0	0
2-Methylnaphthalene	4,088,000	156,429	8/10	40 J - 21000	SBA-01	0	0
2-Methylphenol	10,220,000	391,071	3/10	151 J - 6400 J	SBA-03	0	0
2,4-Dimethylphenol	4,088,000	156,429	4/10	560 K - 41000	SBA-03	0	0
4-Methylphenol	1,022,000	39,107	2/10	161 J - 5500 J	SBA-03	0	0
Acenaphthene	12,264,000	469,286	5/10	53.5 J - 5600	SBA-01	0	0
Benzo(a)anthracene	784	88	2/10	45 J - 165 J	SBA-07DUP	0	1
Benzo(a)pyrene	78	9	1/10	165 J	SBA-07DUP	1	1
Benzo(b)fluoranthene	784	88	2/10	41 J - 172.5	SBA-07DUP	0	1
Benzo(g,h,i)perylene[4]	4,088,000	156,429	1/10	149.5 J	SBA-07DUP	0	0
Benzo(k)fluoranthene	7,840	875	1/10	155.5 J	SBA-07DUP	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-2

SUBSURFACE SOIL BORING SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Semivolatiles (ug/kg)						0	0
Bis(2-ethylhexyl)phthalate	40,880	4,562	5/10	95.5 J - 17000	SBA-06	0	0
Butylbenzylphthalate	40,880,000	1,564,286	1/10	25 J	SBA-10	0	0
Chrysene	78,400	8,750	3/10	26 J - 166 J	SBA-07DUP	0	0
Dibenzofuran	817,600	31,286	3/10	30 J - 1700 J	SBA-01	0	0
Diethylphthalate	163,520,000	6,257,143	3/10	73 J -195 J	SBA-07DUP	0	0
Fluoranthene	8,176,000	312,857	3/10	34 J - 176.5 J	SBA-07DUP	0	0
Fluorene	8,176,000	312,857	4/10	35 J - 1300 J	SBA-01	0	0
Indeno(1,2,3-cd)pyrene	784	88	1/10	151 J	SBA-07DUP	0	1
Isophorone	602,442	67,234	1/10	680 K	SBA-08	0	0
Naphthalene	4,088,000	156,429	6/10	34 J - 32000	SBA-01	0	0
Phenanthrene[4]	4,088,000	156,429	5/10	37 J - 370 J	SBA-06	0	0
Pyrene	6,132,000	234,643	3/10	31 J - 180 J	SBA-10	0	0
Pesticides/PCBs (ug/kg)						0	0
4,4-DDD	2,385	266	8/10	0.88 J - 20 K	SBA-01	0	0
4,4'-DDE	1,683	188	6/10	2.5 K - 9.5 K	SBA-06	0	0
4,4'-DDT	1,683	188	1/10	11 K	SBA-05	0	0
alpha-Chlordane[5]	1,635	183	2/10	1.0 J - 2.6 L	SBA-10	0	0
Aroclor-1254	286	32	2/10	92 L - 1600	SBA-04	1	2
Aroclor-1260	286	32	5/10	49 L - 1800	SBA-06	3	5
delta-BHC[13]	35	4	1/10	1.4 K	SBA-08	0	0
Dieldrin	36	4	7/10	1.09 K - 89 K	SBA-04	3	5

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-2

SUBSURFACE SOIL BORING SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Pesticides/PCBs (ug/kg)						0	0
Endosulfan II[8]	1,226,400	46,929	1/10	3.1 K	SBA-04	0	0
Endrin	61,320	2,346	1/10	2.7 J	SBA-10	0	0
Endrin aldehyde[9]	61,320	2,346	4/10	3.8 K- 34 K	SBA-06	0	0
Heptachlor epoxide	127	14	1/10	2.7 K	SBA-08	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-3

TEST PIT SOIL DATA SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Volatiles (ug/kg)							
Acetone	20,440,000	782,143	9/30	38 - 850J	A1TPW1004 soil	0	0
Benzene	10,406	1,161	1/30	25J - 25J	A2TPW0203	0	0
2-Butanone	1,226,400,001	4,692,857	9/30	6J - 53J	A2TPW0902	0	0
Carbon Disulfide	20,440,000	782,143	2/30	16J - 27	A2TPW0203	0	0
Chloroform	NE	NE	2/30	6J - 12000	A1TPW0505 ash	NE	NE
Ethylbenzene	20,440,000	782,143	9/30	14J - 10000	A1TPW1105 ash	0	0
1,2-Dichloroethane	6,289	702	1/30	6900 - 6900	A1TPW0505 ash	0	0
1,2-Dichloroethene (total)	1,839,600	70,393	6/30	2J - 840000	A1TPW0604 soil/ash	0	1
Methylene Chloride	76,309	8,516	7/30	2J - 46J	A1TPW0102RE ash/soil	0	0
4-Methyl-2-Pentanone	16,352,000	625,714	1/30	1100 - 1100	A1TPW0102RE ash/soil	0	0
Styrene	40,880,000	1,564,286	1/30	2800 - 2800	A1TPW1105 ash	0	0
Tetrachloroethene	11,006	1,228	4/30	570J - 5000	A1TPW1004 soil	0	2
Toluene	40,880,000	1,564,286	14/30	3J - 8100000	A1TPW0604 soil/ash	0	1
Trichloroethene	52,029	5,807	8/30	6J - 510000	A1TPW0604 soil/ash	1	3
Vinyl Chloride	795	NE	6/30	23 - 3000	A1TPW1004 soil	3	NE
Xylenes total	4,088,000,001	15,642,857	9/30	13 - 410000	A1TPW0604 soil/ash	0	0
Total Unknown Hydrocarbons	NE	NE	28/30	10J - 486000J	A1TPW0104 soil, A1TPW0505 ash	NE	NE
Semivolatiles (ug/kg)							
Acenaphthene	12,264,000	469,286	9/26	32J - 1600J	A1TPW0805	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-3

