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FINAL REMEDIAL INVESTIGATION AT OPERABLE UNIT 8 (OU 8) SITE 3 NAS CECIL FIELD FL

2/1/1996

ABB ENVIRONMENTAL SERVICES INC

REMEDIAL INVESTIGATION
OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

UNIT IDENTIFICATION CODE: N60200
CONTRACT NO. N62467-89-D-0317/090

FEBRUARY 1996

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
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REMEDIAL INVESTIGATION
OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Unit Identification Code: N60200

Contract No. N62467-89-D-0317/090

Prepared by:

ABB Environmental Services, Inc.
2590 Executive Center Circle, East
Tallahassee, Florida 32301

Prepared for:

Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29418

Alan Shoultz, Code 1875, Engineer-in-Charge

February 1996

CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/090 are complete and accurate and comply with all requirements of this contract.

DATE: February 14, 1996

NAME AND TITLE OF CERTIFYING OFFICIAL: Rao V.R. Angara
Task Order Manager

NAME AND TITLE OF CERTIFYING OFFICIAL: Eric Blomberg, P.G.
Project Technical Lead

(DFAR 252.227-7036)

This document that describes the Remedial Investigation of Operable Unit 8, Naval Air Station of Cecil Field, Jacksonville, Florida, has been prepared under the direction of a Florida-Registered Professional Geologist. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

Eric A. Blomberg

Professional Geologist No. 1695

Date: 2-13-96

FOREWORD

The Department of the Navy developed the Installation Restoration (IR) program to locate, identify, and remediate environmental contamination from the past disposal of hazardous materials at Navy and Marine Corps installations. The Navy IR program follows the Department of Defense Environmental Restoration Program mandated by the Superfund Amendments and Reauthorization Act of 1986 to address waste sites that may pose a threat to human health or the environment.

The IR program consists of Preliminary Assessment and Site Inspection, Remedial Investigation and Feasibility Study (RI/FS), and Remedial Design and Remedial Action at sites where chemicals were possibly disposed. The Preliminary Assessment and Site Inspection identifies the presence of pollutants. The RI/FS analyzes the nature and extent of contamination and determines the optimum remedial solution. The Remedial Design and Remedial Action complete the implementation of the solution.

Previous investigations have determined that Naval Air Station (NAS) Cecil Field has 18 waste sites that may pose a threat to human health or the environment. Therefore, an RI/FS will be performed to address the extent, magnitude, and impact of possible contamination at these waste sites.

This Remedial Investigation report for Operable Unit 8 summarizes the field program completed at Site 3 and presents the findings and conclusions reached during the investigation.

Questions regarding this report should be addressed to the Commanding Officer, Code OOB, P.O. Box 111, NAS Cecil Field, Jacksonville, Florida 32215-0111.

EXECUTIVE SUMMARY

ABB Environmental Services, Inc. has been contracted by the Southern Division, Naval Facilities Engineering Command to complete a Remedial Investigation (RI) and Feasibility Study (FS) for Operable Unit (OU) 8, the Oil and Sludge Disposal Pit, at Naval Air Station (NAS) Cecil Field. The objectives of the RI (initiated in 1991) were (1) to characterize the nature and extent of contamination associated with OU 8 and (2) to gather sufficient data to complete the Baseline Risk Assessment (BRA) and FS of remedial alternatives. NAS Cecil Field is located in western Duval County, Florida, approximately 14 miles west of Jacksonville, Florida. This document contains only the RI; the BRA and the FS have been completed under separate cover. A summary of the Baseline Risk Assessment is provided in Chapter 6.0.

OU 8 was investigated from 1985 to 1994 to refine and quantify the conceptual understanding of site conditions resulting from wastes placed in the disposal pits. This RI relies on comprehensive measurements, analysis, and interpretation of site conditions including the use of groundwater, surface and subsurface soil, surface water, and sediment samples. These measurements and samples were collected over a 20 acre study area to describe the areal and vertical distribution of contaminants. Based on these investigation results, health and ecological risks posed by the detected contaminants were evaluated.

OU 8 was reportedly used to dispose of liquid wastes and sludge from the mid-1950s until 1975, although review of aerial photographs suggests the area was not disturbed prior to 1960. Liquid wastes including fuels, oils, solvents, paint, and paint strippers were typically taken to the site by the individual generators (i.e., the fuel farm, the Public Works, Aircraft Maintenance Department and the squadrons) in bowsers (trailer mounted tanks) or 55-gallon drums, drained into the pit, and allowed to seep into the soil or evaporate. The pit wastes were burned when the liquid level approached the top. This burning procedure was repeated approximately once every three months by the fire department. No records were kept on disposal practices and access to the site was uncontrolled; therefore, the amount of the liquid wastes disposed at OU 8 is unknown.

On February 8, 1992 a Navy helicopter crashed into a wooded area located approximately 800 feet east of the OU 8 source area. The helicopter had a fuel capacity of between 1,800 and 2,000 gallons and ignited on impact. Although the crash site is not part of the OU 8 source area, it is within the OU 8 study area, and results and conclusions for the crash site have been included in this report.

The former waste disposal activities appears to be responsible for the detection of certain volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and inorganics in the soil and groundwater at OU8. The contaminants which appear associated with disposal activities and are observed to migrate from the pit area via groundwater are VOCs (chlorinated solvents) and SVOCs (dichlorobenzenes). The most prevalent of these contaminants are the chlorinated solvents trichloroethene (TCE) and its transformation products 1,1-dichloroethene (1,1-DCE) and 1,2-dichloroethene (1,2-DCE). The presence of transformation products of TCE (1,2-DCE and 1,1-DCE) indicates the existence of favorable environmental and microbial conditions (e.g. nutrients, organic carbon, redox potential) at OU8.

Based on the results of the confirmatory soil sampling and analysis, it is estimated that a TCE concentration of 146 $\mu g/kg$ (from only two TCE detections in the vadose zone soil) remains in the vadose soil over an area of approximately 8,000 ft^2. It is further estimated that the TCE concentration of the leachate generated from the infiltration of precipitation through these soil would take approximately 23 years so that its concentration after mixing with the top 10 feet of the Surficial Aquifer, would be less than 5 $\mu g/\ell$, the drinking water maximum contaminant level (MCL) for TCE.

The groundwater contaminant plume is currently discharging to Rowell Creek approximately 1,400 feet downgradient of the disposal pit. Based on the estimated groundwater flow rate of 88 feet per year, groundwater from beneath the disposal pit area would have reached Rowell Creek in the early 1970's, approximately 16 years after disposal operations began. Considering retardation but ignoring microbial and abiotic degradation processes, it will take approximately 35 years for the groundwater to naturally flush contaminants to concentrations below drinking water criteria. Including the 23 years estimated above, it would take approximately 58 years for the contaminants to leach naturally from the soil and flush naturally from the aquifer.

All dissolved groundwater contaminants originating from the disposal pit area would be subject to a similar hydrologic transport as TCE. Dilution on the order of 99.2 percent diluted (diluted 133 times) or more is estimated for groundwater contaminants upon their discharging to and mixing with the surface water of Rowell Creek.

A BRA was completed at OU 8 to characterize the risks associated with exposures to site-related contaminants at OU 8 for human health and ecological receptors (ABB-ES, 1995).

The cancer risk estimate for the surficial aquifer under future land use conditions (adult resident using contaminated groundwater as a potable water supply) was 3 in 1,000 (greater than the USEPA acceptable range of 1 in 10,000 to 1 in 1,000,000). The major contaminant contributing cancer risk was 1,1-dichloroethene. The noncancer risk estimate (HI) for potable use of the surficial aquifer is 20 (greater than the USEPA and FDEP threshold of 1). Major contributors to this HI are trichloroethene, 1,2-dichloroethene, 1,2-dichlorobenzene, and 1,1-dichloroethene.

No risks were identified for terrestrial plant and invertebrate exposures to surface soil or for terrestrial wildlife resulting from exposures to selected contaminants in surface soil, surface water, and sediment. Results of laboratory groundwater toxicity testing indicate that exposure to undiluted groundwater from OU 8 may result in reduced survival and reproduction for the water flea and the fathead minnow. When groundwater was diluted approximately 20-fold (compared to the actual 133-fold dilution into Rowell Creek), little toxicity was observed in the water flea or fathead minnow. Analysis of the toxicity testing data supports the interpretation that groundwater discharging to Rowell Creek poses little risk to aquatic receptors.

Conclusions regarding the physical characteristics of the OU 8 study area and the contaminants detected in surface water, sediment, surface soil, subsurface soil, and groundwater include:

- Sufficient information was collected in the field or compiled from historical records to identify and assess human and ecological risks, extent and nature of contamination, and remedial alternatives for OU 8 as a result of waste disposal operations from the mid-1950's to 1975.

- Contaminant distribution from the waste disposal pit area is well defined in surface and subsurface soil at OU 8 and does not pose a risk to human or ecological receptors.

- Disposal pit area wastes are expected to continue to leach contamination from vadose soil to groundwater for a period of approximately 23 years.

- Groundwater from the disposal pit migrates and is interpreted to discharge into Rowell Creek.

- Wastes deposited in the former disposal pit have contaminated underlying groundwater at OU 8 sufficiently to pose a health risk if groundwater is used as a future potable (drinking) water supply. Use of untreated groundwater as a water supply poses an unacceptable carcinogenic risk of 3 in 1000 and a non-carcinogenic risk of 20.

- It is expected that a period of 58 years will be required for contaminants to leach naturally from soil and flush naturally from the aquifer.

- There are no unacceptable human health or ecological risks associated with OU 8 for exposure to wetlands or to Rowell Creek surface water and sediments.

- OU 8 is located in a low traffic area along perimeter road and it is not certain at this time what the land use will be after base closure. The site is not served by potable water or other utilities which are available to the east in the industrialized part of NAS Cecil Field.

Based on the evaluation of data gathered during the OU 8 RI, the following data limitations were identified:

- The distribution of groundwater contaminants between the source area monitoring wells and the area near the helicopter crash site (represented by the cluster of monitoring wells containing CEF-3-28S, CEF-3-29D, and CEF-3-30DD) is based on the groundwater screening program (using temporary well screens and field laboratory analysis) and not monitoring wells.

Based on the evaluation of data gathered during the OU 8 RI, no data gaps were identified that would prevent the development and selection of a remedial action.

Based on the evaluation of data gathered during the OU 8 RI, it is recommended that a program should be instituted to prevent risks associated with possible future use of OU 8 groundwater as a potable water supply.

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
ASTM	American Society for Testing and Materials
bls	below land surface
BRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure
CAP	Contamination Assessment Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
CRDL	contract required detection limit
°C	degrees Celsius
°F	degrees Fahrenheit
DCA	dichloroethane
DCB	dichlorobenzene
DCE	dichloroethene
DERP	Defense Environmental Restoration Program
EBS	Environmental Baseline Survey
ECD	electron capture detector
ESE	Environmental Science and Engineering, Inc.
FDEP	Florida Department of Environmental Protection (as of 7/93)
FFA	Federal Facility Agreement
FID	flame ionization detector
FOTW	Federally Owned Treatment Works
ft/day	feet per day
FY	Fiscal Year
GC	gas chromatograph
GPR	ground penetrating radar
GPS	global positioning system
HDPE	high density polyethylene
HSA	hollow stem auger
IAS	Initial Assessment Study
IDW	investigation-derived wastes
IR	Installation Restoration
IZS	intermediate zone of the surficial aquifer
LZS	lower zone of the surficial aquifer
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
µg/ℓ	micrograms per liter

GLOSSARY (Continued)

NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NEESA	Naval Energy and Environmental Support Activity
NFD	Naval Fuel Depot
NGVD	National Geodetic Vertical Datum of 1929
NPL	National Priority List
NSF	National Sanitation Foundation
NTU	nephelometric turbidity units
OLF	Outlying Landing Field
OU	Operable Unit
OVA	organic vapor analyzer
PCA	preliminary contamination assessment
PCAR	Preliminary Contamination Assessment Report
PCE	perchloroethylene (tetrachloroethene preferred)
POL	petroleum, oils, and lubricants
PSC	Potential Source of Contamination
PVC	polyvinyl chloride
RAOs	remedial action objectives
RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act (RCRA) Facility Investigation
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SMP	Site Management Plan
SOUTHNAV-FACENGCOM	Southern Division, Naval Facilities Engineering Command
SVOC	semivolatile organic compound
TAL	target analyte list
TCA	trichloroethane
TCE	trichloroethene (preferred rather than trichloroethylene)
TCL	target compound list
TMSS	Technical Memorandum for Supplemental Sampling
TOC	top of casing
TRPH	total recoverable petroleum hydrocarbons
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UZH	upper zone of the Hawthorn
UZS	upper zone of the surficial aquifer
VFR	visual flight rules
VLF	very low frequency
VOC	volatile organic compound

1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), has been contracted by the Department of the Navy, Southern Division, Naval Facilities Engineering Command (SOUTHNAVFAC-ENGCOM), to conduct a Remedial Investigation/Feasibility Study (RI/FS) for Operable Unit (OU) 8 at Naval Air Station (NAS) Cecil Field in Jacksonville, Florida (Figure 1-1). Operable Unit (OU) 8 consists of Site 3, the oil and sludge disposal pit (Figure 1-2). The RI/FS is being completed under contract number N62467-89-D-0317-90 as part of the Navy's Installation Restoration (IR) program. This report addresses the results and conclusions of the Remedial Investigation (RI) including a summary of the human health and ecological baseline risk assessment (Chapter 6). The Baseline Risk Assessment (BRA) is reported separately (ABB-ES, 1995a).

1.1 PURPOSE OF REPORT. This report documents the results of the OU 8 RI at NAS Cecil Field. The RI includes field and laboratory measurements; analysis of the observations; a description of the conceptual understanding of the type, extent, transport and fate of hazardous substances released at the site; and a summary assessment of risks to human health and the environment posed by the identified substances. Information gathered during this RI and during previous studies has facilitated a comprehensive evaluation of both the physical characteristics and environmental contamination at OU 8. The physical and chemical database for OU 8 is used to support the BRA and FS (ABB-ES, 1995b). The RI, BRA, and FS for OU 8 are reported separately.

The goals of the RI/FS are to assess the extent, magnitude, and impact of contamination at OU 8, to qualitatively and quantitatively assess the risks posed to human health and the environment, and to develop appropriate remedial action if the site poses a threat to human health and/or the environment. The RI/FS emphasizes the collection of sufficient information to complete the BRA and the FS.

The RI process serves as the mechanism for data collection to identify source and migration pathway characteristics and for collection of other information required for the BRA and FS processes. The BRA and FS processes use the information collected in the RI to assess risks to human health and the environment, develop remedial action objectives (RAOs), and to develop, screen, and evaluate potential remedial alternatives.

The objectives of the NAS Cecil Field RI/FS investigation at OU 8 include the following:

- assess the nature and extent of contamination in site soil and groundwater, and in the surface water and sediment in Rowell Creek, east of OU 8;
- gather sufficient information to complete the human health and ecological risk assessments;
- collect sufficient data to complete an FS of remedial alternatives.

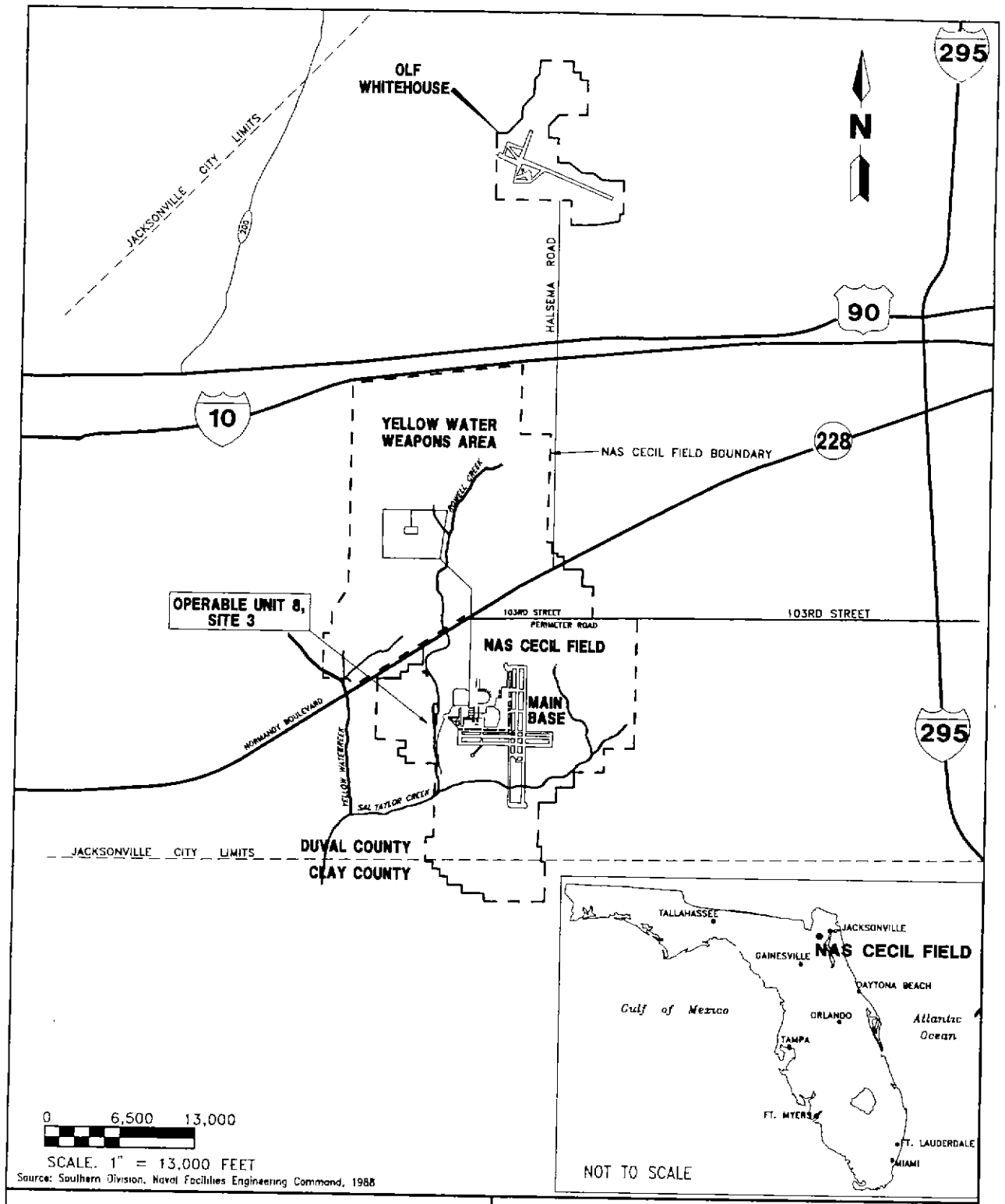

FIGURE 1-1
GENERAL LOCATION MAP

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REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

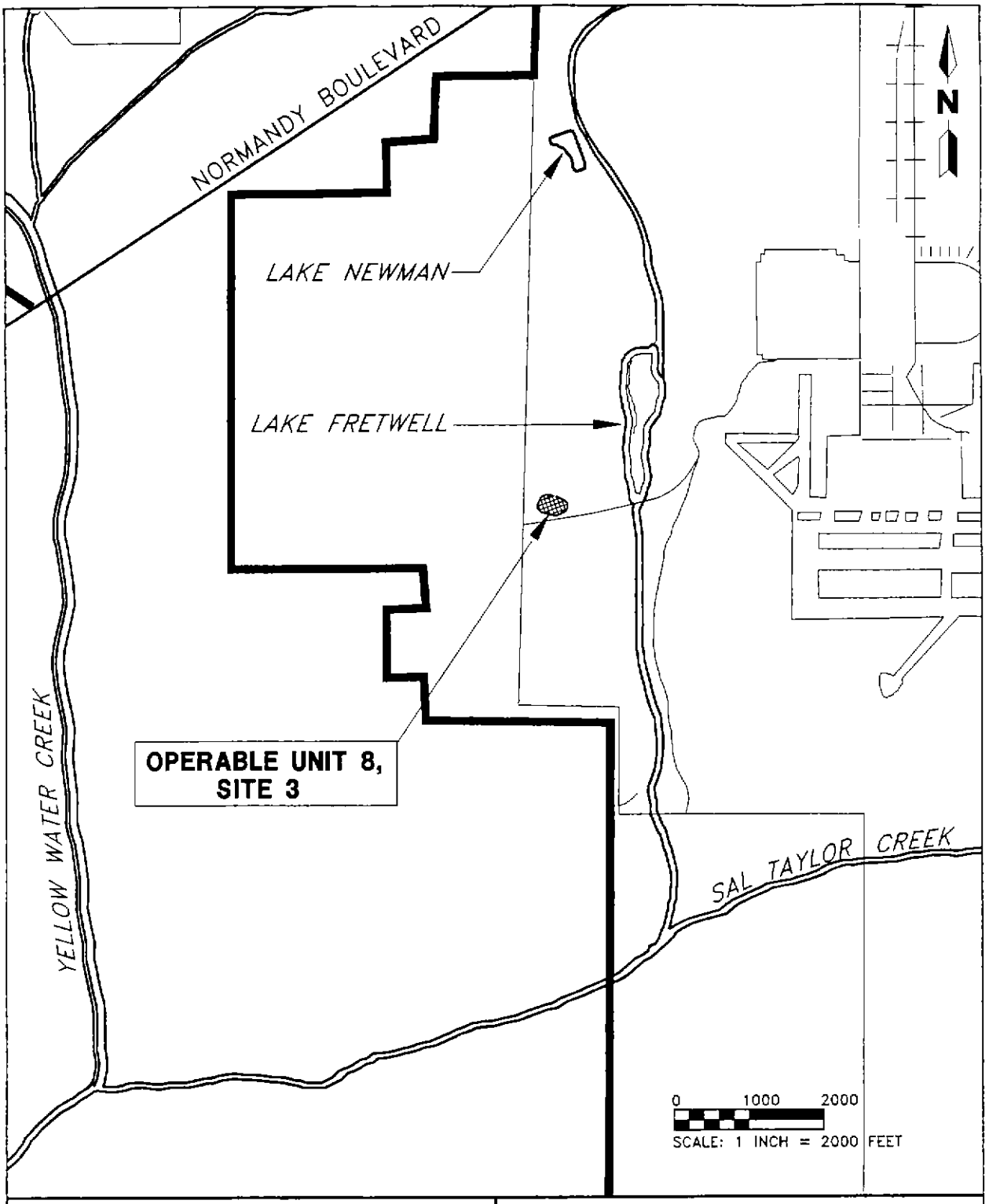

FIGURE 1-2
SITE LOCATION MAP

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REMEDIAL INVESTIGATION,
OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

The RI/FS is being performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986, which established a series of programs for the cleanup of hazardous waste disposal and spill sites nationwide. One of those programs, the Defense Environmental Restoration Program (DERP), is codified in SARA Section 211 (10 U.S. Code [USC] 2701). The Navy's Installation Restoration (IR) program is a component of the DERP.

1.2 SITE BACKGROUND. The mission of NAS Cecil Field (the facility) and available background information for the facility and OU 8 are presented in this section. A general description of NAS Cecil Field is given in Section 1.2.1. Section 1.2.2 summarizes available historical information for the facility and OU 8. Section 1.2.3 provides a remedial review and status of NAS Cecil Field.

1.2.1 Facility Description The official mission of NAS Cecil Field is to provide facilities, services, and material support for the operation and maintenance of naval weapons, aircraft, and other units of the operating forces as designated by the Chief of Naval Operations. Some of the tasks required to accomplish this mission include:

- operation of fuel storage facilities,
- provision of facilities and performance of organizational level aircraft maintenance,
- provision of facilities and performance of intermediate level aircraft maintenance, and
- maintenance and operation of an engine repair facility and test cells for designated turbo-jet engines.

NAS Cecil Field comprises 11 departments and is host to more than 40 tenant commands (SOUTHNAVFACENGCOM, 1989). The facility currently supports a work force of approximately 11,000 civilian and military personnel and can accommodate approximately 3,500 residents in base quarters and housing. As a result of the Base Realignment and Closure (BRAC) Commission recommendations, NAS Cecil Field is scheduled to cease operations and close in 1998.

1.2.1.1 **Facility Land Use** NAS Cecil Field occupies more than 31,000 non-contiguous acres consisting of four distinct areas: the main facility (NAS Cecil Field), which occupies 9,516 acres; the Yellow Water Weapons Department, which occupies 8,091 acres directly north of the main facility; Outlying Landing Field (OLF) Whitehouse, which occupies 2,587 acres about 10 miles north of the main facility and the 11,072-acre Land Target Complex Detachment Astor, located 120 miles south of the main base. The main facility, the Yellow Water Weapons Department, and OLF Whitehouse are shown on Figure 1-1.

The main facility of NAS Cecil Field is located in southwestern Duval County, Florida, and is within the Jacksonville, Florida, city limits. The main facility consists of intersecting north to south and east to west runways bracketing the flightline and support facilities. These facilities occupy approximately 1,000 acres in the northwest quadrant of NAS Cecil Field. The remaining acreage of the main base, including OU 8, is mostly undeveloped (SOUTHNAVFACENGCOM, 1989).

1.2.1.2 **Adjacent Land Use** The greatest population density is approximately 14 miles to the northeast in downtown Jacksonville, Florida. Land west and north

of the base is characterized as rural and is predominantly forested. Cary State Forest is 5 miles to the northwest. Small communities and scattered dwellings are located in the vicinity. A small residential area on Nathan Hale Road, which abuts the NAS Cecil Field property to the west, is an example of these rural communities. The rural community of Whitehouse is nearly adjacent to OLF Whitehouse, and the rural community of Halsema is approximately 1.8 miles to the south of OLF Whitehouse. The closest incorporated municipality is the town of Baldwin, which is centered approximately 6.4 miles to the northwest of the main facility entrance.

To the east, the rural surroundings grade into a suburban fringe bordering the major east to west roadways. Low intensity commercial use, such as convenience stores and low density residential areas, characterize the land use in this eastern area. Herlong Airport lies approximately 4.5 miles east of NAS Cecil Field along State Road 228. A development called Villages of Argyle, Florida, consisting of seven separate villages or communities, is located to the southeast of NAS Cecil Field. To the east, a golf course and residential area border the base (SOUTHNAVFACENGCOM, 1989). The region becomes more urbanized as downtown Jacksonville, Florida, is approached.

1.2.2 Site Description The historical OU 8, Site 3 oil and sludge disposal pit, is located immediately northeast of the intersection of Perimeter Road and the access road leading west from the south end of Lake Fretwell (Figure 1-2). The access road diagonally divides OU 8 with ⅓ north of the road and ⅔ south of the road. Based on information in the Initial Assessment Study (IAS) report, the pit was reported to be approximately 50 to 100 feet in diameter and 3 to 5 feet deep. However, the figures in the IAS show the historical pit area having dimensions of approximately 100 feet wide and 200 feet long or 20,000 square feet (Figure 1-3). It is not known why the discrepancy in the disposal pit dimensions exists. Except for investigation derived wastes (IDW) storage areas, OU 8 has an area of relatively featureless terrain; hence, the former pit cannot be visually located. The most prominent features within the former disposal pit area are the IDW storage areas (see Figure 1-3). IDW stored in these areas consist of soil from the installation of monitoring wells and soil borings. Two of the three locations where IDW was placed in shallow excavations are mounded 2 to 4 feet above the surrounding land surface. IDW from the 1991 investigation, the northernmost IDW location, was placed in an unlined excavation such that the top is level with the land surface. The IDW area located immediately south of the 1991 storage area contains IDW from the 1993-1994 investigation of OU 8. This area is lined with high density polyethylene (HDPE) and is mounded approximately 2 feet above land surface. Directly south of this area is the third area which contains IDW from remedial investigations at OU 7. This area is lined with HDPE and is mounded approximately 4 feet above land surface.

OU 8 and the immediate surrounding area have no present use. Vegetation on the site consists of low weeds and briers. To the east and southeast the study area grades into wetlands adjacent to Lake Fretwell and Rowell Creek. To the north of the historical pit area is Site 4 which is vegetated with pine trees, weeds, and grass. Perimeter Road is immediately to the west of OU 8 and a pine forest is west of Perimeter Road. No indication of stressed vegetation has been observed at OU 8. Surface water flow is locally to the east. Major drainage pathways are the roadside ditches along the access road, which slope slightly down toward Lake

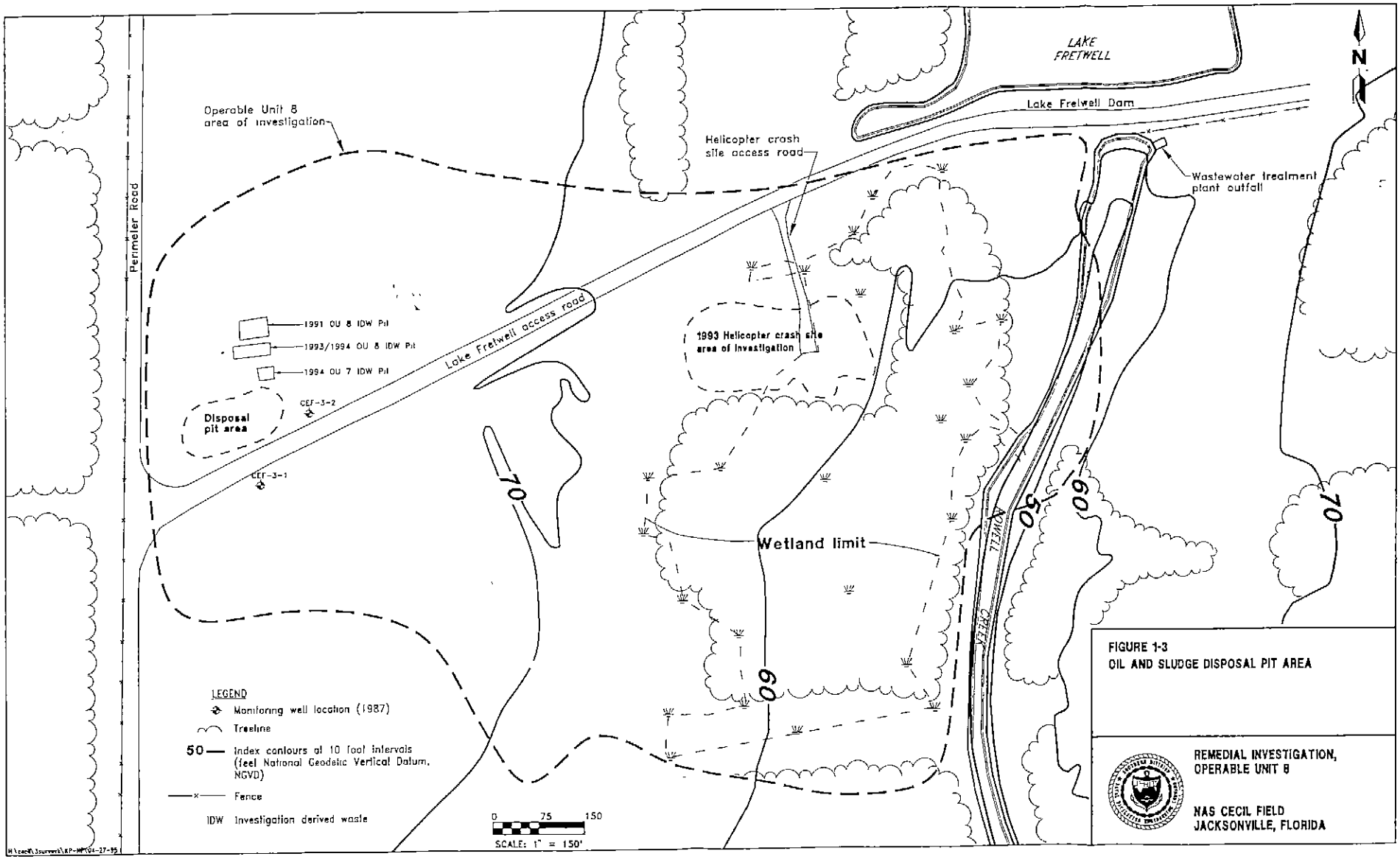


FIGURE 1-3
OIL AND SLUDGE DISPOSAL PIT AREA

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Fretwell. Closer to Rowell Creek and within a 6 acre wetland, a drainage swale extends from south of the access road south to southeast approximately 400 feet to Rowell Creek.

The effluent discharge structure (outfall) for the Federally Operated Treatment Works (FOTW) is approximately 20 feet south of the Lake Fretwell Dam and discharges directly to Rowell Creek. In the vicinity of the effluent discharge structure, concrete rubble (generally greater than 1 foot in diameter) has been spread on the banks of Rowell Creek. This rubble appears to be acting as an erosion control structure intended to stabilize the soil and discharge structure.

1.2.3 **Remedial Review and Status** The first environmental study for the investigation of waste handling and/or disposal sites at NAS Cecil Field was completed between 1983 and 1985 by Geraghty and Miller, Inc. This study was followed by an IAS completed by Envirodyne Engineers in 1985. The IAS was completed under the Navy Assessment and Control of Installation Pollutants (NACIP) program, which was a precursor to the Navy's present Installation Restoration (IR) program. In 1988, a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was completed by Harding Lawson Associates. The RFI acted on the recommendations of the IAS. OU 8 was included in both the IAS and the RFI.

NAS Cecil Field was placed on the National Priority List (NPL) by the U.S. Environmental Protection Agency (USEPA) and the Office of Management and Budget in December 1989. A Federal Facility Agreement (FFA) for NAS Cecil Field was signed by the Florida Department of Environmental Protection (FDEP, formerly the Florida Department of Environmental Regulation [FDER]), USEPA, and the Navy in 1990. Following the listing of NAS Cecil Field on the NPL and the signing of the Site Management Plan (SMP), remedial response activities at the facility were conducted under CERCLA authority.

NAS Cecil Field has several sites where hazardous wastes may have been handled, spilled, or buried. These individual sites are currently referred to as potential sources of contamination (PSCs). The name "site" is applied to PSCs that are currently under investigation at NAS Cecil Field. At the time of the facility's listing on the NPL, 18 PSCs had been identified. The RFI identified another PSC (PSC 19). Remedial response activities are currently underway at Sites 1, 2, 3, 5, 7, 8, 10, 11, 14, 15, 16, and 17. Field investigation plans were prepared for the investigation of PSCs 4, 6, 9, 12, 18, and 19 (ABB-ES, 1995c). Site 13 was transferred to the UST program.

In 1993, NAS Cecil Field was slated for closure by the Base Realignment and Closure (BRAC) Commission. An Environmental Baseline Survey (EBS) was completed as the first step in the closure process. The EBS identifies parcels of land for sale, lease, or investigation depending on the condition of the parcel. OU 8 was classified in the November 1994 EBS as red (release of hazardous substances has occurred, but required remedial actions have not yet been taken) (ABB-ES, 1994a).

1.2.4 **History of OU 8, Site 3** In previous investigations, OU 8 was presented as a part of OU 2 (originally containing Sites 3, 5, and 17). In October 1993, at the 1994 fiscal year (FY) SMP meeting, the USEPA, FDEP, and the Navy identified OU 8 as a separate operable unit. While the investigations for Sites 5 and 17 of OU 2 were complete, it was noted that the OU 8 study area was much larger than historical information suggested and needed further investigation. Rather than delay progress in all three sites of OU 2 and in order to facilitate investigation

procedures, it was decided to proceed with the remediation process for Sites 5 and 17 under OU 2 and to investigate Site 3 as OU 8.

OU 8 was used to dispose of liquid wastes and sludge from as early as the mid-1950s (possibly as recent as 1960 based on aerial photography which showed no evidence of a disposal pit) until 1975. Liquid wastes were typically taken to the site by the individual shops (i.e., fuel farm, Public Works, Aircraft Intermediate Maintenance Department, and the squadrons) in bowsers (trailer mounted tanks) or 55-gallon drums, drained into the pit, and allowed to seep into the soil or evaporate. The pit wastes were burned when the liquid level approached the top. This procedure was repeated approximately once every three months by the fire department (Envirodyne Engineers, 1985).

An estimated 200 to 300 gallons of waste oil, fuel, and tank sludge from the fuel farm were disposed of weekly at the site. Although much of this volume consisted of water, it is estimated that between 210,000 and 310,000 gallons of wastes from the fuel farm were disposed of throughout the operation (20 years) of the site.

Liquid wastes generated by the squadrons, Aircraft Intermediate Maintenance Department, and Public Works were also disposed of at OU 8. These wastes included fuels, oils, solvents, paint, and paint strippers. No records were kept on disposal practices, and access to the site was uncontrolled; therefore, the actual amount of liquid wastes disposed of at OU 8 is unknown.

Estimates developed during the IAS indicate the total quantity dumped from all sources during the site operation are as follows: waste paints, 4200 gallons; spent solvents, 110,000 gallons; paint thinners, 20,000 gallons and petroleum-oil-lubricant (POL) wastes, 440,000 gallons; waste fuel, oil and sludge contaminated water, 210,000 to 310,000 gallons. Following closure of the site in 1975, the pit was filled and covered with soil (Envirodyne Engineers, 1985).

On February 8, 1992, a Navy helicopter crashed into a wooded area located approximately 800 feet east of the historic OU 8 source area (see Figure 1-3). The helicopter had a fuel capacity of between 1,800 and 2,000 gallons and ignited on impact. Soil and groundwater contamination were initially assessed by Environmental Science and Engineers, Inc. (ES&E), in August and September 1993 during a Preliminary Contamination Assessment (PCA). The results of the PCA, presented in a preliminary contamination assessment report (PCAR) indicated the presence of excessively contaminated soil (soil yielding an organic vapor analyzer [OVA] value greater than 50 parts per million [ppm]) in 9 of 31 soil borings and the presence of chlorinated solvents in groundwater. Results of this investigation are presented in Appendix A. Details of the OU 8 disposal pit area investigations are presented in the following section.

As part of the current investigation of OU 8, available historic aerial photographs have been reviewed. This review indicates that no visible disturbance is evident at the site in photographs from 1943, 1952, and 1960. The IAS indicates that OU 8 disposal operations began in the mid 1950's but, as previously stated, no disturbance is evident in the 1960 aerial photo. Based on the available aerial photographs, it appears that OU 8 disposal operations began between 1960 and 1969. The 1969 photograph shows the basic outline of the site (as evidenced by disturbed areas) to be circular and about 100 feet in diameter (8,000 square feet). This photograph also shows a linear feature (approximately 10 feet wide and 50 feet long) on the south side of the disturbed area that

appears to be a trench filled with liquid. Aerial photographs from 1972, 1973, 1975, and 1984 show that OU 8 became progressively more vegetated, indicating that disposal activities were discontinued sometime in the early 1970's.

1.2.5 **Previous Investigations** Investigation of the disposal areas at OU 8 began in 1985. Each investigation completed is discussed in this section in chronological order. Findings, conclusions, and recommendations from these previous investigations are presented and summarized in Appendix A and Table 1-1.

1.2.5.1 **Initial Assessment Study (IAS)** the IAS (Envirodyne Engineers, 1985) was completed to identify hazardous waste sites at NAS Cecil Field warranting further investigation and was accomplished through a records search of historical data, aerial photographs, field inspections, and personnel interviews. No intrusive field investigations were conducted. Eighteen sites were identified during the IAS, including Site 3. Site 3 was studied along with Site 4, another disposal area, due to their close proximity. The information collected during the IAS led to the initiation of RFI field activities at OU 8 (Site 3).

1.2.5.2 **Resource Conservation and Recovery Act (RCRA) Facilities Investigation (RFI)** The RFI (Harding Lawson Associates, 1988) included a site reconnaissance, a magnetometer survey, the installation of two monitoring wells (CEF-3-1 and CEF-3-2) with the subsequent sampling and analysis of groundwater, and collection of water level measurements. The monitoring well locations are shown on Figure 1-3. The location of the disposal pit is unknown precisely due to the featureless landscape of the site. The site was vegetated, mostly with low weeds and briers. Debris consisting of soil, wire, and other miscellaneous material was observed along the north side of the service road.

The magnetometer survey was completed and no anomalies were found. A very low frequency (VLF) sensor detected higher than background conductivity over two areas of the historical pit area, one in the northern part and a smaller one in the southern part. The readings in the northern part were attributed to the disposal pit, and the readings from the southern part were thought to represent a smaller secondary disposal pit.

Monitoring well CEF-3-1 had a screened interval from 10 to 20 feet below land surface (bls) and CEF-3-2 had a screened interval of 30 feet (10 to 40 feet bls). Water elevations were interpreted to indicate a southwest groundwater flow which is nearly opposite to anticipated flow toward Rowell Creek. A "mounded" condition was speculated to exist due to the closure of the oil and sludge pit with an unspecified soil. Analytical results from unfiltered groundwater samples collected during the RFI indicated the presence of 1,1 dichloroethane (210 $\mu g/\ell$), 1,1-dichloroethene (110 $\mu g/\ell$), 1,1,1-trichloroethane (88 $\mu g/\ell$), ethylbenzene (10 $\mu g/\ell$), toluene (8 $\mu g/\ell$), naphthalene (280 $\mu g/\ell$), 2-methylnaphthalene (190 $\mu g/\ell$), 4-methylphenol (29 $\mu g/\ell$), bis(2-ethylhexyl)phthalate (19 $\mu g/\ell$), lead (164 $\mu g/\ell$), and chromium (90 $\mu g/\ell$).

Based on the results of the RFI, a Corrective Action Plan (CAP) was recommended to further investigate the lateral and vertical extent of the hazardous constituents found at the site.

1.2.5.3 **1991-92 Remedial Investigation Activities** RI activities conducted by ABB-ES during fall 1991 and spring 1992 included: a ground penetrating radar (GPR) survey to identify and delineate areas of disturbed site soil; groundwater

Table 1-1
Findings and Conclusions from Previous Investigations

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Previous Study	Tasks Completed	Findings	Recommendations
Initial Assessment Study (IAS) (Envirodyne, 1985)	1. Records search 2. Onsite survey 3. Estimate waste quantities 3. Site ranking 4. Recommendations for future study	1. Summarized available historical information for Site 3. 2. Identified waste oil, fuel, tank sludge, solvents, paint, paint strippers. 3 Estimated waste quantities: fuel, oil, and sludge contaminated water: 310,000 gallons waste paint: 4,200 gallons spent solvents: 110,000 gallons petroleum and organic lubricant (POL) waste: 440,000 gallons paint thinners: 20,000 gallons	1. Confirmation investigation recommended at Site 3. 2. Install and sample two surficial wells monitoring wells. 3. Collect one surface water and one sediment sample from Rowell Creek.
RCRA Facility Investigation (RFI) (Harding Lawson Associates, 1988)	1. Site reconnaissance. 2. Geophysical survey. 3. Monitoring well installation (two wells). 4. Collection of groundwater samples.	1. Groundwater: 1,1-dichloroethane 210 $\mu g/\ell$ 1,1-dichloroethene 110 $\mu g/\ell$ ethylbenzene 10 $\mu g/\ell$ toluene 8 $\mu g/\ell$ 1,1,1-trichloroethane 88 $\mu g/\ell$ 4-methylphenol 29 $\mu g/\ell$ bis(2-ethylhexyl)phthalate 19 $\mu g/\ell$ naphthalene 280 $\mu g/\ell$ 2-methylnaphthalene 190 $\mu g/\ell$ chromium 90 $\mu g/\ell$ lead 164 $\mu g/\ell$	1. Corrective action is recommended.

See notes at end of table.

Table 1-1 (Continued)
Findings and Conclusions from Previous Investigations

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Previous Study	Tasks Completed	Findings	Recommendations
RI/FS Workplan for OUs 1, 2, and 7 (ABB-ES, 1991)	1. Summarize existing data. 2. Define RI/FS objectives. 3. Develop sampling approach to achieve RI/FS objectives.	1. No sampling completed.	1. Well installation and sampling. 2. Soil sampling. 3. Surface water and sediment sampling.
Technical Memorandum for Supplemental Sampling (ABB-ES, 1992c)	1. The 1993/1994 field program completed. 2. Summary of contamination detected in soil, sediment, surface water, and groundwater. 3. Identification of additional information required to characterize site contamination.	1. Findings discussed in Chapter 4.0, Nature and Extent of Contamination. 2. Hazardous constituents detected in soil and groundwater. 3. Horizontal and vertical extent of contaminants not fully characterized at the site. 4. Data gathered not sufficient to complete a Baseline Risk Assessment.	1. Complete screening program to characterize extent of detected contaminants in soil and groundwater. 2. Complete confirmation sampling, based on results of screening program. 3. Number and location of samples (per media) to be finalized with agency approval.

Notes: $\mu g/\ell$ = micrograms per liter.
RI/FS = Remedial Investigation/Feasibility Study.
RCRA = Resource Conservation and Recovery Act.

headspace screening for volatile organic compounds (VOCs); a piezocone (direct technology) survey to investigate subsurface lithology and to collect subsurface soil and groundwater samples; soil sampling; monitoring well installation and collection and analyses of groundwater samples; hydraulic conductivity testing; and collection of water level measurements from monitoring wells.

The results of these investigations, as summarized in the *Technical Memorandum for Supplemental Sampling at Operable Units 1, 2, and 7* (TMSS)(ABB-ES, 1992a), are summarized below for OU 8.

GPR Survey. The GPR survey was conducted on October 9 and 10, 1991, to locate areas of disturbed soil. Delineation of precise areas of disturbed subsurface materials was not achieved; however, groundwater headspace screening was conducted in areas where GPR equipment had detected disturbed materials.

Groundwater Headspace Screening. Groundwater screening was conducted on October 15 and 16, 1991, (Figure 1-4) using onsite gas chromatographs (GCs) equipped with electron capture detectors (ECDs) and flame ionization detectors (FIDs) to identify VOCs, specifically chlorinated aliphatics and aromatic organics. 1,1,1-Trichloroethane (TCA), trichloroethene (TCE), tetrachloroethene (PCE), toluene, and xylenes were detected. TCA was detected at the highest concentrations.

Piezocone Survey. A piezocone survey was conducted on October 15, 1991, to collect lithologic information on subsurface soil in the vicinity of OU 8 (Figure 1-4). Fine-grained to silty sands with occasional lenses of cemented sand were detected to a maximum depth of approximately 59 feet bls.

Soil Sampling. Eight soil borings were installed at OU 8 on December 3 and 4, 1991 (Figure 1-4). Soil samples were collected from 0 to 2 feet bls and 2 to 4 feet bls in each boring and analyzed for USEPA TCL organics and TAL inorganics. The analytical results from this effort are summarized in Appendix A. The results of the organic fraction analyses indicated the presence of VOCs and several semivolatile organic compounds (SVOCs) characteristic of solvents, plasticizers, and petroleum. The results of the inorganic analyses detected chromium.

Monitoring Well Installation. A total of eight monitoring wells were installed in December 1991 (Figure 1-4). Six of the wells were screened in the upper portion of the surficial aquifer (approximately 4 to 14 feet below land surface [bls]), one well was installed in the lower portion of the surficial aquifer (approximately 58 to 68 feet bls), and one well was installed in the intermediate dolomite aquifer (approximately 100 to 110 feet bls).

Groundwater Sampling. Groundwater samples were collected for analysis of TCL organics, TAL inorganics, and total recoverable petroleum hydrocarbons (TRPH) on November 19, 1991 (Figure 1-4). Evaluation of analytical results, which are summarized in Appendix A, indicates the presence of VOCs characteristic of solvents, particularly 1,1,1-TCA, 1,1-dichloroethane (1,1-DCA), TCE, and 1,2-dichloroethene (1,2-DCE).

Hydraulic Conductivity Testing and Water Level Elevation Determination. Slug tests were conducted in all new wells installed at the site on December 16, 1991. The hydraulic conductivity for monitoring wells screened in the upper part of the surficial aquifer ranged from 1.1 feet per day (ft/day) to 3.7 ft/day compared

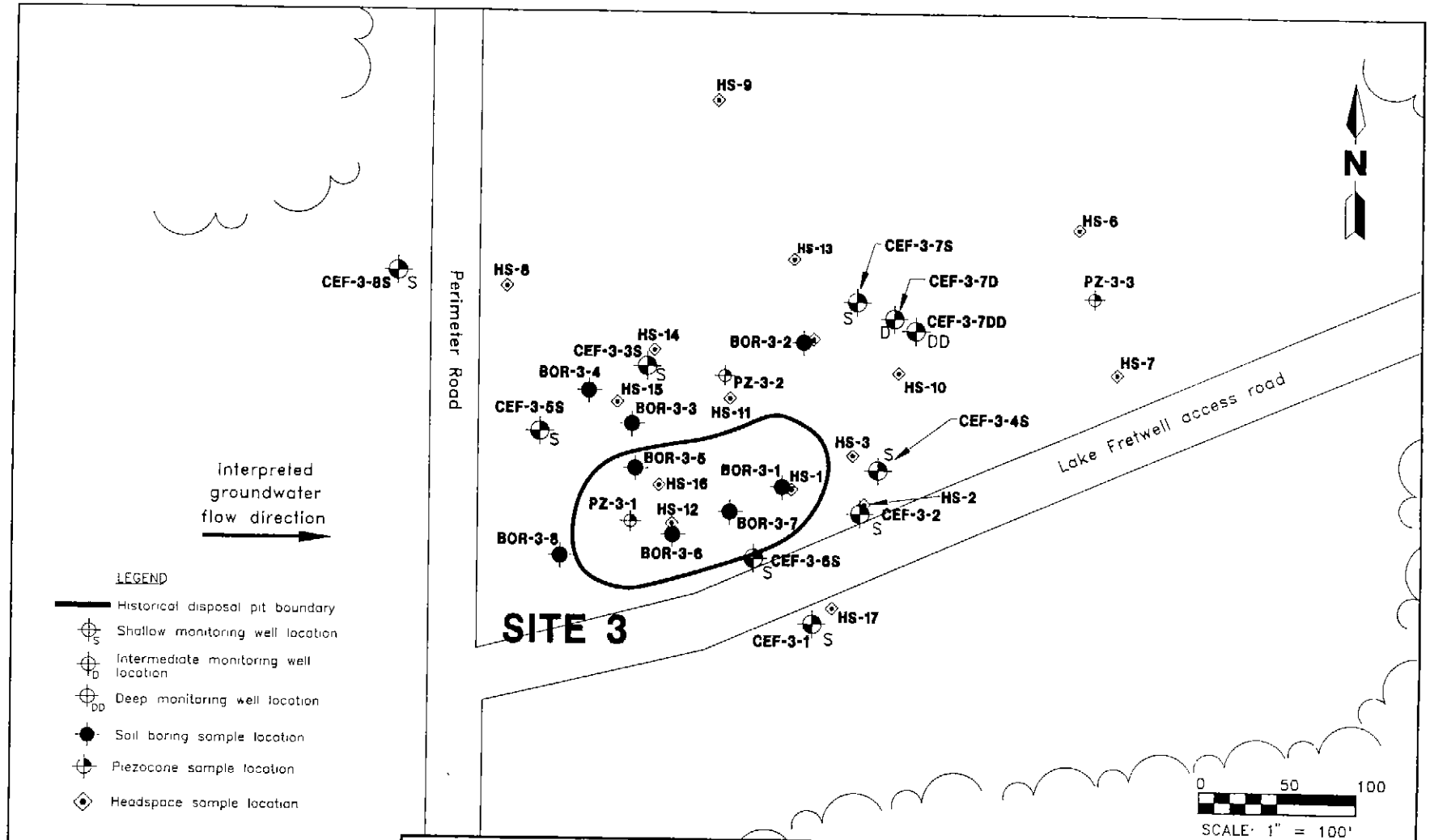


FIGURE 1-4
1991 EXPLORATIONS

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

to 1.3 ft/day for the lower part of the surficial aquifer. Hydraulic conductivity for the intermediate aquifer averaged 12.6 ft/day. Water level measurements were taken on November 19, 1991, and again on April 29, 1992. The depth to water averaged approximately 4 feet bls, which corresponds to an elevation of approximately 71 feet above mean sea level (msl). The depth to groundwater varies seasonally. Based on the water level measurements, groundwater at OU 8 in the vicinity of the disposal pit was interpreted to flow horizontally to the southeast and vertically downward.

Several data needs were identified after the 1991 to 1992 RI activities at OU 8. These consisted primarily of data required to further assess the nature and extent of soil and groundwater contamination. Recommendations to obtain the data were presented in the TMSS.

1.3 CONCEPTUAL UNDERSTANDING BASED ON SITE HISTORY AND PREVIOUS INVESTIGATIONS. Based on the historical information collected, waste liquids (primarily spent solvents and wastewater containing waste fuel, oil, and sludge) were discharged into a disposal pit (8,000 to 20,000 square feet in area) from approximately 1955 to 1975. Liquid waste drained directly to the underlying vadose zone (above the water table) and phreatic zone (below the water table) soil and groundwater. The addition of these liquid contaminants to the groundwater would be expected to create a localized mound on the water table. The mounding is believed to have had the potential to spread the contaminants radially (horizontally and downward) from the disposal pit. When the discharge ceased, the mound would have subsided, leaving contamination in what is now the vadose zone soil. After the initial spreading caused by the mounding, the contaminants would migrate with the flow of groundwater. Any contaminants remaining within the initial mound area vadose and phreatic zone soil would serve as a continuing source of groundwater contamination. Based on the horizontal groundwater flow direction and rate estimated from the 1991 to 1992 investigation data, the dissolved contaminants in the shallow groundwater are expected to have migrated approximately 900 feet to the southeast of the source area in the 37 years (1955 to 1992) since disposal operations began. Based on the vertical groundwater gradients during the operational period, the migration of dissolved contaminants would also be expected to have a downward flow component from the waste disposal pit area.

Based on the estimated flow direction and topographic and surface drainage features, the shallow groundwater would be expected to discharge to Rowell Creek, approximately 1,400 feet southeast of the former waste disposal pit area. This conceptual understanding presents the basis for the additional site investigative activities described in Chapters 2, 3, and 4.

1.4 REPORT ORGANIZATION. The NAS Cecil Field OU 8 RI report consists of seven chapters and has been prepared in accordance with *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (USEPA, 1988a). Chapter 1.0 contains a description and history of the site. Site characterization activities and field programs completed for OU 8 are described in Chapter 2.0. This chapter focuses on the screening program completed, sampling locations selected, analyses completed, and the rationale for sample collection.

Chapter 3.0 provides descriptions of the physical characteristics of the study area, such as surface features, geology, hydrogeology, hydrology, etc.

Descriptive groundwater chemistry (water quality measurements) and soil chemistry are also presented in Chapter 3.0 to augment the discussion of different aquifers and soil units present at OU 8.

The findings of media (groundwater, surface water, sediment, and soil) sampling at OU 8 are addressed in Chapter 4.0. This chapter integrates the analytical results with the findings of subsurface and hydrogeologic investigations to assess the nature and extent of contamination present at OU 8.

Contaminant fate and transport are discussed in Chapter 5.0. Chapter 6.0 presents a summary of the BRA, which is being completed under separate cover. A summary and conclusions of the RI for OU 8 are presented in Chapter 7.0. References and technical appendices are included at the end of the report.

2.0 STUDY AREA INVESTIGATION

The study area investigation was conducted to quantify, confirm, and adjust the conceptual understanding of the site conditions presented in Chapter 1.0. Subsection 1.2.3, in the previous chapter, presents the findings and conclusions from previous investigations. The data collection efforts completed during the 1993 to 1994 RI activities for OU 8 are presented in this chapter.

The 1993 to 1994 RI activities were conducted in accordance with the approach proposed in the TMSS. The supplemental investigative activities outlined in the TMSS for OU 8 consisted of a screening program for soil and groundwater and a confirmatory sampling program. Estimates of the number of wells, soil borings, and surface soil samples were proposed in the TMSS. Confirmatory sampling locations were identified (in consultation among the FDEP, USEPA, and the Navy) following completion of the screening program.

Confirmatory soil and groundwater sampling locations for OU 8 were documented in the following memoranda, which are presented in Appendix B:

- rationale for monitoring well placement at OU 8, dated January 12, 1994; and
- surface and subsurface soil sampling locations at OU 8, dated November 21, 1994.

The 1993 to 1994 RI field activities at OU 8 consisted of the following:

- site reconnaissance;
- sampling and chemical analysis of surface water, sediment, surface and subsurface soil;
- monitoring well installation;
- groundwater sampling and chemical analysis;
- hydraulic conductivity testing;
- water level elevation measurements; and
- biological testing.

2.1 SURFACE FEATURES. Investigations completed to characterize existing surface features at the site included surveying, site reconnaissance, and wetlands and habitat mapping.

Surveying of all sampling stations at OU 8 was completed during the 1993 to 1994 RI investigation. During the survey, which used the global positioning system (GPS) and conventional laser surveying techniques, several monuments were established at NAS Cecil Field, including one at OU 8, to facilitate future surveying efforts. An elevation and location survey was performed to locate all monitoring wells, soil borings, surface soil samples, and surface water and

sediment samples at OU 8. Each land surface elevation and the top of casing (for monitoring wells) elevation at OU 8 were surveyed vertically to a minimum degree of accuracy of 0.01 foot based on the National Geodetic Vertical Datum (NGVD) of 1929. Sampling stations were located areally to the nearest 0.1 foot based on the Florida State Plane Coordinate System (North American Datum, 1983 to 1990). Monitoring wells installed during previous investigations were resurveyed.

Site reconnaissance was ongoing during the current investigation. Information regarding surface features observed during site reconnaissance is summarized in Section 3.1.

2.2 CONTAMINANT SOURCE INVESTIGATIONS. Information on the source of materials deposited in the waste disposal pit at OU 8 was evaluated during the preparation of the IAS (Envirodyne Engineers, 1985). Subsection 1.2.3 summarized the findings and conclusions of the IAS. Contaminant source investigations completed during this RI/FS investigation included geophysical surveys, reviews of historical aerial photographs, site reconnaissance, surface and subsurface soil sampling, monitoring well installation, and groundwater sampling.

2.3 SURFACE WATER AND SEDIMENT INVESTIGATIONS. To supplement the one location sampled in 1993 (RC-SW/SD/BIO-3) and to better define the reach of Rowell Creek into which contaminated groundwater from OU 8 is interpreted to discharge, surface water and sediment samples were collected on November 21, 1994, from two locations (CF-SW/SD-1 and CF-SW/SD-2) (Figure 2-1). The locations were upgradient and downgradient of surface water, sediment, and biological monitoring station RC-SW/SD/BIO-3 (Figure 2-1). The purpose of the surface water and sediment investigation was to assess potential contaminant migration through groundwater-surface water interaction, surface runoff, and/or soil erosion and to assess potential human health and ecological risks. The upgradient location was intended to be collected downgradient of the FOTW wastewater outfall, yet upstream of the zone where groundwater was interpreted to discharge to Rowell Creek. The downgradient location was intended to establish contaminant concentrations after the groundwater plume has discharged to Rowell Creek. In the sampling location nomenclature, "SD" and "SW" denote sediment and surface water, respectively.

Surface water samples were collected by facing upstream and directly immersing the bottle, taking care to avoid stirring up sediment. Sediment samples were collected by using a hand auger or ponar dredge sampler to obtain sediment from the stream bed at a depth of approximately 0 to 1 foot. VOC jars were filled with sample material from the middle of the auger bucket. The remaining sample containers were filled with homogenized sediment. Augers, stainless-steel spoons, and glass bowls were decontaminated prior to use and between each sample location. The date, time, and location of the samples were logged by field personnel.

Field measurements of surface water pH, temperature, depth, turbidity, conductivity, and dissolved oxygen were recorded at each sample location by field personnel. The results of these measurements are presented in Chapter 5.0 of the BRA (ABB-ES, 1995). Surface water and sediment samples were analyzed for target compound list (TCL) organics and target analyte list (TAL) inorganics. Detection limits lower than the contract-required detection limits (CRDLs) were used for all volatile organic compounds (VOCs) and selected metals during the surface water

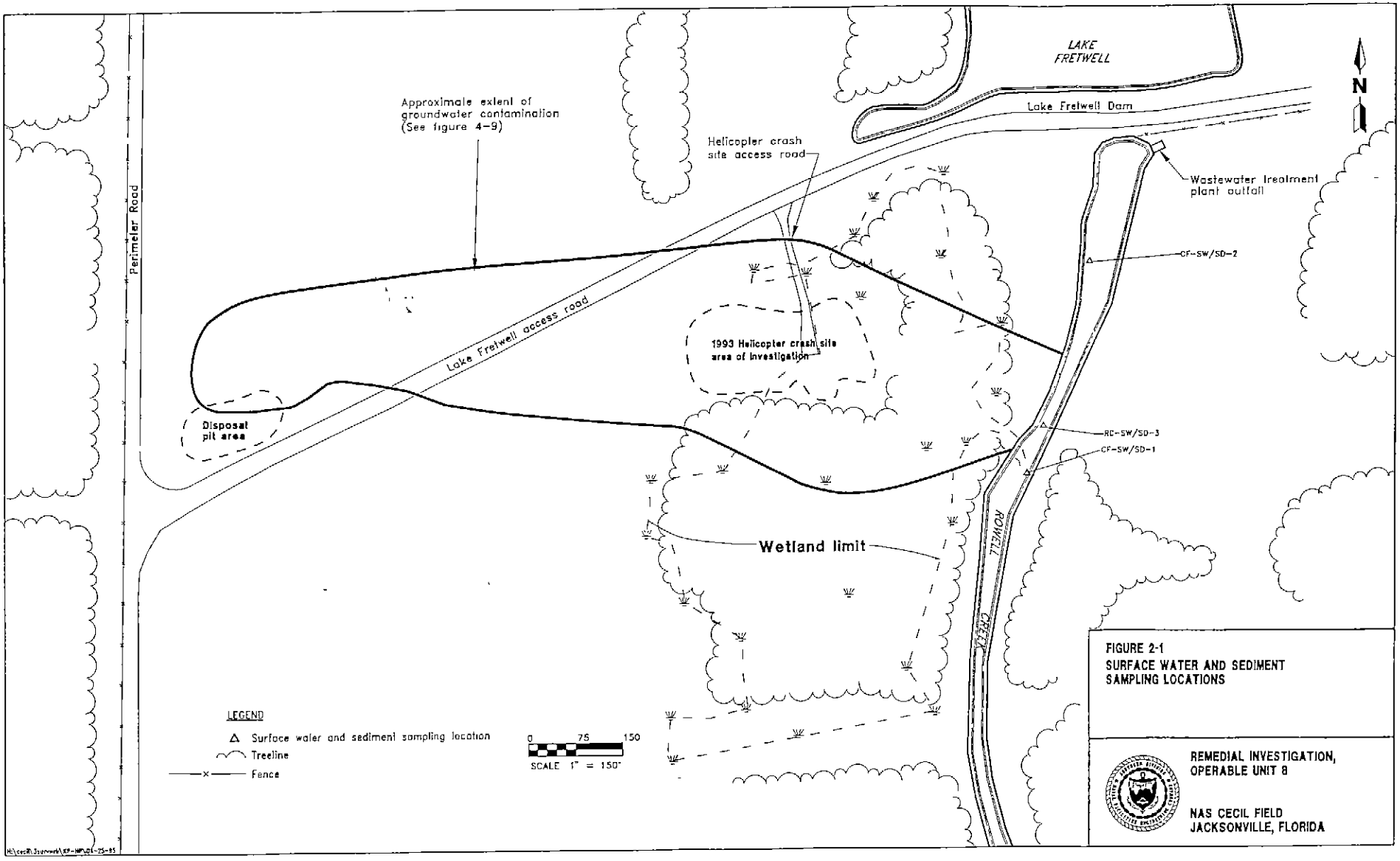


FIGURE 2-1
SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

and sediment analytical program. The metals with lowered detection limit are: beryllium, 0.2 $\mu g/\ell$; cadmium, 0.2 $\mu g/\ell$; and silver, 0.1 $\mu g/\ell$. Total organic carbon (TOC) analyses were completed for all sediment samples. Total recoverable petroleum hydrocarbon (TRPH) analyses were completed on samples from selected sediment sampling locations. Wet chemistry analyses were performed on the surface water samples, which included hardness and nutrients analyses. Hexavalent chromium analysis was performed on select surface water and sediment samples for evaluating whether this more toxic form of chromium was present. Samples were analyzed in accordance with Naval Energy and Environmental Support Activity (NEESA) Level D quality control (NEESA, 1988). The results of the surface water and sediment sampling conducted in the vicinity of OU 8 are presented in Chapter 4.0.

2.4 SOIL INVESTIGATIONS. The soil investigations were conducted to characterize the nature and extent of contamination identified as present by the previous investigations. This was accomplished by conducting a screening program using onsite laboratory analysis, followed by confirmatory sampling and analysis at Level IV quality control.

2.4.1 Soil Screening The soil screening program comprised two series of sample location designations, AGSS and GS. The AGSS series was conducted in Spring 1994 as part of an accelerated effort to delineate the contamination detected in the surface soil (0 to 2 feet bls) in the area of the waste disposal pit and eastward toward Rowell Creek. The GS series was conducted in conjunction with the groundwater screening program (see Subsection 2.7.1), and covered the disposal pit as well as the area to the east, south, and southeast of OU 8. The locations of the AGSS and GS series samples are presented on Figures 2-2 and 2-3, respectively. The soil boring logs are presented in Appendix C. The AGSS surface soil samples were submitted for onsite laboratory VOC and TRPH (AGSS-3-1 through AGSS-3-66) analyses. The GS borings were advanced by hollow stem auger (HSA) method with split spoon samples collected continuously to the water table. Once into the water table, Aquaprobe™ sampling procedures were employed (see Subsection 2.7.1).

The soil samples at each location were field-screened to the water table with a PID or FID. Two soil samples from each boring were submitted for onsite laboratory VOC analysis (USEPA Level III) based upon elevated PID or FID readings, visible evidence of contamination or, in the case that neither above-mentioned method is conclusive, a sample selected by the field geologist from the mid-depth of the borehole. The results of the soil screening program are presented in Appendix D and discussed in Chapter 4.0.

2.4.2 Confirmatory Soil Sampling To confirm the nature and extent of the contamination detected at the disposal pit area, surface and subsurface soil sampling and analyses were conducted. Based on the results of the screening program, surface soil samples were collected from 24 locations, and soil borings were advanced at 21 locations from November 18 through November 20, 1994 . These surface and subsurface soil sampling locations are presented on Figure 2-4. The rationale for the collection of confirmatory surface and subsurface soil sampling is documented in a memorandum, dated November 21, 1994, which is presented in Appendix B.

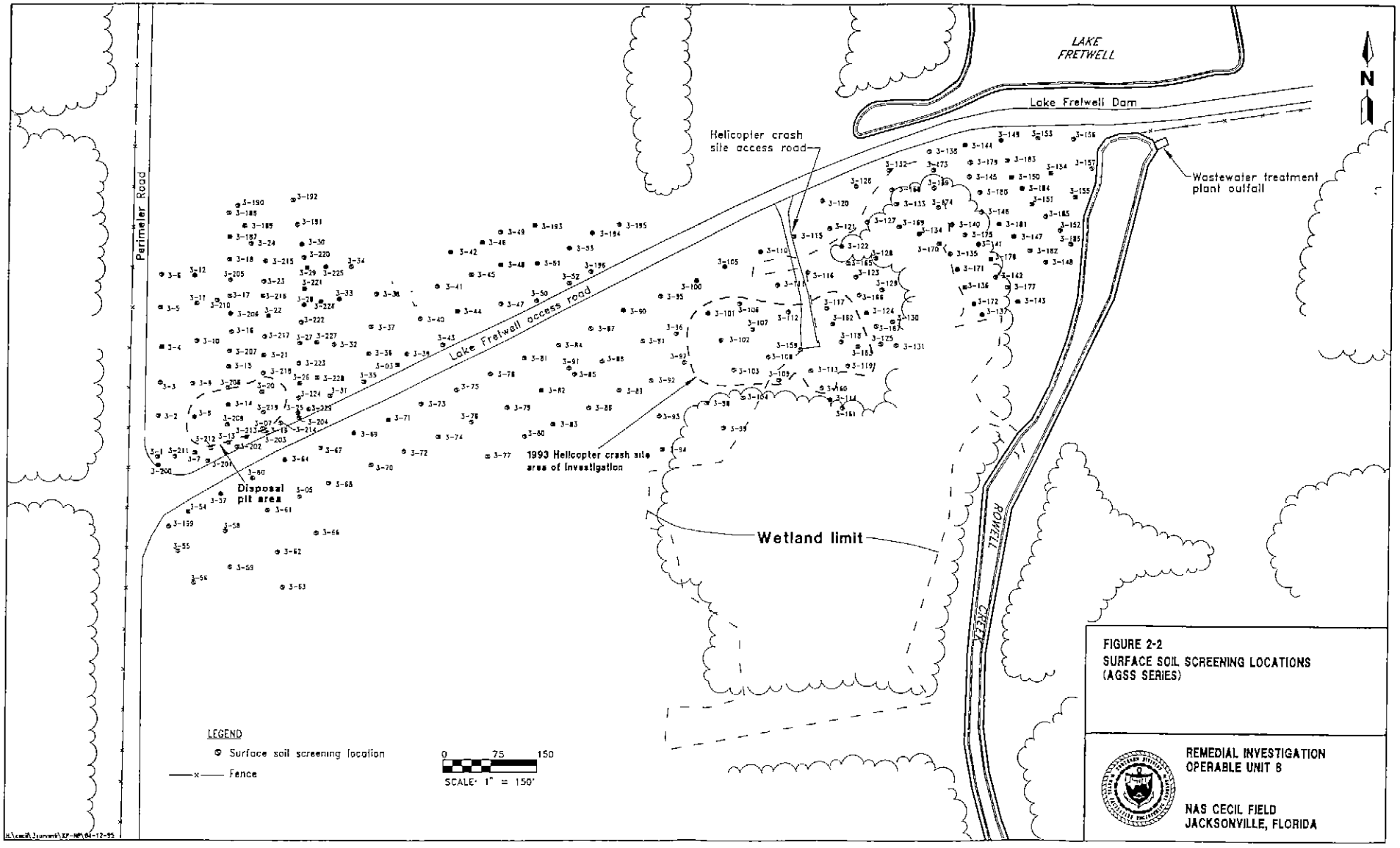


FIGURE 2-2
SURFACE SOIL SCREENING LOCATIONS
(AGSS SERIES)

REMEDIAL INVESTIGATION
OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

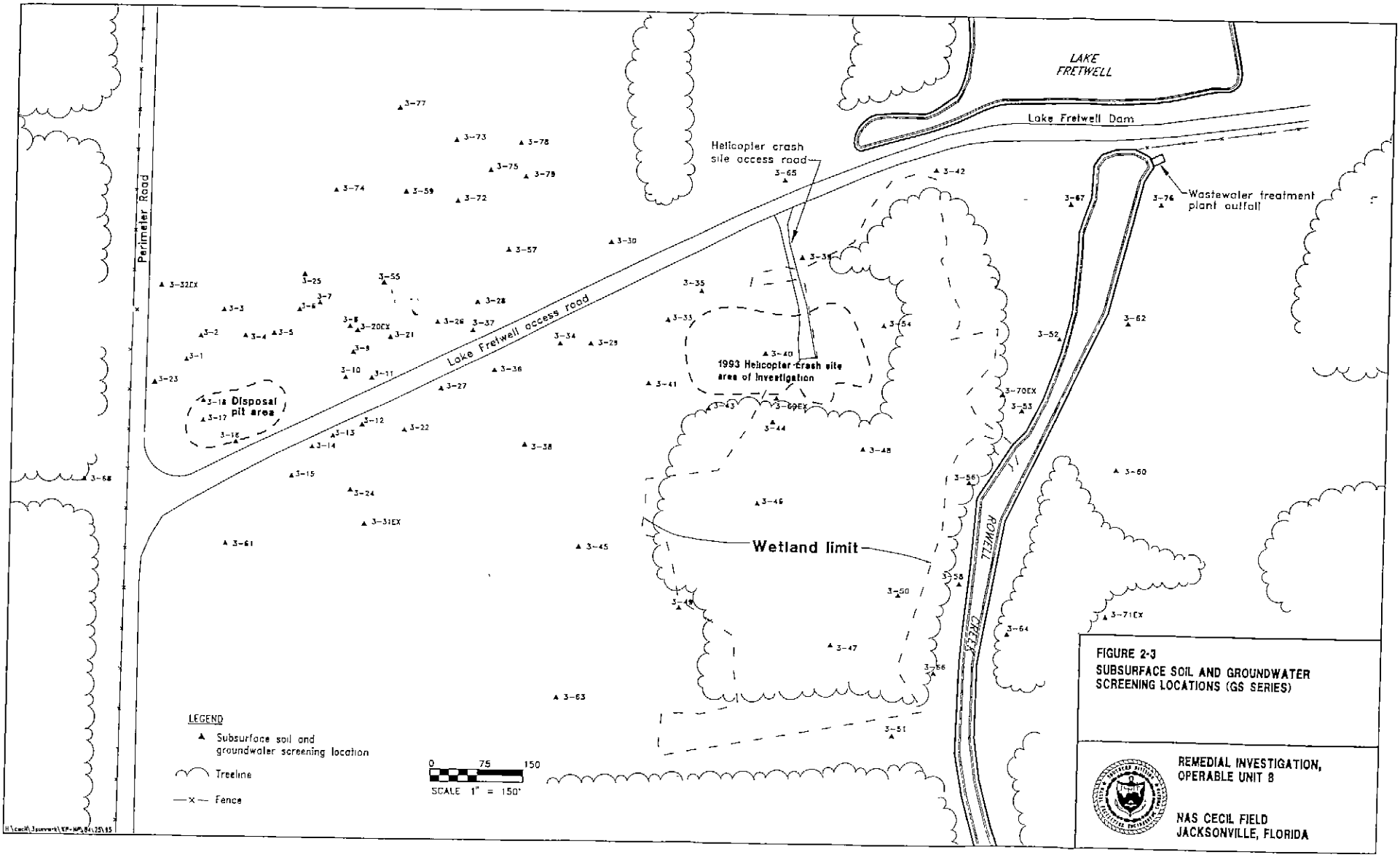


FIGURE 2-3
SUBSURFACE SOIL AND GROUNDWATER SCREENING LOCATIONS (GS SERIES)

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

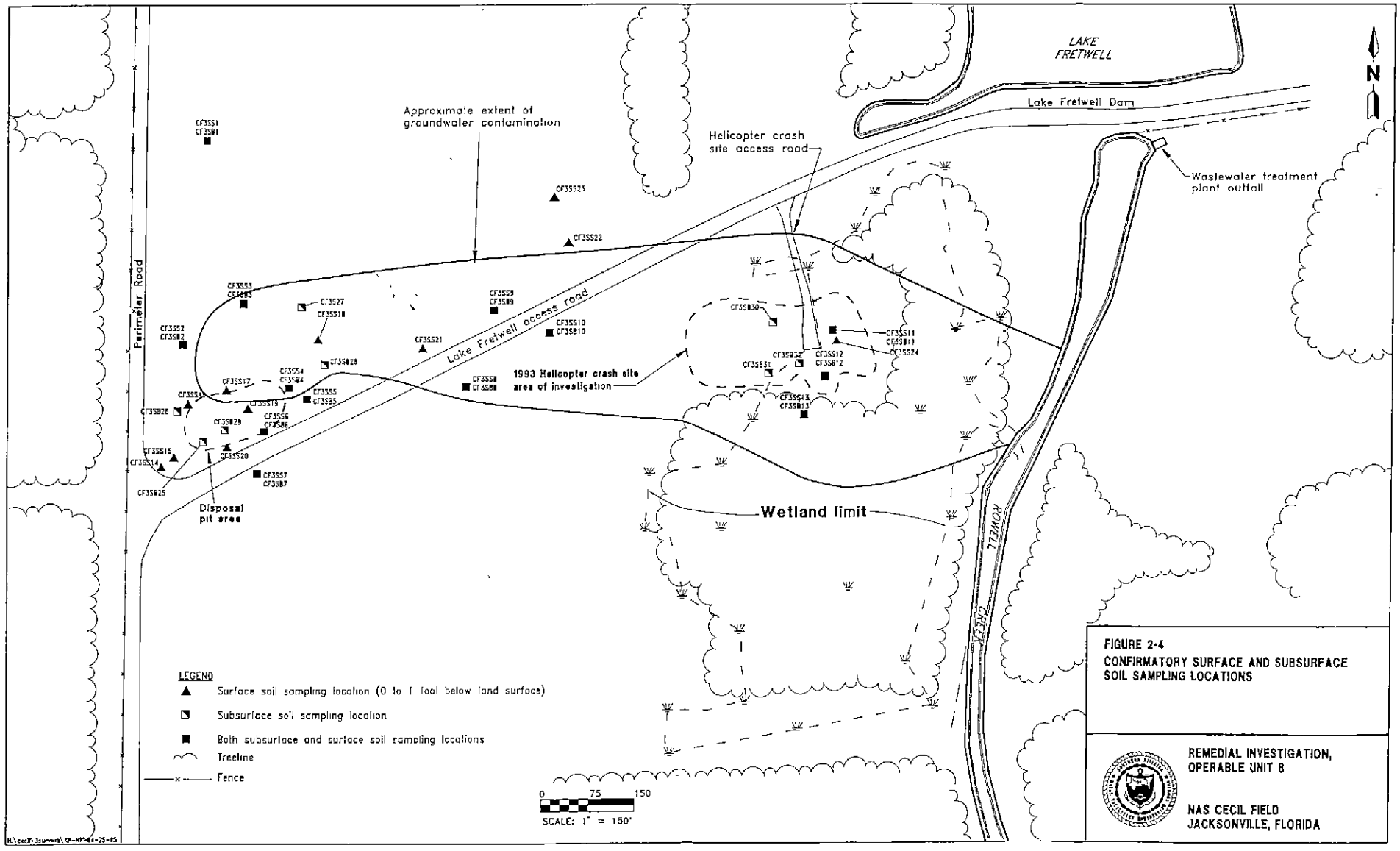


FIGURE 2-4
CONFIRMATORY SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

The surface soil samples were collected from depths of 0 to 12 inches bls and submitted for CLP analysis of TCL parameters, TAL parameters, and TRPH. One subsurface soil sample was collected from each boring. The sample was collected immediately above the water table typically from 1 to 3 feet bls. These samples were analyzed according to CLP procedures for TCL organics, TAL inorganics, and TRPH at USEPA Level IV quality control. The results of the confirmation soil sampling are discussed in Chapter 4.0.

Two geotechnical samples were collected from the vadose zone at OU 8 and submitted for analysis of soil moisture content (ASTM D-2216), Atterberg limits (ASTM D-4318), cation exchange capacity (SW9081), bulk density (ASTM E12-70), and sieve and hydrometer particle size distribution (ASTM D-421 and 422)(ASTM, 1994). The results of the geotechnical analyses are presented in Appendix E.

2.5 GROUNDWATER INVESTIGATIONS. Groundwater monitoring wells were installed to assess the nature and extent of contamination in groundwater at OU 8. This was accomplished by conducting a screening program followed by confirmatory sampling.

2.5.1 Groundwater Screening Field screening of groundwater samples at OU 8, for the 1993 to 1994 sampling event were collected from 79 locations at OU 8 using the direct-push Aquaprobe™ system. These locations are depicted as the GS series soil screening locations shown on Figure 2-3. Two episodes of groundwater screening were completed at OU 8. The first episode (Spring 1993) was centered in the area historically identified as OU 8 and included screening boring locations GS-3-1 through GS-3-33. The field laboratory analyzed groundwater samples for USEPA Method 8010 modified in the field using the purge and trap method of headspace analysis. The second episode of screening included boring locations GS-3-34 through GS-3-79. During this round of screening, the analytical suite being used by the onsite laboratory was changed to USEPA Method 8010/8020, which included benzene, toluene, ethylbenzene, and xylenes (BTEX) and was modified to detect naphthalene.

The Aquaprobe™ consists of: (1) a stainless steel drive point, (2) a 4 foot screened section made of 10 slot (0.010 inch wide) wound stainless steel, (3) a retractable stainless steel outer casing which seats against the drive point and encloses the screen until the time of sample collection, and (4) flush-threaded drill pipe, which is attached to the outer casing. *In situ* groundwater sample collection using the Aquaprobe™ is accomplished by augering (using HSA) down to 4 to 5 feet above the desired sampling interval. The Aquaprobe™ is then placed inside the augers with the outer casing firmly seated against the drive point and lowered to the bottom of the boring. The probe can be advanced to the desired sampling interval by hammering with a drop weight or by pushing with the drill rig. After measuring the level of any water that may have leaked into the probe stem, the stainless steel outer casing was retracted exposing the four foot section of screen to the formation. The groundwater sample is then collected using a Teflon™ bailer. Following collection of each sample, the Aquaprobe is removed from the boring and decontaminated.

The samples were typically collected from six depth intervals at each location; 11 to 15 feet bls, 18 to 22 feet bls, 28 to 32 feet bls, 52 to 56 feet bls, 72 to 76 feet bls, and 98 to 102 feet bls (top of dolomite). Based on the field screening data, and other sampling information, locations or the placement of confirmation monitoring wells were selected.

2.5.2 Monitoring Well Installation, Sampling, and Analysis A total of 27 (CEF-3-9I through CEF-3-35S) monitoring wells were installed from December 4, 1993 to April 20, 1994, to confirm the nature and extent of contamination identified during the groundwater screening program. Monitoring well locations are shown on Figure 2-5 and a summary of the construction details is presented in Table 2-1. Monitoring well lithologic logs and construction diagrams are presented in Appendix F. The rationale for the selection of the monitoring well locations is documented in the memorandum, dated January 12, 1994, presented in Appendix B.

The first numerical character in the monitoring well name indicates the site location. The last numerical character in the monitoring well name is the unique location within the site, and has not changed. The letter at the end of the monitoring well name indicates the approximate screened interval of the well (i.e., "S" denotes a shallow screened interval, "I" denotes an intermediate screened interval, "D" denotes a screened interval immediately above the dolomite, and "DD" denotes a screened interval in the dolomite). The renaming corresponds with the nomenclature used on the chain-of-custody forms during the 1993 to 1994 sampling program.

Monitoring wells CEF-3-1 and CEF-3-2 were installed by a previous contractor. CEF-3-2 has since been abandoned because the screened interval (30 feet) was too long to accurately identify and delineate groundwater contamination. Well CEF-3-1 has a 10 foot screened interval and is being used to delineate the extent of groundwater contamination south of the source area. Well CEF-3-2 was abandoned in accordance with St. Johns River Water Management District procedures (Florida Legislature, 1989). Monitoring wells CEF-3-3S, CEF-3-4S, CEF-3-6S, CEF-3-7S, CEF-3-7D, CEF-3-7DD, and CEF-3-8S were installed during the 1991-92 RI activities. Shallow monitoring wells CEF-3-3S, CEF-3-4S, CEF-3-5S, CEF-3-6S, CEF-3-7S, CEF-3-8S, CEF-3-13S, CEF-3-16S, CEF-3-18S, CEF-3-20S, CEF-3-23S, CEF-3-25S, CEF-3-28S, CEF-3-31S, and CEF-3-34S were installed to investigate the groundwater in the Upper Zone of the surficial (UZS) aquifer. UZS wells have 10-foot screens across the water table, from 15 to 25 feet bls, or from 20 to 30 feet. Intermediate zone of the surficial (IZS) aquifer monitoring wells CEF-3-9I, CEF-3-11I, CEF-3-14I, CEF-3-21I, and CEF-3-26I were installed with 10-foot screens, with the top of screens ranging from 25 to 45 feet bls. The lower zone of the surficial (LZS) aquifer monitoring wells, CEF-3-7D, , CEF-3-10D, CEF-3-12D, CEF-3-15D, CEF-3-17D, CEF-3-19D, CEF-3-22D, CEF-3-24D, CEF-3-27D, CEF-3-29D, CEF-3-32D, and CEF-3-35D have 10-foot screens, with the top of the screens ranging from 55 to 88 feet bls. Monitoring wells CEF-3-7DD, CEF-3-30DD, and CEF-3-33DD, were installed to investigate groundwater in the upper zone of the Hawthorn (UZH), the Intermediate Aquifer. The UZH wells have 10-foot screens, with the top of the screens ranging from 94 to 105 feet bls.

The "S" and "I" monitoring well borings, as well as the borings for CEF-3-12D, CEF-3-19D, and CEF-3-35D, were advanced using the hollow-stem auger method. The remaining "D" well borings and the "DD" monitoring well borings were drilled using the ODEX method. The ODEX drilling method uses a flush-threaded, temporary steel casing that is advanced with an acentric bit and downhole hammer. The acentric bit is spring-loaded and expands when rotated to a diameter slightly greater than that of the casing; when counter-rotated, the drill bit decreases in diameter to a size slightly smaller than that of the casing. Drill cuttings are evacuated from inside the casing through suction or air-lifting, preventing any potentially contaminated cuttings from circulating throughout the depth of the borehole.

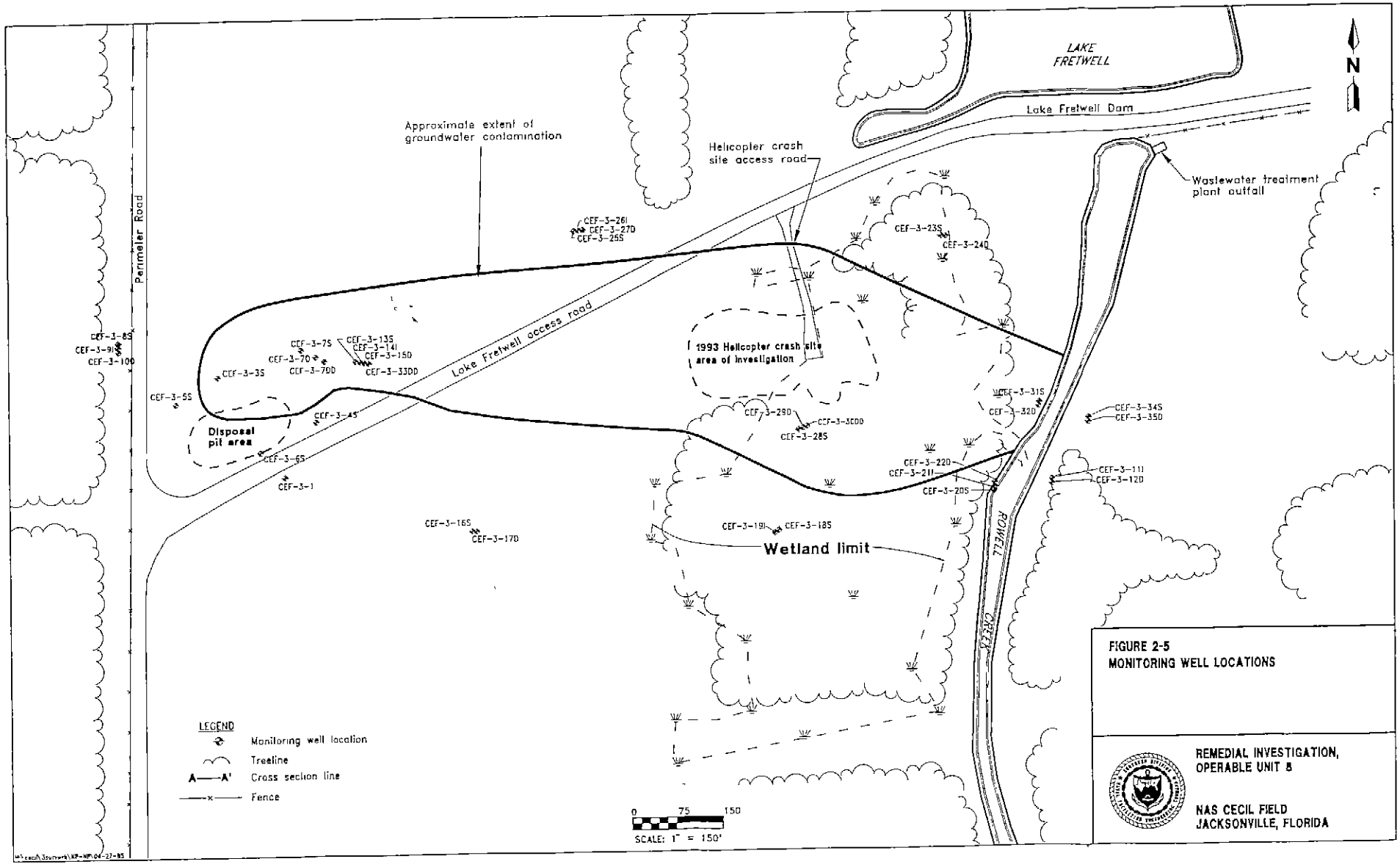


FIGURE 2-5
MONITORING WELL LOCATIONS

REMEDIAL INVESTIGATION,
OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Table 2-1
Monitoring Well Construction Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Well Number	Date Installed	Land Surface Elevation[1] (feet, msl)	Total Depth of Well[2] (feet)	Screened Interval[2] (feet)	Lithology Screened	Construction Method[3]
CEF 3-1	06/06/87	75.1	33.5	22.5-32.5	Surficial Aquifer, Silty Sand	HSA
CEF 3-2	06/08/87	--	--	--	Abandoned	
CEF 3-3	10/21/91	75.7	13.0	3-13	Surficial Aquifer, Sandy Clay	HSA
CEF 3-4	10/21/91	74.3	13.0	3-13	Surficial Aquifer, Sandy Clay	HSA
CEF 3-5S	10/22/91	75.3	13.0	3-13	Surficial Aquifer, Sandy Clay	HSA
CEF 3-6S	10/22/91	75.1	13.0	3-13	Surficial Aquifer, Sandy Clay	HSA
CEF 3-7D	10/23/91	74.9	68.0	58-68	Surficial Aquifer, Clayey Sand	HSA
CEF 3-7DD	10/29/91	74.7	107.0	97-107	Intermediate Aquifer, Cemented Shells	HSA
CEF 3-7S	10/22/91	75.1	13.0	3-13	Surficial Aquifer, Sandy Clay	HSA
CEF 3-8S	10/22/91	74.1	13.0	3-13	Surficial Aquifer, Sandy Clay	HSA
CEF 3-9I	12/05/93	74.2	55.0	45-55	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-10D	12/17/93	74.3	98.0	88-98	Surficial Aquifer, Clay	ODEX
CEF 3-11I	12/07/93	57.1	35.0	25-30	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-12D	12/14/93	57.2	65.0	55-65	Surficial Aquifer, Clayey Gravel/Shells	HSA
CEF 3-13S	12/17/93	74.2	18.0	8-18	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-14I	12/16/93	74.0	55.0	45-55	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-15D	12/19/93	74.1	98.0	88-98	Surficial Aquifer, Clay	ODEX
CEF 3-16S	01/12/94	72.8	16.0	6-16	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-17D	01/15/94	72.7	94.0	84-94	Surficial Aquifer, Clay	ODEX

See notes at end of table.

Table 2-1 (Continued)
Monitoring Well Construction Detail Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Well Number	Date Installed	Land Surface Elevation[1] (feet, msl)	Total Depth of Well[2] (feet)	Screened Interval[2] (feet)	Lithology Screened	Construction Method[3]
CEF 3-18S	02/01/94	62.0	25.0	15-25	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-19I	02/10/94	62.6	76.0	66-76	Surficial Aquifer, Clay/Shells	HSA
CEF 3-20S	01/18/94	55.9	14.0	4-14	Surficial Aquifer, Silty Sand	HSA
CEF 3-21I	01/17/94	55.9	50.0	40-50	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-22D	01/24/94	55.7	70.0	60-70	Surficial Aquifer, Clay/Shell	ODEX
CEF 3-23S	01/28/94	61.1	25.0	15-25	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-24D	01/28/94	61.2	72.5	62.5-72.5	Surficial Aquifer, Sandy Clay	ODEX
CEF 3-25S	01/19/94	69.9	25.0	15-25	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-26I	01/25/94	69.9	55.0	45-55	Surficial Aquifer, Silty Sand	HSA
CEF 3-27D	01/17/94	69.7	91.0	81-91	Surficial Aquifer, Sandy Clay	ODEX
CEF 3-28S	02/16/94	63.7	30.0	20-30	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-29D	02/01/94	63.3	82.0	72-82	Surficial Aquifer, Clayey Sand/Shell	ODEX
CEF 3-30DD	02/14/94	63.5	104.0	94-104	Intermediate Aquifer, Dolomite	ODEX
CEF 3-31S	01/27/94	55.2	30.0	20-30	Surficial Aquifer, Fine to Medium Sand	HSA
CEF 3-32D	01/26/94	55.1	66.0	56-66	Surficial Aquifer, Sandy Clay/Shell	ODEX
CEF 3-33DD	02/24/94	74.1	115.0	105-115	Intermediate Aquifer, Dolomite	ODEX
CEF 3-34S	04/20/94	56.2	35.0	25-35	Surficial Aquifer, Silty Sand	HSA
CEF 3-35D	04/21/94	56.5	65.0	55-65	Surficial Aquifer, Clay	HSA

[1] Elevation of northeast corner of concrete pad.
[2] Measured from land surface elevation; includes any sump.
[3] All wells installed with 2 inch interior diameter (ID), flush threaded, schedule 40 PVC, with 10-foot long screen (0.010 inch screen slot size) and silica sand filter pack (90 percent passing the 20 sieve and 10 percent passing the 30 sieve) in boreholes advanced by the noted drilling method.

Notes: msl = mean sea level datum (NGVD, 1929).
HSA = hollow-stem auger.
ODEX = direct circulation.

Split-spoon samples were collected and logged continuously from the well boreholes advanced by HSA method. Drill cuttings were used for logging purposes from the well boreholes advanced by the ODEX method. Monitoring well boring logs are presented in Appendix F. Physical characteristics of the OU 8 study area are presented in Chapter 3.0.

Monitoring wells were constructed of flush-threaded 2-inch inside diameter (ID), schedule 40, polyvinyl chloride (PVC) screen and riser in compliance with National Sanitation Foundation (NSF) Standard 14. Ten-foot well screens with a slot size of 0.010 inch were used to construct all wells. Monitoring wells were constructed and installed in accordance with SOUTHNAVFACENGCOM *Guidelines for Groundwater Monitoring Well Installation* and as specified by USEPA Region IV Guidance (USEPA, 1991a), with the exception that 4.25-inch ID augers were employed instead of the 6.25-inch ID augers specified in the document. All monitoring wells were constructed as outlined in the Sampling and Analysis Plan (SAP) and RI workplan. Monitoring well construction details for OU 8 are shown in Table 2-1 (see also Appendix F). The wells were developed to remove fine-grained soil particles, improve the hydraulic connection with the natural formation, and to obtain a representative groundwater sample. Preliminary development of the wells occurred after hydration of the bentonite seal by pumping for approximately 30 minutes on the shallow wells and 60 minutes on the deeper wells. The deeper wells were pumped longer to remove water that may have been introduced to the aquifer during the ODEX drilling operations. Approximately 48 hours after installation and initial development, the wells were more fully developed by pumping. Prior to sampling, the wells were purged until turbidity readings were less than 5 nephelometric turbidity units (NTUs). If the 5 NTU limit could not be attained during purging, both filtered and unfiltered samples were collected for TAL analysis. The physical parameter measurements recorded during development and purging are presented in Appendix G.

Groundwater samples were collected from all monitoring wells during March 1994 and analyzed according to USEPA Contract Laboratory Program (CLP) procedures for TCL organics, TAL inorganics, hexavalent chromium, cyanide, sulfides, TRPH, TDS, TOC, and major cations and anions. Sample collection and analyses were performed in accordance with USEPA Level IV requirements. Data validation was performed on all analytical results in accordance with USEPA Functional Guidelines (USEPA, 1991b). Appendix G presents logs completed during groundwater sample collection. Laboratory analytical results are discussed in Chapter 4.0.

In situ hydraulic conductivity tests (slug tests) were conducted on select monitoring wells at OU 8. The method used consists of submersing a slug (PVC tube filled with sand) of known volume within the monitoring well and allowing the well to stabilize to the static water level. After the groundwater in the well has stabilized, the slug is removed as quickly as possible (in theory instantaneously), and the resulting drop in water level (head) and subsequent recharge are recorded over time using a pressure transducer and a data logger. The aquifer slug test data were analyzed using a computer program (Geraghty & Miller, 1989) based on the Bouwer and Rice method (1976) for surficial aquifers and the Cooper and others (1973) method for the intermediate aquifer. The results of the aquifer slug tests are presented in Section 3.6. Appendix H contains the aquifer slug test data.

Groundwater level measurements were collected monthly from all monitoring wells. The groundwater levels were measured using an electric water level indicator and an engineering tape accurate to 0.01 foot. Water level elevations were calculated

by subtracting the measured depth to groundwater from the elevation of the top of well casing. Groundwater level data are found in Appendix I.

2.6 BACKGROUND INVESTIGATIONS. A sampling program was designed to characterize existing background conditions for NAS Cecil Field and to support the RI, BRA, and FS for OU 8. The background monitoring network consisted of monitoring well installation and the collection of surface soil, subsurface soil, and groundwater samples. Surface water and sediment sampling were also completed over much of the drainage system for NAS Cecil Field.

Figure 2-6 shows the soil and groundwater stations included in the background sampling network. Appendix J presents summaries of the background concentrations for all media at OU 8. A detailed rationale for the selection of basewide background sampling locations can be found in RI reports previously prepared for OUs 1, 2, and 7 (ABB-ES, 1994b; 1994c; 1995d). Three different soil types were present in the OU area of investigation including Albany fine sand, Ridgeland fine sand, and Arents. In order to develop a representative background data set, basewide background surface soil samples collected from these three soil types were combined to create the OU 8 surface soil background data set. The subsurface soil background data set was developed by combining all subsurface basewide background samples collected. Groundwater background was established using the results from upgradient monitoring wells CEF-3-8S, CEF-3-9I, and CEF-3-10D. Surface water and sediment background was established using the results from sample CF-SW/SD-2, which are located in Rowell Creek upgradient of the reach where the groundwater plume is interpreted to discharge and downgradient of the point where the NAS Cecil Field wastewater treatment plant discharges.