TEST PIT SOIL DATA SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Semivolatiles (ug/kg)							
Anthracene	61,320,000	2,346,429	8/26	84J - 1100J	A2TPW0703	0	0
Benzo(a)anthracene	20,440,000	782,143	10/26	310J - 3500	A2TPW1102	0	0
Benzo(b)fluoranthene	784	88	10/26	440 - 3500J	A2TPW1102	9	10
Benzo(k)fluoranthene	7,840	875	10/26	140J - 1200J	A2TPW0703	0	0
Benzo(g,h,i)perylene[14]	6,132,000	234,643	10/26	110J - 1400J	A2TPW0902	0	0
Benzo(a)pyrene	78	9	10/26	200J - 2100J	A2TPW1102	10	10
Butyl benzyl phthalate	40,880,000	1,564,286	2/26	150J - 190J	A2TPW1102	0	0
Carbazole	28,616	3,194	5/26	59J - 150J	A2TPW0103D	0	0
Chrysene	78,400	8,750	11/26	56J - 2800	A2TPW1102	0	0
Dibenzo(a,h)anthracene	78,400	8,750	7/26	32J - 340J	A2TPW0902	0	0
Dibenzofuran	817,600	31,286	6/26	60J - 1300J	A1TPW0805	0	0
Di-n-butylphthalate	20,440,000	782,143	5/26	230JS - 40000J	A1TPW0604	0	0
1,2-Dichlorobenzene	18,396,000	703,929	1/26	79J - 79J	A2TPW0103	0	0
1,4-Dichlorobenzene	23,847	2,661	10/26	20J - 1200J	A2TPW1203	0	0
Diethylphthalate	1,635,200,001	6,257,143	1/26	450J - 450J	A2TPW0502	0	0
2,4-Dimethyphenol	4,088,000	156,429	4/26	57J - 2600	A1TPW1105	0	0
bis(2-ethylhexyl)phthalate	40,880	4,562	16/26	48JB - 7500	A2TPW1203	0	0
Fluoranthene	8,176,000	312,857	11/26	37J - 6300J	A2TPW0703	0	0
Fluorene	8,176,000	312,857	11/26	30J - 1200J	A1TPW0805	0	0
Indeno(1,2,3-cd)pyrene	784	88	10/26	100J - 1300J	A2TPW0902	10	10

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-3

TEST PIT SOIL DATA SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Semivolatiles (ug/kg)							
2-Methanol[15]	1,022,000,001	3,910,714	2/26	19000D - 25000E	A1TPW1004	0	0
4-Methanol[15]	1,022,000,001	3,910,714	4/26	12000D - 42000E	A1TPW1004	0	0
4-Methyphenol	1,022,000	39,107	4/26	70J - 530J	A2TPW1203	0	0
2-Methylnaphthalene	4,088,000	156,429	21/26	32J - 36000J	A1TPW0604	0	0
Naphthalene	4,088,000	156,429	21/26	63J - 150000J	A1TPW0604	0	0
3-Nitroaniline	NE	NE	1/26	23J - 23J	A1TPWO905	NE	NE
Pheuanthrene[4]	4,088,000	156,429	15/26	40J - 5400J	A2TPW0703	0	0
Phenol	1,226,400,001	4,692,857	7/26	44J - 26000E	A1TPW1105	0	0
Pyrene	6,132,000	234,643	12/26	40J - 5800J	A2TPW0703	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-4

SURFACE SEDIMENT DATA SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Sediment Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial Soil COC Value	Region III Residential Soil COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Inorganics (mg/kg)							
Copper	8,176	313	1/10	553 J	SWB-SDB-05S	0	1
Lead[9]	NE	400	10/10	36.5 - 1000	SDA-01	NE	2
Mercury	NE	NE	10/10	0.2 - 1.6	SDA-02	NE	NE
Silver	1,022	39	4/10	5 - 110	SDA-18S	0	1
Vanadium	1,431	55	9/10	2 - 180	SDA-02	0	7
Zinc	61,320	2,346	1/10	244 K	SWB-SDB-05S	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-5

SUBSURFACE SEDIMENT DATA SUMMARY
CAMP ALLEN LANDFILL AREA A
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Sediment Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial Soil COC Value	Region III Residential Soil COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Volatiles (ug/kg)							
1,2-Dichloroethene[12]	1,839,600	70,393	1/1	26 J	SWB/SDB-05D	0	0
2-Butanone	1,226,400,001	4,692,857	1/1	120	SWB/SDB-05D	0	0
Acetone	20,440,000	782,143	1/1	520	SWB/SDB-05D	0	0
Trichloroethene	52,029	5,807	1/1	12 J	SWB/SDB-05D	0	0
Semivolatiles (ug/kg)							
Acenaphthene	12,264,000	469,286	1/1	4100	SWB/SDB-05D	0	0
Benzo(a)anthracene	784	88	1/1	2500	SWB/SDB-05D	0	1
Chrysene	78,400	8,750	1/1	460 J	SWB/SDB-05D	0	0
Fluoranthene	8,176,000	312,857	1/1	1000	SWB/SDB-05D	0	0
Pyrene	6,132,000	234,643	1/1	800 J	SWB/SDB-05D	0	0
Pesticides/PCBs (ug/kg)							
4,4'-DDD	2,385	266	1/1	380	SWB/SDB-05D	0	1
4,4'-DDE	1,683	188	1/1	85	SWB/SDB-05D	0	0
Aroclor-1248	286	32	1/1	68 J	SWB/SDB-05D	0	1
Aroclor-1254	286	32	1/1	980	SWB/SDB-05D	1	1
Dieldrin	36	4	1/1	62	SWB/SDB-05D	1	1
Endrin	61,320	2,346	1/1	11	SWB/SDB-05D	0	0
Inorganics (mg/kg)							
Arsenic	0.382	0.043	2/10	18.8 - 50	SDA-18D	2	2
Cadmium	204	8	2/10	11.8 - 180	SDA-18D	0	2
Chromium[8]	613	23	2/10	1.9 - 1700	SDA-18D	1	1
Copper	8,176	313	1/10	9330	SWB/SDB-05D	1	1