The objectives of the background sampling program were to: (1) develop an accurate representation of existing physical and chemical background conditions at NAS Cecil Field, (2) establish a database for physical and chemical background measurements to be used during the OU 8 investigation (and investigation of other OUs), and (3) provide permanent and representative monitoring stations in the upper and lower surficial aquifer. The establishment of existing background conditions is most important for the inorganics (metals), which are naturally occurring and will be detected (at varying concentrations) in all surface soil, subsurface soil, and groundwater samples collected. Characterization of existing background conditions is also important for the interpretation of certain organic analyses, such as pesticides, naturally occurring hydrocarbons, and organic carbon.

2.7 ECOLOGICAL INVESTIGATION. A biological sampling program was implemented to provide information necessary for completion of the Ecological Risk Assessment (ERA) and FS. The biological investigation included a wetlands assessment and habitat mapping, toxicity testing of surface soil and sediment, and an aquatic sampling field program. Each of these components is described in the following subsections. Information from the biological investigation was used to identify ecological receptors, characterize the ecotoxicity of contamination in surface soil and sediment, and to identify risks in the ERA. Information on the extent of wetlands was used in the FS to evaluate remedial alternatives.

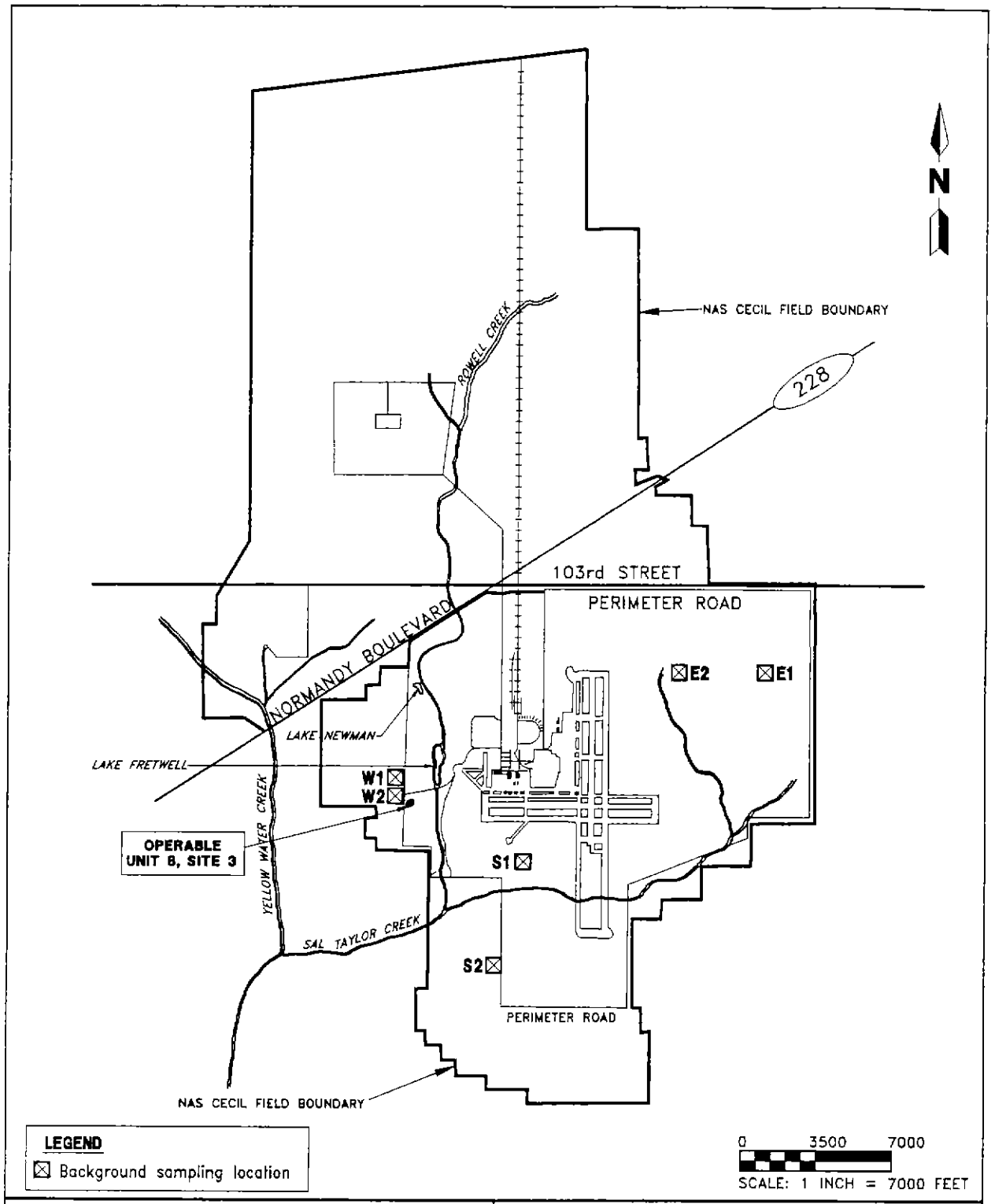


FIGURE 2-6
BACKGROUND SOIL AND GROUNDWATER SAMPLING LOCATIONS

H /CECIL/FS-FACIL/NP/04-25-95

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD JACKSONVILLE, FLORIDA

2.7.1 Wetlands Assessment and Habitat Mapping A wetlands assessment and mapping of upland vegetative communities was completed for OU 8 at NAS Cecil Field (ABB-ES, 1995a). The Wetlands Assessment included identification of wetlands on and adjacent to OU 8, characterization of the vegetative communities, and delineation of the extent of the wetlands. Upland plant communities were also characterized and mapped. The information on vegetative cover was used in the ERA to identify ecological receptors and identify exposure pathways. The area comprises approximately 6.2 acres of Palustrine (swamp) Forested and Scrub-Shrub Broad-Leaved Deciduous Wetlands and 0.5 acre of Palustrine Emergent Persistent. The total area of the Site 3 investigation is approximately 20 acres, so wetlands cover approximately 34 percent of the total investigated area. Based on previous investigations, wildlife diversity and abundance in this area was low, but the site rated high for groundwater discharge, flood-flow alteration, sediment stabilization, sediment and toxicant retention, and nutrient removal and transformation. The Wetlands Assessment and mapping of upland vegetative communities is further described in Section 5.1 of the BRA for OU 8 (ABB-ES, 1995a) and shown on Figure 1-3.

2.7.2 Sediment Toxicity Testing Toxicity testing of sediment and surface soil was completed in coordination with the sampling of these media for chemical analyses as described in Sections 2.3 and 2.4, respectively. The sediment samples for toxicity testing were collected with the samples for chemical analyses, homogenized, and split. The sediment samples were submitted for toxicity testing with two organisms, the water flea *Ceriodaphnia dubia* and the small crustacean amphipod *Hyallela azteca*. The methods for toxicity testing are included as Appendix Q of the Baseline Risk Assessment (ABB-ES, 1995a). The methods described in the daphnid are based on USEPA Method 1002.0 (USEPA, 1989a). The methods described in the amphipod protocol generally meet the standard procedures described in the American Society of Testing and Materials (ASTM) Guidelines for Completing Sediment Toxicity Tests with Freshwater Invertebrates (ASTM, 1991). The purposes of the toxicity testing were to determine a location-specific toxicity of sediment and risk for aquatic receptors in the Ecological Risk Assessment and to determine, if necessary, the concentrations of contaminants in the sediment at OU 8 at which no adverse effects (e.g., death) to the test organisms were observed. The toxicity testing of sediment and results are presented in Chapter 6.0 of the Ecological Risk Assessment (ABB-ES, 1995a).

The surface soil sampling program is described in Section 2.4. Nine surface soil samples (CF3SS1, CF3SS4, CF3SS9, CF3SS12, CF3SS15, CF3SS17, CF3SS20, CF3SS22, CF3SS24) were submitted for analyses of toxicity. The toxicity of surface soil samples was evaluated by use of a subacute toxicity test with earthworms (*Eisenia foetida*) and a seed germination toxicity test with lettuce (*Lactuca sativa*). Protocols used are included as Appendix Q of the Baseline Risk Assessment (ABB-ES, 1995a). The methods described generally meet the standard procedures described in the protocol for short-term toxicity screening of hazardous waste site soil (Green and others, 1989). The purposes of toxicity testing of surface soil were to determine the site-specific toxicity of contamination present, to measure adverse effects (risks) for soil invertebrates and plants cause by contamination, and, if necessary, to determine a concentration of contaminant(s) in the surface soil at OU 8 at which no adverse effects (i.e., successful survival and reproduction) to the test populations were observed. This information could be used to make decisions regarding cleanup levels for remedial alternatives.

2.7.3 Aquatic Invertebrate and Fish Sampling The aquatic field sampling completed for OU 8 included sampling of the benthic macroinvertebrate community, fish, water

quality parameters, and aquatic habitat quality parameters. The benthic macroinvertebrate community was sampled at location RC-SW/SD/BIO-3 as shown on Figure 2-4. The sampling procedures and results are included in the Baseline Risk Assessment (ABB-ES, 1995a). The purpose of the biological investigation was to determine the status of the structure and function of the existing benthic macroinvertebrate community in the area of OU 8 and to ascertain if contaminants present at OU 8 may be having an adverse effect on the health of that community.

3.0 PHYSICAL CHARACTERISTICS OF THE OPERABLE UNIT 8 STUDY AREA

This section presents a description of the physical characteristics of the OU 8 study area. Discussion of the physical characteristics is divided into the following sections: surface features, climatology, surface-water hydrology, soil, geology, hydrogeology, demography and land use, and ecology.

3.1 SURFACE FEATURES AND DRAINAGE. OU 8 consists of the waste disposal pit and adjacent area. The OU 8 area of investigation covers approximately 20 acres and extends from Perimeter Road to the southern tip of Lake Fretwell and up to 1000 feet downstream from the Lake Fretwell Dam. The seepage pit is located adjacent to Perimeter Road approximately 1400 feet west southwest of Lake Fretwell near the intersection of Perimeter Road and the Lake Fretwell Access Road (see Figure 3-1). The area west of Rowell Creek and east of Perimeter Road is primarily flat at the disposal pit (source) area and gently slopes to Rowell Creek. This area is covered with vegetation ranging from open grassy to heavily wooded areas. Perimeter Road and the Lake Fretwell access road are maintained, but not paved through their entire length. Surface features and topography are presented on Figure 3-1.

OU 8 is vegetated primarily with briers and weeds. Adverse effects from waste activities, such as surface soil staining or stressed vegetation, were not visible during site visits in 1988, 1991, 1993 and 1994.

In addition to Lake Fretwell, the primary surface water feature at OU 8 is Rowell Creek and a wetland west of Rowell Creek. The delineated wetland is approximately 6 acres. The ground surface south of the Lake Fretwell Access Road slopes primarily to the east, directing surface runoff toward the wetland and Rowell Creek. North of the access road, surface drainage is to Lake Fretwell via a drainage ditch along the access road.

The effluent discharge structure (outfall) for the Federally Operated Treatment Works (FOTW) is approximately 20 feet south of the Lake Fretwell Dam and discharges directly to Rowell Creek. In the vicinity of the effluent discharge structure, concrete rubble (generally greater than 1 foot in diameter) has been spread on the banks of Rowell Creek. This rubble appears to be acting as an erosion control structure intended to stabilize the soil and discharge structure.

3.2 CLIMATOLOGY. The Jacksonville area has a climate approaching the semi-tropical range as it lies near the northern limit of the trade winds or the prevailing easterly breezes that moderate summer and winter temperatures. This influence is pronounced along the coast but decreases in the vicinity of NAS Cecil Field. Prevailing winds are generally northeasterly in the fall and winter and southwesterly in the spring and summer. A wind rose for NAS Cecil Field is shown on Figure 3-2.

The annual mean temperature is 68 to 70 degrees Fahrenheit (°F) with an average summer maximum temperature of 82 to 83 °F. Between December and February, the temperature averages 56 to 57 °F. Summer highs are in the middle to upper 90 °F and winter lows reach to the upper teens, although temperatures seldom drop below freezing.

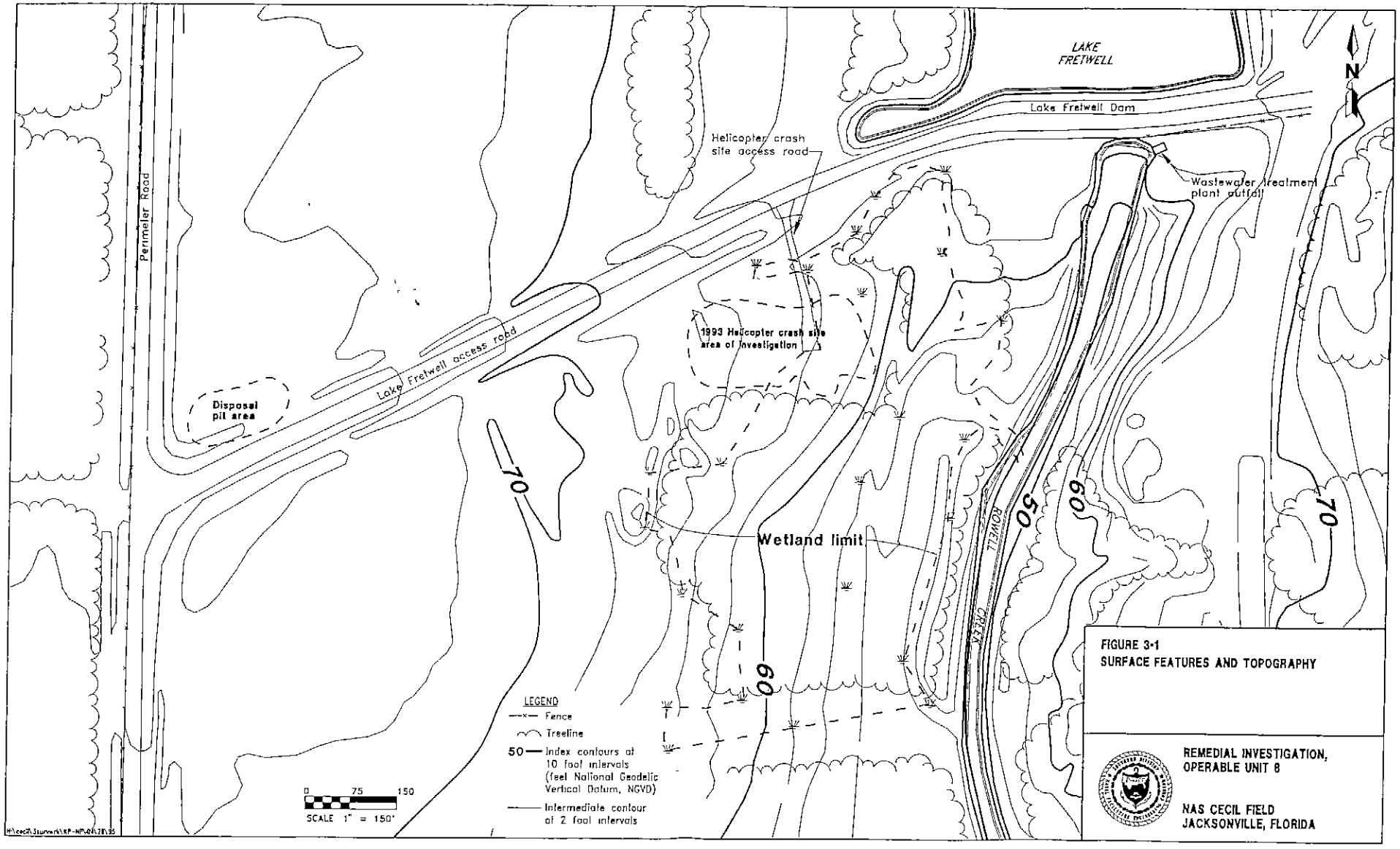
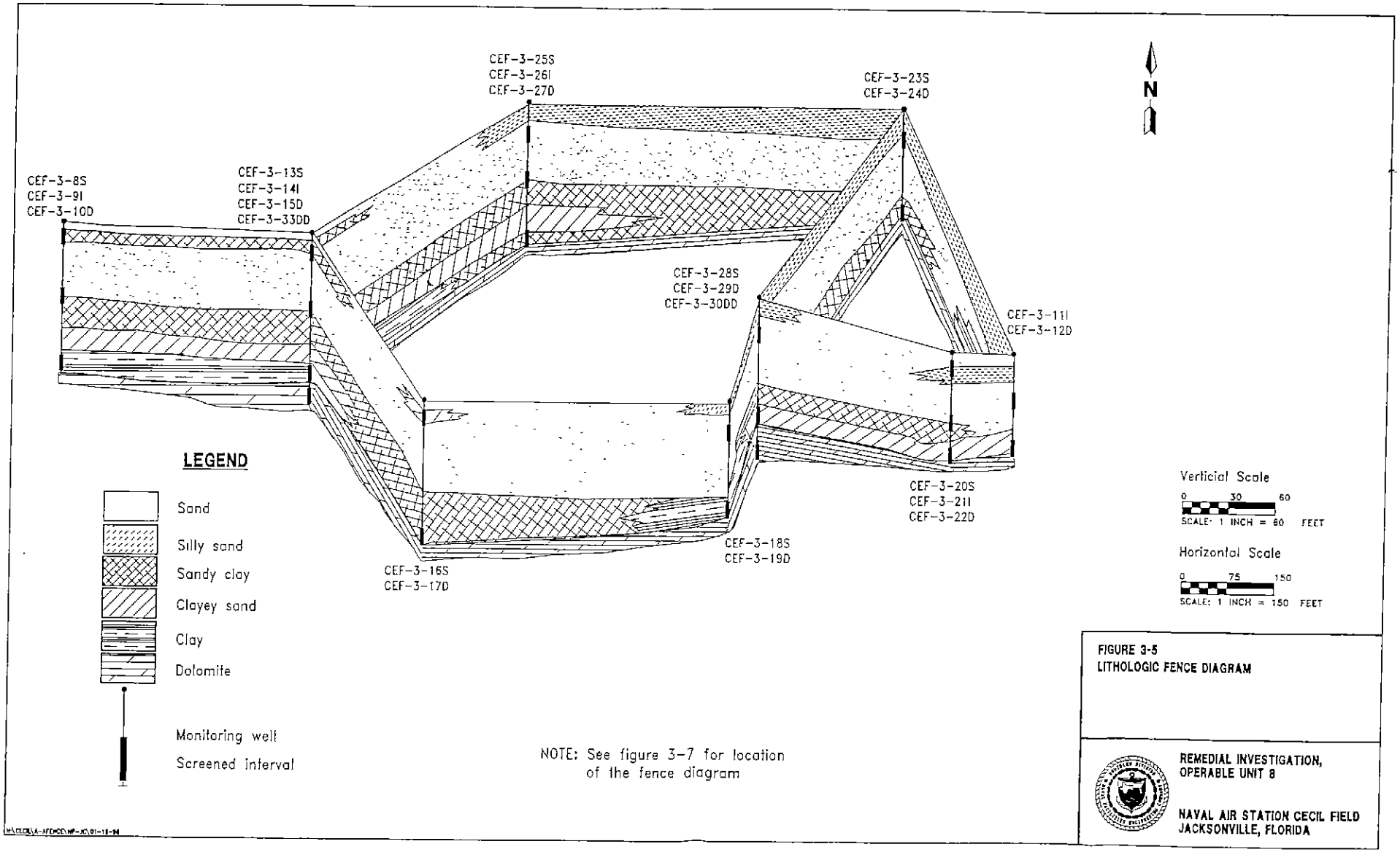


FIGURE 3-1
SURFACE FEATURES AND TOPOGRAPHY

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

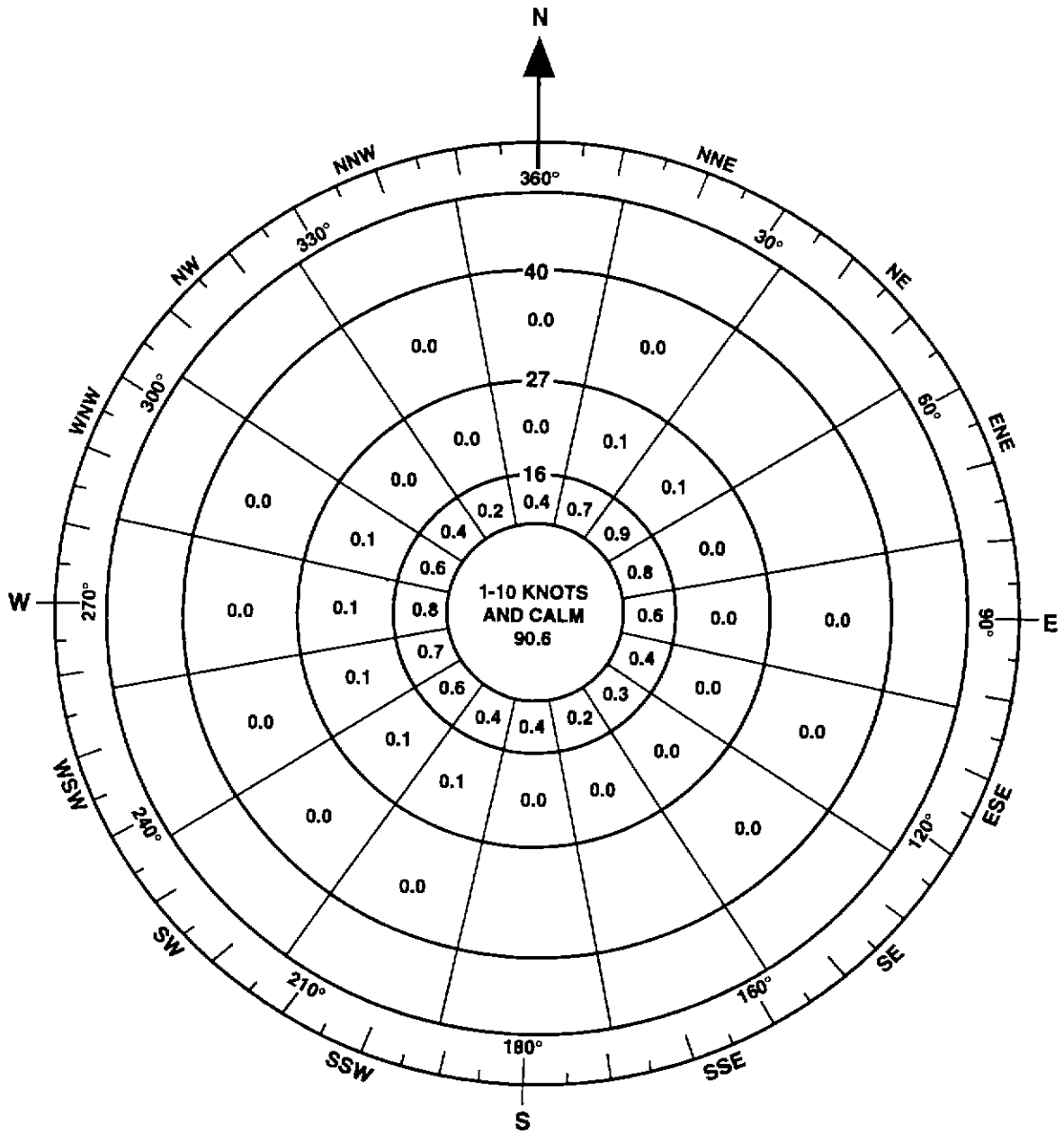


NOTE: See figure 3-7 for location of the fence diagram

FIGURE 3-5
LITHOLOGIC FENCE DIAGRAM

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA



ANNUAL PERCENTAGE FREQUENCY

SURFACE WIND ROSE

1970

Note:
Wind speed is in Knots

Source: NAS Cecil Field Station Map (Undated).

FIGURE 3-2

WIND ROSE

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

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ASW.01.96

The region experiences an average of 53 to 54 inches of rainfall per year, most of which accumulates during frequent summer rain showers. At times, 2 or 3 inches of rain may fall within 1 hour. Extended periods of dry weather may occur in any season but are most common in spring and fall. The relative humidity averages 87 percent, and the average annual duration of sunshine is 62 percent of the maximum. Flying conditions are usually excellent, with NAS Jacksonville reporting 86 percent Visual Flight Rules (VFR) and NAS Cecil Field reporting 90 percent VFR. Table 3-1 provides a compilation of local climate data. Winds of hurricane force (75 miles per hour and above with resulting damage) can be expected once in 5 years with significant deviations from the average. Most occur in August, September, and October, although the 6-month period from June 1 to November 30 is considered the Atlantic hurricane season. On an average of once a year, NAS Cecil Field is in the predicted path of a hurricane.

CLIMATE SUMMARY

Temperature (°F):	82 to 83 summer mean upper 90's summer high 56 to 57 winter mean upper teens winter low 68 to 70 annual mean
Rainfall:	53 to 54 inches per year annual 2 to 3 inches per hour intensity 7 inches frequency of 24 hour, 10 year storm
Hurricane:	One predicted pathway per year

3.3 SURFACE WATER HYDROLOGY. Most of NAS Cecil Field lies within the St. Johns River basin; a small part lies in the St. Marys River basin. Because of the extremely low gradient, the surface water divide between the St. Johns River basin and the St. Marys River basin is mobile, being dependent on severity and location of recent rain events (Figure 3-3).

Most surface water in Duval County is derived from rainfall within the county, except for a small amount of inflow from neighboring Baker County to the west (Anderson, 1972). Groundwater seepage and springs also contribute to surface water, but to a lesser extent than rainfall.

In the southern half of NAS Cecil Field, swampy areas in the uplands (which are probably perched on locally occurring clayey lenses) are drained by steep gradient (approximately 40 feet per mile), first order, unnamed tributaries that flow directly into the major creeks. The direction of flow in these tributaries is highly dependent on local topographic conditions. The effects of minor changes in local topography on stream flow direction are clearly shown by the occurrence of stream pirating of these first order tributaries from one drainage to another. Minor alterations to local conditions can favor a new drainage path over an existing one.

Drainage at NAS Cecil Field consists of sheet flow across areas of low topographic relief combined with streams and canals of low order (having few to no tributaries). In the St. Johns River basin, streams from west to east include Yellow Water Creek, Rowell Creek, and Sal Taylor Creek. Sal Taylor Creek drains the eastern part of the facility, whereas Rowell Creek receives drainage from the

Table 3-1
Climatic Data

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Month	Air Temperature (°F)			Precipitation (inches)		Percent Relative Humidity		Wind Speed (Knots)				Mean Number of Days			
	Normal		Average Monthly	Normal Total	24 Hour Maximum	7:00 a.m.	1:00 p.m.	Mean Speed	Prevailing Direction	Maximum Speed/ Direction		Clear	Partly Cloudy	Cloudy	Fog
	Maximum	Minimum													
January	67	45	56	2.45	3.02	87	56	7.5	NE	34	S	9	9	13	5
February	69	47	57	2.91	3.84	86	52	8.6	WSW	45	NE	9	7	12	4
March	73	51	62	3.49	3.21	85	49	8.5	NW	38	W	9	10	12	3
April	80	58	69	3.55	4.88	84	47	8.3	SE	42	SW	10	10	10	2
May	86	65	76	3.47	5.09	83	48	7.8	WSW	44	E	10	12	9	2
June	91	71	81	6.33	5.93	85	55	7.6	SW	66	NE	6	12	12	1
July	92	73	83	7.68	10.09	87	57	7.0	SW	43	SW	4	15	12	1
August	91	73	82	6.85	7.93	90	59	6.7	SW	3	NE	5	16	10	1
September	88	71	79	7.56	10.17	90	62	7.8	NE	71	N	5	11	14	1
October	80	62	71	5.16	6.66	90	57	7.8	NE	63	E	11	8	12	3
November	72	51	62	1.69	4.21	88	55	7.5	NE	52	S	12	8	10	5
December	67	45	56	2.22	2.51	88	57	7.2	NW	54	N	9	9	13	5

Notes: Table adapted from Master Plan (SOUTHNAVFACENGCOM, 1989).

°F = degrees Fahrenheit.
NE = northeast.
WSW = west to southwest.
NW = northwest.
SE = southeast.
N = north
S = south
E = east
W = west
SW = southwest.

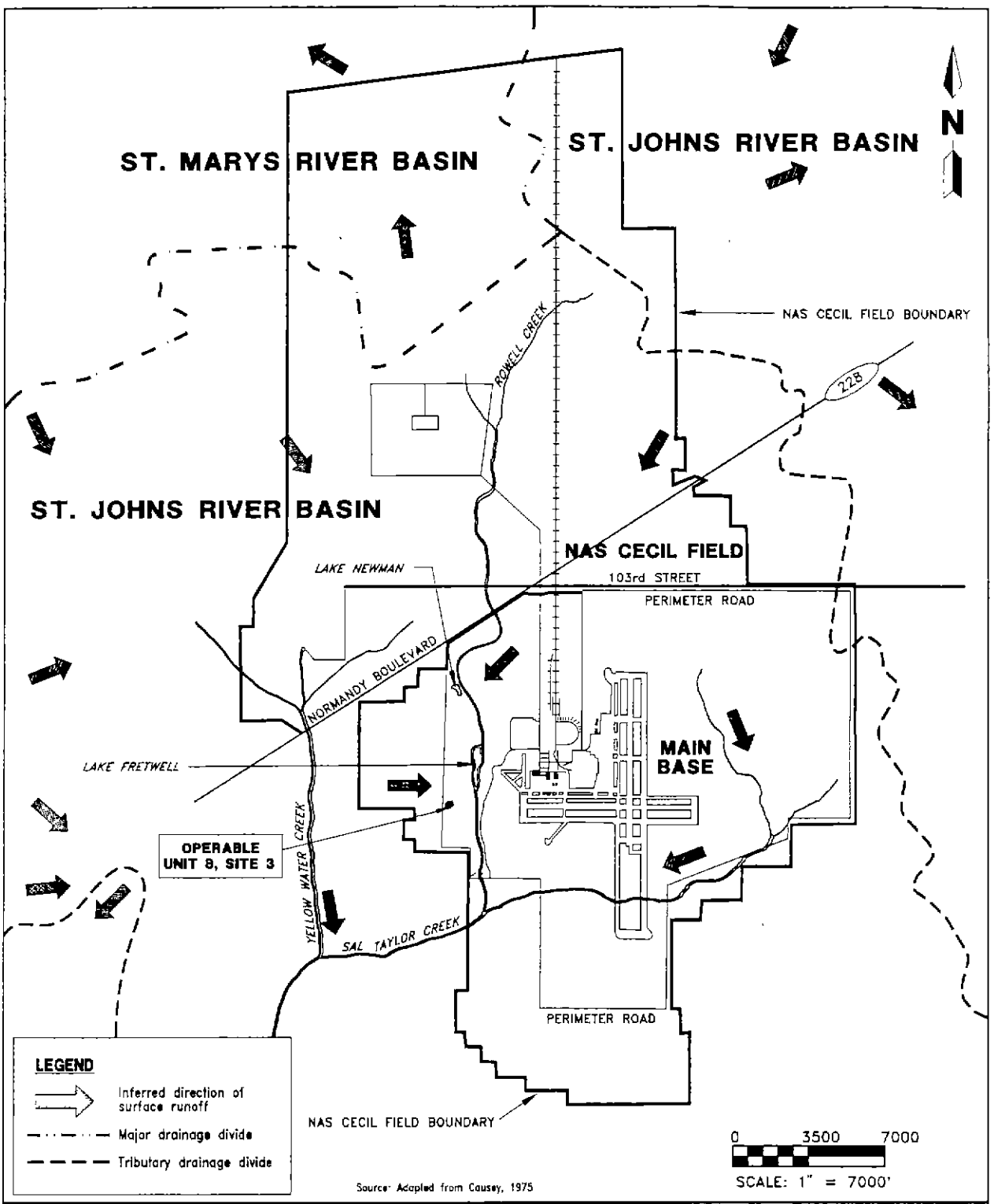

FIGURE 3-3
MAJOR DRAINAGE BASINS AT NAS CECIL FIELD

H /CECIL/RI-DRAIN/WDW-NP/04-25-95

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

central part and flows into Sal Taylor Creek in the south central part of the facility. Sal Taylor Creek then flows west into Yellow Water Creek, which flows southward, joining Black Creek approximately 1.5 miles south of the facility boundary (Figure 3-3). Black Creek eventually flows into the St. Johns River.

Lake Fretwell, Rowell Creek, and Sal Taylor Creek are classified by the Florida Department of Environmental Protection (FDEP) as Class III waters and, as such, are designated for recreation, propagation, and management of fish and wildlife and are not used for drinking water resources (Jacksonville Area Planning Board, 1980). Rowell Creek creates the eastern border of OU 8. Effluent from the FOTW is discharged directly to Rowell Creek approximately 20 feet from the Lake Fretwell Dam and has an average flow rate of 1.2 cubic feet per second (ft^3/sec). The total flow in Rowell Creek is the base flow combined with the effluent from the FOTW. Lake Fretwell is a man-made lake approximately 22 acres in size and is stocked with bass for sport fishing. A recreational complex has been developed along its northeastern shoreline (SOUTHNAVFACENGCOM, 1989).

In the vicinity of OU 8, Rowell Creek has a slope of approximately 8 feet per mile. Surface drainage at OU 8 consists of sheet flow from Perimeter Road across the length of the site and drains to Rowell Creek. In its upper reaches above Lake Fretwell, Rowell Creek tends to have a lower gradient (5 feet per mile) and possesses a slightly incised steam bed, whereas downstream gradients tend to be greater (approximately 10 feet per mile) with stream beds that are more deeply incised.

A stream water level (gauging) data collection effort was conducted by the United States Geological Survey (USGS) in the NAS Cecil Field area. Two gauging stations were located in the vicinity of OU 8.

The gauging station in Rowell Creek at Lake Fretwell was numbered 02245922. This station was located directly north of the culvert that runs under the Lake Fretwell Access Road, approximately 300 feet north of the reach of Rowell Creek where the OU 8 groundwater plume is interpreted to discharge. The recorded flow volume at that point since 1992 ranged from 0.27 ft^3/sec to 383 ft^3/sec.

The second gauging station was located approximately 4,000 feet south of Station 02245922 at the point where Rowell Creek and the Perimeter Road Bridge intersect. This gauging station was numbered 02245927. The recorded flow volume at that point since 1992 ranged from 1.4 ft^3/sec to 418 ft^3/sec. An estimate of the amount of dilution that may occur as any groundwater contamination discharges to Rowell Creek can be calculated by comparing the estimated volumetric flow of the contaminant plume with the lowest volumetric flow recorded in Rowell Creek. On average, the dilution would be expected to be greater. These calculations are presented in Appendix K and discussed in Chapter 5.0.

3.4 SOIL. Based on the U.S. Department of Agriculture (USDA) Soil Conservation Service Soil Survey of Duval County (1978), the soil at OU 8 and the immediate surrounding area were mapped as Albany Fine Sand (85 percent), Ridgeland Fine Sand (10 percent), and Arents (5 percent) (in the historical pit area). Major fieldwork for the SCS soil survey was completed in the period 1973 to 1976. Soil names and descriptions were approved in 1976. Therefore, the soil survey was conducted at approximately the same time as the cessation of disposal operations at OU 8.

Albany Fine Sand is described as nearly level to gently sloping, somewhat poorly drained soil on narrow to broad ridges and isolated knolls. Individual areas range in size from 3 to 200 acres. Slopes are smooth and convex. Typically, the surface layer is very dark gray fine sand about 3 inches thick. The subsurface layer is fine sand about 47 inches thick. The upper 26 inches is light yellowish brown and the lower 21 inches is light gray and is finely mottled. The upper 13 inches of the subsoil is strong brown sandy loam that is coarsely mottled with light gray and red. The lower part is light gray sandy clay loam that is coarsely mottled with reddish yellow. It extends below a depth of 80 inches. Under natural conditions, this soil has a water table at a depth of 10 to 30 inches for 1 to 3 months, and at a depth of 30 to 60 inches for 4 to 8 months or more during most years. Permeability is rapid above a depth of 50 inches and moderate below. Natural fertility is low, and organic matter content is low. Available water capacity is low. Natural vegetation consists of scrub oak, second growth slash pine and longleaf pine, and scattered saw palmetto. Native grasses include pineland threeawn and various bluestems. (USDA, 1978).

The Ridgeland series soil is typical of broad flat woodlands, being nearly level and poorly drained. Slopes range from 0 to 2 percent and are smooth to convex. Usually, the surface layer is a dark gray, fine-grained sand, about 6 inches thick. Beneath this layer is a weakly cemented, fine-grained sand that is high in organic content and about 10 inches thick. A hardpan often forms beneath the second soil layer. Under natural conditions a water table occurs within this second layer only 2 to 4 weeks of the year. Permeability is high in the surface layer, moderately high in the second layer, and then decreases significantly where the hardpan is present (USDA, 1978).

Soil in the former pit area is considered to be of the Arents type. Arents is described as nearly level, poorly drained soil that has been reworked by man made earth moving operations. Slopes range from 0 to 2 percent and are smooth to convex. Typically, the soil consists of mixed material. Arents material includes light gray, grayish brown, very pale brown, yellow, black, dark reddish brown, strong brown, and red fine sand, sandy loam, and sandy clay loam. Sandy textures are dominant in most areas. The sandy loam and sandy clay loam fragments are pieces of subsoil material. Pieces of weakly cemented subsoil material are also present in most of this soil. Thickness of the material ranges from 2 to 20 feet. This soil does not have an orderly sequence of horizons (USDA, 1978).

3.5 GEOLOGY.

3.5.1 Historic and Regional NAS Cecil Field lies within a physiographic feature called the Duval Uplands, a feature composed of various Pleistocene (glacial age) marine terraces (Scott, 1988). The Duval Uplands is an irregular flat plain and is composed mostly of the Wicomico marine terrace. Much of NAS Cecil Field is situated on remnants of the Wicomico marine terrace. The remainder of the facility (generally the more southern part) is located on remnants of the Penholoway marine terrace.

Locally, the shallow marine sediments that make up the surficial aquifer are undifferentiated. This sediment consists of mostly quartz sand with some clayey sand and clay. The rest of the surficial aquifer system is within the Pliocene (6 million years ago)-Pleistocene Nashua Formation. Scott and Others (1991) describe the Nashua as a fossiliferous, variably calcareous, sometimes clayey

quartz sand. The fossil content is variable from a shelly sand to a shell hash. The dominant fossils are mollusks.

In the area of investigation, the intermediate aquifer system or confining unit consists of sediment of the Miocene (6 to 24 million years ago) Hawthorn Group. In addition to its clay-rich sediment, the Hawthorn includes near its top a locally continuous carbonate-rich unit of dolostone or shell hash that forms the historical "rock aquifer" or "secondary artesian aquifer," a water-bearing unit often used near the area of interest as a private drinking water source. (Scott and others, 1991)

Below the Hawthorn Group is a series of carbonate-rich units that form the Floridan aquifer system. In the area of investigation, these units consist of (from oldest to youngest): Cedar Keys Formation, Oldsmar Formation, Avon Park Formation, and the Ocala Limestone. A regional geologic column is presented as Figure 3-4.

3.5.2 Site-Specific Geology The subsurface geologic materials recovered during drilling operations at OU 8 indicate that the site is underlain with undifferentiated sediment, probably of Holocene age (recent, less than 10 thousand years old) to Pliocene age (less than 6 million years old) and are between 70 and 98 feet thick. This sediment consists of fine- to medium-grained, poorly-to well-sorted quartz sand with some silty sand, clayey sand, and clay. The sediment grades from dark brown at land surface to brown at approximately 15 feet bls to light brown at 25 feet bls to an approximate depth of between 40 to 50 feet bls. At this point, the sediment grades to a light to medium gray, and continues to approximately 70 feet bls where it grades to dark gray.

From the land surface to approximately 50 feet bls, the sediment generally consists of a thick layer of fine- to medium-grained, poorly to well sorted quartz sand with some interbedded sandy clay and silty sand layers near land surface. The sand layer is underlain by less permeable layers of sandy clay, clayey sand and clay from approximately 50 feet bls to the top of the dolomite (which ranges from 98 feet bls in the source area to 70 feet bls near Rowell Creek). A layer of dark gray plastic clay containing dolomite cobbles was observed immediately above the dolomite over much of the area of investigation with the exception of approximately the last 400 feet before Rowell Creek. A fence diagram (profile) of the subsurface at OU 8 is presented as Figure 3-5 and a cross-section is shown on Figure 3-6. Lithologic logs from OU 8 soil borings are presented in Appendix C.

Beneath the clay layer is sediment of the Miocene age (between 6 and 24 million years old) Hawthorn Group. Locally, the uppermost layers of the Hawthorn Group include a continuous carbonate-rich unit of dolomite and/or shell hash. Historically, this unit has been called the "rock aquifer" or "secondary artesian aquifer." In this report, this unit is simply considered to be a water producing zone of the intermediate aquifer system. This unit was encountered in deep monitoring well boreholes located immediately below and downgradient of the former waste pit (CEF-3-33DD, CEF-3-7DD, and CEF-3-30DD) and in groundwater screening borings (GS-3-20, GS-3-31, GS-3-32, GS-3-69, GS-3-70, and GS-3-71). Beneath OU 8, the unit consists of a moderate yellowish brown to medium dark gray dolomite. The unit can be fossiliferous, which generally consists of shell fragments. The dolomite also contains voids and caverns, which contain shell fragments, clay, and sand. At the site, this unit is at least 25 feet thick and occurs at a depth of approximately 100 to 125 feet bls.

TIME (million years ago)	Stratigraphic Units	Approximate Elevation (feet, mean sea level)
		50
1.8	Undifferentiated Pleistocene and Recent Sediments	
	Nashua Formation	
5		
	Hawthorn Group	
	Coosawatchie Formation	20
	(Charlton Member)	(20 to -10)
	Marks Head Formation	-110
	Penny Farms Formation	-200
24		
	Ocala Limestone	-350
	Avon Park Formation	-700
	Oldsmar Formation	< -1,000
55		
	Cedar Key	< -1,200
62		-1,700

Sources:
Scott, 1988; and Scott and others, 1991.

FIGURE 3-4

GEOLOGIC COLUMN

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

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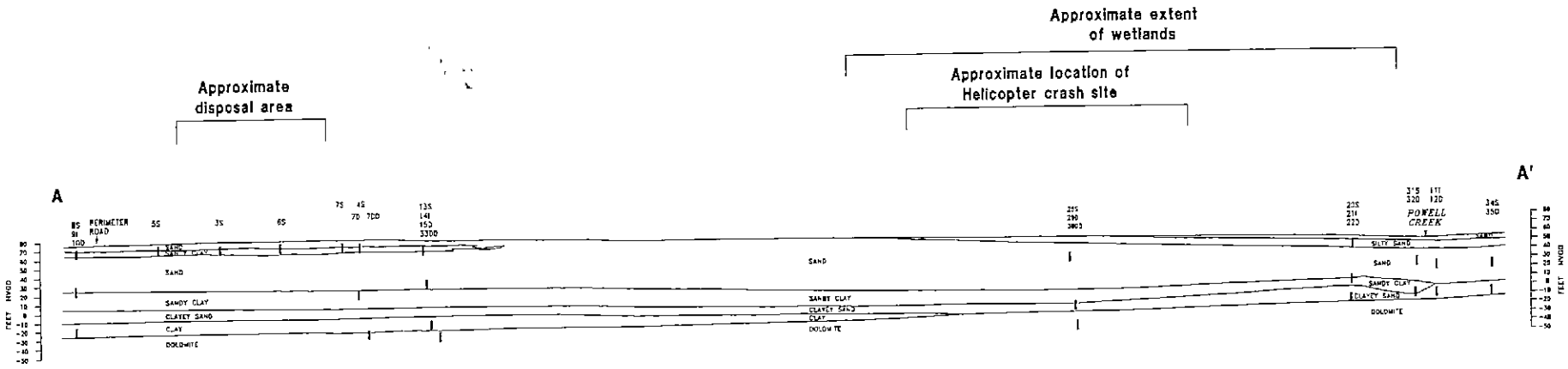


LEGEND

15D — Monitoring well screened intervals

3-41 — Groundwater screening locations

NGVD = National Geodetic Vertical Datum of 1929

NOTE: See figure 3-7 for location of cross-section A-A'

0 60 120
SCALE: 1 INCH = 120 FEET

FIGURE 3-6
LITHOLOGIC CROSS SECTION A-A'

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

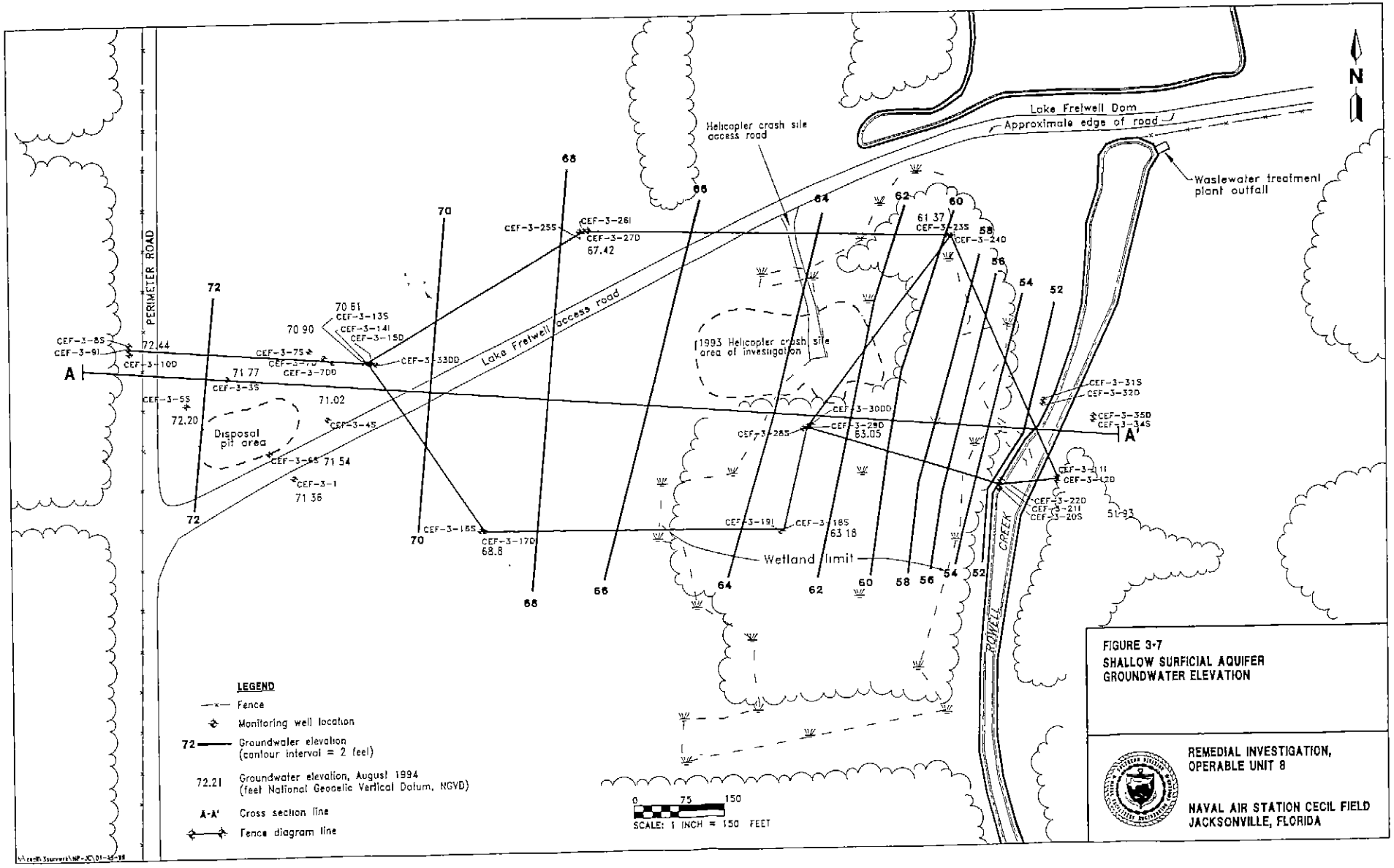


FIGURE 3-7
SHALLOW SURFICIAL AQUIFER GROUNDWATER ELEVATION

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

3.6 HYDROGEOLOGY. In the area of this investigation, there are three water-bearing systems. According to the Florida hydrostratographic nomenclature (Scott, 1988) these units, from most shallow to deepest are: the Upper Zone of the surficial aquifer system (UZS), the Intermediate Zone of the surficial aquifer system (IZS), the Lower Zone of the surficial (LZS), the carbonate-rich Upper Zone of the Hawthorn (UZH) aquifer system, and the Floridan aquifer system.

3.6.1 Aquifer Systems At OU 8, the surficial aquifer system is present in the undifferentiated sediment described above. The UZH aquifer system-confining unit is present as the dolomite (historical "rock" or "secondary artesian" aquifer) underlying the layer of clay with dolomite fragments. The Floridan aquifer system was not encountered during the investigation at OU 8.

3.6.1.1 **Surficial Aquifer System** The surficial aquifer system in the area of OU 8 is composed of undifferentiated sediments. The undifferentiated sediments consist of mostly quartz sand with some clayey sand and clay. The Pliocene-Pleistocene (6 million to 1 million years ago) Nashua Formation and the thick clay layer separating the Nashua from the differentiated sediments at other OUs on Cecil Field were only encountered in the northern part of the site. As a result, the surficial aquifer at OU 8 is not separated into an upper and lower zone based on geology, but rather is considered as one unit. Well screens were placed to investigate conditions in the shallow (UZS), intermediate (IZS), and deep (LZS) portions of the surficial aquifer system. The surficial aquifer system is under water table conditions (unconfined) and is a very fine-grained quartz sand with up to 10 percent silt and clay. The unconsolidated sediments extend downward to the top of the clay unit, which separates the surficial aquifer system from the intermediate aquifer (Figure 3-5).

3.6.1.2 **Intermediate (UZH) Aquifer System** In Duval County, the intermediate aquifer system or confining unit consists of sediment assigned to the Miocene (23 to 5 million years ago) Hawthorn Group. In addition to its clay rich sediment, the Hawthorn includes near its top a locally continuous carbonate-rich unit of dolomite with significant secondary (e.g., fractures) porosity (pore space or void volume ratio), possibly including shell hash or sand. This carbonate-rich unit forms the historical "rock aquifer" or "secondary artesian aquifer," a water-bearing unit widely used in this region as a private drinking water source. For this report, this unit will be referred to as the UZH. In the NAS Cecil Field area, the unit is approximately 20 to 25 feet thick and occurs at a depth of 100 to 125 feet bls. At OU 8 this unit was observed from depths ranging from 70 to 98 feet bls. The top of this unit is irregular and may represent an erosional unconformity. The total thickness of the entire Hawthorn Group (including the underlying clayey confining beds) exceeds 300 feet in this area (Scott and others, 1991). At OU 8, all of the "DD" monitoring wells are screened in the UZH.

3.6.1.3 **Floridan Aquifer System** The Floridan aquifer system is the principal source of groundwater derived for public drinking water in most of northern peninsular Florida. At Cecil Field, five Navy potable water supply wells (that are connected to the Cecil Field water supply system) and an irrigation well produce water from this aquifer system. In the area of investigation, the system comprises (from oldest to youngest) the Oldsmar Formation, the Avon Park Formation, and the Ocala Limestone. The Hawthorn Group, which forms a confining zone, unconformably overlies the Floridan aquifer system. Geraghty & Miller (1983) report that the transmissivity of the Floridan aquifer a few miles east of the base is 25,400 square feet per day (ft^2/day). Leve (1966) and Geraghty

& Miller (1983) report that groundwater within the Floridan aquifer flows east-northeast in the vicinity of NAS Cecil field.

The physical and geochemical characteristics of the aquifers encountered at OU 8 are discussed below.

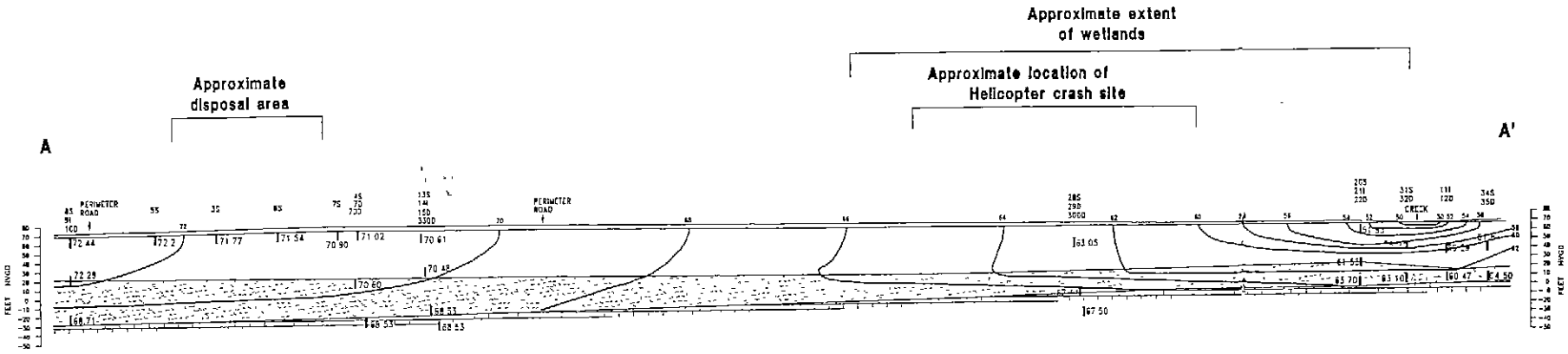
3.6.2 Physical Aquifer Characteristics To better understand the rate and direction of groundwater movement beneath OU 8, certain physical properties of the aquifers were measured at the various well screen locations. These properties include hydraulic gradient (calculated from groundwater level elevation data) and hydraulic conductivity (quantitative measure of aquifer permeability to water) calculated from slug test data. Using this data and an estimated effective porosity (the pore space through which water flows), flow rates within the aquifers are subsequently estimated.

3.6.2.1 **Groundwater Elevations and Flow Directions** As described in Subsection 2.5.2, groundwater level measurements were recorded at monthly intervals for all monitoring wells at OU 8. By subtracting these measurements from the surveyed top of well casing elevation, a groundwater elevation (to 0.01 foot NGVD) is calculated for each well. The water level and groundwater elevation data are presented in Appendix I. The interpretation of these results is discussed below.

Surficial Aquifer System. The groundwater elevation data for the surficial aquifer have been plotted on plan view and cross-section contour maps to facilitate the interpretation of the hydraulic gradients. A plan view for the UZS well water levels is presented as Figure 3-7. The depth to groundwater in the OU 8 area of investigation is typically 1 (in the wet season) to 4 feet bls. A cross-section (Figure 3-8) was prepared, running parallel to the flow direction from the source area, as indicated on the plan view map (Figure 3-7). The general groundwater flow direction in the surficial aquifer is to the east-southeast. There is also a downward flow component which is evident at the waste disposal pit area, and continues for approximately 900 to 1,000 feet downgradient (east-southeast). At this point, the vertical flow potential becomes upward. Both the upward and horizontal gradients become increasingly steeper over the remaining 300 to 400 feet to Rowell Creek. The pronounced upward gradients indicate that the surficial aquifer discharges to Rowell Creek. In the wetland west of Rowell Creek, the water table is near land surface but groundwater has not been observed discharging to land surface.

The average horizontal gradient in the surficial aquifer measured along the flowpath from the waste disposal pit area (CEF-3-3S) to Rowell Creek (CEF-3-20S) for March through September 1994 is approximately 0.016 feet per foot (ft/ft). As discussed above, the gradients increase as the groundwater approaches Rowell Creek, so the horizontal gradients at the waste disposal pit area are less than the gradients near the creek. The average horizontal gradient at the waste disposal pit area (CEF-3-8S to CEF-3-13S, and CEF-3-4S to CEF-3-5S) for March through September 1994 is approximately 0.005 ft/ft. The horizontal gradient for the last 300 feet before Rowell creek is approximately 0.035 ft/ft, estimated from the elevation contours from August 1994 (Figure 3-8).

Intermediate Aquifer System. Regional groundwater flow in the UZH is expected to the east (Fairchild, 1972). The limited water level data from the intermediate aquifer at OU 8 indicates an easterly flow component. The potentiometric surface



LEGEND

- Sand
- Sandy clay, clayey sand, and clay
- Dolomite
- 72.44 Groundwater elevation in feet NVGD, August 1994
- 72 Groundwater elevation equipotential line (feet NVGD)
- 8S Monitoring well location
- Monitoring well screen
- NGVD National Geodetic Vertical Datum of 1929

NOTE:
See figure 3-7 for location of cross section line A-A'

0 60 120
SCALE: 1 INCH = 120 FEET

FIGURE 3-8
GROUNDWATER ELEVATION CONTOUR AND FLOWPATH CROSS SECTIONS

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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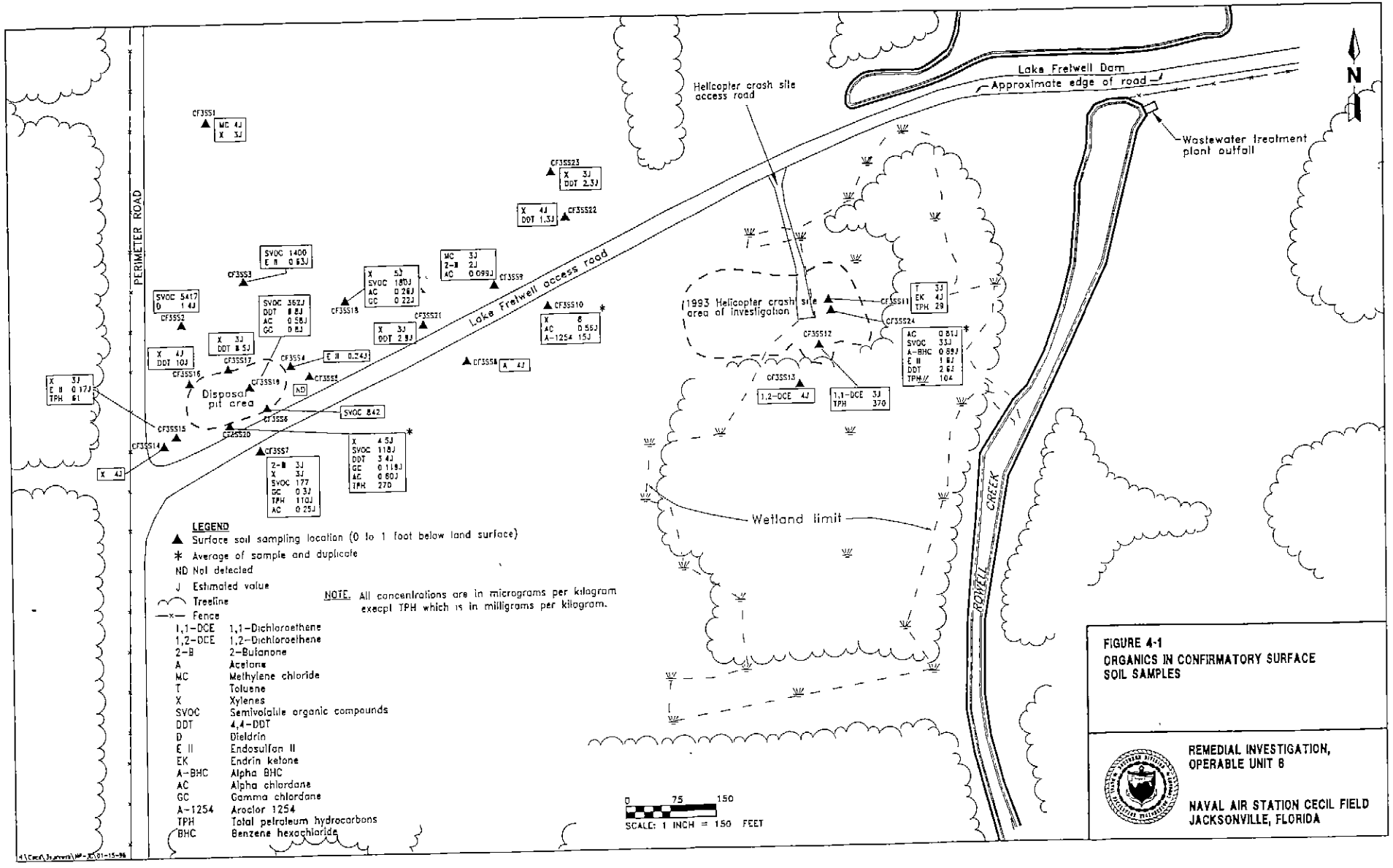


LEGEND

- ▲ Surface soil sampling location (0 to 1 foot below land surface)
- * Average of sample and duplicate
- ND Not detected
- J Estimated value
- Treeline
- —x— Fence

1,1-DCE	1,1-Dichloroethene
1,2-DCE	1,2-Dichloroethene
2-B	2-Butanone
A	Acetone
MC	Methylene chloride
T	Toluene
X	Xylenes
SVOC	Semivolatile organic compounds
DDT	4,4-DDT
D	Dieldrin
E II	Endosulfan II
EK	Endrin ketone
A-BHC	Alpha BHC
AC	Alpha chlordane
GC	Gamma chlordane
A-1254	Aroclor 1254
TPH	Total petroleum hydrocarbons
BHC	Benzene hexachloride

NOTE: All concentrations are in micrograms per kilogram except TPH which is in milligrams per kilogram.

FIGURE 4-1
ORGANICS IN CONFIRMATORY SURFACE SOIL SAMPLES

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

in this unit is generally higher than the potentiometric surface in the lower zone of the surficial aquifer. As a result, there is the potential for upward leakage of water from this unit to the surficial aquifer system. This is particularly true near Rowell Creek, where topographic relief and lowering of surficial heads accentuates this head difference. At OU 8, the groundwater flow direction in the intermediate aquifer is interpreted to the east-southeast, towards Rowell Creek. The horizontal gradient in the intermediate aquifer is approximately 0.0010 ft/ft, based on water level data from May through August 1994.

A vertical upward gradient from the intermediate aquifer to the surficial aquifer is present, as documented by the higher head in the "DD" wells compared to the surficial wells. The groundwater appears to be flowing from the intermediate aquifer to the surficial aquifer beginning southeast of well cluster CEF-3-28S, 29D, and 30DD. The vertical gradients and directions for each well cluster at OU 8 are summarized in Table 3-2.

3.6.2.2 **Hydraulic Conductivity** Slug tests were conducted at all existing monitoring wells at OU 8 to estimate hydraulic conductivity (see Subsection 2.7.2). The results of the slug tests are presented in Appendix H, and the calculated hydraulic conductivities are summarized in table 3-3 for the surficial aquifer and Table 3-4 for the intermediate aquifer.

Surficial Aquifer System. Hydraulic conductivity (K) values were estimated for each well in the surficial aquifer at OU 8. The mean K values for the UZS wells, IZS wells, and LZS wells are 7.5 ft/day, 14 ft/day, and 16 ft/day, respectively. Based on the results of the aquifer pumping test conducted by the USGS at Cecil Field, the hydraulic conductivity of the surficial aquifer ranges from 3 to 5 ft/day (USGS, 1994).

Intermediate Aquifer System. The hydraulic conductivity (K) value was estimated for monitoring well CEF-3-33DD in the intermediate aquifer at OU 8 at 11 ft/day. Based on the results of the USGS aquifer test at Cecil Field, the hydraulic conductivity of the upper part of the intermediate aquifer is estimated at 40 ft/day (USGS, 1995).

3.6.2.3 **Aquifer Flow Rate** The seepage velocity (rate at which groundwater moves through the aquifer) for the groundwater at OU 8 was calculated using the hydraulic conductivities and hydraulic gradients presented above and an estimated effective porosity. The formula used is:

$$V = Ki / n \qquad (1)$$

where

V = horizontal seepage velocity
K = horizontal hydraulic conductivity
i = horizontal hydraulic gradient
n = estimated effective porosity

Surficial Aquifer System. The results of the slug tests show hydraulic conductivities of 7.5 ft/day in the UZS, 14 ft/day in the IZS, and 16 ft/day in the LZS. The aquifer tests conducted by the USGS at the base indicate that 3 ft/day is a representative hydraulic conductivity for the surficial aquifer (USGS, 1995). Using this hydraulic conductivity, an effective porosity of 0.20 (USGS, 1995), and the horizontal gradients presented above, seepage velocity for each

Table 3-2
Vertical Hydraulic Gradient Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Aquifer Zone	Well Pair	Average Vertical Hydraulic Gradient (feet/foot)	Average Direction of Flow
Surficial Aquifer, Shallow and Intermediate Zone			
	CEF 3-13S and CEF 3-14I	0.0035	Down
	CEF 3-8S and CEF 3-9I	0.0051	Down
	CEF 3-25S and CEF 3-26I	0.0064	Down
	CEF 3-20S and CEF 3-21I	0.2745	Up
Surficial Aquifer, Shallow and Deep Zone			
	CEF 3-8S and CEF 3-10D	0.0447	Down
	CEF 3-7S and CEF 3-7D	0.0064	Down
	CEF 3-13S and CEF 3-15D	0.0282	Down
	CEF 3-25S and CEF 3-27D	0.0089	Up
	CEF 3-16S and CEF 3-17D	0.0112	Up
	CEF 3-28S and CEF 3-29D	0.0758	Up
	CEF 3-18S and CEF 3-19D	0.0793	Up
	CEF 3-31S and CEF 3-32D	0.1888	Up
	CEF 3-34S and CEF 3-35D	0.1488	Up
Surficial Aquifer, Intermediate and Deep Zone			
	CEF 3-9I and CEF 3-10D	0.0826	Down
	CEF 3-14I and CEF 3-15D	0.0499	Down
	CEF 3-26I and CEF 3-27D	0.0264	Up
	CEF 3-21I and CEF 3-22D	0.1309	Up
	CEF 3-11I and CEF 3-12D	0.0663	Up
Surficial Aquifer, Deep Zone and Intermediate Aquifer			
	CEF 3-7D and CEF 3-7DD	0.0536	Down
	CEF 3-15D and CEF 3-33DD	0.0002	Up
	CEF 3-29D and CEF 3-30DD	0.0599	Up

Note: 1. Average of monthly water level readings from June, July, August, and September 1994.

Table 3-3
Hydraulic Conductivity Estimates for the Surficial Aquifer System

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Upper Zone of Surficial System (UZS)		Intermediate Zone of Surficial System (IZS)		Lower Zone of Surficial System (LZS)	
Well	K in ft/day	Well	K in ft/day	Well	K in ft/day
CEF-3-13S	6.3	CEF-3-9I	21	CEF-3-17D	2.8
CEF-3-16S	1.1	CEF-3-14I	14	CEF-3-10D	21
CEF-3-18S	9.2	CEF-3-26I	6.9	CEF-3-15D	20
CEF-3-20S	1.5			CEF-3-27D	19
CEF-3-23S	15				
CEF-3-25S	5.8				
CEF-3-28S	17				
CEF-3-31S	4.4				

Notes: K in ft/day = hydraulic conductivity from slug test data in feet per day.

Upper Zone of Surficial System (UZS):
number = 8
minimum = 1.1 ft/day.
maximum = 17 ft/day.
mean = 7.5 ft/day.
median = 6.1 ft/day.

Intermediate Zone of Surficial System (IZS):
number = 3
minimum = 6.9 ft/day.
maximum = 21 ft/day.
mean = 14 ft/day.
median = 14 ft/day.

Lower Zone of Surficial System (LZS):
number = 4
minimum = 2.8 ft/day.
maximum = 21 ft/day.
mean = 16 ft/day.
median = 20 ft/day.

Table 3-4
Hydraulic Conductivity Estimates for the Upper Zone of the Hawthorn Group

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Well	K in ft/day
CEF-3-33DD	11

Notes: K in ft/day = hydraulic conductivity from slug test data in feet per day assuming an aquifer thickness of 15 feet (one and a half times the screen length).

number of runs = 1
minimum = 11 ft/day.
maximum = 11 ft/day.
mean = 11 ft/day.
median = 11 ft/day.

gradient area is calculated. For the entire distance from the waste disposal pit area to Rowell Creek (gradient of 0.016 ft/ft) the seepage velocity is estimated at 88 feet per year (ft/yr). At the waste disposal pit area (gradient of 0.005 ft/ft), the seepage velocity is estimated at 27 ft/yr, and in the last 300 feet before Rowell Creek (gradient of 0.035 ft/ft) a seepage velocity of 190 ft/yr is estimated.

Intermediate Aquifer System. For the intermediate aquifer, a hydraulic conductivity of 40 feet/day (USGS, 1995), a horizontal gradient of 0.0010 feet/foot (average from May through August), and an effective porosity of 0.20 (USGS, 1995) is used, resulting in an estimated seepage velocity of 73 ft/yr.

A summary of the physical characteristics of each aquifer encountered at OU 8 is presented in Table 3-5.

3.6.3 Aquifer Geochemistry Statistical analyses were conducted on the inorganic analytical results from all wells at OU 8 to identify natural geochemical characteristics. First, a descriptive analysis was performed for all inorganics in all wells. Then, a comparative statistical analysis was conducted (Mann-Whitney U Test) for select inorganic parameters. Comparisons were made between site data and background data, and between the various depth intervals at the site. The statistical analysis indicates there are three distinct geochemical zones at OU 8. These are the "S" interval (UZS) wells, the "I" interval (IZS) wells and the "D" (LZS) plus "DD" (UZH) interval wells. The statistical analysis data are presented in Appendix L and summarized below.

Table 3-5
Summary of Aquifer Characteristics

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Parameter	Surficial Aquifer	Intermediate Aquifer
Hydraulic gradient (feet per foot)	0.0059 to 0.028	0.0013
Hydraulic conductivity (feet per day)	3 to 5	40
Effective porosity	0.20	0.20
Groundwater seepage velocity (feet per year)	27 to 130	73

The groundwater in the UZS interval wells had typically large variations in the content of inorganic parameters, which is normal for shallow water table aquifers. The UZS wells contained widely varying water types (from sodium (Na)/sulfate (SO_4) through Na/chloride (Cl) to calcium (Ca)/bicarbonate (HCO_3) with total dissolved solids in the 45 to 570 mg/ℓ range and trace metals.

The IZS interval wells have a consistent NaCl to $CaHCO_3$ water type with total dissolved solids in the 10 to 270 mg/ℓ range. The water chemistry in these wells is consistent with short duration, large volume infiltration of storm waters. If supplied in sufficient volume, this infiltrating rain water might not be

and would still be low in TDS and have a fairly low Ph (approximately 5 standard units). This relatively low Ph water could easily mobilize some adsorbed cations, leading to an increased dissolved metals content. These characteristics are likely being attenuated as the water moves horizontally towards the discharge zone as is illustrated by the relative positions of the four wells 9I, 14I, 21I, and 26I on the Piper diagram (Appendix L).

The LZS and UZH interval wells are typical of wells in a carbonate-rich environment. They are of predominantly Ca/HCO_3 water types with total dissolved solids in the 230 to 360 mg/ℓ range and no significant trace metals. The LZS wells are less carbonate rich upgradient of OU 8, where flow is predominantly horizontal, and more carbonate rich downgradient of OU 8 where a strong upward gradient from the carbonate-rich UZH is present. Upgradient of OU 8, the system appears to be a well stratified, predominantly horizontal flow regime. The flow begins to have a strong upward component downgradient of OU 8. In this area (near CEF-3-21I) the IZS and UZS interval wells begin to resemble the typical LZS and UZH interval water type as can be seen from their position midway between the UZS-IZS cluster and the LZS-UZH cluster on the Piper diagram (Appendix L).

3.6.4 Summary of the Hydrogeologic Conditions In the area of investigation, there are three water-bearing systems. In descending order, these are the surficial aquifer (UZS,IZS,LZS), the intermediate aquifer (UZH), and the Floridan aquifer. Between each system is an aquitard (less permeable unit) or confining unit. At OU 8, only the surficial aquifer and the top of the intermediate aquifer were investigated.

The surficial aquifer is unconfined and composed of undifferentiated fine sand with some clayey sand and clay. This sediment extends to approximately 70 to 100 feet bls and is underlain by a layer of clay with dolomite cobbles. The depth to groundwater in the surficial aquifer is typically between 1 (in the wet season) and 4 feet bls. Groundwater flow in the surficial aquifer is generally to the southeast, toward the wetlands east of Perimeter Road, at an average rate of 88 ft/yr. At this rate, groundwater from under the disposal pit would have migrated the 1,400 feet to Rowell Creek in 16 years. Vertical gradients indicate that the surficial aquifer discharges to the creek. Based on the horizontal seepage velocity, contaminants from the waste disposal pit area which migrate at the same rate as groundwater (unattenuated or not retarded) could have reached Rowell Creek approximately 16 years after disposal began.

Upgradient of OU 8, the geochemistry of the surficial aquifer is indicative of recharge by rainfall, but downgradient, where the strong upward gradient is present, the geochemistry is increasingly bicarbonate-rich with depth, to the point of resembling the geochemistry of the intermediate aquifer. This change in geochemistry, along with the local upward gradient in the surficial aquifer and widespread upward vertical potential between the intermediate and surficial aquifer, indicates that groundwater is migrating from the intermediate aquifer into the surficial aquifer. This same upwelling of groundwater from the UZH to the surficial aquifer was observed at OU 7 in the Sal Taylor Creek drainage system.

The intermediate (UZH) aquifer is encountered at the waste disposal pit area at approximately 100 feet bls. In addition to its clay-rich sediments, the Hawthorn includes near its top a locally continuous carbonate rich unit of dolomite with significant secondary porosity (fractures), possibly including shell hash, or

sand. This carbonate-rich unit forms the historical "rock aquifer" or "secondary artesian aquifer," a water-bearing unit widely used in this region as a private drinking water source.

In the NAS Cecil Field area, the "secondary artesian aquifer" is approximately 20 to 25 feet thick. The top of this unit is irregular and may represent an erosional unconformity. The groundwater flow in the intermediate aquifer at OU 8 is to the east, toward Rowell Creek, at an average rate of approximately 95 ft/yr.

3.7 **DEMOGRAPHY AND LAND USE**. Information presented in this section was collected to identify, enumerate, and characterize human populations potentially exposed to contaminants released from OU 8. This information is necessary to support the human health risk assessment for the site.

3.7.1 **Population and Land Use** In the Resource Availability Inventory Report distributed by the St. Johns River Water Management District (1990), the population of Duval County is reported to be increasing with time, and continued growth is projected through the year 2000. The military personnel at NAS Cecil Field and surrounding military bases such as NAS Jacksonville, Naval Station Mayport, and Naval Fuel Depot (NFD) Jacksonville contribute significantly to this population. BRAC actions are expected to influence the projected growth through the year 2000. NAS Cecil Field is a subordinate command under the Commander Strikefighter Wings, Atlantic Fleet. The facility supports a workforce of approximately 10,000 civilian and military personnel and can accommodate approximately 3,500 residents in base quarters and housing (ABB-ES,1992b).

The area surrounding NAS Cecil Field is rural and sparsely populated. The city center of Jacksonville lies approximately 14 miles to the northeast. Land use surrounding NAS Cecil Field is primarily forestry with some light agricultural and ranching use. Small communities and scattered dwellings associated with these activities are located in the vicinity. A small residential area on Nathan Hale Road, which abuts the NAS Cecil Field property to the west, typifies these rural communities. The nearest incorporated municipality is the town of Baldwin, whose center lies approximately 6 miles to the northwest of the main facility entrance.

To the east of NAS Cecil Field, the rural surroundings grade into a suburban fringe bordering the major east to west roadways. Low commercial use, such as convenience stores, and low density residential areas characterize the land use (ABB-ES, 1992b). A development called Villages of Argyle, when complete, is planned to consist of seven separate villages or communities that will ultimately abut NAS Cecil Field to the south and southeast. A golf course and residential area also border NAS Cecil Field to the east (SOUTHNAVFACENGCOM, 1989). In the immediate vicinity of OU 8, no housing is present. The site is located within the controlled access part of NAS Cecil Field and security passes are needed for admittance onto the base. However, OU 8 is accessible once entrance to NAS Cecil Field has been attained as the site is not fenced.

3.7.2 **Public Water Supply and Groundwater Use** The groundwater in the surficial, intermediate, and Floridan aquifers is classified as Class G-II, intended for potable use (Florida Legislature, 1990).

The surficial aquifer system is described in Section 3.6. Water obtained from the surficial aquifer system is primarily used for lawn irrigation and domestic purposes, including heat exchange units in heating and air conditioning systems. The yield of the wells is typically between 30 and 100 gallons per minute and water use estimates for the surficial aquifer system are approximately 10 to 25 million gallons per day for the City of Jacksonville (Jacksonville Planning Department, 1980). The surficial aquifer level and flow directions have been altered over time because of increased water use and pumping rates.

The intermediate aquifer system is described in Section 3.6. The quality of water from the limestone, shell, and sand of the UZH is hard to very hard and has moderate dissolved solids levels. The iron content is variable and some areas contain hydrogen sulfide (Geraghty & Miller, 1985). At least 50,000 homes in the Jacksonville area obtain water from private wells in the UZH.

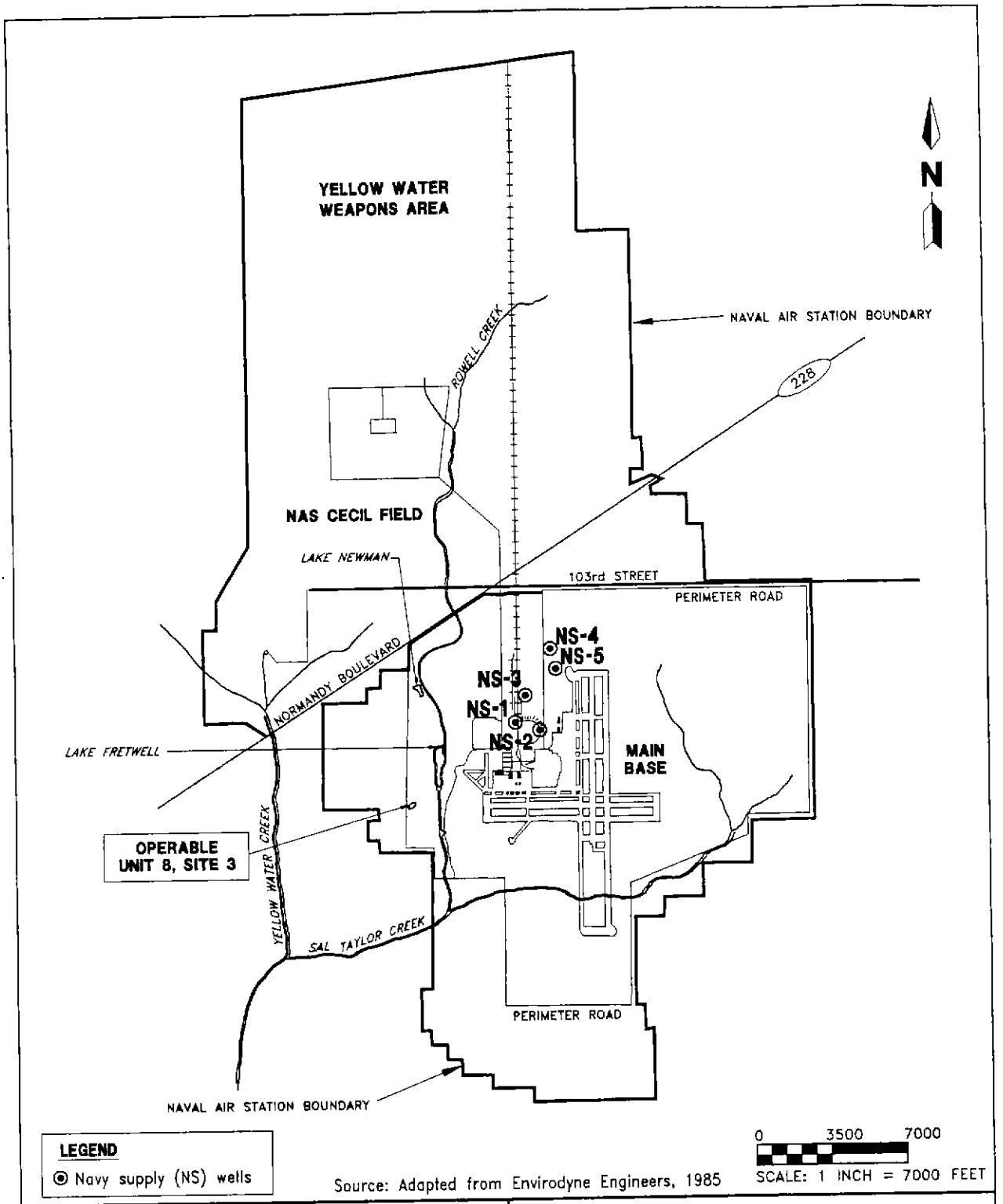
The Floridan aquifer system is described in Section 3.6. It is one of the most productive aquifers in the world, and is the primary source of water in the Jacksonville area.

NAS Cecil Field obtains its potable water from five Navy potable water supply production wells cased to and drawing from the Floridan aquifer system within the facility property boundary (Figure 3-9). These wells are placed at depths ranging from 400 to 800 feet bls (NAS Cecil Field, 1990). Water is extracted from these wells and stored in reservoirs and elevated water tanks. There is one 500,000-gallon reservoir, two 200,000-gallon reservoir, and two 250,000-gallon elevated water tanks at NAS Cecil Field. The five wells have a combined capacity of approximately 4.8 million gallons per day (Envirodyne Engineers, 1985). Water from these wells is used for potable, industrial, and heating purposes. Treatment consists of chlorination and aeration. There are no backup supplies of potable water currently on the base.

Other wells on NAS Cecil Field reportedly tap the UZH (Geraghty & Miller, 1983). These wells are not a part of the NAS Cecil Field potable water supply system and are not used for drinking water. These wells are used as individual water supplies along the outlying areas of the base that are not served by the main water system. Water from these wells is used for flushing toilets and irrigation (Envirodyne Engineers, 1985).

The Florida Department of Health and Rehabilitative Services estimates that there are approximately 75 private wells located within a 2-mile radius of NAS Cecil Field and they reportedly produce from within the UZH. Two potable supply wells are present in a small unincorporated community on Nathan Hale Road, immediately west of NAS Cecil Field and south of Normandy Boulevard (State Road 228). These private wells are 64 and 125 feet deep (Geraghty & Miller, 1983).

<u>3.8 ECOLOGY</u>. Information on the ecological setting of NAS Cecil Field is available in the IAS completed by Envirodyne Engineers in 1985. This information is summarized in the following sections for aquatic and terrestrial wildlife habitats. The OU 8 study area is located to the southwest of Lake Fretwell, and west of Rowell Creek as it flows south from Lake Fretwell. The study area is characterized by disturbed uplands in the northwesterly and westerly parts, and palustrine wetlands in the eastern portion, adjacent to Rowell Creek. Terrestrial areas of OU 8 consist of scrubby flatwoods and disturbed, grassy uplands. A



Source: Adapted from Envirodyne Engineers, 1985

FIGURE 3-9
POTABLE WATER SUPPLY WELLS

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REMEDIAL INVESTIGATION,
OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

palustrine freshwater wetland system associated with the Rowell Creek floodplain is mapped under the Cowardin (Cowardin and others, 1979) system as a mixture of Palustrine Forested and Scrub-Shrub Broad-Leaved Deciduous classes, with some Palustrine Emergent Persistent mixed in the northeastern part. Rowell Creek, which bounds OU 8 to the east, flows from Lake Fretwell and the OU 8 wetlands in a southerly direction to Sal Taylor Creek.

3.8.1 Aquatic Habitats Small streams, totaling approximately 8 miles, are present on NAS Cecil Field property. These streams include Yellow Water Creek, Sal Taylor Creek, and Rowell Creek, as well as smaller tributaries. Two man-made lakes are located on the facility: Newman Lake and Lake Fretwell. Both lakes are upgradient of OU 8 and are a part of the Rowell Creek drainage area. These waters are classified as Class III Waters for recreation, propagation, and management of fish and wildlife by the FDER (Florida Legislature, 1995).

A total of 19 species of fish from 6 families were identified at NAS Cecil Field during the ecological field investigation in 1993. Eight of the total species were representative of the Centrarchidae family (sunfish) and four were in the Cyprinidae family (minnows). Other families represented in the fish surveys included the suckers (*Catostomidae*), killifishes (*Cyprinodontidae*), live bearers (*Poeciliidae*), and the silversides (*Atherinidae*).

A semiquantitative macroinvertebrate survey was conducted at NAS Cecil Field in June and July 1993 (EA Engineering, Science, and Technology, 1994). The 1993 sampling event included sampling of aquatic macroinvertebrate communities at locations throughout Rowell Creek and Lake Fretwell. One sampling location from this sampling event was located in Rowell Creek, downgradient from OU 8. This Rowell Creek station (station RC-BIO-3) is located approximately 1,400 feet east of the disposal area within the area where the groundwater plume from OU 8 is interpreted to discharge.

Sampling completed at the OU 8 sampling station included collection of parameters describing aquatic habitat, collection of macroinvertebrates by use of dip net sweeps, collection of macroinvertebrates by use of Hester-Dendy artificial substrates, collection of macroinvertebrates by use of three replicate petite ponar dredge samples. The results of the OU 8 macroinvertebrate sampling event showed no significant effects from the OU 8 groundwater plume and are presented in Chapter 5 of the baseline ecological risk assessment for OU 8 (ABB-ES, 1995a).

3.8.2 Terrestrial Wildlife Habitats Three major terrestrial habitat types were identified at NAS Cecil Field during the IAS. These habitats are pine flatwoods association, sandhill communities, and swamp forest associations (Envirodyne Engineers, 1985). An upland community consisting primarily of disturbed uplands with some characteristics of a dry prairie occurs in the western portion of OU 8, both to the north and south of the Lake Fretwell Service Road. The OU 8 disposal pit is located in this portion of the site. This area consists of flat, sandy soil with dense ground cover, and few to no trees. Typical vegetation identified here includes ragweed (*Ambrosia* sp.), goldenrod (*Solidago fistulosa*), dog fennel (*Eupatorium capillifolium*), bracken fern (*Pteridium aquilinum*), sand blackberry (*Rubus cuneifolius*), golden ragweed (*Senecio aureus*), and muscadine grape (*Vitis rotundifolia*). Scattered wax myrtle (*Myrica cerifera*) and slash pine (*Pinus elliotii*) are also present.

A small part of the northern end of the study area most closely resembles the Florida Natural Areas Inventory (FNAI, 1990) Scrubby Flatwoods cover type. The area is flat and sandy with scattered pine trees, a sparse shrubby understory, and barren sand. Typical vegetation identified in this area includes longleaf pine (*Pinus palustris*), loblolly pine (*Pinus taeda*), saw palmetto (*Serenoa repens*), myrtle oak (*Quercus myrtifolia*), goldenrod (*Solidago fistulosa*), and sand blackberry (*Rubus cuneifoluis*).

The pine flatwoods association are the most extensive forest in Duval County. The soil is sandy with a moderate amount of organic matter in the top few centimeters and an acidic, organic hardpan 0.3 to 1.0 meter (1 to 3 feet) beneath the surface. This hardpan reduces rainfall percolation and impedes root penetration during droughts. Thus standing water is common during the rainy season (Envirodyne Engineers, 1985).

Three major types of pine flatwoods occur in Florida: (1) longleaf pine (*Pinus palustris*) flatwoods, in which longleaf pine is the dominant overstory tree species in well drained areas; (2) slash pine (*P. elliottii*) flatwoods, in which slash pine is the dominant overstory species in areas of intermediate wetness; and (3) pond pine (*P. serotina*) flatwoods, in which the pond pine is the dominant tree species typical in poorly drained areas (Envirodyne Engineers, 1985).

The forestry program at NAS Cecil Field, which began in 1963, has resulted in reforestation of 97 percent of the area with slash pine. Thus, pine flatwoods are the predominant community type for NAS Cecil Field. Vegetation characteristics of disturbed locations found within the reforested areas include: fennel (*Eupatorium* sp.), beggar's tick (*Bidens* sp.), greenbriar (*Smilax* sp.), sandbur (*Cenchrus* sp.) and rattlebox (*Sesbania* sp.) (Envirodyne Engineers, 1985).

Sandhill communities occur on well-drained white to yellowish sands. Longleaf pines (*P. palustris*) form the overstory and a variety of oaks (*Quercus* sp.) form the understory in mature natural stands. However, due to forestry and prevention of fires, oaks are now predominant and prevent the reestablishment of pine. When this situation is perpetuated, the sandhill community becomes similar to a xeric (dry) or mesic (balanced moisture supply) hammock with a dense stand of oaks and changes in the growth and development of the underbrush. This situation occurs infrequently at NAS Cecil Field. Many of the former sandhill areas are predominated by plant species characteristic of disturbed areas including fennel, beggar's tick, green briar, sandbur, and rattlebox (Envirodyne Engineers, 1985).

The swamp forest association is predominated by deciduous hardwoods that border rivers and streams where the forest floor is saturated or submerged during part of the year. The southern part of Rowell Creek, Sal Taylor Creek, and some of its lesser tributaries to the east are typified by this association at NAS Cecil Field. Red maple (*Acer rubrum*), water oak (*Quercus nigra*), swamp bay (*Persea palustris*), and sweet gum (*Liquidambar styraciflua*) are common along these drainage pathways. Occasional bayheads, scattered about in the pine flatwoods, harbored many of the same species stated above as well as an occasional bald cypress (*Taxodium distichum*) (Envirodyne Engineers, 1985).

<u>3.8.3 Wetlands</u> Wetlands identified at NAS Cecil Field include bay swamp, cypress domes, and hardwood swamp (SOUTHNAVFACENGCOM, 1989). The locations of wetlands are mapped on Figure 3-10. The wetland identified at OU 8 is best described as a mixture of Palustrine Forested and Scrub-Shrub Broad-Leaved Deciduous classes,

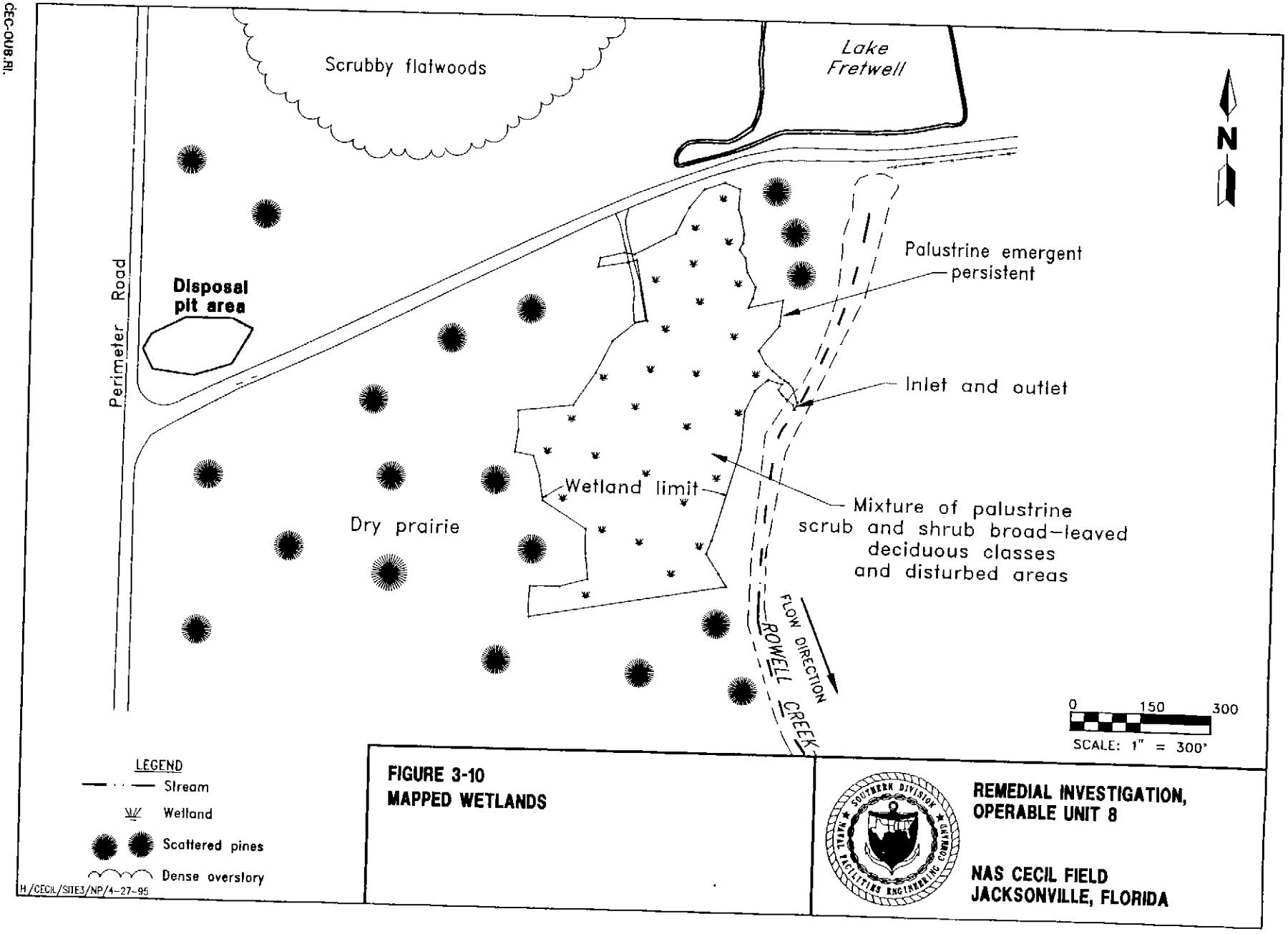


FIGURE 3-10
MAPPED WETLANDS

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

with some Palustrine Emergent Persistent mixed in the northerly part of the wetland. A summary of the OU 8 wetland classes and indicator species is presented in Table 3-6.

The mixed forested and scrub-shrub communities most clearly resemble the FNAI classifications of Bottomland Forest, Wet Prairie, and Baygall. The Bottomland Forest is characterized by a low-lying,closed canopy hardwood forest. Dominant trees are red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*) and various pines. The shrubby understory includes wax myrtle (*Myrica cerifera*), and loblolly bay (*Gordonia lasianthus*). Herbaceous vegetation in this habitat includes cinnamon ferns (*Osmunda cinnamomea*) and netted chain fern (*Woodwardia areolata*). Communities in the Wet Prairie portion of OU 8 consist of sparse, dense ground cover of grasses and herbs. Dominant species include hatpins (*Eriocaulon decangulare*), panic grass (*Panicum* sp.), St. John's wort (*Hypericum fasciculatum*), and meadow beauty (*Rhexia virginica*), with some scattered wax myrtle (*Myrica cerifera*). The Baygall community, also a part of this area, is typically found in flat areas or on slopes where high lowland water tables help maintain soil moisture. Typical plants in this community include sweetbay (*Magnolia virginiana*), swamp bay (*Persea palustris*), red bay (*Persea borbonia*), loblolly bay (*Gordonia lasianthus*), gallberry (*Ilex glabra*), muscadine grape (*Vitis rotundifolia*), netted chain fern (*Woodwardia areolata*), and cinnamon fern (*Osmunda cinnamomea*).

The Palustrine Emergent Persistent area, which is mixed into the northeastern portion of the wetlands at OU 8, most closely approximates the FNAI Floodplain Marsh classification. It is dominated by emergent grasses, herbs, and shrubs. Typical species include sedges (*Carex* sp.), bulrush (*Scirpus* sp.), climbing hempweed (*Mikania scandens*), scarlet pimpernel (*Anagallis arvensis*), and dotted smartweed (*Polygonum punctatum*), along with scattered black willow (*Salix nigra*) and myrtle oak (*Quercus myrtifolia*).

Bay swamp wetlands are associated with Sal Taylor Creek to the east of the runways with additional acreage north of 103rd Street and Normandy Boulevard. Bay Swamp areas are located at the slower moving headwaters of the various creeks. Some bay swamps on the facility are isolated but are not found in OU 8.

Hardwood swamps are found in association with Rowell Creek and Yellow Water Creek. Dominant canopy species found in the hardwood swamps include tupelo (*Nyssa sylvatica* var *biflora*), red maple (*Acer rubrum*), and sweetgum (*Liquidambar styraciflua*). Other canopy species include bald cypress (*Taxodium distichum*), water oak (*Quercus nigra*), laurel oak (*Quercus lauifolia*), and Carolina willow (*Salix caroliniana*). Along the edges of the hardwood swamp, loblolly pine (*Pinus taeda*) and pond pine (*Pinus serotina*) can also be found. The subcanopy within the swamp is dominated by smaller tupelo, red maple, sweetgum, and wax myrtle (*Myrica cerifera*). The ground cover is dominated by cinnamon fern (*Osmunda cinnamomea*), shield fern (*Thelypteris kunthii*), and elderberry (*Samubucus canadensis*). The main stream channel is vegetated along the edge by such species as pickerelweed (*Ponteria* sp.), alligator weed (*Alternanthera philoxeroides*), spatterdock (*Nuphar luteum*), and lizard's tail (*Saururus cernuus*) (SOUTHNAVFACENGCOM, 1989). A series of drainage ditches is connected to the hardwood swamps. These drainage ditches often connect to a low cypress dome or bay swamp. The drainage ditches are vegetated mostly with cattail (*Typha latifolia*), pickerelweed, alligator weed, spatterdock, and lizard's tail (SOUTHNAVFACENGCOM, 1988).

Table 3-6
Wetland Classes of the Study Area[1]

Baseline Risk Assessment
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Wetland Class	Indicator Species (common name)
Palustrine Forested Broad-Leaved Deciduous	Red maple, sweet gum, swamp bay, sweet bay, wax myrtle, loblolly bay, and cinnamon fern.
Palustrine Scrub-Shrub Broad-Leaved Deciduous	Sweet bay, swamp bay, red bay, loblolly bay, wax myrtle, muscadine grape, gallberry, meadow beauty, and netted chain fern.
Palustrine Emergent Persistent	Black willow, myrtle oak, climbing hempweed, scarlet pimpernel, rushes, and dotted smartweed.

[1] Wetland classes indicated on Figure 3-10

Cypress domes are scattered across the base. These are generally isolated circular depressional wetlands found among pine trees. They are often dry for part of the year. Dominant canopy species include bald cypress (*Taxodium distchum*), tupelo (*Nyssa sylvatica* var. *biflora*), and either slash pine (*Pinus elliottii*) or loblolly pine (*Pinus taeda*). Other common trees include red maple and wax myrtle. The subcanopy is generally dominated by the same vegetation as the canopy. Ground cover species include cinnamon fern, Virginia chain fern (*Woodwardia virginica*), St. John's wort (*Hypericum fasciculatum*), and red root (*Lachnanthes caroliniana*) (SOUTHNAVFACENGCOM, 1989).

3.8.4 **Rare, Endangered, and Threatened Species** Rare, endangered, and threatened species identified as potentially residing on NAS Cecil Field are listed in Table 3-7 with corresponding State and Federal designations. The list is based on a review of available information including the IAS (Envirodyne Engineers, 1985), a rare and endangered plant survey report (Environmental Services and Permitting [ESP], 1990), and the Technical Memorandum for Supplemental Sampling at OUs 1, 2, and 7 (ABB-ES, 1992a).

Certain species that potentially reside on NAS Cecil Field are protected by Federal and/or State laws. Although no rare and endangered animal species are known to occur at OU 8, several records exist for occurrences near the site. The gopher tortoise (*Gopherus polyphemus*), a State species of special concern (SSC) and a federal-candidate species, is a confirmed resident at NAS Cecil Field. This reptile has been observed by ABB-ES ecologists within 1,000 feet of Site 5, which is north of Site 3, suggesting this species may occur transiently in the study area. Further, a number of gopher tortoise burrows were observed on the NAS property, some in association with Sites 1 (approximately 2,500 feet south-southeast of OU 8) and 4, immediately north of the OU 8 study area (Envirodyne Engineers, 1985). Also, the Federal- and State-listed endangered species, the woodstork (*Mycteria americana*), and the American alligator (*Alligator mississippiensis*), a State-listed SSC, have been observed at Lake Fretwell, located to the east and northeast of OU 8. As discussed in the OU 2 RI report (ABB-ES, 1994c), Lake Fretwell is not being evaluated in this RI but will be considered in a future study. Sherman's fox squirrel (*Sciurus niger shermani*), a State-listed SSC and Federal-candidate species, may be a resident of the forested area north of Site 18. However, due to the disturbed nature of OU 8, it is unlikely that this fox squirrel occurs at the site.

One State-listed (threatened) plant species is known to occur at the OU 8 study area. The hooded pitcher plant (*Sarracenia minor*), was found at OU 8 near the helicopter crash site by an ABB-ES biologist. Two additional species, listed by FDA as commercially exploited (Wood, 1994) were observed at OU 8. The cinnamon fern (*Osmunda cinnamomea*) and the netted chain fern (*Woodwardia areolata*) were observed in the wetlands on the southeastern part of the site (CDM, 1994). In addition, the wetlands to the north of OU 8 contain another commercially exploited fern species (i.e., *O. regalis*) and the threatened grass pink (*Calopogon tuberosus*).

Table 3-7
Rare, Endangered and Threatened Flora and Fauna at or in the Vicinity of NAS Cecil Field

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Common Name	FGFWFC[1]	USFWS[2]	FDA[3]	Comments
Florida gopher frog (*Rana capito*)	SSC	C2		Possible Resident at NAS Cecil Field. (Envirodyne Engineers, 1985). Suitable habitat exists at Site 3.
American alligator (*Alligator mississippiensis*)	SSC	T(S/A)		Confirmed resident in Lake Fretwell at NAS Cecil Field (Envirodyne Engineers, 1985).
Eastern indigo snake (*Drymarchon corais couperi*)	T	T		Confirmed resident at NAS Cecil Field. (Envirodyne Engineers, 1985). Suitable habitat exists at Site 3.
Gopher tortoise (*Gopherus polyphemus*)	SSC	C2		Confirmed resident at NAS Cecil Field. (Envirodyne Engineers, 1985). Possible resident at Site 3.
Wood stork (*Mycteria americana*)	E	E		Confirmed migrant; observed feeding at Lake Fretwell (Cochran, 1994). Suitable habitat is present in shallow water areas at Site 3.
Southeastern kestrel (*Falco sparverius paulus*)	T	C2		Possible Migrant (Cochran, 1994)
Arctic Peregrine falcon (*Falco peregrinus tundrius*)	E	T		Probable Migrant (Cochran, 1994)
Bald eagle (*Haliaeetus leucocephalus*)	T	E		Confirmed Migrant (Envirodyne Engineers, 1985)
Sherman's fox squirrel (*Sciurus niger shermani*)	SSC	C2		Possible resident near Site 18 (ABB-ES 1995a). Unlikely to occur at Site 3.
Florida black bear (*Ursus americanus floridanus*)	T	C2		Evidence of black bears reported in outlying areas in 1982 (Envirodyne Engineers, 1985). Unlikely to occur at Site 3.
Florida mouse (*Peromyscus floridanus*)	SSC	C2		Known from Clay County, may range into habitats (sand pine scrub and longleaf pine-turkey oak communities) present at NAS Cecil. Not known to be a resident at NAS Cecil Field (Envirodyne Engineers, 1985).
Hooded pitcher plant (*Sarracenia minor*)			T	Found in wetlands at Site 3 (ABB-ES biologist).
Spoon-leaved sundew (*Drosera intermedia*)			T	Found at one location at Yellow Water Weapons area in drainage ditch (ESP, 1990).

See notes at end of table.

Table 3-7 (Continued)
Rare, Endangered and Threatened Flora and Fauna at or in the Vicinity of NAS Cecil Field

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Common Name	FGFWFC[1]	USFWS[2]	FDA[3]	Comments
Cinnamon fern (*Osmunda cinnamomea*)			CE	Observed at Site 3. (CDM, 1994).
Royal fern (*Osmunda regalis*)			CE	Confirmed at NAS Cecil Field. Possibly present at Site 3.
Bartram's ixia (*Salpingostylis coelestinum*)			E	Observed by Navy personnel in the southwest quadrant of NAS Cecil Field (Burst, 1994; Cochran, 1994). Possibly present at Site 3.
Variable-leaf crown beard (*Verbesina heterophylla*)		C2		Found at one location at NAS Cecil Field in sandhill habitat (ESP, 1990). Possibly present at Site 3.
Netted chain fern (*Woodwardia areolata*)			T	Found at Site 3.
Grass pink (*Calopogon tuberosus*)			T	Found at Site 17 by ABB-ES ecologist; possibly present at Site 3.

[1] Florida Game and Fresh Water Fish Commission (list published in Section 39-27.003-005, Florida Administrative Code) (Wood, 1994).
[2] United States Fish and Wildlife Service (list published in List of Endangered and Threatened Wildlife and Plants, 50 CFR 17.11-12) (Wood, 1994).
[3] Florida Department of Agriculture and Consumer Services (list is statutorily designated by the Preservation of Native Flora of Florida Act (581.185-187, Florida Statutes)) (Wood, 1994).

Notes: E = Endangered: any species which is in danger of extinction throughout all or a significant portion of its range.
T = Threatened: any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
T(S/A) = Threatened due to similarity of appearance.
SSC = Species of Special Concern.
C1 = A candidate for Federal listing for which there is enough substantial information on biological vulnerability and threats to justify listing.
C2 = A candidate for federal listing with some evidence of vulnerability, but for which not enough information exists to justify listing.
CE = Commercially Exploited.

4.0 NATURE AND EXTENT OF CONTAMINATION

The results of the field investigation concerning the nature and extent of contamination detected at OU 8, Site 3, have been assessed and the findings are presented in this chapter.

Four rounds of investigation have been completed during the evaluation of OU 8, starting with work by Envirodyne Engineers in 1985 (IAS) and ending with the ABB-ES investigation of 1993-94 (RI). Most of these investigations have included a field program that obtained physical and chemical data. The most recent investigation, completed in 1994 (Chapters 2.0 and 3.0), represents the most comprehensive set of physical and chemical data developed to date. For this reason, discussion of the nature and extent of contamination at OU 8 centers primarily on the data accumulated during this last investigation. Relevant data and findings from previous studies (including the 1991 to 1992 ABB-ES investigation [RI] and field screening data) will be discussed as appropriate. The complete analytical TCL and TAL data set generated for all media during the 1993 to 1994 investigation is presented in Appendix M. Chemical analyses were also completed on groundwater samples for water quality parameters such as hardness, alkalinity, total dissolved solids, etc. These results are presented in Appendix L. Tables and figures summarizing detection and distribution of characteristic contaminants are presented in this chapter. Chemical analytical data from previous investigations are presented in Appendix A and summarized in Chapter 1.0.

A separate investigation is being conducted under the Navy's Underground Storage Tank (UST) Program for petroleum contamination at the helicopter crash site. Petroleum contamination detected near the helicopter crash site, even if it is not associated with the OU 8 source area, is mentioned in this report. Any further delineation of petroleum contamination will be addressed by the UST program. Results of helicopter crash site investigations that have been completed to date are included in Appendix A.

The quality of the chemical analytical data collected during the investigation of OU 8 has been evaluated by assessing the precision, accuracy, representativeness, completeness, and comparability (PARCC) of the analytical data for each medium. PARCC reports summarize the quality control measures taken during the investigation and discuss the suitability of the data for use in this investigation. The PARCC summary reports for media sampled at OU 8 are presented in Appendix N. In general, the data complied with PARCC criteria and are considered acceptable for use in this RI and the associated BRA and FS.

Discussion of the nature and extent of contamination at OU 8 is structured according to the RI/FS guidance (USEPA, 1988). Sources of contamination are discussed first. Environmental media sampled during the investigation are then discussed in the following order: surface soil, subsurface soil, groundwater, surface water, and sediment. Within each of these media, analytical fractions are discussed in the following order: organics (VOCs, SVOCs, pesticides and PCBs) and inorganics. The regulatory and guidance criteria for chemicals in each medium are presented in Appendix O for reference.

In the case of duplicate samples, the average of the sample and the duplicate concentrations is used to be consistent with the procedure employed in the BRA. In accordance with that procedure, if either the sample or duplicate is reported

as not detected, half of the reported detection limit (RDL) value is used as the concentration for that sample or duplicate.

To assist in distinguishing inorganic contaminants from those that are present naturally, analytical results are screened by comparison to background criteria for each media sampled. These background criteria are twice the mean of the concentrations detected in the background samples for each medium. The background screening program is detailed in section 2.6 and the complete analytical data set from the background sampling program is presented in Appendix J.

Other analyses completed (water quality parameters, grain size analyses, etc.) are discussed as appropriate. The results of geotechnical testing are presented in Appendix E. Following the evaluation of each analytical fraction for a particular medium, a summary of relevant results and findings for the medium is presented.

4.1 SOURCES. At OU 8, the primary source of contamination is the liquid waste that was disposed of in a pit located immediately northeast of the intersection of Perimeter Road and the Lake Fretwell access road leading west, away from the dam at the south end of the Lake Fretwell (see Figure 1-3). Based on information in the IAS report, wastewater containing fuel, oil, sludge, solvent (MEK, Stoddard [petroleum distillates], trichloroethylene, PD-680, MIBK, toluene, naphtha, and xylene), paint, and paint thinners was deposited in the pit. Based on the historical information collected, generation of the waste liquids resulted from operations at the fuel farm, the Aircraft Intermediate Maintenance Department (AIMD), the squadrons, and public works.

The waste liquids disposed of in the pit drained directly to the underlying vadose and phreatic zone soil and groundwater. The periodic disposal of waste liquids in the pit would be expected to cause a temporary and localized groundwater mound which would tend to initially spread the contaminants radially. After discharge events, the mounding would subside, leaving some contaminants in the vadose soil (soil above the water table).

After the initial spreading of the contaminants caused by the mounding, the dissolved contaminants would migrate with the natural flow of groundwater. Contaminants remaining within the initial mound area (in soil both above and below the water table) could serve as a continuing source of groundwater contamination.

Another area unrelated to the waste disposal pit that may have resulted in a source of contamination is the helicopter crash site (see Figure 1-3). Although this area is located within the OU 8 study area, the resultant petroleum contamination from the crash is being addressed under the Navy's UST program. However, some solvent contamination was detected within the helicopter crash site during the soil screening program and because the presence of solvents could not be linked to the crash site, confirmatory samples were collected in conjunction with the RI. Detections of solvents 1,1-DCA, 1,1-DCE, 1,2-DCE, and TCE were observed in both soil and groundwater samples collected near and within the helicopter crash site. The source of the solvent contamination in the vadose zone soil at the crash site is believed to be the result of solvents that have volatilized from the shallow groundwater (depth to groundwater is estimated to be less than 2 feet). The source of groundwater contamination at the crash site

appears to be the former waste disposal pit area which is hydraulically upgradient and has very similar organic solvent contaminants.

To document the nature and extent of contamination resulting from wastes deposited at the OU 8 disposal pit, samples for laboratory analyses were collected from surface soil, subsurface soil, groundwater, surface water and sediment. The results of these analyses are discussed below.

4.2 **ANALYTICAL RESULTS**. The chemical analysis results of environmental samples from OU 8 are discussed in this section. Results of the biological toxicity testing of soil contamination are discussed in the ecological portion of the risk assessment and are summarized in Chapter 6.0, Summary of Baseline Risk Assessment. The results of inorganic analyses are compared to background screening concentrations from site-specific media (e.g., upgradient groundwater) and installation-wide media (surface and subsurface soil).

4.2.1 **Surface Soil** Surface soil samples were collected at OU 8 during the 1991 investigation and the screening and the confirmatory sampling programs conducted during the 1993 to 1994 investigation. The results of the 1991 surface soil investigation are presented in Chapter 1.0 and will not be discussed in this chapter because they were collected from the 0 to 2 foot bls interval, which does not meet the current risk assessment surface soil sampling requirement of collection from 0 to 1 foot bls. However, these samples are useful for site evaluation.

Results of the field screening surface soil samples will be briefly discussed, followed by a more detailed discussion of the 24 confirmatory sample results.

4.2.1.1 Organic Compounds in Surface Soil

Field Screening Sample Results. The results of the surface soil screening identified three distinct areas of contamination at OU 8. The areas included the historical disposal pit area, the area along the north side of the Lake Fretwell access road (vicinity of the roadside drainage ditch) between the pit area and Lake Fretwell, and the area near the helicopter crash site. Figures presenting the results of the surface soil screening program can be found in Appendix B.

Evaluation of the screening program results indicated the presence of TRPH; benzene, toluene, ethylbenzene, and xylenes (BTEX); and solvents in the surface soil at OU 8. TRPH was the only detection in surface soil around the historical pit area and had a maximum detection of 770 mg/kg at location 3-13. TRPH was also detected north of the access road at a maximum concentration of 64 mg/kg. The solvents TCE, DCA, and DCE were the most common detections in surface soil screening samples near the helicopter crash site area. The maximum detection of TCE was 19 μg/kg (sample locations 3-114 and 3-118) whereas 1,1-DCA was detected at 10 μg/kg (3-117) and cis-1,2-DCE was detected at 13 μg/kg (sample location 3-118).

Confirmatory Sample Results. The confirmatory analytical results for surface soil are summarized in Table 4-1, and shown on Figures 4-1. In general, analysis of confirmatory samples indicated contaminants were present only in the disposal pit area and drainage swale adjacent to the access road and at the helicopter crash site.

Table 4-1
Surface Soil Organics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations(*)[2]	Mean of Detected Concentrations[3]	Florida Cleanup Goals[4]
Volatiles (µg/kg)					
1,1-Dichloroethene	1/24	6 - 43.5	3 J	3	NP
1,2-Dichloroethene (total)	1/24	6 - 43.5	4 J	4	NP
2-Butanone	2/24	7 - 86	2 J - 3 J	2.5	6,770,000
Acetone	1/24	12 - 86	4 J	4	2,290,000
Methylene chloride	2/24	6 - 43.5	3 J - 4 J	3.5	20,700
Toluene	1/24	6 - 43.5	3 J	3	NP
Xylenes (total)	12/24	6 - 43.5	3 J - 8*	4	37,900,000
Semivolatiles (µg/kg)					
2-Methylphenol	1/24	350 - 565	24 J	24	NP
Acenaphthylene	1/24	350 - 565	170 J	170	ND
Anthracene	1/24	350 - 565	59 J	59	18,300,000
Benzo (a) anthracene	2/24	350 - 565	44 J - 620	332	1,480
Benzo (a) pyrene	4/24	350 - 565	23 J - 440	174	148
Benzo (b) fluoranthene	4/24	350 - 565	30 J - 870	294	1,480
Benzo (g,h,i) perylene	4/24	350 - 565	28 J - 270	116	ND
Benzo (k) fluoranthene	2/24	350 - 565	85 J - 280	183	1,470
Butylbenzylphthalate	1/24	350 - 565	48 J	48	15,300,000
Carbazole	1/24	350 - 565	24 J	24	58,100
Chrysene	4/24	350 - 565	22 J - 700	225	14,800
Di-n-butylphthalate	1/24	350 - 565	1,400	1,400	NP
Dibenz (a,h) anthracene	2/24	350 - 565	32 J - 100 J	66	148
Fluoranthene	4/24	350 - 565	29 J - 720	228	2,990,000
Indeno (1,2,3-cd) pyrene	3/24	350 - 565	22 J - 330	157	1,480
Phenanthrene	1/24	350 - 565	44 J	44	ND
Phenol	1/24	350 - 565	33* J	33	NP
Pyrene	3/24	350 - 565	23 J - 890	323	2,240,000
bis(2-Ethylhexyl) phthalate	2/24	350 - 565	180 J - 290	235	NP
Pesticides/PCBs (µg/kg)					
4,4-DDT	8/24	3.9 - 20	1.3 J - 10	5	3,180
Dieldrin	1/24	2.1 - 20	1.6 J	1.6	71.2
Endosulfan II	4/24	0.2 - 20	0.17 J - 1.55*	0.7	NP

See notes on following page.

Table 4-1 (Continued)
Surface Soil Organics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations(*)[2]	Florida Cleanup Goals[4]	Mean of Detected Concentrations[3]
Endrin ketone	1/24	3.85 - 20	4	NP	4
alpha-BHC	1/24	1.95 - 10	0.89*	NP	0.89
alpha-Chlordane	7/24	1.95 - 10	0.099 - 0.81*	869	0.45
gamma-Chlordane	4/24	1.95 - 10	0.119* - 0.8	869	0.36
Aroclor-1254	1/24	38.5 - 300	15*	NP	15*
Total Recoverable Petroleum Hydrocarbons (mg/kg)					
	7/24	12 - 29	29 - 370	NP	145

[1] Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected values).
[2] Value indicated by asterisk is the average of a sample and its duplicate.
[3] The mean of detected concentrations is the arithmetic mean of all samples in which the analyte was detected; it does not include those samples with a "U" or "UJ" validation qualifier for that analyte.
[4] Florida Department of Environmental Protection (FDEP) memorandum dated July 5, 1994. Values presented are the lesser of the cleanup goals based on the hazard index for the child resident or the cancer risk for the aggregate resident.

Notes: The average of a sample and its duplicate is used for all table calculations.

Sample locations include: CF3SS1, CF3SS2, CF2SS3, CF3SS4, CF3SS5, CF3SS6. CF3SS7, CF3SS8, CF3SS9, CF3SS10, CF3SS11, CF3SS12, CF3SS13, CF3SS14, CF3SS15, CF3SS16, CF3SS17, CF3SS18, CF3SS19, CF3SS20, CF3SS21, CF3SS22, CF3SS23, and CF3SS24
Duplicate samples include: CF3SS10D, CF3SS20D, and CF3SS24D
μg/kg = micrograms per kilograms dry weight.
J = indicates chemical identified by chemist but quantity was estimated.
= these chemicals represent human health chemicals of potential concern (HHCPCs).
NP = analayte is not presented in FDEP guidance.
ND = analyte is presented in FDEP guidance but no data is provided.

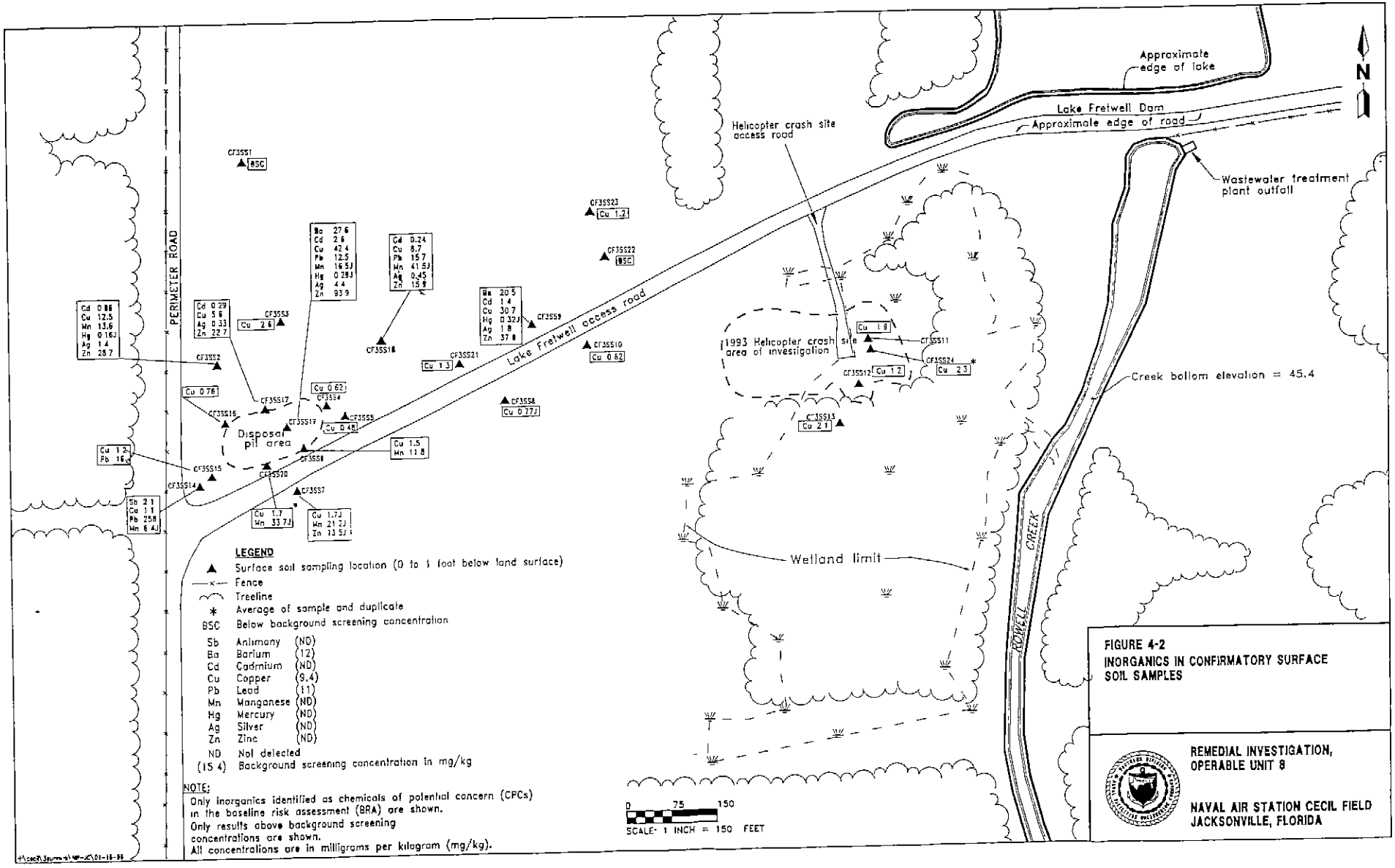


FIGURE 4-2
INORGANICS IN CONFIRMATORY SURFACE SOIL SAMPLES

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

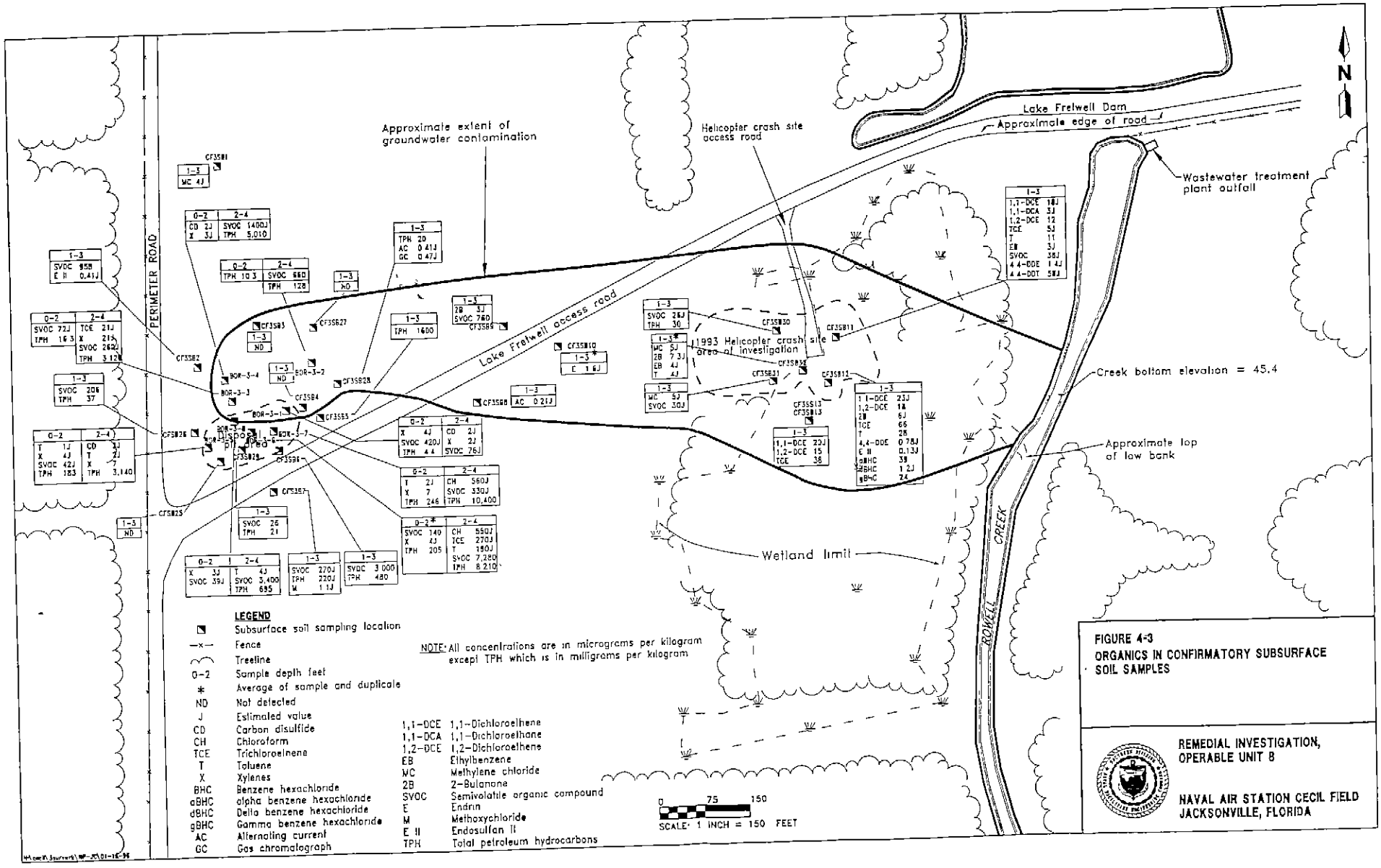


FIGURE 4-3
ORGANICS IN CONFIRMATORY SUBSURFACE SOIL SAMPLES

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

VOCs in Surface Soil. Seven VOCs were detected in surface soil samples collected at OU 8. All detections of VOCs were below 10 μg/kg and only one VOC, xylene, was detected in more than 2 of the 24 samples.

The highest detection of xylene was 8 μg/kg (average of the sample and its duplicate) in sample CEF-3-SS-10, south of Lake Fretwell access road, 500 to 600 feet east of the disposal pit. Xylene was also detected near the disposal pit area, or topographically downgradient, indicating xylene may be present as a result of fuel deposited in the disposal pit or spilled on the access road.

1,1-DCE (3 J μg/kg at CEF-3-SS-12) and 1,2-DCE (4 J μg/kg at CEF-3-SS-13) were detected in only 1 of the 24 samples. The detections are near the helicopter crash site and are interpreted to be the result of the volatilization from shallow contaminated groundwater that originated in the source area. Both 1,1-DCE and 1,2-DCE were detected in nearby monitoring well CEF-3-28S at concentrations that are consistent with volatilization from groundwater and adsorption and detection in overlying soil.

SVOCs in Surface Soil. A total of 19 SVOCs were detected in the surface soil from the analysis of 24 samples. Of the 19 SVOCs detected, the most frequent compounds detected were benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, and fluoranthene. These compounds are common byproducts of the combustion of petroleum fuels and are, therefore, consistent with the waste oil deposited in the disposal pit and burned when the liquid level in the pit was high. Although these SVOCs were most frequently detected, they were only detected in 4 of the 24 surface soil samples.

All of the SVOC detections (except CF-3-SS-24) in surface soil were from samples collected near the disposal pit area. The highest total SVOC concentration was 5,520 μg/kg at CF-3-SS-2, which is located near the northwest side of the former disposal pit. The presence of SVOCs in surface soil near the source area is most likely a result of the former OU 8 waste disposal operations.

TRPH in Surface Soil. TRPH was detected in 6 of the 24 surface soil samples; in 3 samples (CF-3-SS-7, CF-3-SS-15, and CF-3-SS-20) near the disposal pit area and in 3 samples (CF-3-SS-11, CF-3-SS-12 and CF-3-SS-24) near the helicopter crash site. The highest TRPH concentration detected in surface soil was 370 mg/kg in sample CF-3-SS-12 near the helicopter crash site. The three detections near the disposal pit area were along the Lake Fretwell access road. Five of the six samples exceeded the FDEP guidance value of 50 mg/kg for thermally treated petroleum contaminated soil. The distribution of TRPH in surface and subsurface soil is presented in Subsection 4.2.2.1 (Organic Compounds in Subsurface Soil).

The presence of TRPH in the disposal pit area is most likely the result of petroleum waste disposal in the pit or residue from possible historic use of oil to control road dust. The TRPH detected at the helicopter crash site is interpreted to be linked to the helicopter crash rather than the result of transport by the groundwater (as suspected for the chlorinated solvents) or by surface water runoff.

Pesticides and PCBs in Surface Soil. Seven pesticides and one PCB were detected at OU 8. Sporadic detections of pesticides including 4,4-DDT, dieldrin, endosulfan II, endrin ketone, alpha-BHC, alpha-chlordane, and gamma-chlordane were observed in the surface soil samples at OU 8. Based on the observed concentra-

tions, these pesticide detections are most likely the result of previous basewide use of pesticides and not the result of waste disposal operations at OU 8. The only PCB detection was Aroclor 1254.

The most frequently detected pesticides were 4,4-DDT and alpha-chlordane. 4,4-DDT was detected in 8 of 24 samples at concentrations ranging from 1.3 to 10 µg/kg. The highest concentration of 4,4-DDT was at sample location CF-3-SS-16, which is located along the western side of the former pit. Alpha-chlordane was detected in seven samples, with a maximum concentration of 0.81 J µg/kg (the average of sample CF-3-SS-24 and its duplicate) in the helicopter crash area.

Aroclor 1254 was detected at 15 J µg/kg (average of sample and duplicate) in sample CF-3-SS-10. This sample is located along the south side of the access road approximately 400 feet east of the disposal pit. Because no other PCB detections were observed in surface soil samples and this sample location is several hundred feet from the pit (PCBs are relatively immobile in soil), it does not appear this detection of Aroclor 1254 can be related to the source area. It is most likely the result of the former practice of spraying PCB containing oil on the roads for dust control.

4.2.1.2 **Inorganics in Surface Soil** The confirmatory inorganic chemical analysis results for surface soil are summarized in Table 4-2, and shown on Figure 4-2. The background screening concentrations for inorganics in surface soil are also presented in Table 4-2.

Confirmatory Sample Results. A total of 19 TAL inorganic analytes were detected in the surface soil at OU 8. Due to the large number of analytes detected and the widespread distribution, only the inorganic analytes that were chemicals of potential concern (CPC) in the Baseline Risk Assessment will be discussed in the RI report. However, results of all inorganic analytes detected in surface soil are summarized in Table 4-2.

The CPCs identified for OU 8 surface soil in the baseline risk assessment included antimony, barium, cadmium, copper, lead, manganese, mercury, silver, and zinc. Details and rationale for eliminating inorganic compounds as CPCs is presented in the OU 8 Baseline Risk Assessment and are summarized in Chapter 6.0. The distribution and concentration of inorganic CPCs are shown in Figure 4-2. A brief summary of the above inorganic CPC detections is presented in the following paragraphs.

Antimony was detected in only one sample, CF3SS14, at an estimated concentration of 2.1 J mg/kg, which is well below the quantitative reporting limit of 12 mg/kg. This sample was collected in a low area adjacent to the intersection of Perimeter Road and the Lake Fretwell access road near the disposal pit. Antimony was not detected in the disposal pit or in the background data set.

Barium was detected in all but one surface soil sample with the highest detection of 27.6 mg/kg at CF3SS19 which is located within the former disposal pit. The background screening concentration for barium is 12 mg/kg, and the maximum background concentration was 16.4 mg/kg. The only sample results that exceeded the background screening concentrations were at the disposal pit (CF3SS19) and the drainage ditch along the access road (CF3SS9).

Table 4-2
Surface Soil Inorganics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations (*)[2]	Mean of Detected Concentrations[3]	Screening Background Concentration[4]	Maximum Background Concentration	Florida Cleanup Goals[5]
Inorganics (mg/kg)							
Aluminum	24/24	40 - 40	527 - 2,010	1,310	10,100	24,000	ND
Antimony	1/24	12 - 12	2.1 J	2.1	ND	ND	NP
Barium	23/24	40 - 40	1.8 J - 27.6	6	12	16.4	NP
Cadmium	5/24	1 - 1	0.24 J - 2.6	1.1	ND	ND	37.5
Calcium	23/24	1,000 - 1,000	513 J - 66,100	10,800	458	269	NP
Chromium	12/24	2 - 2	0.4 J - 6.2	1.8	25.8	24.9	201
Copper	22/24	5 - 5	0.48 J - 42.4	5.6	ND	ND	2,880
Iron	24/24	20 - 20	185 - 2,100	587	2,790	7,140	ND
Lead	24/24	0.6 - 0.6	2.2 - 258	16	9.4	10.5	ND
Magnesium	23/24	1,000 - 1,000	58 - 1,620*	230	230	376	NP
Manganese	23/24	3 - 3	2.6 J - 41.5	10.7	11	10.9	5,710
Mercury	3/24	0.1 - 0.1	0.16 - 0.32	0.26	ND	ND	NP
Nickel	9/24	8 - 8	0.57 J - 2.4 J	1.1	7.2	5.7	1,510
Potassium	20/24	1,000 - 1,000	24.1 J - 299*	54	310	236	NP
Selenium	1/24	1 - 1	0.75*	0.75	ND	ND	NP
Silver	5/24	2 - 2	0.33 J - 4.4	1.7	ND	ND	NP
Sodium	9/24	1,000 - 1,000	122 - 241	171	ND	ND	NP
Vanadium	24/24	10 - 10	0.79 J - 4.6 J	1.9	13.2	30.7	501
Zinc	6/24	4 - 4	13.5 - 93.9	35.4	ND	ND	23,300

See notes on following page.

Table 4-2 (Continued)
Surface Soil Inorganics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

[1] Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected values).
[2] Value indicated by asterisk is the average of a sample and its duplicate.
[3] The mean of detected concentrations is the arithmetic mean of all samples in which the analyte was detected; it does not include those samples with a "U" or "UJ" validation qualifier for that analyte.
[4] The background screening value is twice the average of detected concentrations for inorganic analytes in background samples.
[5] Florida Department of Environmental Protection (FDEP) memorandum dated July 5, 1994. Values presented are the lesser of the cleanup goals based on the hazard index for the child resident or the cancer risk for the aggregate resident.

Notes: The average of a sample and its duplicate is used for all table calculations.

Sample locations include: CF3SS1, CF3SS2, CF2SS3, CF3SS4, CF3SS5, CF3SS6. CF3SS7, CF3SS8, CF3SS9, CF3SS10, CF3SS11, CF3SS12, CF3SS13, CF3SS14, CF3SS15, CF3SS16, CF3SS17, CF3SS18, CF3SS19, CF3SS20, CF3SS21, CF3SS22, CF3SS23, and CF3SS24
Duplicate samples include: CF3SS10D, CF3SS20D, and CF3SS24D
NP = analayte is not presented in FDEP guidance.
ND = analyte is presented in FDEP guidance but no data is provided.
mg/kg = milligrams per kilograms dry weight.
J = indicates chemical identified by chemist but quantity was estimated.
= these chemicals represent human health chemicals of potential concern (HHCPCs)

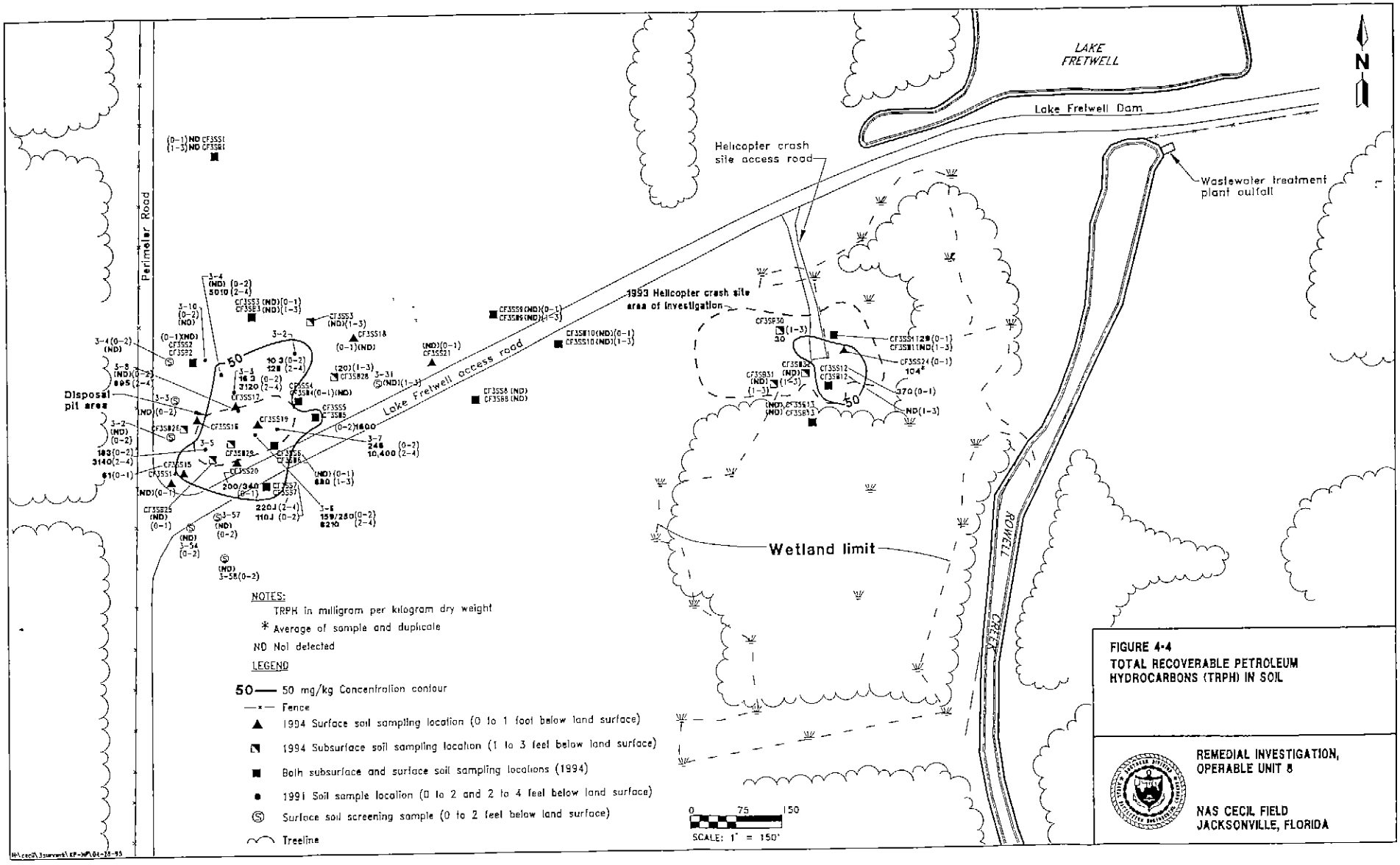


FIGURE 4-4
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) IN SOIL

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Cadmium was not detected in the background soil samples but was detected in 5 of the 24 samples collected at OU 8. Four of the detections were from samples collected within or near the former pit with the highest concentration being 2.6 mg/kg from sample location CF3SS19. The fifth sample was collected topographically downgradient on the north side of the access road at CF3SS9.

Copper was also not detected in the background samples but was detected in 22 of the 24 soil samples at concentrations ranging from 0.48 mg/kg to 42.4 mg/kg. The highest detection of copper (again from CF3SS19) was located within the former pit and the next highest detection (30.7 mg/kg) was also at CF3SS9, topographically downgradient of the former pit.

Lead was detected in all surface soil samples at concentrations ranging from 2.2 mg/kg to 258 mg/kg. The background screening concentration for lead is 9.4 mg/kg and the maximum background concentration was 10.5 mg/kg. The highest concentration of lead was detected in sample CF3SS14 which is located on the southwest side of the disposal pit near Perimeter Road. Only three of the other 23 samples, CF3SS15 (16 mg/kg), CF3SS18 (15.7 mg/kg) and CF3SS19 (12.5 mg/kg), located within the disposal pit, had lead concentrations above the background screening concentration of 9.4 mg/kg.

All concentrations of manganese that exceeded the background screening concentration of 11 mg/kg were detected in samples collected from within or near the former disposal pit. The highest concentration of manganese was 41.5 mg/kg in sample CF3SS18 which is located on the northeast side of the pit boundary. Of the 23 detections of manganese, 6 exceeded the background screening concentration of 11 mg/kg. Five of the six were within or near the disposal pit and the sixth was immediately south of the disposal pit and the access road.

Mercury, silver, and zinc were not detected in any of the background samples but were detected at a low frequency at OU 8. Of these 3 inorganics, zinc was the most common detection (6 detections in 24 samples, with 5 in the disposal pit and 1 at CF3SS9) followed by silver (5 detections in 24 samples, with 4 in the pit and 1 at CF3SS9) and mercury (3 detections in 24 samples, with 2 in the pit and 1 at CF3SS9).

Overall, the inorganic CPCs appear to be most frequently detected within or near the former disposal pit with the highest concentrations often coming from soil samples collected at locations CF3SS14, CF3SS18, and CF3SS19. Surface soil samples collected to the east of the pit area along the access road and near the helicopter crash site typically had inorganic concentrations near or below the background screening concentrations and also had fewer total inorganic CPCs detected. Inorganic CPCs were also detected at CF3SS9 located on the north side of the access road, and topographically 400 to 500 feet downgradient of the disposal pit.

4.2.1.3 **Summary of Analytical Results for Surface Soil** The results of the confirmatory surface soil sampling program indicates the presence of VOCs, SVOCs, pesticides, PCBs, and inorganics.

The most frequent VOC detection was xylene (12 of 24 samples) at concentrations ranging from 3 to 8 μg/kg. All other VOCs had a frequency of detection of 2 out of 24 samples or less and at concentrations below 5 μg/kg.

Several SVOCs were detected in surface soil, although no single SVOC was detected in more than 4 of the 24 samples collected. Many of the detected SVOCs are commonly found in fuel and waste oil, of which both were reportedly disposed of at OU 8. Based on the historical operations and the presence of SVOCs in surface soil primarily near or within the pit area, it appears the source of the SVOCs is the former OU 8 waste disposal operation.

Few pesticides and one PCB were detected in surface soil. The detections cannot be linked to the disposal operations at OU 8 and are most likely the result of former basewide pesticide application and use of oil containing PCBs for dust control along unpaved (dirt) roads.

Nine inorganics were identified as CPCs by the risk assessment. All of these inorganics exceeded the background screening concentrations in at least one sample. Antimony, cadmium, copper, mercury, selenium, silver, sodium, and zinc were detected in OU 8 surface soil but were not detected in any background soil samples. The inorganic CPCs appear to be most frequently detected (and with the highest concentrations) within or near the former disposal pit. One surface soil sample (CF3SS9), collected 400 to 500 feet to the east of the pit area along the north side of the Lake Fretwell access road, also had CPCs above the background screening level. The helicopter crash site typically had inorganic concentrations near or below the background screening concentrations and also had fewer total inorganic CPCs detected.

4.2.2 Subsurface Soil Subsurface soil samples were collected during the 1991 investigation and both screening and confirmatory sampling programs were conducted during the 1993 to 1994 investigation. The results of the 1991 subsurface soil investigation will be used in conjunction with the 1994 data to provide a more complete picture of subsurface soil conditions. The 1991 samples were collected to 4 feet bls and due to a higher water table the 1994 samples were collected to only 3 feet bls. The results of the current investigation screening program were used to approximate the extent of subsurface soil contamination for the selection of confirmatory samples. Results of the subsurface soil screening program are presented in Appendix D.

A total of 16 subsurface soil samples were collected from 8 soil borings during the 1991 investigation. Two samples were collected from each boring, the first from 0 to 2 feet bls and the second from 2 to 4 feet bls.

The confirmatory subsurface soil sample locations were selected based on the results of the screening program. The 21 confirmatory subsurface soil sample locations were selected jointly between representatives from the USEPA, FDEP, and the Navy during a meeting on November 9, 1994.

4.2.2.1 Organic Compounds in Subsurface Soil

Field Screening Sample Results. An extensive subsurface soil screening program was conducted during the 1993 to 1994 field program. The results of the subsurface soil screening program identified two areas of subsurface soil contamination: the historical pit area, and the helicopter crash site area. These two areas were also areas that were identified to have surface soil contamination present. The results of the subsurface screening program are presented in Appendix D.

Subsurface soil detections primarily consisted of solvents. The solvent with the highest concentration in the historical pit area was 1,2-dichlorobenzene (1,2-DCB) at 130 µg/kg (location 3-5 from 8 to 10 feet bls). 1,2-DCB also had the highest detected concentration (11 µg/kg at location 3-40 from 6 to 8 feet bls) at the helicopter crash site area.

1991 and 1994 Subsurface Soil Sample Results. By combining the 1991 and 1994 data sets, a data set of 37 subsurface soil samples was created for this assessment. The 1994 confirmatory organic analytical data set for subsurface soil is found in Appendix M and the 1991 data in Appendix A. Both sets of data are summarized in Table 4-3 and the distribution of the organic detections for both data sets is presented in Figure 4-3.

VOCs in Subsurface Soil. Eleven VOCs were detected in the subsurface soil at OU 8. The detections included the solvents 1,1 DCA, 1,1 DCE, 1,2 DCE, and TCE; petroleum related compounds ethylbenzene, toluene, and xylene; chloroform and carbon disulfide; and compounds that are often laboratory artifacts including 2-butanone, and methylene chloride.

The most frequently detected VOCs were toluene and xylene. These two VOCs, both common components in fuel, were generally detected from within and around the pit area. The highest detection of toluene was 190 µg/kg and xylene was 21 µg/kg.

The chlorinated solvent detections were primarily in the samples collected near the helicopter crash site with only one detection (TCE at 21 J µg/kg in CF-3-BOR-3 from 2 to 4 feet bls) near the pit area. The detection of solvents near the helicopter crash site is believed to be the result of these compounds volatilizing from groundwater, which typically ranges from 1 to 3 feet bls.

SVOCs in Subsurface Soil. Sixteen SVOCs were detected in subsurface soil samples. Of the SVOCs detected, only 1,4 dichlorobenzene and bis (2-ethylhexyl) phthalate were detected in more than two samples. Since several SVOCs were detected sporadically at OU 8, the discussion of the SVOC results will be presented as total SVOCs.

The highest concentration of total SVOCs (7,280 µg/kg) was detected in soil boring CEF-3-BOR-6 at a depth of 2 to 4 feet bls and is located within the former disposal pit. The bulk of total SVOCs at this location (6,800 µg/kg) was from bis(2-ethylhexyl)phthalate (BEP). The next three highest detections of total SVOCs were at CF-3-BOR-8 (3,400 µg/kg from 2 to 4 feet bls), CF-3-SB-6 (3,000 µg/kg from 1 to 3 feet bls), and CF-3-BOR-4 (1,400 J µg/kg from 2 to 4 feet bls). It should be noted that the only SVOC that contributes to these three total SVOC detections is BEP. Although BEP is a common laboratory contaminant, it was found in the 1991 and 1994 samples and in the presence of other contaminants which are considered to be waste related. Based on the disposal operations at OU 8, it is not apparent what may be the source of BEP. The remaining detections of total SVOCs within the disposal pit area were all less than 1,000 µg/kg.

All concentrations of total SVOCs in samples collected from the helicopter crash site were 38 µg/kg or less and are presented on Figure 4-3.

TRPH in Subsurface Soil. TRPH was detected in 20 of the 37 subsurface soil samples. The maximum concentration (10,400 mg/kg at 2 to 4 feet bls) was in soil boring CEF-3-BOR-7 which is located within the disposal pit. The distribution

Table 4-3
Subsurface Soil Organics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations(*)[2]	Mean of Detected Concentrations[3]	FDEP Cleanup Goals Based on Leachability[4]
Volatiles (µg/kg)					
1,1-Dichloroethane	1/37	5 - 760	3 J	3	NP
1,1-Dichloroethene	3/37	5 - 760	18 - 23	20	NP
1,2-Dichloroethene (total)	3/37	5 - 760	12 - 18	15	NP
2-Butanone	4/37	5 - 1,500	3 J - 16	8	878
Carbon disulfide	4/37	5 - 760	1 J - 2	2	NP
Chloroform	2/37	5 - 760	550 - 560	555	NP
Ethylbenzene	2/37	5 - 760	3 J - 3.5*	3.3	72.7
Methylene chloride	3/37	5 - 760	4 J - 5	5	1.13
Toluene	8/37	5 - 760	1 J - 190	30	NP
Trichloroethene	5/37	5 - 760	5 - 270	80	1.46
Xylenes (total)	9/37	5 - 760	2 J - 21	6	14.1
Semivolatiles (µg/kg)					
1,4-Dichlorobenzene	3/37	330 - 3,300	26 J - 30 J	27	NP
2-Nitroaniline	1/37	970 - 16,000	26 J	26	NP
3-Nitroaniline	1/37	970 - 16,000	82 J	82	NP
4-Nitroaniline	1/37	970 - 16,000	40 J	40	NP
4-Nitrophenol	1/37	970 - 16,000	58 J	58	NP
Benzo (a) anthracene	1/37	330 - 3,300	23 J	23	11,000
Benzo (a) pyrene	1/37	330 - 3,300	55 J	55	2,200
Benzo (b) fluoranthene	2/37	330 - 3,300	32 J - 88 J	60	4,400
Benzo (g,h,i) perylene	1/37	330 - 3,300	87 J	87	32,000
Benzo (k) fluoranthene	1/37	330 - 3,300	79 J	79	4,400
Chrysene	1/37	330 - 3,300	31 J	31	2,000
Di-n-butylphthalate	2/37	330 - 3,300	760 - 800	780	NP
Fluoranthene	2/37	330 - 3,300	30 J - 480	255	21,300
Indeno (1,2,3-cd) pyrene	1/37	330 - 3,300	59 J	59	24,000
Pyrene	1/37	330 - 3,300	42 J	42	16,000
bis(2-Ethylhexyl) phthalate	15/37	330 - 3,900	38 J - 6,800	1,110	NP
Pesticides/PCBs (µg/kg)					
4,4-DDE	2/37	4 - 38	0.78 J - 1.4 J	1.1	880
Endosulfan II	2/37	0.2 - 38	0.13 J - 0.41	0.27	NP
Endrin	1/37	4 - 38	1.6* J	1.6	7.19
alpha-BHC	1/37	2.1 - 19	39	39	NP
alpha-Chlordane	1/21	2 - 2.85	0.41 J	0.41	560
delta-BHC	1/37	2.1 - 19	1.2 J	1.2	NP
gamma-BHC (Lindane)	1/37	2.1 - 19	24	24	NP
gamma-Chlordane	1/37	2 - 190	0.47 J	0.47	560

See notes at end of table.

Table 4-3 (Continued)
Subsurface Soil Organics Summary

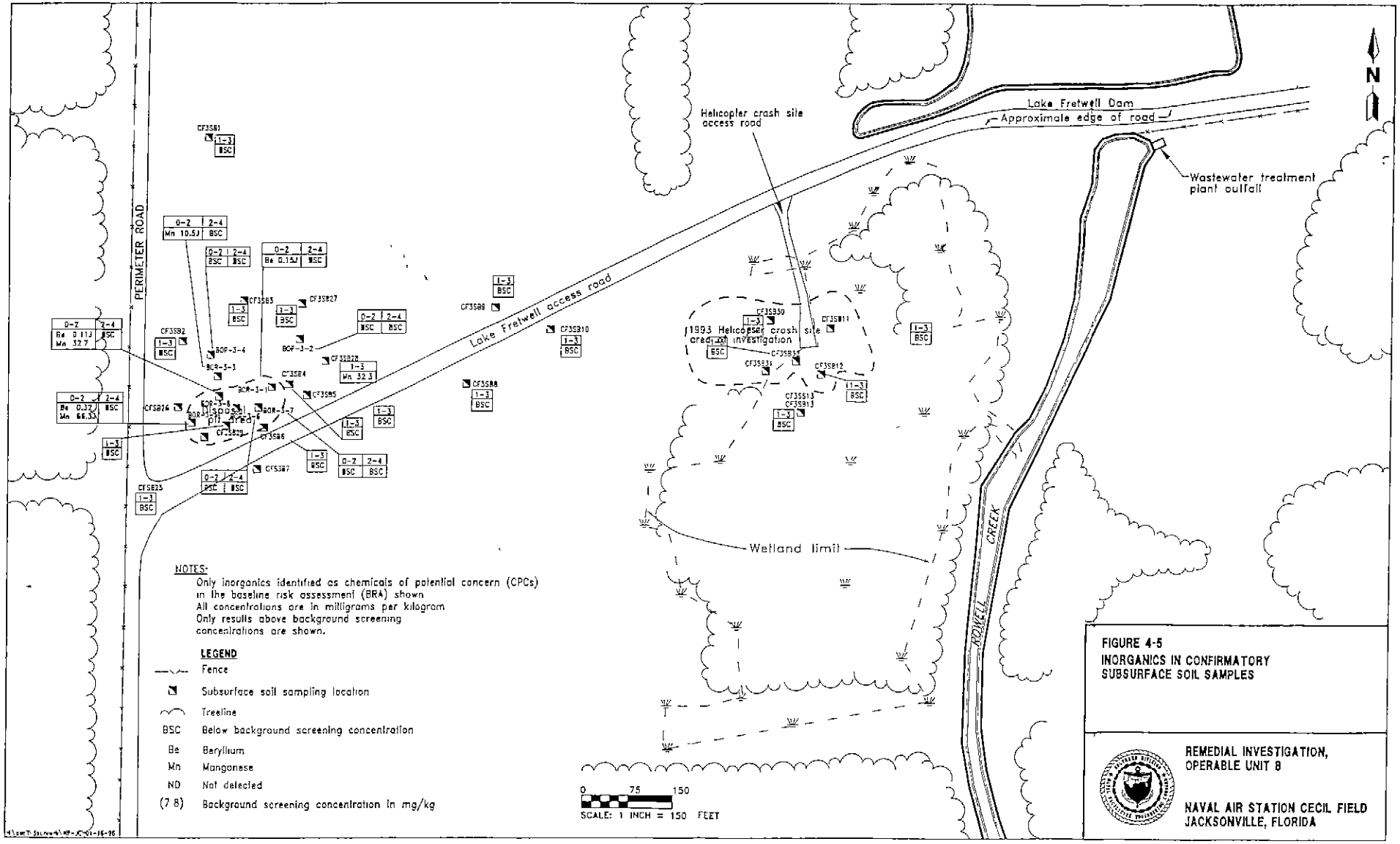
Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations(*)[2]	Mean of Detected Concentrations[3]	FDEP Cleanup Goals Based on Leachability[4]
Total Recoverable Petroleum Hydrocarbons (mg/kg)					
	7/21	12 - 130	20 - 1,600	344	NP

[1] Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected values).
[2] Value indicated by asterisk is the average of a sample and its duplicate.
[3] The mean of detected concentrations is the arithmetic mean of all samples in which the analyte was detected; it does not include those samples with a "U" or "UJ" validation qualifier for that analyte.
[4] Florida Department of Environmental Protection (FDEP) memorandum dated July 5, 1994. Values presented are the lesser of the cleanup goals based on leachability.

Notes: The average of a sample and its duplicate is used for all table calculations.

Sample locations include: BOR3-1-1, BOR3-1-2, BOR3-2-1, BOR3-2-2, BOR3-3-1, BOR3-3-2, BOR3-4-1, BOR3-4-2, BOR3-5-1, BOR3-5-2, BOR3-6-1, BOR3-6-2, BOR3-7-1, BOR3-7-2, BOR3-8-1, BOR3-8-2, CF3SB1, CF3SB2, CF3SB3, CF3SB4, CF3SB5, CF3SB6, CF3SB7, CF3SB8, CF3SB9, CF3SB10, CF3SB11, CF3SB12, CF3SB13, CF3SB25, CF3SB26, CF3SB27, CF3SB28, CF3SB29, CF3SB30, CF3SB31, and CF3SB32
Duplicate samples include: BOR3-6-1D, CF3SB10D, CF3SB27D, and CF3SB32D
NP = analayte is not presented in FDEP guidance.
ND = analyte is presented in FDEP guidance but no data is provided.
µg/kg = micrograms per kilograms dry weight.
J = indicates chemical identified by chemist but quantity was estimated.
= these chemicals represent human health chemicals of potential concern (HHCPCs).



NOTES:

Only inorganics identified as chemicals of potential concern (CPCs) in the baseline risk assessment (BRA) shown
All concentrations are in milligrams per kilogram
Only results above background screening concentrations are shown.

LEGEND

—\/—	Fence
◥	Subsurface soil sampling location
⌒	Treeline
BSC	Below background screening concentration
Be	Beryllium
Mn	Manganese
ND	Not detected
(7.8)	Background screening concentration in mg/kg

FIGURE 4-5
INORGANICS IN CONFIRMATORY SUBSURFACE SOIL SAMPLES

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

of TRPH in soil is presented in Figure 4-4. Since samples were collected from overlapping intervals (i.e., 1 to 3 feet bls and 2 to 4 feet bls) and the current water table is approximately 3 feet bls, all detections of TRPH in soil are presented in Figure 4-3. Surface soil samples from the 1994 investigation and selected surface soil screening samples were also used when necessary to define the distribution of TRPH in soil. If two TRPH values were present for the same location, the higher of the two values was used when contouring the TRPH concentrations.

The FDEP guidance value of 50 mg/kg for thermally treated petroleum-contaminated soil was exceeded in 13 of the 20 samples that detected TRPH. The majority of the TRPH detections greater than 50 mg/kg were from samples collected from within the pit boundary. TRPH was also detected in boring CF-3-SB-30 (1 to 3 feet bls) at the helicopter crash site, with a concentration of 30 mg/kg.

Pesticides and PCBs in Subsurface Soil. Few pesticides and no PCBs were detected in subsurface soil at OU 8. Sporadic detection of pesticides, including 4,4-DDE, endosulfan II, endrin, alpha-chlordane, gamma-chloradane, alpha-BHC, delta-BHC, and gamma-BHC were observed in subsurface soil samples at OU 8. The only pesticides that were detected in more than one of the 37 subsurface soil samples were 4,4 DDE and endosulfan II. 4,4 DDE was detected in 2 of 37 samples at a maximum concentration of 1.4 J μg/kg in boring CF-3-SB-11 from 1 to 3 feet bls. Endosulfan II was also detected in only 2 of 37 samples with a maximum concentration of 0.41 J μg/kg at a depth of 1 to 3 feet bls in boring CF-3-SB-2. Due to the low frequency of detection and sporadic distribution, these pesticide detections are most likely the result of previous basewide use of pesticides and not the result of waste disposal operations at OU 8.

4.2.2.2 **Inorganic Analytes in Subsurface Soil** Confirmatory Sample Results. The confirmatory inorganic chemical analysis results for subsurface soil are summarized in Table 4-4, and shown on Figure 4-5. The background screening concentrations for inorganics in subsurface soil are also presented in Table 4-4.

Twenty-two TAL inorganic analytes were detected in the subsurface soil at OU 8. Due to the natural occurrence and widespread distribution of these inorganics, only those identified as CPCs in the human health risk assessment will be discussed in this section.

The CPCs identified for OU 8 subsurface soil in the human health risk assessment included beryllium and manganese. Although only two CPCs were identified in the baseline risk assessment, other inorganics exceeded the background screening concentrations for OU 8. Inorganic analytes that exceeded the background subsurface soil concentration but were not CPCs included barium, calcium, chromium, copper, magnesium and nickel. Antimony, cadmium, cyanide, selenium, silver, and zinc were not detected in the subsurface soil background set but were detected in at least one sample collected from OU 8. The distribution and concentration of inorganic CPCs, beryllium and manganese, are shown in Figure 4-5. A brief summary of the inorganic CPC detections is presented in the following paragraphs.

Beryllium was detected in 3 of the 37 subsurface soil samples collected at OU 8. All three beryllium detections were from samples collected from within the pit boundary during the 1991 investigation. The beryllium concentrations ranged from

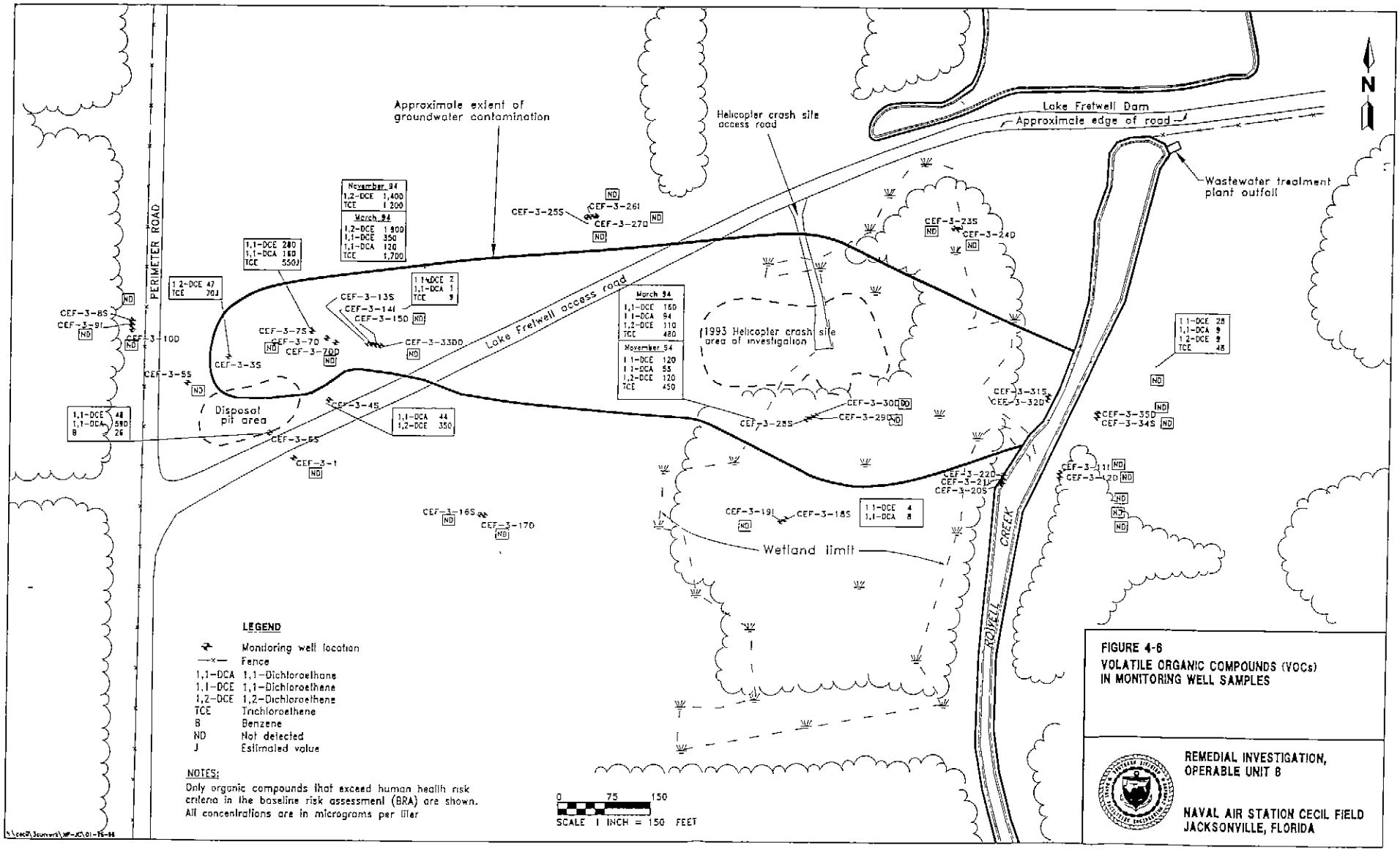


FIGURE 4-6
VOLATILE ORGANIC COMPOUNDS (VOCs) IN MONITORING WELL SAMPLES

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

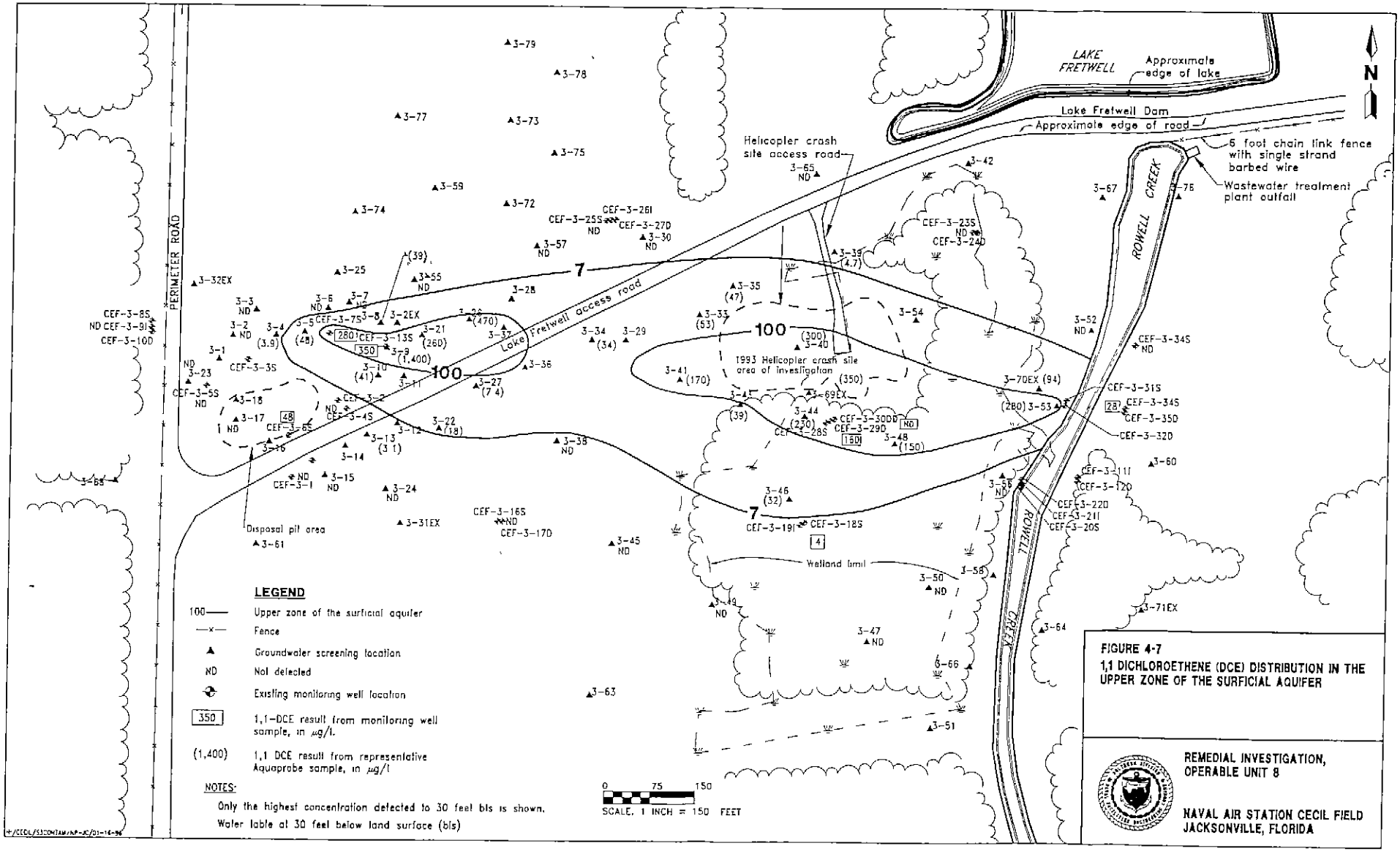


FIGURE 4-7
1,1 DICHLOROETHENE (DCE) DISTRIBUTION IN THE UPPER ZONE OF THE SURFICIAL AQUIFER

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Table 4-4
Subsurface Soil Inorganics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations (*)[2]	Mean of Detected Concentrations[3]	Screening Background Concentration[4]	Maximum Background Concentration	FDEP Cleanup Goals Based on Leachability[5]
Inorganics (mg/kg)							
Aluminum	37/37	40 - 40	465 - 3,100	1,190	11,200	15,600	ND
Antimony	2/37	12 - 12	0.99 J - 2.5 J	1.7	ND	ND	NP
Arsenic	13/37	2 - 20	0.094 J - 1.1 J	0.2	1.6	0.98	ND
Barium	30/37	40 - 40	0.47 J - 32.5 J	3.7	15.4	12.2	NP
Beryllium	3/37	1 - 1	0.11 J - 0.32 J	0.19	ND	ND	NP
Cadmium	4/37	1 - 1	0.33 J - 2.6	1.1	ND	ND	ND
Calcium	32/37	1,000 - 1,000	74 J - 235,000	8,550	320	277	NP
Chromium	20/37	2 - 2	0.81* J - 28.1	3.6	15	17.4	ND
Copper	20/37	5 - 5	0.5 J - 19.4	2.7	1.2	0.58	ND
Cyanide	1/37	0.5 - 2	1.3	1.3	ND	ND	NP
Iron	37/37	20 - 20	75.6 - 1,050	313	2,840	5,660	ND
Lead	29/37	0.6 - 1	0.8 - 7.4	2.5	13.2	18.8	ND
Magnesium	33/37	1,000 - 1,000	16.9 J - 1,620	140	268	256	NP
Manganese	32/37	3 - 3	1 J - 66.3	7	7.8	4.5	ND
Mercury	9/37	0.1 - 0.1	0.036 J - 0.21	0.07	1.1	0.55	NP
Nickel	8/37	8 - 8	0.63 J - 19.1	3.8	5.4	3.9	ND
Potassium	16/37	1,000 - 1,000	18.8 J - 143	59	153	158	NP
Selenium	1/37	1 - 1	1.1	1.1	ND	ND	NP
Silver	3/37	2 - 2	0.55 J - 1.4	0.9	ND	ND	NP
Sodium	24/37	1,000 - 1,000	87 J - 160	123	312	225	NP
Vanadium	22/37	10 - 10	0 57 J - 4.5	1.6	15.4	15.1	ND
Zinc	9/37	4 - 4	2.33 J - 36.9	11.7	ND	ND	ND

See notes on following page.

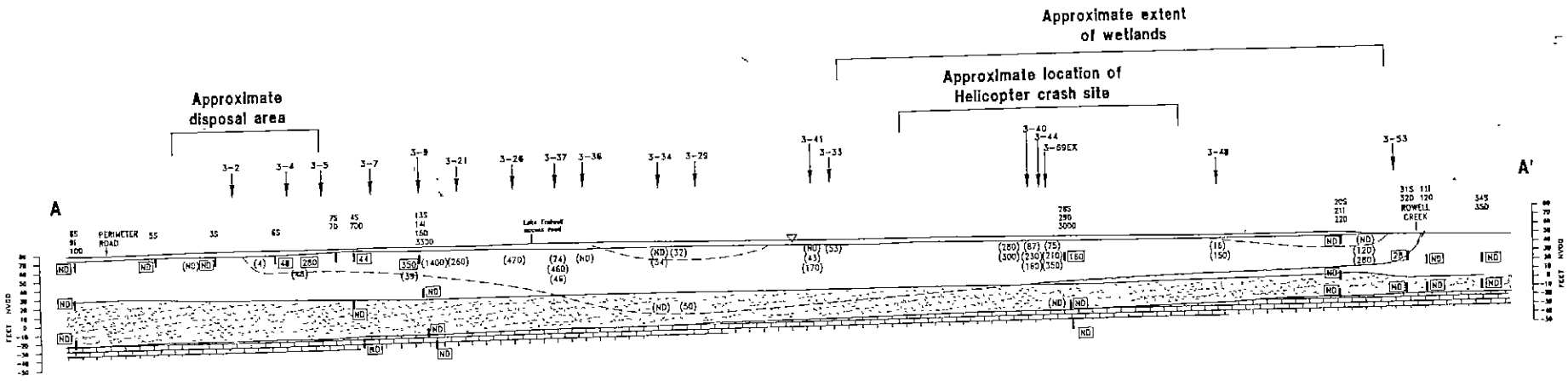
Table 4-4 (Continued)
Subsurface Soil Inorganics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

[1] Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected values).
[2] Value indicated by asterisk is the average of a sample and its duplicate.
[3] The mean of detected concentrations is the arithmetic mean of all samples in which the analyte was detected; it does not include those samples with "U" or "UJ" validation qualifiers for that analyte.
[4] The background screening value is twice the average of detected concentrations for inorganic analytes in background samples.
[5] Florida Department of Environmental Protection (FDEP) memorandum dated July 5, 1994. Values presented are the lesser of the cleanup goals based on leachability.

Notes: The average of a sample and its duplicate is used for all table calculations.

Sample locations include: BOR3-1-1, BOR3-1-2, BOR3-2-1, BOR3-2-2, BOR3-3-1, BOR3-3-2, BOR3-4-1, BOR3-4-2, BOR3-5-1, BOR3-5-2, BOR3-6-1, BOR3-6-2, BOR3-7-1, BOR3-7-2, BOR3-8-1, BOR3-8-2, CF3SB1, CF3SB2, CF3SB3, CF3SB4, CF3SB5, CF3SB6, CF3SB7, CF3SB8, CF3SB9, CF3SB10, CF3SB11, CF3SB12, CF3SB13, CF3SB25, CF3SB26, CF3SB27, CF3SB28, CF3SB29, CF3SB30, CF3SB31, and CF3SB32
Duplicate samples include: BOR3-6-1D, CF3SB10D, CF3SB27D, and CF3SB32D
NP = analayte is not presented in FDEP guidance.
ND = analyte is presented in FDEP guidance but no data is provided.
mg/kg = milligrams per kilograms dry weight.
J = indicates chemical identified by chemist but quantity was estimated.
= these chemicals represent human health chemicals of potential concern (HHCPCs).



LEGEND

Sandy clay, clayey sand, and clay.

Dolomite

Interpreted extent of 1,1-DCE

85 Monitoring well location

Monitoring well screen

3-2 Aquaprobe location

350 1,1 DCE result from monitoring well sample, in micrograms per liter (ug/l).

(48) 1,1 DCE result from representative Aquaprobe sample, in ug/l

NOTE:

See figure 2-5 for location of cross section line A-A'

0 60 120

SCALE: 1" = 120 FEET

FIGURE 4-8
1,1-DICHLOROETHENE (DCE) VERTICAL DISTRIBUTION ALONG FLOWPATH

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

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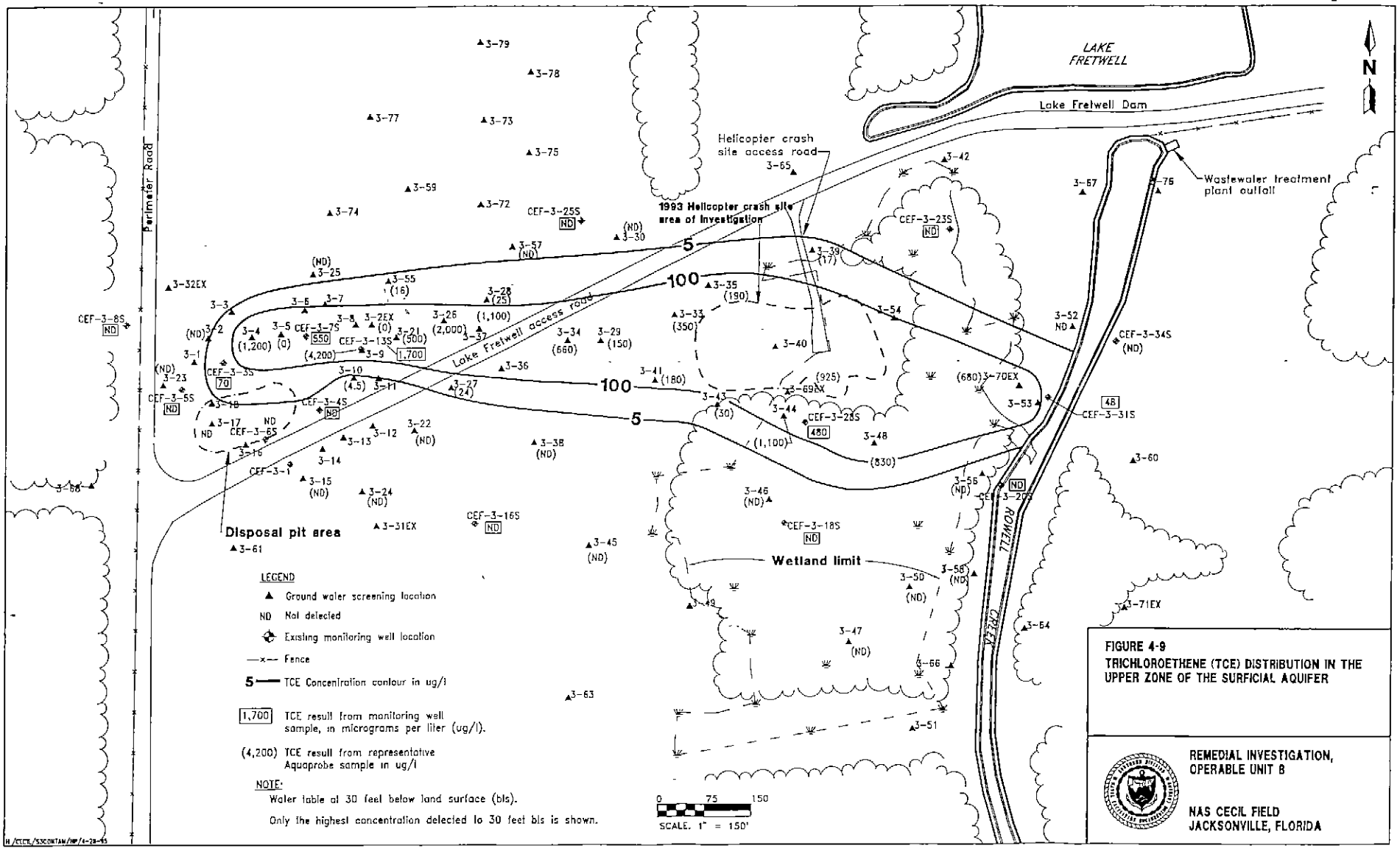


FIGURE 4-9
TRICHLOROETHENE (TCE) DISTRIBUTION IN THE UPPER ZONE OF THE SURFICIAL AQUIFER

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

0.11 to 0.32 mg/kg with the highest concentration being detected in the sample collected from boring BOR-3-5 at a depth of 0 to 2 feet bls. Beryllium was not detected in the background soil samples.

Manganese had a more widespread distribution over OU 8, in that it was detected in 32 of the 37 samples collected. Detections of manganese ranged from 1 mg/kg to 66.3 mg/kg and the background screening concentration was 7.8 mg/kg. Of the 32 manganese detections only 4 were above the background screening concentration of 7.8 mg/kg. All four of these detections were from samples collected from within or along the perimeter of the disposal pit. The highest detection (66.3 mg/kg) was in the sample collected from boring BOR-3-5 in the disposal pit at a depth of 0 to 2 feet bls.

Similar to the distribution of inorganics in surface soil, the detection of inorganics above the background screening concentrations appears to be most prevalent from within or along the perimeter of the former waste disposal pit.

4.2.2.3 **Summary of Analytical Results for Subsurface Soil** The results of the confirmatory subsurface soil sampling program indicates the presence of VOCs, SVOCs, pesticides, PCBs, and inorganics. The distribution of VOCs, SVOCs, and inorganics is generally similar with the highest concentrations located in soil borings near or within the pit area and at the helicopter crash site. Pesticides generally had a more sporadic distribution and low frequency of detection over the site.

The VOC detections were primarily chlorinated solvents and fuel-related VOCs and appear to be related to the previous waste disposal operations at OU 8 and from the volatilization of VOCs in groundwater near the helicopter crash site. The highest chlorinated solvent detected in subsurface soil was TCE at 270 μg/kg from soil boring CEF-3-BOR-6 which is located within the disposal pit boundary.

Several SVOCs were detected in subsurface soil at OU 8. The most commonly detected SVOCs included 1,4-dichlorobenzene and bis(2-ethylhexyl)phthalate. Of these two compounds, bis(2-ethylhexyl)phthalate had the most detections (15) and was detected at the highest concentration (6,800 μg/kg). Similar to VOCs, SVOCs appear to have the highest concentrations in borings within the disposal pit boundary and are most likely present from the past waste disposal operations.

The inorganic CPCs identified for OU 8 subsurface soil in the human health risk assessment included beryllium and manganese. Although only two CPCs were identified in the baseline risk assessment, other inorganics exceeded the background screening concentrations for OU 8. Inorganic analytes that exceeded the background subsurface soil concentration but were not CPCs included barium, calcium, chromium, copper, magnesium, and nickel. Antimony, cadmium, cyanide, selenium, silver, and zinc were not detected in the subsurface soil background set but were detected in at least one sample collected from OU 8. Detections of inorganics above background concentrations were primarily observed in samples collected from borings located within or along the perimeter of the former waste disposal pit.

4.2.3 Groundwater. The following discussion focuses on the significant findings of the groundwater investigation completed to support the RI at OU 8.

Only summaries of the groundwater data generated during the 1993 to 1994 groundwater investigation will be presented in this section. The complete 1993 to 1994 analytical data set for OU 8 is presented as Appendix M. The groundwater results of the 1991 to 1992 field investigation at OU 8 are discussed in Chapter 1.0 and are presented in Appendix A. Other information relating to the groundwater investigation (boring logs, well completion diagrams, water levels, etc.) is also fully presented in appendices.

A total of 37 monitoring wells were installed at OU 8 during field investigations. One of these wells, CEF-3-2 (installed in 1987) was abandoned in 1994 because the screened interval was 30 feet. Current monitoring well protocols consider a 30-foot long screen to be too long to accurately identify and delineate groundwater contamination.

Of the 36 existing wells, 33 are screened in the surficial aquifer and three are screened in the intermediate aquifer (UZH). Of the 33 wells installed in the surficial aquifer, 16 are screened in the shallow zone (UZS water table to approximately 30 feet bls), 6 are screened in the intermediate zone (IZS: 30 to 77 feet bls), and 11 are screened in the deep or lower zone (LZS: 60 to 100 feet bls). One UZS well (CEF-3-8S), one IZS well (CEF-3-9I), and one LZS (CEF-3-10D) are upgradient and are used to document background groundwater conditions. The results of these three wells are summarized in Appendix J and used for comparison to the results of the 30 site wells discussed below.

Discussion of sampling and chemical analysis results is presented by organic and inorganic analytical fractions for each of the surficial and intermediate aquifers. The discussion presents the results from the most recent sampling event (1994). Results of the field screening groundwater samples will be briefly discussed followed by a more detailed discussion of the confirmatory sample results.

4.2.3.1 Organic Analytes in Groundwater

Field Screening Sample Results. The results of the groundwater screening indicate the presence of organic contaminants (predominantly chlorinated solvents) which, based on their distribution, are interpreted to originate from the disposal pit area and migrate toward Rowell Creek with the natural flow of groundwater (Chapter 3.0). The most prevalent contaminants detected include: TCE, 1,1-DCA, 1,2-DCB, 1,1-DCE, and 1,4-DCB. The groundwater screening data are presented in Appendix D and are included, as appropriate, in the following discussion of confirmatory sample chemical analysis results.

Confirmatory Sample Results. The confirmatory organic analytical results for groundwater are summarized in Table 4-5. Chemical analytical results for the volatile fraction are discussed followed by the results of the semivolatile fraction, pesticides, and PCBs.

VOCs in the Surficial Aquifer. Based on the results of the VOC analysis of groundwater from the 30 surficial aquifer wells, 10 VOCS were detected. Of these 10 compounds, five exceeded human health risk criteria (ABB-ES, 1995a): 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethene (1,2-DCE), trichloroethene (TCE) and benzene (ABB-ES, 1995a). The detections of these VOCs are presented in Figure 4-6.

Table 4-5
Surficial Aquifer Groundwater Organics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations(*)[2]	Mean of Detected Concentrations[3]	Federal Primary MCL[4]	Florida Primary MCL[5]	Florida Guidance Concentration[6]
Volatiles (µg/l)							
1,1,1-Trichloroethane	4/30	1 - 170	96 - 860	342	200	200	200
1,1-Dichloroethane	8/30	1 - 170	1 - 590	167	NA	NA	700
1,1-Dichloroethene	8/30	1 - 170	2 - 350	115	7	7	7
1,2-Dichloroethene (total)	4/30	1 - 83	9 - 1,900	520	[8]70	[9]70	[9]70
2-Butanone	3/30	2 - 170	1 J - 25	9	NA	NA	4,200
4-Methyl-2-pentanone	1/30	2 - 170	2	2	NA	NA	350
Acetone	1/30	2 - 550	180	180	NA	NA	700
Benzene	1/30	1 - 83	26	26	5	1	1
Trichloroethene	6/30	1 - 83	9 - 1,700	480	5	3	3
Xylenes (total)	5/30	1 - 170	9 - 150	51	10,000	10,000	10,000
Semivolatiles (µg/l)							
1,2-Dichlorobenzene	4/30	10 - 2,000	350 - 9,800	2,960	600	600	600
1,3-Dichlorobenzene	4/30	10 - 2,000	9 J - 240	75.5	600	NA	10
1,4-Dichlorobenzene	4/30	10 - 2,000	49 - 1,300	400	75	75	75
2,4-Dichlorophenol	1/30	10 - 2,000	5 J	5	NA	NA	30
2,4-Dimethylphenol	3/30	10 - 2,000	0.5 J - 10	4	NA	NA	400
2-Methylnaphthalene	8/30	10 - 2,000	0.8 J - 200	76	NA	NA	NA
2-Methylphenol	2/30	10 - 2,000	8 J - 19	14	NA	NA	350
4-Methylphenol	4/30	10 - 2,000	3 J - 61	20	NA	NA	35
Benzo (b) fluoranthene	1/30	10 - 2,000	3 J	3	0.2	NA	4
Di-n-butylphthalate	1/30	10 - 2,000	0.8 J	0.8	NA	NA	700
Diethylphthalate	2/30	10 - 2,000	1 J - 3 J	2	NA	NA	5,600
Naphthalene	11/30	10 - 2,000	0.6 J - 450	108	NA	NA	6.8
Phenol	7/30	10 - 2,000	0.5 J - 10	3	NA	NA	10
bis(2-Ethylhexyl) phthalate	12/30	10 - 2,000	0.5 J - 61	8	6	6	6
Pesticides/PCBs (µg/l)							
Aroclor-1248	2/30	0.8 - 1	0.6 J - 0.79 J	0.7	0.5	0.5	0.5
Endosulfan II	1/30	0.1 - 0.1	0.04 J	0.04	NA	NA	NA
beta-BHC	1/30	0.03 - 0.08	0.05	0.05	NA	NA	0.1

See notes at end of table.

Table 4-5 (Continued)
Surficial Aquifer Groundwater Organics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

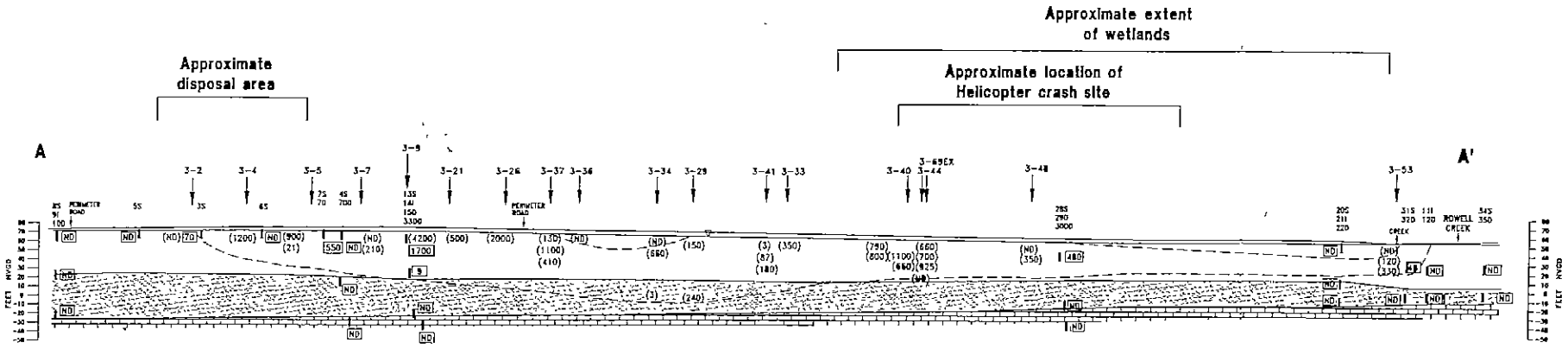
Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations(*)[2]	Mean of Detected Concentrations[3]	Federal Primary MCL[4]	Florida Primary MCL[5]	Florida Guidance Concentration[6]
Total Recoverable Petroleum Hydrocarbons (µg/l)							
	7/30	0.5 - 0.5	425* - 2,100	1,300	NA	NA	NA

[1] Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected values).
[2] Value indicated by asterisk is the average of a sample and its duplicate.
[3] The mean of detected concentrations is the arithmetic mean of all samples in which the analyte was detected; it does not include those samples with a "U" or "UJ" validation qualifier for that analyte.
[4] Federal Primary MCLs are taken from USEPA Drinking Water Regulations and Health Advisories (May 1994).
[5] Florida Primary Standards are taken from Chapter 1 (Primary Standards) of the FDEP Groundwater Guidance Concentrations (June 1995).
[6] Florida Guidance Concentrations are taken form Chapter 6 (Guidance Concentrations Index) of the FDEP Groundwater Guidance Concentrations (June 1994).

Notes: The average of a sample and its duplicate is used for all table calculations.

Sample locations include: CF3MW1, CF3MW3S, CF3MW4S, CF3MW5S, CF3MW6S, CF3MW7D, CF3MW7S, CF3MW11I, CF3MW12D, CF3MW13S, CF3MW14I, CF3MW15D, CF3MW16S, CF3MW17D, CF3MW18S, CF3MW19D, CF3MW20S, CF3MW21I, CF3MW22D, CF3MW23S, CF3MW24D, CF3MW25S, CF3MW26I, CF3MW27D, CF3MW28S, CF3MW29D, CF3MW31S, CF3MW32D, CF3MW34S, and CF3MW35D
Duplicate samples include: CF3MW17DD and CF3MW24DD

µg/kg = micrograms per kilograms dry weight.
NA = not applicable.
J = indicates chemical identified by chemist but quantity was estimated.
= these chemicals represent human health chemicals of potential concern (HHCPCs).



LEGEND

- Sand
- Sandy clay, clayey sand, and clay zone.
- Dolomite
- Interpreted extent of TCE
- 550 TCE result from monitoring well sample, in micrograms per liter (ug/l).
- (48) TCE result from representative aquaprobe sample, in ug/l.
- ND Not detected
- 8S Monitoring well location
- Monitoring well screen

NOTE:

See figure 2-5 for location of cross section line A-A'.

0 60 120

SCALE: 1" = 120 FEET

FIGURE 4-10
TRICHLOROETHENE (TCE) VERTICAL DISTRIBUTION ALONG FLOWPATH

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

H:\CECIL\CROSS-AA\XM\04-25-95

Representative Aquaprobe™ groundwater screening results were included to present as complete a picture as possible with the data generated. Representative Aquaprobe™ results are from sample locations where groundwater was not observed in the drill stem (potentially contaminating or diluting the sample) prior to deploying the four feet of screen and sample collection equipment. To further support the use of groundwater screening data, representative Aquaprobe™ results were compared to Level IV data quality analytical results from nearby monitoring wells and found to show good correlation between the detected concentrations in the UZS.

A comparison of Aquaprobe™ groundwater screening data with nearby monitoring well data is presented in Appendix D.

The VOCs appear to have migrated with the natural flow of groundwater (Chapter 3.0) from the former waste disposal pit area to Rowell Creek. The general groundwater flow direction in the surficial aquifer is to the east-southeast. There is also a downward flow component which is evident at the waste disposal pit area, and continues for approximately 700 to 800 feet downgradient (east-southeast). At this point, the vertical flow gradient becomes upward. Both the vertical and horizontal gradients become increasingly steeper over the remaining 400 feet to Rowell Creek. The pronounced upward gradients indicate that the surficial aquifer discharges to Rowell Creek. No VOC detections were observed on the east side of Rowell Creek, supporting the interpretation that VOC contaminated groundwater in the surficial aquifer discharges into the creek.

Although VOC contaminated groundwater may be discharging into Rowell Creek, no VOC detections in surface water adjacent to the discharge area have been observed. The absence of VOCs in surface water is most likely the result of dilution and volatilization and is further discussed in Chapter 5.0. Chapter 3.0 presents more detail on the hydrogeology and figures showing the interpreted groundwater flow paths in cross section. The following paragraphs summarize the VOC detections and areal and vertical distributions.

1,1-DCE was detected in 8 monitoring wells with a maximum concentration of 350 $\mu g/\ell$ in monitoring well CEF-3-13S. Detections of 1,1-DCE were only observed in wells screened in the UZS to a maximum depth of 31 feet bls. However, 1,1-DCE was detected in representative Aquaprobe 3-29 (50 $\mu g/\ell$) in the 67 to 71 foot blsinterval, approximately 500 feet downgradient of the former waste disposal pit area. At this location, groundwater flow has begun to move upward after flowing downward from the waste pit area. Concentrations of 1,1-DCE in monitoring wells decrease downgradient from the source: 160 $\mu g/\ell$ in CEF-3-28S and 28 $\mu g/\ell$ in CEF-3-31S. The distribution of 1,1-DCE has been shown in more detail with in Figure 4-7 (areal distribution) and Figure 4-8 (vertical distribution).