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-6

SUPPLEMENTAL SEDIMENT DATA AND SUMMARY
CAMP ALLEN LANDFILL AREA B
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Sediment Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial Soil COC Value	Region III Residential Soil COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Volatiles (µg/kg):							
Acetone	20,440,000	782,143	2/8	73B - 730B	CASD-3	0	0
Methylene Chloride	76,309	8,516	4/8	10B - 26B	CASD-3	0	0
Carbon Disulfide	20,440,000	782,143	1/8	13J	2D3-3	0	0
2-Butanone	1,226,400,000	4,692,857	1/8	240	CASD-3	0	0
Trichloroethene	52,029	5,807	1/8	5J	CASD-1D	0	0
Toluene	40,880,000	1,564,286	1/8	3J	2DC-2	0	0
1,2-Dichloroethene (Total)	1,839,600	70,393	1/8	25J	CASD-1D	0	0
Semivolatiles (µg/kg):							
N-Nitrosodiphenylamine	204	23	1/8	140J	2SS-1	0	1
2,4-Dinitrotoluene	408,800	15,643	1/8	130J	2 DC-2	0	0
2-Methylnaphthalene	4,088,000	156,429	2/8	220J - 3,000J	CASD-3	0	0
Acenaphthene	12,264,000	469,286	2/8	300J - 880	2DC-2	0	0
Acenaphthylene [18]	12,264,000	469,286	1/8	89J	2DC-2	0	0
Anthracene	61,320,000	2,346,429	2/8	130J - 1,400	2 DC-2	0	0
Benzo(a)anthracene	784	88	5/8	52J - 2,900	2DC-2	1	4
Benzo(a)pyrene	78	9	4/8	180J - 2,700	2DC-2	4	4
Benzo(b)fluoranthene	784	88	5/8	65J - 4,000	2 DC-2	1	4
Benzo(g,h,i)perylene [14]	6,132,000	234,643	4/8	310J - 2,300	2 DC-2	0	0
Benzo(k)fluoranthene	7,840	875	4/8	130J - 1,600	2DC-2	0	1
Benzyl butyl phthalate	40,880,000	1,564,286	3/4	180J - 260J	CASD-1	0	0
Bis(2-ethylhexyl)phthalate	40,880	4,562	7/8	76J - 13,000	2 DC-2	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-6

SUPPLEMENTAL SEDIMENT DATA AND SUMMARY
CAMP ALLEN LANDFILL AREA B
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Sediment Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial Soil COC Value	Region III Residential Soil COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Pesticides (µg/kg):							
Endrin Ketone[17]	61,320	2,346	1/8	54J	CASD-3	0	0
gamma-BHC (Lindane)	440	49	1/8	260	2DC-2	0	1
gamma-Chlordane[5]	1,635	183	1/8	8.3J	CASD-3	0	0
PCBs (µg/kg):							
Aroclor-1260	286	32	5/8	190J - 6,100J	2DC-2	3	5
Inorganics (mg/kg):	0	0					
Aluminum	2,044,000	7,821	8/8	1,330 - 18,500	CASD-3	0	3
Antimony	82	3	3/8	3.11 - 22.2L	CASD-3	0	3
Arsenic	0.381	0.043	8/8	2.3K - 98.9	CASD-3	8	8
Barium	14,308	548	8/8	17.3 - 151	CASD-1	0	0
Beryllium	409	16	8/8	0.18 - 1.7	CASD-3	0	0
Cadmium	102	4	7/8	2 - 46.9	CASD-3	0	6
Calcium+	NE	NE	8/8	965 - 272,000	CASD-2	NE	NE
Chromium[8]	613	24	5/8	12.7 - 126	CASD-3	0	4
Cobalt	4,088	156	8/8	1.7 - 15	CASD-3	0	0
Copper	8,176	313	8/8	3.9 - 669	CASD-3	0	1
Cyanide	4,088	156	4/8	0.66K - 2.53	CASD-1	0	0
Iron	61,320	2,346	8/8	4,420 - 53,200	CASD-3	0	8
Lead[9]	400	400	7/8	5.1 - 1,180	CASD-3	1	1
Magnesium+	NE	NE	8/8	855 - 5,710	CASD-3	NE	NE
Manganese	28,616	1,095	8/8	55.4J - 369	CASD-3	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-6

SUPPLEMENTAL SEDIMENT DATA AND SUMMARY
CAMP ALLEN LANDFILL AREA B
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Sediment Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial Soil COC Value	Region III Residential Soil COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Inorganics (mg/kg):	0	0					
Mercury	NE	NE	6/8	0.19L - 2.4L	CASD-3	NE	NE
Nickel	4,088	156	7/8	5.9 - 66.4	CASD-3	0	0
Potassium+	NE	NE	7/8	392 - 2,490	CASD-1D	NE	NE
Selenium	1,022	39	4/8	0.93B - 4.1B	CASD-1	0	0
Silver	1,022	39	3/8	2.1 - 35.1	CASD-3	0	0
Sodium+	NE	NE	8/8	56.9 - 2,440J	CASD-2	NE	NE.
Vanadium	1,431	55	4/8	18.3 - 155	CASD-3	0	3
Zinc	61,320	2,346	8/8	18.2 - 1,880	CASD-3	0	0

Soil/Sediment Notes:

[1] Organic concentrations reported in µg/kg; inorganic concentrations reported in mg/kg.

[2] COC = USEPA Region III COC screening values derived from USEPA Region III Risk Based Concentration Table, dated May 2001.

[3] B = Analyte was detected in laboratory method blank
J = Analyte was positively identified, value is estimated.
K = Estimated value; biased high.
L = Estimated value; biased low.

+ = Essential Nutrient
ND = Non Detected
NA = Not Applicable
NE = Not Established

[4] Naphthalene COPC screening level used as a surrogate.

[5] Chlordane COPC screening level used as a surrogate.

[6] Endosulfan COPC screening level used as a surrogate.

[7] COPC screening level is for carcinogenic arsenic.

[8] COPC screening level is for chromium VI.

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Soil/Sediment Notes Continued:

[9] Soil screening level for residential land use (USEPA, 1994b).
[10] COPC screening level is for thallium carbonate, thallium chloride and thallium sulfate
[11] Lead retained for qualitative evaluation since no toxicity criteria are established.
[12] RBS is for mixture of cis- and trans- isomers
[13] Technical BHC used as surrogate.
[14] Pyrene COPC screening level used as a surrogate.
[15] Methanol COPC screening level used as a surrogate.
[16] beta-BHC COPC screening level used as a surrogate.
[17] Endrin COPC screening level used as a surrogate..
[18] Acenaphthene COPC screening level used as a surrogate.

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-7a

1997 GROUNDWATER DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	National Recommended Water Quality Criteria for Human Health Consumption of:[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Water + organism (ug/L)	Organism only (ug/l)	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Water + Organism Value	Positive Detects Above Organism Only Value
Volatiles (ug/l)							
1,1-Dichloroethane	5	190	1/71	10	NBS01-B-MW19B	1	0
1,1-Dichloroethylene	0.057	3	11/71	3-55	NBS01-B-EW4A	11	11
1,2-Dichloroethane	5[4]	99[4]	3/71	4-7	NBS01-A2-MW28B	2	0
Benzene	5[4]	600[4]	9/71	2-10	NBS01-A1-MW21	3	0
Chlorobenzene	680	21,000	10/71	3-9	NBS01-B-MW11A	0	0
Chloroform	6	470	3/71	3-3	NBS01-B-EW1A, NBS01-B-EW1AP, NBS01-B-EW4A	0	0
Tetrachloroethylene	5	340	3/71	2-5	NBS01-B-EW1AP	1	0
Trichloroethylene	5	1,600	11/71	3-8	NBS01-A1-MW10D, NBS01-B-MW16	9	0
Vinyl Chloride	2[4]	29[4]	10/71	2-96	NBS01-A2-MW28B	10	3
Xylenes	10,000[4]	3,000,000[4]	1/71	3	NBS01-B-MW11A	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-7b

1998 GROUNDWATER DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	National Recommended Water Quality Criteria for Human Health Consumption of:[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Water + organism (ug/L)	Organism only (ug/l)	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Water + Organism Value	Positive Detects Above Organism Only Value
Volatiles (ug/l)							
1,1-Dichloroethane	5	190	1/19	1	NBS01-A-MW29	0	0
1,2-Dichloroethene (cis)	70[4]	15,000[4]	1/19	1	NBS01-A-MW29	0	0
1,2-Dichloropropane	1	39	1/19	5	NBS01-A-MW30B	1	0
Chlorobenzene	680	21,000	1/19	1	NBS01-A-MW29	0	0
Chloroform	6	470	1/19	2	NBS01-A-MW31B	0	0
Methyl Bromide	48	4,000	1/19	1	NBS01-A-MW15B	0	0
Methyl Chloride	NE	NE	1/19	99	NBS01-A-MW15B	0	0
Tetrachloroethylene	5	340	2/19	1	NBS01-A-MW15B, NBS01-A-MW16B	0	0
Trichloroethylene	5	1,600	4/19	1-5	NBS01-A-MW29	1	0
Vinyl Chloride	2[4]	9[4]	1/19	1	NBS01-A-MW19B	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX A-7c

2001 MONITORING WELL GROUNDWATER DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	National Recommended Water Quality Criteria for Human Health Consumption of:[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Water + organism (ug/L)	Organism only (ug/l)	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Water + Organism Value	Positive Detects Above Organism Only Value
Volatiles (ug/l)							
1,1,1-Trichloroethane	200[4]	13,500[4]	4/83	15 - 210	NBS01-B-EW4A-01	0	0
1,1,2,2-Tetrachloroethane	0	11	1/83	1-1	NBS01-A1-MW21-R03	1	0
1,1,2-Trichloroethane	1	42	1/83	1-1	NBS01-B-MW19B-R03	1	0
1,1-Dichloroethane	5	190	4/83	10-1	NBS01-B-EW4A-01	4	0
1,1-Dichloroethylene	0	3	7/83	1-110	NBS01-B-EW4A-01	7	3
1,2-Dichlorobenzene	2,700	17,000	5/83	1-22	NBS01-A1-EW1A-01	0	0
1,2-Dichloroethane	5[4]	190[4]	8/83	2-230	NBS01-B-EW3B-01, NBS01-B-EW4A-01	8	2
1,2-Dichloroethene (cis)	70[4]	15,000[4]	12/83	1-1500	NBS01-B-EW4A-01	3	0
Benzene	5[4]	600[4]	12/83	1-190	NBS01-B-EW4A-01	7	0
Chlorobenzene	680	21,000	9/83	1-1	NBS01-B-EW3A-01	0	0
Chloroform	6	470	1/83	1-1	NBS01-B-MW11B-R03	0	0
Ethylbenzene	700[4]	150,000[4]	1/83	1-8	NBS01-B-MW33A-R03	0	0
Tetrachloroethylene	5	340	5/83	1-13	NBS01-B-MW33A-R03	3	0
Toluene	1,000[4]	301,000[4]	6/83	1-8	NBS01-B-MW11A-R03	0	0
Trichloroethylene	5	1,600	15/83	1-1	NBS01-B-EW4A-01	5	1
Vinyl Chloride	2[4]	9[4]	7/83	3-260	NBS01-B-EW5A-01	7	6