TCE was detected at concentrations ranging from 9 to 1700 $\mu g/\ell$ in six monitoring wells. The highest TCE concentration was in well CEF-3-13S, which is located in the disposal pit area. Detections of TCE were only in wells screened in the UZS, with the exception of well CEF-3-14I, which is screened in the IZS from 46 to 56 feet bls. However, TCE was detected in representative Aquaprobe™ 3-29 (240 $\mu g/\ell$) in the 67 to 71 foot bls interval, and in representative Aquaprobe™ 3-34 (3 $\mu g/\ell$) in the 72 to 76 foot bls interval, both approximately 500 feet downgradient of the former waste disposal pit area. At this location, groundwater flow has begun

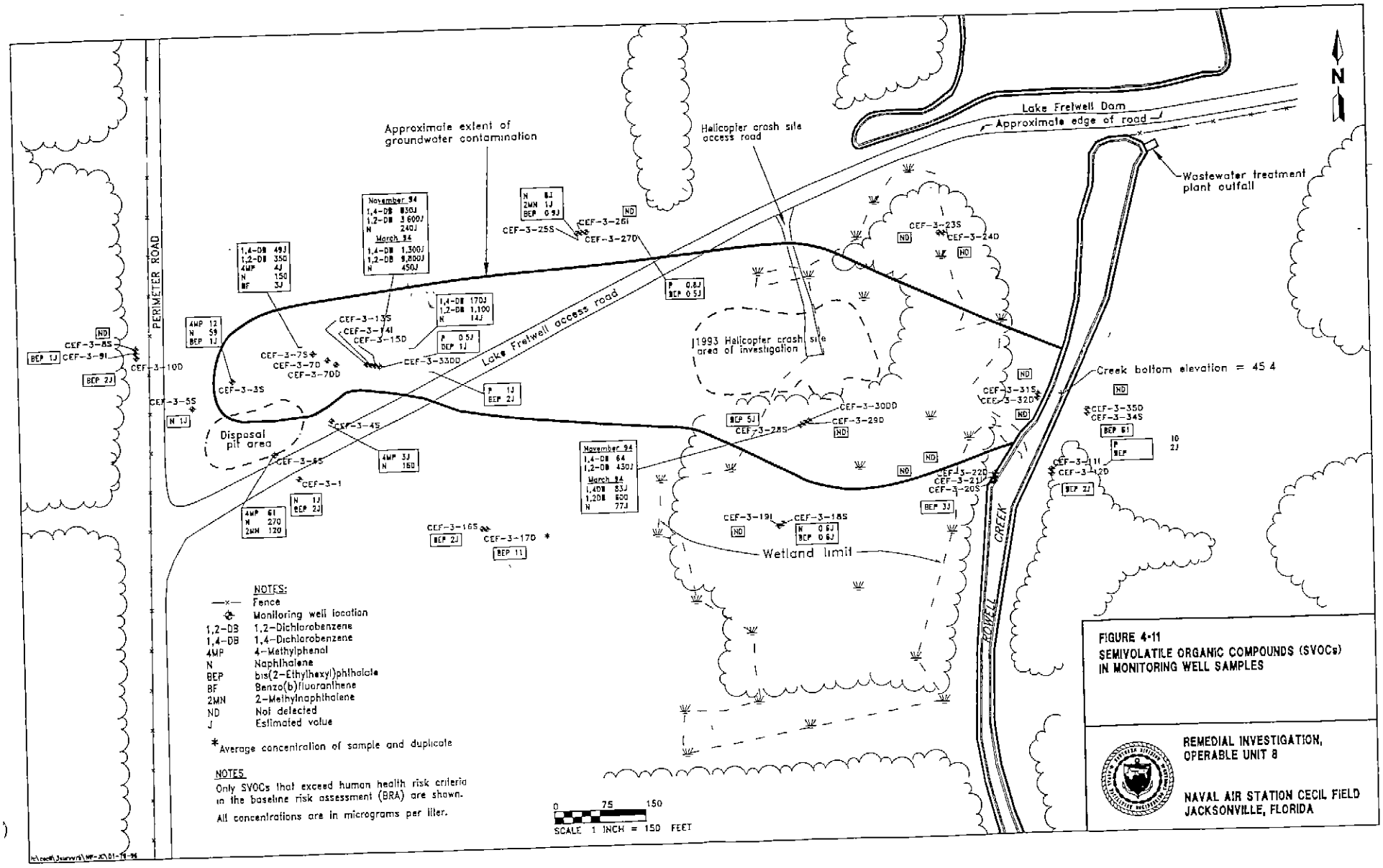
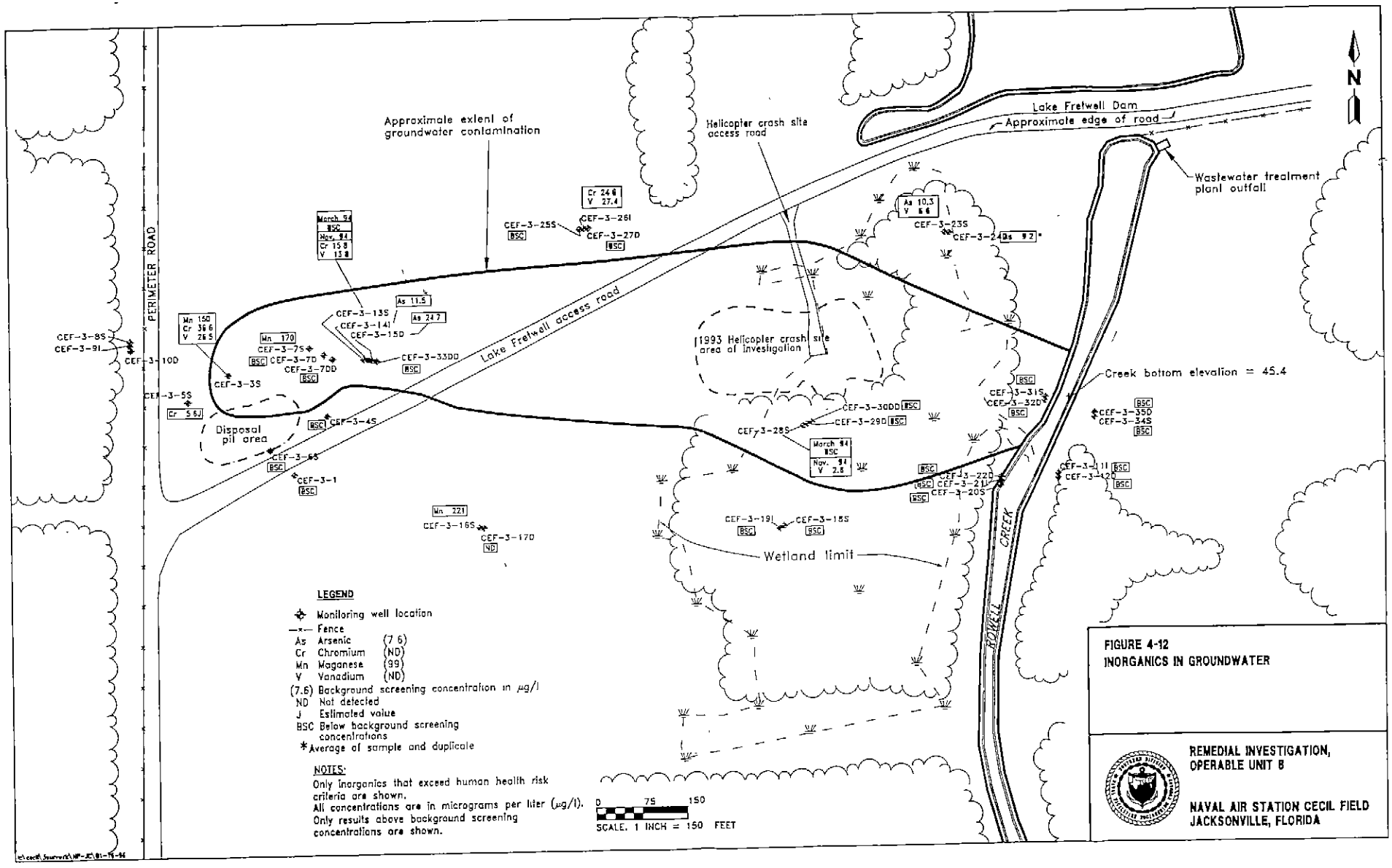


FIGURE 4-11
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs) IN MONITORING WELL SAMPLES

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA



LEGEND

- Monitoring well location
- Fence
- As Arsenic (7.6)
- Cr Chromium (ND)
- Mn Maganese (99)
- V Vanadium (ND)
- (7.6) Background screening concentration in µg/l
- ND Not detected
- J Estimated value
- BSC Below background screening concentrations
- * Average of sample and duplicate

NOTES:

Only inorganics that exceed human health risk criteria are shown.
All concentrations are in micrograms per liter (µg/l).
Only results above background screening concentrations are shown.

0 75 150
SCALE, 1 INCH = 150 FEET

FIGURE 4-12
INORGANICS IN GROUNDWATER

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

to move upward after flowing downward from the waste pit area. The distribution of TCE has been shown in more detail in Figure 4-9 (areal distribution) and Figure 4-10 (vertical distribution).

The VOC 1,2-DCE was detected in four monitoring wells. The maximum concentration of 1,2-DCE was detected in monitoring well CEF-3-13S at 1900 $\mu g/\ell$. Although 1,2-DCE was detected in only five wells, it was distributed the entire length of the groundwater contaminant plume from CEF-3-3S at the source area to CEF-3-31S adjacent to Rowell Creek. These detections were also only observed in the shallow UZS wells.

1,1-DCA was detected in eight monitoring wells with concentrations ranging from 1 to 590 $\mu g/\ell$. All detections of 1,1-DCA were in monitoring wells that are screened in the UZS (less than 30 feet bls) with the exception of one well, CEF-3-14I, which is screened in the IZS from 46 to 56 feet bls where the 1,1 DCA concentration was 1 $\mu g/\ell$. The highest detection of 1,1-DCA was in monitoring well CEF-3-6S, which is located in the disposal pit area. The concentration of 1,1-DCA decreases downgradient of the disposal pit area as seen in CEF-3-28S (94 $\mu g/\ell$) and further downgradient near Rowell Creek in CEF-3-31S (9 $\mu g/\ell$).

Benzene was only detected in one well, CEF-3-6S, at a concentration of 26 $\mu g/\ell$. This well is located in the disposal pit area and is screened between 3.5 and 13.5 feet bls.

<u>SVOCs in the Surficial Aquifer</u>. Based on the results of SVOC analyses of groundwater from the 30 surficial aquifer wells, 14 compounds were detected. A summary of all detected SVOCs is presented in Table 4-5. Of these 18 compounds, 6 exceeded the human health risk criteria (ABB-ES, 1995a): 1,2-dichlorobenzene (1,2 DCB); 1,4-dichlorobenzene (1,4 DCB); benzo(b)fluoranthene; naphthalene; 4-methylphenol; and bis(2-ethylhexyl)phthalate. The detections of these SVOCs are presented in Figure 4-11.

The detection of SVOCs has been observed to extend from the disposal pit area to approximately 1,400 feet downgradient toward Rowell Creek. However, the detections of SVOCs that contribute to the risk were only observed at the source area and in monitoring wells (CEF-3-18S and CEF-3-28S) approximately 900 feet downgradient. SVOCs were detected on the east side of Rowell Creek but are interpreted to be unrelated to the pit area because groundwater on the east side of Rowell Creek is moving to the west and discharging into Rowell Creek. The following paragraphs summarize the SVOC detections and distribution.

1,2-DCB and 1,4-DCB were detected in 4 (CEF-3-7S, CEF-3-13S, CEF-3-14I, and CEF-3-28S) of the 30 surficial aquifer monitoring wells. The highest concentrations were 9,800 $\mu g/\ell$ and 1,300 J $\mu g/\ell$, respectively, in the disposal pit area monitoring well CEF-3-13S which is screened from 9 to 19 feet bls. Monitoring well CEF-3-14I, screened in the cluster with CEF-3-13S from 46 to 56 feet bls, also contained both dichlorobenzenes, but at a lower concentrations (1,100 $\mu g/\ell$ and 170 J $\mu g/\ell$, respectively). The dichlorobenzenes were not observed in any well below a depth of 56 feet. The farthest downgradient detection was in well CEF-3-28S at 600 $\mu g/\ell$ and 83 J $\mu g/\ell$, respectively. This well is approximately 900 feet downgradient of the disposal pit area.

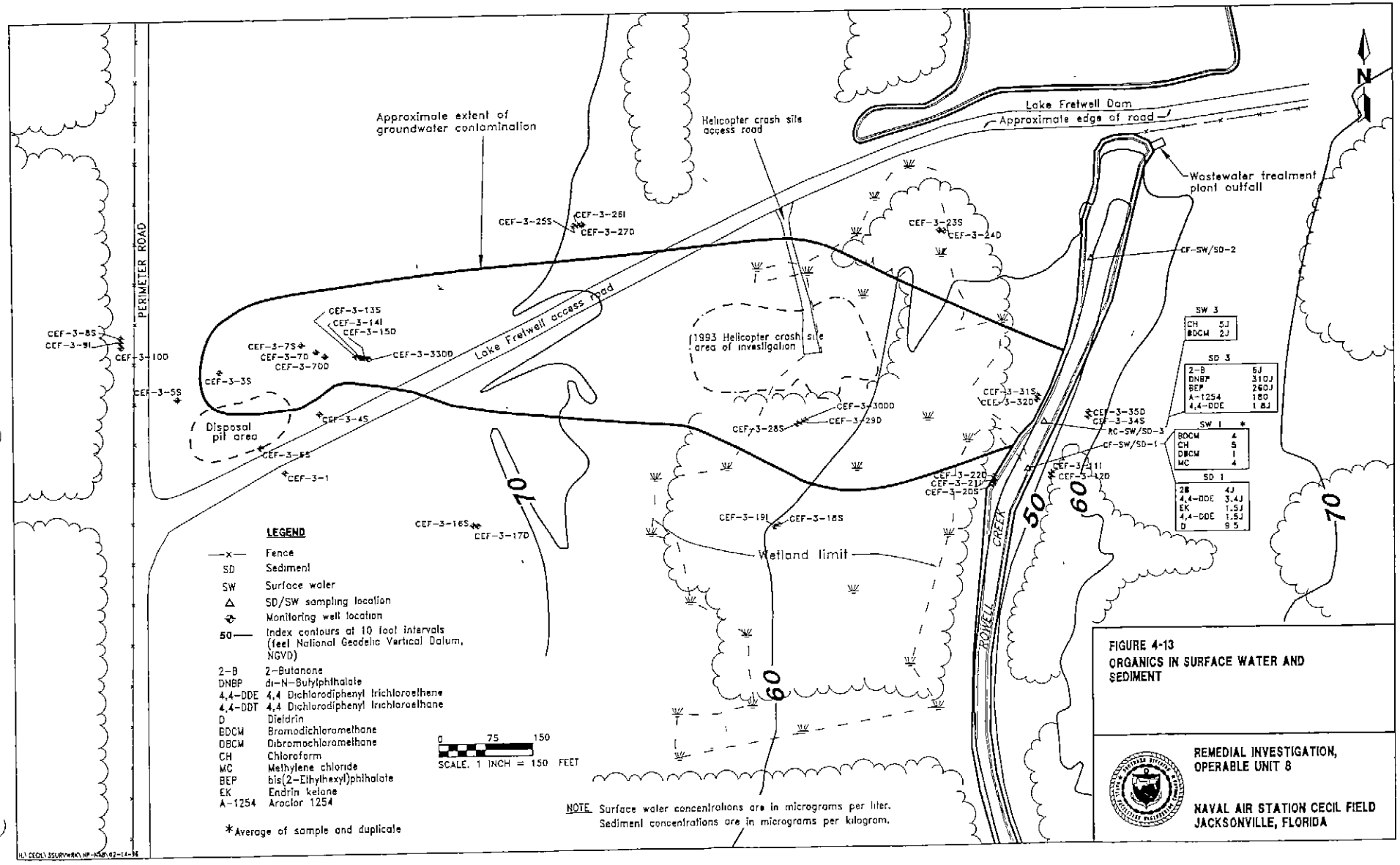


FIGURE 4-13
ORGANICS IN SURFACE WATER AND SEDIMENT

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

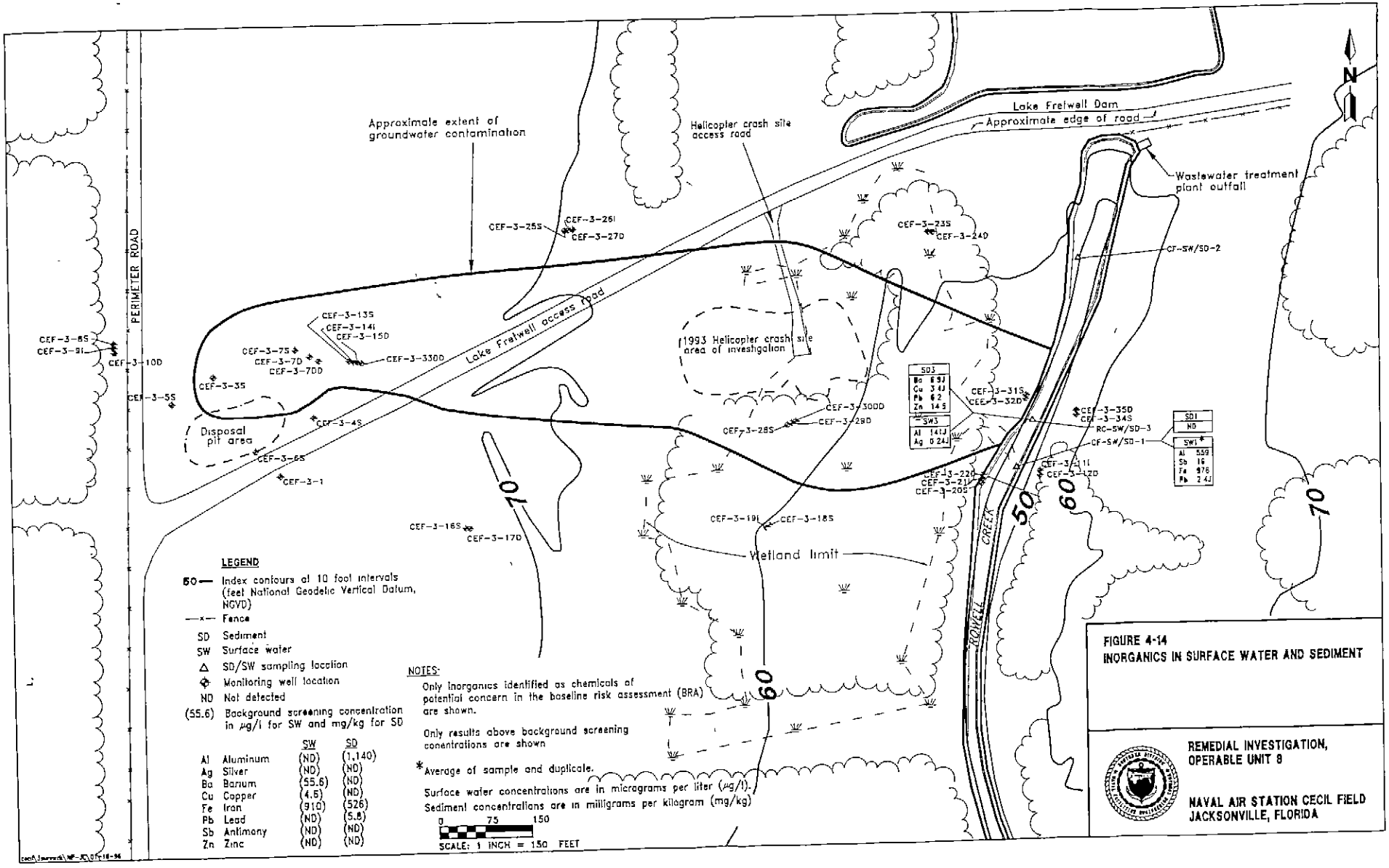


FIGURE 4-14
INORGANICS IN SURFACE WATER AND SEDIMENT

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Benzo(b)fluoranthene was detected in only one groundwater sample, CEF-3-7S, at a concentration of 3 J $\mu g/\ell$. It was detected at the disposal pit area and is most likely related to waste oil and fuel disposal at OU 8.

Naphthalene was one of the most widespread SVOCs detected at OU 8. Eleven of the 33 surficial wells contained naphthalene at concentrations ranging from 0.6 to 450 $\mu g/\ell$. The highest detections were observed in the disposal pit area UZS wells CEF-3-4S (160 $\mu g/\ell$), CEF-3-6S (270 $\mu g/\ell$), CEF-3-7S (150 $\mu g/\ell$), and CEF-3-13S (450 J $\mu g/\ell$). Naphthalene was detected approximately 900 feet downgradient in monitoring wells CEF-3-18S (0.6 J $\mu g/\ell$) and CEF-3-28S (77 J $\mu g/\ell$) but was not detected in any wells further downgradient near Rowell Creek. The source of naphthalene is most likely from waste oil and fuel disposed of at OU 8.

4-Methylphenol was detected in four monitoring wells, all of which are located in the disposal pit area. The highest detection was observed in well CEF-3-6S at 61 $\mu g/\ell$.

Bis(2-ethylhexyl)phthalate (BEP), a common laboratory contaminant, was the most widely detected SVOC. The highest detection of BEP was 61 $\mu g/\ell$ in well CEF-3-34S, which is on the east side of Rowell Creek and cannot be hydraulically linked to the disposal pit area. The highest concentration of BEP on the west side of Rowell Creek was 13 $\mu g/\ell$ in the duplicate sample from CEF-3-17D. This well is screened from 84 to 94 feet bls and, based on the conceptual understanding of groundwater flow at OU 8 and the absence of other organic contaminants known to migrate from the disposal pit, it does not appear that this detection is related to the disposal pit area.

Pesticides and PCBs in the Surficial Aquifer. The pesticides Endosulfan II and beta-BHC and the PCB Aroclor-1248 were detected in the groundwater at OU 8. Aroclor-1248 was detected in 2 of the 33 surficial monitoring wells at concentrations of 0.6 J $\mu g/\ell$ (CEF-3-4S) and 0.79 J $\mu g/\ell$ (CEF-3-6S). Both of the wells are located in the disposal pit area and may be related to the waste disposal operations at OU 8 as a contaminant of waste oils.

Organics in the Intermediate Aquifer. The only organic compounds detected in the intermediate aquifer were phenol at 1 J $\mu g/\ell$ and bis(2-ethylhexyl)phthalate at 2 J $\mu g/\ell$. Both of these compounds were detected in well CEF-3-33DD, which is located below the disposal pit area and screened in the dolomite between 108 and 118 feet bls. Both of these compounds were detected at comparably low concentrations in the upgradient background well CEF-3-10D, which is screened from 90 to 100 feet bls, and do not appear to be site related due to the absence of these compounds in the overlying shallow UZS wells near the disposal pit area.

4.2.3.2 **Inorganic Analytes in Groundwater** The organic analytical results for groundwater are summarized with background screening concentrations in Table 4-6.

Inorganic Analytes in the Surficial Aquifer. Based on the results of inorganic chemical analyses of unfiltered groundwater from the 30 surficial aquifer wells, 18 inorganics were detected. Of these 18 inorganics, 4 exceed human health risk criteria (ABB-ES, 1995a): arsenic, chromium, manganese, and vanadium. The distribution of these four inorganics is presented in Figure 4-12.

Arsenic was detected in 12 of the 30 surficial aquifer at concentrations ranging from 1 J $\mu g/\ell$ (CEF-3-9I) to 24.7 $\mu g/\ell$ (CEF-3-13D). However, arsenic was detected

Table 4-6
Surficial Aquifer Groundwater Inorganics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations (*)[2]	Mean of Detected Concentrations[3]	Screening Background Concentration[4]	Maximum Background Concentration	Federal Primary MCL[5]	Florida Primary Standard[6]	Florida Guidance Concentration[7]
Inorganics (µg/ℓ)									
Aluminum	14/30	200 - 200	37.4 J - 47,400	7,560	17,200	15,200	*200	NA	200
Antimony	2/30	60 - 60	4.5 J - 9.2 J	6.9	ND	ND	6	6	6
Arsenic	12/30	10 - 10	1.5 J - 24.7	7.1	7.6	6.6	50	50	50
Barium	30/30	200 - 200	6 J - 312	36	42	29.8	2,000	2,000	2,000
Calcium	29/30	5,000 - 5,000	419 J - 71,300	37,800	47,100	67,200	NA	NA	NA
Chromium	3/30	10 - 10	5.6 J - 36.6	22.3	ND	ND	100	100	100
Cobalt	7/30	50 - 50	9.5 J - 14 J	11.2	20	9.9	NA	NA	NA
Copper	6/30	25 - 25	6.1 J - 73.5	23	ND	ND	*1,000	NA	1,000
Iron	17/30	100 - 100	44.6 J - 36,500	4,490	2,500	1,780	*300	NA	300
Lead	6/30	3 - 3	1 J - 7.6	3	13	6.3	*15	15	15
Magnesium	30/30	5,000 - 5,000	247 J - 24,400	7,020	6,820	5,620	NA	NA	NA
Manganese	22/30	15 - 15	3.6 J - 221	42	99	49.5	*50	NA	50
Nickel	1/30	40 - 40	12.8 J	12.8	38	19	100	100	100
Potassium	29/30	5,000 - 5,000	103 J - 4,600 J	1,544	3,920	1,960	NA	NA	NA
Selenium	1/30	5 - 5	5	5	4	2	50	50	50
Sodium	30/30	5,000 - 5,000	1,920 J - 13,700	8,030	12,400	8,760	NA	160,000	160,000
Vanadium	3/30	50 - 50	6.6 J - 27.4 J	20.2	ND	ND	NA	NA	49
Zinc	9/30	20 - 20	2.1 J - 41.4	12.3	ND	ND	5,000	NA	5,000

See notes at end of table.

Table 4-6 (Continued)
Surficial Aquifer Groundwater Inorganics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations (*)[2]	Mean of Detected Concentrations[3]	Screening Background Concentration[4]	Maximum Background Concentration	Federal Primary MCL[5]	Florida Primary Standard[6]	Florida Guidance Concentration[7]

[1] Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected values).
[2] Value indicated by asterisk is the average of a sample and its duplicate.
[3] The mean of detected concentrations is the arithmetic mean of all samples in which the analyte was detected; it does not include those samples with a "U" or "UJ" validation qualifier for that analyte.
[4] The background screening value is twice the average of detected concentrations for inorganic analytes in background samples.
[5] Federal Primary MCLs are taken from USEPA Drinking Water Regulations and Health Advisories (May 1994).
[6] Florida Primary Standards are taken from Chapter 1 (Primary Standards) of the FDEP Groundwater Guidance Concentrations (June 1995).
[7] Florida Guidance Concentrations are taken from Chapter 6 (Guidance Concentrations Index) of the FDEP Groundwater Guidance Concentrations (June 1994).
[8] Value is a Federal Secondary MCL.
[9] Treatment technology action limit for drinking water distribution systems per "Drinking Water Regulations and Health Advisories", USEPA, Office of Water, December 1993.

Notes: The average of a sample and its duplicate is used for all table calculations.

Sample locations include: CF3MW1, CF3MW3S, CF3MW4S, CF3MW5S, CF3MW6S, CF3MW7D, CF3MW7S, CF3MW11I, CF3MW12D, CF3MW13S, CF3MW14I, CF3MW15D, CF3MW16S, CF3MW17D, CF3MW18S, CF3MW19D, CF3MW20S, CF3MW21I, CF3MW22D, CF3MW23S, CF3MW24D, CF3MW25S, CF3MW26I, CF3MW27D, CF3MW28S, CF3MW29D, CF3MW31S, CF3MW32D, CF3MW34S, and CF3MW35D
Duplicate samples include: CF3MW17DD and CF3MW24DD

$\mu g/\ell$ = micrograms per liter.
J = indicates chemical identified by chemist but quantity was estimated.
= these chemicals represent human health chemicals of potential concern (HHCPCs).
NA = not applicable.

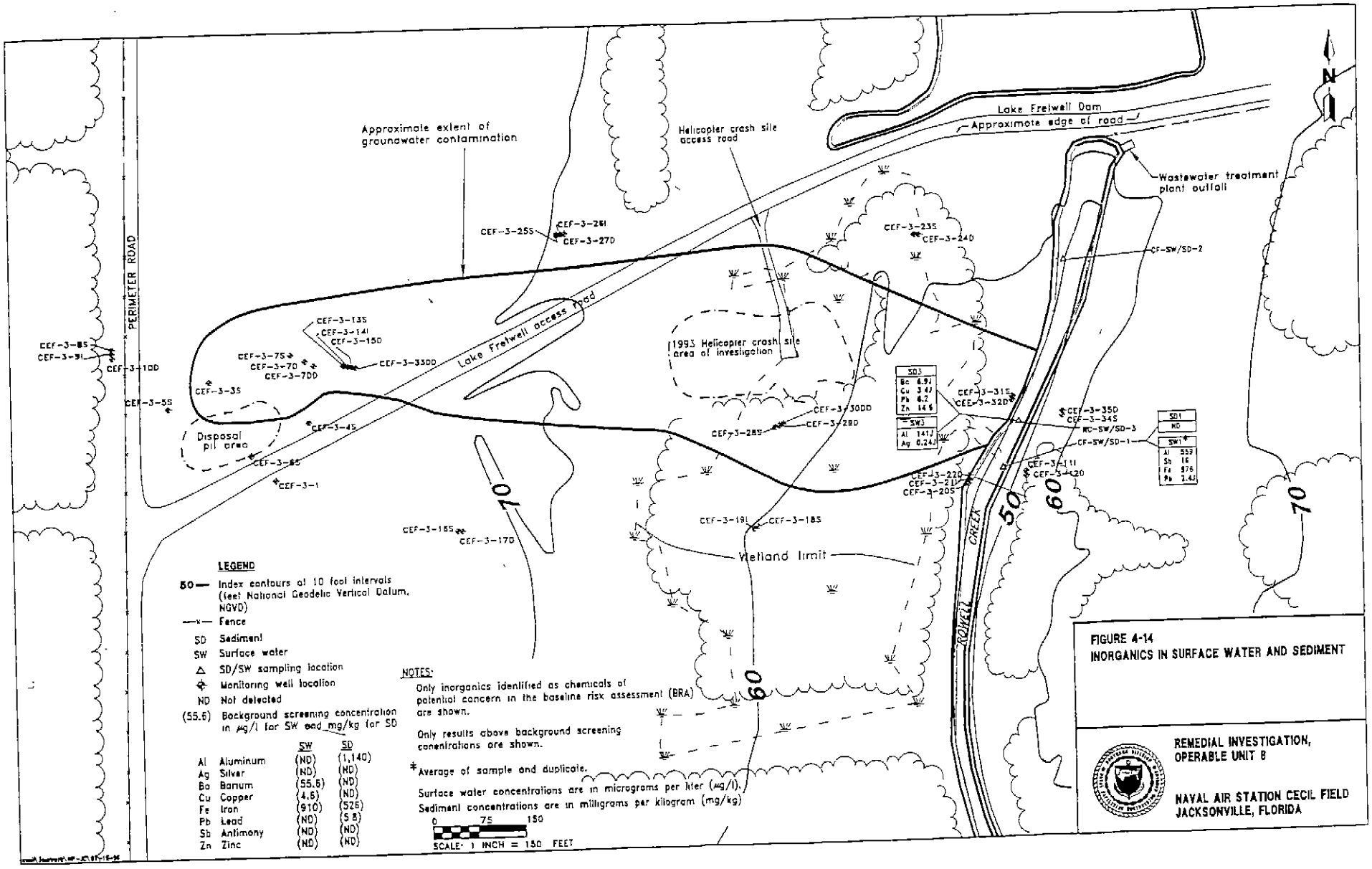


FIGURE 4-14
INORGANICS IN SURFACE WATER AND SEDIMENT

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

above the background screening concentration of 7.6 μg/ℓ in only four wells; CEF-3-15D (24.7 μg/ℓ), CEF-3-14I (11.5 μg/ℓ), CEF-3-23S (10.3 μg/ℓ), and CEF-3-24D (9.2 μg/ℓ, average of sample and duplicate). The highest concentrations of arsenic were observed in the disposal pit area, but in the deeper IZS and LZS wells (CEF-3-14I and CEF-3-15D) as opposed to the highest concentrations of organics being detected in the shallow UZS wells immediately below the disposal pit. Based on its presence in the IZS and LZS background wells, its highest concentrations in the IZS and LZS wells, and relatively low detections in the UZS, arsenic is interpreted to be indigenous to the IZS and LZS portions of the aquifer in this area and not a result of the former waste disposal operations at OU 8.

Manganese was detected in 22 of 30 surficial monitoring wells at concentrations ranging from 3.6 to 221 μg/ℓ. Manganese was detected above the background screening concentration of 99 μg/ℓ in only three wells: CEF-3-16S (221 μg/ℓ), CEF-3-7S (170 μg/ℓ), and CEF-3-3S (150 μg/ℓ). Unlike arsenic, the highest concentrations of manganese were detected in the shallow wells of the UZS near the disposal pit area. The highest detection, 221 μg/ℓ in well CEF-3-16S, is outside the extent of the organic plume and somewhat cross-gradient from the disposal pit area. Manganese was also detected in the upgradient well CEF-3-10D (at 49.5 μg/ℓ) which is screened in the LZS (90 to 100 feet bls) and in many of the downgradient IZS and LZS wells. Due to the widespread distribution of manganese throughout the surficial aquifer and the presence of manganese in an upgradient well, the presence of manganese in groundwater at OU 8 cannot solely be attributed to the source area. Other than at CEF-16S and 17D (south of the organic plume and 350 feet southeast of the disposal pit) all manganese detections higher than upgradient wells were located in the disposal pit area.

Chromium was only detected in three wells, at concentrations ranging from 5.6 to 36.6 μg/ℓ. Chromium was not detected in the background wells. Two of the chromium detections were in shallow UZS wells CEF-3-3S and CEF-3-5S located near the pit area and outside the organic plume. The other detection was in CEF-3-26I which is somewhat cross-gradient from the disposal pit area and outside the organic plume. Because chromium was detected in the shallow wells CEF-3-3S and CEF-3-5S near the disposal pit and at only one other location in the study area, its presence may be related to the disposal pit at OU 8.

Vanadium was also detected in three monitoring wells with a maximum concentration of 27.4 μg/ℓ in well CEF-3-26I. Vanadium was also not detected in the background wells. The two highest detections of vanadium were observed in the disposal pit area wells where organic compounds were also detected. For this reason and the absence of vanadium in other OU 8 wells except CEF-3-23S, it appears that the detections of vanadium may be site-related. The third location was in the vicinity of the helicopter crash site.

Inorganic Analytes in the Intermediate Aquifer. Only two (arsenic and manganese) of the four inorganic analytes were detected in the intermediate aquifer. Arsenic was detected in one of the three intermediate aquifer wells, CEF-3-33D at 1.2 J μg/ℓ. Manganese was detected in all three intermediate aquifer monitoring wells at concentrations ranging from 10.8 J μg/ℓ in CEF-3-7DD to 37.9 μg/ℓ in CEF-3-33DD. All detections of arsenic and manganese in the intermediate aquifer were below the surficial aquifer background screening concentrations. According to the conceptual model developed in Chapter 3.0, groundwater flow has a downward component in the disposal pit area in addition to predominant horizontal flow. Downgradient of the disposal pit area, the groundwater develops an upward flow

component from the surficial aquifer to Rowell Creek. Based on this conceptual model, it does not appear that these inorganic detections are related to the disposal pit.

4.2.3.3 Summary of Analytical Results for Groundwater

Summary of Organics in the Surficial Aquifer. Ten VOCs were detected in groundwater samples collected from the surficial aquifer. Five of these 10 compounds exceeded human health risk criteria: 1,1-DCA, 1,1-DCE, 1,2-DCE, TCE, and benzene. The detection of VOCs has been observed to extend from the disposal pit area to approximately 1,400 feet downgradient toward Rowell Creek. No VOC detections were observed on the east side of Rowell Creek, indicating that VOC contaminated groundwater in the surficial aquifer on the westside of Rowell Creek is discharging into the creek.

A total of 14 SVOCs were detected in groundwater samples collected from the surficial aquifer. Of these 14 compounds, six were identified as characteristic at OU 8: 1,2 DCB, 1,4 DCB, benzo(b)fluoranthene, naphthalene, 4-methylphenol, and bis(2-ethylhexyl)phthalate.

Based on the historical operations at OU 8 and the VOC and SVOC contaminant distribution in the surficial aquifer, it is evident that the source of these contaminants is the former waste disposal pit at OU 8.

The only pesticides or PCBs that were detected in the groundwater at OU 8 were the pesticides Endosulfan II and beta-BHC and the PCB Aroclor-1248. Aroclor-1248 was detected in 2 of the 30 surficial monitoring wells at concentrations of 0.6 J $\mu g/\ell$ (CEF-3-4S) and 0.79 J $\mu g/\ell$ (CEF-3-6S). Both of the wells are located in the disposal pit area.

Summary of Inorganics in the Surficial Aquifer. Based on the results of inorganics analyses of unfiltered groundwater from the 30 surficial aquifer wells, 18 inorganics were detected. Of these 18 inorganics, arsenic, chromium, manganese, and vanadium exceed human health risk criteria and appear to have elevated concentrations in the vicinity of the disposal pit.

Summary of Organics in the Intermediate Aquifer. The only organic compounds detected in the intermediate aquifer were phenol at 1 J $\mu g/\ell$ and bis(2-ethylhexyl)phthalate at 2 J $\mu g/\ell$. Both of these compounds were detected in well CEF-3-33DD, which is located in the source area and screened in the dolomite between 108 and 118 feet bls. Both of these compounds were detected at low concentrations in the upgradient background well CEF-3-10D, which is screened from 90 to 100 feet bls, and do not appear to be site related due to the absence of these compounds in the shallow UZS wells near the source area.

Summary of Inorganics in the Intermediate Aquifer. Only two (arsenic and manganese) of the four inorganic analytes which exceed human health risk criteria were detected in the intermediate aquifer. The detections of these two inorganics were below surficial aquifer background screening concentrations. Based on the conceptual model developed for groundwater flow that indicates a downward component to the predominant horizontal groundwater flow in the disposal pit area, it does not appear that these inorganic detections are site-related.

4.2.4 Surface Water and Sediment Surface water and sediment samples were collected during the current investigation in 1993 and 1994 to support the RI, BRA, and FS for OU 8. Section 2.4 presents: (1) the methods used during the collection of surface water and sediment samples, (2) the analysis completed at each sampling location, and (3) the rationale for the selection of sampling locations. The following discussion, focusing on the nature and extent of contamination detected, evaluates only the results of TCL and TAL analyses.

Surface water and sediment samples were collected from three locations in Rowell Creek. One location, RC-SW/SD-BIO-3, was sampled in August 1993. The two other sampling locations, CF-SW/SD-1 and CF-SW/SD-2, were sampled during the confirmatory event in November 1994. Background concentrations for surface water and sediment are based on results for CF-SW/SD-2, the upgradient sampling location. The results from this background location are summarized in Appendix J.

RC-SW/SD-3 is located in Rowell Creek where the groundwater plume discharges. Sampling location CF-SW/SD-1 is approximately 75 feet downgradient of RC-SW/SD-BIO-3. Background location CF-SW/SD-2 is approximately 250 feet upgradient of RC-SW/SD-3.

Discussion of sampling results is presented by organic and inorganic analytical fractions. Due to the large number of inorganic compounds detected in surface water and sediment samples, only inorganic analytes that are CPCs in the risk assessment will be presented on figures and discussed in the text.

The evaluation of the surface water and sediment data was made based on the conceptual understanding of the transport pathways of contaminants from the source area to Rowell Creek. Contaminants detected in groundwater samples (assuming no biodegradation or other physical and chemical processes that would break down contaminants) will eventually discharge into Rowell Creek and may be detected in sediment and surface water. Based on topography, contaminants in surface soil from the helicopter crash site area would be the most likely contributors of sediment contamination in Rowell Creek via surface water runoff and overland transport of surface soil. In order to evaluate if the presence of contaminants in surface water and sediment samples is a result of contaminant transport from OU 8, surface water sample results were compared to groundwater data from shallow monitoring wells adjacent to Rowell Creek and sediment sample results were compared to surface soil samples collected from the helicopter crash site.

Another potential source of surface water and sediment contamination unrelated to OU 8 is the FOTW effluent that discharges into Rowell Creek at the base (south side) of the Lake Fretwell dam. All three surface water and sediment samples included in this assessment were collected downstream of this effluent outfall.

4.2.4.1 **Organics in Surface Water and Sediment** The organic analytical results for surface water and sediment are summarized in Table 4-7, and shown on Figure 4-13.

VOCs in Surface Water. VOCs were the only organic compounds detected in surface water. Based on the results of VOC analyses of the three surface water samples, four VOCs were detected: bromodichloromethane, dibromochloromethane, methylene chloride, and chloroform. The detections of bromodichloromethane, dibromochloromethane, and chloroform are most likely from the wastewater treatment plant

Table 4-7
Surface Water and Sediment Organics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations(*)[2]	Mean of Detected Concentrations[3]	FDEP Class III Fresh Water Quality Standards[4] (µg/ℓ)	AWQC[5] (µg/ℓ)	USEPA SQGs[6]
Surface Water Volatiles (µg/ℓ)							
Dibromochloromethane	1/2	1.5 - 10	1.3* J	1.3	34	NA	–
Bromodichloromethane	2/2	1 - 1	2 - 3.5*	2.8	22	NA	–
Chloroform	2/2	2 - 10	5* - 5*	5	470.8	1,240	–
Methylene chloride	1/2	2 - 10	3.5*	3.5	1,580	NA	–
Total Recoverable Petroleum Hydrocarbons (µg/ℓ)							
Not Detected							
Sediment Volatiles (µg/kg)							
2-Butanone	2/2	14 - 14	5.5* J - 6 J	5.8	–	–	NA
Semivolatiles (µg/kg)							
Di-n-butylphthalate	1/2	460 - 460	310 J	310	–	–	NA
bis(2-Ethylhexyl) phthalate	1/2	460 - 460	260 J	260	–	–	NA
Pesticides/PCBs (µg/kg)							
4,4-DDE	1/2	4 - 4.65	1.8 J	1.8	–	–	NA
4,4-DDT	1/2	4.5 - 4.6	3.4* J	3.4	–	–	8.28
Aroclor-1254	1/2	45 - 46.5	180	180	–	–	195
Dieldrin	1/2	4.4 - 4.5	3.5* J	3.5	–	–	1.3
Endrin ketone	1/2	4.4 - 4.5	1.5* J	1.5	–	–	NA
Total Recoverable Petroleum Hydrocarbons (µg/kg)							
Not Detected							

[1] Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected values).
[2] Value indicated by asterisk is the average of a sample and its duplicate.
[3] The mean of detected concentrations is the arithmetic mean of all samples in which the analyte was detected; it does not include those samples with a "U" or "UJ" validation qualifier for that analyte.
[4] Chapter 62-302, Surface Water Quality Standards (Florida Legislature, 1995).
[5] Federal Ambient Water Quality Chronic Criteria (U.S. Environmental Protection Agency [USEPA], 1991g; 1988a).
[6] USEPA (1988c) mean Sediment Quality Criteria (SQCs) values at 1 percent total organic carbon (TOC) (used instead of site-specific TOC of 0.34 percent). All values represent Final Residue Values (FRVs).

Notes: The average of a sample and its duplicate is used for all table calculations.

Sample locations include: CF3SW1/SD1 and RCSW3/SD3
Duplicate samples include: CF3SW1D/SD1D

µg/kg = micrograms per kilograms.
µg/ℓ = micrograms per liter.
J = indicates chemical identified by chemist but quantity was estimated.
= these chemicals represent human health chemicals of potential concern (HHCPCs).
NA = not applicable.

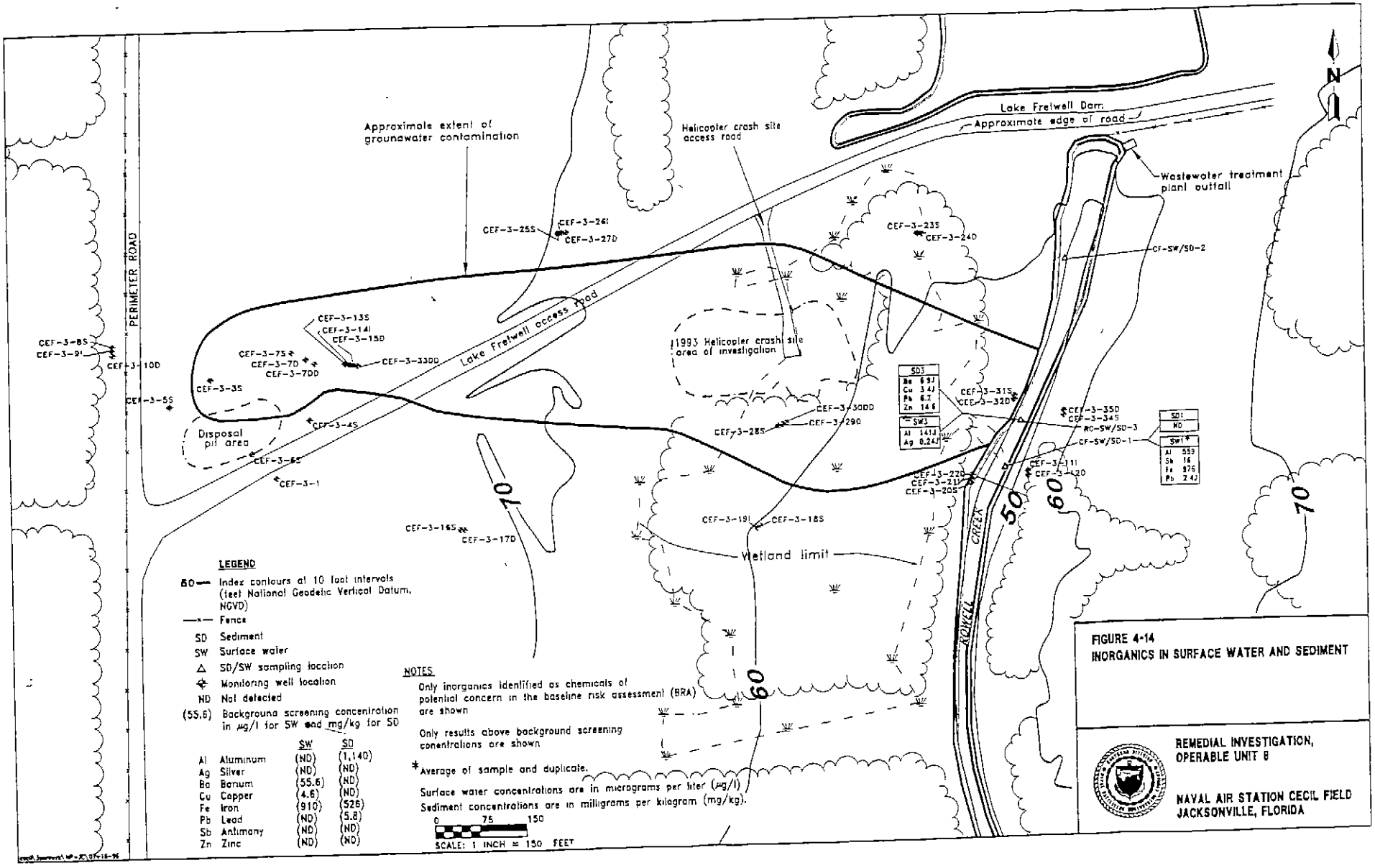


FIGURE 4-14
INORGANICS IN SURFACE WATER AND SEDIMENT

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

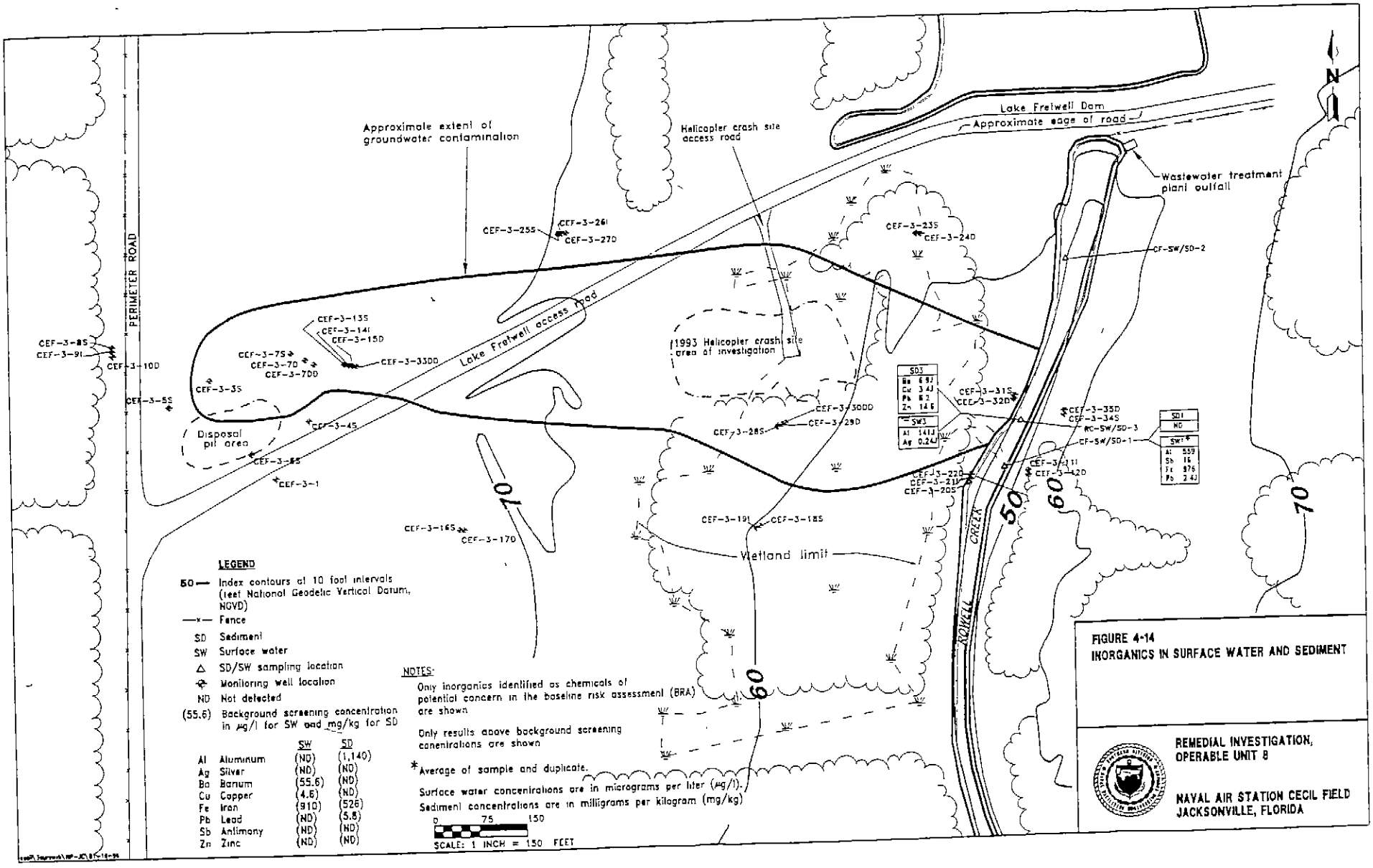


FIGURE 4-14
INORGANICS IN SURFACE WATER AND SEDIMENT

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

effluent which enters Rowell Creek upstream of these sampling locations near the base of the Lake Fretwell dam. These VOCs are common by-products of the chlorination process used during the treatment of wastewater and were not detected in any medium in the disposal pit area. Chloroform was detected at all three sampling locations, with the maximum concentration (5 $\mu g/\ell$) detected at locations CF-SW-1 and RC-SW-3. Chloroform was detected in the background location, CF-SW-2, at a concentration of 7 $\mu g/\ell$. Bromodichloromethane was detected at all three locations, CF-SW-1 (4 $\mu g/\ell$, average of sample and duplicate), CF-SW-2 (5 $\mu g/\ell$), and RC-SW-3 (2 $\mu g/\ell$). Dibromochloromethane was detected at locations CF-SW-1 and CF-SW-2 at concentrations of 1 (average of sample and duplicate) and 2 $\mu g/\ell$, respectively.

Methylene chloride (a common laboratory artifact) was detected at CF-SW-1 and the background location, CF-SW-2, at concentrations of 4 $\mu g/\ell$ (average of sample and duplicate) and 3 $\mu g/\ell$ respectively. Methylene chloride, a common laboratory contaminant, was not detected in any OU 8 groundwater samples.

VOCs in Sediment. 2-Butanone (a common laboratory artifact) was the only VOC detected in the sediment samples. 2-Butanone was detected at CF-SD-1 (4 J $\mu g/\ell$) and RC-SD-3 (6 J $\mu g/\ell$). 2-butanone does not appear related to the disposal pit area because it was not detected in groundwater (groundwater that could later discharge into Rowell Creek and potentially contaminate the sediment) from the shallow monitoring wells adjacent to Rowell Creek or in surface soil samples nearest Rowell Creek.

SVOCs in Sediment. Two SVOC compounds were detected in the sediment samples: di-n-butylphthalate and bis(2-ethylhexyl)phthalate.

The two SVOCs were detected at only one location, RC-SD-3. Di-n-butylphthalate was detected at a concentration of 310 J $\mu g/kg$ and bis(2-ethylhexyl)phthalate was detected at 260 J $\mu g/kg$. Di-n-butylphthalate was not detected in any groundwater samples from shallow monitoring wells adjacent to Rowell Creek or in any surface soil samples collected at the helicopter crash site area.

Bis(2-ethylhexyl)phthalate was detected in monitoring well CEF-3-34S which is on the east side of Rowell Creek and slightly upstream of location RC-SD-3. Since the bis(2-ethylhexyl)phthalate was detected in well CEF-3-34S which is on the east side of Rowell Creek, it can not be hydraulically linked to OU 8. Bis(2-ethylhexyl)phthalate was not detected in any of the surface soil samples collected from the helicopter crash site area. Phthalates are a common laboratory contaminant.

Pesticides and PCBs in Surface Water. No pesticides or PCBs were detected in the surface water. The pesticide Endosulfan I was detected in the background surface water sample from CF-SW-2 at 0.008 $\mu g/\ell$. The presence of this pesticide in the background sample is most likely the result of previous basewide use of pesticides.

Pesticides and PCBs in Sediment. Four pesticides and one PCB were detected in the sediment samples collected from Rowell Creek adjacent to OU 8.

The four pesticides detected in sediment included endrin ketone, dieldrin, 4,4-DDT, and 4,4-DDE. Endrin ketone at 1.5 J $\mu g/kg$, Dieldrin at 9.7 $\mu g/kg$, 4,4-DDT at 3.4 $\mu g/kg$, and 4,4-DDE at 1.5 J $\mu g/kg$ (all average of sample and duplicate) were only detected in the furthest downstream location CF-SD-1. The only other pesticide detected was 4,4 DDE in sample RC-SD-3 at a concentration of 1.8 $\mu g/kg$. Endrin ketone and 4,4 DDT were detected in surface soil samples collected near the helicopter crash site. The presence

of pesticides in Rowell Creek sediments is most likely the result of previous basewide use of pesticides and not the result of waste disposal operations at OU 8.

Aroclor 1254 was only detected in sample RC-SD-3, at a concentration of 180 μg/kg. Aroclor 1254 was detected in only one OU 8 surface soil sample (CF3SS10 at 10 μg/kg) which was located on the south side of the access road. Since this side of the road drains to Rowell Creek, it is possible that the detection is related to waste disposal operations or oiling of unpaved roads at OU 8. Arochlor 1254 has been found at locations upgradient on Rowell Creek (e.g., Lake Fretwell).

4.2.4.2 **Inorganics in Surface Water and Sediment** The inorganic analytical results for surface water and sediment are summarized in Table 4-8 (with the background screening concentrations).

Inorganics in Surface Water. Based on the results of inorganic analyses of the two surface water samples, five inorganic CPCs were identified in the BRA (ABB-ES, 1995a): aluminum, antimony, iron, lead, and silver. Of these five inorganics, only iron was detected in the upstream background sample CF-SD-2. The detections of these inorganics are presented in Figure 4-14.

Aluminum was detected at the highest concentration (559 μg/ℓ, average of the sample and its duplicate sample) in the furthest downstream sample, CF-SW-1. Aluminum was also detected in surface water sample RC-SW-3 at a concentration of 141 μg/ℓ but was not detected in the upstream background sample CF-SW-2. Aluminum was detected in monitoring well CEF-3-31S adjacent to Rowell Creek but at a lower concentration of 44.3 μg/ℓ. If the contaminant plume was the source of aluminum in surface water, the concentration would be much higher in groundwater since it is diluted upon discharge into Rowell Creek.

Antimony was only detected in sample CF-SW-1 at a concentration of 16.2 (average of the sample and its duplicate sample). Antimony was not detected in the groundwater sample collected from monitoring well CEF-3-31S which is upstream of the sampling location and at the leading edge of the OU 8 groundwater contaminant plume discharging to Rowell Creek.

Iron was detected in all three surface water samples collected adjacent to OU 8. The upstream background screening concentration of 910 μg/ℓ was nearly the same at the downstream location CF-SW-1 (976 μg/ℓ, average of the sample and its duplicate sample). Iron was detected at a lower concentration in monitoring well CEF-3-31S (54.2 μg/ℓ) and the presence of iron is most likely the result of the natural occurrence of iron in the native soil.

Lead was detected in the downstream sample, CF-SW-1, at a concentration of 2.4 J μg/ℓ. Lead was not detected in the upstream background surface water sample CF-SW-2 or in the groundwater from monitoring well CEF-3-31S.

Silver was only detected at surface water sample location RC-SW-3 at a concentration of 0.24 J μg/ℓ. Silver was not detected in the upstream background sample CF-SW-2 or in the groundwater sample collected from monitoring well CEF-3-31S.

Inorganics in Sediment. Based on the inorganic analytical results of the two sediment samples, four inorganics were identified as CPCs in the BRA (ABB-ES,

Table 4-8
Surface Water and Sediment Inorganics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations (*)[2]	Mean of Detected Concentrations[3]	Screening Background Concentration[4]	Maximum Background Concentration	FDEP Class III Fresh Water Quality Standards[5] (µg/ℓ)	AWQC[6] (µg/ℓ)	USEPA SQGs[7]
Surface Water Inorganics (µg/ℓ)									
Aluminum	2/2	200 - 200	141 - 559*	350	ND	ND	NA	[8]87	--
Antimony	1/2	60 - 60	16.2* J	16.2	ND	ND	4,300	160	--
Barium	1/2	200 - 200	26.1* J	26.1	55.6	27.8	NA	NA	--
Calcium	2/2	5,000 - 5,000	16,700* - 26,500	21,600	46,400	23,200	NA	NA	--
Copper	1/2	25 - 25	4.6* J	4.6	4.6	2.3	12	12	--
Iron	2/2	100 - 100	702 - 976*	839	910	455	1,000	1,000	--
Lead	1/2	5 - 5	2.4* J	2.4	ND	ND	3.3	3.3	--
Magnesium	2/2	5,000 - 5,000	3,490* J - 9,670	6,580	12,100	6,050	NA	NA	--
Manganese	2/2	15 - 15	10.7 J - 19.7*	15.2	35.6	17.8	NA	NA	--
Potassium	2/2	5,000 - 5,000	1,260* J - 4,500 J	2,878	5,380	2,690	NA	NA	--
Silver	1/2	10 - 10	0.24 J	0.24	ND	ND	0.07	0.12	
Sodium	2/2	5,000 - 5,000	10,800* J - 27,200	19,005	38,000	19,000	NA	NA	--
Vanadium	1/2	50 - 50	1.8* J	1.8	2.8	1.4	NA	NA	--
Sediment Inorganics (mg/kg)									
Aluminum	2/2	40 - 40	394* - 1,010	700	1,140	568	--	--	NA
Barium	1/2	40 - 40	6.9 J	6.9	ND	ND	--	--	NA
Calcium	2/2	1,000 - 1,000	351* J - 912 J	631	1,040	520	--	--	NA
Copper	1/2	5 - 5	3.4 J	3.4	ND	ND	--	--	NA
Iron	2/2	20 - 20	271* - 599	435	526	263	--	--	NA
Lead	2/2	0.6 - 1	3.5* - 6.2	4.9	5.8	2.6	--	--	NA
Magnesium	2/2	1,000 - 1,000	49.9* J - 85.8 J	67.9	99.6	49.8	--	--	NA
Manganese	2/2	3 - 3	2.1* J - 3	2.6	8.6	4.3	--	--	NA
Vanadium	2/2	10 - 10	0.835* J - 1.2 J	1	2.2	1.1	--	--	NA
Zinc	1/2	4 - 4	14.6	14.6	ND	ND	--	--	NA

See notes at end of table.

Table 4-8 (Continued)
Surface Water and Sediment Inorganics Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations (*)[2]	Mean of Detected Concentrations[3]	Screening Background Concentration[4]	Maximum Background Concentration	FDEP Class III Fresh Water Quality Standards[5] (µg/ℓ)	AWQC[6] (µg/ℓ)	USEPA SQGs[7]

[1] Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected values).
[2] Value indicated by asterisk is the average of a sample and its duplicate.
[3] The mean of detected concentrations is the arithmetic mean of all samples in which the analyte was detected; it does not include those samples in which the analyte was not detected.
[4] The background screening value is twice the average of detected concentrations for inorganic analytes in background samples.
[5] Chapter 62-302, Surface Water Quality Standards (Florida Legislature, 1995).
[6] Federal Ambient Water Quality Chronic Criteria (U.S. Environmental Protection Agency [USEPA], 1991g; 1988a).
[7] USEPA (1988c) mean Sediment Quality Criteria (SQCs) values at 1 percent total organic carbon (TOC) (used instead of site-specific TOC of 0.34 percent). All values represent Final Residue Values (FRVs).
[8] Based on pH of 6.5-9 (USEPA, 1988).

Notes: The average of a sample and its duplicate is used for all table calculations.

Sample locations include: CF3SW1/SD1 and RCSW3/SD3
Duplicate samples include: CF3SW1D/SD1D

mg/kg = milligrams per kilograms.
µg/l - micrograms per liter.
NA = not applicable.
J = indicates chemical identified by chemist but quantity was estimated.
= these chemicals represent human health chemicals of potential concern (HHCPCs).

1995a): barium, copper, lead, and zinc. Barium, copper, and zinc were not detected in the upstream background sample CF-SD-2.

Barium (6.9 J mg/kg), copper (3.4 J mg/kg) and zinc (14.6 mg/kg) were detected in only one sediment sample, RC-SD-3.

Lead was detected in both sediment sample locations and the upstream background sample. The upstream background screening lead concentration of 5.8 mg/kg, was only exceeded by one sample, RC-SD-3, at a concentration of 6.2 mg/kg.

Barium and lead were detected in surface soil samples collected from the helicopter crash site area. However, the surface soil concentrations of these inorganics did not exceed the background soil concentrations and do not appear to be the source of these analytes detected in the sediment samples. Copper was also detected in surface soil samples at the helicopter crash site but at concentrations lower than what was detected in sediment.

4.2.4.3 Summary of Analytical Results for Surface Water and Sediment

Summary of Organics in Surface Water. Four organic compounds were detected in the surface water samples collected for OU 8: the VOCs, bromodichloromethane, dibromochloromethane, methylene chloride, and chloroform. With the exception of methylene chloride, these VOCs are most likely from the wastewater treatment plant effluent which enters Rowell Creek upstream of these sampling locations near the base of the Lake Fretwell dam. These VOCs are common by-products of the chlorination process used during the treatment of wastewater.

Summary of Organics in Sediment. Three organic compounds were detected in the sediment samples collected for OU 8: one VOC, 2-butanone, and two SVOCs (di-n-butylphthalate, and bis(2-ethylhexyl)phthalate). Due to their absence in nearby surface soil samples and shallow groundwater samples on the west side of Rowell Creek, the presence of these compounds is not linked to the disposal pit area.

Summary of Inorganics in Surface Water. Based on the results of inorganic analyses of the two surface water samples, five inorganic CPCs were identified by the BRA: aluminum, antimony, iron, lead, and silver. Of these five inorganics, only iron was detected in the upstream background sample CF-SD-2. Iron and aluminum were detected in the shallow monitoring well CEF-3-31S, which is located adjacent to Rowell Creek, but at concentrations lower than those observed in surface water. Antimony, lead and silver were not detected in monitoring well CEF-3-31S.

Summary of Inorganics in Sediment. Based on the inorganic analytical results of the two sediment samples, four inorganics identified as CPCs in the risk assessment were detected: barium, copper, lead, and zinc. Barium, copper, and zinc were not detected in the upstream background sample CF-SD-2.

Lead was detected in both sediment sample locations and the upstream background sample. The upstream background screening lead concentration of 5.8 mg/kg is nearly the same as at RC-SD-3 (6.2 mg/kg).

Barium and lead were detected in surface soil samples collected from the helicopter crash site area. However, the surface soil concentrations of these inorganics did not exceed the background soil concentrations and do not appear

to be the source of these analytes detected in the sediment samples. Copper was also detected in surface soil samples at the helicopter crash site but at concentrations lower than what was detected in sediment.

5.0 CONTAMINANT FATE AND TRANSPORT

This chapter discusses the fate and transport of contaminants detected in the environment at OU 8, Site 3. Fate, in the context of this chapter, refers to the ultimate disposition of a given contaminant following its release into the environment. Transport refers to the mechanism(s) by which a given contaminant released into the environment will arrive at its fate.

Several organic and inorganic compounds were detected in the four media sampled at OU 8 (soil, sediment, surface water, and groundwater). Because of the number of contaminants detected and the number of fate and transport scenarios possible for those contaminants in the four media, this discussion will focus only on those compounds and metals that may pose significant risk to human health or the environment, as identified by the BRA (ABB-ES, 1995a), and summarized in Chapter 6.0.

The following discussion of contaminant fate and transport is divided into two sections. Section 5.1 discusses potential routes of contaminant migration in the media evaluated at OU 8. The site-specific persistence, fate, and transport of those compounds and elements found to pose a potential risk to human health or the environment are discussed in Section 5.2.

5.1 POTENTIAL ROUTES OF MIGRATION. Several routes of migration are possible for OU 8 contaminants through the various media: air, soil, surface water, and groundwater. These routes are summarized below.

5.1.1 Air Organic compounds, metals, and metal complexes that exist as gases, are volatile at surface temperature and pressure, or are airborne particulates may migrate in the air from the OU 8 source area. The extent to which gaseous constituents and particulate material remain airborne is a function of their density, the level of excitation of the air (wind and temperature), and fate processes acting on the constituent. Particulate material may contain (or consist of) organic compounds and elements that would otherwise not be present in air. Prevailing wind directions are depicted in the wind rose in Figure 3-2.

5.1.2 Soil Organic and inorganic compounds are present in soil at OU 8. The primary agents of contaminant migration acting on soil include wind, rain water, running water, and human activity. In the absence of vegetative cover and under dry soil conditions, wind could potentially transport surface soil in the form of particulate material throughout and beyond the installation. Rain water may cause surface soil to migrate either by washing soil particles downward into the subsurface or by carrying soil particles overland to the nearest surface water body, either Lake Fretwell or Rowell Creek. Contaminated soil can also be transported through human activity. Other than the former disposal pit operations, human activity appears to be limited at OU 8. It is located near the installation boundary where human activity is limited to forestry, security patrol, and an occasional jogger.

5.1.3 Surface Water Organic and inorganic compounds can migrate from the OU 8 disposal pit area via surface water runoff to surface water and be further transported downstream in Rowell Creek. The primary mechanism for migration of contaminants once they reach surface water are dissolution and suspension.

Several organic compounds and metals are soluble in water and will remain in the aqueous phase until fate mechanisms cause removal or degradation. Other organic compounds and elements are not soluble in water but may be transported by surface water via suspension of solids (e.g., sediment) to which the compounds are attached. The amount of suspended particulate material in surface water is largely a function of the water's energy and, as that energy decreases, suspended material will settle and become part of the soil or sediment. Colloidal material may remain in suspension (by electrochemical forces) even in water of very low energy (e.g., standing water). It is interpreted that some surface water transport of disposal pit contaminants may have occurred (300 to 500 ft to CF3SS9) along the northern drainage ditch of the access road.

5.1.4 Sediment Organic and inorganic compounds from OU 8 can migrate with sediment carried by surface water runoff to Lake Fretwell and Rowell Creek east of OU 8 and then further downstream in Rowell Creek. Erosion, biological action, and human action are the primary transport mechanisms for sediment. Sediment transport in surface water is greatest under high stream flow conditions. Sediment transport at OU 8 has not been observed to be significant contaminant transport mechanism.

5.1.5 Groundwater Groundwater flow is the major migration mechanism for transporting dissolved constituents from the disposal pit area at OU 8. Organic compounds and elements at OU 8 are believed to have reached groundwater by the placement of wastes into the disposal pit. Contaminated groundwater is interpreted to be currently discharging to Rowell Creek but, due to the expected dilution, has not been detected in surface water or sediment samples.

5.2 CONTAMINANT PERSISTENCE AND FATE. The discussion of contaminant persistence and fate in the environment is divided into three subsections. Subsection 5.2.1 discusses the processes that control the persistence and fate of organic compounds and elements in the environment. Subsection 5.2.2 discusses the primary persistence and fate characteristics of the constituents detected at OU 8. Subsection 5.2.3 discusses contaminant transport.

5.2.1 Processes The persistence and fate of chemical constituents in the environment depends on various chemical, physical, and biological processes. The predominant processes affecting the environmental persistence and fate of chemical constituents include solubility, photolysis, volatilization, hydrolysis, oxidation, chemical speciation, complexation, precipitation/co-precipitation, cationic exchange, sorption, bioaccumulation, and biodegradation-biotransformation. The more important and prevalent of these processes, with regard to the risk-driving chemicals identified at OU 8, are described below.

5.2.2 Persistence and Fate of OU 8 Specific Contaminants The human health risk assessment (summarized in Chapter 6.0) has only identified risk to human health at OU 8 from the exposure to contaminated groundwater (if it is used in the future as a potable water supply). The organic and inorganic constituents which exceed human health risk criteria (cancer risk of 10^{-6} and noncancer risk factor greater than 0.1) are summarized below.

- Groundwater: Benzene, 1,1-DCA, 1,1-DCE, 1,2-DCE, TCE, 1,2-DCB, 1,4-DCB, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, 4-methylphenol, naphthalene, Aroclor-1248, arsenic, chromium, manganese, and vanadium.

Of these organic and inorganic compounds, 1,1-DCE, 1,2-DCE, TCE, 1,2-DCB, 1,4-DCB and arsenic pose the most significant risk and will be the focus of the discussion in this subsection.

The only potential risk identified by the ecological risk assessment was the exposure to undiluted groundwater by aquatic organisms. Considering the dilution of groundwater upon discharge into Rowell Creek, ecological receptors are not likely to be at risk.

5.2.2.1 **VOCs** As indicated above, TCE, 1,2-DCE, and 1,1-DCE were identified in groundwater as potentially posing a risk to human health and the environment. TCE can be biologically transformed under aerobic (with oxygen) and anaerobic (without oxygen) conditions. Because oxygen is generally limited, natural (unaided) biotransformation of TCE in groundwater most often occurs under anaerobic conditions. Anaerobic biodegradation of chlorinated VOCs is a reductive dechlorination process in which anaerobic bacteria utilize a chlorinated VOC molecule as an electron acceptor (respiration) when degrading organic carbon present in the soil and groundwater system. The anaerobic biotransformation of TCE results in less-chlorinated transformation products such as cis-1,2-dichloroethene (cis-DCE), vinyl chloride, and ethylene. The presence of such transformation products in groundwater indicates that anaerobic biodegradation of TCE has occurred.

At OU 8, cis-DCE was detected throughout the groundwater contaminant plume from the disposal pit area to Rowell Creek. The presence of cis-DCE indicates biodegradation of TCE has occurred. Based on the comparison of the TCE and cis-DCE concentrations, it appears that the biodegradation of TCE is most prevalent at the disposal pit area because the cis-DCE concentration was higher than the TCE concentration. Cis-DCE was detected at 1900 $\mu g/\ell$ and TCE was detected at 1700 $\mu g/\ell$ in the source area monitoring well CEF-3-13S. Approximately 700 feet downgradient in well CEF-3-28S, the TCE concentration (480 $\mu g/\ell$) is more than 4 times that of cis-DCE (110 $\mu g/\ell$). The more active biodegradation of TCE at the disposal pit area is most likely due to the existence of more favorable environmental or microbial conditions (e.g., nutrients, organic carbon, oxidation-reduction potential) than are found downgradient in the vicinity of well CEF-3-28S.

Although biodegradation of TCE is occurring at OU 8, the transformation process is not going to vinyl chloride. Chemical data collected to assist in the evaluation of unaided biodegradation of TCE indicated that vinyl chloride was not being formed because the subsurface conditions were not favorable. The conditions that appeared to be limiting the biological process included: low pH (4.5-5.5); low levels of nitrogen, phosphate and sulfate; and/or low levels of an electron donor (carbon source).

5.2.2.2 **SVOCs** 1,2-DCB and 1,4-DCB, the most significant SVOC contributors to human health risk, were both found in groundwater at OU 8. 1,4-DCB was also detected in subsurface soil at the disposal pit area.

1,2-DCB and 1,4-DCB have relatively low vapor pressure (1,2-DCB: 1.28 mm at 25 degrees celsius [°C], 1,4-DCB: 0.7 mm at 25 °C [Montgomery, 1991]), and low aqueous solubility (1,2-DCB: 100 mg/ℓ at 20 °C, 1,4-DCB: 49 mg/ℓ at 22 °C [Montgomery, 1991]). Based on these physical characteristics, sorption, bioaccumulation, and volatilization are expected to be competing processes. These

compounds also moderately biodegrade, with half-lives of 1 to 6 months in soil and surface water and 2 to 12 months in groundwater. The fate of 1,2-DCB and 1,4-DCB in the aquatic environment depends on the rate at which each of these processes occur (USEPA, 1979).

5.2.2.3 **Inorganics** Arsenic was identified as potentially posing a risk to human health in the groundwater at Site 3.

Arsenic has two stable forms in solution: As^{5+} (arsenate) and As^{3+} (arsenite). In groundwater with pH ranging from 3 to 7, the monovalent arsenate anion $H_2AsO_4^-$ is the dominant form. Upon entering surface water, via groundwater discharge, arsenic may partition to sediments from solution by hydrous iron oxide adsorption and/or co-precipitation (or a combination of both) with sulfides in the sediment. The oxidation-reduction potential (Eh) and pH conditions of the surface water and sediment govern the effectiveness of these mechanisms (adsorption and co-precipitation) for arsenic. These mechanisms appear to be the major inorganic factors controlling arsenic concentrations in surface water (Hem, 1989). Arsenic becomes more soluble as reducing conditions become stronger and pH becomes more acidic.

5.2.3 Transport of Contaminants This section presents a discussion of the anticipated migration of contaminants at OU 8 in soil, groundwater, and in surface water upon groundwater discharge into Rowell Creek.

5.2.3.1 **Soil** Contaminants in groundwater that potentially pose a risk to human health that were also detected in the disposal pit source area vadose zone soil included TCE, 1,4-DCB, and benzo(b)fluoranthene. These contaminants are a potential source of future groundwater contamination through leaching by infiltrating precipitation. The amount of a particular contaminant that is leached from the vadose zone soil is a function of the sorptive properties of the compound and the presence of organic material. The concentration of a contaminant in the leachate can be estimated (using Summers model [USEPA, 1989b]) if the concentration of the contaminant in the vadose zone and the total organic carbon concentrations are known. Once the leachate concentration is calculated, the concentration of the contaminant in groundwater after mixing can be estimated. The Summers model was run (i.e., used to estimate concentrations) for TCE, 1,4-DCB, and benzo(b)fluoranthene. The results are discussed in the following subsection and the calculations are found in Appendix K.

5.2.3.2 **Groundwater** The primary route for contaminant migration in groundwater from OU 8 would be through the surficial aquifer from the location of the former disposal pit to discharge into Rowell Creek, 1,400 feet east of the pit.

As mentioned in section 5.2.2, contaminants associated with human health and ecological risk include VOCs: TCE and its transformation products, 1,2-DCE, and 1,1-DCE; SVOCs: 1,2-DCB and 1,4-DCB; and one inorganic: arsenic. Of these, only TCE, 1,2-DCE, 1,1-DCE, and 1,2-DCB and 1,4-DCB appear to have an association with the disposal pit area. Based on groundwater flow paths and the relatively low concentrations of arsenic in the shallow wells at the source area, it is not likely that the detections of arsenic in the surficial aquifer, downgradient of the disposal pit, are source-related.

The chlorinated VOCs are the most prevalent organic contaminants detected at OU 8. TCE was one of the most widespread contaminants detected at OU 8. Considering

this, the following discussion will first focus on the migration of TCE in groundwater. When appropriate, other groundwater contaminants for which a risk has been identified will be addressed.

The dissolved contaminants in the shallow groundwater (UZS) appear to have migrated to and are discharging into Rowell Creek approximately 1,400 feet east of the source area.

The discussion of contaminant migration in groundwater at OU 8 will address the following items:

1. the estimated duration of leaching and concentration of TCE, benzo(b)fluoranthene, and 1,4-DCB from vadose zone soil to the groundwater;

2. the transport and concentration of TCE along the groundwater flow path to Rowell Creek; and

3. the estimated dilution of the TCE plume upon entering and mixing with surface water in Rowell Creek.

The calculations and documentation to support this discussion are presented in Appendix K.

Leaching of TCE, benzo(b)fluoranthene and 1,4-DCB from Vadose Zone Soil. The concentration and duration of the leaching of TCE, benzo(b)fluoranthene and 1,4-DCB from vadose zone soil to groundwater was estimated and is discussed in the following paragraphs.

The estimated volume of TCE contaminated vadose zone soil is approximately 24,000 ft^3, with an average TCE concentration of 146 J $\mu g/kg$. The soil volume was estimated by multiplying the disposal pit area (8,000 square feet) by a depth of 3 feet (approximate depth to groundwater). The average TCE concentration was estimated using the average of two detections in the disposal pit area vadose zone soil. The contaminated soil volume estimate is expected to be high (i.e., conservative) because there were also several nondetects in the disposal pit area vadose zone soil. Using the Summers model (USEPA, 1989b), TCE in leachate resulting from precipitation infiltrating through these vadose soil would enter and mix with the top 10 feet of the surficial aquifer, and would be diluted to approximately 80 $\mu g/\ell$. Using the USEPA batch model (USEPA, 1988b), it would take approximately 23 years to flush the vadose zone soil to the point that the leachate would be less than the TCE MCL of 5 $\mu g/\ell$ after mixing with the top 10 feet of the surficial aquifer (Appendix K).

The Summers model was also run for 1,4-DCB and benzo(b)fluoranthene, which were both detected in source area vadose zone soil and in groundwater.

1,4-DCB was the most frequently detected SVOC in subsurface soil, was also detected in the shallow source area groundwater, and had the lowest drinking water MCL of the dichlorobenzenes. Using the Summers model, the concentration of 1,4-DCB in the leachate resulting from the infiltration of precipitation through the source area vadose soil (27.3 J $\mu g/kg$) is estimated to be 39 $\mu g/\ell$. This concentration was below the State and Federal drinking water MCL of 75 $\mu g/\ell$ so further flushing calculations were not conducted.

The benzo(b)fluoranthene concentration in the leachate was estimated to be 0.08 $\mu g/\ell$ which was also below the federal drinking water MCL of 0.2 $\mu g/\ell$. Therefore no additional flushing calculations were conducted. Summers model calculations are presented in Appendix K.

TCE Transport and Concentration in Groundwater. The TCE plume has been observed to have migrated approximately 1,400 feet east to Rowell Creek in the 40 years since the waste liquid discharge to the disposal pit began. Based on the seepage velocity of 88 feet per day (from Section 3.6.2.3), it is likely that contaminated groundwater has been discharging to Rowell Creek for some time since it would take groundwater approximately 16 years to travel from the disposal pit to Rowell Creek.

The highest concentration of TCE (1,700 $\mu g/\ell$) in the monitoring wells was in the disposal pit area well CEF-3-13S. Approximately 700 feet downgradient, the TCE concentration in groundwater decreased to a concentration of 480 $\mu g/\ell$ in well CEF-3-28S. Further downgradient (CEF-3-31S), adjacent to Rowell Creek, the TCE concentration was detected at one order of magnitude lower (48 $\mu g/\ell$) than in well CEF-3-28S. This pattern of decreasing concentration from the source area to Rowell Creek was also observed for 1,1 DCE, 1,1 DCA, and 1,2 DCE and may represent the cumulative effect of fate and transport mechanisms.

Using an analytical dispersion equation solution (Appendix K), it is estimated that concentrations of TCE greater than 5 $\mu g/\ell$ would be flushed by the natural flow of groundwater from the surficial aquifer to Rowell Creek in approximately 35 years. This estimate assumes a retardation factor of 2.3 for TCE. As described in item 1 above, in approximately 23 years the concentration of the TCE leachate from the vadose soil at the disposal pit area is estimated to be less than 5 $\mu g/\ell$ (after mixing with the top 10 feet of the surficial aquifer). By adding the two estimates, it is interpreted that concentrations of TCE in the surficial aquifer at OU 8 will be less than 5 $\mu g/\ell$ in approximately 58 years.

Although contaminated groundwater may be discharging into Rowell Creek, organic contaminants detected in groundwater have not been detected in surface water samples from locations where the contaminated groundwater would be expected to discharge into Rowell Creek based on piezometric conditions. The absence of contaminants in surface water and sediment samples is most likely due to dilution of the discharging groundwater by Rowell Creek. Dilution of groundwater discharging into Rowell Creek is discussed in a following section.

Plume Dilution in Surface Water Some dilution of the contaminant plume concentrations would be expected to occur as it discharges to Rowell Creek. The dilution of groundwater from the contaminant plume by Rowell Creek surface water has been estimated using estimates of the wastewater treatment plant discharge, groundwater discharge to Rowell Creek, and USGS discharge measurements at the Lake Fretwell dam, the OU 1 tributary (approximately 1,800 feet downstream), and the Perimeter Road bridge (approximately 3,400 feet downstream).

The total contribution to surface water by groundwater discharge was estimated for the Rowell Creek reach between the Lake Fretwell dam and Perimeter Road bridge. The OU 8 contaminant plume discharge was estimated as a fraction of the total surface water flowrate. The dilution factor was calculated for the OU 8 contaminant plume discharge zone (see figure in Appendix K). The dilution factor at this location was estimated to be 0.008 (99.2 percent diluted or diluted 133

times). This estimate was developed using monthly discharge averages and was based on the lowest observed monthly average (calculations that can be found in Appendix K).

6.0 SUMMARY OF BASELINE RISK ASSESSMENT

A baseline risk assessment (BRA) was completed at OU 8 to characterize the risks associated with exposure to identified contaminants for human health and ecological receptors (ABB-ES, 1995a). This section presents a summary of the human health and ecological BRAs for OU 8. Although the BRA is presented as a separate document, it is summarized here to complete the RI and to provide the rationale for developing remedial action objectives and alternatives as part of the FS.

6.1 APPROACH TO THE BASELINE RISK ASSESSMENT. The BRA was completed in accordance with the USEPA's human health risk assessment guidance for Superfund (USEPA, 1989c; 1989d; 1989e; 1991c; 1991d; 1992a), Region IV Risk Assessment Guidance (USEPA, 1991e), Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference (USEPA, 1989a); and Ecological Assessment of Superfund Sites: An Overview (USEPA, 1991f). Recent risk assessment guidance including the USEPA "Eco Update" bulletins (USEPA, 1991b; 1992g; 1992c) and recent publications (Maughan 1993; Suter, 1993) were also consulted.

The BRA for OU 8 consisted of three primary components: (1) data evaluation, (2) human health risk assessment, and (3) ecological assessment. The purpose of the BRA was to evaluate whether or not contamination present at OU 8 poses unacceptable risks to human health and/or environmental receptors, in the absence of any remedial action.

6.2 DATA EVALUATION. The purpose of the data evaluation process was to identify the environmental data suitable for use in the BRA in accordance with the guidance in Section 6.1. The data from OU 8 were evaluated to determine which data were of sufficient quality for use in a quantitative risk assessment. Data from the RI were first compiled and sorted by environmental medium (i.e., surface and subsurface soil, groundwater, surface water, and sediment). Then, based on results of the data validation, overall quality of the data was reviewed to determine which data were of sufficient quality for use in a quantitative risk assessment.

In the human health and ecological risk assessments (ABB-ES, 1995a), the analytical data were used to select chemicals of potential concern (CPCs). Data collected from previous investigations were evaluated qualitatively.

6.3 HUMAN HEALTH RISK EVALUATION. The purpose of the human health risk assessment (HHRA) was to characterize the risks associated with potential exposures to site-related contaminants at OU 8 for human health receptors. Five components for the HHRA were completed: (1) data evaluation (including selection of human health chemicals of potential concern), (2) exposure assessment, (3) toxicity assessment, and (4) risk characterization (including an uncertainty analysis). In addition, a review of available criteria is presented.

6.3.1 Selection of Chemicals of Potential Concern Generally, chemicals for which data of sufficient quality are available and which are potentially site related are defined as HHCPCs. These contaminants are typically a subset of all

inorganics and organics detected in the various media at the site and are selected based on concentration; physical, chemical, and toxicological characteristics; frequency of detection (normally greater than 5 percent of the total sample set); comparison of detected values to background or baseline concentrations and associated blanks; and comparison to USEPA Region III risk-based concentrations and State of Florida criteria (USEPA, 1993; USEPA, 1994a; FDEP, 1994a; 1994b). The HHCPCs for OU 8 for each medium (surface soil, surface water, sediment, and groundwater) are presented in Table 6-1.

6.3.2 Exposure Assessment OU 8 was evaluated to identify actual or hypothetical populations that could contact site-related contaminants and the pathways through which exposure could occur. There are five potential sources of exposure associated with OU 8: surface soil, subsurface soil, surface water, sediment, and groundwater. Based on current site uses, surface soil, surface water, and sediment are the only media that are appropriate for evaluation because there is no current exposure to subsurface soil or groundwater. Under future land use, all the media were evaluated in the assessment based on the assumptions that subsurface soil may be exposed for contact and that groundwater may be used as an alternate potable water supply at OU 8.

As a result of the exposure assessment, the following exposure scenarios were identified as being possible at OU 8 under current use conditions: (1) incidental ingestion, direct contact, and inhalation of fugitive dust associated with surface soil by a child and adult transient and an adult site worker; and (2) incidental ingestion and direct contact with surface water or sediment by a child and adult trespasser. Under future land use, the following exposure scenarios were identified as being possible at Site 3: (1) incidental ingestion, direct contact, and inhalation of fugitive dust associated with surface soil by an adult and child resident, an adult occupational worker, and an adult excavation worker; (2) incidental ingestion, direct contact, and inhalation of fugitive dust associated with subsurface soil by an adult excavation worker; (3) domestic use of groundwater by an adult resident; and (4) incidental ingestion and dermal contact with surface water and sediment by an adult and child resident wader.

Under current land use, fish consumption was not evaluated in the risk assessment because there are no humans that reside at the site. Fishing is not known to occur in Rowell Creek in the area adjacent to OU 8 under current land use. The depth of Rowell Creek is between 1 to 2 feet in the area of OU 8. In the future, fish consumption will not be evaluated because there are no lipophilic compounds detected in surface water and lipophilic compounds are detected at low concentrations in sediment.

Generally, exposure scenarios associated with future land use are difficult to predict. Residential land use was selected as a future land use scenario at Site 3 based on USEPA Region IV guidance (USEPA, 1991e). The inclusion of a residential land use scenario at OU 8 is intended to represent a worst case scenario. Future residential land use at or near OU 8 is possible. Because NAS Cecil Field is scheduled for closure in the late 1990's as part of Base Realignment and Closure (BRAC), land use near OU 8 may be altered from its current use. Planned continued use as an airfield, possibly as a global airfield, would likely continue nonresidential use of OU 8.

Table 6-1
Human Health Chemicals of Potential Concern

Baseline Risk Assessment
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Environmental Medium	Human Health Chemicals of Potential Concern [1]
Surface Soil	**Inorganics**: manganese **Organics**: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluorantnene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-dc)pyrene, endrin ketone, and TRPH
Subsurface Soil	**Inorganics**: beryllium and manganese **Organics**: benzo(g,h,i)perylene and TRPH
Surface Water	**Inorganics**: antimony **Organics**: dibromochloromethane, bromodichloromethane, and chloroform
Sediment	**Inorganics**: none **Organics**: Aroclor-1254 and endrin ketone
Surficial Aquifer	**Inorganic**: aluminum, arsenic, chromium, iron, manganese, and vanadium **Organics**: 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethene (total), benzene, trichloroethene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2-methylnaphthalene, 4-methylphenol, benzo(b)fluoranthene, naphthalene, bis(2-ethylhexyl)phthalate, Aroclor-1248, and TRPH.
Intermediate Aquifer	**Inorganics**: arsenic and manganese **Organic**: none

[1] HHCPCs were selected for each medium in Tables 4-4 through 4-9 of the Baseline Risk Assessment (ABB-ES, 1995).

Notes: HHCPC = human health chemicals of potential concern.
TRPH = total recoverable petroleum hydrocarbons

6.3.3 Toxicity Assessment A toxicity assessment was conducted to identify the relevant oral, dermal, and inhalation toxicity values for carcinogenic and non-carcinogenic effects of OU 8 HHCPCs. These values were identified from either the USEPA's Integrated Risk Information System database (USEPA, 1994b) or USEPA's Health Effects Assessment Summary Tables (USEPA, 1994c).

6.3.4 Risk Characterization Quantitative estimates of both carcinogenic and non-carcinogenic risks were calculated for each HHCPC and each complete exposure scenario selected for evaluation in the exposure assessment. Carcinogenic risks associated with exposure to individual chemicals were estimated by multiplying the estimated chemical intake for each carcinogen (in units of milligram of chemical per kilogram of body weight each day [mg/kg-day]) by its USEPA cancer slope factor (CSF) (in units of [$mg/kg\text{-}day^{-1}$]). The result is a chemical-specific excess lifetime cancer risk (ELCR). This value represents the probability of developing cancer over the course of a 70-year lifetime as a result of the assumed exposure to site chemicals. The term excess refers to the increase in risk of cancer associated with exposure to site-related chemicals that is above and beyond baseline cancer risks. The average cancer burden in the United States in 1993 was one in three for women and one in two for men (American Cancer Society, 1994).

Within each exposure pathway, cancer risks associated with multiple carcinogenic compounds are estimated by summing the chemical-specific risks to yield a pathway-specific ELCR. USEPA's guidelines state that the acceptable total incremental carcinogenic risk for an individual resulting from exposure at a hazardous waste site is in a range of 1 in 1,000,000 (10^{-6}) to 1 in 10,000 (10^{-4}) (USEPA, 1990).

Noncarcinogenic risk estimates are calculated by dividing estimated chemical intakes (in units of mg/kg-day) by the appropriate reference dose (RfD) developed by USEPA (in units of mg/kg-day). The resulting ratio is called the hazard quotient (HQ). The HQs for individual compounds within an exposure pathway were summed resulting in a hazard index (HI) for that pathway. An HI equal to 1 represents concentrations and levels of exposure that are generally considered to be without deleterious effects for a lifetime exposure, even for sensitive individuals. As the HI increases above 1, the risk of adverse effects also increases if the toxic endpoint (organic or bodily function) is the same and the effects are additive.

6.3.4.1 Risk Characterization for Human Health at OU 8 Health risks associated with current land use are not of concern. Cancer risk estimates associated with OU 8 surface soil, subsurface soil, surface water, sediment, and the intermediate aquifer are all below or within the acceptable risk range defined by USEPA (10^{-6} to 10^{-4}). The risk estimate for the surficial aquifer under future land use conditions (adult resident) is 3×10^{-3} which is at a level of concern. The major contaminants contributing cancer risk to the ELCR for the resident is 1,1-dichloroethene (ELCR = 3×10^{-3}), trichloroethene (ELCR = 2×10^{-4}), 1,4-dichlorobenzene (ELCR = 2×10^{-4}), and arsenic (ELCR = 2×10^{-4}).

Noncancer risk estimates associated with OU 8 surface soil, subsurface soil, surface water, sediment, and the intermediate aquifer are all equal to or less than an HI of 1. The noncancer risk estimate (HI) for the surficial aquifer under future land use conditions (adult resident) is 20. Major contributors to this HI are trichloroethene (HQ=6.7), 1,2-dichloroethene (total) (HQ=5.8), 1,2-dichlorobenzene (HQ=3), and 1,1-dichlorothene (HQ=1.1).

6.3.5 Comparison to Available Criteria Available criteria and guidance for groundwater (USEPA, 1994d; FDEP, 1994a), surface soil (FDEP, 1994b), and subsurface soil (FDEP, 1994b) were considered in the HHRA for OU 8 (Appendix O; Tables O-1 through O-5). The maximum detected concentrations for each chemical detected in the OU 8 surficial aquifer, intermediate aquifer, surface soil, and subsurface soil were compared to the available criteria as a part of the BRA (ABB-ES, 1995a).

Groundwater. In the surficial aquifer, the maximum detected concentration of 1,1,1-trichloroethane, 1,1-dichloroethene, 1,2-dichloroethene (total), benzene, trichloroethene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 4-methylphenol, benzo(b)fluoranthene, naphthalene, bis(2-ethylhexyl)phthalate, Aroclor-1248, aluminum, iron, and manganese exceeded the respective Federal MCL, Florida Standard, or Florida Guidance value (Table O-1). Each of these chemicals was retained as an HHCPC in the surficial aquifer because it was detected at a concentration that exceeded background (upgradient) or risk-based screening concentrations.

In the intermediate aquifer (Table O-2), aluminum exceeded the Federal MCL and the Florida Guidance Concentration. However, this chemical was not retained as an HHCPC because it was detected at a concentration less than the associated risk-based screening concentration.

Soil. The concentration of benzo(a)pyrene detected in Site 3 surface soil exceeded the available FDEP guidance concentrations for direct contact and inhalation exposures (Table O-3).

In subsurface soil (Table O-4), the concentrations of contaminants detected at Site 3 subsurface soil did not exceed the FDEP guidance concentration for the general worker. The maximum concentrations of methylene chloride, trichloroethene, and xylenes (total) exceed their available FDEP guidance concentrations for leaching to groundwater. This comparison was conducted because subsurface soil may be contributing to the contamination in the surficial aquifer. It should be noted that methylene chloride, with a frequency of detection (FOD) of 3 in 37 samples, is a common laboratory contaminant.

TRPH. TRPH data was collected in surface and subsurface soil, groundwater, surface water, and sediments at Site 3. TRPH was not detected in surface water and sediment samples. The maximum TRPH value for surface soil and subsurface soil exceeded the available Florida guidance value of 50 mg/kg developed for thermally treated soil contaminated with TRPH (Florida Legislature, 1992)(Table O-5).

6.3.6 Summary of Human Health Risk Assessment The purpose of the HHRA at OU 8 was to characterize the risks associated with the potential exposures to site-related contaminants. Potential health risks were evaluated under current and assumed future land use conditions for a subset of contaminants detected in surface soil, subsurface soil, surface water, sediment, and groundwater (surficial and intermediate aquifers) associated with Site 3 (Table 6-2). The chemicals chosen were selected because they are the most likely chemicals to pose risks of concern to human receptors.

Current Land Use. All cancer (Figure 6-1) and noncancer risks (Figure 6-2) for current land use are consistent with USEPA Superfund guidelines, established in the NCP, that indicate that acceptable exposure levels are associated with an

Table 6-2
Human Health Risk Summary

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Medium	Risks Above USEPA Risk Range? [1]		Concentrations Above Florida Guidance Criteria? [2]
	Current Land Use [3]	Future Land Use [4]	
Surface Soil	No	No	No
Subsurface Soil	No	No	Yes [5]
Surface Water	No	No	NA
Sediment	No	No	NA
Surficial Aquifer	NA	Yes	Yes [6]
Intermediate Aquifer	NA	No	Yes [7]

[1] The U.S. Environmental Protection Agency (USEPA) regulations, established in the National Contingency Plan, indicate that the total lifetime cancer risk due to exposure to the HHCPCs at a site, by each complete exposure pathway, should not exceed a range of 1 in 1,000,000 ($1x10^{-6}$) to 1 in 10,000 ($1x10^{-4}$) (USEPA, 1990) or a hazard index of 1.

[2] Florida Soil Cleanup Goals for Military Sites in Florida are identified in the Florida Department of Environmental Protection (FDEP) memorandum dated July 5, 1994 (FDEP, 1994b). Florida Guidance Concentrations are taken from Chapter 6 (Guidance Concentrations Index) of the FDEP Groundwater Guidance Concentrations issued in June 1994 (FDEP, 1994a). Appendix O provides a comparison of each medium with available criteria.

[3] Current land uses evaluated in this report include nonresidential exposures with no current use of groundwater.

[4] Potential future land uses evaluated in this report include residential exposures with the use of groundwater as drinking water.

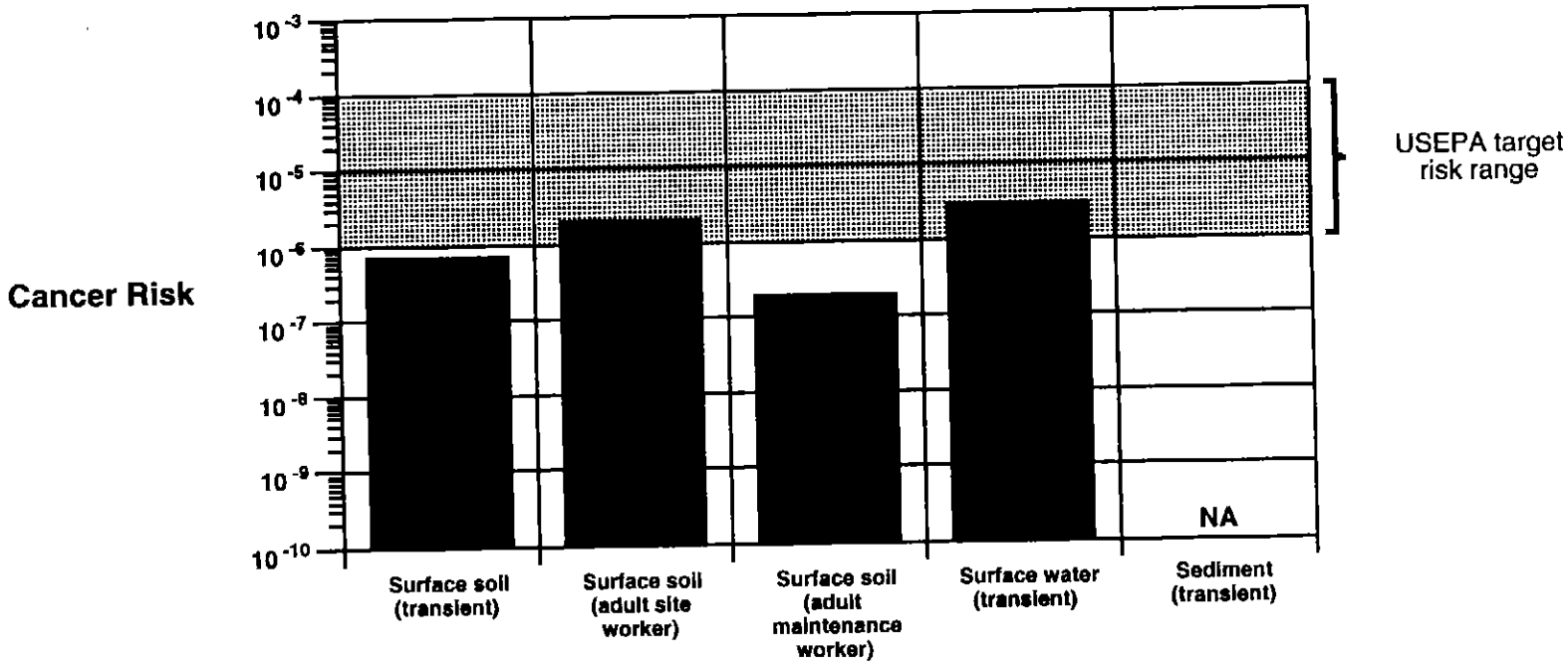
[5] In subsurface soil, the maximum concentrations of methylene chloride, trichloroethene, xylenes (total) exceed their available Florida guidance concentrations for leaching to groundwater (Appendix O, Table O-4).

[6] In the surficial aquifer, the maximum detected concentration of 1,1,1-trichloroethane, 1,1-dichloroethene, 1,2-dichloroethene (total), benzene, trichloroethene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 4-methylphenol, naphthalene, Aroclor-1248, aluminum, iron, and manganese exceeded the respective Florida guidance concentration (Appendix O, O-1)).

[7] In the intermediate aquifer, the maximum concentration of aluminum exceeded their respective Florida guidance concentration (Appendix O, O-2).

Notes: USEPA = U.S. Environmental Protection Agency.
NA = not applicable.
HHCPC = human health chemical of potential concern.
FDEP = Florida Department of Environmental Protection.

Cancer Risk Summary, Current Land Use



NA = No carcinogens were selected as Human Health Chemicals of Potential Concern in sediment.

FIGURE 6-1

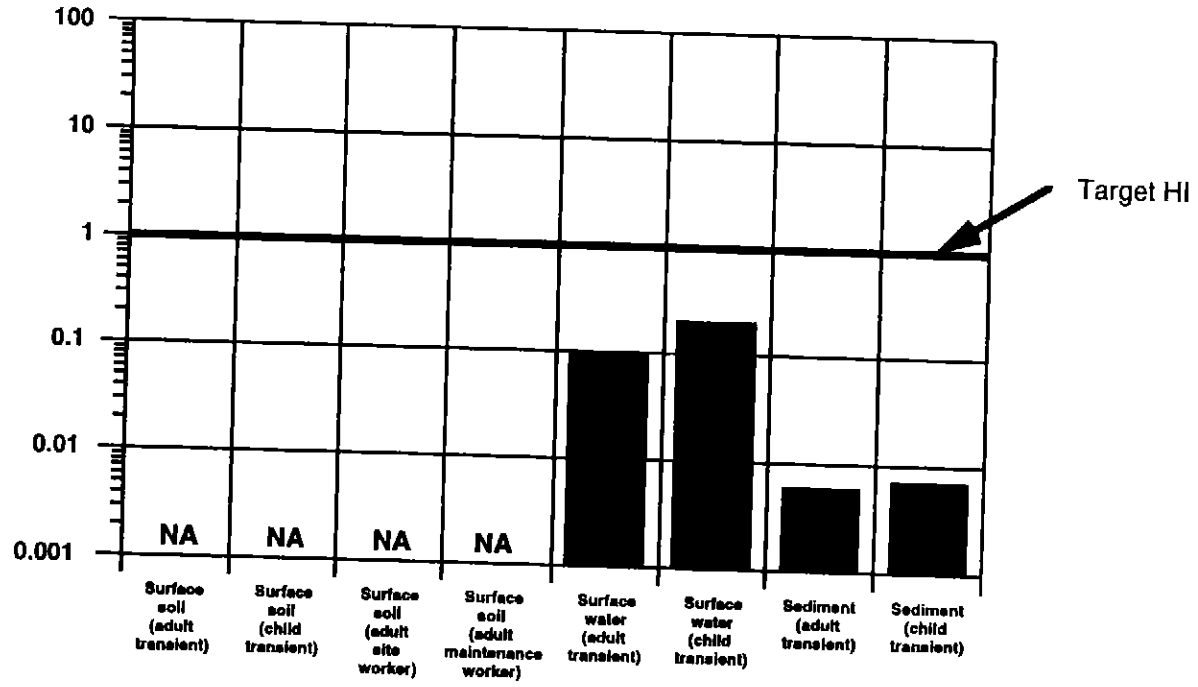
CANCER RISK SUMMARY, CURRENT LAND USE

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

8500-13 950419WEM

Hazard Index Summary, Current Land Use



NA = Harard Index is less than 0.001.

FIGURE 6-2

HAZARD INDEX SUMMARY, CURRENT LAND USE

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

8500-13 950419WEM

excess lifetime cancer risk due to exposure to the HHCPCs at a site in the range of 1×10^{-6} to 1×10^{-4} (USEPA, 1990) or a hazard index of 1 or less.

Future Land Use. Cancer and noncancer risks in surface soil, subsurface soil, surface water, sediment, and the intermediate aquifer under future residential land use assumptions are consistent with acceptable risks as described by USEPA (USEPA, 1990).

Future use of the surficial aquifer has risks greater than those associated with acceptable exposure levels. The cancer risk estimate for the surficial aquifer under future land use conditions (adult resident) is 3×10^{-3} (Figure 6-3). The major contaminants contributing cancer risk to the ELCR for the resident is 1,1-dichloroethene (ELCR = 3×10^{-3}), trichloroethene (ELCR = 2×10^{-4}), 1,4-dichlorobenzene (ELCR = 2×10^{-4}), and arsenic (ELCR = 2×10^{-4}). The noncancer risk estimate (HI) for the surficial aquifer (adult resident) is 20 (Figure 6-4). Major contributors to this HI are trichloroethene (HQ = 6.7), 1,2-dichloroethene (HQ = 5.8), 1,2-dichlorobenzene (HQ = 3), and 1,1-dichloroethene (HQ = 1.1).

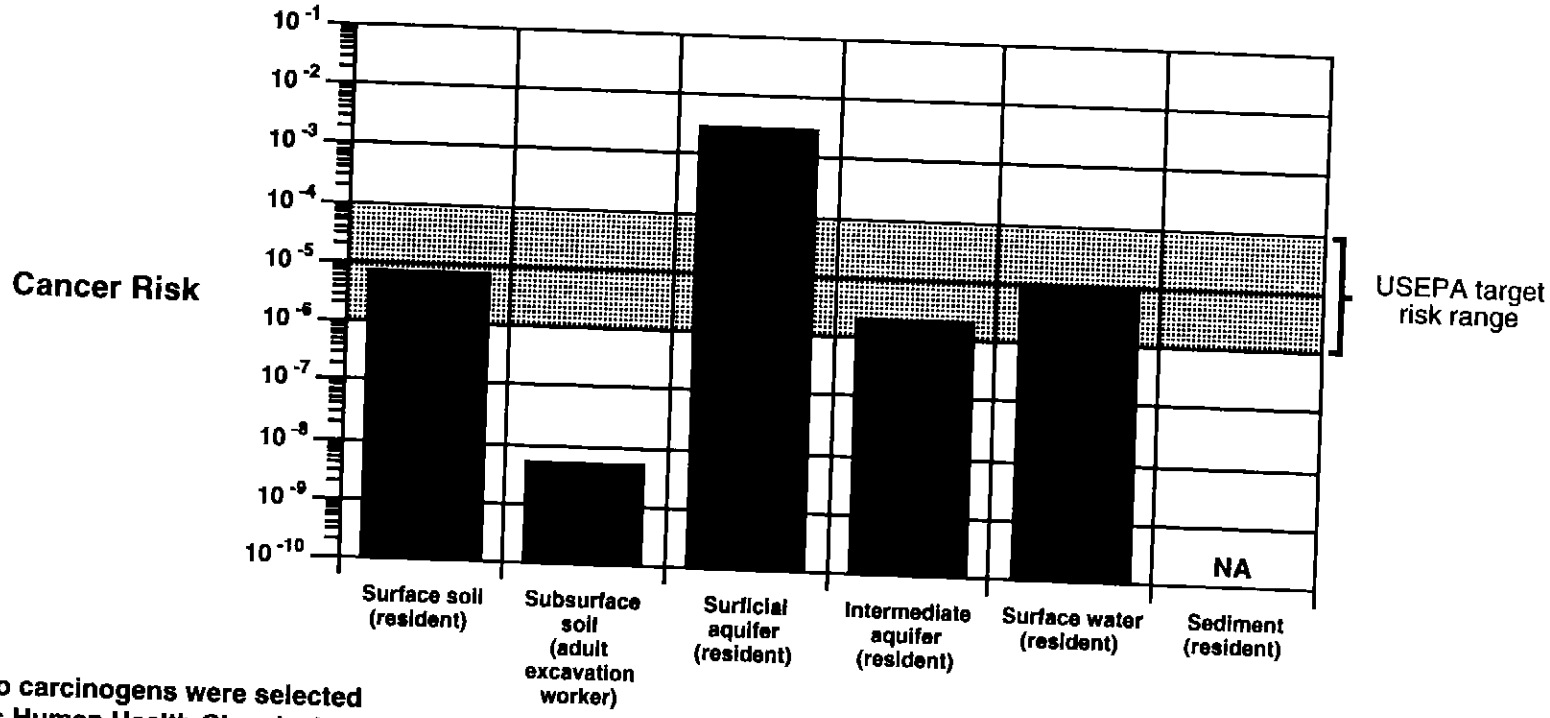
An analysis was conducted to determine if there would be any human health risk associated with discharge of the surficial aquifer to surface water. Maximum groundwater concentrations for each analyte detected was divided by a dilution factor of 133 to obtain the associated surface water concentrations. The derivation of the dilution factor can be found in Appendix K. The surface water concentrations were compared to the USEPA Region III risk-based concentrations for tap water (USEPA, 1994a) and background screening concentrations (Table O-6). Any analyte which exceeded either of these screening criteria was retained as an HHCPC (Table O-7). Exposure to surface water by an adult and child resident was evaluated because these are the most conservative scenarios for surface water exposure. The cancer risk associated with a resident (child and adult) was 2×10^{-6} (Tables O-8 and O-9), which is within the acceptable risk range. The hazard indices associated with the child (HI=0.5) and adult (HI=0.3) were both below the acceptable level of 1 (Tables O-8 and O-9). In summary, discharge of the surficial aquifer into the surface water is not associated with any unacceptable human health risk.

In summary, the risk estimates for surface soil, subsurface soil, surface water, sediment, and the intermediate aquifer indicate that human exposure to these media at OU 8, under the conditions evaluated in this assessment, is not associated with unacceptable risk of adverse health effects (cancer or noncancer) (Figures 6-1 through 6-4). Concern over the contamination in the surficial aquifer may be warranted (Figures 6-3 and 6-4), however, because of the risk of adverse health effects (cancer and noncancer) associated with assumed future use of the groundwater as a potable water supply. Use of the surficial aquifer as a drinking water supply at OU 8 may never occur because NAS Cecil Field is served by a community water supply system.

Based on the results of the human health portion of the BRA, including the results of the criteria comparison (Subsection 6.3.5), the development of remedial action strategies may be necessary for the surficial aquifer at OU 8.

6.4 ECOLOGICAL RISK EVALUATION. The purpose of the ecological risk assessment for OU 8 is to assess actual and potential adverse effects to ecological receptors associated with exposure to site related contaminants. First, a problem

Cancer Risk Summary, Future Land Use



NA = No carcinogens were selected as Human Health Chemical of Potential Concern in sediment.

FIGURE 6-3

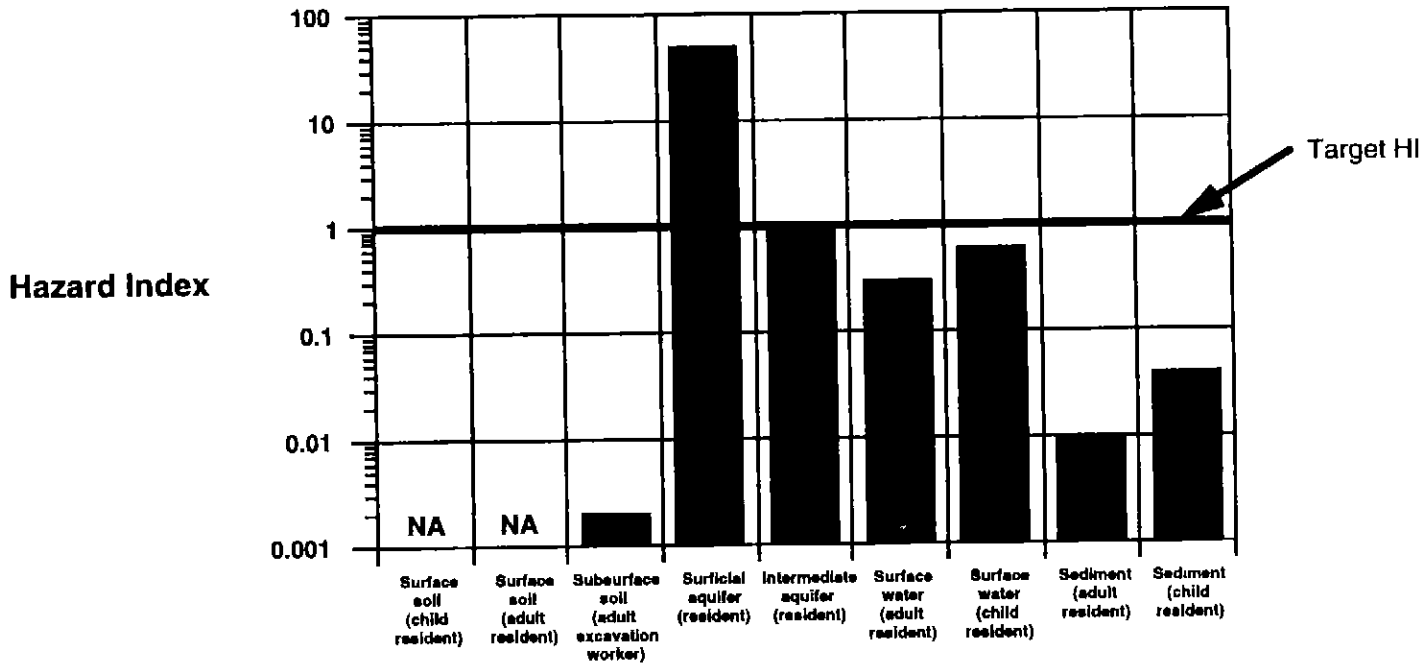
CANCER RISK SUMMARY, FUTURE LAND USE

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

8500-13 950419WEM

Hazard Index Summary, Future Land Use



NA = Harard Index is less than 0.001.

FIGURE 6-4

HAZARD INDEX SUMMARY, FUTURE LAND USE

REMEDIAL INVESTIGATION, OPERABLE UNIT 8

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

8500-13 950419WEM

formulation component identifies ecological receptors and exposure pathways for the receptors. The next steps in the ecological risk assessment are selection of ecological contaminants of potential concern (ECPCs), exposure assessment, description of potential adverse effects to ecological receptors associated with the ECPCs, and finally, characterization of risk posed to representative species.

6.4.1 Problem Formulation Exposure pathways are discussed for four groups of ecological receptors (terrestrial and wetlands wildlife, aquatic receptors, terrestrial plants, and terrestrial invertebrates). The exposure pathway includes a source of contamination, contaminated media (surface soil, food, groundwater, surface water, and sediments), and an exposure route. The OU 8 ecological assessment is based on the pathways for which contaminant exposures are believed to be the highest and most likely to occur and for which there are adequate toxicity data for completion of a risk analysis. For wildlife these pathways include, ingestion of soil, surface water, and sediment. Pathways evaluated for aquatic receptors include direct contact with surface water, sediment, and groundwater (as it discharges to surface water).

6.4.2 Selection of Ecological Chemicals of Potential Concern Ecological chemicals of potential concern (ECPCs) represent the analytes detected in media (surface soil, surface water, sediment, and groundwater) at OU 8 that were considered in the risk assessment process. The ECPCs are identified as being present at OU 8 and representing a potential risk for ecological receptors. ECPCs were selected separately for: (1) surface soil at the grassy OU 8 disposal pit area and the forested OU 8 helicopter crash site, (2) the OU 8 surface water and sediment sampling stations in Rowell Creek, and (3) groundwater from within the OU 8 plume. Undiluted unfiltered, undiluted filtered, and diluted unfiltered groundwater were evaluated separately. For surface water and sediment, ECPCs were selected separately for terrestrial wildlife and aquatic receptors. Table 6-3 provides a summary of the ECPCs selected for OU 8 for each medium and considered in the risk assessment.

6.4.3 Exposure Assessment The exposure pathways evaluated for wildlife at OU 8 include ingestion of soil, surface water, and sediment, and ingestion of food items that have accumulated contaminants from contaminated media. The exposure pathways evaluated for terrestrial plants and invertebrates at OU 8 include direct contact with contamination in surface soil and (for invertebrates) ingestion of soil.

Exposure pathways evaluated for aquatic receptors (including invertebrates, plants, amphibians and fish) in Rowell Creek include direct contact with surface water, sediment, and groundwater (as it discharges to surface water).

6.4.4 Ecological Effects Assessment The ecological effects assessment describes the potential adverse effects associated with the ECPCs to ecological receptors. The methods for identifying and characterizing ecological effects for ECPCs in surface soil, surface water, sediment, and groundwater are described below.

Surface soil toxicity to wildlife species is evaluated based on a model that estimates the amount of contaminant exposure obtained via the diet and incidental ingestion of soil. Estimated doses are compared with reference toxicity doses representing thresholds for both lethal and sublethal effects. Risks for soil

Table 6-3
Ecological Chemicals of Potential Concern (ECPCs)

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Environmental Medium	Ecological Contaminants of Potential Concern [1]
Surface Soil, Disposal Pit	**Inorganics:** Antimony, Barium, Cadmium, Copper, Lead, Manganese, Mercury, Silver, Zinc **Organics:** Acetone, 2-Butanone, Methylene chloride, Xylenes (total), Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Di-n-butylphthalate, bis(2)Ethylhexyl)phthalate, Fluoranthene, Indeno(1,2,3-cd)pyrene, 2-Methylphenol, Aroclor-1254, alpha-Chlordane, gamma-Chlordane, 4,4'-DDT, Dieldrin, Endosulfan II
Surface Soil, Helicopter Crash Site	**Inorganics:** Copper **Organics:** 1,1-Dichloroethylene, 1,2-Dichloroethylene, Toluene, Phenol, alpha-BHC, alpha-Chlordane, 4,4'-DDT, Endosulfan II, Endrin ketone
Surface Water	**Inorganics:** Aquatic and wildlife receptors: Aluminum Wildlife receptors only: Antimony, Iron, Lead **Organics:** Aquatic and wildlife receptors: Bromodichloromethane and Dibromochloromethane Wildlife receptors only: Chloroform and Methylene chloride
Sediment	**Inorganics:** None retained as ECPCs **Organics:** Aquatic and wildlife receptors: 4,4'-DDT Wildlife receptors only: Endrin ketone
Unfiltered, Undiluted Groundwater	**Inorganics:** Aluminum, Barium, Chromium, Copper, Iron, Lead, Manganese, Vanadium, **Organics:** Acetone, 2-Butanone, 1,1-Dichloroethylene, 1,2-Dichloroethylene, 1,1,1-Trichloroethane, Trichloroethylene, Xylenes (total), Benzo(b)fluoranthene, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, bis(2-Ethylhexyl)phthalate, 2-Methynaphthalene, 2,Methylphenol, 4-Methylphenol, Naphthalene, Aroclor-1248
Unfiltered, Diluted Groundwater	**Inorganics:** Aluminum, vanadium **Organics:** Acetone, 2-Butanone, Trichloroethylene, Xylenes (total), Benzo(b)-fluoranthene, 1,2-Dichlorobenzene, 2-Methylnaphthalene, 2-Methylphenol, 4-Methylphenol

[1] ECPCs were selected for each medium in the Baseline Risk Assessment Report (ABB-ES, 1995a).

invertebrates and plants are evaluated based on the results of laboratory toxicity testing of surface soil samples from OU 8 with earthworms (*Eisenia foetida*) and lettuce seeds (*Lactuca sativa*).

The measures of adverse ecological effects for wildlife exposed to Rowell Creek surface water and sediment are evaluated based on a model that estimates the amount of contaminant exposure obtained via the diet and incidental ingestion of these media. Comparison of estimated doses with reference toxicity doses representing thresholds for both lethal and sublethal effects is the basis of the wildlife evaluation. Potential adverse ecological effects for aquatic life are indirectly measured for the entire mixture of ECPCs through the use of a benthic macroinvertebrate study. In addition, site-specific surface water and sediment contaminant concentrations are compared to surface water and sediment criteria, guidelines, and benchmark values.

Current and future risks for aquatic receptors are evaluated through characterization of risks from exposure to ECPCs in groundwater. Exposure concentrations of each ECPC in filtered and unfiltered groundwater are compared with available aquatic toxicity benchmark values. Additionally, an evaluation is presented of a dilution-series chronic toxicity test conducted using the water flea (*Ceriodaphnia dubia*) and fathead minnow (*Pimephales promelas*).

6.4.5 Risk Characterization The following sections describe how risks are characterized for ecological receptors. Potential adverse effects resulting from exposure to ECPCs in surface soil, surface water and sediment are characterized for wildlife, invertebrates, and plants. Risks are also characterized for aquatic receptors for exposures resulting from ECPCs in surface water, sediment, and groundwater.

Terrestrial Wildlife Exposure to Surface Soil. Risks for the representative wildlife species associated with ingestion and bioaccumulation of ECPCs in surface soil and prey items are quantitatively evaluated using Hazard Quotients (HQs), which are calculated for each ECPC by dividing the potential dietary exposure (PDE) concentration by the toxicity benchmark (RTV). Hazard Indices (HIs) are determined for each receptor by summing the HQs for all ECPCs. When the estimated exposure concentration is less than the RTV (i.e., the HQ is less than one), the contaminant exposures are assumed to fall below the range considered to be associated with adverse effects for growth, reproduction, and survival (of the individual organism) and no risks to the wildlife populations are assumed. When the ratio is greater than one (i.e., HQ greater than one), a discussion of the ecological significance is included and risk is assumed.

Summary HIs and HQs for representative wildlife receptors exposed to maximum ECPCs for both lethal and sublethal effects are less than 1. No potential adverse effects to reproduction, growth, or survival are indicated.

Terrestrial Plant and Invertebrate Exposure to Surface Soil. Risks for terrestrial plants and soil invertebrates are characterized based on the results of laboratory toxicity tests. Surface soil analytical and toxicity samples are collected concurrently and split for the two separate analyses. The analytical results for the surface soil samples are used to help interpret the contaminant exposures and responses of the test species (earthworms and lettuce seeds).

Earthworm survival was not adversely affected following test exposures to OU 8 soil. Although a reduction in lettuce seed germination was observed (as compared to the reference soil sample) in two of the surface soil samples from OU 8, there was no correlation between any ECPC concentration and observed responses. Interpretation of these results is confounded by apparently low statistical power. However, it is likely that a non-ECPC stressor (i.e., another physical, chemical, or biological stressor such as halogenated organomethanes) is responsible for the observed adverse response.

Wildlife Exposure to Surface Water and Sediment. Risks for wildlife associated with the ingestion of surface water, potentially contaminated aquatic life, and sediment are quantitatively evaluated using the HQ/HI approach described above for terrestrial wildlife exposure to surface soil. All of the HIs and HQs are less than one, indicating no potential adverse effects to reproduction, growth, or survival for wildlife from exposure to ECPCs currently detected in Rowell Creek surface water and sediment adjacent to OU 8.

Aquatic Receptor Exposure to Surface Water and Sediment. Risks for aquatic receptors are characterized based on a weight-of-evidence evaluation of the following factors:

- measurements of the aquatic macroinvertebrate community structure and function;
- comparison of concentrations of ECPCs in unfiltered surface water to reported toxicity of the ECPC in laboratory tests (AQUIRE information, USEPA, 1994e), AWQC (40 CFR 122; USEPA, 1991h) and State of Florida Surface Water Quality Standards (Chapter 62-302, FAC; Florida Legislature, 1995); and
- comparison of concentrations of ECPCs in sediment to National Oceanic and Atmospheric Administration (NOAA) Effects Range-Low (ER-L) and Effects Range-Median (ER-M) sediment guidelines (Long and others, 1993), USEPA sediment quality guidelines based on equilibrium partitioning (USEPA, 1988c), and OME LEL provincial sediment quality guidelines (Persaud and others, 1992).

Aquatic Receptor Exposure to Surface Water. No substantial exceedances of available surface water quality guidelines are identified for aquatic receptors in Rowell Creek in the vicinity of OU 8 (Table O-10). Aluminum was detected at both downstream surface water sample locations at concentrations ranging from 141 to 559 $\mu g/\ell$; the USEPA chronic water quality criterion is 87 $\mu g/\ell$. Although larval trout are among the most sensitive ecological receptors with regard to aluminum exposure, no salmonids occur in Rowell Creek, a warm water system. The majority of species evaluated in AQUIRE (Appendix T, Baseline Risk Assessment, ABB-ES, 1995) are tolerant of the concentrations of aluminum detected in Rowell Creek adjacent to OU 8.

Silver was detected at a concentration of 0.24 $\mu g/\ell$ in a 1993 sample taken from Rowell Creek adjacent to OU 8. This analyte was not detected in surface water samples collected in 1994. It is unlikely that silver in surface water is posing a risk to OU 8 aquatic receptors.

A review of the macroinvertebrate habitat quality parameter data suggests that habitat quality conditions at this location of Rowell Creek represent a poor environment for many types of aquatic organisms. Community metric data from the macroinvertebrate study support this conclusion. Differences in habitat structure between Rowell Creek at OU 8 and the regional reference station may be sufficient to explain the decreased biological condition. The upgradient chlorinated sewage treatment plant discharge may also contribute to the differences in community structure at this sampling location.

Aquatic Receptor Exposure to Sediment. No substantial exceedances of available sediment quality guidelines are identified for aquatic receptors in Rowell Creek in the vicinity of OU 8 (Table 0-11). Aroclor 1254 (180 μg/kg) and 4,4"-DDT (4.4 μg/kg) were detected; however, neither of these analytes was detected in OU 8 groundwater, indicating that transport of these contaminants from the disposal pit is not occurring. Further, it is unlikely that aquatic receptors are currently at risk from exposure to the low levels of these analytes in Rowell Creek sediment.

Aquatic Receptor Exposure to Groundwater. Risks for aquatic life associated with exposures to ECPCs in groundwater as it discharges to Rowell Creek are evaluated based on the following factors:

- comparison of maximum and average ECPCs in groundwater relative to reported toxicity benchmarks of the ECPC in laboratory tests (AQUIRE information, USEPA, 1994e), Federal AWQC (40 CFR 122; USEPA, 1991h), and State of Florida Surface Water Quality Standards for Class III waters (Chapter 62-302; Florida Legislature, 1995) and

- responses of *P. promelas* and *C. dubia* in the groundwater laboratory toxicity tests.

Comparison of the exposure concentrations of each ECPC in filtered and unfiltered groundwater indicates that several constituents in groundwater may result in risk to aquatic organisms (Table 0-12). However, when a dilution factor is applied to estimate the dilution of groundwater prior to discharge to Rowell Creek, estimated concentrations of contaminants in groundwater are below available aquatic toxicity criteria.

Results of the dilution-series groundwater laboratory toxicity testing indicate that exposure to undiluted groundwater from OU 8 may result in reduced survival and reproduction for the water flea and the fathead minnow. Although several groundwater risk contributors were identified, three dichlorobenzene isomers were found to be the primary risk contributors from OU 8 groundwater. When groundwater was diluted approximately 20-fold, little toxicity was observed in the water flea or fathead minnow. Analysis of the toxicity testing data supports the contention that diluted groundwater discharging to Rowell Creek poses little risk to aquatic receptors. Chapter 3.0 states that a dilution of 132-fold or more would be expected as OU 8 groundwater discharges to Rowell Creek.

6.5 CONCLUSIONS OF ECOLOGICAL ASSESSMENT. Potential risks for ecological receptors were evaluated for contaminants in surface soil, surface water, and sediment at OU 8. A summary of these risks is presented in Tables 6-4 and 6-5. Ecological receptors are not likely to be at risk from exposure to OU 8 surface soil, groundwater as it discharges to Rowell Creek, surface water, or sediment.

Table 6-4
Summary of Risk Characterization for Wildlife, Plant, and Invertebrate Receptors, Site 3

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Receptor	Biological Parameters	Medium			
		Surface Soil	Surface Water	Sediment	Future Groundwater Discharge
Terrestrial and wetland wildlife	Food web modeling	None	None	None	NA
Terrestrial and wetland plants	Toxicity tests with lettuce seeds	None[1]	NA	NA	NA
Soil invertebrates	Toxicity tests with earthworms	None	NA	NA	NA

[1] Slight reduction of lettuce seed germination believed to be associated with a noncontaminant stressor.

Notes: None = no effect.
NA = not applicable.

Table 6-5
Summary of Risk Characterization for Aquatic Receptors, Site 3

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Sampling Location	Biological Parameters		ECPCs[1]			Interpretation of Weight-of-Evidence
	Groundwater Laboratory Toxicity Testing	Benthic Community Composition	Groundwater	Surface Water	Sediments	
Fourteen monitoring wells located within the OU 8 plume, including the following:	NA	NA	Diluted, unfiltered: 1,2-DCB[2]; aluminum[3] Undiluted, unfiltered: 1,2-DCB; 1,3-DCB; 1,4-DCB; bis(2-Ethylhexyl-phthalate; Aroclor 1248; aluminum; chromium; copper, iron	NA NA	NA NA	Diluted, unfiltered groundwater: no risk is expected upon discharge to Rowell Creek. Undiluted, unfiltered groundwater: risk may be associated primarily with dichlorobenzene isomers. Undiluted, unfiltered groundwater is not expected to discharge into Rowell Creek.
CF-3-MW13S Located within the plume, immediately upgradient of discharge into Rowell Creek.	100 percent survival of the water flea and 93 percent survival of the fathead minnow at 5 percent of sample; sublethal effects noted at 50 percent sample (water flea) and 100 percent sample (fathead minnow).	NA	aluminum, chromium, iron, lead,	NA	NA	No risk is expected on discharge to Rowell Creek.
CF-3-MW28S Located within the plume, under the "hot spot" near the former disposal pit.	No effects noted on survival of water flea in 100 percent sample, but reduced survival in the fathead minnow at this concentration; sublethal effects noted at all dilutions in the water flea, but none observed in the fathead minnow at any dilution.	NA	aluminum, copper, iron	NA	NA	No risk is expected on discharge to Rowell Creek.

See notes at end of table.

Table 6-5 (Continued)
Summary of Risk Characterization for Aquatic Receptors, Site 3

Remedial Investigation
Operable Unit 8
Naval Air Station Cecil Field
Jacksonville, Florida

Sampling Location	Biological Parameters		ECPCs[1]			Interpretation of Weight-of-Evidence
	Groundwater Laboratory Toxicity Testing	Benthic Community Composition	Groundwater	Surface Water	Sediments	
CF-3-SW/SD1	NA	NA	NA	Aluminum[3]	4,4'-DDT[4,5]	No site-related risk is estimated.
RC-SW/SD3	NA	Inconclusive, but reduced relative to Five Mile Creek	NA	Aluminum[3]	Aroclor-1254[5,6]	No significant site-related risks estimated. Macroinvertebrate data suggest the decreased biological condition may be due to poor habitat structure; the upgradient sewage treatment plant discharge may contribute to decreased habitat quality.

[1] Ecological chemicals of potential concern (ECPCs) which exceeded two times the reference concentration and also exceeded benchmarks.
[2] Value is 2 orders of magnitude less than the AWQC value (USEPA, 1991h); exceeds lowest effect level reported for the most sensitive species tested, trout, which is a cold-water species not expected to occur in Rowell Creek. Exposure to this level is not expected to be toxic to indigenous species.
[3] Evaluation of unfiltered water over-estimates the risk associated with exposure to inorganics such as aluminum (USEPA, 1993).
[4] Value is less than the USEPA draft SQG (8.28 μg/kg) and OME LEL value (8 μg/kg)(USEPA 1988c; Persaud and others, 1992, respectively).
[5] Analyte was not detected in OU 8 groundwater, indicating transport of the contaminant from OU 8 is not occurring.
[6] PCBs were not detected in 1994 samples.

Notes: NA = not applicable.
DCB = Dichlorobenzene.

7.0 SUMMARY AND CONCLUSIONS

7.1 SUMMARY. Operable Unit (OU) 8, located at Naval Air Station (NAS) Cecil Field in Jacksonville, Florida, consists of Site 3, the oil and sludge disposal pit. OU 8 is located immediately northeast of the intersection of Perimeter Road and the access road which connects Perimeter Road and the Lake Fretwell dam.

OU 8 was investigated from 1985 to 1994 to refine and quantify the conceptual understanding of site conditions resulting from wastes placed in the disposal pits. This RI relies on comprehensive measurements, analysis, and interpretation of site conditions including the use of groundwater, surface and subsurface soil, surface water, and sediment samples. These measurements and samples were collected over a 20-acre study area to describe the areal and vertical distribution of contaminants. Based on these investigation results, health and ecological risks posed by the detected contaminants were evaluated.

OU 8 was reportedly used to dispose of liquid wastes and sludge from the mid-1950s until 1975, although review of aerial photographs suggests the area was not disturbed prior to 1960. Liquid wastes, including fuel, oil, solvent, paint, and paint stripper, were typically taken to the site by the individual generators (i.e., the fuel farm, Public Works, the Aircraft Maintenance Department, and the squadrons) in bowsers (trailer mounted tanks) or 55-gallon drums, drained into the pit, and allowed to seep into the soil or evaporate. The pit wastes were burned when the liquid level approached the top. This burning procedure was repeated approximately once every 3 months by the fire department. No records were kept on disposal practices, and access to the site was uncontrolled; therefore, the amount of the liquid wastes disposed of at OU 8 is unknown.

On February 8, 1992, a Navy helicopter crashed into a wooded area located approximately 800 feet east of the OU 8 source area (see Figure 1-3). The helicopter had a fuel capacity of between 1,800 and 2,000 gallons and ignited on impact. Although the crash site is not part of the OU 8 source area, it is within the OU 8 study area, and results and conclusions for the crash site have been included in this report.

7.1.1 Physical Setting The disposal pit area is located adjacent to the unpaved Perimeter Road and Lake Fretwell access road approximately 1,400 feet west-southwest of the Lake Fretwell dam. The disposal pit area is flat and the area to the east slopes gently to the wetlands and Rowell Creek (which flows south) and Lake Fretwell dam. The area is covered with vegetation ranging from open grassy areas to heavily wooded areas. The disposal pit area is vegetated primarily with briers and weeds. The major surface drainage pathways are the ditches along the Lake Fretwell access road, which carry runoff in the direction of the lake. South of the Lake Fretwell access road, surface drainage follows the topography, which slopes gently to the east to the wetlands area. A drainage ditch carries runoff from the wetlands area to Rowell Creek during periods of heavy precipitation.

Groundwater is typically encountered 3 to 4 feet bls in the disposal pit area, 2 to 3 feet bls in the helicopter crash area, and may be as shallow as 6 inches bls in the downgradient wetlands area. The water table represents the top of the surficial aquifer, which is approximately 100 feet thick beneath the disposal pit area and approximately 70 feet thick at Rowell Creek. The upper portion of the

surficial aquifer is composed primarily of sand. From approximately 50 feet bls to the bottom of the surficial aquifer, clayey material is encountered. The surficial aquifer is underlain by the intermediate aquifer, which is primarily composed of dolomite and is estimated to be 20 to 25 feet thick in the area.

The general groundwater flow direction in the surficial aquifer is horizontal to the east-southeast. There is also a downward flow component which is evident at the waste disposal pit area, and continues for approximately 900 to 1,000 feet downgradient (east-southeast). At this point the vertical flow becomes upward and both horizontal and vertical gradients become increasingly steeper over the remaining 300 to 400 feet to Rowell Creek. The pronounced upward gradients in this interval indicate that the surficial aquifer discharges to Rowell Creek. Rowell Creek has gauged flows as low as 2.4 cfs, including 1.2 cfs from the FOTW effluent outfall immediately below the dam. The estimated flow rate of the surficial aquifer from the disposal pit to Rowell Creek is approximately 88 feet per year, assuming a horizontal gradient of 0.016 feet per foot, a horizontal hydraulic conductivity of 3 feet per year, and an effective porosity of 20 percent. Assuming this flow rate, groundwater would travel the 1,400 feet from the disposal pit area to Rowell Creek in approximately 16 years.

7.1.2 Nature and Extent of Contamination Evaluation of investigation results to delineate the nature and extent of contamination from the past discharge to the disposal pit indicate the presence of contaminants in all media sampled.

Surface Soil. Evaluation of surface soil sample analytical results indicate the presence of VOCs, SVOCs, pesticides, PCBs, and inorganics. Many of the VOCs and SVOCs detected in surface soil are commonly found in fuel and waste oil and may be related to the former waste disposal operations at OU 8. Few pesticides and PCBs were detected in surface soil and are most likely the result of former basewide application of pesticides and use of oil containing PCBs for dust control along dirt roads. Inorganic chemicals of potential concern (CPCs) appear to be most frequently detected within or near the former pit boundary.

Subsurface Soil. Evaluation of subsurface soil sample analytical results indicate the presence of VOCs, SVOCs, pesticides, PCBs, and inorganics. The distribution of VOCs, SVOCs, and inorganics is generally similar with the highest concentrations located in samples from soil borings near or within the pit area and at the helicopter crash site. Pesticides and PCBs generally had a more sporadic distribution and low frequency of detection over the site. Detections of inorganics above background subsurface soil concentrations were observed in samples collected from the borings located within or along the perimeter of the former waste disposal pit.

Surficial Aquifer Groundwater. Ten VOCs were detected in groundwater samples collected from the surficial aquifer (composed of sandy sediments within 70 to 100 feet of land surface). Of these 10 compounds, 5 exceeded human health risk criteria at OU 8: 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethene (1,2-DCE), trichloroethene (TCE) and benzene. The detection of VOCs has been observed to extend from the source area to approximately 1,400 feet downgradient toward Rowell Creek. No VOC detections were observed on the east side of Rowell Creek indicating that VOC-contaminated groundwater in the surficial aquifer on the west side of Rowell Creek is discharging into the creek.

A total of 14 SVOCs were detected in groundwater samples collected from the surficial aquifer. Of these 14 compounds, 6 exceeded human health risk criteria at OU 8: 1,2-dichlorobenzene (1,2 DCB), 1,4-dichlorobenzene (1,4 DCB), benzo(b)fluoranthene, naphthalene, 4-methylphenol, and bis(2-ethylhexyl) phthalate.

Based on the historical operations at OU 8 and the VOC and SVOC contaminant distribution in the surficial aquifer, it is evident that the source of these contaminants is the former waste disposal pit at OU 8.

Several State and Federal drinking water criteria (Appendix O) were exceeded by the detections of these VOCs and SVOCs. Detections of VOCs and SVOCs which exceeded the state and federal standards are discussed in the Baseline Risk Assessment (see Chapter 6.0 for a summary of the risk assessment).

The only pesticides or PCBs that were detected in the groundwater at OU 8 were the pesticides Endosulfan II and beta-BHC; and the PCB Aroclor-1248. The only compound of these three that contributed to the overall risk was Aroclor-1248. Aroclor-1248 was detected in 2 of the 33 surficial monitoring wells at concentrations of 0.6 J $\mu g/\ell$ (CEF-3-4S) and 0.79 J $\mu g/\ell$ (CEF-3-6S), slightly above the MCL of 0.5 $\mu g/\ell$. Both of these water table wells are located in the area adjacent to the Lake Fretwell access road and south of the disposal pit. It is unknown if these detections are related to the waste disposal operations at OU 8 or the use of oil on the unpaved access road.

Based on the results of inorganics analyses of unfiltered groundwater from the 30 surficial aquifer wells, 18 inorganics were detected. Of these 18 inorganics, 4 exceeded the human health risk criteria: arsenic, chromium, manganese, and vanadium. These four inorganics do not appear to originate at the OU 8 disposal pit area.

Intermediate Aquifer Groundwater. The only organic compounds detected in the intermediate aquifer (a dolomite layer below the surficial aquifer) were phenol at 1 J $\mu g/\ell$ and bis(2-ethylhexyl)phthalate at 2 J $\mu g/\ell$. Both of these compounds were detected in well CEF-3-33DD, which is located in the disposal pit area and screened in the dolomite between 108 and 118 feet bls. Both of these compounds were also detected at low concentrations in the upgradient background well CEF-3-10D, which is screened from 90 to 100 feet bls, and do not appear to be site related due to the absence of these compounds in the shallow surficial aquifer wells near the disposal pit area.

Only two of the inorganic analytes (arsenic and manganese) that contributed to the overall risk were detected in the intermediate aquifer. Arsenic was detected in one of the three intermediate aquifer wells, CEF-3-33D at 1.2 $\mu g/\ell$. Manganese was detected in all three intermediate aquifer monitoring wells at concentrations ranging from 10.8 J $\mu g/\ell$ in CEF-3-7DD to 37.9 $\mu g/\ell$ in CEF-3-33DD. Based on the conceptual model developed for groundwater flow that indicates a downward flow component of groundwater in the source area and then upward flow from the surficial aquifer to Rowell Creek downgradient, it does not appear that these inorganic detections are site-related.

Surface Water. Four organic compounds were detected in the surface water samples collected for OU 8: the VOCs bromodichloromethane, dibromochloromethane, methylene chloride, and chloroform. With the exception of methylene chloride, these VOCs

are most likely from the wastewater treatment plant effluent which enters Rowell Creek upstream of these sampling locations near the base of the Lake Fretwell dam. These VOCs are common by-products of the chlorination process used during the treatment of wastewater.

Based on the results of inorganic analyses of the two surface water samples, five inorganic CPCs were identified during the risk assessment: aluminum, antimony, iron, lead, and silver. Of these five inorganics, only iron was detected in the upstream background sample RC-SW-2.

Iron and aluminum were detected in the shallow monitoring well CEF-3-31S adjacent to Rowell Creek but at concentrations lower than those observed in surface water. Antimony, lead, and silver were not detected in monitoring well CEF-3-31S. Since these inorganics were detected at lower concentrations or not detected in monitoring wells on the west side of Rowell Creek, the source of these analytes does not appear to be contaminated groundwater coming from the OU 8 source area.

Sediment. Three organic compounds were detected in the sediment samples collected for OU 8: one VOC, 2-butanone; and two SVOCs, di-n-butylphthalate, and bis(2-ethylhexyl) phthalate. Due to their absence in nearby surface soil samples and shallow groundwater samples on the west side of Rowell Creek, the presence of these compounds cannot be linked to the source area.

Based on the inorganic analytical results of the two sediment samples, four inorganics identified as CPCs in the risk assessment were detected: barium, copper, lead, and zinc. Barium, copper, and zinc were not detected in the upstream background sample RC-SD-2.

Barium and lead were detected in surface soil samples collected from the helicopter crash site area, which is the area with inorganic surface soil data nearest Rowell Creek. However, the surface soil concentrations of these inorganics did not exceed the background soil concentrations and do not appear to be the source of these analytes detected in the sediment samples. Copper was also detected in surface soil samples at the helicopter crash site but at concentrations lower than what was detected in sediment.

7.1.3 Fate and Transport of Contamination The fate and transport of contaminants at OU 8 focuses on TCE because of its widespread distribution and because it is a major risk driver in the baseline risk assessment.

TCE was apparently introduced to the soil and groundwater at the waste disposal pit area from 1955 to 1975. Other contaminants may have also been introduced to these media via the same disposal, including VOCs, SVOCs (such as 1,4-dichlorobenzene), and inorganics (such as iron and lead). Several of the VOCs and SVOCs have been observed to migrate from the source area in the 35 to 40 years since the discharge to the disposal pit began.

Some transformation products of TCE (1,2-DCE and 1,1-DCE) were detected in the soil and groundwater near the source area. These compounds are formed by the natural biodegradation of TCE. The biodegradation of TCE near the source area is most likely due to the existence of favorable environmental and microbial conditions (e.g., nutrients, organic carbon, redox potential) in that area.

Based on the results of the confirmatory soil sampling and analysis, it is estimated that a TCE concentration of 146 $\mu g/kg$ remains in the vadose soil over an area of approximately 8000 ft^2. It is further estimated that the TCE concentration of the leachate generated from the infiltration of precipitation through these soil would take approximately 23 years so that its concentration after mixing with the top 10 feet of the surficial aquifer, would be less than 5 $\mu g/\ell$, the drinking water MCL for TCE.

The groundwater contaminant plume is currently discharging to Rowell Creek approximately 1,400 feet downgradient of the disposal pit. Based on the estimated groundwater flow rate of 88 feet per year, groundwater from beneath the disposal pit area would have reached Rowell Creek in the early 1970's, approximately 16 years after disposal operations began. Ignoring microbial and abiotic processes, it will take approximately 58 years for the groundwater to naturally flush contaminants to concentrations below drinking water criteria.

All dissolved groundwater contaminants originating from the disposal pit area would be subject to a similar hydrologic transport as TCE. Dilution on the order of 99.2 percent diluted (diluted 133 times) or more is estimated for groundwater contaminants upon their discharging to and mixing with the surface water of Rowell Creek.

7.1.4 **Baseline Risk Assessment** A baseline risk assessment was completed at OU 8 to characterize the risks associated with exposures to contaminants detected at OU 8 for human health and ecological receptors (ABB-ES, 1995). A review of available guidance was also presented.

7.1.4.1 **Human Health Risk Assessment** Potential health risks were evaluated under current and assumed future land use conditions for a subset of contaminants detected in surface soil, subsurface soil, surface water, sediment, and groundwater (surficial and intermediate aquifers) associated with OU 8. The chemicals chosen were selected in accordance with USEPA guidance and because they are the most likely chemicals to pose risks of concern to human receptors.

Current Land Use. All cancer and noncancer risks estimated for current land use are consistent with USEPA criteria, which indicate acceptable exposure levels are associated with an excess lifetime cancer risk in the range of 1 in 10,000 to 1 in a million (USEPA, 1990) or a hazard index of 1 or less. Comparison to the FDEP cancer risk threshold of 1 in a 1,000,000 also indicates acceptable exposure levels for current land use. The baseline cancer risk in the U.S. is one in two for men and one in three for women (ACS, 1994)

Future Land Use. Cancer and noncancer risks estimated in surface soil, subsurface soil, surface water, sediment, and the intermediate aquifer under future residential land use assumptions are also consistent with acceptable risks as described by USEPA. However, future potable use of the surficial aquifer was estimated to have risks greater than those associated with acceptable exposure levels. The cancer risk estimate for the surficial aquifer under future land use conditions (adult resident) was 3 in 1,000. The major contaminant contributing cancer risk was 1,1-dichloroethene. The noncancer risk estimate (HI) for potable use of the surficial aquifer is 20. Major contributors to this HI are trichloroethene, 1,2-dichloroethene, 1,2-dichlorobenzene, and 1,1-dichloroethene.

In summary, the risk estimates for surface soil, subsurface soil, surface water, sediment, and the intermediate aquifer indicate that human exposure to these media at OU 8, under the conditions evaluated in this assessment, is not associated with unacceptable risk (USEPA) of adverse health effects (cancer or noncancer). Concern over the contamination in the surficial aquifer may be warranted, however, because of the risk of adverse health effects (cancer and noncancer) associated with assumed future use of the groundwater as a potable water supply. Use of the surficial aquifer as a drinking water supply at Site 3 may never occur because the area is served by a community water supply system. Based on the results of the human health portion of the BRA, including the results of the criteria comparison, the development of remedial action strategies may be necessary for future potable use of the surficial aquifer at OU 8.

7.1.4.2 **Ecological Assessment** The purpose of the ecological risk assessment (ERA) was to characterize the risks associated with potential exposures to site-related contaminants at OU 8 for ecological receptors. Potential risks for ecological receptors were evaluated for selected contaminants detected in surface water, sediment, and groundwater at OU 8.

No risks were identified for terrestrial plant and invertebrate exposures to surface soil or for terrestrial wildlife resulting from exposures to selected contaminants in surface soil, surface water, and sediment.

Results of laboratory groundwater toxicity testing indicate that exposure to undiluted groundwater from OU 8 may result in reduced survival and reproduction for the water flea and the fathead minnow. In general, the water flea was more sensitive to undiluted groundwater than the fathead minnow. Although several groundwater risk contributors were identified, three dichlorobenzene isomers were found to be the primary ecological risk contributors. When groundwater was diluted approximately 20-fold (actual groundwater discharging into Rowell Creek is diluted 133 times), little toxicity was observed in the water flea or fathead minnow. Analysis of the toxicity testing data supports the contention that groundwater discharging to Rowell Creek poses little risk to aquatic receptors.

7.1.4.3 **Comparison to Available Criteria** Available criteria for groundwater (USEPA, 1994d; FDEP, 1994a), surface soil (FDEP, 1994b), and subsurface soil (FDEP, 1994b) were considered in the HHRA for OU 8. Comparing these criteria to the maximum detected concentrations for each chemical detected in OU 8 media (ABB-ES, 1995a) led to the following list of chemicals by medium which exceeded at least one criterion.

- Groundwater: 1,1,1-trichloroethane, 1,1-dichloroethene, 1,2-dichloroethene, benzene, trichloroethene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 4-methylphenol, benzo(b)fluoranthene, naphthalene, and bis(2-ethylhexyl)phthalate.

- Surface Soil: benzo(a)pyrene and TRPH.

- Subsurface Soil: methylene chloride, trichloroethene, and TRPH.

<u>7.2 CONCLUSIONS</u>. Several conclusions can be made regarding the physical characteristics of the OU 8 study area and the contaminants detected in surface water, sediment, surface soil, subsurface soil, and groundwater.

- Sufficient information was collected in the field or compiled from historical records to identify and assess human and ecological risks, extent and nature of contamination, and remedial alternatives for OU 8 as a result of waste disposal operations from the mid 1950's to 1975.

- Contaminant distribution from the waste disposal pit area is well defined in surface and subsurface soil at OU 8 and does not pose a risk to human or ecological receptors.

- Disposal pit area vadose zone wastes are expected to continue to leach contamination to groundwater for a period of approximately 23 years.

- Groundwater from the disposal pit migrates and is interpreted to discharge into Rowell Creek.

- Wastes deposited in the former disposal pit have contaminated underlying groundwater at OU 8 sufficiently to pose a health risk if groundwater is used as a future potable (drinking) water supply. Use of untreated groundwater as a water supply poses an unacceptable carcinogenic risk of 3 in 1,000 and a noncarcinogenic risk of 20.

- It is expected that a period of 58 years will be required for contamination to leach naturally from soil and to flush naturally from the aquifer.

- There are no unacceptable human health or ecological risks associated with OU 8 for exposure to Rowell Creek surface water and sediments.

- OU 8 is located in a low traffic area along perimeter road and it is not certain at this time what the land use will be after base closure. The site is not served by potable water or other utilities which are available to the east in the industrialized part of NAS Cecil Field.

7.2.1 **Data Limitations and Recommendations for Future Work** The purpose of the data limitations section is to outline the limits within which the conclusions of the RI are made and to identify areas for which use of the data, findings, and conclusions developed during the RI may be inappropriate. This information will assist in the evaluation of RI data during the FS and assist the Navy and regulatory agencies during the selection of the final remedy for OU 8.

7.2.1.1 **Data limitations** Based on the evaluation of data gathered during the OU 8 RI, the distribution of groundwater contaminants between the source area monitoring wells and the area near the helicopter crash site (represented by the cluster of monitoring wells containing CEF-3-28S, CEF-3-29D, and CEF-3-30DD) is based on the groundwater screening program (using temporary well screens and field laboratory analysis) and not monitoring wells.

7.3.2 **Data Gaps** No data gaps were identified that would prevent the development and selection of a remedial action for OU 8.

7.3.3 **Recommendation** Based on the evaluation of data gathered during the OU 8 RI, it is recommended that a program should be instituted to prevent risks associated with possible future use of OU 8 groundwater as a potable water supply.

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APPENDIX A

ANALYTICAL DATA FROM PREVIOUS INVESTIGATIONS

A Report Prepared for

Department of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina

DRAFT FINAL RCRA FACILITIES INVESTIGATION REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

HLA Job No. 2176,098.12

by

Jerrold A. Trezzo
Senior Hydrogeologist

Pierce L. Chandler, Jr., P.E.
Associate Engineer

Gary F. Goodheart, P.E.
Principal Engineer

Harding Lawson Associates
6220 Westpark Drive, Suite 100
Houston, Texas 77057
Telephone: (713) 789-8050

March 17, 1988

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TABLE 6

Results of VOA Analysis on Water Samples

VOLATILE ORGANICS	CONCENTRATION (UG/L)		DETECTION LIMIT (UG/L)
HLA ID:	3-1	3-2	
JTC ID:	87-0526	87-0527	
ACROLEIN	BDL	BDL	10
ACRYONITRILE	BDL	BDL	10
BENZENE	BDL	4*	5
BROMOFORM	BDL	BDL	5
BROMOMETHANE	BDL	BDL	10
CARBON TETRACHLORIDE	BDL	BDL	5
CHLOROBENZENE	BDL	BDL	5
CHLORODIBROMOMETHANE	BDL	BDL	5
CHLOROETHANE	BDL	BDL	10
CHLOROMETHANE	BDL	BDL	10
2-CHLOROETHYLVINYL ETHER	BDL	BDL	10
CHLOROFORM	BDL	BDL	5
DICHLOROBROMOMETHANE	BDL	BDL	5
1,1-DICHLOROETHANE	BDL	210	5
1,2-DICHLOROETHANE	BDL	BDL	5
1,1-DICHLOROETHYLENE	BDL	110	5
1,2-DICHLOROPROPANE	BDL	BDL	5
TRANS-1,3-DICHLOROPROPENE	BDL	BDL	5
ETHYLBENZENE	BDL	10	5
METHYLENE CHLORIDE	BDL	BDL	5
1,1,2,2-TETRACHLOROETHANE	BDL	BDL	5
TETRACHLOROETHYLENE	BDL	BDL	5
TOLUENE	BDL	8	5
1,2-TRANS-DICHLOROETHYLENE	BDL	BDL	5
1,1,1-TRICHLOROETHANE	BDL	88	5
1,1,2-TRICHLOROETHANE	BDL	BDL	5
TRICHLOROETHYLENE	BDL	BDL	5
TRICHLOROFLUOROMETHANE	BDL	BDL	10
VINYL CHLORIDE	BDL	BDL	10
CIS-1,3-DICHLOROPROPENE	BDL	BDL	5

BDL = BELOW DETECTION LIMIT

* = found below method detection limit

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TABLE 43

Results of Acid Analysis on Water Samples

ACID EXTRACTABLE ORGANICS	CONCENTRATION (UG/L)		DETECTION LIMIT (UG/L)
HLA I.D.:	3-1	3-2	
JTC I.D.:	87-0526	87-0527	
2-CHLOROPHENOL	BDL	BDL	10
2,4-DICHLOROPHENOL	BDL	BDL	10
2,4-DIMETHYLPHENOL	BDL	BDL	10
4,6-DINITRO-O-CRESOL	BDL	BDL	50
2,4-DINITROPHENOL	BDL	BDL	50
2-NITROPHENOL	BDL	BDL	10
4-NITROPHENOL	BDL	BDL	50
P-CHLORO-M-CRESOL	BDL	BDL	10
PENTACHLOROPHENOL	BDL	BDL	50
PHENOL	BDL	BDL	10
2,4,5-TRICHLOROPHENOL	BDL	BDL	50
2,4,6-TRICHLOROPHENOL	BDL	BDL	50
4-METHYLPHENOL	BDL	29	10

BDL=BELOW DETECTION LIMITS

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TABLE 66

Results of Base-Neutral Analysis on Water Samples

BASE-NEUTRAL EXTRACTABLE ORGANICS	CONCENTRATION (UG/L)		DETECTION LIMIT (UG/L)
HLA I.D.:	3-1	3-2	
JTC I.D.:	87-0526	87-0527	
ACENAPHTHENE	BDL	BDL	10
ACENAPHTHYLENE	BDL	BDL	10
ANTHRACENE	BDL	BDL	10
BENZIDINE	BDL	BDL	50
BENZO (A) ANTHRACENE	BDL	BDL	10
BENZO (A) PYRENE	BDL	BDL	10
3,4-BENZOFLUORANTHENE	BDL	BDL	10
BENZO (GHI) PERYLENE	BDL	BDL	10
BENZO (K) FLUORANTHENE	BDL	BDL	10
BIS (2-CHLOROETHOXY) METHANE	BDL	BDL	10
BIS (2-CHLOROETHYL) ETHER	BDL	BDL	10
BIS (2-CHLOROISOPROPYL) ETHER	BDL	BDL	10
BIS (2-ETHYLHEXYL) PHTHALATE	BDL	19	10
4-BROMOPHENYL PHENYL ETHER	BDL	BDL	10
BUTYL BENZYL PHTHALATE	BDL	BDL	10
2-CHLORONAPHTHALENE	BDL	BDL	10
4-CHLOROPHENYL PHENYL ETHER	BDL	BDL	10
CHRYSENE	BDL	BDL	10
DIBENZO (A,H) ANTHRACENE	BDL	BDL	10
1,2-DICHLOROBENZENE	BDL	BDL	10
1,3-DICHLOROBENZENE	BDL	BDL	10
1,4-DICHLOROBENZENE	BDL	BDL	10
3,3'-DICHLOROBENZIDINE	BDL	BDL	20
DIETHYL PHTHALATE	BDL	BDL	10
DIMETHYL PHTHALATE	BDL	BDL	10
DI-N-BUTYL PHTHALATE	BDL	BDL	10
2,4-DINITROTOLUENE	BDL	BDL	10
2,6-DINITROTOLUENE	BDL	BDL	10
DI-N-OCTYL PHTHALATE	BDL	BDL	10
1,2-DIPHENYLHYDRAZINE	BDL	BDL	10
FLUORANTHENE	BDL	BDL	10
FLUORENE	BDL	BDL	10
HEXACHLOROBENZENE	BDL	BDL	10
HEXACHLOROBUTADIENE	BDL	BDL	10
HEXACHLOROCYCLOPENTADIENE	BDL	BDL	10
HEXACHLOROETHANE	BDL	BDL	10
INDENO (1,2,3-CD) PYRENE	BDL	BDL	10
ISOPHORONE	BDL	BDL	10
NAPHTHALENE	BDL	280	10
NITROBENZENE	BDL	BDL	10
N-NITROSODIMETHYLAMINE	BDL	BDL	10
N-NITROSODI-N-PROPYLAMINE	BDL	BDL	10
N-NITROSODIPHENYLAMINE	BDL	BDL	10
PHENANTHRENE	BDL	BDL	10
PYRENE	BDL	BDL	10
1,2,4-TRICHLOROBENZENE	BDL	BDL	10
2-METHYLNAPHTHALENE	BDL	190	10

BDL=BELOW DETECTION LIMIT

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TABLE 107

Results of Metal Analysis on Water Samples

HLA I.D.	JTC I.D.	Cd UG/L	Cr UG/L	Pb UG/L
Site 1	87-0528	<5	<10	<5
Site 4	87-0532	<5	<10	<5
Site 5	87-0542	<5	<10	<5
Site 8	87-0543	<5	<10	<5
1-1	87-0520	<5	<10	19
1-2	87-0521	<5	<10	<5
1-3	87-0522	<5	26	19
1-4	87-0523	<5	176	294
2-1	87-0524	<5	250	336
2-2	87-0525	12	425	385
3-1	87-0526	<5	<10	<5
3-2	87-0527	<5	90	164
4-1	87-0533	<5	<10	6
4-2	87-0534	<5	<10	<5
4-3	87-0535	<5	<10	<5
4-4	87-0536	<5	<10	<5
5-1	87-0537	5	39	44
5-2	87-0538	<5	18	49
7-1	87-0539	<5	13	12
7-2	87-0540	5	<10	<5
7-3	87-0541	6	61	50
8-1	87-0544	<5	28	19
8-2	87-0545	<5	21	15

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336006				31624006				20336006R				20336007			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-1-1				BOR3-1-1				BOR3-1-1_R				BOR3-1-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP VOLATILE COMPOUNDS																
Chloromethane	11	UJ	ug/kg	11	-				11	U	ug/kg	11	12	U	ug/kg	12
Bromomethane	11	UJ	ug/kg	5	-				11	U	ug/kg	11	12	U	ug/kg	12
Vinyl Chloride	11	UJ	ug/kg	11	-				11	U	ug/kg	11	12	U	ug/kg	12
Chloroethane	11	UJ	ug/kg	11	-				11	U	ug/kg	11	12	U	ug/kg	12
Methylene Chloride	12	UJ	ug/kg	5	-				50	U	ug/kg	5	31	U	ug/kg	6
Acetone	11	UJ	ug/kg	11	-				24	U	ug/kg	11	25	U	ug/kg	12
Carbon disulfide	5	UJ	ug/kg	5	-				1	J	ug/kg	5	2	J	ug/kg	6
1,1-Dichloroethene	5	UJ	ug/kg	5	-				5	U	ug/kg	5	6	U	ug/kg	6
1,1-Dichloroethane	5	UJ	ug/kg	5	-				5	U	ug/kg	5	6	U	ug/kg	6
1,2-Dichloroethene (total)	5	UJ	ug/kg	5	-				5	U	ug/kg	5	6	U	ug/kg	6
Chloroform	5	UJ	ug/kg	5	-				5	U	ug/kg	5	6	U	ug/kg	6
1,2-Dichloroethane	5	UJ	ug/kg	5	-				5	U	ug/kg	5	6	U	ug/kg	6
2-Butanone	11	UJ	ug/kg	11	-				11	U	ug/kg	11	12	U	ug/kg	12
1,1,1-Trichloroethane	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Carbon tetrachloride	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Vinyl acetate	11	UJ	ug/kg	11	-				11	UJ	ug/kg	11	12	U	ug/kg	12
Bromodichloromethane	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
1,2-Dichloropropane	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
cis-1,3-Dichloropropene	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Trichloroethene	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Dibromochloromethane	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
1,1,2-Trichloroethane	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Benzene	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
trans-1,3-Dichloropropene	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Bromoform	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
4-Methyl-2-pentanone	11	UJ	ug/kg	11	-				11	UJ	ug/kg	11	12	U	ug/kg	12
2-Hexanone	11	UJ	ug/kg	11	-				11	UJ	ug/kg	11	12	U	ug/kg	12
Tetrachloroethene	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Toluene	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
1,1,2,2-Tetrachloroethane	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Chlorobenzene	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Ethyl Benzene	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Styrene	5	UJ	ug/kg	5	-				5	UJ	ug/kg	5	6	U	ug/kg	6
Xylenes (total)	4	J	ug/kg	5	-				2	J	ug/kg	5	2	J	ug/kg	6
CLP SEMIVOLATILES																
Phenol	360	U	ug/kg	330	-				-				380	U	ug/kg	330
bis(2-Chloroethyl) ether	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2-Chlorophenol	360	U	ug/kg	330	-				-				380	U	ug/kg	330
1,3-Dichlorobenzene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
1,4-Dichlorobenzene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Benzyl Alcohol	-				-				-				-			
1,2-Dichlorobenzene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2-Methylphenol	360	U	ug/kg	330	-				-				380	U	ug/kg	330
bis(2-Chloroisopropyl) ether	-				-				-				-			
4-Methylphenol	360	U	ug/kg	330	-				-				380	U	ug/kg	330
N-Nitroso-di-n-propylamine	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Hexachloroethane	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Nitrobenzene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Isophorone	360	U	ug/kg	330	-				-				380	U	ug/kg	330

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336006				31624006				20336006R				20336007			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-1-1				BOR3-1-1				BOR3-1-1 R				BOR3-1-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
2-Nitrophenol	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2,4-Dimethylphenol	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Benzoic Acid	1700	U	ug/kg	1600	-				-				1900	U	ug/kg	1600
bis(2-Chloroethoxy) methane	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2,4-Dichlorophenol	360	U	ug/kg	330	-				-				380	U	ug/kg	330
1,2,4-Trichlorobenzene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Naphthalene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
4-Chloroaniline	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Hexachlorobutadiene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
4-Chloro-3-methylphenol	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2-Methylnaphthalene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Hexachlorocyclopentadiene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2,4,6-Trichlorophenol	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2,4,5-Trichlorophenol	1700	U	ug/kg	1600	-				-				1900	U	ug/kg	1600
2-Chloronaphthalene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2-Nitroaniline	1700	U	ug/kg	1600	-				-				1900	U	ug/kg	1600
Dimethylphthalate	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Acenaphthylene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2,6-Dinitrotoluene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
3-Nitroaniline	1700	U	ug/kg	1600	-				-				1900	U	ug/kg	1600
Acenaphthene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2,4-Dinitrophenol	1700	U	ug/kg	1600	-				-				1900	U	ug/kg	1600
4-Nitrophenol	1700	U	ug/kg	1600	-				-				1900	U	ug/kg	1600
Dibenzofuran	360	U	ug/kg	330	-				-				380	U	ug/kg	330
2,4-Dinitrotoluene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Diethylphthalate	360	U	ug/kg	330	-				-				380	U	ug/kg	330
4-Chlorophenyl-phenylether	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Fluorene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
4-Nitroaniline	1700	U	ug/kg	1600	-				-				1900	U	ug/kg	1600
4,6-Dinitro-2-methylphenol	1700	U	ug/kg	1600	-				-				1900	U	ug/kg	1600
N-Nitrosodiphenylamine (1)	360	U	ug/kg	330	-				-				380	U	ug/kg	330
4-Bromophenyl-phenylether	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Hexachlorobenzene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Pentachlorophenol	1700	U	ug/kg	1600	-				-				1900	U	ug/kg	1600
Phenanthrene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Anthracene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Di-n-butylphthalate	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Fluoranthene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Pyrene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Butylbenzylphthalate	360	U	ug/kg	330	-				-				380	U	ug/kg	330
3,3'-Dichlorobenzidine	-				-				-				-			
Benzo (a) anthracene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Chrysene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
bis(2-Ethylhexyl) phthalate	52	J	ug/kg	330	-				-				76	J	ug/kg	330
Di-n-octylphthalate	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Benzo (b) fluoranthene	88	J	ug/kg	330	-				-				380	U	ug/kg	330
Benzo (k) fluoranthene	79	J	ug/kg	330	-				-				380	U	ug/kg	330
Benzo (a) pyrene	55	J	ug/kg	330	-				-				380	U	ug/kg	330
Indeno (1,2,3-cd) pyrene	59	J	ug/kg	330	-				-				380	U	ug/kg	330
Dibenz (a,h) anthracene	360	U	ug/kg	330	-				-				380	U	ug/kg	330
Benzo (g,h,i) perylene	87	J	ug/kg	330	-				-				380	U	ug/kg	330

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336006				31624006				20336006R				20336007			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-1-1				BOR3-1-1				BOR3-1-1_R				BOR3-1-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP PESTICIDES/PCBS																
alpha-BHC	8.7	U	ug/kg	8.7	-				-				9.3	U	ug/kg	9.3
beta-BHC	8.7	U	ug/kg	8.7	-				-				9.3	U	ug/kg	9.3
delta-BHC	8.7	U	ug/kg	8.7	-				-				9.3	U	ug/kg	9.3
gamma-BHC (Lindane)	8.7	U	ug/kg	8.7	-				-				9.3	U	ug/kg	9.3
Heptachlor	8.7	U	ug/kg	8.7	-				-				9.3	U	ug/kg	9.3
Aldrin	8.7	U	ug/kg	8.7	-				-				9.3	U	ug/kg	9.3
Heptachlor epoxide	8.7	U	ug/kg	8.7	-				-				9.3	U	ug/kg	9.3
Endosulfan I	8.7	U	ug/kg	8.7	-				-				9.3	U	ug/kg	9.3
Dieldrin	17	U	ug/kg	17	-				-				19	U	ug/kg	19
4,4'-DDE	-				-				-				-			
Endrin	17	U	ug/kg	17	-				-				19	U	ug/kg	19
Endosulfan II	17	U	ug/kg	17	-				-				19	U	ug/kg	19
4,4'-DDD	-				-				-				-			
Endosulfan sulfate	17	U	ug/kg	17	-				-				19	U	ug/kg	19
4,4'-DDT	-				-				-				-			
Methoxychlor	87	U	ug/kg	87	-				-				93	U	ug/kg	93
Endrin ketone	17	U	ug/kg	17	-				-				19	U	ug/kg	19
alpha Chlordane	87	U	ug/kg	87	-				-				93	U	ug/kg	93
gamma-Chlordane	87	U	ug/kg	87	-				-				93	U	ug/kg	93
Toxaphene	170	U	ug/kg	170	-				-				190	U	ug/kg	190
Aroclor-1016	87	U	ug/kg	87	-				-				93	U	ug/kg	93
Aroclor-1221	87	U	ug/kg	87	-				-				93	U	ug/kg	93
Aroclor-1232	87	U	ug/kg	87	-				-				93	U	ug/kg	93
Aroclor-1242	87	U	ug/kg	87	-				-				93	U	ug/kg	93
Aroclor-1248	87	U	ug/kg	87	-				-				93	U	ug/kg	93
Aroclor-1254	170	U	ug/kg	170	-				-				190	U	ug/kg	190
Aroclor-1260	170	U	ug/kg	170	-				-				190	U	ug/kg	190
CLP METALS AND CYANIDE																
Aluminum	-				1500		mg/kg	40	-				-			
Antimony	-				2.49	UJ	mg/kg	12	-				-			
Arsenic	-				.18	J	mg/kg	2	-				-			
Barium	-				2.51	J	mg/kg	40	-				-			
Beryllium	-				.15	J	mg/kg	1	-				-			
Cadmium	-				.29	UJ	mg/kg	1	-				-			
Calcium	-				11500	J	mg/kg	1000	-				-			
Chromium	-				1.6	J	mg/kg	2	-				-			
Cobalt	-				.64	UJ	mg/kg	10	-				-			
Copper	-				1.8	J	mg/kg	5	-				-			
Iron	-				395		mg/kg	20	-				-			
Lead	-				2.4		mg/kg	1	-				-			
Magnesium	-				120	J	mg/kg	1000	-				-			
Manganese	-				6.1	J	mg/kg	3	-				-			
Mercury	-				.031	U	mg/kg	.1	-				-			
Nickel	-				2.6	UJ	mg/kg	8	-				-			
Potassium	-				62.9	J	mg/kg	1000	-				-			
Selenium	-				.088	UJ	mg/kg	1	-				-			
Silver	-				.4	U	mg/kg	2	-				-			
Sodium	-				131	J	mg/kg	1000	-				-			
Thallium	-				.18	U	mg/kg	2	-				-			
Vanadium	-				1.4	UJ	mg/kg	10	-				-			

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336006				31624006				20336006R				20336007			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-1-1				BOR3-1-1				BOR3-1-1_R				BOR3-1-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Zinc	-				2.5	UJ	mg/kg	4	-				-			
Cyanide	-				.55	U	mg/kg	2	-				-			
TOC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31624007				20336007RX				20336008				31624008			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-1-2				BOR3-1-2_RX				BOR3-2-1				BOR3-2-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP VOLATILE COMPOUNDS																
Chloromethane	-				-				11	UJ	ug/kg	11	-			
Bromomethane	-				-				11	UJ	ug/kg	11	-			
Vinyl Chloride	-				-				11	UJ	ug/kg	11	-			
Chloroethane	-				-				11	UJ	ug/kg	11	-			
Methylene Chloride	-				-				25	UJ	ug/kg	5	-			
Acetone	-				-				18	UJ	ug/kg	11	-			
Carbon disulfide	-				-				5	UJ	ug/kg	5	-			
1,1-Dichloroethene	-				-				5	UJ	ug/kg	5	-			
1,1-Dichloroethane	-				-				5	UJ	ug/kg	5	-			
1,2-Dichloroethene (total)	-				-				5	UJ	ug/kg	5	-			
Chloroform	-				-				5	UJ	ug/kg	5	-			
1,2-Dichloroethane	-				-				5	UJ	ug/kg	5	-			
2-Butanone	-				-				11	UJ	ug/kg	5	-			
1,1,1-Trichloroethane	-				-				5	UJ	ug/kg	5	-			
Carbon tetrachloride	-				-				5	UJ	ug/kg	5	-			
Vinyl acetate	-				-				11	UJ	ug/kg	11	-			
Bromodichloromethane	-				-				5	UJ	ug/kg	5	-			
1,2-Dichloropropane	-				-				5	UJ	ug/kg	5	-			
cis-1,3-Dichloropropene	-				-				5	UJ	ug/kg	5	-			
Trichloroethene	-				-				5	UJ	ug/kg	5	-			
Dibromochloromethane	-				-				5	UJ	ug/kg	5	-			
1,1,2-Trichloroethane	-				-				5	UJ	ug/kg	5	-			
Benzene	-				-				5	UJ	ug/kg	5	-			
trans-1,3-Dichloropropene	-				-				5	UJ	ug/kg	5	-			
Bromoform	-				-				5	UJ	ug/kg	5	-			
4-Methyl-2-pentanone	-				-				11	UJ	ug/kg	11	-			
2-Hexanone	-				-				11	UJ	ug/kg	11	-			
Tetrachloroethene	-				-				5	UJ	ug/kg	5	-			
Toluene	-				-				5	UJ	ug/kg	5	-			
1,1,2,2-Tetrachloroethane	-				-				5	UJ	ug/kg	5	-			
Chlorobenzene	-				-				5	UJ	ug/kg	5	-			
Ethyl Benzene	-				-				5	UJ	ug/kg	5	-			
Styrene	-				-				5	UJ	ug/kg	5	-			
Xylenes (total)	-				-				5	UJ	ug/kg	5	-			
CLP SEMIVOLATILES																
Phenol	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
bis(2-Chloroethyl) ether	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
2-Chlorophenol	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
1,3-Dichlorobenzene	-				380	U	ug/kg	330	350	R	ug/kg	330	-			

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31624007			20336007RX			20336008			31624008		
Site	CECIL			CECIL			CECIL			CECIL		
Locator	BOR3-1-2			BOR3-1-2_RX			BOR3-2-1			BOR3-2-1		
Collect Date:	04-DEC-91			04-DEC-91			04-DEC-91			04-DEC-91		
	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
1,4-Dichlorobenzene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Benzyl Alcohol	-			-			-			-		
1,2-Dichlorobenzene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2-Methylphenol	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
bis(2-Chloroisopropyl) ether	-			380 U	ug/kg	380	-			-		
4-Methylphenol	-			380 UJ	ug/kg	330	350 R	ug/kg	330	-		
N-Nitroso-di-n-propylamine	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Hexachloroethane	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Nitrobenzene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Isophorone	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2-Nitrophenol	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2,4-Dimethylphenol	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Benzoic Acid	-			1900 U	ug/kg	1600	1700 R	ug/kg	1600	-		
bis(2-Chloroethoxy) methane	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2,4-Dichlorophenol	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
1,2,4-Trichlorobenzene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Naphthalene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
4-Chloroaniline	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Hexachlorobutadiene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
4-Chloro-3-methylphenol	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2-Methylnaphthalene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Hexachlorocyclopentadiene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2,4,6-Trichlorophenol	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2,4,5-Trichlorophenol	-			1900 U	ug/kg	1600	1700 R	ug/kg	1600	-		
2-Chloronaphthalene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2-Nitroaniline	-			1900 U	ug/kg	1600	1700 R	ug/kg	1600	-		
Dimethylphthalate	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Acenaphthylene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2,6-Dinitrotoluene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
3-Nitroaniline	-			1900 U	ug/kg	1600	1700 R	ug/kg	1600	-		
Acenaphthene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2,4-Dinitrophenol	-			1900 U	ug/kg	1600	1700 R	ug/kg	1600	-		
4-Nitrophenol	-			1900 U	ug/kg	1600	1700 R	ug/kg	1600	-		
Dibenzofuran	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
2,4-Dinitrotoluene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Diethylphthalate	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
4-Chlorophenyl-phenylether	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Fluorene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
4-Nitroaniline	-			1900 U	ug/kg	1600	1700 R	ug/kg	1600	-		
4,6-Dinitro-2-methylphenol	-			1900 U	ug/kg	1600	1700 R	ug/kg	1600	-		
N-Nitrosodiphenylamine (1)	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
4-Bromophenyl-phenylether	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Hexachlorobenzene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Pentachlorophenol	-			1900 U	ug/kg	1600	1700 R	ug/kg	1600	-		
Phenanthrene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Anthracene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Di-n-butylphthalate	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Fluoranthene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Pyrene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
Butylbenzylphthalate	-			380 U	ug/kg	330	350 R	ug/kg	330	-		
3,3'-Dichlorobenzidine	-			-			-			-		
Benzo (a) anthracene	-			380 U	ug/kg	330	350 R	ug/kg	330	-		

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31624007				20336007RX				20336008				31624008			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-1-2				BOR3-1-2_RX				BOR3-2-1				BOR3-2-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Chrysene	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
bis(2-Ethylhexyl) phthalate	-				380	U	ug/kg	330	160	R	ug/kg	330	-			
Di-n-octylphthalate	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
Benzo (b) fluoranthene	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
Benzo (k) fluoranthene	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
Benzo (a) pyrene	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
Indeno (1,2,3-cd) pyrene	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
Dibenz (a,h) anthracene	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
Benzo (g,h,i) perylene	-				380	U	ug/kg	330	350	R	ug/kg	330	-			
CLP PESTICIDES/PCBS																
alpha-BHC	-				-				8.6	U	ug/kg	8.6	-			
beta-BHC	-				-				8.6	U	ug/kg	8.6	-			
delta-BHC	-				-				8.6	U	ug/kg	8.6	-			
gamma-BHC (Lindane)	-				-				8.6	U	ug/kg	8.6	-			
Heptachlor	-				-				8.6	U	ug/kg	8.6	-			
Aldrin	-				-				8.6	U	ug/kg	8.6	-			
Heptachlor epoxide	-				-				8.6	U	ug/kg	8.6	-			
Endosulfan I	-				-				8.6	U	ug/kg	8.6	-			
Dieldrin	-				-				17	U	ug/kg	17	-			
4,4'-DDE	-				-				-				-			
Endrin	-				-				17	U	ug/kg	17	-			
Endosulfan II	-				-				17	U	ug/kg	17	-			
4,4'-DDD	-				-				-				-			
Endosulfan sulfate	-				-				17	U	ug/kg	17	-			
4,4'-DDT	-				-				-				-			
Methoxychlor	-				-				86	U	ug/kg	86	-			
Endrin ketone	-				-				17	U	ug/kg	17	-			
alpha Chlordane	-				-				86	U	ug/kg	86	-			
gamma-Chlordane	-				-				86	U	ug/kg	86	-			
Toxaphene	-				-				170	U	ug/kg	170	-			
Aroclor-1016	-				-				86	U	ug/kg	86	-			
Aroclor-1221	-				-				86	U	ug/kg	86	-			
Aroclor-1232	-				-				86	U	ug/kg	86	-			
Aroclor-1242	-				-				86	U	ug/kg	86	-			
Aroclor-1248	-				-				86	U	ug/kg	86	-			
Aroclor-1254	-				-				170	U	ug/kg	170	-			
Aroclor-1260	-				-				170	U	ug/kg	170	-			
CLP METALS AND CYANIDE																
Aluminum	547.98		mg/kg	40	-				-				1714.78		mg/kg	40
Antimony	2.7	UJ	mg/kg	12	-				-				2.4	UJ	mg/kg	12
Arsenic	.14	J	mg/kg	2	-				-				.13	J	mg/kg	2
Barium	.51	J	mg/kg	40	-				-				2	J	mg/kg	40
Beryllium	.047	UJ	mg/kg	1	-				-				.043	UJ	mg/kg	1
Cadmium	.31	UJ	mg/kg	1	-				-				.28	UJ	mg/kg	1
Calcium	271	J	mg/kg	1000	-				-				122	J	mg/kg	1000
Chromium	1.6	J	mg/kg	2	-				-				1.9	J	mg/kg	2
Cobalt	.69	UJ	mg/kg	10	-				-				.63	UJ	mg/kg	10
Copper	.4	U	mg/kg	5	-				-				.37	U	mg/kg	5
Iron	143		mg/kg	20	-				-				401		mg/kg	20
Lead	1.1		mg/kg	1	-				-				1.3		mg/kg	1

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31624007				20336007RX				20336008				31624008			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-1-2				BOR3-1-2_RX				BOR3-2-1				BOR3-2-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Magnesium	18.7	J	mg/kg	1000	-				-				45.1	J	mg/kg	1000
Manganese	1	J	mg/kg	3	-				-				3.9	J	mg/kg	3
Mercury	.04	J	mg/kg	.1	-				-				.03	U	mg/kg	.1
Nickel	1.4	U	mg/kg	8	-				-				1.3	U	mg/kg	8
Potassium	111	J	mg/kg	1000	-				-				67.3	J	mg/kg	1000
Selenium	.095	UJ	mg/kg	1	-				-				.086	UJ	mg/kg	1
Silver	.55	J	mg/kg	2	-				-				.39	U	mg/kg	2
Sodium	123	J	mg/kg	1000	-				-				138	J	mg/kg	1000
Thallium	.19	U	mg/kg	2	-				-				.17	U	mg/kg	2
Vanadium	.56	UJ	mg/kg	10	-				-				1.3	UJ	mg/kg	10
Zinc	.75	UJ	mg/kg	4	-				-				1.1	UJ	mg/kg	4
Cyanide	.59	U	mg/kg	2	-				-				.54	U	mg/kg	2
OC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336009			31624009			20336010			31624010		
Site	CECIL			CECIL			CECIL			CECIL		
Locator	BOR3-2-2			BOR3-2-2			BOR3-3-1			BOR3-3-1		
Collect Date:	04-DEC-91			04-DEC-91			04-DEC-91			04-DEC-91		
	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
CLP VOLATILE COMPOUNDS												
Chloromethane	12	U ug/kg	12	-			11	U ug/kg	11	-		
Bromomethane	12	U ug/kg	12	-			11	U ug/kg	11	-		
Vinyl Chloride	12	U ug/kg	12	-			11	U ug/kg	11	-		
Chloroethane	12	U ug/kg	12	-			11	U ug/kg	11	-		
Methylene Chloride	6	U ug/kg	6	-			13	U ug/kg	6	-		
Acetone	12	U ug/kg	12	-			11	U ug/kg	11	-		
Carbon disulfide	6	U ug/kg	6	-			6	U ug/kg	6	-		
1,1-Dichloroethene	6	U ug/kg	6	-			6	U ug/kg	6	-		
1,1-Dichloroethane	6	U ug/kg	6	-			6	U ug/kg	6	-		
1,2-Dichloroethene (total)	6	U ug/kg	6	-			6	U ug/kg	6	-		
Chloroform	6	U ug/kg	6	-			6	U ug/kg	6	-		
1,2-Dichloroethane	6	U ug/kg	6	-			6	U ug/kg	6	-		
2-Butanone	12	U ug/kg	12	-			11	U ug/kg	11	-		
1,1,1-Trichloroethane	6	U ug/kg	6	-			6	U ug/kg	6	-		
Carbon tetrachloride	6	U ug/kg	6	-			6	U ug/kg	6	-		
Vinyl acetate	12	U ug/kg	12	-			11	U ug/kg	11	-		
Bromodichloromethane	6	U ug/kg	6	-			6	U ug/kg	6	-		
1,2-Dichloropropane	6	U ug/kg	6	-			6	U ug/kg	6	-		
cis-1,3-Dichloropropene	6	U ug/kg	6	-			6	U ug/kg	6	-		
Trichloroethene	6	U ug/kg	6	-			6	U ug/kg	6	-		
Dibromochloromethane	6	U ug/kg	6	-			6	U ug/kg	6	-		
1,1,2-Trichloroethane	6	U ug/kg	6	-			6	U ug/kg	6	-		
Benzene	6	U ug/kg	6	-			6	U ug/kg	6	-		
trans-1,3-Dichloropropene	6	U ug/kg	6	-			6	U ug/kg	6	-		
Bromoform	6	U ug/kg	6	-			6	U ug/kg	6	-		
4-Methyl-2-pentanone	12	U ug/kg	12	-			11	U ug/kg	11	-		
2-Hexanone	12	U ug/kg	12	-			11	U ug/kg	11	-		
Tetrachloroethene	6	U ug/kg	6	-			6	U ug/kg	6	-		
Toluene	6	U ug/kg	6	-			6	U ug/kg	6	-		
1,1,2,2-Tetrachloroethane	6	U ug/kg	6	-			6	U ug/kg	6	-		
Chlorobenzene	6	U ug/kg	6	-			6	U ug/kg	6	-		
Ethyl Benzene	6	U ug/kg	6	-			6	U ug/kg	6	-		
Styrene	6	U ug/kg	6	-			6	U ug/kg	6	-		
Xylenes (total)	6	U ug/kg	6	-			6	U ug/kg	6	-		
CLP SEMIVOLATILES												
Phenol	390	U ug/kg	330	-			370	U ug/kg	330	-		
bis(2-Chloroethyl) ether	390	U ug/kg	330	-			370	U ug/kg	330	-		
2-Chlorophenol	390	U ug/kg	330	-			370	U ug/kg	330	-		
1,3-Dichlorobenzene	390	U ug/kg	330	-			370	U ug/kg	330	-		

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336009				31624009				20336010				31624010			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-2-2				BOR3-2-2				BOR3-3-1				BOR3-3-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
1,4-Dichlorobenzene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Benzyl Alcohol	-				-				-				-			
1,2-Dichlorobenzene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2-Methylphenol	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
bis(2-Chloroisopropyl) ether	-				-				-				-			
4-Methylphenol	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
N-Nitroso-di-n-propylamine	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Hexachloroethane	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Nitrobenzene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Isophorone	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2-Nitrophenol	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2,4-Dimethylphenol	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Benzoic Acid	1900	U	ug/kg	1600	-				1800	U	ug/kg	1600	-			
bis(2-Chloroethoxy) methane	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2,4-Dichlorophenol	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
1,2,4-Trichlorobenzene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Naphthalene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
4-Chloroaniline	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Hexachlorobutadiene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
4-Chloro-3-methylphenol	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2-Methylnaphthalene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Hexachlorocyclopentadiene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2,4,6-Trichlorophenol	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2,4,5-Trichlorophenol	1900	U	ug/kg	1600	-				1800	U	ug/kg	1600	-			
2-Chloronaphthalene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2-Nitroaniline	1900	U	ug/kg	1600	-				1800	U	ug/kg	1600	-			
Dimethylphthalate	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Acenaphthylene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2,6-Dinitrotoluene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
3-Nitroaniline	1900	U	ug/kg	1600	-				1800	U	ug/kg	1600	-			
Acenaphthene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2,4-Dinitrophenol	1900	U	ug/kg	1600	-				1800	U	ug/kg	1600	-			
4-Nitrophenol	1900	U	ug/kg	1600	-				1800	U	ug/kg	1600	-			
Dibenzofuran	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
2,4-Dinitrotoluene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Diethylphthalate	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
4-Chlorophenyl-phenylether	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Fluorene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
4-Nitroaniline	1900	U	ug/kg	1600	-				1800	U	ug/kg	1600	-			
4,6-Dinitro-2-methylphenol	1900	U	ug/kg	1600	-				1800	U	ug/kg	1600	-			
N-Nitrosodiphenylamine (1)	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
4-Bromophenyl-phenylether	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Hexachlorobenzene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Pentachlorophenol	1900	U	ug/kg	1600	-				1800	U	ug/kg	1600	-			
Phenanthrene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Anthracene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Di-n-butylphthalate	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Fluoranthene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Pyrene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Butylbenzylphthalate	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
3,3'-Dichlorobenzidine	-				-				-				-			
Benzo (a) anthracene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336009				31624009				20336010				31624010			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-2-2				BOR3-2-2				BOR3-3-1				BOR3-3-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Chrysene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
bis(2-Ethylhexyl) phthalate	660		ug/kg	330	-				72	J	ug/kg	330	-			
Di-n-octylphthalate	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Benzo (b) fluoranthene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Benzo (k) fluoranthene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Benzo (a) pyrene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Indeno (1,2,3-cd) pyrene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Dibenz (a,h) anthracene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
Benzo (g,h,i) perylene	390	U	ug/kg	330	-				370	U	ug/kg	330	-			
CLP PESTICIDES/PCBS																
alpha-BHC	9.4	U	ug/kg	9.4	-				9	U	ug/kg	9	-			
beta-BHC	9.4	U	ug/kg	9.4	-				9	U	ug/kg	9	-			
delta-BHC	9.4	U	ug/kg	9.4	-				9	U	ug/kg	9	-			
gamma-BHC (Lindane)	9.4	U	ug/kg	9.4	-				9	U	ug/kg	9	-			
Heptachlor	9.4	U	ug/kg	9.4	-				9	U	ug/kg	9	-			
Aldrin	9.4	U	ug/kg	9.4	-				9	U	ug/kg	9	-			
Heptachlor epoxide	9.4	U	ug/kg	9.4	-				9	U	ug/kg	9	-			
Endosulfan I	9.4	U	ug/kg	9.4	-				9	U	ug/kg	9	-			
Dieldrin	19	U	ug/kg	19	-				18	U	ug/kg	18	-			
4,4'-DDE	-				-				-				-			
Endrin	19	U	ug/kg	19	-				18	U	ug/kg	18	-			
Endosulfan II	19	U	ug/kg	19	-				18	U	ug/kg	18	-			
4,4'-DDD	-				-				-				-			
Endosulfan sulfate	19	U	ug/kg	19	-				18	U	ug/kg	18	-			
4,4'-DDT	-				-				-				-			
Methoxychlor	94	U	ug/kg	94	-				90	U	ug/kg	90	-			
Endrin ketone	19	U	ug/kg	19	-				18	U	ug/kg	18	-			
alpha Chlordane	94	U	ug/kg	94	-				90	U	ug/kg	90	-			
gamma-Chlordane	94	U	ug/kg	94	-				90	U	ug/kg	90	-			
Toxaphene	190	U	ug/kg	190	-				180	U	ug/kg	180	-			
Aroclor-1016	94	U	ug/kg	94	-				90	U	ug/kg	90	-			
Aroclor-1221	94	U	ug/kg	94	-				90	U	ug/kg	90	-			
Aroclor-1232	94	U	ug/kg	94	-				90	U	ug/kg	90	-			
Aroclor-1242	94	U	ug/kg	94	-				90	U	ug/kg	90	-			
Aroclor-1248	94	U	ug/kg	94	-				90	U	ug/kg	90	-			
Aroclor-1254	190	U	ug/kg	190	-				180	U	ug/kg	180	-			
Aroclor-1260	190	U	ug/kg	190	-				180	U	ug/kg	180	-			
CLP METALS AND CYANIDE																
Aluminum	-				869.52		mg/kg	40	-				1540		mg/kg	40
Antimony	-				2.7	UJ	mg/kg	12	-				2.5	UJ	mg/kg	12
Arsenic	-				.094	J	mg/kg	2	-				.18	J	mg/kg	2
Barium	-				1.1	J	mg/kg	40	-				5.4	J	mg/kg	40
Beryllium	-				.047	UJ	mg/kg	1	-				.045	UJ	mg/kg	1
Cadmium	-				.31	UJ	mg/kg	1	-				.029	UJ	mg/kg	1
Calcium	-				103	J	mg/kg	1000	-				281	J	mg/kg	1000
Chromium	-				2.1	J	mg/kg	2	-				3.9		mg/kg	2
Cobalt	-				.68	UJ	mg/kg	10	-				.65	UJ	mg/kg	10
Copper	-				.4	U	mg/kg	5	-				6.2		mg/kg	5
Iron	-				190		mg/kg	20	-				537		mg/kg	20
Lead	-				.89		mg/kg	1	-				3.4		mg/kg	1

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336009				31624009				20336010				31624010			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-2-2				BOR3-2-2				BOR3-3-1				BOR3-3-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Magnesium	-				27.5	J	mg/kg	1000	-				45.9	J	mg/kg	1000
Manganese	-				2.1	J	mg/kg	3	-				10.5	J	mg/kg	3
Mercury	-				.033	U	mg/kg	.1	-				.044	J	mg/kg	.1
Nickel	-				1.4	U	mg/kg	8	-				1.8	UJ	mg/kg	8
Potassium	-				99.4	J	mg/kg	1000	-				61.5	U	mg/kg	1000
Selenium	-				.094	UJ	mg/kg	1	-				.09	UJ	mg/kg	1
Silver	-				.42	U	mg/kg	2	-				.72	J	mg/kg	2
Sodium	-				110	J	mg/kg	1000	-				128	J	mg/kg	1000
Thallium	-				.19	U	mg/kg	2	-				.18	U	mg/kg	2
Vanadium	-				.74	UJ	mg/kg	10	-				1.7	UJ	mg/kg	10
Zinc	-				1.4	UJ	mg/kg	4	-				12.5		mg/kg	4
Cyanide	-				.59	U	mg/kg	2	-				.56	U	mg/kg	2
TOC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336011			31624011			20336012			31624012		
Site	CECIL			CECIL			CECIL			CECIL		
Locator	BOR3-3-2			BOR3-3-2			BOR3-4-1			BOR3-4-1		
Collect Date:	04-DEC-91			04-DEC-91			04-DEC-91			04-DEC-91		
	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
CLP VOLATILE COMPOUNDS												
Chloromethane	60	U ug/kg	60	-			11	U ug/kg	11	-		
Bromomethane	60	U ug/kg	60	-			11	U ug/kg	11	-		
Vinyl Chloride	60	U ug/kg	60	-			11	U ug/kg	11	-		
Chloroethane	60	U ug/kg	60	-			11	U ug/kg	11	-		
Methylene Chloride	100	U ug/kg	30	-			25	U ug/kg	5	-		
Acetone	68	U ug/kg	60	-			11	U ug/kg	11	-		
Carbon disulfide	30	U ug/kg	30	-			2	J ug/kg	5	-		
1,1-Dichloroethene	30	U ug/kg	30	-			5	U ug/kg	5	-		
1,1-Dichloroethane	30	U ug/kg	30	-			5	U ug/kg	5	-		
1,2-Dichloroethene (total)	30	U ug/kg	30	-			5	U ug/kg	5	-		
Chloroform	30	U ug/kg	30	-			5	U ug/kg	5	-		
1,2-Dichloroethane	30	U ug/kg	30	-			5	U ug/kg	5	-		
2-Butanone	60	U ug/kg	60	-			11	U ug/kg	11	-		
1,1,1-Trichloroethane	30	U ug/kg	30	-			5	U ug/kg	5	-		
Carbon tetrachloride	30	U ug/kg	30	-			5	U ug/kg	5	-		
Vinyl acetate	60	U ug/kg	60	-			11	U ug/kg	11	-		
Bromodichloromethane	30	U ug/kg	30	-			5	U ug/kg	5	-		
1,2-Dichloropropane	30	U ug/kg	30	-			5	U ug/kg	5	-		
cis-1,3-Dichloropropene	30	U ug/kg	30	-			5	U ug/kg	5	-		
Trichloroethene	21	J ug/kg	30	-			5	U ug/kg	5	-		
Dibromochloromethane	30	U ug/kg	30	-			5	U ug/kg	5	-		
1,1,2-Trichloroethane	30	U ug/kg	30	-			5	U ug/kg	5	-		
Benzene	30	U ug/kg	30	-			5	U ug/kg	5	-		
trans-1,3-Dichloropropene	30	U ug/kg	30	-			5	U ug/kg	5	-		
Bromoform	30	U ug/kg	30	-			5	U ug/kg	5	-		
4-Methyl-2-pentanone	60	U ug/kg	60	-			11	U ug/kg	11	-		
2-Hexanone	60	U ug/kg	60	-			11	U ug/kg	11	-		
Tetrachloroethene	30	U ug/kg	30	-			5	U ug/kg	5	-		
Toluene	30	U ug/kg	30	-			5	U ug/kg	5	-		
1,1,2,2-Tetrachloroethane	30	U ug/kg	30	-			5	U ug/kg	5	-		
Chlorobenzene	30	U ug/kg	30	-			5	U ug/kg	5	-		
Ethyl Benzene	30	U ug/kg	30	-			5	U ug/kg	5	-		
Styrene	30	U ug/kg	30	-			5	U ug/kg	5	-		
Xylenes (total)	21	J ug/kg	30	-			3	J ug/kg	5	-		
CLP SEMIVOLATILES												
Phenol	380	U ug/kg	330	-			350	U ug/kg	330	-		
bis(2-Chloroethyl) ether	380	U ug/kg	330	-			350	U ug/kg	330	-		
2-Chlorophenol	380	U ug/kg	330	-			350	U ug/kg	330	-		
1,3-Dichlorobenzene	380	U ug/kg	330	-			350	U ug/kg	330	-		