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX B-1

SURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Volatiles (ug/kg)							
1,1-Dichloroethane	1,839,600	70,393	1/22	7 J	SYD-SB-10S	0	0
Acetone	20,440,000	782,143	12/22	15 - 64 B	CASB-10-00	0	0
Methylene chloride	76,309	8,516	12/22	6 B - 12 B	CASB-10-00, SYD-SB-20S	0	0
Tetrachloroethene	11,006	1,228	1/22	4 J	SYD-SB-19S	0	0
Trichloroethene	52,029	5,807	2/22	10 J - 28	SYD-SB-19S	0	0
Semivolatiles (ug/kg)						0	0
1,4-Dichlorobenzene	23,847	2,661	1/22	150 J	SYD-SB-10S	0	0
2,4-Dimethylphenol	4,088,000	156,429	1/22	37 J	SYD-SB-10S	0	0
Benzo(a)anthracene	784	88	6/23	34 J - 160 J	2SB-04A	0	0
Benzo(a)pyrene	78	9	7/23	45 J - 180 J	2SB-04A	5	19
Benzo(b)fluoranthene	784	88	8/23	43 J - 180 J	CASB-1-00	0	6
Benzo(g,h,i)perylene[10]	4,088,000	156,429	7/23	43 J - 160 J	2SB-04A	0	0
Benzo(k)fluoranthene	7,840	875	5/23	51 J - 110 J	2SB-04B, CASB-4-02, SYD-SB-10S	0	0
Bis(2-ethylhexyl)phthalate	40,880	4,562	13/23	42 J - 400	2SB-04A	0	0
Butylbenzylphthalate	40,880,000	1,564,286	2/13	77 J - 84 J	2SB-04A	0	0
Chrysene	78,400	8,750	8/23	36 J - 200 J	2SB-04A	0	0
Dibenzo(a,h)anthracene	78	9	1/23	51 J	2SB-04A	10	1
Di-n-butylphthalate	20,440,000	782,143	2/23	64 J - 150 J	2SB-19A	0	0
Fluoranthene	8,176,000	31,28,571	8/23	45 J - 180 J	2SB-04A	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX B-1

SURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Semivolatiles (ug/kg)							
Indeno(1,2,3-cd)pyrene	784	88	7/23	38 J - 150 J	2SB-04A; 2SB-04B	0	1
Phenanthrene[4]	6,132,000	234,643	6/23	36 J - 140 J	SYD-SB-10S	0	0
Pyrene	6,132,000	234,643	8/23	38 J - 280 J	2SB-04A	0	0
Pesticides/PCBs (ug/kg)						0	0
4,4'-DDD	2,385	266	8/26	2.9 J - 2,100	2SB-04A	0	1
4,4'-DDE	1,683	188	12/26	4.7 J - 630 J	2SB-04A	0	2
4,4'-DDT	1,683	188	15/26	4.8 J - 2,600	2SB-04A	2	4
alpha-Chlordane[5]	1,635	183	6/25	1.1 J - 7.9	2SB-16A	0	0
Aroclor-1248	286	32	1/1	8,900	2SB-04A	1	1
Aroclor-1254	286	32	3/26	190 J - 510 J	SYD-SB-15S	1	3
Aroclor-1260	286	32	17/26	74 J - 5,400	2SB-04A	4	13
Dieldrin	36	4	11/26	2.2 J - 520 J	2SB-04A	4	8
Endrin	61,320	2,346	2/25	1.7 J - 1.7 J	SYD-SB-15S	0	0
Endrin aldehyde[6]	61,320	2,346	4/25	5.9 J - 8.7 J	CASB-1-00	0	0
Endrin ketone[6]	61,320	2,346	3/25	1.9 J - 3.7 J	CASB-1-00	0	0
gamma-Chlordane[5]	1,635	183	5/25	2.2 J - 5.4 J	2SB-14C	0	0
Heptachlor epoxide	63	7	2/26	1.8 J - 1.8 J	CASB-3-00	0	0
Inorganics (mg/kg)							
Aluminum	2,044,001	7,821	57/57	619 - 11,100	METAL2	0	12
Antimony	82	3	136/195	0.22 - 254	2SB165F	4	78

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX B-1

SURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Inorganics (mg/kg)							
Arsenic	0.382	0.043	189/195	0.47 - 300	2SB16K	189	189
Barium	14,308	548	57/57	5.3 - 467	2SB104A	0	0
Beryllium	409	16	40/56	0.08 - 0.66	SYD-SB-10S	0	0
Cadmium	204	8	50/57	0.17 - 44.9	2SB-04A	0	6
Calcium+	NE	NE	57/57	213 - 317,000	CASB-7-00	0	0
Chromium	613	23	57/57	2.25 - 137	2SB-04A	0	10
Cobalt	4,088	156	57/57	0.61 J - 20.7 L	2SB-04A	0	0
Copper	8,176	313	56/57	0.56 - 5,430	2SB073A	0	7
Cyanide	4,088	156	1/23	0.63	2SB-14C	0	0
Iron	61,320	2,346	195/195	2,090 - 308,000	2SB162J	25	117
Inorganics (mg/kg)							
Lead[6]	NE	400	195/195	1.5 - 16,200	2SB16PDUP	0	59
Magnesium+	NE	NE	57/57	213 - 5,130	2SB-19A	0	0
Manganese	4,088	156	57/57	4.6 L - 683	2SB104A	0	16
Mercury	NE	NE	42/57	0.033 J - 3.6	2SB-04A	0	0
Nickel	4,088	156	57/57	1.2 - 145	2SB104A	0	0
Potassium+	NE	NE	57/57	162 J - 4,250	2SB-17A	0	0
Selenium	1,022	39	21/57	0.2 J - 2.6	2SB077A	0	0
Silver	1,022	39	41/57	0.27 B - 11.4	2SB075A	0	0
Sodium+	NE	NE	51/57	33.3 - 5,750	2SB104A	0	0

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX B-1

SURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Inorganics (mg/kg)							
Thallium	14	1	19/56	0.26 B - 2.1	2SB104B, 2SB108A, 2SB162B	0	AE
Vanadium	1,431	55	57/57	2.7 - 185	2SB104A	0	18
Zinc	61,320	2,346	57/57	5.1 B - 2,410	2SB078A	0	1