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336011				31624011				20336012				31624012			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-3-2				BOR3-3-2				BOR3-4-1				BOR3-4-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
1,4-Dichlorobenzene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Benzyl Alcohol	-				-				-				-			
1,2-Dichlorobenzene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2-Methylphenol	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
bis(2-Chloroisopropyl) ether	-				-				-				-			
4-Methylphenol	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
N-Nitroso-di-n-propylamine	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Hexachloroethane	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Nitrobenzene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Isophorone	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2-Nitrophenol	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2,4-Dimethylphenol	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Benzoic Acid	1900	U	ug/kg	1600	-				1700	U	ug/kg	1600	-			
bis(2-Chloroethoxy) methane	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2,4-Dichlorophenol	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
1,2,4-Trichlorobenzene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Naphthalene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
4-Chloroaniline	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Hexachlorobutadiene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
4-Chloro-3-methylphenol	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2-Methylnaphthalene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Hexachlorocyclopentadiene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2,4,6-Trichlorophenol	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2,4,5-Trichlorophenol	1900	U	ug/kg	1600	-				1700	U	ug/kg	1600	-			
2-Chloronaphthalene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2-Nitroaniline	1900	U	ug/kg	1600	-				1700	U	ug/kg	1600	-			
Dimethylphthalate	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Acenaphthylene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2,6-Dinitrotoluene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
3-Nitroaniline	1900	U	ug/kg	1600	-				1700	U	ug/kg	1600	-			
Acenaphthene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2,4-Dinitrophenol	1900	U	ug/kg	1600	-				1700	U	ug/kg	1600	-			
4-Nitrophenol	1900	U	ug/kg	1600	-				1700	U	ug/kg	1600	-			
Dibenzofuran	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
2,4-Dinitrotoluene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Diethylphthalate	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
4-Chlorophenyl-phenylether	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Fluorene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
4-Nitroaniline	1900	U	ug/kg	1600	-				1700	U	ug/kg	1600	-			
4,6-Dinitro-2-methylphenol	1900	U	ug/kg	1600	-				1700	U	ug/kg	1600	-			
N-Nitrosodiphenylamine (1)	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
4-Bromophenyl-phenylether	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Hexachlorobenzene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Pentachlorophenol	1900	U	ug/kg	1600	-				1700	U	ug/kg	1600	-			
Phenanthrene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Anthracene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Di-n-butylphthalate	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Fluoranthene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Pyrene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Butylbenzylphthalate	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
3,3'-Dichlorobenzidine	-				-				-				-			
Benzo (a) anthracene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336011				31624011				20336012				31624012			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-3-2				BOR3-3-2				BOR3-4-1				BOR3-4-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Chrysene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
bis(2-Ethylhexyl) phthalate	260	J	ug/kg	330	-				350	U	ug/kg	330	-			
Di-n-octylphthalate	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Benzo (b) fluoranthene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Benzo (k) fluoranthene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Benzo (a) pyrene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Indeno (1,2,3-cd) pyrene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Dibenz (a,h) anthracene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
Benzo (g,h,i) perylene	380	U	ug/kg	330	-				350	U	ug/kg	330	-			
CLP PESTICIDES/PCBS																
alpha-BHC	9.3	U	ug/kg	9.3	-				8.6	U	ug/kg	8.6	-			
beta-BHC	9.3	U	ug/kg	9.3	-				8.6	U	ug/kg	8.6	-			
delta-BHC	9.3	U	ug/kg	9.3	-				8.6	U	ug/kg	8.6	-			
gamma-BHC (Lindane)	9.3	U	ug/kg	9.3	-				8.6	U	ug/kg	8.6	-			
Heptachlor	9.3	U	ug/kg	9.3	-				8.6	U	ug/kg	8.6	-			
Aldrin	9.3	U	ug/kg	9.3	-				8.6	U	ug/kg	8.6	-			
Heptachlor epoxide	9.3	U	ug/kg	9.3	-				8.6	U	ug/kg	8.6	-			
Endosulfan I	9.3	U	ug/kg	9.3	-				8.6	U	ug/kg	8.6	-			
Dieldrin	19	U	ug/kg	19	-				17	U	ug/kg	17	-			
4,4'-DDE	-				-				-				-			
Endrin	19	U	ug/kg	19	-				17	U	ug/kg	17	-			
Endosulfan II	19	U	ug/kg	19	-				17	U	ug/kg	17	-			
4,4'-DDD	-				-				-				-			
Endosulfan sulfate	19	U	ug/kg	19	-				17	U	ug/kg	17	-			
4,4'-DDT	-				-				-				-			
Methoxychlor	93	U	ug/kg	93	-				86	U	ug/kg	86	-			
Endrin ketone	19	U	ug/kg	19	-				17	U	ug/kg	17	-			
alpha Chlordane	93	U	ug/kg	93	-				86	U	ug/kg	86	-			
gamma-Chlordane	93	U	ug/kg	93	-				86	U	ug/kg	86	-			
Toxaphene	190	U	ug/kg	190	-				170	U	ug/kg	170	-			
Aroclor-1016	93	U	ug/kg	93	-				86	U	ug/kg	86	-			
Aroclor-1221	93	U	ug/kg	93	-				86	U	ug/kg	86	-			
Aroclor-1232	93	U	ug/kg	93	-				86	U	ug/kg	86	-			
Aroclor-1242	93	U	ug/kg	93	-				86	U	ug/kg	86	-			
Aroclor-1248	93	U	ug/kg	93	-				86	U	ug/kg	86	-			
Aroclor-1254	190	U	ug/kg	190	-				170	U	ug/kg	170	-			
Aroclor-1260	190	U	ug/kg	190	-				170	U	ug/kg	170	-			
CLP METALS AND CYANIDE																
Aluminum	-				617		mg/kg	40	-				1400		mg/kg	40
Antimony	-				2.7	UJ	mg/kg	12	-				2.5	J	mg/kg	12
Arsenic	-				.094	J	mg/kg	2	-				.13	J	mg/kg	2
Barium	-				2.4	J	mg/kg	40	-				2.3	J	mg/kg	40
Beryllium	-				.047	UJ	mg/kg	1	-				.043	UJ	mg/kg	1
Cadmium	-				.33	J	mg/kg	1	-				.28	UJ	mg/kg	1
Calcium	-				116	J	mg/kg	1000	-				182	J	mg/kg	1000
Chromium	-				3.3		mg/kg	2	-				1.6	J	mg/kg	2
Cobalt	-				.68	UJ	mg/kg	10	-				.62	UJ	mg/kg	10
Copper	-				1.4	J	mg/kg	5	-				.51	J	mg/kg	5
Iron	-				161		mg/kg	20	-				402		mg/kg	20
Lead	-				3.5		mg/kg	1	-				1.5		mg/kg	1

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336011				31624011				20336012				31624012			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-3-2				BOR3-3-2				BOR3-4-1				BOR3-4-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Magnesium	-				26.2	J	mg/kg	1000	-				33.6	J	mg/kg	1000
Manganese	-				5.4	J	mg/kg	3	-				2.6	J	mg/kg	3
Mercury	-				.039	J	mg/kg	.1	-				.03	U	mg/kg	.1
Nickel	-				2.7	UJ	mg/kg	8	-				1.3	U	mg/kg	8
Potassium	-				101	J	mg/kg	1000	-				94.2	J	mg/kg	1000
Selenium	-				.094	UJ	mg/kg	1	-				.086	UJ	mg/kg	1
Silver	-				.42	U	mg/kg	2	-				.39	U	mg/kg	2
Sodium	-				119	J	mg/kg	1000	-				118	J	mg/kg	1000
Thallium	-				.19	U	mg/kg	2	-				.17	U	mg/kg	2
Vanadium	-				.84	UJ	mg/kg	10	-				1.3	UJ	mg/kg	10
Zinc	-				5	J	mg/kg	4	-				1.5	UJ	mg/kg	4
Cyanide	-				.59	U	mg/kg	2	-				.54	U	mg/kg	2
TOC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336013				20337001				31625001				20337002			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-4-2				BOR3-5-1				BOR3-5-1				BOR3-5-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP VOLATILE COMPOUNDS																
Chloromethane	11	U	ug/kg	11	11	U	ug/kg	11	-				12	U	ug/kg	12
Bromomethane	11	U	ug/kg	11	11	U	ug/kg	11	-				12	U	ug/kg	12
Vinyl Chloride	11	U	ug/kg	11	11	U	ug/kg	11	-				12	U	ug/kg	12
Chloroethane	11	U	ug/kg	11	11	U	ug/kg	11	-				12	U	ug/kg	12
Methylene Chloride	10	U	ug/kg	6	13	U	ug/kg	5	-				39	U	ug/kg	6
Acetone	11	U	ug/kg	11	11	U	ug/kg	11	-				14	U	ug/kg	12
Carbon disulfide	6	U	ug/kg	6	5	U	ug/kg	5	-				2	J	ug/kg	6
1,1-Dichloroethene	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
1,1-Dichloroethane	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
1,2-Dichloroethene (total)	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Chloroform	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
1,2-Dichloroethane	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
2-Butanone	11	U	ug/kg	11	11	U	ug/kg	11	-				12	U	ug/kg	12
1,1,1-Trichloroethane	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Carbon tetrachloride	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Vinyl acetate	11	U	ug/kg	11	11	U	ug/kg	11	-				12	U	ug/kg	12
Bromodichloromethane	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
1,2-Dichloropropane	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
cis-1,3-Dichloropropene	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Trichloroethene	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Dibromochloromethane	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
1,1,2-Trichloroethane	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Benzene	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
trans-1,3-Dichloropropene	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Bromoform	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
4-Methyl-2-pentanone	11	U	ug/kg	11	11	U	ug/kg	11	-				12	U	ug/kg	12
2-Hexanone	11	U	ug/kg	11	11	U	ug/kg	11	-				12	U	ug/kg	12
Tetrachloroethene	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Toluene	6	U	ug/kg	6	1	J	ug/kg	5	-				2	J	ug/kg	6
1,1,2,2-Tetrachloroethane	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Chlorobenzene	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Ethyl Benzene	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Styrene	6	U	ug/kg	6	5	U	ug/kg	5	-				6	U	ug/kg	6
Xylenes (total)	6	U	ug/kg	6	4	J	ug/kg	5	-				7		ug/kg	6
CLP SEMIVOLATILES																
Phenol	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
bis(2-Chloroethyl) ether	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2-Chlorophenol	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
1,3-Dichlorobenzene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336013				20337001				31625001				20337002			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-4-2				BOR3-5-1				BOR3-5-1				BOR3-5-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
1,4-Dichlorobenzene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Benzyl Alcohol	-				-				-				-			
1,2-Dichlorobenzene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2-Methylphenol	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
bis(2-Chloroisopropyl) ether	-				-				-				-			
4-Methylphenol	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
N-Nitroso-di-n-propylamine	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Hexachloroethane	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Nitrobenzene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Isophorone	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2-Nitrophenol	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2,4-Dimethylphenol	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Benzoic Acid	19000	U	ug/kg	16000	1700	UJ	ug/kg	1600	-				7500	UJ	ug/kg	7500
bis(2-Chloroethoxy) methane	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2,4-Dichlorophenol	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
1,2,4-Trichlorobenzene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Naphthalene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
4-Chloroaniline	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Hexachlorobutadiene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
4-Chloro-3-methylphenol	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2-Methylnaphthalene	3800	U	ug/kg	3300	350	UJ	ug/kg	330	-				1600	UJ	ug/kg	1600
Hexachlorocyclopentadiene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2,4,6-Trichlorophenol	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2,4,5-Trichlorophenol	19000	U	ug/kg	16000	1700	U	ug/kg	1600	-				7500	U	ug/kg	7500
2-Chloronaphthalene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2-Nitroaniline	19000	U	ug/kg	16000	1700	U	ug/kg	1600	-				7500	U	ug/kg	7500
Dimethylphthalate	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Acenaphthylene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2,6-Dinitrotoluene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
3-Nitroaniline	19000	U	ug/kg	16000	1700	U	ug/kg	1600	-				7500	U	ug/kg	7500
Acenaphthene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2,4-Dinitrophenol	19000	U	ug/kg	16000	1700	U	ug/kg	1600	-				7500	U	ug/kg	7500
4-Nitrophenol	19000	U	ug/kg	16000	1700	U	ug/kg	1600	-				7500	U	ug/kg	7500
Dibenzofuran	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
2,4-Dinitrotoluene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Diethylphthalate	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
4-Chlorophenyl-phenylether	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Fluorene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
4-Nitroaniline	19000	U	ug/kg	16000	1700	U	ug/kg	1600	-				7500	U	ug/kg	7500
4,6-Dinitro-2-methylphenol	19000	U	ug/kg	16000	1700	U	ug/kg	1600	-				7500	U	ug/kg	7500
N-Nitrosodiphenylamine (1)	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
4-Bromophenyl-phenylether	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Hexachlorobenzene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Pentachlorophenol	19000	U	ug/kg	16000	1700	U	ug/kg	1600	-				7500	U	ug/kg	7500
Phenanthrene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Anthracene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Di-n-butylphthalate	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Fluoranthene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Pyrene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Butylbenzylphthalate	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
3,3'-Dichlorobenzidine	-				-				-				-			
Benzo (a) anthracene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336013				20337001				31625001				20337002			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-4-2				BOR3-5-1				BOR3-5-1				BOR3-5-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Chrysene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
bis(2-Ethylhexyl) phthalate	1400	J	ug/kg	3300	42	J	ug/kg	330	-				1600	U	ug/kg	1600
Di-n-octylphthalate	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Benzo (b) fluoranthene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Benzo (k) fluoranthene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Benzo (a) pyrene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Indeno (1,2,3-cd) pyrene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Dibenz (a,h) anthracene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
Benzo (g,h,i) perylene	3800	U	ug/kg	3300	350	U	ug/kg	330	-				1600	U	ug/kg	1600
CLP PESTICIDES/PCBS																
alpha-BHC	9.3	U	ug/kg	9.3	17	U	ug/kg	17	-				19	U	ug/kg	19
beta-BHC	9.3	U	ug/kg	9.3	17	U	ug/kg	17	-				19	U	ug/kg	19
delta-BHC	9.3	U	ug/kg	9.3	17	U	ug/kg	17	-				19	U	ug/kg	19
gamma-BHC (Lindane)	9.3	U	ug/kg	9.3	17	U	ug/kg	17	-				19	U	ug/kg	19
Heptachlor	9.3	U	ug/kg	9.3	17	U	ug/kg	17	-				19	U	ug/kg	19
Aldrin	9.3	U	ug/kg	9.3	17	U	ug/kg	17	-				19	U	ug/kg	19
Heptachlor epoxide	9.3	U	ug/kg	9.3	17	U	ug/kg	17	-				19	U	ug/kg	19
Endosulfan I	9.3	U	ug/kg	9.3	17	U	ug/kg	17	-				19	U	ug/kg	19
Dieldrin	19	U	ug/kg	19	34	U	ug/kg	34	-				38	U	ug/kg	38
4,4'-DDE	-				-				-				-			
Endrin	19	U	ug/kg	19	34	U	ug/kg	34	-				38	U	ug/kg	38
Endosulfan II	19	U	ug/kg	19	34	U	ug/kg	34	-				38	U	ug/kg	38
4,4'-DDD	-				-				-				-			
Endosulfan sulfate	19	U	ug/kg	19	34	U	ug/kg	34	-				38	U	ug/kg	38
4,4'-DDT	-				-				-				-			
Methoxychlor	93	U	ug/kg	93	170	U	ug/kg	170	-				190	U	ug/kg	190
Endrin ketone	19	U	ug/kg	19	34	U	ug/kg	34	-				38	U	ug/kg	38
alpha Chlordane	93	U	ug/kg	93	170	U	ug/kg	170	-				190	U	ug/kg	190
gamma-Chlordane	93	U	ug/kg	93	170	U	ug/kg	170	-				190	U	ug/kg	190
Toxaphene	190	U	ug/kg	190	340	U	ug/kg	340	-				380	U	ug/kg	380
Aroclor-1016	93	U	ug/kg	93	170	U	ug/kg	170	-				190	U	ug/kg	190
Aroclor-1221	93	U	ug/kg	93	170	U	ug/kg	170	-				190	U	ug/kg	190
Aroclor-1232	93	U	ug/kg	93	170	U	ug/kg	170	-				190	U	ug/kg	190
Aroclor-1242	93	U	ug/kg	93	170	U	ug/kg	170	-				190	U	ug/kg	190
Aroclor-1248	93	U	ug/kg	93	170	U	ug/kg	170	-				190	U	ug/kg	190
Aroclor-1254	190	U	ug/kg	190	340	U	ug/kg	340	-				380	U	ug/kg	380
Aroclor-1260	190	U	ug/kg	190	340	U	ug/kg	340	-				380	U	ug/kg	380
CLP METALS AND CYANIDE																
Aluminum	758		mg/kg	40	-				3100		mg/kg	40	-			
Antimony	2.6	UJ	mg/kg	12	-				2.4	UJ	mg/kg	12	-			
Arsenic	.12	J	mg/kg	2	-				.24	J	mg/kg	2	-			
Barium	.51	J	mg/kg	40	-				32.5	J	mg/kg	40	-			
Beryllium	.047	UJ	mg/kg	1	-				.32	J	mg/kg	1	-			
Cadmium	.3	UJ	mg/kg	1	-				.28	U	mg/kg	1	-			
Calcium	178	J	mg/kg	1000	-				11100	J	mg/kg	1000	-			
Chromium	1.6	J	mg/kg	2	-				2	J	mg/kg	2	-			
Cobalt	1.2	UJ	mg/kg	10	-				.63	U	mg/kg	10	-			
Copper	.4	U	mg/kg	5	-				2.8	J	mg/kg	5	-			
Iron	149		mg/kg	20	-				431		mg/kg	20	-			
Lead	.8		mg/kg	1	-				1.8	J	mg/kg	1	-			

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	20336013				20337001				31625001				20337002			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-4-2				BOR3-5-1				BOR3-5-1				BOR3-5-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Magnesium	24.9	J	mg/kg	1000	-				1300		mg/kg	1000	-			
Manganese	1.6	J	mg/kg	3	-				66.3	J	mg/kg	3	-			
Mercury	.033	U	mg/kg	.1	-				.03	U	mg/kg	.1	-			
Nickel	1.5	UJ	mg/kg	8	-				1.3	U	mg/kg	8	-			
Potassium	74.8	J	mg/kg	1000	-				285	UJ	mg/kg	1000	-			
Selenium	.094	UJ	mg/kg	1	-				.086	U	mg/kg	1	-			
Silver	.42	U	mg/kg	2	-				.39	U	mg/kg	2	-			
Sodium	129	J	mg/kg	1000	-				133	J	mg/kg	1000	-			
Thallium	.19	U	mg/kg	2	-				.17	U	mg/kg	2	-			
Vanadium	.47	UJ	mg/kg	10	-				4.3	J	mg/kg	10	-			
Zinc	1.1	UJ	mg/kg	4	-				1.7	UJ	mg/kg	4	-			
Cyanide	.59	U	mg/kg	2	-				.61	U	mg/kg	2	-			
OC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625002				20337003				31625003				20337004			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-5-2				BOR3-6-1				BOR3-6-1				BOR3-6-1B			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
.P VOLATILE COMPOUNDS																
Chloromethane		-			11	U	ug/kg	11		-			11	U	ug/kg	11
Bromomethane		-			11	U	ug/kg	11		-			11	U	ug/kg	11
Vinyl Chloride		-			11	U	ug/kg	11		-			11	U	ug/kg	11
Chloroethane		-			11	U	ug/kg	11		-			11	U	ug/kg	11
Methylene Chloride		-			28	U	ug/kg	6		-			7	U	ug/kg	6
Acetone		-			14	U	ug/kg	11		-			29	U	ug/kg	11
Carbon disulfide		-			6	U	ug/kg	6		-			6	U	ug/kg	6
1,1-Dichloroethene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
1,1-Dichloroethane		-			6	U	ug/kg	6		-			6	U	ug/kg	6
1,2-Dichloroethene (total)		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Chloroform		-			6	U	ug/kg	6		-			6	U	ug/kg	6
1,2-Dichloroethane		-			6	U	ug/kg	6		-			6	U	ug/kg	6
2-Butanone		-			11	U	ug/kg	11		-			11	U	ug/kg	11
1,1,1-Trichloroethane		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Carbon tetrachloride		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Vinyl acetate		-			11	U	ug/kg	11		-			11	U	ug/kg	11
Bromodichloromethane		-			6	U	ug/kg	6		-			6	U	ug/kg	6
1,2-Dichloropropane		-			6	U	ug/kg	6		-			6	U	ug/kg	6
cis-1,3-Dichloropropene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Trichloroethene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Dibromochloromethane		-			6	U	ug/kg	6		-			6	U	ug/kg	6
1,1,2-Trichloroethane		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Benzene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
trans-1,3-Dichloropropene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Bromoform		-			6	U	ug/kg	6		-			6	U	ug/kg	6
4-Methyl-2-pentanone		-			11	U	ug/kg	11		-			11	U	ug/kg	11
2-Hexanone		-			11	U	ug/kg	11		-			11	U	ug/kg	11
Tetrachloroethene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Toluene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
1,1,2,2-Tetrachloroethane		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Chlorobenzene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Ethyl Benzene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Styrene		-			6	U	ug/kg	6		-			6	U	ug/kg	6
Xylenes (total)		-			6	U	ug/kg	6		-			4	J	ug/kg	6
CLP SEMIVOLATILES																
Phenol		-			810	U	ug/kg	810		-			740	U	ug/kg	740
bis(2-Chloroethyl) ether		-			810	U	ug/kg	810		-			740	U	ug/kg	740
2-Chlorophenol		-			810	U	ug/kg	810		-			740	U	ug/kg	740
1,3-Dichlorobenzene		-			810	U	ug/kg	810		-			740	U	ug/kg	740

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625002				20337003				31625003				20337004			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-5-2				BOR3-6-1				BOR3-6-1				BOR3-6-1B			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
1,4-Dichlorobenzene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Benzyl Alcohol	-				-				-				-			
1,2-Dichlorobenzene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2-Methylphenol	-				810	U	ug/kg	810	-				740	U	ug/kg	740
bis(2-Chloroisopropyl) ether	-				-				-				-			
4-Methylphenol	-				810	U	ug/kg	810	-				740	U	ug/kg	740
N-Nitroso-di-n-propylamine	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Hexachloroethane	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Nitrobenzene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Isophorone	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2-Nitrophenol	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2,4-Dimethylphenol	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Benzoic Acid	-				4000	UJ	ug/kg	4000	-				3600	UJ	ug/kg	3600
bis(2-Chloroethoxy) methane	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2,4-Dichlorophenol	-				810	U	ug/kg	810	-				740	U	ug/kg	740
1,2,4-Trichlorobenzene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Naphthalene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
4-Chloroaniline	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Hexachlorobutadiene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
4-Chloro-3-methylphenol	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2-Methylnaphthalene	-				810	UJ	ug/kg	810	-				740	UJ	ug/kg	740
Hexachlorocyclopentadiene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2,4,6-Trichlorophenol	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2,4,5-Trichlorophenol	-				4000	U	ug/kg	4000	-				3600	U	ug/kg	3600
2-Chloronaphthalene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2-Nitroaniline	-				4000	U	ug/kg	4000	-				3600	U	ug/kg	3600
Dimethylphthalate	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Acenaphthylene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2,6-Dinitrotoluene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
3-Nitroaniline	-				4000	U	ug/kg	4000	-				3600	U	ug/kg	3600
Acenaphthene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2,4-Dinitrophenol	-				4000	U	ug/kg	4000	-				3600	U	ug/kg	3600
4-Nitrophenol	-				4000	U	ug/kg	4000	-				3600	U	ug/kg	3600
Dibenzofuran	-				810	U	ug/kg	810	-				740	U	ug/kg	740
2,4-Dinitrotoluene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Diethylphthalate	-				810	U	ug/kg	810	-				740	U	ug/kg	740
4-Chlorophenyl-phenylether	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Fluorene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
4-Nitroaniline	-				4000	U	ug/kg	4000	-				3600	U	ug/kg	3600
4,6-Dinitro-2-methylphenol	-				4000	U	ug/kg	4000	-				3600	U	ug/kg	3600
N-Nitrosodiphenylamine (1)	-				810	U	ug/kg	810	-				740	U	ug/kg	740
4-Bromophenyl-phenylether	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Hexachlorobenzene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Pentachlorophenol	-				4000	U	ug/kg	4000	-				3600	U	ug/kg	3600
Phenanthrene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Anthracene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Di-n-butylphthalate	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Fluoranthene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Pyrene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Butylbenzylphthalate	-				810	U	ug/kg	810	-				740	U	ug/kg	740
3,3'-Dichlorobenzidine	-				-				-				-			
Benzo (a) anthracene	-				810	U	ug/kg	810	-				740	U	ug/kg	740

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625002				20337003				31625003				20337004			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-5-2				BOR3-6-1				BOR3-6-1				BOR3-6-1B			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Chrysene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
bis(2-Ethylhexyl) phthalate	-				170	J	ug/kg	810	-				110	J	ug/kg	740
Di-n-octylphthalate	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Benzo (b) fluoranthene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Benzo (k) fluoranthene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Benzo (a) pyrene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Indeno (1,2,3-cd) pyrene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Dibenz (a,h) anthracene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
Benzo (g,h,i) perylene	-				810	U	ug/kg	810	-				740	U	ug/kg	740
CLP PESTICIDES/PCBS																
alpha-BHC	-				9.9	U	ug/kg	9.9	-				9	U	ug/kg	9
beta-BHC	-				9.9	U	ug/kg	9.9	-				9	U	ug/kg	9
delta-BHC	-				9.9	U	ug/kg	9.9	-				9	U	ug/kg	9
gamma-BHC (Lindane)	-				9.9	U	ug/kg	9.9	-				9	U	ug/kg	9
Heptachlor	-				9.9	U	ug/kg	9.9	-				9	U	ug/kg	9
Aldrin	-				9.9	U	ug/kg	9.9	-				9	U	ug/kg	9
Heptachlor epoxide	-				9.9	U	ug/kg	9.9	-				9	U	ug/kg	9
Endosulfan I	-				9.9	U	ug/kg	9.9	-				9	U	ug/kg	9
Dieldrin	-				20	U	ug/kg	20	-				18	U	ug/kg	18
4,4'-DDE	-				-				-				-			
Endrin	-				20	U	ug/kg	20	-				18	U	ug/kg	18
Endosulfan II	-				20	U	ug/kg	20	-				18	U	ug/kg	18
4,4'-DDD	-				-				-				-			
Endosulfan sulfate	-				20	U	ug/kg	20	-				18	U	ug/kg	18
4,4'-DDT	-				-				-				-			
Methoxychlor	-				99	U	ug/kg	99	-				90	U	ug/kg	90
Endrin ketone	-				20	U	ug/kg	20	-				18	U	ug/kg	18
alpha Chlordane	-				99	U	ug/kg	99	-				90	U	ug/kg	90
gamma-Chlordane	-				99	U	ug/kg	99	-				90	U	ug/kg	90
Toxaphene	-				200	U	ug/kg	200	-				180	U	ug/kg	180
Aroclor-1016	-				99	U	ug/kg	99	-				90	U	ug/kg	90
Aroclor-1221	-				99	U	ug/kg	99	-				90	U	ug/kg	90
Aroclor-1232	-				99	U	ug/kg	99	-				90	U	ug/kg	90
Aroclor-1242	-				99	U	ug/kg	99	-				90	U	ug/kg	90
Aroclor-1248	-				99	U	ug/kg	99	-				90	U	ug/kg	90
Aroclor-1254	-				200	U	ug/kg	200	-				180	U	ug/kg	180
Aroclor-1260	-				200	U	ug/kg	200	-				180	U	ug/kg	180
CLP METALS AND CYANIDE																
Aluminum	723		mg/kg	40	-				1360		mg/kg	40	-			
Antimony	2.6	UJ	mg/kg	12	-				2.6	UJ	mg/kg	12	-			
Arsenic	.21	J	mg/kg	2	-				.11	J	mg/kg	2	-			
Barium	1.9	J	mg/kg	40	-				6.1	J	mg/kg	40	-			
Beryllium	.047	U	mg/kg	1	-				.046	U	mg/kg	1	-			
Cadmium	.3	U	mg/kg	1	-				.71	UJ	mg/kg	1	-			
Calcium	412	J	mg/kg	1000	-				1180	J	mg/kg	1000	-			
Chromium	1.5	J	mg/kg	2	-				2.2	J	mg/kg	2	-			
Cobalt	.68	U	mg/kg	10	-				.67	U	mg/kg	10	-			
Copper	2	J	mg/kg	5	-				9.9		mg/kg	5	-			
Iron	196		mg/kg	20	-				656		mg/kg	20	-			
Lead	1.4	J	mg/kg	1	-				4	J	mg/kg	1	-			

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625002				20337003				31625003				20337004			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-5-2				BOR3-6-1				BOR3-6-1				BOR3-6-1B			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Magnesium	51.6	J	mg/kg	1000	-				73.9	J	mg/kg	1000	-			
Manganese	1.9	J	mg/kg	3	-				3.7		mg/kg	3	-			
Mercury	.033	U	mg/kg	.1	-				.13		mg/kg	.1	-			
Nickel	1.5	J	mg/kg	8	-				3.7	J	mg/kg	8	-			
Potassium	98.9	UJ	mg/kg	1000	-				102	UJ	mg/kg	1000	-			
Selenium	.094	U	mg/kg	1	-				.92	U	mg/kg	1	-			
Silver	.42	U	mg/kg	2	-				1.2	UJ	mg/kg	2	-			
Sodium	100	J	mg/kg	1000	-				93	J	mg/kg	1000	-			
Thallium	.19	U	mg/kg	2	-				.18	UJ	mg/kg	2	-			
Vanadium	.92	UJ	mg/kg	10	-				1.2	UJ	mg/kg	10	-			
Zinc	1.4	UJ	mg/kg	4	-				17.9		mg/kg	4	-			
Cyanide	.18	U	mg/kg	2	-				.17	U	mg/kg	2	-			
OC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625004			20337005			31625005			20337006		
Site	CECIL			CECIL			CECIL			CECIL		
Locator	BOR3-6-1B			BOR3-6-2			BOR3-6-2			BOR3-7-1		
Collect Date:	04-DEC-91			04-DEC-91			04-DEC-91			04-DEC-91		
	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
LP VOLATILE COMPOUNDS												
Chloromethane	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Bromomethane	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Vinyl Chloride	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Chloroethane	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Methylene Chloride	-			760	U ug/kg	760	-			6	U ug/kg	5
Acetone	-			8400	U ug/kg	1500	-			11	U ug/kg	11
Carbon disulfide	-			760	U ug/kg	760	-			5	U ug/kg	5
1,1-Dichloroethene	-			760	U ug/kg	760	-			5	U ug/kg	5
1,1-Dichloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
1,2-Dichloroethene (total)	-			760	U ug/kg	760	-			5	U ug/kg	5
Chloroform	-			550	J ug/kg	760	-			5	U ug/kg	5
1,2-Dichloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
2-Butanone	-			1500	U ug/kg	1500	-			11	U ug/kg	11
1,1,1-Trichloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
Carbon tetrachloride	-			760	U ug/kg	760	-			5	U ug/kg	5
Vinyl acetate	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Bromodichloromethane	-			760	U ug/kg	760	-			5	U ug/kg	5
1,2-Dichloropropane	-			760	U ug/kg	760	-			5	U ug/kg	5
cis-1,3-Dichloropropene	-			760	U ug/kg	760	-			5	U ug/kg	5
Trichloroethene	-			270	J ug/kg	760	-			5	U ug/kg	5
Dibromochloromethane	-			760	U ug/kg	760	-			5	U ug/kg	5
1,1,2-Trichloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
Benzene	-			760	U ug/kg	760	-			5	U ug/kg	5
trans-1,3-Dichloropropene	-			760	U ug/kg	760	-			5	U ug/kg	5
Bromoform	-			760	U ug/kg	760	-			5	U ug/kg	5
4-Methyl-2-pentanone	-			1500	U ug/kg	1500	-			11	U ug/kg	11
2-Hexanone	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Tetrachloroethene	-			760	U ug/kg	760	-			5	U ug/kg	5
Toluene	-			190	J ug/kg	760	-			2	J ug/kg	5
1,1,2,2-Tetrachloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
Chlorobenzene	-			760	U ug/kg	760	-			5	U ug/kg	5
Ethyl Benzene	-			760	U ug/kg	760	-			5	U ug/kg	5
Styrene	-			760	U ug/kg	760	-			5	U ug/kg	5
Xylenes (total)	-			760	U ug/kg	760	-			7	ug/kg	5
LP SEMIVOLATILES												
Phenol	-			3100	U ug/kg	3100	-			360	U ug/kg	360
bis(2-Chloroethyl) ether	-			3100	U ug/kg	3100	-			360	U ug/kg	360
2-Chlorophenol	-			3100	U ug/kg	3100	-			360	U ug/kg	360
1,3-Dichlorobenzene	-			3100	U ug/kg	3100	-			360	U ug/kg	360

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625004				20337005				31625005				20337006			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-6-1B				BOR3-6-2				BOR3-6-2				BOR3-7-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
1,4-Dichlorobenzene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Benzyl Alcohol	-				-				-				-			
1,2-Dichlorobenzene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2-Methylphenol	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
bis(2-Chloroisopropyl) ether	-				-				-				-			
4-Methylphenol	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
N-Nitroso-di-n-propylamine	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Hexachloroethane	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Nitrobenzene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Isophorone	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2-Nitrophenol	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2,4-Dimethylphenol	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Benzoic Acid	-				15000	U	ug/kg	15000	-				1700	UJ	ug/kg	1700
bis(2-Chloroethoxy) methane	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2,4-Dichlorophenol	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
1,2,4-Trichlorobenzene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Naphthalene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
4-Chloroaniline	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Hexachlorobutadiene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
4-Chloro-3-methylphenol	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2-Methylnaphthalene	-				3100	U	ug/kg	3100	-				360	UJ	ug/kg	360
Hexachlorocyclopentadiene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2,4,6-Trichlorophenol	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2,4,5-Trichlorophenol	-				15000	U	ug/kg	15000	-				1700	U	ug/kg	1700
2-Chloronaphthalene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2-Nitroaniline	-				15000	U	ug/kg	15000	-				1700	U	ug/kg	1700
Dimethylphthalate	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Acenaphthylene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2,6-Dinitrotoluene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
3-Nitroaniline	-				15000	U	ug/kg	15000	-				1700	U	ug/kg	1700
Acenaphthene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2,4-Dinitrophenol	-				15000	U	ug/kg	15000	-				1700	U	ug/kg	1700
4-Nitrophenol	-				15000	U	ug/kg	15000	-				1700	U	ug/kg	1700
Dibenzofuran	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
2,4-Dinitrotoluene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Diethylphthalate	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
4-Chlorophenyl-phenylether	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Fluorene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
4-Nitroaniline	-				15000	U	ug/kg	15000	-				1700	U	ug/kg	1700
4,6-Dinitro-2-methylphenol	-				15000	U	ug/kg	15000	-				1700	U	ug/kg	1700
N-Nitrosodiphenylamine (1)	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
4-Bromophenyl-phenylether	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Hexachlorobenzene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Pentachlorophenol	-				15000	U	ug/kg	15000	-				1700	U	ug/kg	1700
Phenanthrene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Anthracene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Di-n-butylphthalate	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Fluoranthene	-				480	J	ug/kg	3100	-				360	U	ug/kg	360
Pyrene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
Butylbenzylphthalate	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360
3,3'-Dichlorobenzidine	-				-				-				-			
Benzo (a) anthracene	-				3100	U	ug/kg	3100	-				360	U	ug/kg	360

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625004			20337005			31625005			20337006		
Site	CECIL			CECIL			CECIL			CECIL		
Locator	BOR3-6-1B			BOR3-6-2			BOR3-6-2			BOR3-7-1		
Collect Date:	04-DEC-91			04-DEC-91			04-DEC-91			04-DEC-91		
	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
Chrysene	-			3100 U	ug/kg	3100	-			360 U	ug/kg	360
bis(2-Ethylhexyl) phthalate	-			6800	ug/kg	3100	-			360 U	ug/kg	360
Di-n-octylphthalate	-			3100 U	ug/kg	3100	-			360 U	ug/kg	360
Benzo (b) fluoranthene	-			3100 U	ug/kg	3100	-			360 U	ug/kg	360
Benzo (k) fluoranthene	-			3100 U	ug/kg	3100	-			360 U	ug/kg	360
Benzo (a) pyrene	-			3100 U	ug/kg	3100	-			360 U	ug/kg	360
Indeno (1,2,3-cd) pyrene	-			3100 U	ug/kg	3100	-			360 U	ug/kg	360
Dibenz (a,h) anthracene	-			3100 U	ug/kg	3100	-			360 U	ug/kg	360
Benzo (g,h,i) perylene	-			3100 U	ug/kg	3100	-			360 U	ug/kg	360
CLP PESTICIDES/PCBS												
alpha-BHC	-			9.4 U	ug/kg	9.4	-			17 U	ug/kg	17
beta-BHC	-			9.4 U	ug/kg	9.4	-			17 U	ug/kg	17
delta-BHC	-			9.4 U	ug/kg	9.4	-			17 U	ug/kg	17
gamma-BHC (Lindane)	-			9.4 U	ug/kg	9.4	-			17 U	ug/kg	17
Heptachlor	-			9.4 U	ug/kg	9.4	-			17 U	ug/kg	17
Aldrin	-			9.4 U	ug/kg	9.4	-			17 U	ug/kg	17
Heptachlor epoxide	-			9.4 U	ug/kg	9.4	-			17 U	ug/kg	17
Endosulfan I	-			9.4 U	ug/kg	9.4	-			17 U	ug/kg	17
Dieldrin	-			19 U	ug/kg	19	-			35 U	ug/kg	35
4,4'-DDE	-			-			-			-		
Endrin	-			19 U	ug/kg	19	-			35 U	ug/kg	35
Endosulfan II	-			19 U	ug/kg	19	-			35 U	ug/kg	35
4,4'-DDD	-			-			-			-		
Endosulfan sulfate	-			19 U	ug/kg	19	-			35 U	ug/kg	35
4,4'-DDT	-			-			-			-		
Methoxychlor	-			94 U	ug/kg	94	-			170 U	ug/kg	170
Endrin ketone	-			19 U	ug/kg	19	-			35 U	ug/kg	35
alpha Chlordane	-			94 U	ug/kg	94	-			170 U	ug/kg	170
gamma-Chlordane	-			94 U	ug/kg	94	-			170 U	ug/kg	170
Toxaphene	-			190 U	ug/kg	190	-			350 U	ug/kg	350
Aroclor-1016	-			94 U	ug/kg	94	-			170 U	ug/kg	170
Aroclor-1221	-			94 U	ug/kg	94	-			170 U	ug/kg	170
Aroclor-1232	-			94 U	ug/kg	94	-			170 U	ug/kg	170
Aroclor-1242	-			94 U	ug/kg	94	-			170 U	ug/kg	170
Aroclor-1248	-			94 U	ug/kg	94	-			170 U	ug/kg	170
Aroclor-1254	-			190 U	ug/kg	190	-			350 U	ug/kg	350
Aroclor-1260	-			190 U	ug/kg	190	-			350 U	ug/kg	350
CLP METALS AND CYANIDE												
Aluminum	1580	mg/kg	40	-			572	mg/kg	40	-		
Antimony	2.5 UJ	mg/kg	12	-			2.7 UJ	mg/kg	12	-		
Arsenic	.09 J	mg/kg	2	-			.094 U	mg/kg	2	-		
Barium	4.3 J	mg/kg	40	-			1.9 J	mg/kg	40	-		
Beryllium	.045 U	mg/kg	1	-			.047 U	mg/kg	1	-		
Cadmium	.29 U	mg/kg	1	-			.31 U	mg/kg	1	-		
Calcium	1340 J	mg/kg	1000	-			507 J	mg/kg	1000	-		
Chromium	2.1 J	mg/kg	2	-			1.3 J	mg/kg	2	-		
Cobalt	.65 U	mg/kg	10	-			.68 U	mg/kg	10	-		
Copper	4.9 J	mg/kg	5	-			1.7 J	mg/kg	5	-		
Iron	530	mg/kg	20	-			183	mg/kg	20	-		
Lead	2.3 J	mg/kg	1	-			2 J	mg/kg	1	-		

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625004				20337005				31625005				20337006			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-6-1B				BOR3-6-2				BOR3-6-2				BOR3-7-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Magnesium	53.6	J	mg/kg	1000	-				28.6	UJ	mg/kg	1000	-			
Manganese	4		mg/kg	3	-				2	J	mg/kg	3	-			
Mercury	.035	J	mg/kg	.1	-				.04	J	mg/kg	.1	-			
Nickel	1.7	J	mg/kg	8	-				2.2	J	mg/kg	8	-			
Potassium	90.4	UJ	mg/kg	1000	-				85.6	UJ	mg/kg	1000	-			
Selenium	.09	U	mg/kg	1	-				.094	U	mg/kg	1	-			
Silver	.41	U	mg/kg	2	-				.42	U	mg/kg	2	-			
Sodium	99	J	mg/kg	1000	-				120	J	mg/kg	1000	-			
Thallium	.18	UJ	mg/kg	2	-				.19	UJ	mg/kg	2	-			
Vanadium	1.2	UJ	mg/kg	10	-				.45	UJ	mg/kg	10	-			
Zinc	7.6		mg/kg	4	-				2.33	J	mg/kg	4	-			
Cyanide	.17	U	mg/kg	2	-				.18	U	mg/kg	2	-			
TOC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625006			20337007			31625007			20337008		
Site	CECIL			CECIL			CECIL			CECIL		
Locator	BOR3-7-1			BOR3-7-2			BOR3-7-2			BOR3-8-1		
Collect Date:	04-DEC-91			04-DEC-91			04-DEC-91			04-DEC-91		
	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
CLP VOLATILE COMPOUNDS												
Chloromethane	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Bromomethane	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Vinyl Chloride	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Chloroethane	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Methylene Chloride	-			760	U ug/kg	760	-			5	U ug/kg	5
Acetone	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Carbon disulfide	-			760	U ug/kg	760	-			5	U ug/kg	5
1,1-Dichloroethene	-			760	U ug/kg	760	-			5	U ug/kg	5
1,1-Dichloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
1,2-Dichloroethene (total)	-			760	U ug/kg	760	-			5	U ug/kg	5
Chloroform	-			560	J ug/kg	760	-			5	U ug/kg	5
1,2-Dichloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
2-Butanone	-			1500	U ug/kg	1500	-			11	U ug/kg	11
1,1,1-Trichloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
Carbon tetrachloride	-			760	U ug/kg	760	-			5	U ug/kg	5
Vinyl acetate	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Bromodichloromethane	-			760	U ug/kg	760	-			5	U ug/kg	5
1,2-Dichloropropane	-			760	U ug/kg	760	-			5	U ug/kg	5
cis-1,3-Dichloropropene	-			760	U ug/kg	760	-			5	U ug/kg	5
Trichloroethene	-			760	U ug/kg	760	-			5	U ug/kg	5
Dibromochloromethane	-			760	U ug/kg	760	-			5	U ug/kg	5
1,1,2-Trichloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
Benzene	-			760	U ug/kg	760	-			5	U ug/kg	5
trans-1,3-Dichloropropene	-			760	U ug/kg	760	-			5	U ug/kg	5
Bromoform	-			760	U ug/kg	760	-			5	U ug/kg	5
4-Methyl-2-pentanone	-			760	U ug/kg	760	-			5	U ug/kg	5
2-Hexanone	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Tetrachloroethene	-			1500	U ug/kg	1500	-			11	U ug/kg	11
Toluene	-			760	U ug/kg	760	-			5	U ug/kg	5
1,1,2,2-Tetrachloroethane	-			760	U ug/kg	760	-			5	U ug/kg	5
Chlorobenzene	-			760	U ug/kg	760	-			5	U ug/kg	5
Ethyl Benzene	-			760	U ug/kg	760	-			5	U ug/kg	5
Styrene	-			760	U ug/kg	760	-			5	U ug/kg	5
Xylenes (total)	-			760	U ug/kg	760	-			3	J ug/kg	5
CLP SEMIVOLATILES												
Phenol	-			790	U ug/kg	790	-			350	U ug/kg	350
bis(2-Chloroethyl) ether	-			790	U ug/kg	790	-			350	U ug/kg	350
2-Chlorophenol	-			790	U ug/kg	790	-			350	U ug/kg	350
1,3-Dichlorobenzene	-			790	U ug/kg	790	-			350	U ug/kg	350

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625006				20337007				31625007				20337008			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-7-1				BOR3-7-2				BOR3-7-2				BOR3-8-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
1,4-Dichlorobenzene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Benzyl Alcohol	-				-				-				-			
1,2-Dichlorobenzene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2-Methylphenol	-				790	U	ug/kg	790	-				350	U	ug/kg	350
bis(2-Chloroisopropyl) ether	-				-				-				-			
4-Methylphenol	-				790	U	ug/kg	790	-				350	U	ug/kg	350
N-Nitroso-di-n-propylamine	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Hexachloroethane	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Nitrobenzene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Isophorone	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2-Nitrophenol	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2,4-Dimethylphenol	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Benzoic Acid	-				3800	UJ	ug/kg	3800	-				1700	UJ	ug/kg	1700
bis(2-Chloroethoxy) methane	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2,4-Dichlorophenol	-				790	U	ug/kg	790	-				350	U	ug/kg	350
1,2,4-Trichlorobenzene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Naphthalene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
4-Chloroaniline	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Hexachlorobutadiene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
4-Chloro-3-methylphenol	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2-Methylnaphthalene	-				790	UJ	ug/kg	790	-				350	UJ	ug/kg	350
Hexachlorocyclopentadiene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2,4,6-Trichlorophenol	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2,4,5-Trichlorophenol	-				3800	U	ug/kg	3800	-				1700	U	ug/kg	1700
2-Chloronaphthalene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2-Nitroaniline	-				3800	U	ug/kg	3800	-				1700	U	ug/kg	1700
Dimethylphthalate	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Acenaphthylene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2,6-Dinitrotoluene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
3-Nitroaniline	-				3800	U	ug/kg	3800	-				1700	U	ug/kg	1700
Acenaphthene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2,4-Dinitrophenol	-				3800	U	ug/kg	3800	-				1700	U	ug/kg	1700
4-Nitrophenol	-				3800	U	ug/kg	3800	-				1700	U	ug/kg	1700
Dibenzofuran	-				790	U	ug/kg	790	-				350	U	ug/kg	350
2,4-Dinitrotoluene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Diethylphthalate	-				790	U	ug/kg	790	-				350	U	ug/kg	350
4-Chlorophenyl-phenylether	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Fluorene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
4-Nitroaniline	-				3800	U	ug/kg	3800	-				1700	U	ug/kg	1700
4,6-Dinitro-2-methylphenol	-				3800	U	ug/kg	3800	-				1700	U	ug/kg	1700
N-Nitrosodiphenylamine (1)	-				790	U	ug/kg	790	-				350	U	ug/kg	350
4-Bromophenyl-phenylether	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Hexachlorobenzene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Pentachlorophenol	-				3800	U	ug/kg	3800	-				1700	U	ug/kg	1700
Phenanthrene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Anthracene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Di-n-butylphthalate	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Fluoranthene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Pyrene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Butylbenzylphthalate	-				790	U	ug/kg	790	-				350	U	ug/kg	350
3,3'-Dichlorobenzidine	-				-				-				-			
Benzo (a) anthracene	-				790	U	ug/kg	790	-				350	U	ug/kg	350

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625006				20337007				31625007				20337008			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-7-1				BOR3-7-2				BOR3-7-2				BOR3-8-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Chrysene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
bis(2-Ethylhexyl) phthalate	-				330	J	ug/kg	790	-				39	J	ug/kg	350
Di-n-octylphthalate	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Benzo (b) fluoranthene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Benzo (k) fluoranthene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Benzo (a) pyrene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Indeno (1,2,3-cd) pyrene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Dibenz (a,h) anthracene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
Benzo (g,h,i) perylene	-				790	U	ug/kg	790	-				350	U	ug/kg	350
CLP PESTICIDES/PCBS																
alpha-BHC	-				19	U	ug/kg	19	-				8.6	U	ug/kg	8.6
beta-BHC	-				19	U	ug/kg	19	-				8.6	U	ug/kg	8.6
delta-BHC	-				19	U	ug/kg	19	-				8.6	U	ug/kg	8.6
gamma-BHC (Lindane)	-				19	U	ug/kg	19	-				8.6	U	ug/kg	8.6
Heptachlor	-				19	U	ug/kg	19	-				8.6	U	ug/kg	8.6
Aldrin	-				19	U	ug/kg	19	-				8.6	U	ug/kg	8.6
Heptachlor epoxide	-				19	U	ug/kg	19	-				8.6	U	ug/kg	8.6
Endosulfan I	-				19	U	ug/kg	19	-				8.6	U	ug/kg	8.6
Dieldrin	-				38	U	ug/kg	38	-				17	U	ug/kg	17
4,4'-DDE	-				-				-				-			
Endrin	-				38	U	ug/kg	38	-				17	U	ug/kg	17
Endosulfan II	-				38	U	ug/kg	38	-				17	U	ug/kg	17
4,4'-DDD	-				-				-				-			
Endosulfan sulfate	-				38	U	ug/kg	38	-				17	U	ug/kg	17
4,4'-DDT	-				-				-				-			
Methoxychlor	-				190	U	ug/kg	190	-				86	U	ug/kg	86
Endrin ketone	-				38	U	ug/kg	38	-				17	U	ug/kg	17
alpha Chlordane	-				190	U	ug/kg	190	-				86	U	ug/kg	86
gamma-Chlordane	-				190	U	ug/kg	190	-				86	U	ug/kg	86
Toxaphene	-				380	U	ug/kg	380	-				170	U	ug/kg	170
Aroclor-1016	-				190	U	ug/kg	190	-				86	U	ug/kg	86
Aroclor-1221	-				190	U	ug/kg	190	-				86	U	ug/kg	86
Aroclor-1232	-				190	U	ug/kg	190	-				86	U	ug/kg	86
Aroclor-1242	-				190	U	ug/kg	190	-				86	U	ug/kg	86
Aroclor-1248	-				190	U	ug/kg	190	-				86	U	ug/kg	86
Aroclor-1254	-				380	U	ug/kg	380	-				170	U	ug/kg	170
Aroclor-1260	-				380	U	ug/kg	380	-				170	U	ug/kg	170
CLP METALS AND CYANIDE																
Aluminum	1180		mg/kg	40	-				469		mg/kg	40	-			
Antimony	2.4	UJ	mg/kg	12	-				2.7	UJ	mg/kg	12	-			
Arsenic	.086	U	mg/kg	2	-				.096	U	mg/kg	2	-			
Barium	2	J	mg/kg	40	-				.47	J	mg/kg	40	-			
Beryllium	.043	U	mg/kg	1	-				.048	U	mg/kg	1	-			
Cadmium	.28	U	mg/kg	1	-				.31	U	mg/kg	1	-			
Calcium	650	J	mg/kg	1000	-				139	J	mg/kg	1000	-			
Chromium	1.2	J	mg/kg	2	-				1.4	J	mg/kg	2	-			
Cobalt	.62	U	mg/kg	10	-				.69	U	mg/kg	10	-			
Copper	.83	J	mg/kg	5	-				.75	J	mg/kg	5	-			
Iron	243		mg/kg	20	-				106		mg/kg	20	-			
Lead	1.51	J	mg/kg	1	-				1	J	mg/kg	1	-			

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625006				20337007				31625007				20337008			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	BOR3-7-1				BOR3-7-2				BOR3-7-2				BOR3-8-1			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Magnesium	31.1	UJ	mg/kg	1000	-				17.8	UJ	mg/kg	1000	-			
Manganese	1.6	J	mg/kg	3	-				1.1	J	mg/kg	3	-			
Mercury	.04	J	mg/kg	.1	-				.033	U	mg/kg	.1	-			
Nickel	1.3	U	mg/kg	8	-				1.4	U	mg/kg	8	-			
Potassium	76.8	UJ	mg/kg	1000	-				107	UJ	mg/kg	1000	-			
Selenium	.086	U	mg/kg	1	-				.096	U	mg/kg	1	-			
Silver	.39	U	mg/kg	2	-				.43	U	mg/kg	2	-			
Sodium	87.55	J	mg/kg	1000	-				87	J	mg/kg	1000	-			
Thallium	.17	UJ	mg/kg	2	-				.19	UJ	mg/kg	2	-			
Vanadium	1.2	UJ	mg/kg	10	-				.31	U	mg/kg	10	-			
Zinc	1.02	UJ	mg/kg	4	-				.87	UJ	mg/kg	4	-			
Cyanide	.61	U	mg/kg	2	-				.18	U	mg/kg	2	-			
TOC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625008			20337009			31625009		
Site	CECIL			CECIL			CECIL		
Locator	BOR3-8-1			BOR3-8-2			BOR3-8-2		
Collect Date:	04-DEC-91			04-DEC-91			04-DEC-91		
	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
CLP VOLATILE COMPOUNDS									
Chloromethane	-			12	U ug/kg	12	-		
Bromomethane	-			12	U ug/kg	12	-		
Vinyl Chloride	-			12	U ug/kg	12	-		
Chloroethane	-			12	U ug/kg	12	-		
Methylene Chloride	-			13	U ug/kg	6	-		
Acetone	-			12	U ug/kg	12	-		
Carbon disulfide	-			6	U ug/kg	6	-		
1,1-Dichloroethene	-			6	U ug/kg	6	-		
1,1-Dichloroethane	-			6	U ug/kg	6	-		
1,2-Dichloroethene (total)	-			6	U ug/kg	6	-		
Chloroform	-			6	U ug/kg	6	-		
1,2-Dichloroethane	-			6	U ug/kg	6	-		
2-Butanone	-			12	U ug/kg	12	-		
1,1,1-Trichloroethane	-			6	U ug/kg	6	-		
Carbon tetrachloride	-			6	U ug/kg	6	-		
Vinyl acetate	-			12	U ug/kg	12	-		
Bromodichloromethane	-			6	U ug/kg	6	-		
1,2-Dichloropropane	-			6	U ug/kg	6	-		
cis-1,3-Dichloropropene	-			6	U ug/kg	6	-		
Trichloroethene	-			6	U ug/kg	6	-		
Dibromochloromethane	-			6	U ug/kg	6	-		
1,1,2-Trichloroethane	-			6	U ug/kg	6	-		
Benzene	-			6	U ug/kg	6	-		
trans-1,3-Dichloropropene	-			6	U ug/kg	6	-		
Bromoform	-			6	U ug/kg	6	-		
4-Methyl-2-pentanone	-			12	U ug/kg	12	-		
2-Hexanone	-			12	U ug/kg	12	-		
Tetrachloroethene	-			6	U ug/kg	6	-		
Toluene	-			4	J ug/kg	6	-		
1,1,2,2-Tetrachloroethane	-			6	U ug/kg	6	-		
Chlorobenzene	-			6	U ug/kg	6	-		
Ethyl Benzene	-			6	U ug/kg	6	-		
Styrene	-			6	U ug/kg	6	-		
Xylenes (total)	-			6	U ug/kg	6	-		
CLP SEMIVOLATILES									
Phenol	-			800	U ug/kg	800	-		
bis(2-Chloroethyl) ether	-			800	U ug/kg	800	-		
2-Chlorophenol	-			800	U ug/kg	800	-		
1,3-Dichlorobenzene	-			800	U ug/kg	800	-		

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625008				20337009				31625009			
Site	CECIL				CECIL				CECIL			
Locator	BOR3-8-1				BOR3-8-2				BOR3-8-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
1,4-Dichlorobenzene	-				800	U	ug/kg	800	-			
Benzyl Alcohol	-				-				-			
1,2-Dichlorobenzene	-				800	U	ug/kg	800	-			
2-Methylphenol	-				800	U	ug/kg	800	-			
bis(2-Chloroisopropyl) ether	-				-				-			
4-Methylphenol	-				800	U	ug/kg	800	-			
N-Nitroso-di-n-propylamine	-				800	U	ug/kg	800	-			
Hexachloroethane	-				800	U	ug/kg	800	-			
Nitrobenzene	-				800	U	ug/kg	800	-			
Isophorone	-				800	U	ug/kg	800	-			
2-Nitrophenol	-				800	U	ug/kg	800	-			
2,4-Dimethylphenol	-				800	U	ug/kg	800	-			
Benzoic Acid	-				3900	UJ	ug/kg	3900	-			
bis(2-Chloroethoxy) methane	-				800	U	ug/kg	800	-			
2,4-Dichlorophenol	-				800	U	ug/kg	800	-			
1,2,4-Trichlorobenzene	-				800	U	ug/kg	800	-			
Naphthalene	-				800	U	ug/kg	800	-			
4-Chloroaniline	-				800	U	ug/kg	800	-			
Hexachlorobutadiene	-				800	U	ug/kg	800	-			
4-Chloro-3-methylphenol	-				800	U	ug/kg	800	-			
2-Methylnaphthalene	-				800	UJ	ug/kg	800	-			
Hexachlorocyclopentadiene	-				800	U	ug/kg	800	-			
2,4,6-Trichlorophenol	-				800	U	ug/kg	800	-			
2,4,5-Trichlorophenol	-				3900	U	ug/kg	3900	-			
2-Chloronaphthalene	-				800	U	ug/kg	800	-			
2-Nitroaniline	-				3900	U	ug/kg	3900	-			
Dimethylphthalate	-				800	U	ug/kg	800	-			
Acenaphthylene	-				800	U	ug/kg	800	-			
2,6-Dinitrotoluene	-				800	U	ug/kg	800	-			
3-Nitroaniline	-				3900	U	ug/kg	3900	-			
Acenaphthene	-				800	U	ug/kg	800	-			
2,4-Dinitrophenol	-				3900	U	ug/kg	3900	-			
4-Nitrophenol	-				3900	U	ug/kg	3900	-			
Dibenzofuran	-				800	U	ug/kg	800	-			
2,4-Dinitrotoluene	-				800	U	ug/kg	800	-			
Diethylphthalate	-				800	U	ug/kg	800	-			
4-Chlorophenyl-phenylether	-				800	U	ug/kg	800	-			
Fluorene	-				800	U	ug/kg	800	-			
4-Nitroaniline	-				3900	U	ug/kg	3900	-			
4,6-Dinitro-2-methylphenol	-				3900	U	ug/kg	3900	-			
N-Nitrosodiphenylamine (1)	-				800	U	ug/kg	800	-			
4-Bromophenyl-phenylether	-				800	U	ug/kg	800	-			
Hexachlorobenzene	-				800	U	ug/kg	800	-			
Pentachlorophenol	-				3900	U	ug/kg	3900	-			
Phenanthrene	-				800	U	ug/kg	800	-			
Anthracene	-				800	U	ug/kg	800	-			
Di-n-butylphthalate	-				800	U	ug/kg	800	-			
Fluoranthene	-				800	U	ug/kg	800	-			
Pyrene	-				800	U	ug/kg	800	-			
Butylbenzylphthalate	-				800	U	ug/kg	800	-			
3,3'-Dichlorobenzidine	-				-				-			
Benzo (a) anthracene	-				800	U	ug/kg	800	-			

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625008				20337009				31625009			
Site	CECIL				CECIL				CECIL			
Locator	BOR3-8-1				BOR3-8-2				BOR3-8-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Chrysene	-				800	U	ug/kg	800	-			
bis(2-Ethylhexyl) phthalate	-				3400		ug/kg	3400	-			
Di-n-octylphthalate	-				800	U	ug/kg	800	-			
Benzo (b) fluoranthene	-				800	U	ug/kg	800	-			
Benzo (k) fluoranthene	-				800	U	ug/kg	800	-			
Benzo (a) pyrene	-				800	U	ug/kg	800	-			
Indeno (1,2,3-cd) pyrene	-				800	U	ug/kg	800	-			
Dibenz (a,h) anthracene	-				800	U	ug/kg	800	-			
Benzo (g,h,i) perylene	-				800	U	ug/kg	800	-			
CLP PESTICIDES/PCBS												
alpha-BHC	-				9.6	U	ug/kg	9.6	-			
beta-BHC	-				9.6	U	ug/kg	9.6	-			
delta-BHC	-				9.6	U	ug/kg	9.6	-			
gamma-BHC (Lindane)	-				9.6	U	ug/kg	9.6	-			
Heptachlor	-				9.6	U	ug/kg	9.6	-			
Aldrin	-				9.6	U	ug/kg	9.6	-			
Heptachlor epoxide	-				9.6	U	ug/kg	9.6	-			
Endosulfan I	-				9.6	U	ug/kg	9.6	-			
Dieldrin	-				19	U	ug/kg	19	-			
4,4'-DDE	-				-				-			
Endrin	-				19	U	ug/kg	19	-			
Endosulfan II	-				19	U	ug/kg	19	-			
4,4'-DDD	-				-				-			
Endosulfan sulfate	-				19	U	ug/kg	19	-			
4,4'-DDT	-				-				-			
Methoxychlor	-				96	U	ug/kg	96	-			
Endrin ketone	-				19	U	ug/kg	19	-			
alpha Chlordane	-				96	U	ug/kg	96	-			
gamma-Chlordane	-				96	U	ug/kg	96	-			
Toxaphene	-				190	U	ug/kg	190	-			
Aroclor-1016	-				96	U	ug/kg	96	-			
Aroclor-1221	-				96	U	ug/kg	96	-			
Aroclor-1232	-				96	U	ug/kg	96	-			
Aroclor-1242	-				96	U	ug/kg	96	-			
Aroclor-1248	-				96	U	ug/kg	96	-			
Aroclor-1254	-				190	U	ug/kg	190	-			
Aroclor-1260	-				190	U	ug/kg	190	-			
CLP METALS AND CYANIDE												
Aluminum	1170		mg/kg	40	-				1610		mg/kg	40
Antimony	2.5	UJ	mg/kg	12	-				2.7	UJ	mg/kg	12
Arsenic	.15	J	mg/kg	2	-				.096	U	mg/kg	2
Barium	2.35	J	mg/kg	40	-				3.2	J	mg/kg	40
Beryllium	.11	J	mg/kg	1	-				.048	U	mg/kg	1
Cadmium	.28	U	mg/kg	1	-				.31	U	mg/kg	1
Calcium	482	J	mg/kg	1000	-				449	J	mg/kg	1000
Chromium	28.1		mg/kg	2	-				1.2	J	mg/kg	2
Cobalt	.63	U	mg/kg	10	-				.69	U	mg/kg	10
Copper	1.4	J	mg/kg	5	-				.99	J	mg/kg	5
Iron	516		mg/kg	20	-				415		mg/kg	20
Lead	2.1	J	mg/kg	1	-				2.9	J	mg/kg	1

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- SUBSURFACE SOIL

Lab Sample Number:	31625008				20337009				31625009			
Site	CECIL				CECIL				CECIL			
Locator	BOR3-8-1				BOR3-8-2				BOR3-8-2			
Collect Date:	04-DEC-91				04-DEC-91				04-DEC-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Magnesium	88	J	mg/kg	1000	-				70.7	J	mg/kg	1000
Manganese	32.7		mg/kg	3	-				4.9		mg/kg	3
Mercury	.036	J	mg/kg	.1	-				.08		mg/kg	.1
Nickel	19.1		mg/kg	8	-				2.43	J	mg/kg	8
Potassium	85.4	UJ	mg/kg	1000	-				69.32	UJ	mg/kg	1000
Selenium	.087	U	mg/kg	1	-				.096	U	mg/kg	1
Silver	.39	U	mg/kg	2	-				.43	U	mg/kg	2
Sodium	119	J	mg/kg	1000	-				115	J	mg/kg	1000
Thallium	.17	UJ	mg/kg	2	-				.19	UJ	mg/kg	2
Vanadium	1.3	UJ	mg/kg	10	-				1.4	UJ	mg/kg	10
Zinc	2.8	J	mg/kg	4	-				3.51	J	mg/kg	4
Cyanide	.61	U	mg/kg	2	-				.18	U	mg/kg	2
TOC												
Total organic carbon	-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198009				20198006				20198004				20198005			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	CEF-3-3				CEF-3-4				CEF-3-5				CEF-3-6			
Collect Date:	19-NOV-91				19-NOV-91				19-NOV-91				19-NOV-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP VOLATILE COMPOUNDS																
Chloromethane	60	U	ug/l	60	10	U	ug/l	10	10	U	ug/l	10	50	U	ug/l	50
Bromomethane	60	U	ug/l	60	10	U	ug/l	10	10	U	ug/l	10	50	U	ug/l	50
Vinyl Chloride	60	U	ug/l	60	10	U	ug/l	10	10	U	ug/l	10	50	U	ug/l	50
Chloroethane	60	U	ug/l	60	22		ug/l	10	10	U	ug/l	10	10	J	ug/l	50
Methylene Chloride	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Acetone	96	U	ug/l	60	23	U	ug/l	10	15	U	ug/l	10	150	U	ug/l	50
Carbon disulfide	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
1,1-Dichloroethene	7	J	ug/l	30	11		ug/l	5	5	U	ug/l	5	58		ug/l	25
1,1-Dichloroethane	8	J	ug/l	30	69		ug/l	5	5	U	ug/l	5	180		ug/l	25
1,2-Dichloroethene (total)	390		ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Chloroform	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
1,2-Dichloroethane	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
2-Butanone	60	U	ug/l	60	22	J	ug/l	10	10	U	ug/l	10	50	U	ug/l	50
1,1,1-Trichloroethane	22	J	ug/l	30	29		ug/l	5	5	U	ug/l	5	700		ug/l	25
Carbon tetrachloride	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Vinyl acetate	60	U	ug/l	60	10	U	ug/l	10	10	U	ug/l	10	50	U	ug/l	50
Bromodichloromethane	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
1,2-Dichloropropane	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
cis-1,3-Dichloropropene	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Trichloroethene	910		ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Dibromochloromethane	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
1,1,2-Trichloroethane	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Benzene	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	8	J	ug/l	25
trans-1,3-Dichloropropene	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Bromoform	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
4-Methyl-2-pentanone	60	U	ug/l	60	10	U	ug/l	10	10	U	ug/l	10	50	U	ug/l	50
2-Hexanone	60	U	ug/l	60	10	U	ug/l	10	10	U	ug/l	10	50	U	ug/l	50
Tetrachloroethene	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Toluene	8	J	ug/l	30	3	J	ug/l	5	5	U	ug/l	5	32		ug/l	25
1,1,2,2-Tetrachloroethane	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Chlorobenzene	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Ethyl Benzene	6	J	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	13	J	ug/l	25
Styrene	30	U	ug/l	30	5	U	ug/l	5	5	U	ug/l	5	25	U	ug/l	25
Xylenes (total)	39		ug/l	30	26		ug/l	5	2	J	ug/l	5	60		ug/l	25
CLP SEMIVOLATILES																
Phenol	11		ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
bis(2-Chloroethyl) ether	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2-Chlorophenol	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
1,3-Dichlorobenzene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
1,4-Dichlorobenzene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Benzyl Alcohol	-				-				-				-			
1,2-Dichlorobenzene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2-Methylphenol	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
bis(2-Chloroisopropyl) ether	-				-				-				-			
4-Methylphenol	100		ug/l	10	10	U	ug/l	10	10	U	ug/l	10	23		ug/l	10
N-Nitroso-di-n-propylamine	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Hexachloroethane	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Nitrobenzene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Isophorone	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198009				20198006				20198004				20198005			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	CEF-3-3				CEF-3-4				CEF-3-5				CEF-3-6			
Collect Date:	19-NOV-91				19-NOV-91				19-NOV-91				19-NOV-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
2-Nitrophenol	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2,4-Dimethylphenol	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Benzoic Acid	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50
bis(2-Chloroethoxy) methane	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2,4-Dichlorophenol	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
1,2,4-Trichlorobenzene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Naphthalene	52		ug/l	10	66		ug/l	10	6	J	ug/l	10	130		ug/l	10
4-Chloroaniline	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Hexachlorobutadiene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
4-Chloro-3-methylphenol	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2-Methylnaphthalene	40	J	ug/l	10	38	J	ug/l	10	4	J	ug/l	10	70	J	ug/l	10
Hexachlorocyclopentadiene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2,4,6-Trichlorophenol	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2,4,5-Trichlorophenol	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50
2-Chloronaphthalene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2-Nitroaniline	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50
Dimethylphthalate	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Acenaphthylene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2,6-Dinitrotoluene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
3-Nitroaniline	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50
Acenaphthene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
2,4-Dinitrophenol	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50
4-Nitrophenol	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50
Dibenzofuran	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	2	J	ug/l	10
2,4-Dinitrotoluene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Diethylphthalate	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
4-Chlorophenyl-phenylether	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Fluorene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
4-Nitroaniline	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50
4,6-Dinitro-2-methylphenol	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50
N-Nitrosodiphenylamine (1)	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
4-Bromophenyl-phenylether	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Hexachlorobenzene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Pentachlorophenol	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50	50	U	ug/l	50
Phenanthrene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Anthracene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Di-n-butylphthalate	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Fluoranthene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Pyrene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Butylbenzylphthalate	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
3,3'-Dichlorobenzidine	-			*	-				-				-			
Benzo (a) anthracene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Chrysene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
bis(2-Ethylhexyl) phthalate	7	J	ug/l	10	2	J	ug/l	10	15	J	ug/l	10	6	J	ug/l	10
Di-n-octylphthalate	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Benzo (b) fluoranthene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Benzo (k) fluoranthene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Benzo (a) pyrene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Indeno (1,2,3-cd) pyrene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Dibenz (a,h) anthracene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10
Benzo (g,h,i) perylene	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10	10	U	ug/l	10

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198009				20198006				20198004				20198005			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	CEF-3-3				CEF-3-4				CEF-3-5				CEF-3-6			
Collect Date:	19-NOV-91				19-NOV-91				19-NOV-91				19-NOV-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP PESTICIDES/PCBS																
alpha-BHC	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
beta-BHC	.11	J	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
delta-BHC	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
gamma-BHC (Lindane)	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
Heptachlor	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
Aldrin	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
Heptachlor epoxide	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
Endosulfan I	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
Dieldrin	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1
4,4'-DDE	-				-				-				-			
Endrin	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1
Endosulfan II	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1
4,4'-DDD	-				-				-				-			
Endosulfan sulfate	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1
4,4'-DDT	-				-				-				-			
Methoxychlor	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Endrin ketone	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1
alpha Chlordane	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
gamma-Chlordane	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Toxaphene	1	U	ug/l	1	1	U	ug/l	1	1	U	ug/l	1	1	U	ug/l	1
Aroclor-1016	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1221	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1232	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1242	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1248	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1254	1	U	ug/l	1	1	U	ug/l	1	1	U	ug/l	1	1	U	ug/l	1
Aroclor-1260	1	U	ug/l	1	1	U	ug/l	1	1	U	ug/l	1	1	U	ug/l	1
CLP METALS AND CYANIDE																
Aluminum	11000		ug/l	200	111000		ug/l	200	11100		ug/l	200	24900		ug/l	200
Antimony	40	U	ug/l	60	40	U	ug/l	60	40	U	ug/l	60	40	U	ug/l	60
Arsenic	5.5	J	ug/l	10	5.5	J	ug/l	10	1.4	J	ug/l	10	7.2	J	ug/l	10
Barium	36.8	J	ug/l	200	122	J	ug/l	200	19.3	J	ug/l	200	29.4	J	ug/l	200
Beryllium	.1	U	ug/l	5	.44	J	ug/l	5	.1	U	ug/l	5	.1	U	ug/l	5
Cadmium	1.6	U	ug/l	5	1.6	U	ug/l	5	1.6	U	ug/l	5	1.6	U	ug/l	5
Calcium	30800		ug/l	5000	69400		ug/l	5000	14200		ug/l	5000	55300		ug/l	5000
Chromium	8.3	J	ug/l	10	81		ug/l	10	14.1		ug/l	10	27.1		ug/l	10
Cobalt	5.1	U	ug/l	50	5.7	UJ	ug/l	50	8.2	UJ	ug/l	50	5.3	UJ	ug/l	50
Copper	1.4	UJ	ug/l	25	17.7	J	ug/l	25	1.4	UJ	ug/l	25	1.6	J	ug/l	25
Iron	11500		ug/l	100	21200		ug/l	100	3340		ug/l	100	27300		ug/l	100
Lead	1.8	J	ug/l	5	12.3		ug/l	5	3.3		ug/l	5	3.2		ug/l	5
Magnesium	7760		ug/l	5000	3110	J	ug/l	5000	7600		ug/l	5000	2450	J	ug/l	5000
Manganese	545		ug/l	15	143		ug/l	15	11.1	J	ug/l	15	54.9		ug/l	15
Mercury	.16	U	ug/l	.2	.16	U	ug/l	.2	.16	U	ug/l	.2	.16	U	ug/l	.2
Nickel	7	U	ug/l	40	15.5	J	ug/l	40	7	U	ug/l	40	9.9	J	ug/l	40
Potassium	2530	J	ug/l	5000	6300		ug/l	5000	1430	J	ug/l	5000	1220	J	ug/l	5000
Selenium	1.1	U	ug/l	5	1.1	UJ	ug/l	5	1.1	U	ug/l	5	1.1	U	ug/l	5
Silver	2.3	U	ug/l	10	2.3	U	ug/l	10	2.3	U	ug/l	10	2.3	U	ug/l	10
Sodium	5500	J	ug/l	5000	6520	J	ug/l	5000	6010	J	ug/l	5000	3630	UJ	ug/l	5000
Thallium	1.4	U	ug/l	10	1.4	U	ug/l	10	1.4	U	ug/l	10	1.4	U	ug/l	10
Vanadium	8.5	J	ug/l	50	56.5		ug/l	50	9.6	J	ug/l	50	16.6	J	ug/l	50

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198009				20198006				20198004				20198005			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	CEF-3-3				CEF-3-4				CEF-3-5				CEF-3-6			
Collect Date:	19-NOV-91				19-NOV-91				19-NOV-91				19-NOV-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Zinc	4.2	J	ug/l	20	36.4		ug/l	20	4.6	J	ug/l	20	19.7	J	ug/l	20
Cyanide	1.8	U	ug/l	10	2.4	J	ug/l	10	1.8	U	ug/l	10	1.8	U	ug/l	10
TOC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198008			20253012			20253010			20253002		
Site	CECIL			CECIL			CECIL			CECIL		
Locator	CEF-3-7			CEF-3-7D			CEF-3-7DD			CEF-3-8		
Collect Date:	19-NOV-91			22-NOV-91			22-NOV-91			21-NOV-91		
	VALUE QUAL	UNITS	DL	VALUE QUAL	UNITS	DL	VALUE QUAL	UNITS	DL	VALUE QUAL	UNITS	DL
CLP VOLATILE COMPOUNDS												
Chloromethane	20 U	ug/l	20	10 U	ug/l	10	10 U	ug/l	10	10 U	ug/l	10
Bromomethane	20 U	ug/l	20	10 U	ug/l	10	10 U	ug/l	10	10 U	ug/l	10
Vinyl Chloride	20 U	ug/l	20	10 U	ug/l	10	10 U	ug/l	10	10 U	ug/l	10
Chloroethane	7 J	ug/l	20	10 U	ug/l	10	10 U	ug/l	10	10 U	ug/l	10
Methylene Chloride	11 U	ug/l	10	10 U	ug/l	5	8 U	ug/l	5	5 U	ug/l	5
Acetone	180 U	ug/l	20	10 U	ug/l	10	14 U	ug/l	10	13 U	ug/l	10
Carbon disulfide	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
1,1-Dichloroethene	77	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
1,1-Dichloroethane	120	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
1,2-Dichloroethene (total)	3 J	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Chloroform	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
1,2-Dichloroethane	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
2-Butanone	23 J	ug/l	20	10 U	ug/l	10	10 U	ug/l	10	10 U	ug/l	10
1,1,1-Trichloroethane	370	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Carbon tetrachloride	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Vinyl acetate	20 U	ug/l	20	10 U	ug/l	10	10 U	ug/l	10	10 U	ug/l	10
Bromodichloromethane	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
1,2-Dichloropropane	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
cis-1,3-Dichloropropene	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Trichloroethene	93	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Dibromochloromethane	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
1,1,2-Trichloroethane	2 J	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Benzene	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
trans-1,3-Dichloropropene	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Bromoform	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
4-Methyl-2-pentanone	2 J	ug/l	20	10 U	ug/l	10	10 U	ug/l	10	10 U	ug/l	10
2-Hexanone	20 U	ug/l	20	10 U	ug/l	10	10 U	ug/l	10	10 U	ug/l	10
Tetrachloroethene	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Toluene	73	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
1,1,2,2-Tetrachloroethane	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Chlorobenzene	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Ethyl Benzene	8 J	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Styrene	10 U	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
Xylenes (total)	45	ug/l	10	5 U	ug/l	5	5 U	ug/l	5	5 U	ug/l	5
CLP SEMIVOLATILES												
Phenol	10 U	ug/l	10	20 U	ug/l	20	10 U	ug/l	10	10 U	ug/l	10
bis(2-Chloroethyl) ether	10 U	ug/l	10	20 U	ug/l	20	10 U	ug/l	10	10 U	ug/l	10
2-Chlorophenol	10 U	ug/l	10	20 U	ug/l	20	10 U	ug/l	10	10 U	ug/l	10
1,3-Dichlorobenzene	10 U	ug/l	10	20 U	ug/l	20	10 U	ug/l	10	10 U	ug/l	10

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198008				20253012				20253010				20253002			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	CEF-3-7				CEF-3-7D				CEF-3-7DD				CEF-3-8			
Collect Date:	19-NOV-91				22-NOV-91				22-NOV-91				21-NOV-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
1,4-Dichlorobenzene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Benzyl Alcohol	-				-				-				-			
1,2-Dichlorobenzene	41		ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2-Methylphenol	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
bis(2-Chloroisopropyl) ether	-				-				-				-			
4-Methylphenol	92		ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
N-Nitroso-di-n-propylamine	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Hexachloroethane	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Nitrobenzene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Isophorone	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2-Nitrophenol	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2,4-Dimethylphenol	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Benzoic Acid	50	U	ug/l	50	100	U	ug/l	100	50	U	ug/l	50	50	U	ug/l	50
bis(2-Chloroethoxy) methane	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2,4-Dichlorophenol	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
1,2,4-Trichlorobenzene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Naphthalene	75		ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
4-Chloroaniline	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Hexachlorobutadiene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
4-Chloro-3-methylphenol	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2-Methylnaphthalene	45	J	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Hexachlorocyclopentadiene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2,4,6-Trichlorophenol	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2,4,5-Trichlorophenol	50	U	ug/l	50	100	U	ug/l	100	50	U	ug/l	50	50	U	ug/l	50
2-Chloronaphthalene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2-Nitroaniline	50	U	ug/l	50	100	U	ug/l	100	50	U	ug/l	50	50	U	ug/l	50
Dimethylphthalate	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Acenaphthylene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2,6-Dinitrotoluene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
3-Nitroaniline	50	U	ug/l	50	100	U	ug/l	100	50	U	ug/l	50	50	U	ug/l	50
Acenaphthene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2,4-Dinitrophenol	50	U	ug/l	50	100	U	ug/l	100	50	U	ug/l	50	50	U	ug/l	50
4-Nitrophenol	50	U	ug/l	50	100	U	ug/l	100	50	U	ug/l	50	50	U	ug/l	50
Dibenzofuran	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
2,4-Dinitrotoluene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Diethylphthalate	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
4-Chlorophenyl-phenylether	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Fluorene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
4-Nitroaniline	50	U	ug/l	50	100	U	ug/l	100	50	U	ug/l	50	50	U	ug/l	50
4,6-Dinitro-2-methylphenol	50	U	ug/l	50	100	U	ug/l	100	50	U	ug/l	50	50	U	ug/l	50
N-Nitrosodiphenylamine (1)	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
4-Bromophenyl-phenylether	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Hexachlorobenzene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Pentachlorophenol	50	U	ug/l	50	100	U	ug/l	100	50	U	ug/l	50	50	U	ug/l	50
Phenanthrene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Anthracene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Di-n-butylphthalate	10	U	ug/l	10	20	U	ug/l	20	2	J	ug/l	10	10	U	ug/l	10
Fluoranthene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Pyrene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Butylbenzylphthalate	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
3,3'-Dichlorobenzidine	-				-				-				-			
Benzo (a) anthracene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198008				20253012				20253010				20253002			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	CEF-3-7				CEF-3-7D				CEF-3-7DD				CEF-3-8			
Collect Date:	19-NOV-91				22-NOV-91				22-NOV-91				21-NOV-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Chrysene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
bis(2-Ethylhexyl) phthalate	3	J	ug/l	10	310		ug/l	20	3	J	ug/l	10	10	U	ug/l	10
Di-n-octylphthalate	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Benzo (b) fluoranthene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Benzo (k) fluoranthene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Benzo (a) pyrene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Indeno (1,2,3-cd) pyrene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Dibenz (a,h) anthracene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
Benzo (g,h,i) perylene	10	U	ug/l	10	20	U	ug/l	20	10	U	ug/l	10	10	U	ug/l	10
CLP PESTICIDES/PCBS																
alpha-BHC	.05	U	ug/l	.05	.05	UJ	ug/l	.05	.05	UJ	ug/l	.05	.05	UJ	ug/l	.05
beta-BHC	.16	J	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
delta-BHC	.05	U	ug/l	.05	.05	UJ	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
gamma-BHC (Lindane)	.05	U	ug/l	.05	.05	UJ	ug/l	.05	.05	UJ	ug/l	.05	.05	UJ	ug/l	.05
Heptachlor	.05	U	ug/l	.05	.05	UJ	ug/l	.05	.05	UJ	ug/l	.05	.03	U	ug/l	.05
Aldrin	.05	U	ug/l	.05	.05	UJ	ug/l	.05	.05	UJ	ug/l	.05	.05	UJ	ug/l	.05
Heptachlor epoxide	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
Endosulfan I	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05	.05	U	ug/l	.05
Dieldrin	.1	U	ug/l	.1	.1	UJ	ug/l	.1	.1	UJ	ug/l	.1	.02	UJ	ug/l	.1
4,4'-DDE	-				-				-				-			
Endrin	.1	U	ug/l	.1	.1	UJ	ug/l	.1	.1	UJ	ug/l	.1	.06	UJ	ug/l	.1
Endosulfan II	.1	U	ug/l	.1	.1	UJ	ug/l	.1	.1	UJ	ug/l	.1	.04	UJ	ug/l	.1
4,4'-DDD	-				-				-				-			
Endosulfan sulfate	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1
4,4'-DDT	-				-				-				-			
Methoxychlor	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Endrin ketone	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1	.1	U	ug/l	.1
alpha Chlordane	.5	U	ug/l	.5	.5	UJ	ug/l	.5	.5	UJ	ug/l	.5	.5	UJ	ug/l	.5
gamma-Chlordane	.5	U	ug/l	.5	.5	UJ	ug/l	.5	.5	UJ	ug/l	.5	.5	UJ	ug/l	.5
Toxaphene	1	U	ug/l	1	1	U	ug/l	1	1	U	ug/l	1	1	U	ug/l	1
Aroclor-1016	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1221	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1232	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1242	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1248	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5	.5	U	ug/l	.5
Aroclor-1254	1	U	ug/l	1	1	UJ	ug/l	1	1	UJ	ug/l	1	1	UJ	ug/l	1
Aroclor-1260	1	U	ug/l	1	1	UJ	ug/l	1	1	UJ	ug/l	1	1	UJ	ug/l	1
CLP METALS AND CYANIDE																
Aluminum	33700		ug/l	200	18200		ug/l	200	603	UJ	ug/l	200	70400		ug/l	200
Antimony	40	U	ug/l	60	40	UJ	ug/l	60	40	UJ	ug/l	60	40	UJ	ug/l	60
Arsenic	3.4	J	ug/l	10	6.7	J	ug/l	10	.89	J	ug/l	10	1.6	J	ug/l	10
Barium	32.9	J	ug/l	200	35.5	J	ug/l	200	64.6	J	ug/l	200	69.3	J	ug/l	200
Beryllium	.11	J	ug/l	5	.83	J	ug/l	5	.82	J	ug/l	5	.76	J	ug/l	5
Cadmium	1.6	U	ug/l	5	1.6	U	ug/l	5	1.6	U	ug/l	5	1.6	U	ug/l	5
Calcium	8280		ug/l	5000	7720		ug/l	5000	67500		ug/l	5000	3110	J	ug/l	5000
Chromium	20.6		ug/l	10	18.7		ug/l	10	1.9	U	ug/l	10	49.1		ug/l	10
Cobalt	5.9	UJ	ug/l	50	17	UJ	ug/l	50	7.8	UJ	ug/l	50	6.1	UJ	ug/l	50
Copper	1.4	UJ	ug/l	25	3.2	J	ug/l	25	1.6	J	ug/l	25	11.2	J	ug/l	25
Iron	11700		ug/l	100	5310		ug/l	100	88.6	UJ	ug/l	100	7210		ug/l	100
Lead	3.5		ug/l	5	7.2		ug/l	5	.69	U	ug/l	5	12.3		ug/l	5

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198008				20253012				20253010				20253002			
Site	CECIL				CECIL				CECIL				CECIL			
Locator	CEF-3-7				CEF-3-7D				CEF-3-7DD				CEF-3-8			
Collect Date:	19-NOV-91				22-NOV-91				22-NOV-91				21-NOV-91			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Magnesium	2740	J	ug/l	5000	1260	J	ug/l	5000	3870	J	ug/l	5000	2040	J	ug/l	5000
Manganese	264		ug/l	15	25.1	J	ug/l	15	7	J	ug/l	15	64.5	J	ug/l	15
Mercury	.16	U	ug/l	.2	.16	U	ug/l	.2	.16	U	ug/l	.2	.23		ug/l	.2
Nickel	7	U	ug/l	40	23.2	J	ug/l	40	7	U	ug/l	40	19	J	ug/l	40
Potassium	1510	J	ug/l	5000	982	J	ug/l	5000	10100		ug/l	5000	1490	J	ug/l	5000
Selenium	1.1	U	ug/l	5	1.1	UJ	ug/l	5	1.1	UJ	ug/l	5	1.1	UJ	ug/l	5
Silver	2.3	U	ug/l	10	2.3	U	ug/l	10	2.3	U	ug/l	10	2.3	U	ug/l	10
Sodium	4920	UJ	ug/l	5000	4510	J	ug/l	5000	13400	J	ug/l	5000	8790	J	ug/l	5000
Thallium	1.4	U	ug/l	10	1.4	U	ug/l	10	1.4	U	ug/l	10	1.4	U	ug/l	10
Vanadium	20.1	J	ug/l	50	17.1	J	ug/l	50	3.2	J	ug/l	50	33.1	J	ug/l	50
Zinc	9.3	J	ug/l	20	194		ug/l	20	10	UJ	ug/l	20	24.5	UJ	ug/l	20
Cyanide	1.8	U	ug/l	10	1.8	UJ	ug/l	10	1.8	UJ	ug/l	10	1.8	UJ	ug/l	10
TOC																
Total organic carbon	-				-				-				-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198007			
Site	CECIL			
Locator	CEF-3-9			
Collect Date:	19-NOV-91			
	VALUE	QUAL	UNITS	DL
CLP VOLATILE COMPOUNDS				
Chloromethane	10	U	ug/l	10
Bromomethane	10	U	ug/l	10
Vinyl Chloride	10	U	ug/l	10
Chloroethane	22		ug/l	10
Methylene Chloride	5	U	ug/l	5
Acetone	36	U	ug/l	10
Carbon disulfide	5	U	ug/l	5
1,1-Dichloroethene	9		ug/l	5
1,1-Dichloroethane	58		ug/l	5
1,2-Dichloroethene (total)	5	U	ug/l	5
Chloroform	5	U	ug/l	5
1,2-Dichloroethane	5	U	ug/l	5
2-Butanone	20	J	ug/l	10
1,1,1-Trichloroethane	24		ug/l	5
Carbon tetrachloride	5	U	ug/l	5
Vinyl acetate	10	U	ug/l	10
Bromodichloromethane	5	U	ug/l	5
1,2-Dichloropropane	5	U	ug/l	5
cis-1,3-Dichloropropene	5	U	ug/l	5
Trichloroethene	5	U	ug/l	5
Dibromochloromethane	5	U	ug/l	5
1,1,2-Trichloroethane	5	U	ug/l	5
Benzene	5	U	ug/l	5
trans-1,3-Dichloropropene	5	U	ug/l	5
Bromoform	5	U	ug/l	5
4-Methyl-2-pentanone	10	U	ug/l	10
2-Hexanone	10	U	ug/l	10
Tetrachloroethene	5	U	ug/l	5
Toluene	3	J	ug/l	5
1,1,2,2-Tetrachloroethane	5	U	ug/l	5
Chlorobenzene	5	U	ug/l	5
Ethyl Benzene	5		ug/l	5
Styrene	5	U	ug/l	5
Xylenes (total)	27		ug/l	5
CLP SEMIVOLATILES				
Phenol	10	U	ug/l	10
bis(2-Chloroethyl) ether	10	U	ug/l	10
2-Chlorophenol	10	U	ug/l	10
1,3-Dichlorobenzene	10	U	ug/l	10

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198007			
Site	CECIL			
Locator	CEF-3-9			
Collect Date:	19-NOV-91			
	VALUE	QUAL	UNITS	DL
1,4-Dichlorobenzene	10	U	ug/l	10
Benzyl Alcohol	-			
1,2-Dichlorobenzene	10	U	ug/l	10
2-Methylphenol	10	U	ug/l	10
bis(2-Chloroisopropyl) ether	-			
4-Methylphenol	10		ug/l	10
N-Nitroso-di-n-propylamine	10	U	ug/l	10
Hexachloroethane	10	U	ug/l	10
Nitrobenzene	10	U	ug/l	10
Isophorone	10	U	ug/l	10
2-Nitrophenol	10	U	ug/l	10
2,4-Dimethylphenol	10	U	ug/l	10
Benzoic Acid	50	U	ug/l	50
bis(2-Chloroethoxy) methane	10	U	ug/l	10
2,4-Dichlorophenol	10	U	ug/l	10
1,2,4-Trichlorobenzene	10	U	ug/l	10
Naphthalene	87		ug/l	10
4-Chloroaniline	10	U	ug/l	10
Hexachlorobutadiene	10	U	ug/l	10
4-Chloro-3-methylphenol	10	U	ug/l	10
2-Methylnaphthalene	45	J	ug/l	10
Hexachlorocyclopentadiene	10	U	ug/l	10
2,4,6-Trichlorophenol	10	U	ug/l	10
2,4,5-Trichlorophenol	50	U	ug/l	50
2-Chloronaphthalene	10	U	ug/l	10
2-Nitroaniline	50	U	ug/l	50
Dimethylphthalate	10	U	ug/l	10
Acenaphthylene	10	U	ug/l	10
2,6-Dinitrotoluene	10	U	ug/l	10
3-Nitroaniline	50	U	ug/l	50
Acenaphthene	10	U	ug/l	10
2,4-Dinitrophenol	50	U	ug/l	50
4-Nitrophenol	50	U	ug/l	50
Dibenzofuran	10	U	ug/l	10
2,4-Dinitrotoluene	10	U	ug/l	10
Diethylphthalate	10	U	ug/l	10
4-Chlorophenyl-phenylether	10	U	ug/l	10
Fluorene	10	U	ug/l	10
4-Nitroaniline	50	U	ug/l	50
4,6-Dinitro-2-methylphenol	50	U	ug/l	50
N-Nitrosodiphenylamine (1)	10	U	ug/l	10
4-Bromophenyl-phenylether	10	U	ug/l	10
Hexachlorobenzene	10	U	ug/l	10
Pentachlorophenol	50	U	ug/l	50
Phenanthrene	10	U	ug/l	10
Anthracene	10	U	ug/l	10
Di-n-butylphthalate	10	U	ug/l	10
Fluoranthene	10	U	ug/l	10
Pyrene	10	U	ug/l	10
Butylbenzylphthalate	10	U	ug/l	10
3,3'-Dichlorobenzidine	-			
Benzo (a) anthracene	10	U	ug/l	10

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198007			
Site	CECIL			
Locator	CEF-3-9			
Collect Date:	19-NOV-91			
	VALUE	QUAL	UNITS	DL
Chrysene	10	U	ug/l	10
bis(2-Ethylhexyl) phthalate	10	U	ug/l	10
Di-n-octylphthalate	10	U	ug/l	10
Benzo (b) fluoranthene	10	U	ug/l	10
Benzo (k) fluoranthene	10	U	ug/l	10
Benzo (a) pyrene	10	U	ug/l	10
Indeno (1,2,3-cd) pyrene	10	U	ug/l	10
Dibenz (a,h) anthracene	10	U	ug/l	10
Benzo (g,h,i) perylene	10	U	ug/l	10
CLP PESTICIDES/PCBS				
alpha-BHC	.05	U	ug/l	.05
beta-BHC	.1	J	ug/l	.05
delta-BHC	.05	U	ug/l	.05
gamma-BHC (Lindane)	.05	U	ug/l	.05
Heptachlor	.05	U	ug/l	.05
Aldrin	.05	U	ug/l	.05
Heptachlor epoxide	.05	U	ug/l	.05
Endosulfan I	.05	U	ug/l	.05
Dieldrin	.1	U	ug/l	.1
4,4'-DDE	-			
Endrin	.1	U	ug/l	.1
Endosulfan II	.1	U	ug/l	.1
4,4'-DDD	-			
Endosulfan sulfate	.1	U	ug/l	.1
4,4'-DDT	-			
Methoxychlor	.5	U	ug/l	.5
Endrin ketone	.1	U	ug/l	.1
alpha Chlordane	.5	U	ug/l	.5
gamma-Chlordane	.5	U	ug/l	.5
Toxaphene	1	U	ug/l	1
Aroclor-1016	.5	U	ug/l	.5
Aroclor-1221	.5	U	ug/l	.5
Aroclor-1232	.5	U	ug/l	.5
Aroclor-1242	.5	U	ug/l	.5
Aroclor-1248	.5	U	ug/l	.5
Aroclor-1254	1	U	ug/l	1
Aroclor-1260	1	U	ug/l	1
CLP METALS AND CYANIDE				
Aluminum	84300		ug/l	200
Antimony	40	U	ug/l	60
Arsenic	4.5	J	ug/l	10
Barium	91.6	J	ug/l	200
Beryllium	.31	J	ug/l	5
Cadmium	1.6	U	ug/l	5
Calcium	65000		ug/l	5000
Chromium	70.2		ug/l	10
Cobalt	6	UJ	ug/l	50
Copper	14.6	J	ug/l	25
Iron	18100		ug/l	100
Lead	10.4		ug/l	5

NAS CECIL FIELD -- OPERABLE UNIT 8 -- SITE 3
1991 DATA -- GROUNDWATER

Lab Sample Number:	20198007			
Site	CECIL			
Locator	CEF-3-9			
Collect Date:	19-NOV-91			
	VALUE	QUAL	UNITS	DL
Magnesium	2780	J	ug/l	5000
Manganese	138		ug/l	15
Mercury	.16	U	ug/l	.2
Nickel	14.4	J	ug/l	40
Potassium	5960		ug/l	5000
Selenium	1.1	U	ug/l	5
Silver	2.3	U	ug/l	10
Sodium	6530	J	ug/l	5000
Thallium	1.4	U	ug/l	10
Vanadium	42.9	J	ug/l	50
Zinc	31		ug/l	20
Cyanide	2.9	J	ug/l	10
TOC				
Total organic carbon	-			

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

PRELIMINARY
CONTAMINATION ASSESSMENT REPORT
FOR THE HELICOPTER CRASH SITE
CECIL FIELD NAVAL AIR STATION
JACKSONVILLE, FLORIDA

Prepared for:

NAVY PUBLIC WORKS CENTER
Jacksonville, Florida

Prepared by:

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
Gainesville, Florida

February 1994

ESE Project No. 3935014G-0500-3120

JAX NAS CECIL FIELD 12/93SS

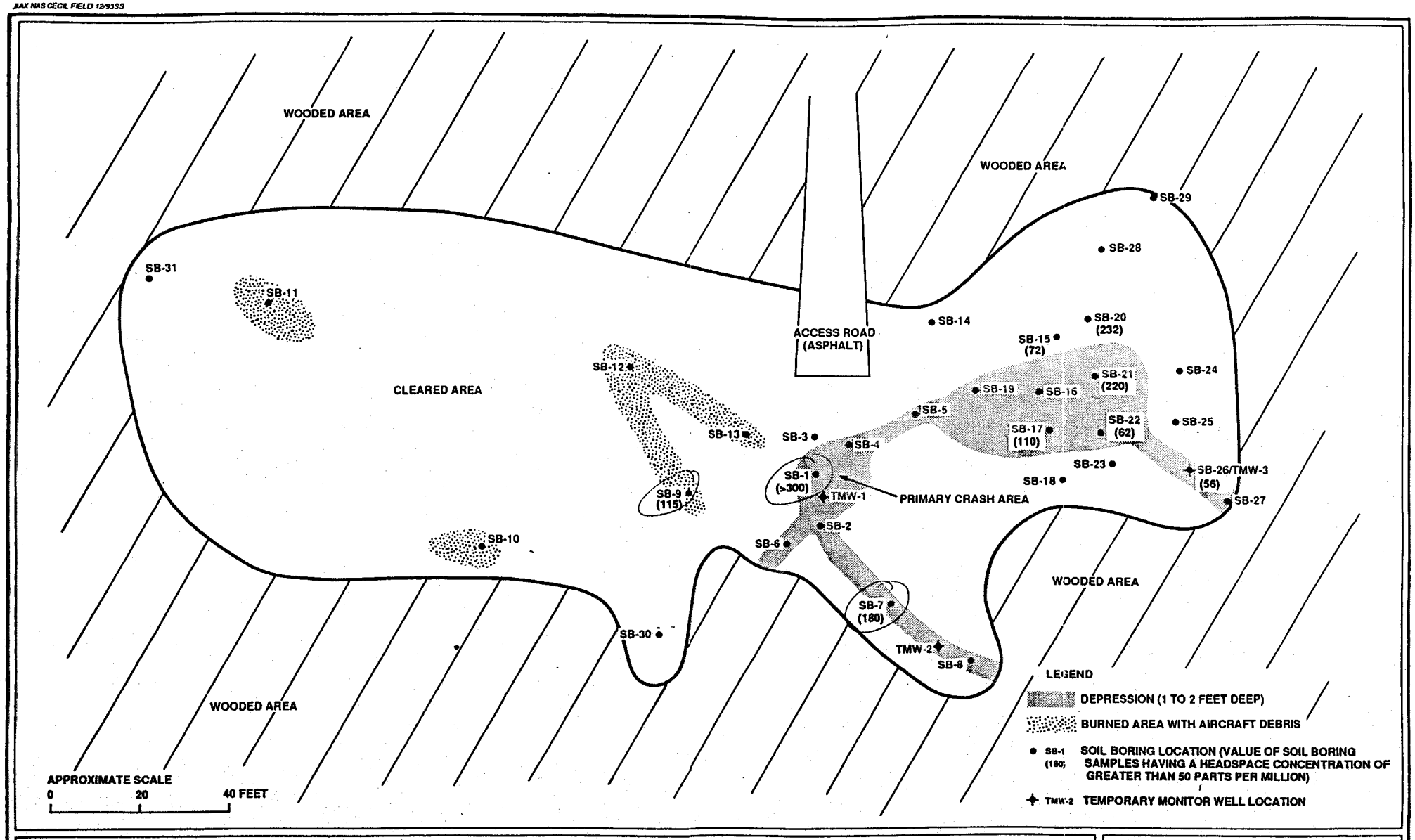


Figure 3
SOIL BORING AND TEMPORARY MONITOR WELL LOCATION MAP FOR THE HELICOPTER CRASH SITE

SOURCE: ESE.

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

Table 1. Soil Boring (Headspace) Analytical Results For The Helicopter Crash Site, Cecil Field Naval Air Station, Jacksonville, Florida (Continued, Page 2 of 2)

SAMPLE ID	DATE	SAMPLE INTERVAL (ft)	STANDARD PROBE READING (ppm)	CHARCOAL PROBE READING (ppm)	TOTAL VOC (ppm)
SB-18	9/1/93	0.0-1.0	0.0	0.0	0.0
SB-18	9/1/93	1.0-2.0	0.0	0.0	0.0
SB-19	9/1/93	0.0-1.0	1.0	0.0	1.0
SB-19	9/1/93	1.0-2.0	14.0	0.0	14.0
SB-20	9/1/93	0.0-1.0	240.0	8.0	232.0
SB-20	9/1/93	1.0-2.0	24.0	0.0	24.0
SB-21	9/1/93	0.0-1.0	220.0	0.0	220.0
SB-22	9/1/93	0.0-1.0	62.0	0.0	62.0
SB-23	9/2/93	0.0-1.0	42.0	18.0	24.0
SB-23	9/2/93	1.0-2.0	26.0	26.0	0.0
SB-24	9/2/93	0.0-1.0	0.0	0.0	0.0
SB-24	9/2/93	1.0-1.5	4.0	4.0	0.0
SB-25	9/2/93	0.0-1.0	0.0	0.0	0.0
SB-25	9/2/93	1.0-1.5	17.0	17.0	0.0
SB-26	9/2/93	0.0-1.0	68.0	12.0	56.0
SB-26	9/2/93	1.0-1.5	20.0	8.0	12.0
SB-27	9/2/93	0.0-1.0	0.0	0.0	0.0
SB-27	9/2/93	1.0-1.5	2.0	2.0	0.0
SB-28	9/2/93	0.0-1.0	42.0	4.0	38.0
SB-28	9/2/93	1.0-2.0	36.0	8.0	28.0
SB-29	9/2/93	0.0-1.0	12.0	2.0	10.0
SB-29	9/2/93	1.0-2.0	6.0	4.0	2.0
SB-30	9/2/93	0.0-1.0	0.0	0.0	0.0
SB-30	9/2/93	1.0-2.0	18.0	18.0	0.0
SB-31	9/2/93	0.0-1.0	12.0	10.0	2.0
SB-31	9/2/93	1.0-2.0	22.0	22.0	0.0

Note: SB = Soil Boring
VOC = Volatile Organic Compound
ppm = parts per million

Table 1. Soil Boring (Headspace) Analytical Results For The Helicopter Crash Site, Cecil Field Naval Air Station, Jacksonville, Florida

SAMPLE ID	DATE	SAMPLE INTERVAL (ft)	STANDARD PROBE READING (ppm)	CHARCOAL PROBE READING (ppm)	TOTAL VOC (ppm)
SB-1	8/31/93	0.0-0.5	* >1,000.0	700.0	300.0+
SB-2	8/31/93	0.0-1.0	0.0	0.0	0.0
SB-2	8/31/93	1.0-2.0	4.0	0.0	4.0
SB-3	8/31/93	0.0-1.0	4.0	0.0	4.0
SB-3	8/31/93	1.0-2.0	9.0	0.0	9.0
SB-4	8/31/93	0.0-1.0	50.0	48.0	2.0
SB-5	8/31/93	0.0-1.0	1.0	0.0	1.0
SB-5	8/31/93	1.0-2.0	12.0	9.0	3.0
SB-6	9/1/93	0.0-1.0	0.0	0.0	0.0
SB-6	9/1/93	1.0-2.0	1.0	1.0	0.0
SB-7	9/1/93	0.0-1.0	180.0	0.0	180.0
SB-7	9/1/93	1.0-2.0	80.0	80.0	0.0
SB-8	9/1/93	0.0-1.0	34.0	34.0	0.0
SB-9	9/1/93	0.0-1.0	120.0	5.0	115.0
SB-9	9/1/93	1.0-2.0	12.0	0.0	12.0
SB-10	9/1/93	0.0-1.0	2.0	0.0	2.0
SB-10	9/1/93	1.0-2.0	0.0	0.0	0.0
SB-11	9/1/93	0.0-1.0	11.0	0.0	11.0
SB-11	9/1/93	1.0-2.0	34.0	0.0	34.0
SB-12	9/1/93	0.0-1.0	1.0	0.0	1.0
SB-12	9/1/93	1.0-2.0	1.0	0.0	1.0
SB-13	9/1/93	0.0-1.0	2.0	0.0	2.0
SB-13	9/1/93	1.0-2.0	6.0	3.0	3.0
SB-14	9/1/93	0.0-1.0	9.0	1.0	8.0
SB-14	9/1/93	1.0-1.5	5.0	0.0	5.0
SB-15	9/1/93	0.0-1.0	18.0	2.0	16.0
SB-15	9/1/93	1.0-2.0	82.0	10.0	72.0
SB-16	9/1/93	0.0-1.0	40.0	40.0	0.0
SB-16	9/1/93	1.0-1.5	32.0	32.0	0.0
SB-17	9/1/93	0.0-1.0	120.0	10.0	110.0
SB-17	9/1/93	1.0-1.5	140.0	140.0	0.0

Note: SB = Soil Boring
VOC = Volatile Organic Compound
ppm = parts per million

* Sample out of instruments range

Environmental Science & Engineering, Inc. 10/19/93 STATUS: FINAL

PROJECT NUMBER 3924031G 0205 PROJECT NAME NAS CECIL FIELD CRASH
FIELD GROUP RGNJW2 LAB COORDINATOR C.E. FIORE

RESULTS OF ANALYSIS

SAMPLE ID'S PARAMETERS UNITS	STORET METHOD	TMW-1 RGNJW2 2	TMW-2 RGNJW2 3	TMW-3 RGNJW2 4	EQPBLK RGNJW2 5	TRPBLK RGNJW2 6
DATE		09/07/93	09/07/93	09/07/93	09/07/93	09/07/93
TIME		14:40	15:35	16:45	13:40	16:55
HYDROCARBONS,PETRO MG/L	45501 I	<0.19	0.39	<0.19	<0.17	NRQ
LEAD,TOTAL UG/L	1051 GFAA	15.2	7.2	6.5	<2.0	NRQ
1,2-DIBROMOETHANE (EDB) UG/L	77651 EC	<0.020	<0.020	<0.020	<0.020	NRQ
BROMODICHLOROMETHANE UG/L	32101 HA	<10.00	<1.00	<1.00	<1.00	<1.00
BROMOFORM UG/L	32104 HA	<10.00	<1.00	<1.00	<1.00	<1.00
BROMOMETHANE UG/L	34413 HA	<10.00	5.58	16.7	<1.00	<1.00
CARBON TETRACHLORIDE UG/L	32102 HA	<10.00	<1.00	<1.00	<1.00	<1.00
CHLOROBENZENE UG/L	34301 HA	<10.00	<1.00	<1.00	<1.00	<1.00
CHLOROETHANE UG/L	34311 HA	<10.00	3.51	1.09	<1.00	<1.00
2-CHLOROETHYLVINYL ETHER UG/L	34576 HA	<10.00	<1.00	<1.00	<1.00	<1.00
CHLOROFORM UG/L	32106 HA	<10.00	<1.00	<1.00	<1.00	<1.00
CHLOROMETHANE UG/L	34418 HA	<10.00	<1.00	11.4	<1.00	<1.00
DIBROMOCHLOROMETHANE UG/L	32105 HA	<10.00	<1.00	<1.00	<1.00	<1.00
DICHLOROBENZENE,TOT. UG/L	81524 HA	<10.00	<1.00	<1.00	<1.00	<1.00
DICHLORODIFLUORO METHANE UG/L	34668 HA	<10.00	<1.00	<1.00	<1.00	<1.00
1,1-DICHLOROETHANE UG/L	34496 HA	<10.00	18.3	46.3	<1.00	<1.00
1,2-DICHLOROETHANE UG/L	34531 HA	<10.00	1.58	2.42	<1.00	<1.00
1,1-DICHLOROETHYLENE UG/L	34501 HA	57.4	74.1	114	<1.00	<1.00
TRANS-1,2-DICHLORO ETHENE UG/L	34546 HA	<10.00	1.03	<1.00	<1.00	<1.00
1,2-DICHLOROPROPANE UG/L	34541 HA	<10.00	<1.00	<1.00	<1.00	<1.00
CIS-1,3-DICHLORO PROPENE UG/L	34704 HA	<10.00	<1.00	<1.00	<1.00	<1.00
TRANS-1,3-DICHLORO PROPENE UG/L	34699 HA	<10.00	<1.00	<1.00	<1.00	<1.00
METHYLENE CHLORIDE UG/L	34423 HA	<10.00	1.26	1.17	<1.00	4.13
1,1,2,2-TETRACHLORO ETHANE UG/L	34516 HA	<10.00	<1.00	<1.00	<1.00	<1.00
TETRACHLOROETHENE UG/L	34475 HA	<10.00	<1.00	<1.00	<1.00	<1.00
1,1,1-TRICHL'ETHANE UG/L	34506 HA	<10.00	<1.00	<1.00	<1.00	<1.00
1,1,2-TRICHL'ETHANE UG/L	34511 HA	<10.00	<1.00	<1.00	<1.00	<1.00
TRICHLOROETHENE UG/L	39180 HA	28.0	139	<1.00	<1.00	<1.00
TRICHL'FLUOROMETHANE UG/L	34488 HA	<10.00	<1.00	<1.00	<1.00	<1.00

Environmental Science & Engineering, Inc. 10/19/93 STATUS: FINAL

PROJECT NUMBER 3924031G 0205 PROJECT NAME NAS CECIL FIELD CRASH

RESULTS OF ANALYSIS

SAMPLE ID'S PARAMETERS UNITS	STORET METHOD	TMW-1 RGNJW2 2	TMW-2 RGNJW2 3	TMW-3 RGNJW2 4	EQPBLK RGNJW2 5	TRPBLK RGNJW2 6
DATE		09/07/93	09/07/93	09/07/93	09/07/93	09/07/93
TIME		14:40	15:35	16:45	13:40	16:55
VINYL CHLORIDE UG/L	39175 HA	<10.00	<1.00	<1.00	<1.00	<1.00
BENZENE UG/L	34030 PI	<10.00	<1.00	<1.00	<1.00	<1.00
CHLOROBENZENE UG/L	34301 PI	<10.00	<1.00	<1.00	<1.00	<1.00
DICHLOROBENZENE,TOT. UG/L	81524 PI	<10.00	<1.00	<1.00	<1.00	<1.00
ETHYLBENZENE UG/L	34371 PI	<10.00	<1.00	<1.00	<1.00	<1.00
TOLUENE UG/L	34010 PI	11.5	<1.00	<1.00	<1.00	<1.00
XYLENES,TOTAL UG/L	81551 PI	54.8	<1.00	<1.00	<1.00	<1.00
METHYL-T-BUT'ETHER UG/L	98676 PI	<10.00	<1.00	<1.00	<1.00	<1.00
VOA,TOTAL(BTEX,T) UG/L	97512 PI	66.3	<1.0	<1.0	<1.0	<1.0
ACENAPHTHENE UG/L	34205 LC	<2.41	<2.26	<2.26	<2.26	NRQ
ACENAPHTHYLENE UG/L	34200 LC	<1.62	<1.52	<1.52	<1.52	NRQ
ANTHRACENE UG/L	34220 LC	<0.094	0.477	5.42	<0.088	NRQ
BENZO(A)ANTHRACENE UG/L	34526 LC	<0.002	0.002	0.099	<0.002	NRQ
BENZO(A)PYRENE UG/L	34247 LC	0.004	0.004	0.028	<0.001	NRQ
BENZO(B)FLUORANTHENE UG/L	34230 LC	0.013	0.004	0.046	<0.001	NRQ
BENZO(GHI)PERYLENE UG/L	34521 LC	<0.004	0.007	0.052	<0.004	NRQ
BENZO(K)FLUORANTHENE UG/L	34242 LC	0.003	0.005	0.014	<0.0004	NRQ
CHRYSENE UG/L	34320 LC	<0.032	0.051	4.39	<0.030	NRQ
DIBEN'(A,H)ANTH'CENE UG/L	34556 LC	<0.003	<0.003	0.081	<0.003	NRQ
FLUORANTHENE UG/L	34376 LC	0.008	0.006	0.058	<0.006	NRQ
FLUORENE UG/L	34381 LC	0.944	<0.235	<0.235	<0.235	NRQ
INDENO(1,2,3-CD)PYRN UG/L	34403 LC	<0.003	<0.003	<0.003	<0.003	NRQ
NAPHTHALENE UG/L	34696 LC	<0.963	<0.905	<0.905	<0.905	NRQ
PHENANTHRENE UG/L	34461 LC	<0.065	<0.061	2.68	<0.061	NRQ
PYRENE UG/L	34469 LC	<0.027	<0.025	0.376	<0.025	NRQ
2-METHYL NAPHTHALENE UG/L	77416 LC	<1.22	<1.15	1.96	<1.15	NRQ
1-METHYL NAPHTHALENE UG/L	77418 LC	<1.56	<1.47	<1.47	<1.47	NRQ

Environmental Science and Engineering, Inc.

SAMPLE IDENTIFICATION & DISPOSITION TABLE

SAMPLE ID	STATION ID	COLLECT.	RECEIPT	CLASSIFICATION	EXTRACT.	ANALYSIS	C-E	E-A	C-A	ESE Batch
RGNJW2*2	TMW-1	09/07/93	09/08/93	TRPH - EPA 418.1	10/01/93	10/01/93	24	0	24	G42057
				LEAD - EPA 7421	09/29/93	10/05/93	22	6	28	G42183
				EDB - EPA 504	09/24/93	09/24/93	17	0	17	G41881
				PURGEABLE HALOCARBONS - EPA 8010	NA	09/14/93			7	G41395
				PURGEABLE AROMATICS - EPA 8020	NA	09/14/93			7	G41395
				PAHs - EPA 8310	09/13/93	09/15/93	6	2	8	G41459
RGNJW2*3	TMW-2	09/07/93	09/08/93	TRPH - EPA 418.1	10/01/93	10/01/93	24	0	24	G42057
				LEAD - EPA 7421	09/29/93	10/05/93	22	6	28	G42183
				EDB - EPA 504	09/24/93	09/24/93	17	0	17	G41881
				PURGEABLE HALOCARBONS - EPA 8010	NA	09/15/93			8	G41395
				PURGEABLE AROMATICS - EPA 8020	NA	09/15/93			8	G41395
				PAHs - EPA 8310	09/13/93	09/15/93	6	2	8	G41459
RGNJW2*4	TMW-3	09/07/93	09/08/93	TRPH - EPA 418.1	10/01/93	10/01/93	24	0	24	G42057
				LEAD - EPA 7421	09/29/93	10/05/93	22	6	28	G42183
				EDB - EPA 504	09/24/93	09/24/93	17	0	17	G41881
				PURGEABLE HALOCARBONS - EPA 8010	NA	09/15/93			8	G41395
				PURGEABLE AROMATICS - EPA 8020	NA	09/15/93			8	G41395
				PAHs - EPA 8310	09/13/93	09/15/93	6	2	8	G41459
RGNJW2*5	EQPBLK	09/07/93	09/08/93	TRPH - EPA 418.1	10/01/93	10/01/93	24	0	24	G42057
				LEAD - EPA 7421	09/29/93	10/05/93	22	6	28	G42183
				EDB - EPA 504	09/24/93	09/24/93	17	0	17	G41881
				PURGEABLE HALOCARBONS - EPA 8010	NA	09/14/93			7	G41395
				PURGEABLE AROMATICS - EPA 8020	NA	09/14/93			7	G41395
				PAHs - EPA 8310	09/13/93	09/16/93	6	3	9	G41459
RGNJW2*6	TRPBLK	09/07/93	09/08/93	PURGEABLE HALOCARBONS - EPA 8010	NA	09/14/93			7	G41395
				PURGEABLE AROMATICS - EPA 8020	NA	09/14/93			7	G41395

Note: C-E = days from Collection to Extraction/Preparation
E-A = days from Extraction/Preparation to Analysis
C-A = days from Collection to Analysis

APPENDIX B

SAMPLING RATIONALE MEMORANDA

ABB

12 January 1994

Mr. Bart Reedy, Remedial Project Manager
Federal Facilities Section
Waste Management Division
U.S. Environmental Protection Agency
345 Courtland Street
Atlanta, GA 30365

Subject: RI/FS Program, NAS Cecil Field, Operable Unit (OU) 8, Site 3
Rationale for the Placement of Monitoring Wells.

Dear Mr. Reedy:

On behalf of Southern Division Naval Facilities Engineering Command, ABB Environmental Services, Inc. is pleased to forward a draft copy of *Monitoring Well Placement Rationale for Site 3, Operable Unit 8, Naval Air Station Cecil Field* for your information and review. In order to maintain our program schedule, we would like to schedule a conference call to review the placement of confirmation monitoring wells as soon as possible. Andrew Lonergan or Alan Stodghill of our technical staff will be contacting you to schedule the call.

Questions or comments should be directed to Alan Shoultz at (803) 743-0669 the Navy's Engineer-in-Charge or to me at (904) 656-1293.

Sincerely,
ABB ENVIRONMENTAL SERVICES, INC.

Barry Lester, P.E.
Task Order Manager

cc: Mike Deliz, FDEP
Alan Shoultz
John Dingwall
Jennifer Herndon
Maria Pijnenburg
Al Stodghill
Andrew Lonergan

ABB Environmental Services Inc.

2590 Executive Center Circle East
Berkeley Building
Tallahassee, Florida 32301

Telephone (904) 656-1293
Fax (904) 877-0742

Monitoring Well Placement Rational for Site 3, Operable Unit 8 Naval Air Station Cecil Field

Naval Air Station Cecil Field (NASCF) is located west of Jacksonville, in southwestern Duval County. Site 3 of Operable Unit 8 (Site 3) is located in the western part of NASCF, along the facility's perimeter road (Figure 1). Reportedly, Site 3 was used for the disposal of oil and/or sludge wastes. Waste disposal consisted of dumping of fuels, solvents, paints, paint thinners, oil and sludge into an unlined pit. Wastes were then allowed to evaporate and drain into the soil. Any remaining wastes were burned in the pit. The pit is reported to have been 50 to 100 feet in diameter and 3 to 5 feet in deep.

Field screening of groundwater samples at Site 3 has been completed. Field screening included the collection of groundwater samples through the direct-drive Aqua-Probe™ system. Field screening groundwater samples were collected at various depths to a maximum depth of 118 feet below land surface (bls). Groundwater samples were analyzed onsite and screened for selected volatile organic compounds (VOC) and semivolatile organic compounds (SVOC) using modified U. S. Environmental Protection Agency (USEPA) Methods 8010 and 8020 (discussed below). Based on the field screening data, and other sampling information, locations for the placement of confirmation monitoring wells have been selected. Presented herein is a summary of the information gathered and the rationale for placement of permanent monitoring wells.

Generally, the surficial aquifer at Site 3 is composed of silty fine-grained sand from land surface to approximately 45 feet bls. Thin layers of clay are interspersed in this silty sand. Below 45 feet bls sediments are represented by alternating layers of clay and poorly graded sand to a depth of 65 feet bls. From 65 to the top of the dolomite (approximately 70 to 100 feet bls) sediments are composed of fined-grained sand, clay, marl and shell material. Beneath these fine sediments is a well-cemented dolomite, which appears to be acting as a lower aquitard for the surficial aquifer at the site. Based on a review of the groundwater screening data, the surficial aquifer above the dolomite appears to be acting as a single hydraulic unit.

The field screening results from Site 3 are plotted on figures presented in Attachment A, Field Screening Data Figures. These figures present total VOCs plus naphthalene (Figures A-1 through A-6), trichloroethylene (TCE) (Figures A-7 through A-11), and 1,1-dichloroethlyene (DCE) (Figures A-13 through A-17) for the surficial aquifer at Site 3. The following intervals within the surficial aquifer have been mapped: the water table to 15 feet bls, 18 to 22 feet bls, 26 to 32 feet bls, 45 to 60 feet bls, 64 to 76 feet bls, and 80 feet bls to top of dolomite.

Maps for all compounds detected in the surficial aquifer at Site 3 have not been included as the distributions of DCE and TCE are representative of the contaminant plume and the figures for total VOCs plus naphthalene show the total extent of site-related compounds. Compounds detected in the groundwater at Site 3 during the field screening program are listed below.

1,2-Dichlorobenzene *	1,1,1-Trichloroethylene
1,3-Dichlorobenzene	1,1-Dichloroethylene *
1,4-Dichlorobenzene *	cis-1,2-Dichloroethene *
1,1,1-Trichloroethane *	Methylene Chloride *
1,1-Dichloroethane	Chloromethane
1,2-Dichloroethane	Naphthalene *
Benzene *	Toluene
Xylene	

* = in excess of standard

Two episodes of groundwater screening were completed at Site 3. The first episode (Spring 1993) was centered in the area historically identified as Site 3 and included screening boring locations GS-3-1 through GS-3-33. The field laboratory analyzed groundwater samples for USEPA Modified-Method 8010. The second episode of screening included boring locations GS-3-34 through GS-3-79. During the this round of screening, the analytical suite being used by the on-site laboratory was changed to a USEPA Modified-Method 8010/8020 to include benzene, toluene, ethyl benzene, and xylenes (BTEX) constituents and naphthalene.

Three other figures have been prepared to summarize the physical conditions at the site. Figure A-18 shows the results of field screening samples collected below the dolomite unit. Samples from below the dolomite were collected by augering to the dolomite using the hollow stem auger (HSA) drilling technique. The augers acted as a temporary surface casing through which the mud rotary drilling technique was used to penetrate the dolomite. After advancing the borehole, a temporary well point was then installed in the dolomite and developed. A sample was then collected. Contaminants were not detected below the dolomite, which indicates that the dolomite is acting as a lower confining unit for the surficial aquifer.

Two maps are also presented which depict topography on the top of the dolomite unit (Figures A-19 and A-20) adjusted to mean sea level. The two maps are different (but valid) interpretations of the top of the dolomite. Both figures show high areas to the northwest and southeast of the site with a trough or low area in the center of the site. These high areas and the trough result in a "saddle-shaped" expression to the upper surface of the dolomite.

Figure A-19 and A-20, when compared to Figures A-1 through A-17 (and especially A-6), show that the upper surface of the dolomite is not acting as a control on the horizontal migration of contaminants within the surficial aquifer. This lack of horizontal control is consistent with the observed levels of contaminants in the groundwater of the surficial aquifer, as the are dissolved in the groundwater rather than present as a dense non-aqueous phase liquid (DNAPL), which would be affected by relief on the dolomite. Further, none of the observed contaminant concentrations from the screening program are high enough to indicate that a DNAPL source is present (i.e., none of the contaminants are present at concentrations approaching their solubility).

Figure A-21 shows the proposed locations for monitoring well installation at Site 3. Three cluster locations have been have been selected to characterize the nature of the contaminant plume. The remaining locations have been chosen to

monitor the perimeter of groundwater plume. Screened intervals for the proposed monitoring wells are presented in Table 1.

A total of seven wells have already been installed at Site 3 during the current investigation (as of the preparation of this data package). These wells are indicated in the status column in Table 1. The rationale for the placement of these wells, as wells as the rationale for proposed locations, is discussed below.

Attachment B, On-Site Field Screening, Groundwater Results, presents a summary of the onsite laboratory field screening data from Site 3. Attachment C, Groundwater Data from Previous Investigations, presents the results of groundwater sampling completed during the November, 1991 field program. Figures and tables in attachment C are reproduced from the Technical Memorandum for Supplemental Sampling at OUs 1, 2, and 7 (ABB-ES, 1992). Attachment D presents boring logs from selected screening locations at Site 3.

Figure A-21 indicates the proposed monitoring well locations to be installed at Site 3 as part of the confirmatory sampling program. The rationale for the placement of monitoring wells and their screened intervals is as follows. Table 2 summarizes the rational for placement of monitoring well clusters.

CEF-3-16S Proposed screened interval is from the water table to 15 feet bls. This well will be located in a lateral to downgradient direction of the contaminant plume, between screening locations GS-3-13, GS-3-27, and GS-3-38. The target compound concentrations tend to be highest in this depth interval.

CEF-3-17D Proposed screened interval is 85-95 feet bls or the 10 feet just above the dolomite. This well will be located in a lateral to downgradient direction of the contaminant plume, between screening locations GS-3-24, GS-3-31, and GS-3-45. The proposed well will be adjacent to CEF-3-16S. Analysis of the groundwater sample from this well will provide information on the nature and degree of potential contamination just above the dolomite.

CEF-3-18S This well will be located in a lateral to downgradient direction of the contaminant plume, in the vicinity of direct-drive sample locations GS-3-43, GS-3-44, and GS-3-46. Target compound concentrations decrease by an order of magnitude from GS-3-44 to GS-3-46. It anticipated that target compound concentrations will continue to decrease in the distance from GS-3-46 to the proposed well. The proposed screened interval is 15 to 25 feet bls and is situated in a shallow depth of the surficial aquifer. Target compound concentrations tend to be greatest at this depth interval.

CEF-3-19D Proposed screened interval is 75 to 85 feet bls or the 10 feet just above the dolomite. This well will be adjacent to CEF-3-18S. Analysis of the groundwater sample from this well will provide information on the nature and degree of potential contamination just above the dolomite.

Table 1
Site 3, Operable Unit 8
Screened Intervals for Proposed Wells

Well Number	Screened Interval	Status
CEF-3-9I	45-55	Installed
CEF-3-10D	85-95	"
CEF-3-11S	25-35	"
CEF-3-12D	55-65	"
CEF-3-13S	WT-15	"
CEF-3-14I	45-55	"
CEF-3-15D	88-98	"
CEF-3-16S	WT-15	Proposed
CEF-3-17D	85-95	"
CEF-3-18S	15-25	"
CEF-3-19D	75-85	"
CEF-3-20S	WT-15	"
CEF-3-21I	40-50	"
CEF-3-22D	60-70	"
CEF-3-23S	15-25	"
CEF-3-24D	75-85	"
CEF-3-25S	15-25	"
CEF-3-26I	45-55	"
CEF-3-27D	85-95	"
CEF-3-28S	20-30	"
CEF-3-29D	75-85	"
CEF-3-30DD	90-100	"
CEF-3-31S	20-30	"
CEF-3-32D	60-70	"
CEF-3-33DD	105-115	"

WT = water table

Table 2
Site 3, Operable Unit 8
Monitoring Well Placement Rationale

Well Cluster	Rationale
CEF-3-9I CEF-3-10D	- Provide for characterization of upgradient groundwater - Nested with existing well CEF-3-8S
CEF-3-11S CEF-3-12D	- Act as downgradient monitoring station at the nose of the contaminant plume - Provide data to assess the presence (and concentration if detected) of contaminants on the eastern side of Rowell Creek
CEF-3-13S CEF-3-14I CEF-3-15D CEF-3-33DD	- Provide data to characterize the nature of contamination in the most contaminated part of historic Site 3 - Provide data to assess the potential for contaminant migration below the dolomite - Provide data to address vertical hydraulic gradients across the dolomite
CEF-3-16S CEF-3-17D	- Act as perimeter monitoring station along the southern edge of contaminant plume in the western part of the site
CEF-3-18S CEF-3-19D	- Act as perimeter monitoring station along the southern edge of contaminant plume in the eastern part of the site
CEF-3-20S CEF-3-21I CEF-3-22D	- Act as downgradient monitoring station on the southeastern edge of the contaminant plume in the western part of the site - Act as monitoring station to assess potential lateral spreading the plume along Rowell Creek
CEF-3-23S CEF-3-24D	- Act as perimeter monitoring station along the northeastern edge of contaminant plume in the eastern part of the site
CEF-3-25S CEF-3-26I CEF-3-27D	- Act as perimeter monitoring station along the northern edge of contaminant plume - Act as downgradient monitoring station for detections in the vicinity of screening boring GS-3-59
CEF-3-28S CEF-3-29D CEF-3-30DD	- Provide data to characterize the nature of contamination in the most contaminated part of Site 3 southeast of the road - Provide data to assess the potential for contaminant migration below the dolomite - Provide data to address vertical hydraulic gradients across the dolomite
CEF-3-31S CEF-3-32D	- Provide data to characterize contaminant concentrations at the nose of the plume immediately adjacent to Rowell Creek - Provide vertical hydraulic data along the western edge of Rowell Creek

CEF-3-20S Proposed screened interval is from the water table to 15 feet bls. This well will be located in a direction potentially downgradient of an area of known contamination. The well will be installed in the vicinity of direct-drive location GS-3-56. Data from this direct-drive location did not indicate the presence of target compounds.

CEF-3-21I Proposed screened interval is 40 to 50 feet. This well will be located adjacent to proposed well CEF-3-20S and potentially downgradient of an area of known contamination. Analytical data from this well will characterize groundwater quality at an intermediate depth of the surficial aquifer.

CEF-3-22D Proposed screened interval is 60 to 70 feet bls or the 10 feet just above the dolomite. This well will be located adjacent to proposed well CEF-3-21I. Analytical data from this well will characterize groundwater quality at the base of the surficial aquifer. Data from proposed wells CEF-3-13S, CEF-3-14I, and CEF-3-15D will vertically characterize groundwater quality in the surficial aquifer and assist in delineating the eastern extent of the contaminant plume.

CEF-3-23S The proposed well is located approximately midway between direct-push sample locations GS-3-39, GS-3-42, GS-3-52, GS-3-54, and GS-3-67. The proposed screened interval is 15 to 25 feet bls. Target compound concentrations tend to be highest in this interval, in this part of the site.

CEF-3-24D The proposed screened interval is 75 to 85 feet bls or the 10 feet just above the dolomite. Analytical data from this well will characterize the groundwater quality at the base of the surficial aquifer in this part of Site 3. This proposed well will be adjacent to CEF-3-23S.

CEF-3-25S This well will be placed midway between direct-push sample locations GS-3-30, GS-3-57, and GS-3-75. Analytical data from the well is intended to help delineate the extent of the contaminant plume in the north central part of the site. The well will also be located downgradient of direct-push location GS-3-59, where concentrations of naphthalene and xylene were indicated. The proposed screened interval is 15 to 25 feet bls.

CEF-3-26I This proposed well will be adjacent to proposed well CEF-3-25S. The proposed screened interval is 45 to 55 feet. Analytical data from this well will help characterize groundwater quality at an intermediate depth of the surficial aquifer in this part of Site 3.

CEF-3-27D This proposed well will be adjacent to proposed well CEF-3-26I. The proposed screened interval is 85 to 95 feet or the 10 feet just above the dolomite. This well is intended to provide analytical groundwater data for the deeper part of the surficial aquifer in this part of the site. Analytical groundwater data from this well and from proposed wells CEF-3-18S and CEF-3-19I will provide

vertical characterization of the surficial aquifer in the north central part of the site.

CEF-3-28S This proposed well is situated east of direct-push sample locations GS-3-40 and GS-3-69EX. Data collected from these sample locations indicated high concentrations of target compounds. The proposed well will be located in the immediate vicinity and downgradient these sample locations. The proposed screened interval is 20 to 30 feet bls, the zone where the highest concentration of target compounds generally occurred. Sample data from this proposed well will help assess the nature and degree of target compounds in east central part of the contaminant plume.

CEF-3-29D The proposed screened interval is 70 to 80 feet bls or the 10 feet just above the dolomite. This well is intended to provide analytical groundwater data for the base of the surficial aquifer. The well will be set adjacent to proposed well CEF-3-28S.

CEF-3-30DD This proposed well is to be located adjacent to proposed well CEF-3-29D. The proposed screened interval is 90 to 100 feet bls or some suitable interval within the dolomite so that a groundwater sample from the "rock aquifer" of the surficial aquifer can be collected. Sample data from this well will provide information on the quality of groundwater below the dolomite.

CEF-3-31S The proposed screened interval is 20 to 30 feet bls, the zone where the highest concentration of target compounds generally occur. This well will be located between direct-push sample locations GS-3-53 and GS-3-70EX. Analytical groundwater data from this well will be used to characterize groundwater conditions at the eastern (downgradient) extent of the contaminant plume.

CEF-3-32D The proposed screened interval is 60 to 70 feet bls or the 10 feet just above the dolomite. This well will be adjacent to CEF-3-31S. Analytical data will be used to assess groundwater conditions at the base of the surficial aquifer.

CEF-3-33DD This proposed well is to be located adjacent to proposed well CEF-3-15D. The proposed screened interval is 105 to 115 feet bls or some suitable interval within the dolomite so that a groundwater sample from the "rock aquifer" of the surficial aquifer can be collected. Sample data from this well will provide information on the quality of groundwater below the dolomite.

Attachment A
Field Screening Data
Figures

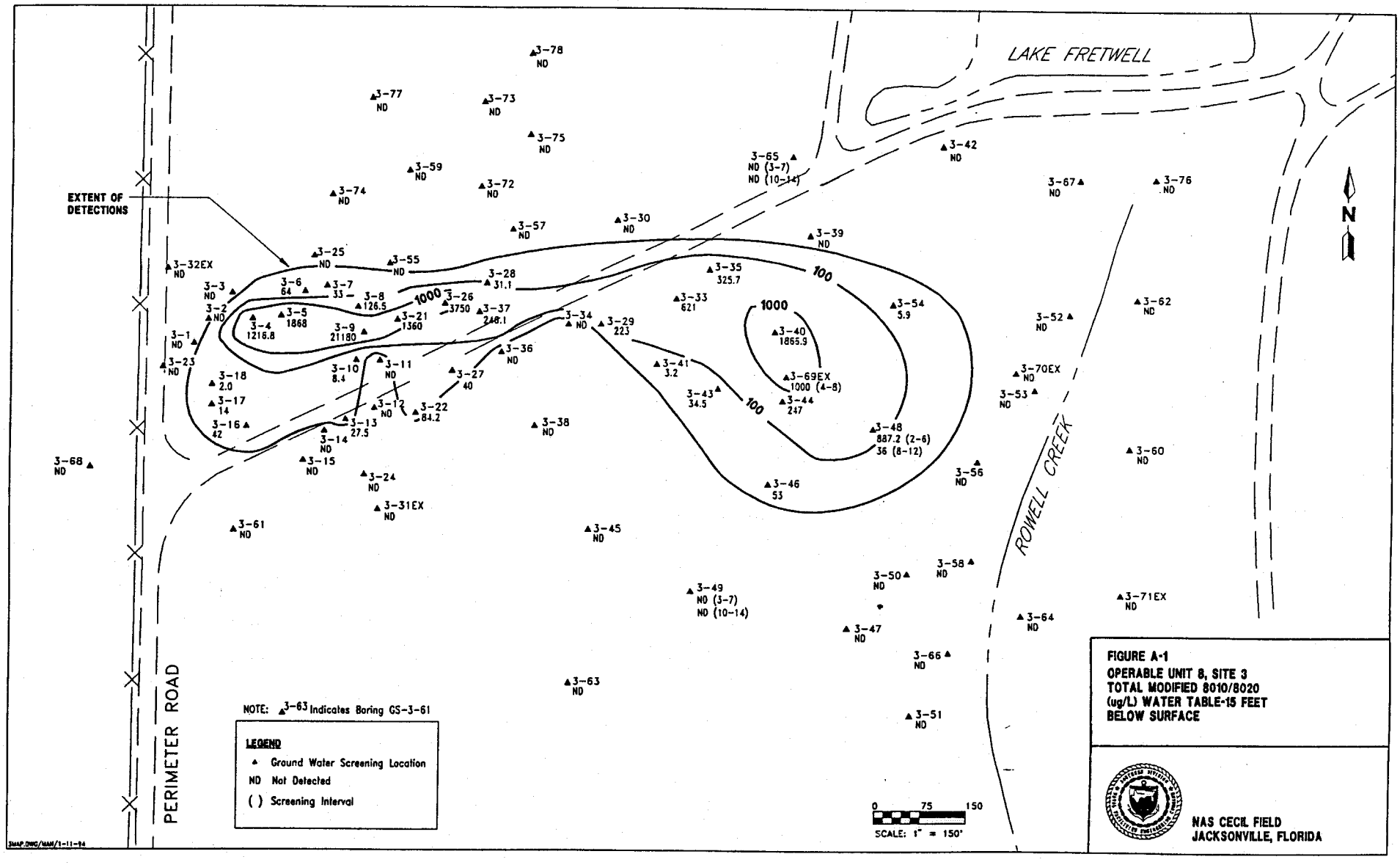


FIGURE A-1
OPERABLE UNIT 8, SITE 3
TOTAL MODIFIED 8010/8020
(ug/L) WATER TABLE-15 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

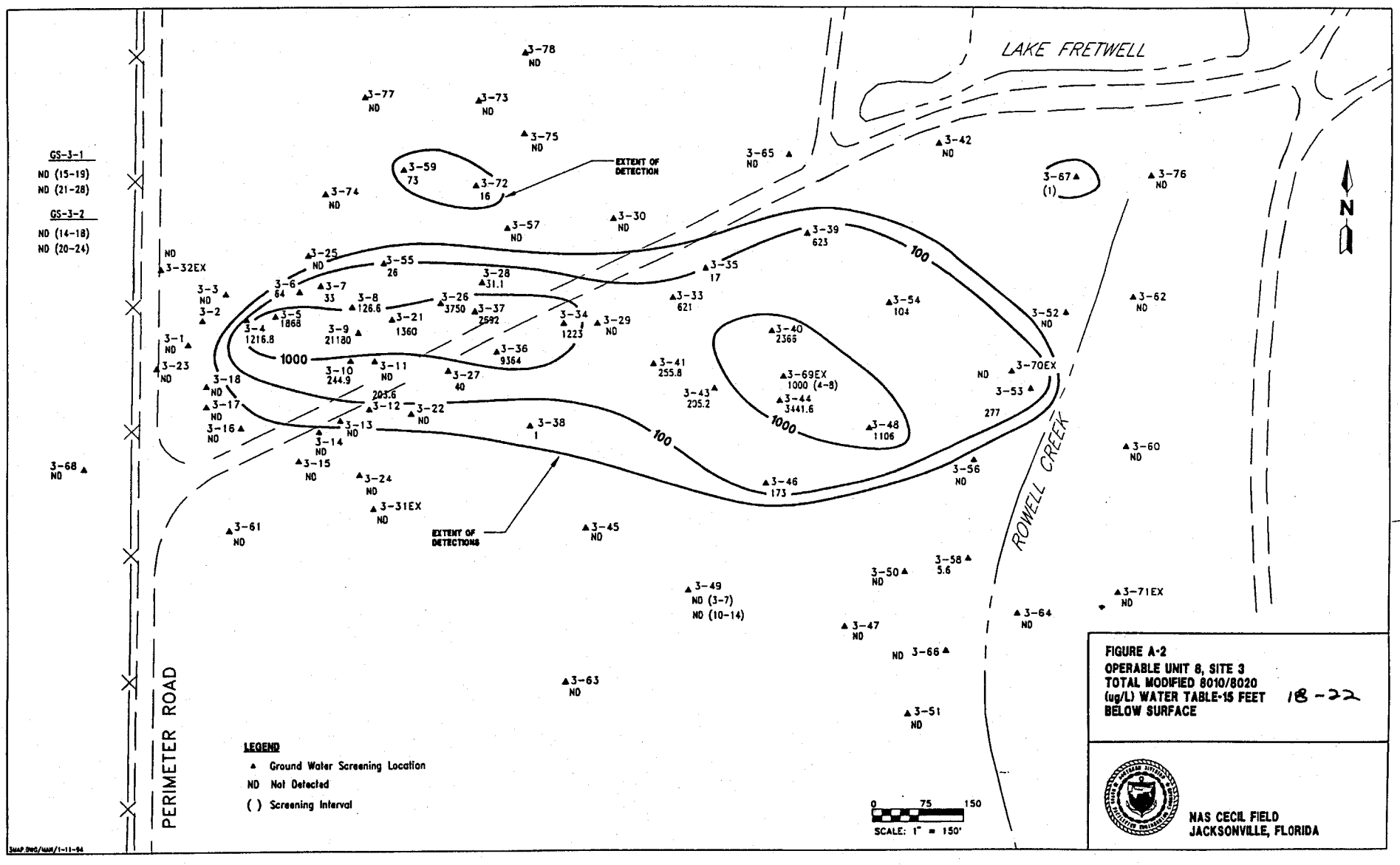
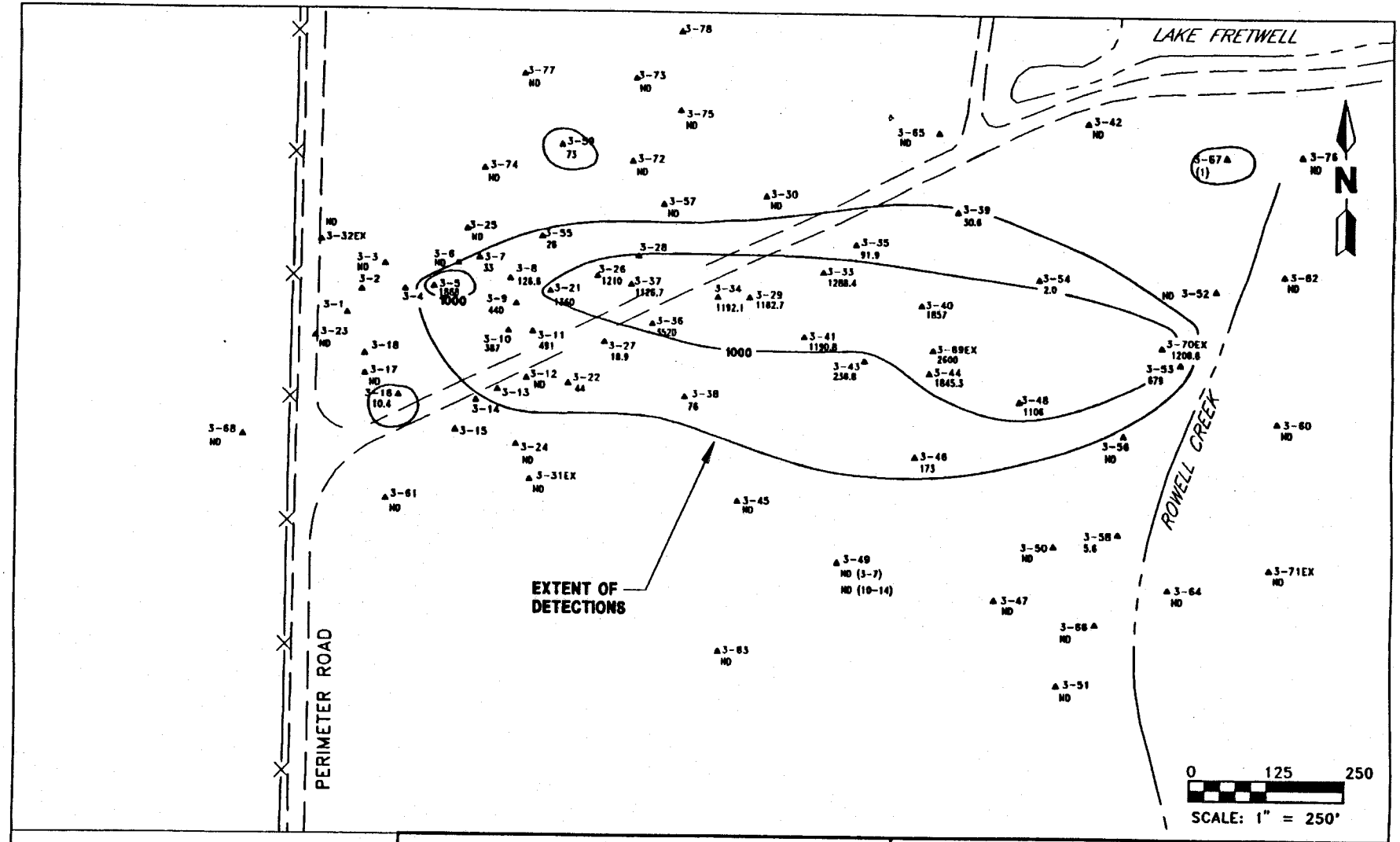


FIGURE A-2
OPERABLE UNIT 8, SITE 3
TOTAL MODIFIED 8010/8020 (ug/L) WATER TABLE-15 FEET BELOW SURFACE

18-22

NAS CECIL FIELD
JACKSONVILLE, FLORIDA



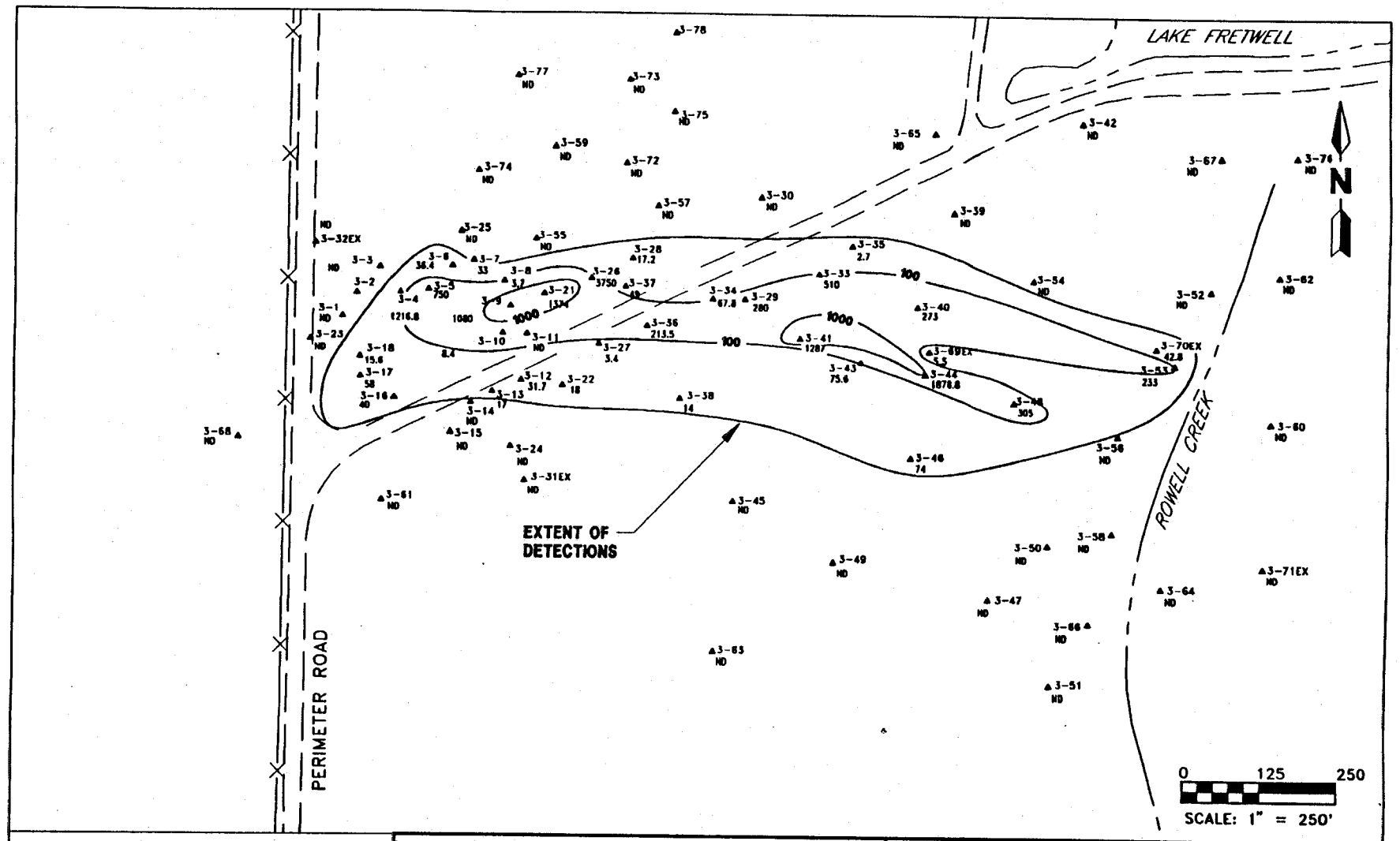
LEGEND

- ▲ Ground Water Screening Location
- ND Not Detected
- NS Not Sampled
- ( ) Not Quantified Due to Matrix Interference

3MAP.DWG\MAH\11-29-93

FIGURE A-3
OPERABLE UNIT 8, SITE 3
TOTAL MODIFIED 8010/8020
(ug/L) WATER TABLE 26-32 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA



LEGEND

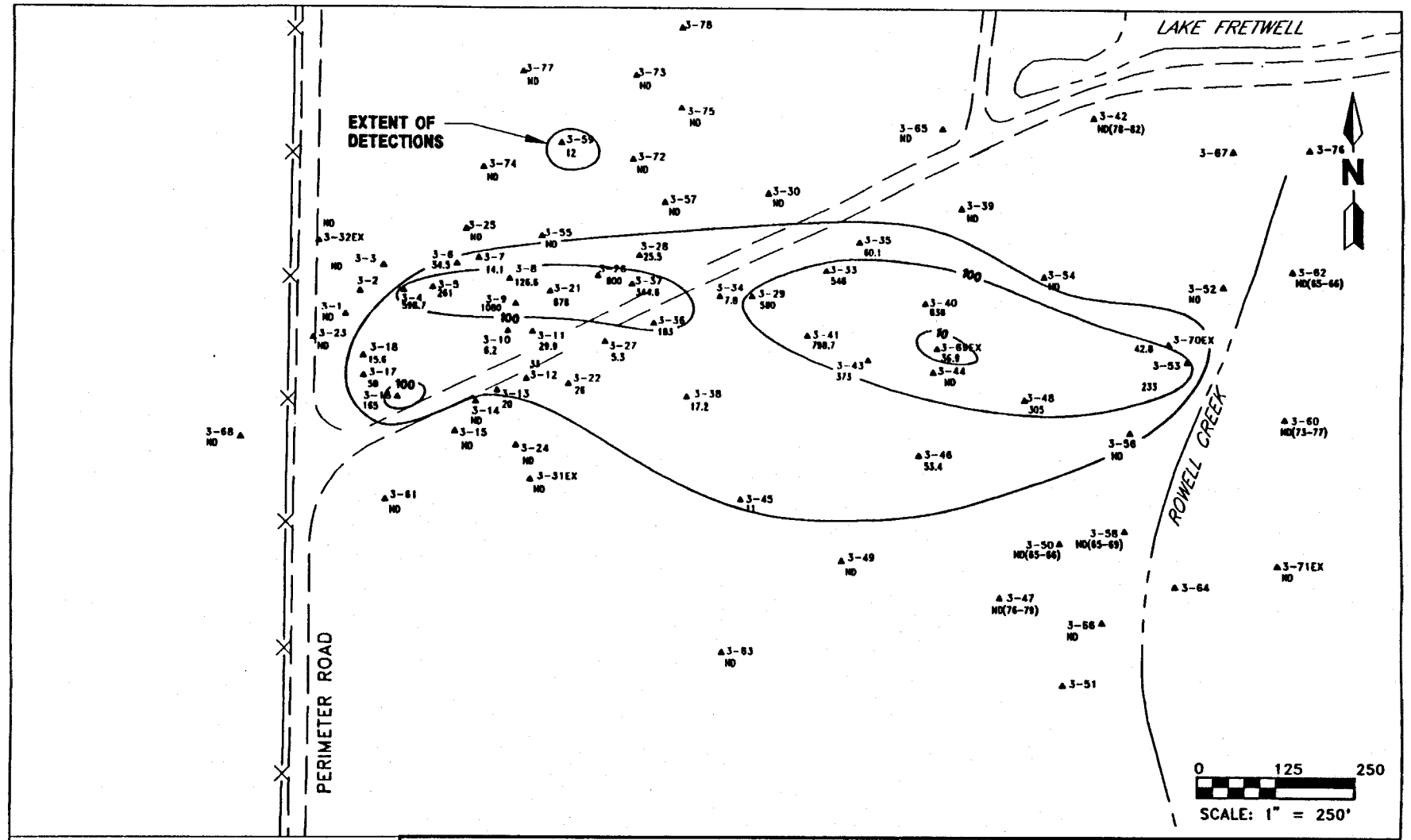
▲ Ground Water Screening Location

ND Not Detected

3MAP.DWG\MAP\11-29-93

FIGURE A-4
OPERABLE UNIT 8, SITE 3
TOTAL MODIFIED 8010/8020
(ug/L) WATER TABLE 46-56 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA



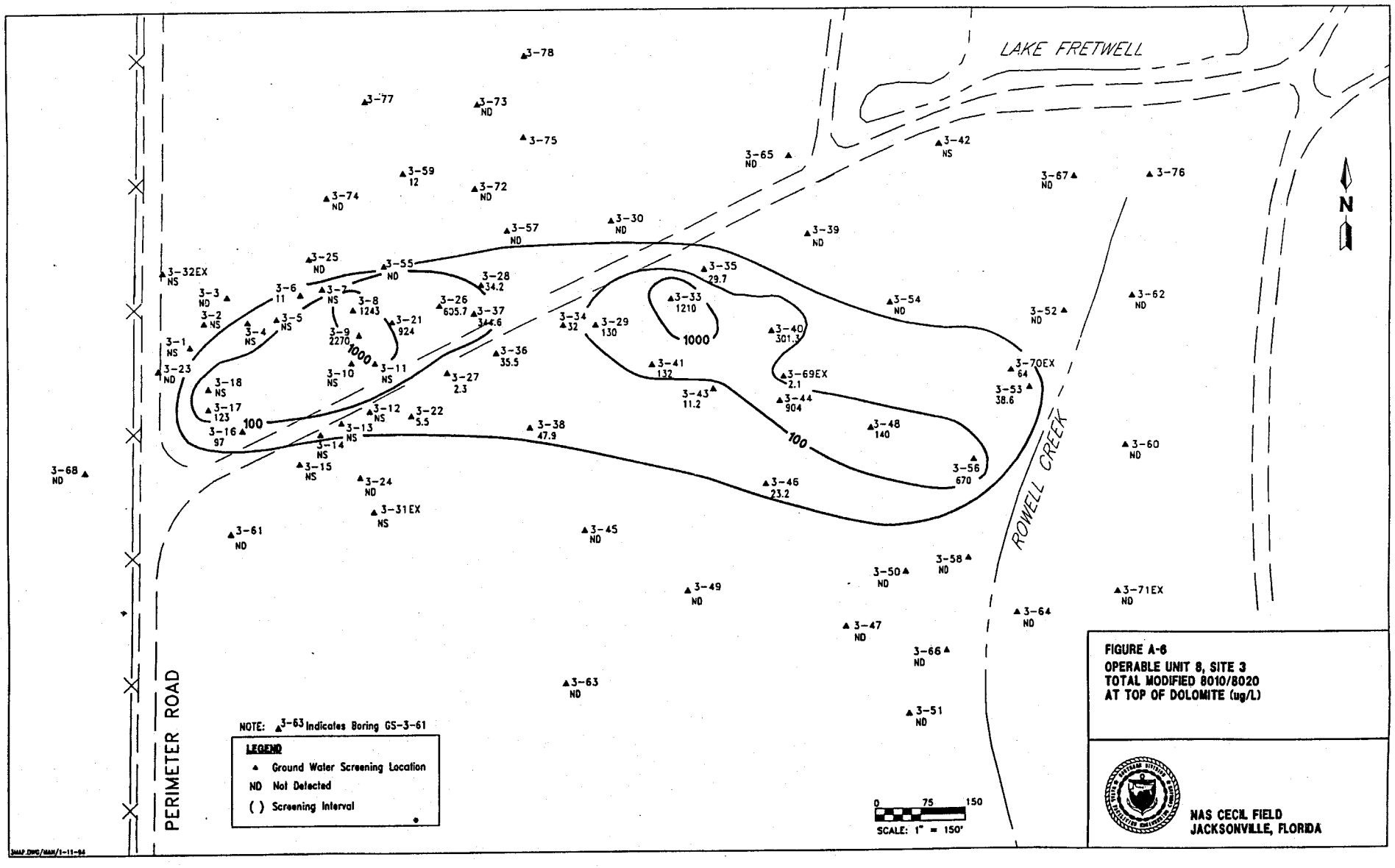
LEGEND

- ▲ Ground Water Screening Location
- ND Not Detected
- NS Not Sampled
- ( ) Screening Interval

3MAP.DWG\MAH\11-29-93

FIGURE A-5
OPERABLE UNIT 8, SITE 3
TOTAL MODIFIED 8010/8020
(ug/L) WATER TABLE 67-76 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA


LAKE FRETWELL
ROWELL CREEK
PERIMETER ROAD
N
3-78
3-77
3-73 ND
3-75
3-59 12
3-72 ND
3-74 ND
3-57 ND
3-30 ND
3-65 ND
3-42 NS
3-67 ND
3-76
3-39 ND
3-25 ND
3-55 ND
3-32EX NS
3-3 ND
3-2 NS
3-6 11
3-7 NS
3-8 1243
3-26 605.7
3-37 344.6
3-28 34.2
3-35 29.7
3-33 1210
3-54 ND
3-52 ND
3-62 ND
3-1 NS
3-4 NS
3-5 NS
3-9 2270
3-21 924
3-34 32
3-29 130
3-40 301.3
3-36 35.5
3-23 ND
3-10 NS
3-11 NS
3-27 2.3
3-41 132
3-69EX 2.1
3-70EX 64
3-53 38.6
3-18 NS
3-17 123
3-16 97
3-12 NS
3-22 5.5
3-43 11.2
3-44 904
3-48 140
3-13 NS
3-14 NS
3-15 NS
3-38 47.9
3-56 670
3-60 ND
3-68 ND
3-24 ND
3-46 23.2
3-31EX NS
3-61 ND
3-45 ND
3-58 ND
3-50 ND
3-49 ND
3-71EX ND
3-64 ND
3-47 ND
3-66 ND
3-63 ND
3-51 ND
1000
100
NOTE: 3-63 Indicates Boring GS-3-61
LEGEND
Ground Water Screening Location
ND Not Detected
( ) Screening Interval
0 75 150
SCALE: 1" = 150'
FIGURE A-6
OPERABLE UNIT 8, SITE 3
TOTAL MODIFIED 8010/8020
AT TOP OF DOLOMITE (ug/L)
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

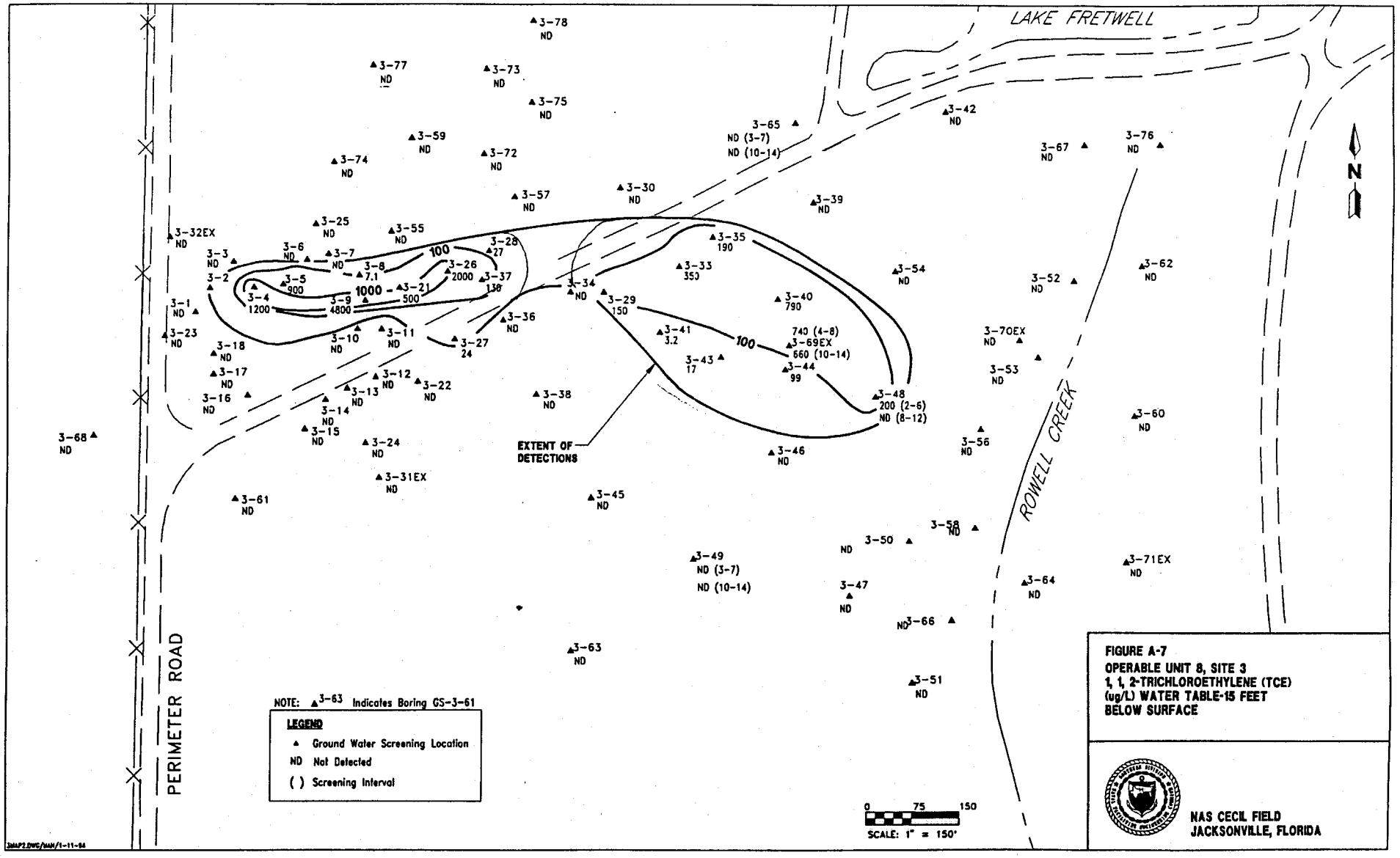


FIGURE A-7
OPERABLE UNIT 8, SITE 3
1, 1, 2-TRICHLOROETHYLENE (TCE)
(ug/L) WATER TABLE-15 FEET
BELOW SURFACE

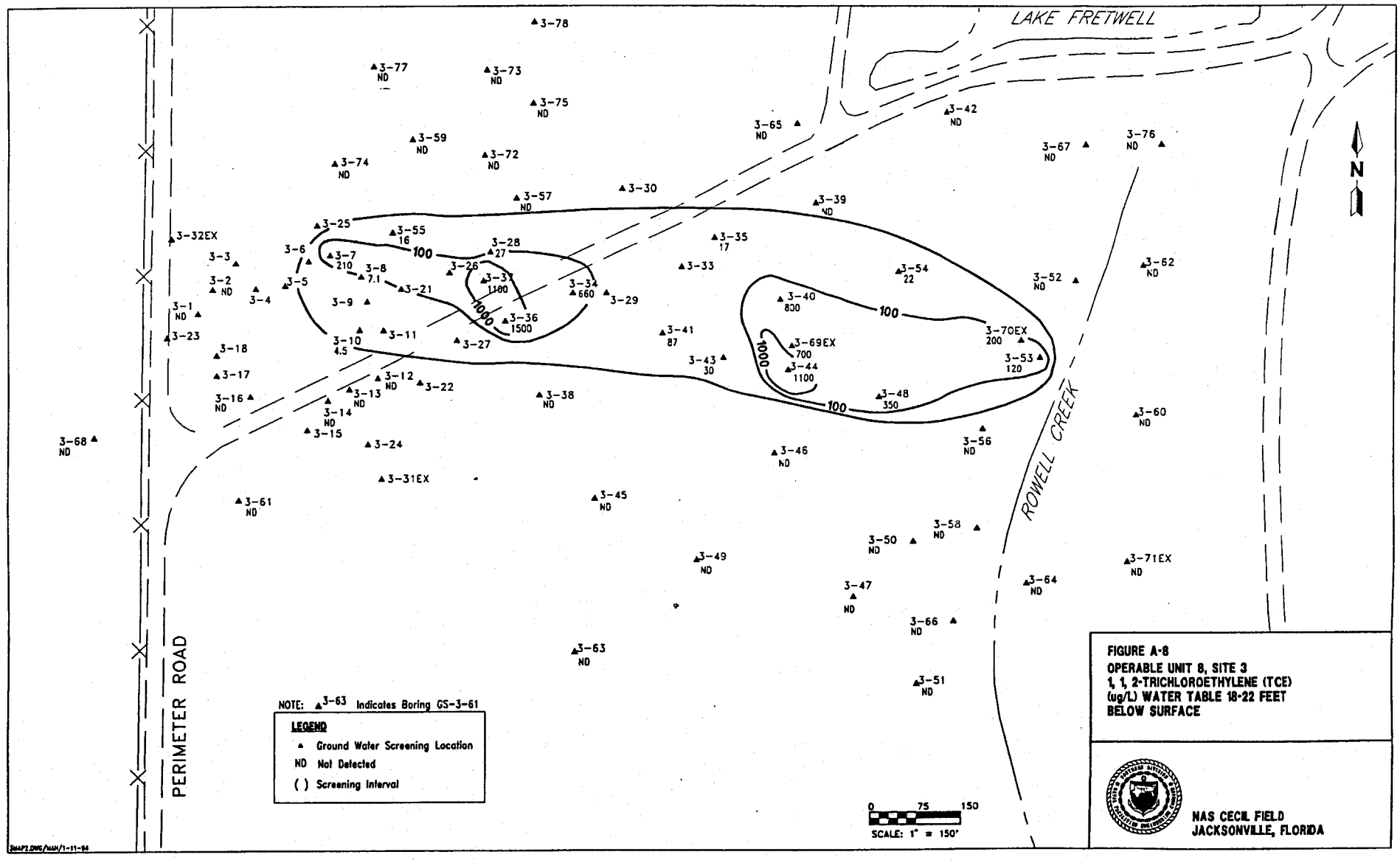


FIGURE A-8
OPERABLE UNIT 8, SITE 3
1, 1, 2-TRICHLOROETHYLENE (TCE)
(ug/L) WATER TABLE 18-22 FEET
BELOW SURFACE

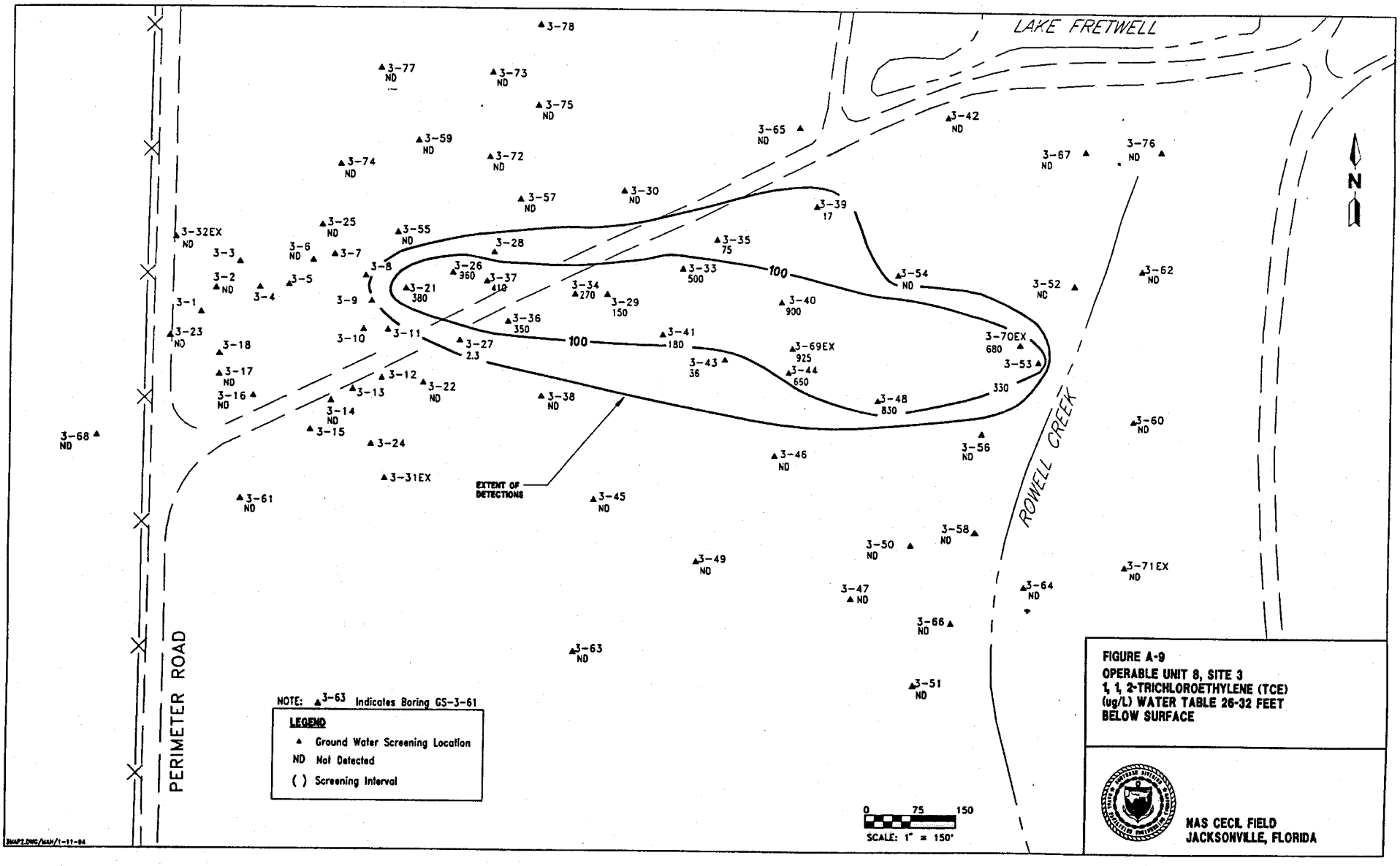


FIGURE A-9
OPERABLE UNIT 8, SITE 3
1, 1, 2-TRICHLOROETHYLENE (TCE)
(ug/L) WATER TABLE 26-32 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

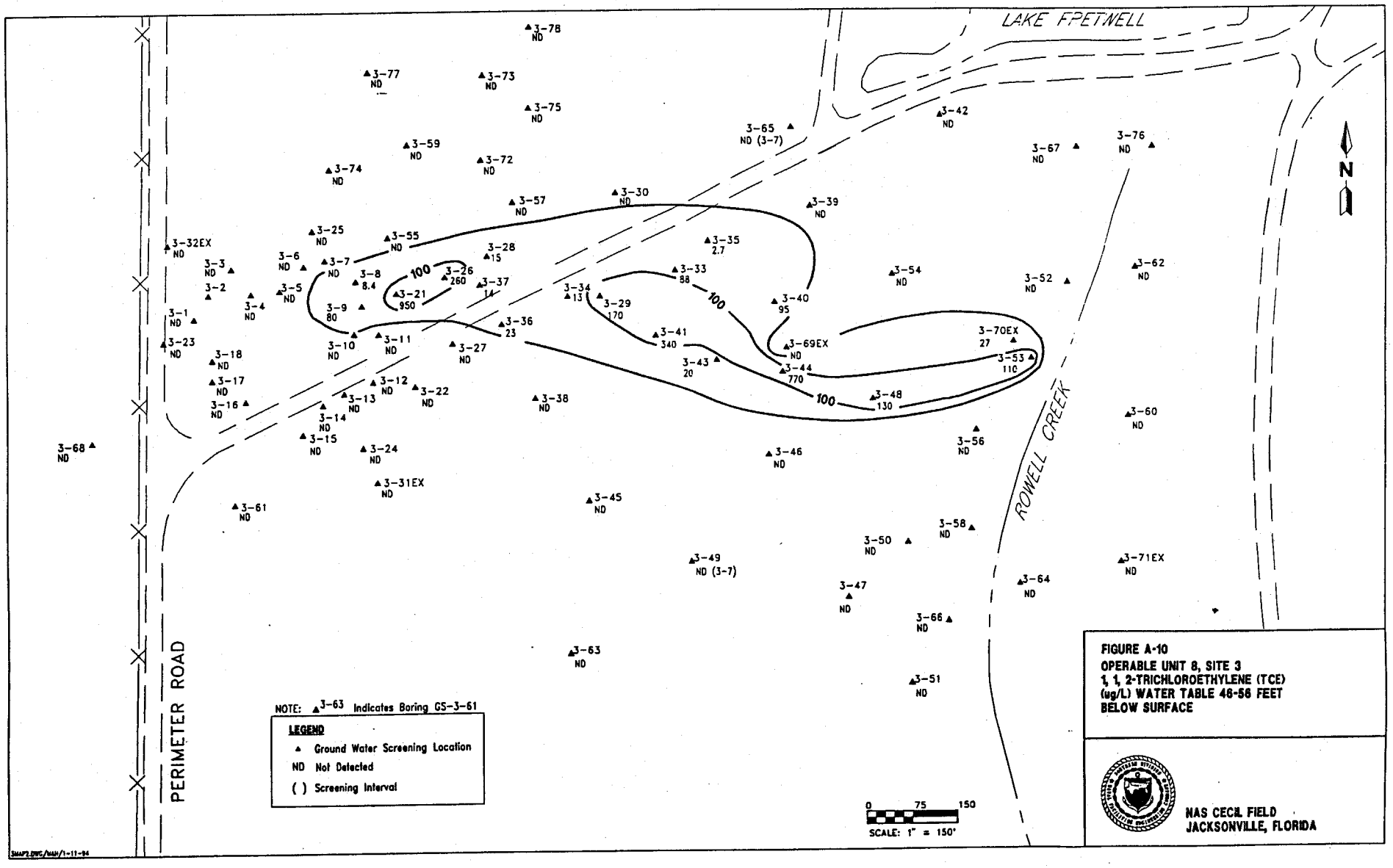


FIGURE A-10
OPERABLE UNIT 8, SITE 3
1, 1, 2-TRICHLOROETHYLENE (TCE)
(ug/L) WATER TABLE 46-56 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

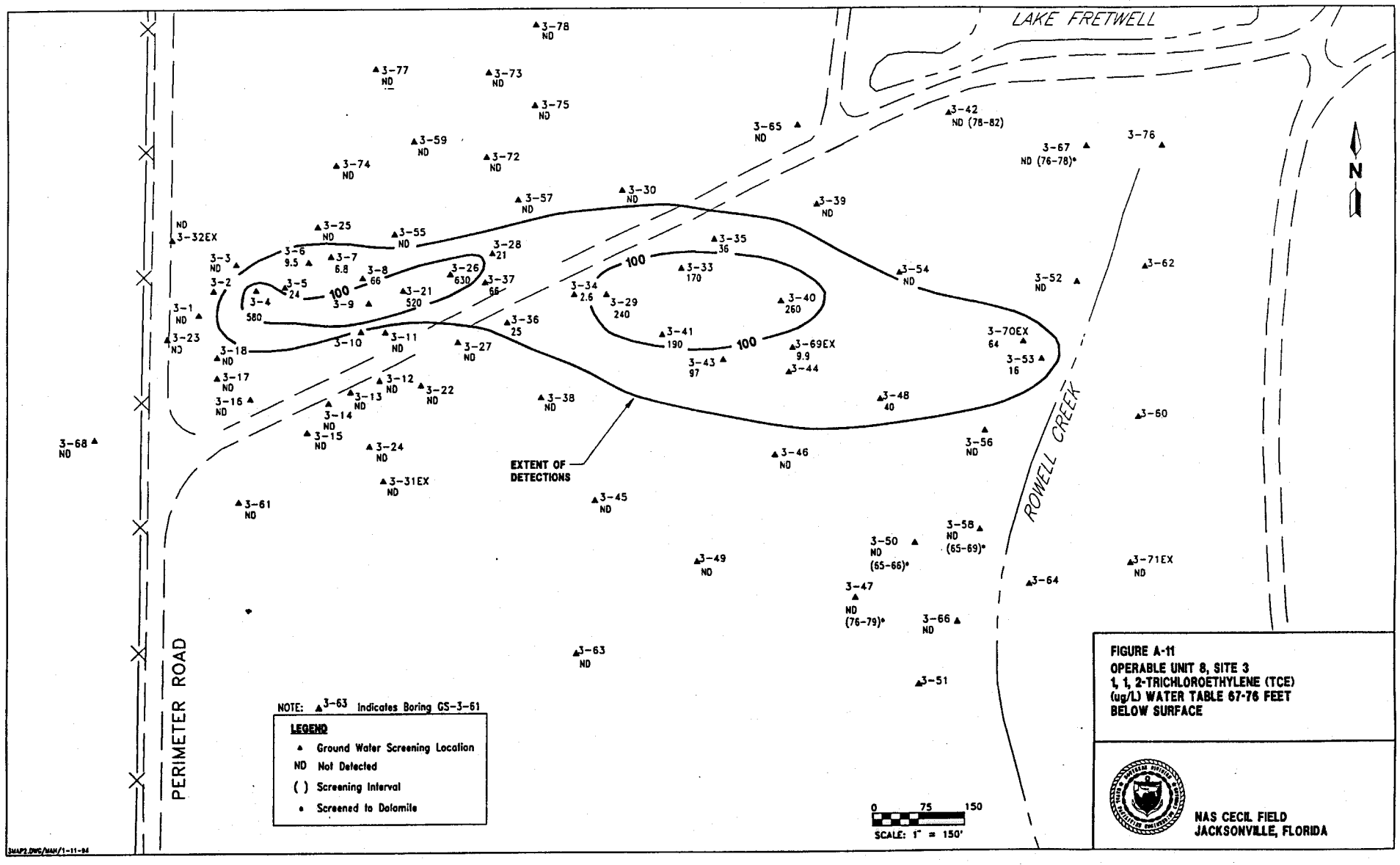


FIGURE A-11
OPERABLE UNIT 8, SITE 3
1, 1, 2-TRICHLOROETHYLENE (TCE)
(ug/L) WATER TABLE 67-76 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

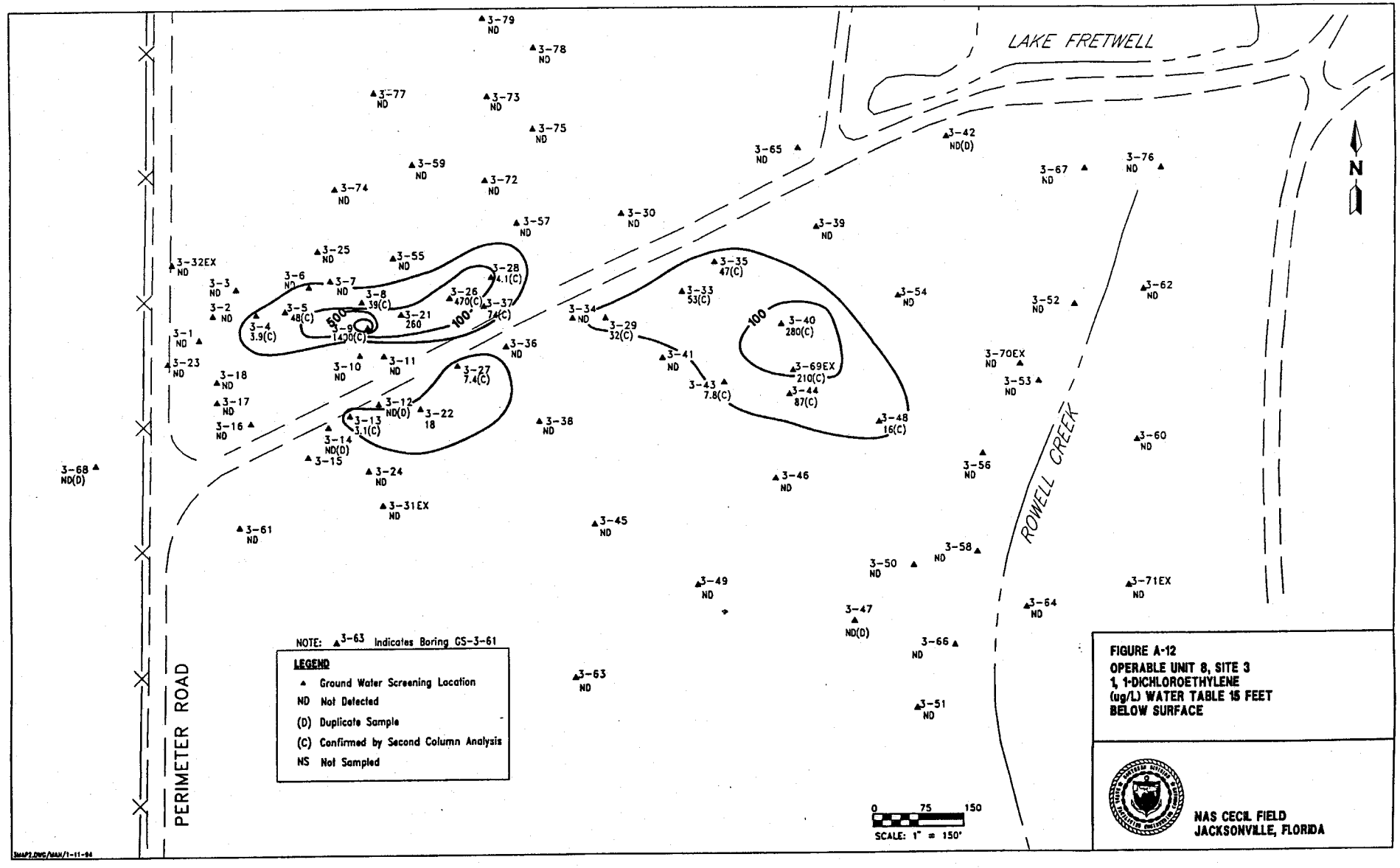


FIGURE A-12
OPERABLE UNIT 8, SITE 3
1, 1-DICHLOROETHYLENE
(ug/L) WATER TABLE 15 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

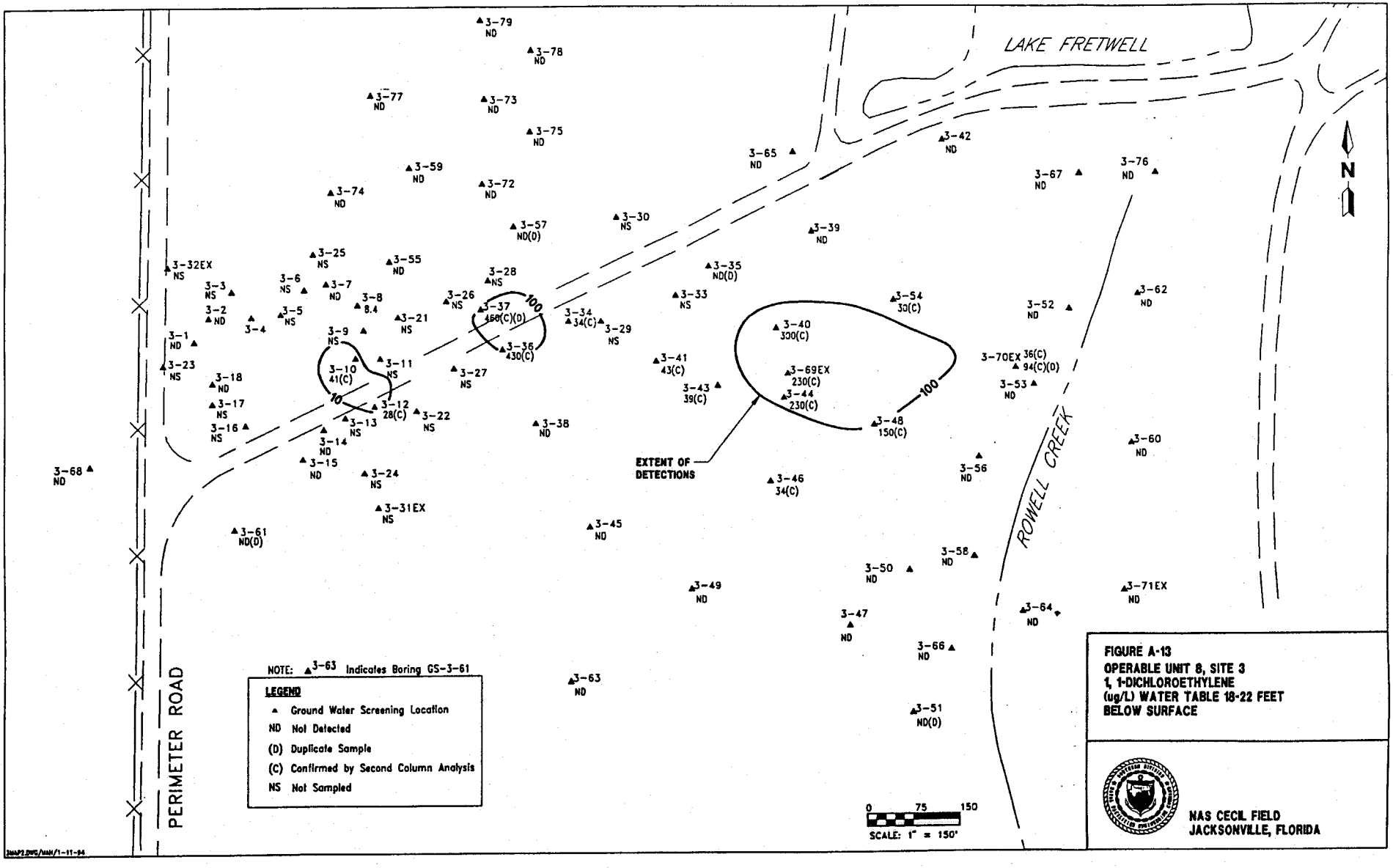


FIGURE A-13
OPERABLE UNIT 8, SITE 3
1, 1-DICHLOROETHYLENE
(ug/L) WATER TABLE 18-22 FEET
BELOW SURFACE

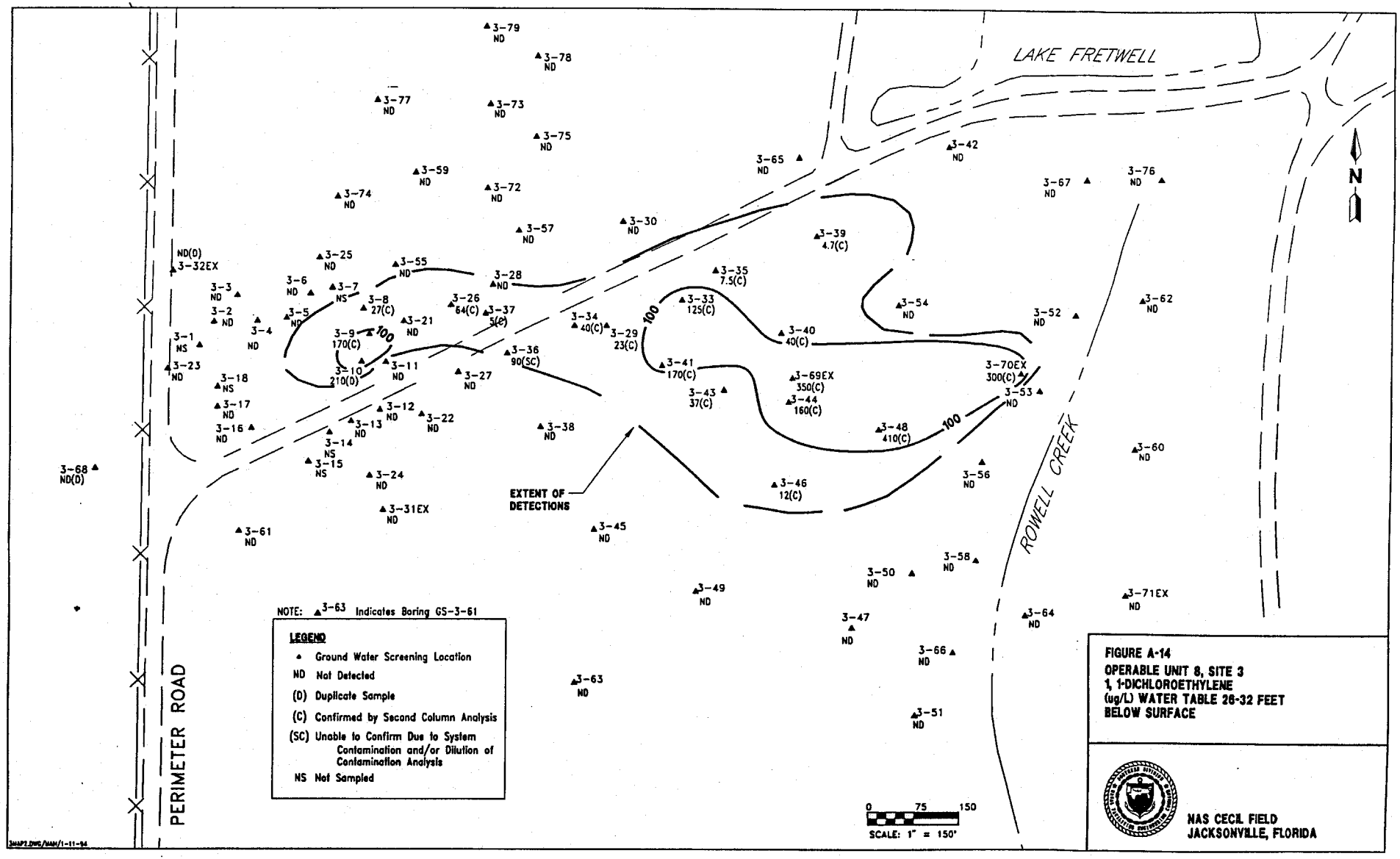


FIGURE A-14
OPERABLE UNIT 8, SITE 3
1, 1-DICHLOROETHYLENE
(ug/L) WATER TABLE 26-32 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

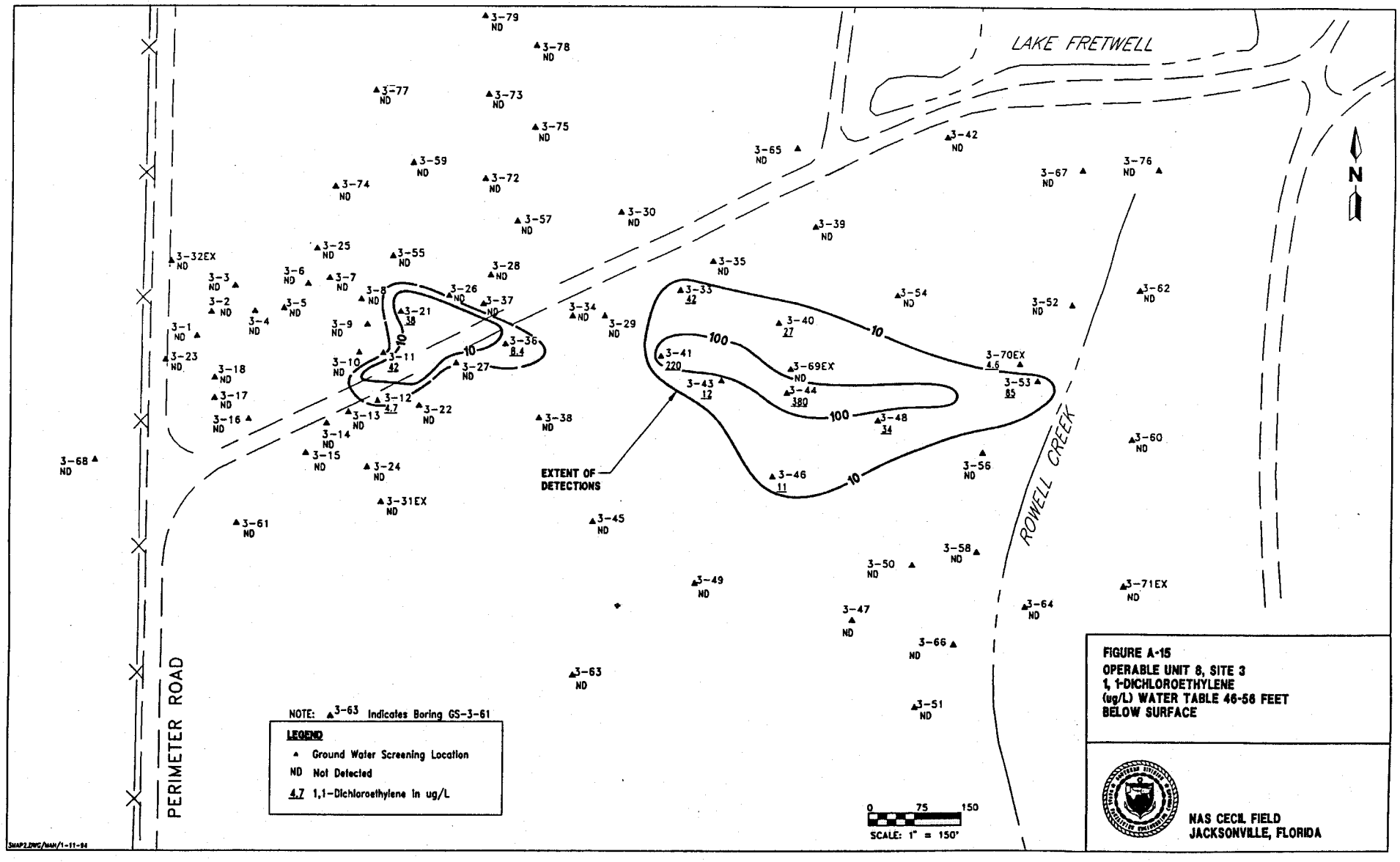


FIGURE A-15
OPERABLE UNIT 8, SITE 3
1, 1-DICHLOROETHYLENE
(ug/L) WATER TABLE 46-56 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