ORDER NO.: G25
CONTRACT ID. NO.: C00061322C02

APPENDIX B-2

SUBSURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Volatiles (ug/kg)							
Acetone	20,440,000	782,143	11/24	15 - 72 B	CASB-02-02	0	0
Methylene chloride	76,309	8,516	9/20	6 B - 10 B	CASB-02-02	0	0
Semivolatiles (ug/kg)							
2-Methylnaphthalene	4,088,000	156,429	6/22	39 J - 4,200	2SB-03B	0	0
4-Methylphenol	1,022,000	39,107	1/21	43 J - 43 J	2SB-10A	0	0
Acenaphthene	12,264,000	469,286	6/47	50 J - 590 J	2SB-12A	0	0
Acenaphthylene[9]	12,264,000	469,286	1/24	96 J	2SB-12B	0	0
Anthracene	61,320,000	2,346,429	3/22	40 J - 560 J	2SB-12A	0	0
Benzo(a)anthracene	784	88	3/21	110 J - 840 J	2SB-12A	1	3
Benzo(a)pyrene	78	9	3/21	190 J - 650 J	2SB-12A	3	3
Benzo(b)fluoranthene	784	88	4/21	142 J - 380 J	CASB-4-02	0	2
Benzo(g,h,i)perylene[10]	4,088,000	156,429	3/21	150 J - 390 J	2SB-12A	0	0
Benzo(k)fluoranthene	7,840	875	2/21	110 J - 110 J	2SB-04B, CASB-4-02, SYD-SB-10S	0	0
Bis(2-ethylhexyl)phthalate	40,880	4,562	5/24	41 B - 99 J	2SB-20A, CASB-4-02	0	0
Butylbenzylphthalate	40,880,000	1,564,286	1/14	38 J	2SB-10A	0	0
Carbazole	28,616	3,194	2/22	74 J - 220 J	2SB-12A	0	0
Chrysene	78,400	8,750	3/21	220 J - 1,000 J	2SB-12A	0	0
Dibenzo(a,h)anthracene	78	9	2/22	39 J - 130 J	2SB-12B	4	4
Dibenzofuran	817,600	31,286	4/24	150 J - 460 J	2SB-12A	0	0

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APPENDIX B-2

SUBSURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Semivolatiles (ug/kg)							
Di-n-butylphthalate	20,440,000	782,143	3/24	65 J - 140 J	2SB-10C	0	0
Fluoranthene	8,176,000	312,857	5/21	43 J - 1,700 J	2SB-12A	0	0
Fluorene	8,176,000	312,857	6/24	57 J - 980 J	2SB-12A	0	0
Indeno(1,2,3-cd)pyrene	784	88	4/21	100 J - 370 J	2SB-12A	0	4
Naphthalene	4,088,000	156,429	5/22	50 J - 200 J	2SB-03A	0	0
Phenanthrene[4]	6,132,000	234,643	2/20	220 J - 640	2SB-03A	0	0
Pyrene	6,132,000	234,643	7/20	35 J - 430	2SB-03A	0	0
Pesticides/PCBs (ug/kg)							
4,4'-DDD	2,385	266	4/24	10 NJ - 31 NJ	2SB-03A	0	0
4,4'-DDE	1,683	188	7/24	1.7 J - 90 NJ	2SB-03A	0	0
4,4'-DDT	1,683	188	3/23	2.5 J - 31 J	2SB-03A	0	0
Aroclor-1260	286	32	3/20	390 J - 1,800 J	2SB-03A	3	3
Dieldrin	36	4	1/23	1.4 J	2SB-10A	0	0
Heptachlor epoxide	63	7	3/24	1.4 J - 3.6 J	2SB-12A	0	0
Inorganics (mg/kg)							
Aluminum	2,044,001	7,821	63/66	749 - 17,600	2SB-20B	0	8
Antimony	82	3	62/124	0.21 B - 355 B	2SB20O	2	37
Arsenic	0.382	0.043	125/127	0.37 BJ - 63.7	2SB204B	124	125
Barium	14,308	548	64/66	1 - 960	2SB-10B	0	3
Beryllium	409	16	45/63	0.14 - 0.93	2SB208B	0	0
Cadmium	204	8	53/66	0.11 J - 36	2SB-10B	0	13
Calcium+	NE	NE	65/66	292 J - 473,000	2SB108B	0	0

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APPENDIX B-2

SUBSURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Inorganics (mg/kg)							
Chromium[7]	613	23	66/66	1.8 - 124	2SB-10B	0	11
Cobalt	4,088	156	59/66	0.28 B - 19.2	2SB204B	0	0
Copper	8,176	313	62/66	0.52 - 3,780 J	2SB-03A	0	13
Iron	61,320	2,346	127/127	886 - 483,000	2SB204B	12	118
Lead[8]	NE	400	127/127	0.93 - 95,800	2SB204B	0	25
Magnesium+	NE	NE	62/66	255 - 4,430	2SB-10A	0	0
Manganese	4,088	156	66/66	9.2 - 837	2SB204B	0	18
Mercury	NE	NE	40/66	0.017 B - 1.1	2SB072A, 2SB207B	0	0
Nickel	4,088	156	63/66	0.85 B - 209 J	2SB-20B	0	2
Potassium+	NE	NE	53/66	82.4 B - 3,940 L	2SB-10A	0	0
Selenium	1,022	39	19/66	0.19 J - 1.3 B	CASB-8-00, METAL4, METAL5D	0	0
Silver	1,022	39	36/66	0.17 B - 8.7	2SB207B	0	0
Sodium+	NE	NE	59/63	32 B - 4730	2SB207B	0	0
Thallium	14	1	29/61	0.26 B - 2.5	2SB106B, 2SB163B	0	18
Vanadium	1,431	55	66/66	2 B - 899	2SB204B	0	3
Zinc	61,320	2,346	65/66	7.1 - 3,180	2SB-10B	0	5
Other	0	0					
Diesel Fuel (mg/kg)	NE	NE	2/3	150 J - 290 J	2SB-03B	0	0

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APPENDIX B-2

SUBSURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Other							
Gasoline (ug/kg)	NE	NE	3/3	32 J - 19,000 J	2SB-03B	0	0
Motor Oil (mg/kg)	NE	NE	3/3	550 J - 2,800 J	2SB-03A	0	0

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APPENDIX B-3

SUPPLEMENTAL SURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Inorganics (mg/kg)							
Aluminum	2,044,001	7,821	5/5	5,050 - 11,100	Metal 2	0	1
Antimony	82	3	2/5	1 B - 5.3 B	Metal 5	0	1
Arsenic	0.400	0.043	5/5	0.75 B - 5.5	Metal 3	5	5
Barium	14,308	548	5/5	15.8 B - 54.4	Metal 5	0	0
Beryllium	409	16	4/5	0.12 B - 0.2 B	Metal 5	0	0
Cadmium	102	4	4/5	0.24 B - 5.2	Metal 5	0	1
Calcium+	NE	NE	5/5	626 - 51,600	Metal 3	0	0
Chromium[7]	613	24	5/5	5 - 12	Metal 2	0	0
Cobalt	4,088	156	5/5	0.61 B - 1.9 B	Metal 2	0	0
Copper	8,176	313	5/5	2.3 B - 152	Metal 5	0	0
Iron	61,320	2,346	5/5	2,090 - 6,230	Metal 5	0	4
Lead[8]	400	400	5/5	3.1 - 83.3	Metal 5	0	0
Magnesium+	NE	NE	5/5	242 B - 974	Metal 3	0	0
Manganese	28,616	1,095	5/5	4.6 L - 67.9	Metal 5	0	0
Mercury	NE	NE	5/5	0.033 B - 0.82	Metal 5	0	0
Nickel	4,088	156	5/5	2.1 B - 8.6	Metal 5	0	0
Potassium+	NE	NE	5/5	162 B - 467 B	Metal 3	0	0
Selenium	1,022	39	2/5	1.1 - 1.3	Metal 4	0	0
Silver	1,022	39	1/5	0.42 B - 0.42 B	Metal 5	0	0
Sodium+	NE	NE	5/5	207 B - 740	Metal 3	0	0
Thallium	14	1	3/5	0.69 B - 1.2	Metal 2	0	2
Vanadium	1,431	55	5/5	6.5 - 18.6	Metal 2	0	0
Zinc	61,320	2,346	5/5	5.1 - 194	Metal 5	0	0

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APPENDIX B-4

SUPPLEMENTAL SUBSURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Inorganics (mg/kg)							
Aluminum	2,044,001	7,821	6/6	1,380 - 10,200	Metal 5D	0	1
Antimony	82	3	2/6	0.77 B - 1.1 B	Metal 5D	0	0
Arsenic	0.400	0.043	6/6	11.7 - 27.2	Metal 2D	6	6
Barium	14,308	548	6/6	17.4 B - 99.2	Metal 5D	0	0
Beryllium	409	16	6/6	0.17 B - 0.49 B	Metal 5D	0	0
Cadmium	102	4	6/6	0.11 B - 0.65	Metal 3D	0	0
Calcium+	NE	NE	6/6	1,670 -	Metal 2D	0	0
Chromium[7]	613	24	6/6	5 - 14.8	Metal 3D-Dup	0	0
Cobalt	4,088	156	6/6	1.2 B - 2.6 B	Metal 3D, Metal 3D-Dup	0	0
Copper	8,176	313	6/6	1.4 B - 13.1	Metal 5D	0	0
Iron	61,320	2,346	6/6	3770 - 11,600 MBB	Metal 3D-Dup	0	6
Lead[8]	400	400	6/6	4.6 - 121	Metal 5D	0	0
Magnesium+	NE	NE	6/6	436 B - 2,390	Metal 3D-Dup	0	0
Manganese	28,616	1,095	6/6	94.3 - 193	Metal 5D	0	0
Mercury	NE	NE	6/6	0.021 B - 0.08 B	Metal 3D	0	0
Nickel	4,088	156	6/6	3.3 B - 5.6	Metal 5D	0	0
Potassium+	NE	NE	6/6	224 B - 655	Metal 3D-Dup	0	0
Selenium	1,022	39	2/6	1.2 - 1.3	Metal 5D	0	0
Silver	1,022	39	1/6	0.24 B - 0.24 B	Metal 1D	0	0
Sodium+	NE	NE	6/6	237 B - 2,650	Metal 2D	0	0

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APPENDIX B-4

SUPPLEMENTAL SUBSURFACE SOIL DATA SUMMARY
CAMP ALLEN SALVAGE YARD
NAVAL STATION NORFOLK, VIRGINIA

Contaminant[1]	Soil Criteria[2]		Contaminant Frequency/Range[3]			Comparison to Criteria	
	Region III Industrial COC Value	Region III Residential COC Value	No. of Positive Detects/No. of Samples	Range of Positive Detections	Location of Maximum Detection	Positive Detects Above Industrial Value	Positive Detects Above Residential Value
Inorganics (mg/kg)							
Thallium	14	1	3/6	0.6 B - 0.83 B	Metal 1D	0	0
Vanadium	1,431	55	6/6	8.2 - 29.3	Metal 2D	0	0
Zinc	61,320	2,346	6/6	11.8 - 47.3	Metal 5D	0	0

Notes:

[1] Organic concentrations reported in µg/kg; inorganic concentrations reported in mg/kg.

[2] COC = USEPA Region III COC screening values derived from USEPA Region III Risk Based Concentration Table, dated May 2001.

[3] B = Analyte was detected in laboratory method blank
J = Analyte was positively identified, value is estimated.
K = Estimated value; biased high.
L = Estimated value; biased low.

+ = Essential Nutrient
ND = Non Detected
NA = Not Applicable
NE = Not Established

[4] COC screening value for pyrene used as a surrogate.

[5] COC screening value for chlordane used as a surrogate.

[6] COC screening value for endrin used as a surrogate

[7] COC screening value for chromium VI

[8] Action level for residential soils (USEPA, 1994b)

[9] COC screening value for Acenaphthene used as surrogate.

[10] COC screening value for Naphthalene used as surrogate.

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Appendix III

Quality Assurance/Quality Control Procedures

QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Sample Designation

The establishment of a standard sample identification protocol is essential to ensure adequate QA/QC with regard to the traceability of samples and their associated analytical data. Proper labeling allows for the tracking of samples beginning from the time of sample collection, through analyses, and following project completion, should future data correlation be deemed necessary. Sample tracking will be initiated in the field with the assignment of an identification number to each sample as it is collected. The first set of symbols describes the sample type, which includes: DP (direct push soil core) and BH (backhoe obtained sample). A numerical value will immediately follow the sample-type delineator to identify each unique sample of that type. The final number will represent the depth interval, measured from surface grade from which the sample was collected.

The identification number will be recorded on the sample label and Chain-of-Custody forms described below. The number will also be recorded in the field logbook along with any additional comments relative to the sample description and collection methodology.

Quality control samples collected in the field will be labeled as follows:

- Trip blanks will be designated as TB, numbered sequentially (e.g. TB1, TB2) and dated;
- Field duplicates will be labeled in such a manner so persons performing laboratory analyses are not able to assign duplicates to their respective samples. The field duplicates designation will be determined in the field and properly noted in the site and field logbooks; and
- Matrix spike will be designated as MS, numbered sequentially (e.g., MS1, MS2) and dated.

All other pertinent information (collection procedures, collection location, time, etc.) regarding collection of the quality control samples shall be recorded in the project field notebook.

Sample Label

The proper labeling of samples is also critical in ensuring that samples are analyzed within the required sample holding times as specified by the appropriate analytical methods. Each sample container will be identified with a separate identification label. Labeling will be done in permanent black ink. Any errors will be crossed out with a single line, dated, and initialed. Each securely affixed label will include the following information:

- Project identification;
- Sample identification;
- Sampler's name or initials;
- Date of collection;
- Time of collection; and
- Required analytical method numbers.

Chain Of Custody

Samples will be accompanied by a Chain-of-Custody Record. The Chain-of-Custody Record will accompany the sample during shipment to the laboratory, and through all the analyses at the laboratory. Information recorded on the Chain of Custody Form will at a minimum include:

- Sample ID;
- Project number and name;
- Date and time collected;
- Brief description of sample location;
- Type of sample/matrix (i.e., soil);
- Sample collection method (i.e., grab or composite);
- Sample container type and number of containers;
- Method of preservation (i.e., none, 4°C, etc.);
- Analyses to be conducted;
- Sample collectors name; and

- Spaces for signatures, dates, and times of sample custody transfer.

The samples will remain in the custody of the sampler, or designated field sample custodian, until the transfer of custody is completed.

Sample Handling

After collection, all sample handling will be minimized. Investigators will use extreme care to ensure that sample integrity is not compromised due to mishandling. If samples are placed in an ice chest, investigators will ensure that melted ice cannot cause the sample containers to become submerged, as this may result in sample cross-contamination. Plastic bags, such as Zip-lock® bags or similar plastic bags sealed with tape, will be used in ice chests to prevent cross-contamination.

Samples to be analyzed will be placed in pre-cleaned laboratory grade jars or bottles (type dependent on analysis) with screw-on, Teflon™-lined lids (where required), preserved as recommended by the laboratory procedure. The sample containers will meet the requirements presented in the *Specifications and Guidance for Contaminant-Free Sample Containers*, December 1992 or latest version. The sample container lids will be taped using polyethylene (Teflon™ for VOC samples) tape to ensure they remain sealed during shipment.

Sample containers will be wrapped in bubble pack and placed in sealed bags to prevent breakage during shipment. Prefabricated foam inserts, designed to hold specific sample container sizes may be substituted for bubble pack. The bags will be placed into insulated shipping coolers with plastic bags of ice or "blue ice". The shipping coolers will be sealed to prevent leakage of melting ice, and security labels affixed over opposite ends of the lid. Custody seals will also be place on the coolers. The coolers will be labeled in accordance with applicable U.S. Department of Transportation (U.S. DOT) regulations for transport and shipped for overnight delivery to the laboratory. If the samples are held overnight at the site, they will be kept in a locked vehicle or locked

office. The laboratory will be notified by telephone of the shipment and the estimated time of arrival.

Accuracy, Precision, and Sensitivity of Analysis

The contracted analytical laboratory is required to implement quality assurance measures to ensure that the accuracy, precision, and sensitivity of analysis is sufficient to conform, at a minimum, to the most current version of SW-846.

Appropriate measures will be implemented for all field analytical procedures to ensure a high standard of accuracy, precision, and sensitivity of analysis. Specific field QA/QC measures will include:

- Maintenance and calibration of field instruments as specified in operation and maintenance manuals;
- Thorough decontamination of all sampling and analytical equipment and field instruments as necessary;
- Use of standardized measurement and analytical procedures to minimize systematic errors in the field measurements and analytical results; and
- Implementing procedures to test the reproducibility of field measurements and analytical results (duplicate samples).

Field Instrument/Equipment

The instruments used in the field will be maintained in accordance with the manufacturers' instructions. All scheduled and unscheduled maintenance of each instrument will be recorded in detail in a bound logbook.

Laboratory Instruments

A comprehensive preventive maintenance program increases the reliability of the measurement system. The analytical laboratory chosen to perform the analyses retains written documentation of their preventive maintenance programs that should address:

- Schedules of important preventive maintenance tasks that are carried out to minimize downtime; and

- Lists of critical spare parts that are available to minimize downtime.

The laboratory maintains histories of all major equipment in logbooks. Troubleshooting, maintenance, and spare parts inventories are to be recorded in the logbooks. Instruments and equipment are to be maintained periodically in accordance with procedures described in individual analytical methods, manufacturer's recommendations, and/or service contracts.

Laboratory Data

As part of its analytical QA/QC program, the laboratory will apply precision and accuracy criteria for each parameter that is analyzed. When analysis of a sample set is complete, QC data generated will be reviewed and evaluated to ensure that acceptance criteria are met. The QA/QC will include criteria such as method blank evaluation, standard calibration curve verification, duplicate sample analysis, reference sample analysis, surrogate standard analysis and matrix spike analysis.

For completeness, it is expected that the methodology proposed for chemical characterization of the samples will meet QC acceptance criteria for the majority of the sample data. To ensure this completeness goal, sample data that does not meet the established criteria will be recollected, re-extracted, or reanalyzed. Comparability is a qualitative characteristic of the data that will be assured by using standard methods for sampling and analysis. The laboratory will be requested to submit the results in a Level III data package for verification review.