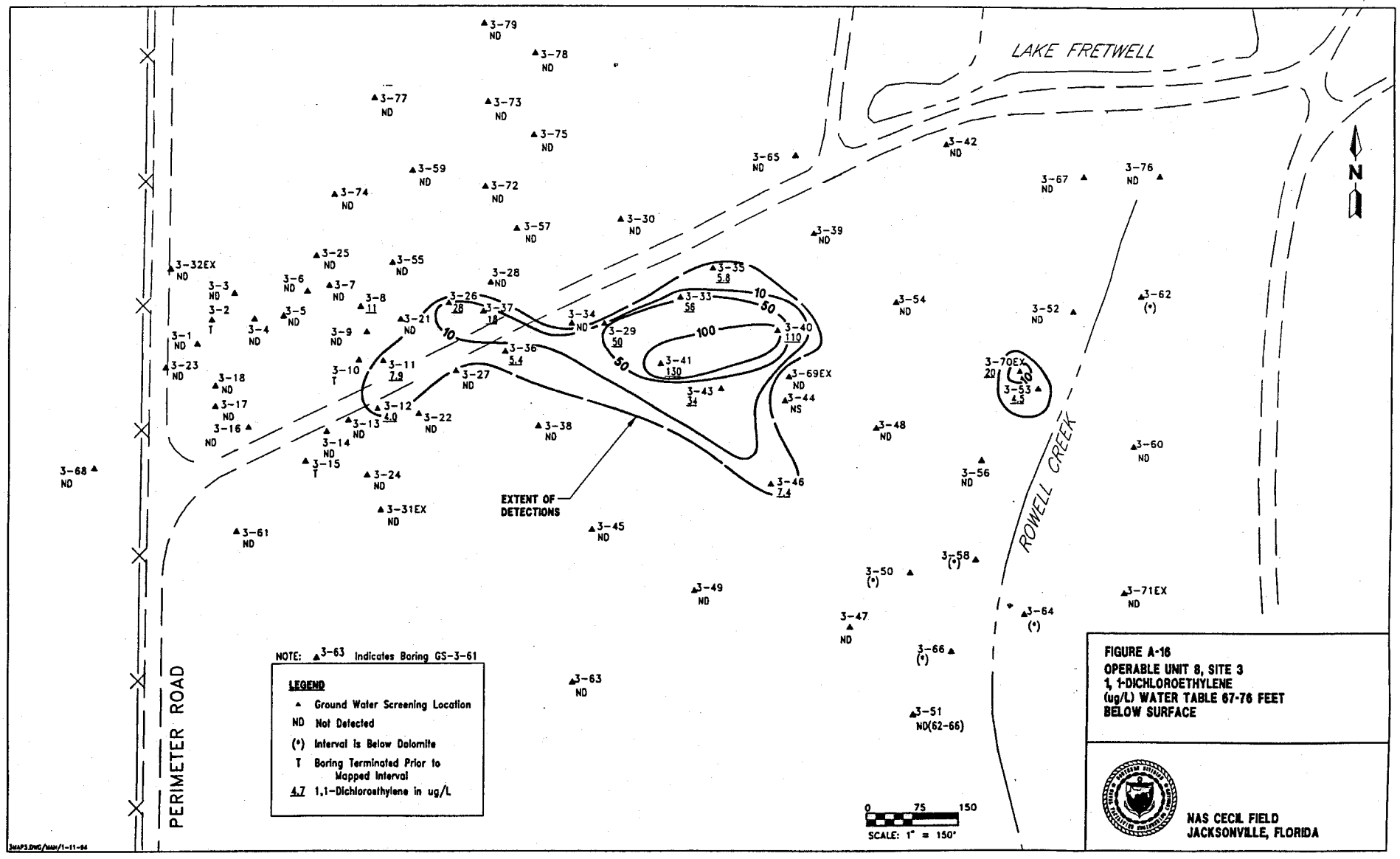


FIGURE A-16
OPERABLE UNIT 8, SITE 3
1, 1-DICHLOROETHYLENE
(ug/L) WATER TABLE 67-76 FEET
BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

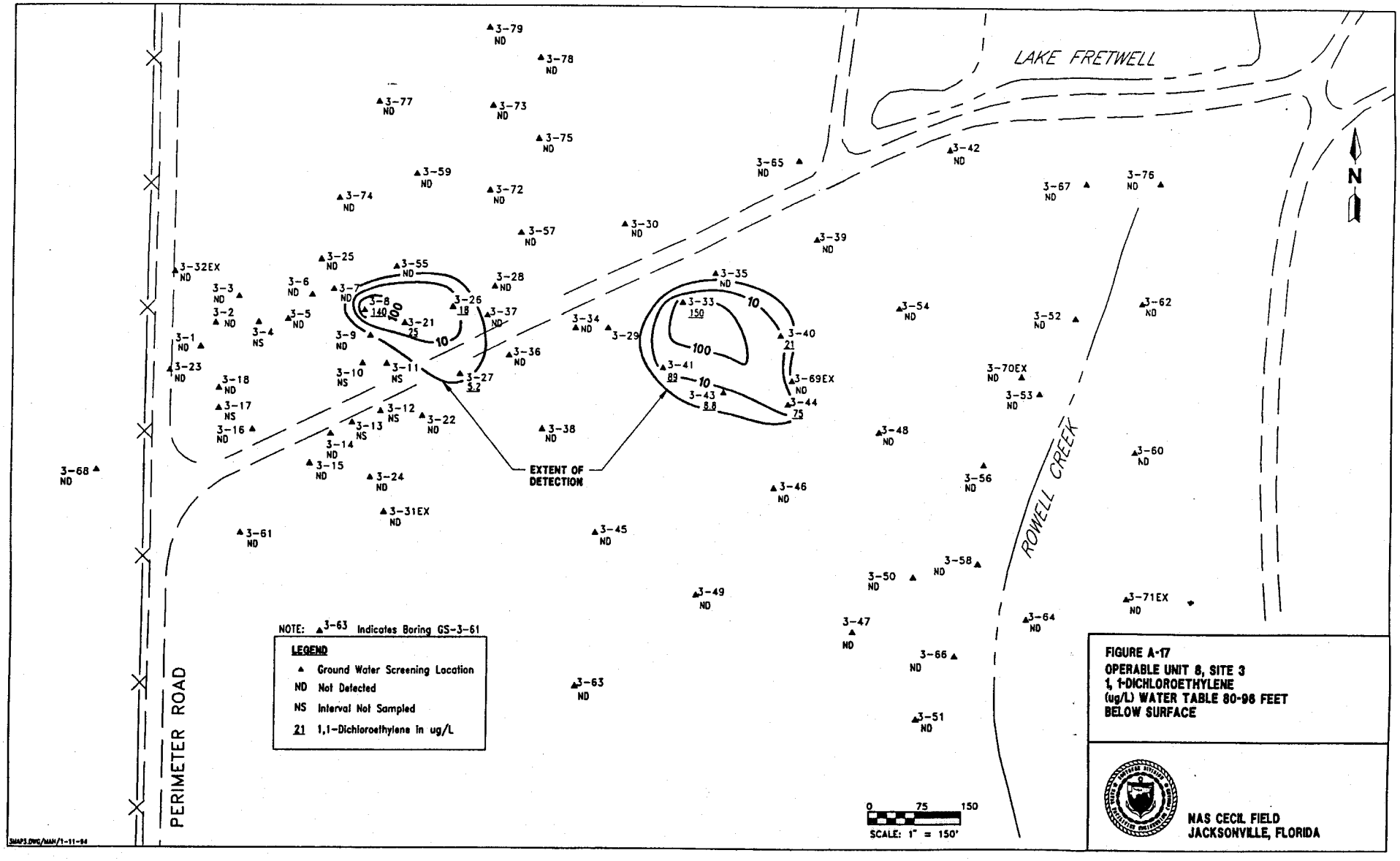
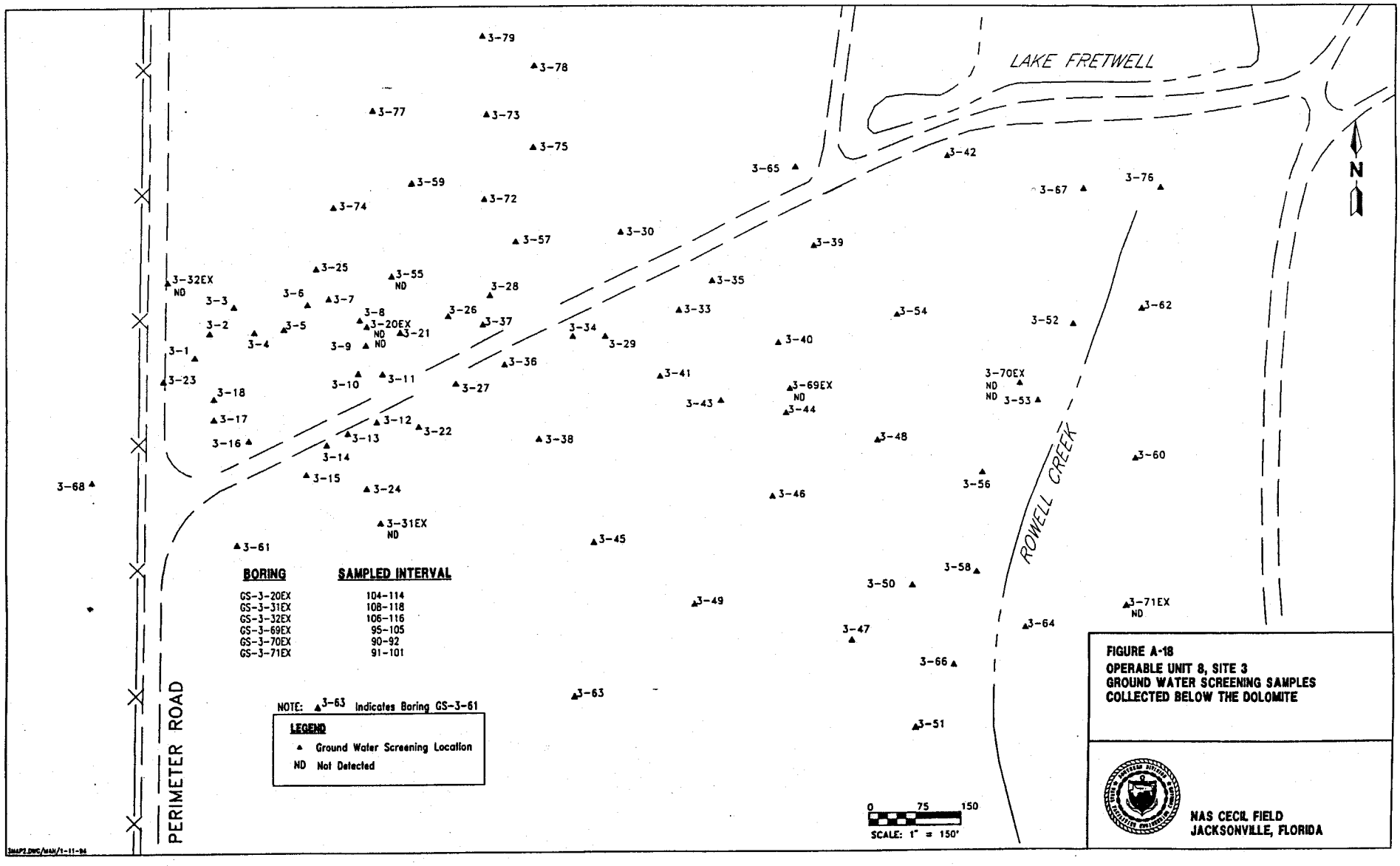


FIGURE A-17
OPERABLE UNIT 8, SITE 3
1, 1-DICHLOROETHYLENE (ug/L) WATER TABLE 80-98 FEET BELOW SURFACE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

SMAP3.DWG/MAN/1-11-94



BORING	SAMPLED INTERVAL
GS-3-20EX	104-114
GS-3-31EX	108-118
GS-3-32EX	106-116
GS-3-69EX	95-105
GS-3-70EX	90-92
GS-3-71EX	91-101

NOTE: ▲3-63 Indicates Boring GS-3-61

LEGEND

▲ Ground Water Screening Location

ND Not Detected

FIGURE A-18
OPERABLE UNIT 8, SITE 3
GROUND WATER SCREENING SAMPLES
COLLECTED BELOW THE DOLOMITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

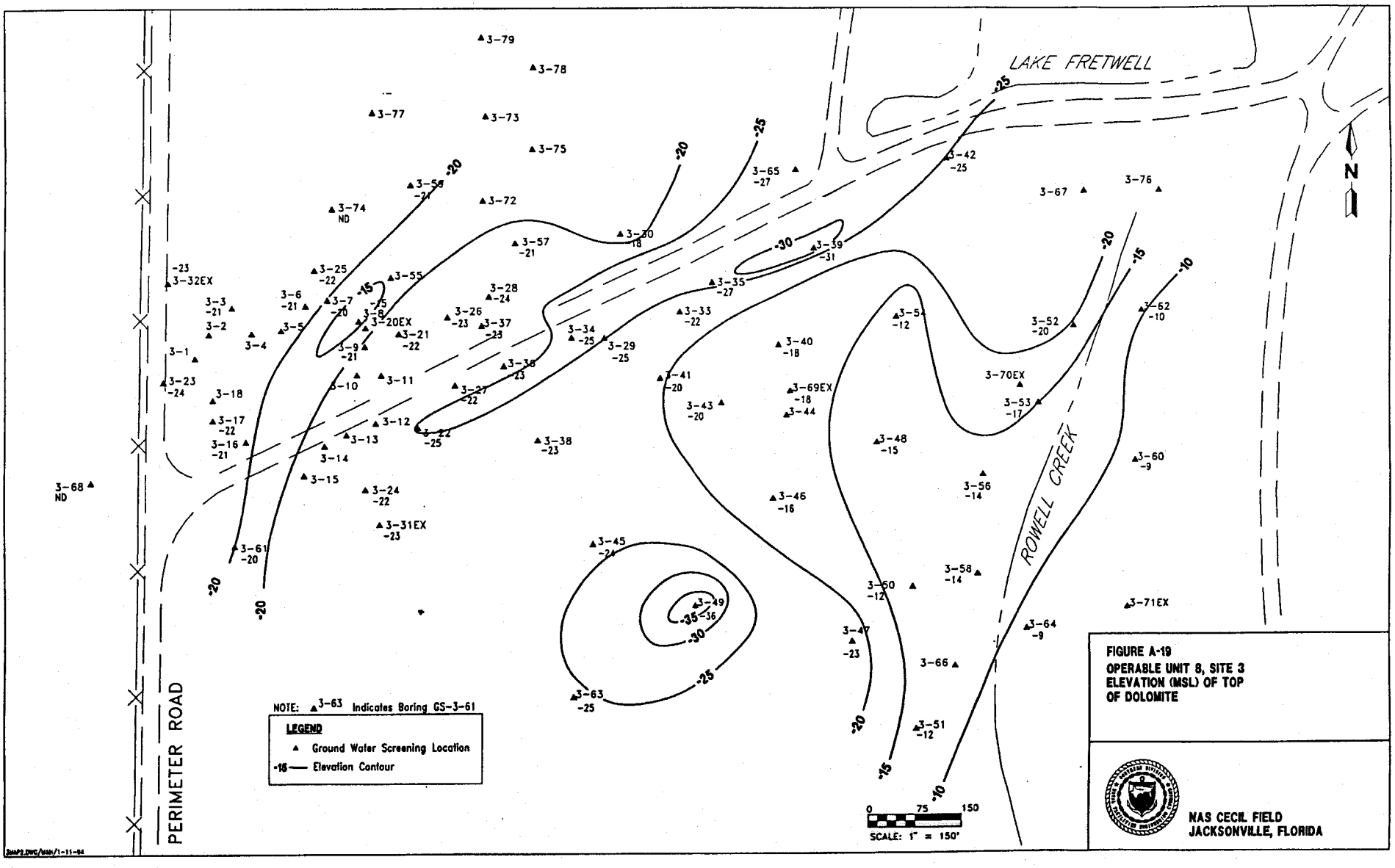


FIGURE A-19
OPERABLE UNIT 8, SITE 3
ELEVATION (MSL) OF TOP
OF DOLOMITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

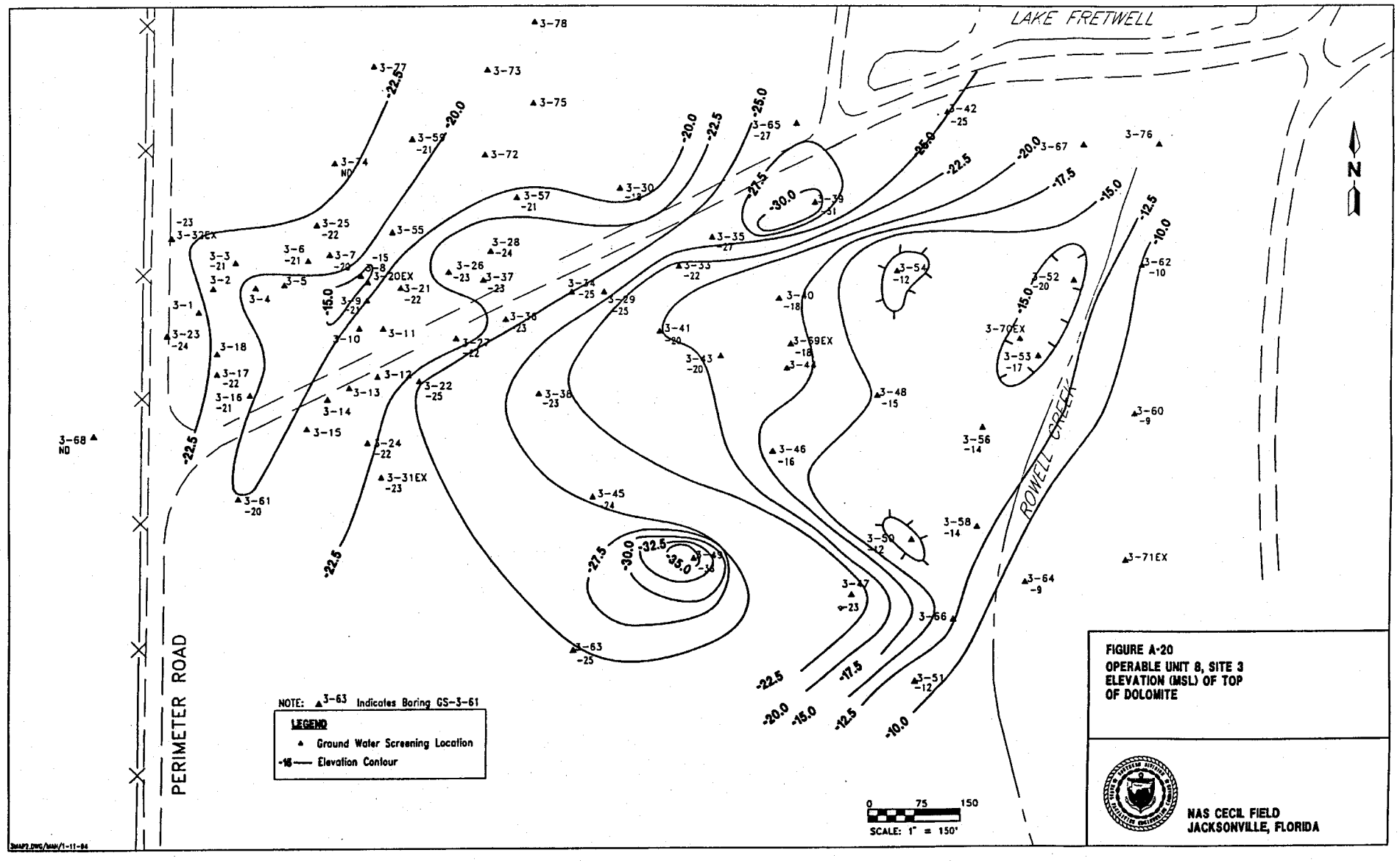


FIGURE A-20
OPERABLE UNIT 8, SITE 3
ELEVATION (MSL) OF TOP
OF DOLOMITE

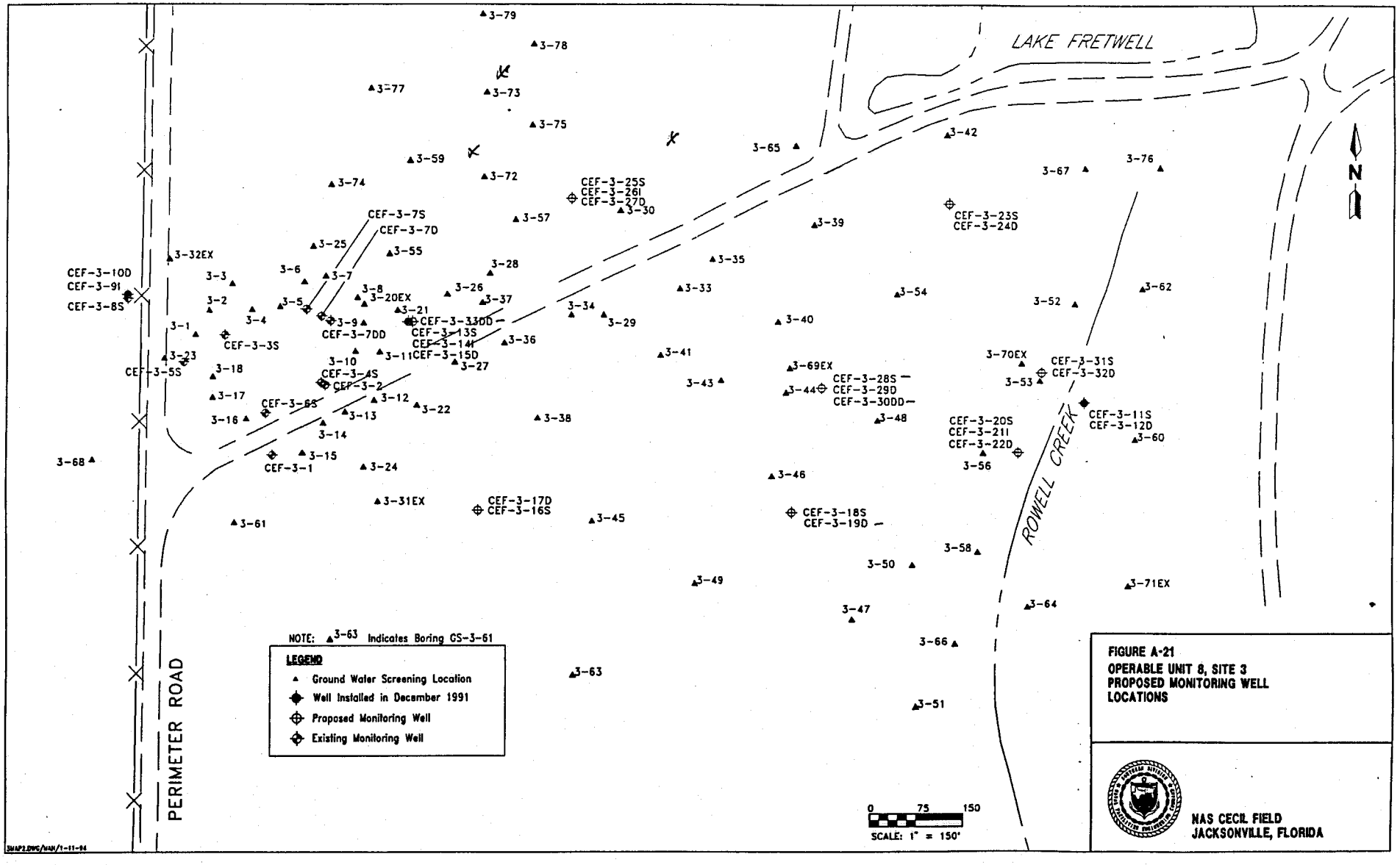


FIGURE A-21
OPERABLE UNIT 8, SITE 3
PROPOSED MONITORING WELL
LOCATIONS

Attachment B
Field Screening Data
Complete Data Set

SEE APPENDIX D

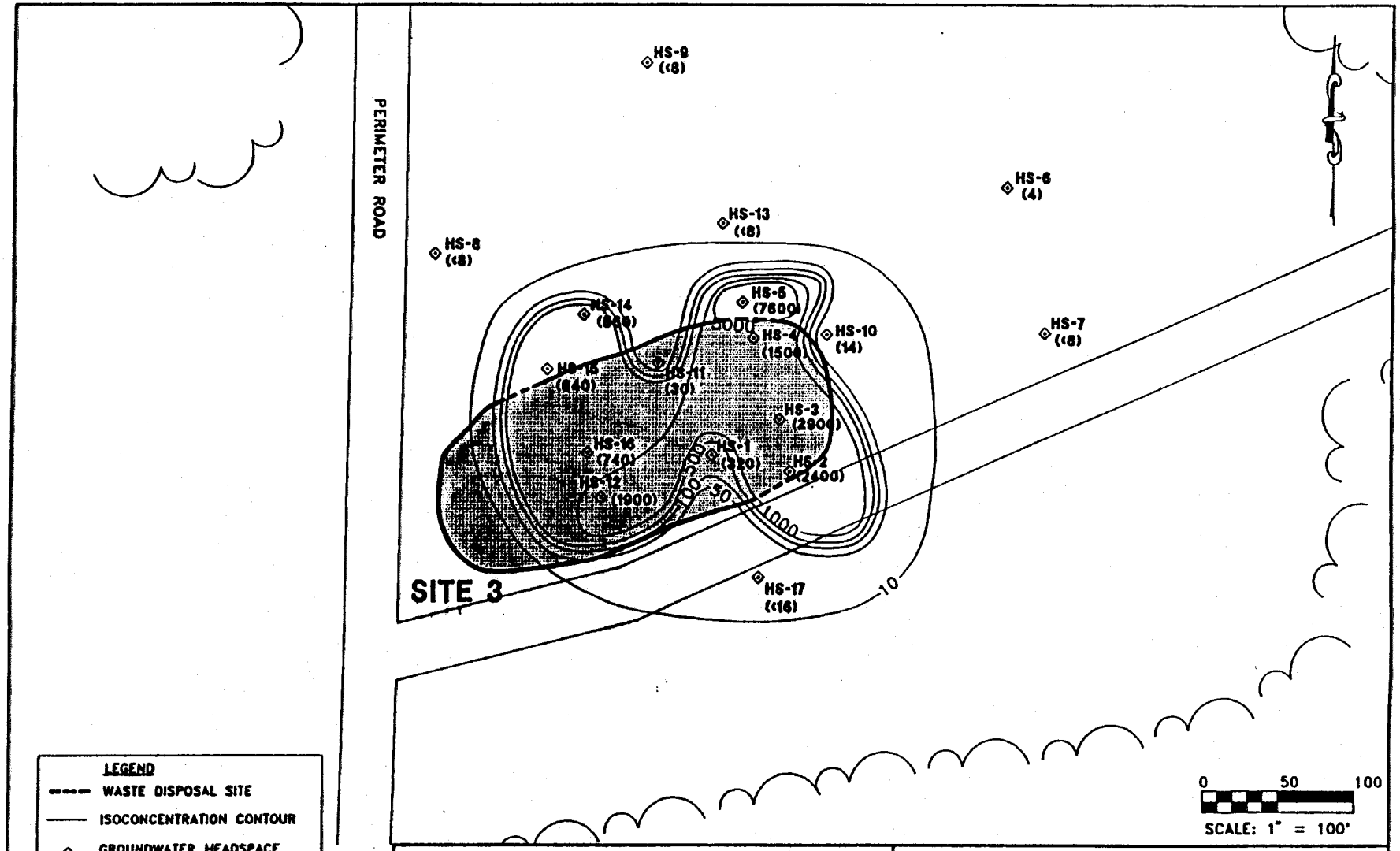
Attachment C
Groundwater Sampling Data from
Previous Investigations

Table 5-8
Groundwater Screening Analytical Summary, Operable Unit 2, Site 3

Technical Memorandum for Supplemental Sampling
NAS Cecil Field
Jacksonville, Florida

Sample	TCA (µg/ℓ)	TCE (µg/ℓ)	PCE (µg/ℓ)	Benzene (µg/ℓ)	Toluene (µg/ℓ)	Ethyl Benzene (µg/ℓ)	Xylenes (µg/ℓ)	TVHC (µg/ℓ)
HS-1-5'	1	0.07	0.06	<3	93	<11	<20	320
HS-2-5'	12	0.1	<0.01	<3	290	<11	170	2,400
HS-3-5'	75	2	<0.01	<3	460	<11	80	2,900
HS-4-5'	430	120	<0.1	<3	170	<11	<20	1,500
HS-5-5'	3,600	640	<1	<3	320	<11	230	7,600
HS-6-5'	0.07	<0.02	<0.007	<1	<3	<5	<10	4
HS-7-5'	<0.004	<0.02	<0.007	<1	<3	<5	<10	<8
HS-8-5'	0.006	<0.02	<0.007	<1	<3	<5	<10	<8
HS-9-5'	<0.004	<0.02	<0.007	<1	<3	<5	<10	<8
HS-10-5'	0.01	0.08	0.07	<1	<3	<5	<10	14
HS-11-5'	0.6	1	<0.008	<1	<2	<6	<11	30
HS-12-5'	510	1	<0.08	<3	370	<11	<22	1,900
HS-13-5'	0.9	<0.01	<0.004	<1	<2	<6	<11	<8
HS-14-5'	1	2	<0.008	<1	52	<6	<11	560
HS-15-5'	10	17	0.4	<3	140	<11	<22	840
HS-16-5'	530	5	<0.08	<3	71	<11	<22	740
HS-17-10'	0.1	<0.02	<0.008	<3	<5	<11	<22	<16

Notes: TCA = trichloroethane.
TCE = trichloroethene.
PCE = tetrachloroethene.
TVHC = total volatile hydrocarbons.
µg/ℓ = micrograms per liter.
HS-1-5' = Sample identifier and location number; sample collected from 5 feet below land surface (bls).



LEGEND

- WASTE DISPOSAL SITE
- ISOCONCENTRATION CONTOUR
- GROUNDWATER HEADSPACE SAMPLE LOCATION
- (XXX) TOTAL VOLATILE ORGANIC HYDROCARBONS (ug/L)

FIGURE 5-6
ISOCONCENTRATION CONTOURS OF GROUNDWATER HEADSPACE ANALYSES FOR TOTAL VOLATILE ORGANIC HYDROCARBONS, SITE 3

TECHNICAL MEMORANDUM FOR SUPPLEMENTAL SAMPLING AT OUs 1, 2, AND 7

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

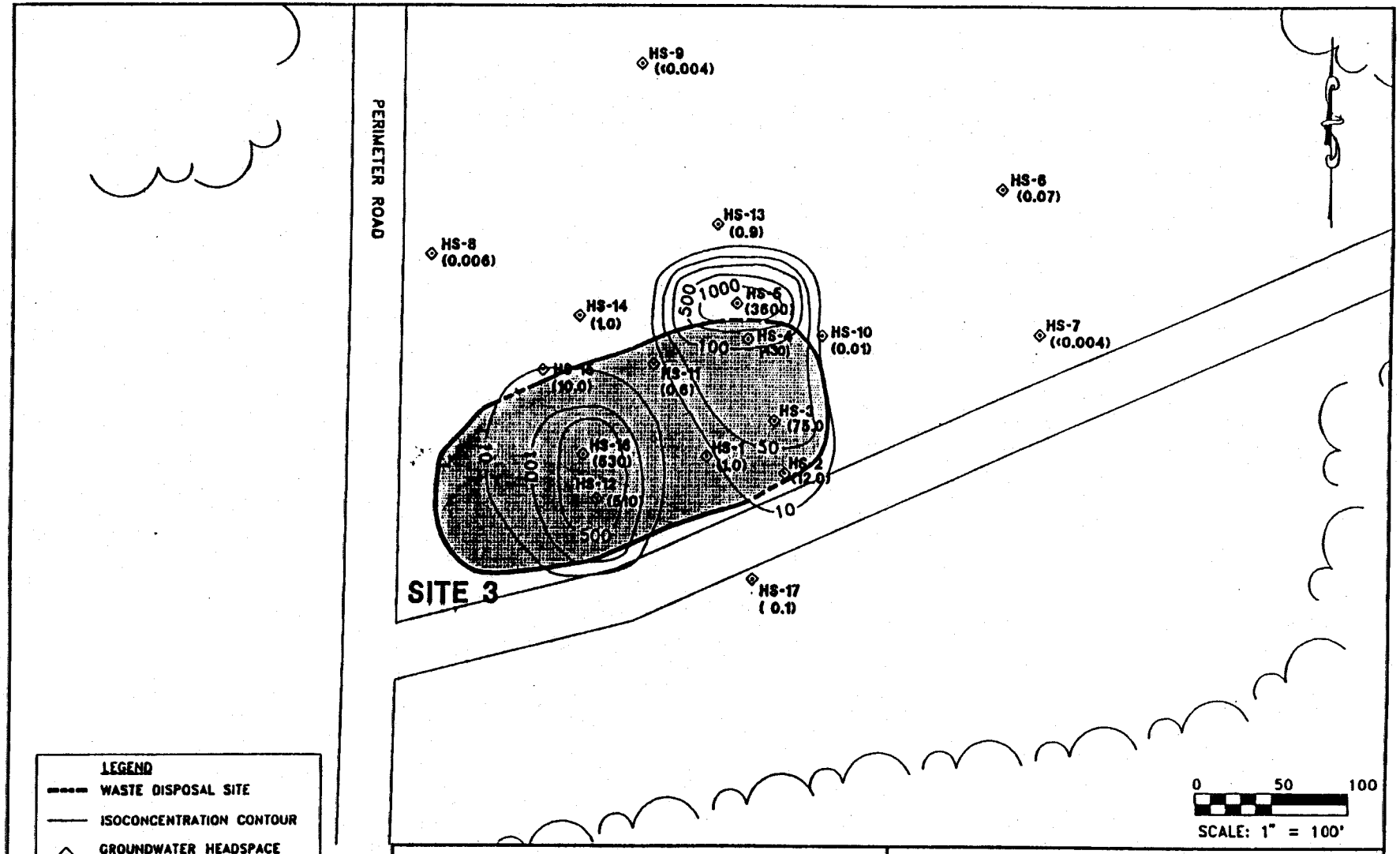
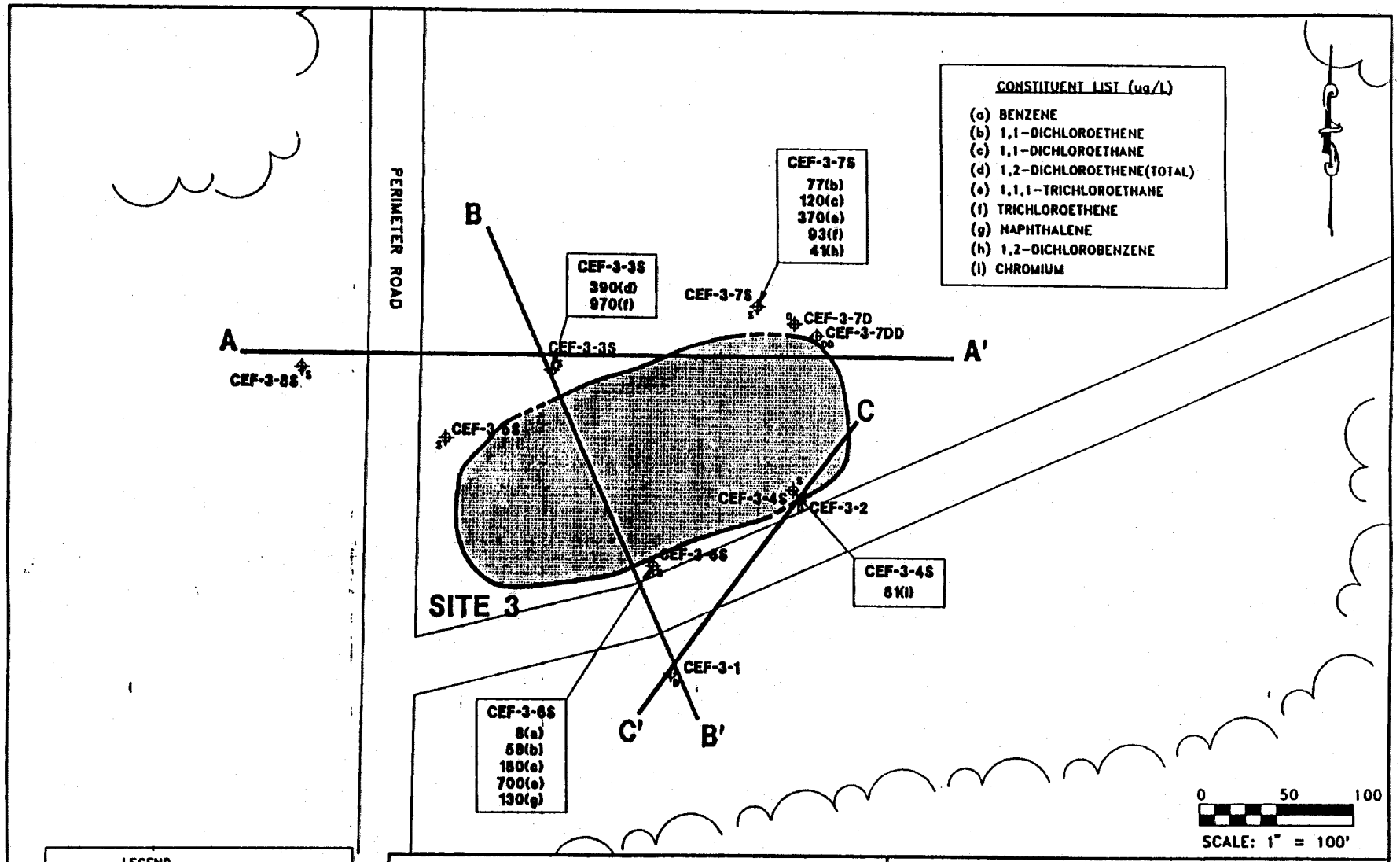


FIGURE 5-7
ISOCONCENTRATION CONTOURS OF GROUNDWATER HEADSPACE ANALYSES FOR TRICHLOROETHANE, SITE 3

TECHNICAL MEMORANDUM FOR SUPPLEMENTAL SAMPLING AT OUs 1, 2, AND 7

NAS CECIL FIELD
JACKSONVILLE, FLORIDA



LEGEND

- WASTE DISPOSAL SITE
- EXISTING SHALLOW MONITORING WELL LOCATION
- EXISTING INTERMEDIATE MONITORING WELL LOCATION
- EXISTING DEEP MONITORING WELL LOCATION

FIGURE 5-9
SUMMARY OF SELECTED GROUNDWATER CHEMICAL ANALYSES AND GEOLOGIC CROSS SECTION LOCATIONS, SITE 3

TECHNICAL MEMORANDUM FOR SUPPLEMENTAL SAMPLING AT OUs 1, 2, AND 7

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Table 5-11
Groundwater Sampling Analysis,
Operable Unit 2, Site 3

Technical Memorandum for Supplemental Sampling
NAS Cecil Field
Jacksonville, Florida

Identifier:	CEF-3-3S		CEF-3-4S		CEF-3-5S		CEF-3-6S		CEF-3-7S		CEF-3-7D		CEF-3-7DD		CEF-3-8S		CEF-3-9S Dup of CEF-3-4	
Screen Interval (feet, bls):	3-13'		3-13'		3-13'		3-13'		3-13'		80-90'		97-107'		3-13'			
Volatiles (µg/l)																		
Acetone	96	U	23	U	15	U	150	U	180	U	180	U	14	U	13	U	36	
Benzene	30	U	6	U	5	U	8	J	10	U	5	U	5	U	5	U	5	U
2-Butanone	60	U	22	J	10	U	50	U	23	J	10	U	10	U	10	U	20	J
Chloroethane	60	U	22		10	U	10	J	7	J	10	U	10	U	10	U	22	
1,1-Dichloroethene	7	J	11		5	U	58		77		5	U	5	U	5	U	9	
1,1-Dichloroethane	8	J	69		5	U	180		120		5	U	5	U	5	U	58	
1,2-Dichloroethene (total)	390		5	U	5	U	25	U	3	J	5	U	5	U	5	U	5	U
Ethyl benzene	6	J	5	U	5	U	13	J	8	J	5	U	5	U	5	U	5	
4-Methyl-2-pentanone	60	U	10	U	10	U	50	U	2	J	10	U	10	U	10	U	10	U
Toluene	8	J	3	J	5	U	32		73		5	U	5	U	5	U	3	J
1,1,1-Trichloroethane	22	J	29		5	U	700		370		5	U	5	U	5	U	24	
1,1,2-Trichloroethane	30	U	5	U	5	U	25	U	2	J	5	U	5	U	5	U	5	U
Trichloroethene	910		5	U	5	U	25	U	93		5	U	5	U	5	U	5	U
Xylenes	39		26		2	J	60		45		5	U	5	U	5	U	27	
Semivolatiles (µg/l)																		
bis(2-Ethylhexyl)phthalate	7	J	2	J	15	J	6	J	3	J	310		3	J	10	U	10	U
Di-n-butylphthalate	10	U	10	U	10	U	10	U	10	U	20	U	2	J	10	U	10	U
2-Methylnaphthalene	40	J	38	J	4	J	70	J	45	J	20	U	10	U	10	U	45	J
Naphthalene	52		66		6	J	130		75		20	U	10	U	10	U	87	
2,4-Dimethylphenol	10	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U	10	U
2-Methylphenol	10	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U	10	U
4-Methylphenol	100		10	U	10	U	23		92		20	U	10	U	10	U	10	
Dibenzofuran	10	U	10	U	10	U	2	J	10	U	20	U	10	U	10	U	10	U
Phenol	11		10	U	10	U	10	U	10	U	20	U	10	U	10	U	50	U
1,2-Dichlorobenzene	10	U	10	U	10	U	10	U	41		20	U	10	U	10	U	10	U
Benzoic acid	50	U	50	U	50	U	50	U	50	U	100	U	50	U	50	U	50	U
Pesticides (µg/l)																		
beta-BHC	0.11	J	0.05	U	0.05	U	0.05	U	0.16	J	0.05	UJ	0.05	UJ	0.05	UJ	0.1	J

See notes at end of table.

Table 5-11 (Continued)
Groundwater Sampling Analysis,
Operable Unit 2, Site 3

Technical Memorandum for Supplemental Sampling
NAS Cecil Field
Jacksonville, Florida

Identifier:	CEF-3-3S		CEF-3-4S		CEF-3-5S		CEF-3-6S		CEF-3-7S		CEF-3-7D		CEF-3-7DD		CEF-3-8S		CEF-3-9S Dup of CEF-3-4	
Screen Interval (feet, bls):	3-13'		3-13'		3-13'		3-13'		3-13'		80-90'		97-107'		3-13'			
Inorganics (μg/ℓ)																		
Aluminum	11,000.2		111,391.1		11,145.93		24,913.5		33,719.43		18,156.6		602.76	UJ	70,396.39		84,258.48	
Arsenic	5.53	U	5.49	U	1.43	U	7.24	U	3.39	U	6.72	U	0.89	U	1.55	U	4.48	U
Barium	36.81	J	121.64	J	19.34	J	29.4	J	32.92	J	35.48	U	64.61	U	69.33	U	91.65	J
Calcium	30,767.22		69,420.41		14,185.88		55,258.6		8,282.49		7,721.5		67,468.76		3,107.59	U	65,029.81	
Chromium	8.25	U	81.03		14.05		27.08		20.57		18.68		1.9	U	49.12		70.18	
Copper	1.43	UJ	17.68	J	1.43	UJ	1.6	J	1.43	UJ	3.22	U	1.63	U	11.21	U	14.64	J
Iron	11,532.62		21,235.72		3,335.02		27,266.95		11,741.7		5,311.99		88.62	UJ	7,210.25		18,126.19	
Lead	1.77	U	12.32		3.28		3.19		3.48		7.16		0.69	U	12.34		10.41	
Magnesium	7,758.46		3,114.03	U	7,604.13		2,452.5	U	2,744.53	U	1,262.9	U	3,869.06	U	2,044.32	U	2,780.01	U
Manganese	545.43		143.36		11.07	J	54.93		264.38		25.06	J	7.05	J	64.47	J	138.16	
Mercury	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.23		0.16	U
Nickel	6.97	U	15.46	U	6.97	U	9.86	U	6.97	U	23.2	U	6.97	U	19.01	U	14.4	U
Potassium	2,532.94	U	6,303.14		1,430.05	U	1,216.64	U	1,507.56	U	982.09	U	10,079.43		1,488.84	U	5,959.23	
Selenium	1.14	U	1.14	UJ	1.14	U	1.14	U	1.14	U	1.14	UJ	1.14	UJ	1.14	UJ	1.14	U
Sodium	5,501.36	J	6,522.38	J	6,006.66	J	3,632.06	UJ	4,918.5	UJ	4,506.91	J	13,390.61	J	8,794.72		6,528.46	J
Vanadium	8.55	U	56.5		9.64	U	16.62	U	20.06	U	17.05	U	3.2	U	33.08	U	42.94	U
Zinc	4.15	U	36.38		4.64	U	19.67	U	9.3	U	194.5		10	UJ	24.48	UJ	31.03	
Total Petroleum Hydrocarbons (mg/ℓ)	2.43		2.79		0.27		4.51		1.75		0.06	U	0.05	U	0.06	U	1.76	

Notes: μg/ℓ = micrograms per liter.
mg/ℓ = milligrams per liter.
bls = below land surface.
U = undetected.
J = estimated.
UJ = quantitation estimated.

Attachment D
Field Screening Data
Selected Boring Logs

DRILLING LOG

HOLE NO. GS-3-69 EX

SHEET 1 OF 1 SHEETS

1. PROJECT NAME: ABB-ES

2. DRILLING SUBCONTRACTOR: LAYNE-ES

3. PROJECT: RI OUs 1,2,7

4. LOCATION: OU 2 SITE 3

5. NAME OF DRILLER: Rick Ragsdale

6. MANUFACTURER'S DESIGNATION OF DRILL: Gus Pech BR22

7. TYPES OF DRILLING AND SAMPLING EQUIPMENT: Gus Pech BR22: 4 1/4" ID 8 1/4" OD Augers; 2.0" x 2.0" Standard and Stainless Steel Split Spoons; 4.0' x 1 1/8" Stainless Steel A-Probe

8. HOLE LOCATION: GS-3-69

9. SURFACE ELEVATION:

10. DATE STARTED: 10/21/93

11. DATE COMPLETED: 10/28/93

12. OVERBURDEN THICKNESS: 83'

13. DEPTH GROUNDWATER ENCOUNTERED: ~4.0' bls

14. IF DRILLED INTO ROCK: 36'

15. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:

16. TOTAL DEPTH OF HOLE: 119.0' bls

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

TECHNICAL SAMPLES	DISTURBED	UNDISTURBED

18. TOTAL NUMBER OF CORE BOXES:

SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	8010/8020					

DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
	✓		

22. SIGNATURE OF INSPECTOR: Maria Zinenburg

DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
2	0 - 48.0 Sand (SP) 100%, medium to dark brown, quartz, fine- to medium-grained, subrounded, moderately well sorted, occasionally silty	0-2 7.1 Baggie 194		0-2	1 1 4 2	
4		2-4 4.0 Baggie 18.6		2-4	3 4 6 6	
6		~~4~~ MD		4-8 AP		WL String O WL Augers N/A
8				10-14 AP		WL String O WL Augers N/A

DRILLING LOG

HOLE NO. OS-3-6 EX

SHEET 2 OF 4 SHEETS

121 OUs 1,2,7

INSPECTOR M. Kinnenberg

DESCRIPTION OF MATERIALS	FIELD POTENTIOMETER READING	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
Sand 100% (con't)			18-22 Ap		WL String 22' bls WL Augers 12' bls
			28-32 Ap		WL String 0 WL Augers 14' bls
48.0-70.0 Sandy Clay (CL-CH) - 100%, medium gray, dense, moist to wet, plastic pliable, grades to clayey sand.			52-56 Ap		WL String 0 WL Augers 49' bls

TIME FIN. 25-2-1 asv

DRILLING LOG

HOLE NO. GS-3-69 EX

SHEET 3 OF 6 SHEETS

R1- OUs 1, 2, 7

INSPECTOR: R. Pynenburg

DEPTH A	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
54						
56						
58						
60						
62						
64				70-74 AP		WL String 68' bls WL Augers 16' bls
66						
68						
70	70.0 - 85.0 Clayey Sand with Shell and Marl. - Clayey Sand (SC), 70%, medium gray, quartz, fine- to medium-grained subrounded, moderately well to poorly sorted; Shell, 20%, very pale orange, fine fragments; Marl, 10%, white, wet, soft, calcareous.					
72						
74						
76						
78						
80				80-83 AP		WL String 76' bls WL Auger 17' bls
82						
84						
86						

DRILLING LOG

HOLE NO. GS-3-[redacted]69EX

SHEET 4 OF 4 SHEETS

—RI OUs 1,2,7

FOREMAN: Li Pinenburg

DEPTH A	DESCRIPTION OF MATERIALS C	FIELD POTENTIOMETRIC RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
85	85.0-106.0 Dolomite - 100%, moderate yellowish brown to light gray to medium gray, hard, microcrystalline, shell replacement features visible, vuggy, sucrosic.					85-93 Hard PR 3-4 min/ft
90						
95						93-98 Softer PR 1 min/ft
				95-105 TWP		Temporary Wellpoint Sample
100	106.0-119.0 Calcareous Clay (CH) - 100%, white, soft, wet, non-plastic, Calcareous, trace phosphate.					98-102 Hard PR 5-6 min/ft
105						102-104 Softer PR 1 min/ft
						104-106 Hard PR 3-4 min/ft
110						
115						
118	Bottom of Hole		119.0'	bls.		
120						

DRILLING LOG

HOLE NO. GS-3-31EX

SHEET 1 OF 1 SHEETS

1. COMPANY NAME: ABB-ES	2. DRILLING SUBCONTRACTOR: LAYNE - ES
3. PROJECT: RI OUs 1,2,7	4. LOCATION: SITE 3
5. NAME OF DRILLER: Rick Ragsdale	6. MANUFACTURER'S DESIGNATION OF DRILL: Gus Deck
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Gus Deck 4 1/4" ID Augers; 2.0'x2.0' Standard and Stainless Steel Split-Spoons; 4.0'x1 7/8" Stainless Steel Aqua-Probe; 5.0'x4.0" Cont. Split Spoon	8. HOLE LOCATION: GS-3-31 EX
	9. SURFACE ELEVATION:
	10. DATE STARTED: 4/15/93 — 11. DATE COMPLETED: 4/17/93
12. OVERBURDEN THICKNESS: 99'	15. DEPTH GROUNDWATER ENCOUNTERED: ~11.0' bls
13. DEPTH DRILLED INTO ROCK: 19'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 118' bls	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —
18. GEOTECHNICAL SAMPLES: DISTURBED — UNDISTURBED —	19. TOTAL NUMBER OF CORE BOXES: —

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	—	✓	8010	TPH	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓	—	—	Maria Zimmerberg

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANAYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
	2	0 - 32.0 Clayey Sand (SC) - 100%, colorless to medium brown to reddish yellow to yellowish red, quartz, fine- to medium-grained, subangular to subrounded, moderately well sorted; trace phosphate	0-2 0 Baggie 16.9		0-2		
	4		2-4 0 Baggie 70.1		4-6		
	6		4-6 3.8 Baggie 74.4		6-8		6-8 CH2MHill metals / TPH
	8		6-8 20.2 Baggie 42.2				
	10		8-10 38.8 Baggie 41.4				
	12						
	14						
	16				11-15 AP		WL Sting 0 WL Augers —
	18						

PROJECT: RI OUs 1,2,7 — HOLE NO. GS-3-31EX

DRILLING LOG

PROJECT: R1 OUs 1,2,7

INSPECTOR: M. Pyrenburg

HOLE NO. GS-3-31EX

SHEET 2 OF 4 SHEETS

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
	22	Clayey Sand (Con't.)					
	24						
	26				26-30 AP		WL String 29', WL Augers 13'
	28						
	30						
	32	32.0 - 67.0 Sandy Clay (CL-CH) - 100%, dark to medium gray, dense, wet, soft, plastic					
	34						
	36						
	38						PR < 1 min/Sr
	40						
	42						
	44						
	46				46-50 AP		WL String 50' bk, WL Augers 8' bl
	48						
	50						
	52						

DRILLING LOG

PROJECT: RI OUs 1,2,7

INSPECTOR: M. Zimmerburg

HOLE NO. GS-3-31EX

SHEET 2 OF 4 SHEETS

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
	50						
	60						
	70						
	80						
	90						
	100						
	110						
	120						
	130						
	140						
	150						
	160						
	170	67.0 - 99.0 Marl with Sandy Clay (CL-CH) - Sandy Clay, 85%, dark gray to greenish gray, sandy, dense, soft, plastic, moist; Marl, 15%, white, calcareous, soft, plastic; trace, shell.			67-71 AP		WL Spring 71' bgs WL Augers 17' bgs. 67-71 CH2M Hill PR 2 min/ft
	180						
	190						
	200						
	210						
	220						
	230						
	240						

DRILLING LOG

PROJECT: RI OUs 1,2,7

INSPECTOR: M. Rifenburg

HOLE NO. GS-3-3 EX

SHEET 4 OF 4 SHEETS

DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
88						
90						
92						
94				94-95 AP		WL String 90' WL Augers 13'
96						
98						
100	99.0 - 118.0 Dolomite 100%, medium gray to moderate yellowish brown, moderately well cemented, moderately hard, crystalline, vuggy, dense, many $CaCO_3$ replacement features visible, numerous gastropods, pelecypods, shark's teeth - dolomitized, dolomitized coquina present; trace, limestone.					Augers 96' bls Mud Rotary 118' bls
102						
104				108-118		Wellpoint Sample 108' - 118' bls Evacuate 480 gal
106						
108						PR 1-2 min/ft
110						
112						
114						Slight increase in clay content @ 118' bls.
116						
118	Bottom of Hole	118' bls				
120						

DRILLING LOG

HOLE NO. GS-3-20E

SHEET 1 OF 6 SHEETS

1. COMPANY NAME	ABB-ES
2. DRILLING SUBCONTRACTOR	Layne - ES
3. PROJECT	RI OUs 1,2,7
4. LOCATION	SITE 3
5. NAME OF DRILLER	Rick Ragsdale
6. MANUFACTURER'S DESIGNATION OF DRILL	Gus Deck
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Gus Deck 3 7/8" Tricone Bit 2 7/8" OD NWI Rods 4.0' x 1.78" Aqua Probe
8. HOLE LOCATION	GS-3-20EX
9. SURFACE ELEVATION	
10. DATE STARTED	3/8/93
11. DATE COMPLETED	3/18/93
12. OVERBURDEN THICKNESS	96.0'
13. DEPTH DRILLED INTO ROCK	—
14. TOTAL DEPTH OF HOLE	160.0'
15. DEPTH GROUNDWATER ENCOUNTERED	11.0' blg. Equalizes @ 4.0' blg.
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—
18. GEOTECHNICAL SAMPLES	DISTURBED: — ; UNDISTURBED: —
19. TOTAL NUMBER OF CORE BOXES	None
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC: — ; METALS: ✓ ; OTHER (SPECIFY): 8010 ; OTHER (SPECIFY): TPH ; OTHER (SPECIFY): —
21. TOTAL CORE RECOVERY	%
22. DISPOSITION OF HOLE	BACKFILLED: ✓ ; MONITORING WELL: — ; OTHER (SPECIFY): —
23. SIGNATURE OF INSPECTOR	M. Greenberg

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANAYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
	2, 4, 6, 8, 10, 12, 14, 16, 18	0-6.0 Silty Sand (SM) 100%, colorless to medium brown, quartz, fine-to very fine-grained subrounded, moderately well sorted, soft, silty. 6.0-11.0 Silty Clay (CL-CH) 100%, light to medium gray to very pale orange, dense, dry to moist, plastic.					Exploratory Boring installed to collect water samples below 90' blg for laboratory analysis - 8010. PR 1 min/ft Borehole installed using the mud rotary method.

PROJECT: RI OUs 1,2,7

HOLE NO.: GS-3-20EX

DRILLING LOG

PROJECT: RI OUs 1,2,7

INSPECTOR: M. Pinenburg

HOLE NO. GS-3-20EX

SHEET 2 OF 6 SHEETS

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANAYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
	20	11.0 - 56.0 Sand (SW-SP) 100%, colorless, quartz, medium to fine grained, sub-rounded, well sorted, trace phosphate.					Monitoring Conditions During Drilling at Borehole Mudbank - Miniatyp 0, O_2 20.8%, LEL 0.
	22						
	24						
	26						
	28						
	30						
	32						
	34						
	36						
	38						
	40						PR 1 min/ft
	42						
	44						
	46						
	48						
	50						
	52						

PROJECT: RI OUs 1,2,7

HOLE NO. GS-3-20EX

DRILLING LOG

PROJECT: RI OUs 1,2,7

INSPECTOR: M. Pinenburg

HOLE NO. GS-3-20EX

SHEET 3 OF 6 SHEETS

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANAYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
	54						
	56	56.0 - 67.0 Clayey Sand (CH) 100%, colorless to medium gray, fine-grained, subrounded, moderately well sorted, approximately 30% of sample is clay, small, rounded, flat, platelets, medium gray, soft, plastic.					PR 1 min/ft
	58						
	60						
	62						
	64						
	66						
	68						
	70						
	72	67.0 - 96.0 Sand, Shell and Marl with Clay - Sand 30%, colorless to light gray, quartz, fine-grained, subrounded, moderately well sorted; Clay, 30%, medium to dark gray, soft, dense, plastic, trace phosphate, Clay appears more continuous and homo-					
	74						
	76						PR 1 min/ft
	78						
	80						
	82						
	84						
	86						

PROJECT: RI OUs 1,2,7

HOLE NO. GS-3-20EX

DRILLING LOG

PROJECT: RI-OUs-1,2,7

INSPECTOR: M. Pinenburg

HOLE NO.: GS-3-20EX

SHEET 4 OF 6 SHEETS

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
		geneous than 56 -					
	88	67.0' bls ; Shell,					
		20%, very pale					
	90	orange, small, thin,					
		angular fragments.					
	92	Marl, 20%, white,					82' bls Shell
		calcareous, soft,					Content in-
	94	intermittent lensing,					creases to
		trace limestone.					40%, Sand
	96						Content Dec-
					96-100		reases to 10%
	98	96.0 - 102.0 Clay			AP		
		and Shell with Partially					
	100	Dolomitized Coquina			Attempted		
		and Limestone - Clay			AP twice,		PR 2/3 min/ft
	102	20%, medium to dark			could		
		gray to olive green,			not re-		91' bls Clay
	104	soft, dense, plastic;			trieve		changes from
		Shell, 20%, very pale			sample		dark gray to
	106	orange, small, thin,					olive green.
		angular fragments;					
	108	Dolomitized Coquina					
		30%, very pale orange,					
	110	remnant shell and					
		cemented shell frag-					
	112	ments visible, well			104-114		Temporary
		cemented, hard;					Well pt. Sample
	114	limestone, 30%,					Evacuated 330 gal
		medium gray,					
	116	micritic, dense,					
		well cemented, hard.					
	118						
	120						

PROJECT: RI OUs 1,2,7

HOLE NO.: GS-3-20EX

DRILLING LOG

PROJECT: R1—OUs-1,2,7

INSPECTOR:

HOLE NO. GS-3-20EX

SHEET 5 OF 6 SHEETS

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANAYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
	122	102.0 - 106.0 Partially Dolomitized Limestone - 100%, medium gray, micritic, dense, hard, well cemented, trace dolomitized coquina					PR: 5-6 min/ft
	124						
	126						
	128	106.0 - 122.0 Dolomite and Limestone - Limestone, 40%, medium gray, micritic, hard, dense, well cemented, some shell replacement features visible; Dolomite, 60%, moderate yellowish orange, crystalline, hard, dense, well cemented, sucrosic					114-120 Slightly Softer PR 4-5 min/ft
	130						
	132						PR 6-7 min/ft
	134						
	136						
	138						
	140						
	142	122.0 - 154.0 Calcareous Clay - 100%, white to light gray, soft, plastic, pliable, contains 2-3% phosphate; trace dolomite					PR 1-2 min/ft
	144						
	146						
	148						
	150						
	152						
	154						

PROJECT: R1 OUs 1,2,7

HOLE NO. GS-3-20EX

DRILLING LOG

PROJECT: RI OUs 1, 2, 7

INSPECTOR: M. Pyrenburg

HOLE NO.: GS-3-20EX

SHEET 6 OF 6 SHEETS

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANAYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
	150	154.0 – 160.0 Clay (CH) 100%, olive green, plastic, dense, moderately soft, phosphate nodules common; trace limestone					
	158						
	160						
	162						
	164						
	166	Bottom of Hole 160.0' bls					
	168						
	170						

PROJECT: RI OUs 1, 2, 7

HOLE NO.: GS-3-20EX

DRILLING LOG

HOLE NO. GS-3-32E

SHEET 1 OF 4

1. COMPANY NAME: ABB-ES-	2. DRILLING SUBCONTRACTOR: LAYNE-ES
3. PROJECT: RI OUs 1,2,7	4. LOCATION: Site 3 OU2
5. NAME OF DRILLER: Rick Ragsdale	6. MANUFACTURER'S DESIGNATION OF DRILL: Gus Peck
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Gus Peck 4 1/4" ID Augers; 2.0' x 2.0' Stainless & Standard Steel Split Spoons; 4.0' x 1 7/8" Stainless Steel D-Probes; 5.0' x 4.0' Continuous Split Spoons	8. HOLE LOCATION: GS-3-32EX
	9. SURFACE ELEVATION:
	10. DATE STARTED: 4/18/93 — 11. DATE COMPLETED: 4/20/93
12. OVERBURDEN THICKNESS: 94'	15. DEPTH GROUNDWATER ENCOUNTERED: ~9.0' bls
13. DEPTH DRILLED INTO ROCK: 22'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:
14. TOTAL DEPTH OF HOLE: 116' bls	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	—	✓	8010	TPH	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓	—	—	Maria Zyrenburg

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANAYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
		0-5.0 Silty Sand - 100%, colorless to light gray to light brown, fine- to very fine-grained, quartz, subangular to subrounded, moderately well sorted; trace phosphate, organics.	0-2 33 Baggie 88.4				
	2		2-4 11.6 Baggie 98.8				
	4						
	6		4-6 9.6 Baggie 104		4-6		
	8						
	10		6-8 6.1 Baggie 102				
	12	5.0 - 9.0 Clayey Sand - 100%, moderate yellowish brown to pale yellowish brown, fine- to very fine-grained quartz, subrounded, dense, clayey.	8-10 9.9 Baggie 21		8-10		8-10 CH, Mitel Metals / TPH
	14						
	16						
	18				11-15 AP		WL String WL Augers

PROJECT: RI OUs 1,2,7

HOLE NO.: GS-3-32EX

DRILLING LOG

PROJECT: R1-OUs 1,2,7

INSPECTOR: M. Zynenburg

HOLE NO.: GS-3-32EX

SHEET 2 OF 4 SHEETS

DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
20	9.0 - ~~54.0~~ 29.0 Sand - 100%, colorless to dark brown, quartz, fine- to medium-grained, moderately well sorted, sub-angular to sub-rounded, occasionally clayey.					
22						
24						
26				26-30 AP		WL Stung 27' bls WL Augers 4' bls
28						
30						
32	29.0 - 54.0 Clayey Sand - 100%, pale olive green to light gray, fine- to very fine-grained, sub-rounded, clayey, soft.					
34						
36						
38						
40						
42						
44						
46						
48				46-47 AP		WL Stung 35' bls WL Augers 4' bls
50						
52						

DRILLING LOG

HOLE NO. GS-3-32EX

SHEET 2 OF 4 SHEETS

PROJECT: RI OUs 1,2,7

INSPECTOR: M. Pinenburg

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
	54	54.0 – 66.0 Clay – 100%, dark gray, dense, soft, plastic, homogeneous, sandy.					
	66	66.0 – 94.0 Marl with Clayey Sand and Shell (CL-CH, SC) – Clayey Sand, 85%, medium gray, medium-grained, quartz, moderately well to well sorted, Clayey; Marl, 10%, white, calcareous, soft, plastic; Shell, 5%, very pale orange, angular small to medium-sized fragments; trace, phosphate.			67-70 AP		67-70 CH2M Hill Metals (TPH) NL Swing 60' bls WL Augers 4' bls

RI OUs 1,2,7

HOLE NO. GS-3-32EX

DRILLING LOG

PROJECT: RI. OUs 1,2,7

INSPECTOR: M. Pfenenburg

HOLE NO.: GS-3-32EX

SHEET 4 OF 4 SHEETS

DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
88						
90						
92				92-93 AP		WL String 45' WL Augers 5'
94	94.0 - 105.0 Clay and Shell with Partially Dolomitized Limestone - Clay, 20%, medium gray to pale olive green, soft, dense, plastic, phosphatic; Shell, 20%, very pale orange, small, flat, angular fragments; Limestone, 60%, medium to dark gray, partially dolomitized, micritic, moderately hard to soft, dense, moderately well cemented, sucrosic.					
96						
98						
100						
102						Augers to 102' bgs Mud rotary to 116' bgs
104						
106						
108						
110						
112	105.0 - 116.0 Dolomite and Limestone - Limestone, 30%, medium gray, micritic, moderately hard, dense, moderately well cemented, partially dolomitized; Dolomite, 60%, moderate yellowish orange, crystalline, hard, dense, well cemented to moderately well cemented, sucrosic.					
114				106-116 AP		Temporary Wellpoint Sample Evacuated 210 gal
116						
118						
120						

DRILLING LOG

HOLE NO. GS-3-70EX

SHEET 1 OF 4 SHEETS

1. COMPANY NAME	ABB-ES
2. DRILLING SUBCONTRACTOR	LAYNE-ES
PROJECT	RI OUs 1,2,7
4. LOCATION	OU 2 SITE 3
NAME OF DRILLER	Rick Ragsdale
6. MANUFACTURER'S DESIGNATION OF DRILL	Gus Pech BR22
TYPES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Gus Pech BR22: 4 1/4" ID, 8 1/4" OD Augers; 2.0' x 2.0" Standard and Stainless Steel Split Spoon, 4.0' x 1 1/8" Stainless Steel A-Probes
8. HOLE LOCATION	GS-3-70EX
9. SURFACE ELEVATION	
10. DATE STARTED	10/29/93
11. DATE COMPLETED	11/1/93
OVERBURDEN THICKNESS	82'
13. DEPTH GROUNDWATER ENCOUNTERED	~7' bls
DEPTH DRILLED INTO ROCK	24'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
TOTAL DEPTH OF HOLE	106' bls
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	
GEOTECHNICAL SAMPLES	DISTURBED: — / UNDISTURBED: —
19. TOTAL NUMBER OF CORE BOXES	
SAMPLES FOR CHEMICAL ANALYSIS	VOC: 8010/8020 / METALS: — / OTHER (SPECIFY): — / OTHER (SPECIFY): — / OTHER (SPECIFY): —
21. TOTAL CORE RECOVERY	%
DISPOSITION OF HOLE	BACKFILLED: ✓ / MONITORING WELL: — / OTHER (SPECIFY): —
23. SIGNATURE OF INSPECTOR	Maria Greenberg

DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
2	0 – 6.2 Sand (SP) - 100%, medium to light brown, quartz, fine- to medium-grained, subrounded, moderately well to poorly sorted, occasionally silty..	0-2 0 Baggie 18.6		0-2	0 1 4 1	
4						
6		2-4 0.2 Baggie 16.0			1 2 3 5	
8						
10	6.2 - 8.0 Clayey Sand (CL-CH) - 100%, medium gray, quartz, fine-grained, subrounded, moderately well sorted, clayey.				5 4 4 2	
12		4-6 0 Baggie 23.4		4-6		
14					5 7 8 10	
16		6-8 0 Baggie 16.6				
18				8-12 Ap		WL String 0 WL Augers N/A

DRILLING LOG

PROJECT: R1 OUs 1, 2, 7

INSPECTOR: Maria Pinenburg

HOLE NO. GS-3-70EX

SHEET 2 OF 2 SHEETS

ELEV. A	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
		8.0 - 46.0 Sand - (SP) 100%, light brown, quartz, medium-grained, subrounded, moderately well sorted, occasionally silty.			18-22 AP		WL String 0 WL Augers 0
	20						
	22						
	24						
	26						
	28						
	30						
	32						
	34						
	36				28-32 AP		WL String 0 WL Augers 21' bls
	38						
	40						
	42						
	44						
	46	46.0 - 69.0 Sandy Clay (CL-CH) - 100%, medium gray, dense, moist to wet, plastic, pliable, grades to Clayey sand.					Dolomite Stringer (~8") @ 69' bls
	48						
	50						
	52						

PROJECT: R1 OUs 1 2 7

HOLE NO. GS-3-70EX

DRILLING LOG

HOLE NO. GS-3-70EX

SHEET 3 OF 4 SHEETS

R1 OVs 1, 2, 7

INSPECTOR L. Pinenburg

DEPTH	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
4				52-56 AP		WL String 0 WL Augers 28' bls
5						
6						
7						
8						
10	69.0 - 82.0 Clayey Sand with Shell and Marl - Clayey Sand (SC), 70%, medium gray, quartz, fine- to medium-grained, subrounded, moderately well sorted; Shell, 20%, very pale orange, fine fragments; Marl, 10%, white, wet, soft, calcareous			68-69 AP		WL String 36' bls WL Augers 34' bls
12						
14						
16						
18						
20						
22						
24						
26						
28						
30						
32						
34				80-84 AP		WL String 60' bls WL Augers 6' bls
36						

R1 OVs 1, 2, 7

HOLE NO. GS-3-70EX

DRILLING LOG

HOLE NO. GS-3-70EX

SHEET 4 OF 4 SHEETS

R-1 Obs 1, 2, 7

INSPECTOR N. Pijanowski

DEPTH B	DESCRIPTION OF MATERIALS C	FIELD PENETROMETER RESULTS D	GEOTECH SAMPLE OR CORE BOX NO. E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
88	82.0-96.0 Dolomite - 100%, moderate yellowish brown, hard, well cemented, microcrystalline, sucrosic, vuggy, shell replacement features visible, oolite-like replacement features visible, trace phosphate					85-89 PR 6-7 min/ft
90						89-92 PR 45 sec/ft
92						92-96 PR 4-5 min/ft
94						96-106 PR 30 sec/ft
96						
98	96.0'-106.0 Calcareous Clay (CH) - 100%, white to light gray, soft, wet, non-plastic, calcareous					
100				90-92		Collect sample flowing from drill rod. Allow ≈ 500 gal to flow prior to sampling
102						
104						
106	Bottom of Hole @		106' bls.			
108						
110						
112						
114						
116						
118						
120						

PROPOSED CONFIRMATORY SURFACE AND SUBSURFACE SOIL SAMPLE LOCATIONS
OU 8, SITE 3, NAS CECIL FIELD
JACKSONVILLE, FLORIDA
DECEMBER 30, 1994

Based on the review of the soil screening data, surface and subsurface soil confirmatory sample locations have been selected for collection at OU 8/Site 3, Oil/Sludge Disposal Pit, NAS Cecil Field. The confirmatory soil sample locations were selected during a meeting between the Navy, USEPA, FDEP, and ABB-ES at NAS Cecil Field in Jacksonville, Florida on November 9, 1994. Representatives from each party included: Steve Wilson (Navy), Bart Reedy (USEPA), Mike Deliz (FDEP), Rao Angara (ABB-ES), Eric Blomberg (ABB-ES) and Maria Pijnenburg (ABB-ES). This memorandum presents the location and rationale for the proposed surface and subsurface soil sample locations.

Surface and Subsurface Soil Screening Programs

Surface and subsurface soil screening samples were collected at Site 3 for onsite analysis of VOCs and naphthalene (modified methods 8010 and 8020) and TPH. Screening locations are presented in Figure 1 and the results of the surface and subsurface soil screening are shown in Figures 2 and 3, respectively.

The results of the surface soil screening identified three distinct areas of contamination at Site 3 and adjacent areas (see Figure 2). The areas included the historical pit area, the area north of the road that connects Lake Fretwell to Perimeter Road, and the area near the helicopter crash site.

The results of the screening program indicated the presence of TPH, BTEX, and solvents in the surface soils at Site 3. TPH was the only detection in surface soil around the historical pit area and had a maximum detection of 770 mg/kg at location 3-13. TPH was also detected north of the service road at a maximum concentration of 64 mg/kg. The solvents TCE, DCA, and DCE were the most common detections in surface soil screening samples near the helicopter crash site area. The maximum detection of TCE was 19 ug/kg (3-114 and 3-118) while DCA was detected at 10 ug/kg (3-117) and DCE was detected at 13 ug/kg (3-118).

The results of the subsurface soil screening program identified two major areas of subsurface soil contamination that included the historical pit area and the helicopter crash site area (see Figure 3). These two areas were also areas that were identified to have surface soil contamination present.

Subsurface soil detections primarily consisted of solvents. The solvent with the highest concentration in the historical pit area was 1,2 dichlorobenzene (1,2 DCB) at 130 mg/kg (3-5 from 8 to 10 feet bls). 1,2 DCB was also had the highest detected concentration (11 mg/kg at 3-40 from 6 to 8 feet bls) at the helicopter crash site area.

Confirmatory Surface Soil Sampling Program

A total of 18 confirmatory surface soil sample locations were selected during the meeting. Subsequently, six additional soil samples (bringing the total number of surface soil samples to 24) were added by the ABB-ES risk assessment team to supplement the soil toxicity sample locations that will be used for the risk assessment. Locations of the proposed confirmatory soil samples are presented on Figure 4.

The locations of the surface soil samples were selected to provide confirmation of the nature and extent of surface soil contamination detected during the screening program. Specific rationale for the surface soil sample locations is as follows.

Surface soil samples CF3SS4, CF3SS7, CF3SS14, and CF3SS17 are characterization samples for the historical pit area. Delineation surface soil samples located around the perimeter of the extent of surface

soil contamination in the pit area include CF3SS1, CF3SS2, CF3SS3, CF3SS5, CF3SS6, CF3SS7, CF3SS14, CF3SS16, and CF3SS18.

Characterization surface soil samples for the area of contaminated surface soil north of the road that intersects the area of investigation include CF3SS9 and CF3SS22. Delineation samples in this area are represented by CF3SS8, CF3SS10, CF3SS21, and CF3SS23.

Surface soil samples to be collected for characterization near the helicopter crash site area include CF3SS24 and samples to be used for delineation include CF3SS24, CF3SS12, and CF3SS13.

Toxicity testing soil samples will be collected in conjunction with nine of the confirmatory soil samples. Locations of toxicity samples include CF3SS1, CF3SS4, CF3SS9, CF3SS12, CF3SS15, CF3SS17, CF3SS20, CF3SS22, and CF3SS24.

Confirmatory Subsurface Soil Sampling Program

A total of 21 confirmation soil borings were selected during the meeting, for the collection of subsurface soil samples. Figure 4 presents the proposed locations of the confirmatory soil borings.

Eleven of the proposed borings are located at the historical Site 3 pit area. Two of these borings will be drilled in the most contaminated area (based on previous investigations) within the pit boundary and the remaining nine borings will be located around the perimeter of the historical pit area to delineate the lateral extent of subsurface soil contamination.

Three borings will be drilled in the area north of the road that intersects the Site 3 groundwater plume. Several TPH detections were observed in surface soil while only one detection of TCE was observed in the subsurface soil. One boring will be advanced at the location with the highest detection of TPH in surface soil. Two soil borings will be drilled along the south side of this area and the road.

A total of six borings are proposed for the area near the helicopter crash site where chlorinated solvents were detected in both surface and subsurface soil. One soil boring is proposed to be drilled within the area of previously identified subsurface soil detections at the boring (3-69EX) with the highest TCE detection. The remaining 5 borings will be advanced along the perimeter of the area that bounds the extent of subsurface soil detections identified during the screening program.

Subsurface soil samples that will be used to characterize the contamination at Site 3 include samples collected from soil borings CF3SB4, and CF3SS29 in the historical pit area; CF3SB9, from the area north of the road intersecting the investigation area; and CF3SB32, from the area near the helicopter crash site.

Soil borings that will be used to delineate the extent of subsurface soil contamination at Site 3 include CF3SB1, CF3SB2, CF3SB3, CF3SB5, CF3SB6, CF3SB7, CF3SB25, CF3SB26, CF3SB27, and CF3SB28 around the subsurface soil contamination detected at the pit area; CF3SB8 and CF3SB10 around the area of contamination north of the road intersecting the site; and CF3SB11, CF3SB12, CF3SB13, CF3SB30, and CF3SB31 around the perimeter of the subsurface soil contamination detected near the helicopter crash site.

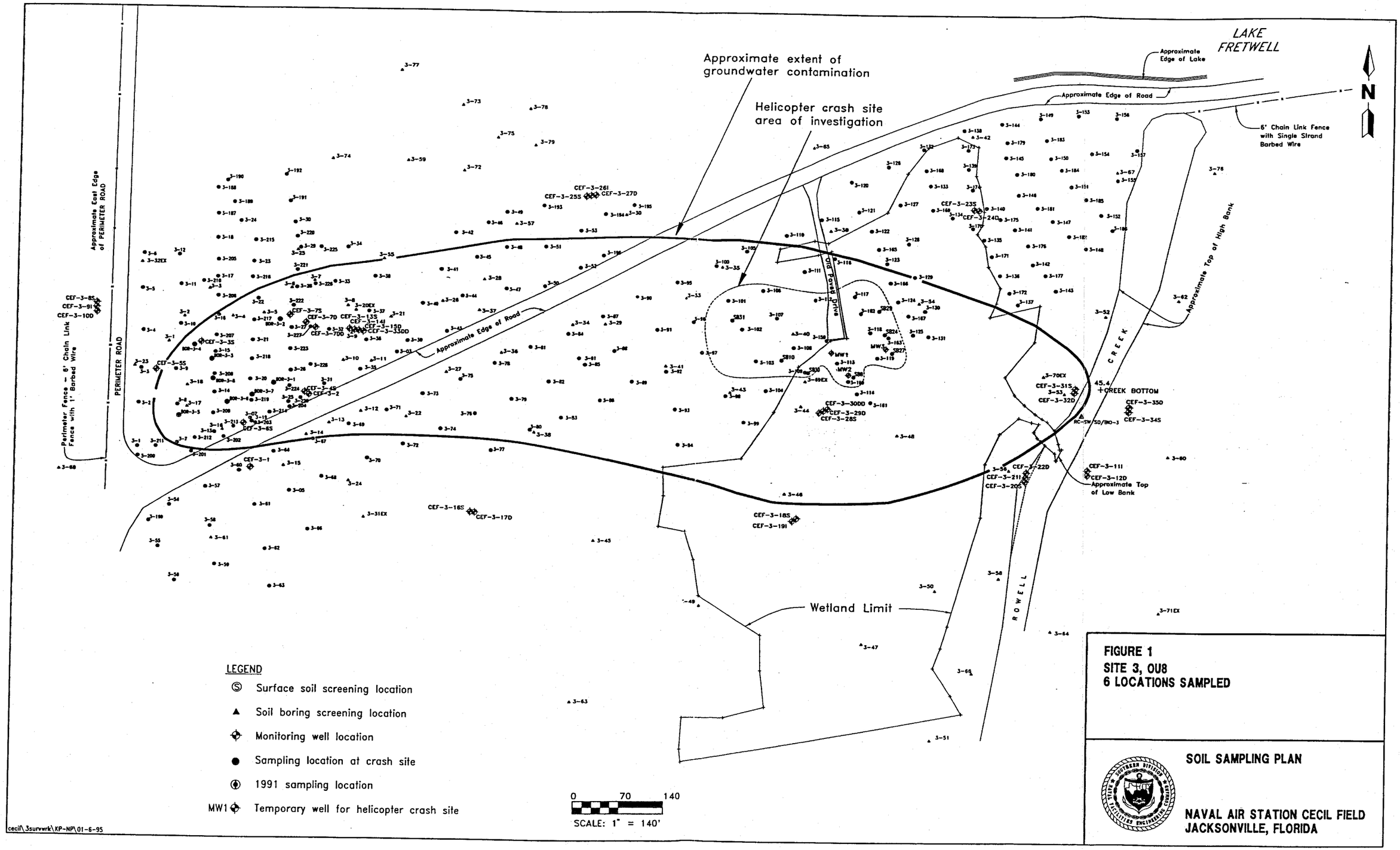


FIGURE 1
SITE 3, OU8
6 LOCATIONS SAMPLED

SOIL SAMPLING PLAN

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

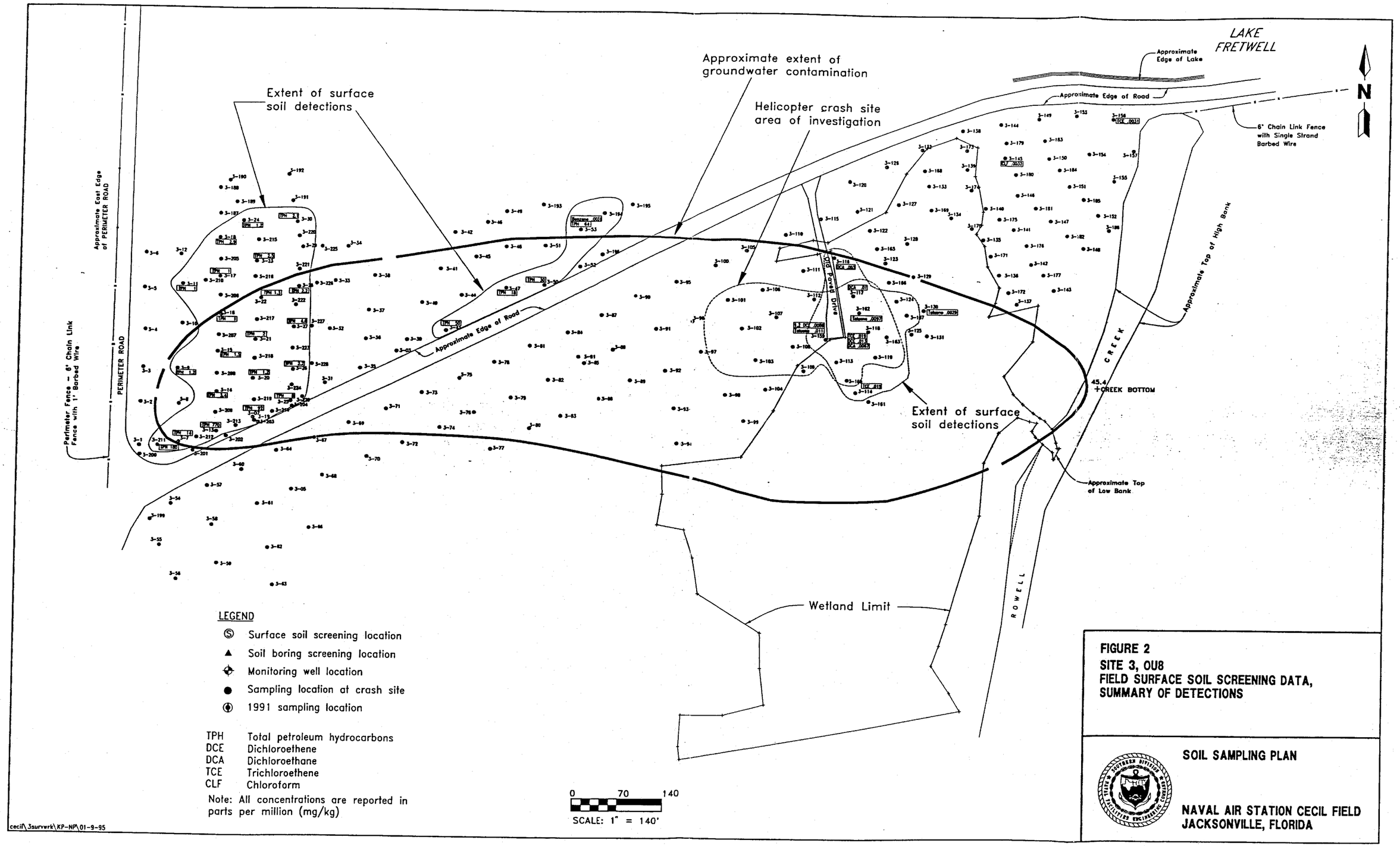
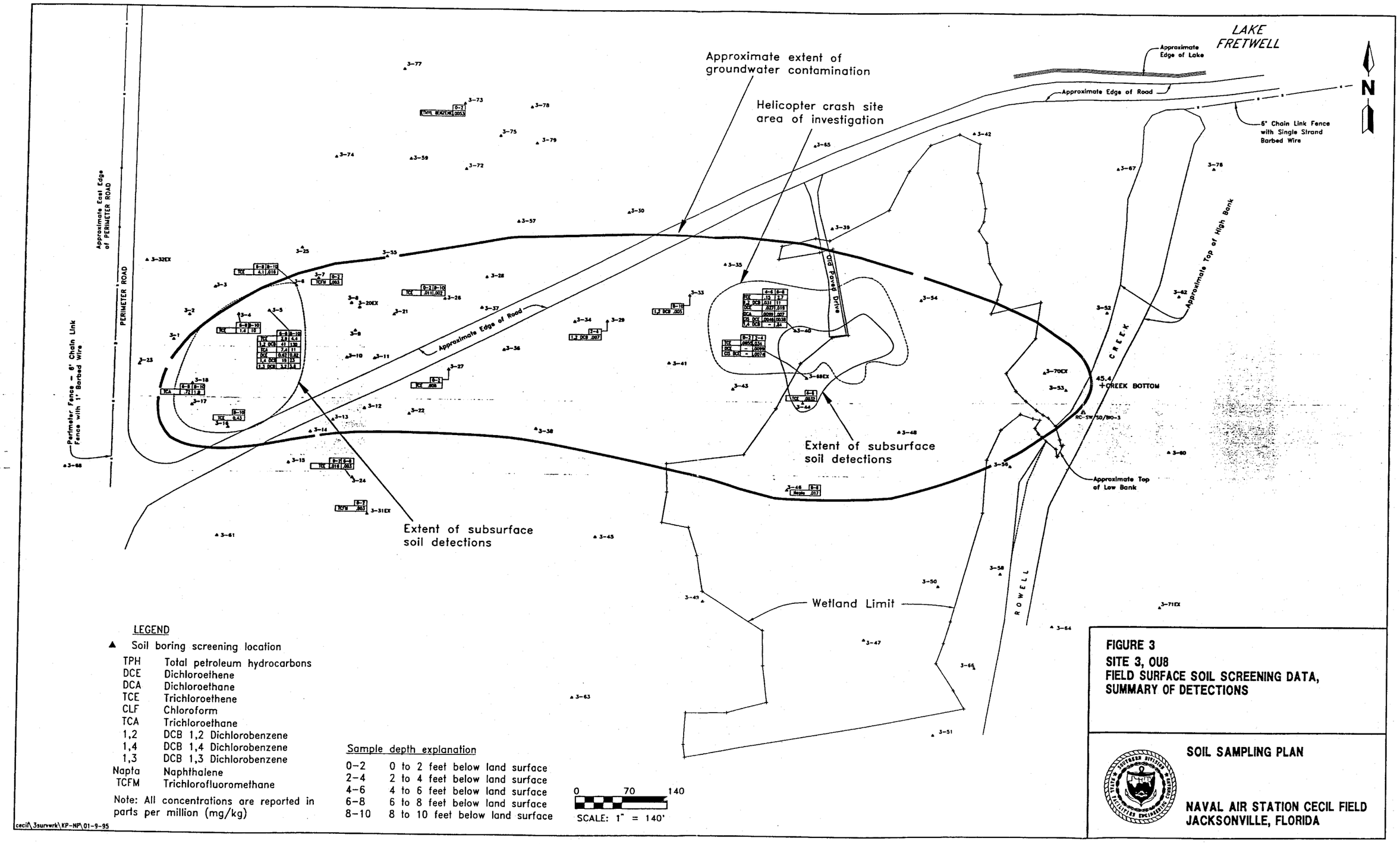


FIGURE 2
SITE 3, OU8
FIELD SURFACE SOIL SCREENING DATA, SUMMARY OF DETECTIONS

SOIL SAMPLING PLAN

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA



LEGEND

▲ Soil boring screening location

TPH	Total petroleum hydrocarbons
DCE	Dichloroethene
DCA	Dichloroethane
TCE	Trichloroethene
CLF	Chloroform
TCA	Trichloroethane
1,2	DCB 1,2 Dichlorobenzene
1,4	DCB 1,4 Dichlorobenzene
1,3	DCB 1,3 Dichlorobenzene
Napta	Naphthalene
TCFM	Trichlorofluoromethane

Note: All concentrations are reported in parts per million (mg/kg)

Sample depth explanation

0-2	0 to 2 feet below land surface
2-4	2 to 4 feet below land surface
4-6	4 to 6 feet below land surface
6-8	6 to 8 feet below land surface
8-10	8 to 10 feet below land surface

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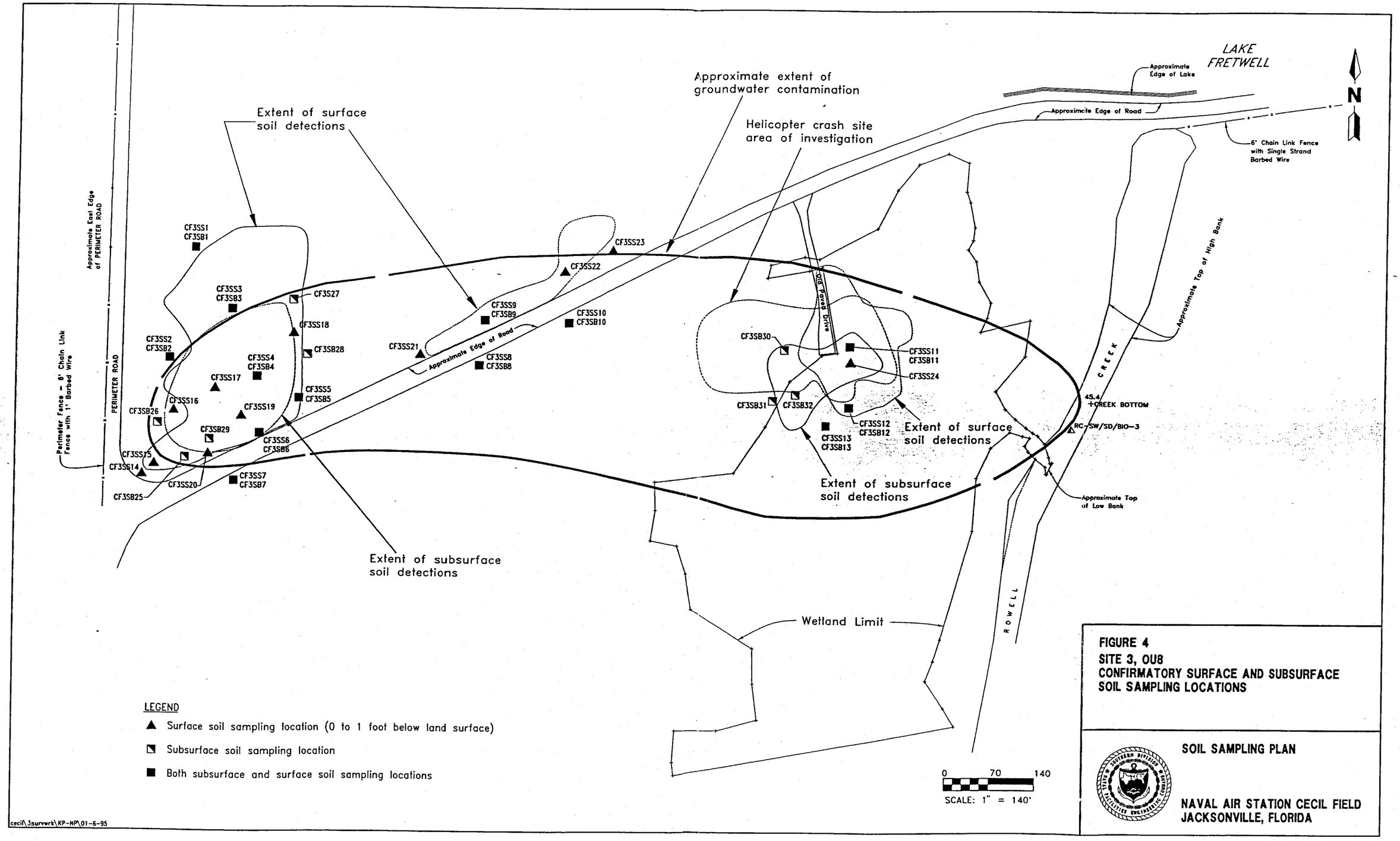
FIGURE 3
SITE 3, OU8
FIELD SURFACE SOIL SCREENING DATA, SUMMARY OF DETECTIONS

SOIL SAMPLING PLAN

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA



LEGEND

- ▲ Surface soil sampling location (0 to 1 foot below land surface)
- ◥ Subsurface soil sampling location
- ■ Both subsurface and surface soil sampling locations

FIGURE 4
SITE 3, OU8
CONFIRMATORY SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS

SOIL SAMPLING PLAN

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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APPENDIX C

SOIL BORING LOGS

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-1
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-02-93	**COMPLETED:** 02-08-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-08-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
		2-2	0-2 17	0-5.8 *Silty Sand (SM)*, 100%, quartz, pale yellow to light yellowish-brown, very fine-to fine-grained, sub-angular to sub-rounded, well sorted, trace phosphates, organics.		SM	0-10'bls: continuous split-spoons
		5-8					
		5-9	2-4 150				
		17-21					
		24-24	4-6 350				
5		16-28					
	6-8 soil	29-29	6-8 2500	5.8-15.0 *Clayey Sand (SC)*, 100%, quartz, brownish-yellow, occasionally orange, very fine-grained, compact, dense, hard, dry.		SC	
		31-34					
	8-10 soil	39-38	8-10 2500				
		43-42					
10	10-14 water						wl sampling string: n/a wl augers: n/a groundwater encountered ▽
15	15-19 water	4-2	15-17 11.7	15.0-31.2 *Sand (SP)*, 100%, colorless to light brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well to well sorted, alternating layers of colorless sand and silty organic material.		SP	wl sampling string: n/a wl augers: n/a predominantly sand after 17'bls.
		2-6					
		12-15	17-19 6				
		18-19					
20							TD @ 20'bls 2-2-93
	21-28 water						wl sampling string: n/a wl augers: n/a
25		26-18	25-27 0				thin clay lense 26.5-26.8'bls
		31-45					
30	30-35 water	5-7	30-32 0				wl sampling string: n/a wl augers: n/a
		16-17		31.2-57.0 *Clayey Sand (SC)*, 100%, quartz, pale olive green to light gray, very fine-to fine-grained, sub-rounded, clayey, soft.		SC	
35		52-48	35-37 0				sand lightens @ 35'bls
		58-115					flowing sand prevents further collection of split-spoons
	38-43 water						wl sampling string: n/a wl augers: n/a
40							

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-1
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 02-02-93	**COMPLETED:** 02-08-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.5 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-08-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Clayey Sand continued.		SC	
	43-49 water							wl sampling string: n/a wl augers: n/a
45								
50	50-53 water							wl sampling string: n/a wl augers: n/a
55								
					57.0-71.0 *Clay (CL)* 100%, dark gray, dense, soft, plastic, homogeneous, sandy, fluid in select intervals.		CL	depth to clay was noted on auger flights upon removal from borehole.
60	60-64 water							wl sampling string: n/a wl augers: n/a
65			16-9	65-67 2				
			7-5					
	67-71 water		4-6	67-69 7				bottom hole augers wl sampling string: 64'bls wl augers: 4'bls
			9-5		Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
70					End of boring: 71'bls.			bottom hole probe
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-2
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 02-07-93	**COMPLETED:** 02-07-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 88 FT. BLS	**DEPTH TO ⊻** 10.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-07-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-3.0 *Silty Sand (SM)*, 100%, quartz, light brown to brown, very fine-to fine-grained, sub-angular to sub-rounded, soft, trace organics.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 0				
	4-6 soil			4-6 125.2	3.0-10.0 *Clayey Sand (SC)*, 100%, quartz, pale yellowish-brown to reddish-orange to light brown, very fine to fine-grained, slightly compact, dense.		SC	
5				6-8 39.2				
	8-10 soil		5'spoon	8-10 217				
10			7-8	10-12 23.3	10.0-58.0 *Sand (SP)*, 100%, quartz, colorless, medium-grained, sub-rounded, well sorted.		SP	groundwater encountered ⊻
			12-10	12-14 13				
			6-8					
			8-6					
	14-18 water				14.0-28.0 clay content increases.			wl sampling string: 0 wl augers: 7.f'bls
15								
			4-16	18-20 0				
			16-15					
20	20-24 water							wl sampling string: 11'bls wl augers: 7'bls
			6-12	24-26 0				
25			46-22					
	28-30 water				28.0-58.0 clay content decreases.			wl sampling string: 30'bls wl augers: 7'bls
30			11-28	30-32 0				
			42-49					
	32-36 water							wl sampling string: 30'bls wl augers: 8'bls
35								
40				40-42 0				

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-2
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-07-93	**COMPLETED:** 02-07-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 88 FT. BLS	**DEPTH TO ▽** 10.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-07-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
		26-32			*Sand* continued.		SP	
		18-20						
	42-48 water							wl sampling string: 42'bls wl augers: 7'bls
45								
		15-32		48-50 0				
		48-39						
50								
	52-58 water							wl sampling string: 57'bls wl augers: 8'bls
55								
					58.0-88.0 *Clay (CL)* 100%, dark gray, dense, soft, occasionaly sandy, occasionally fluid-like, occasionally plastic.		CL	clay observed upon auger removal
60								
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
65								
	88-71 water				End of boring: 88'bls.			bottom hole augers * could not advance aqua probe screen
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-3
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-21-93	**COMPLETED:** 03-21-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-21-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			5'spoon	0-2 0 2-4 0 4-6 0	0-8.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded, moderately well sorted, soft, silty.		SM	0-10'bls: 2 (5'x4") split-spoons
5								
	6-8 soil		5'spoon	6-8 0	8.0-11.0 *Silty Clay (CL-CH)*, 100%, light to medium gray to dark yellowish-orange, dense, dry to moist, plastic.		CL	
	8-10 soil			8-10 295				* - CH2MHILL 8-10 metals/TPH
10								groundwater encountered ▽
	11-15 water				11.0-58.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphates.		SP	w/ sampling string: 0 w/ augers: dry
15								
20								
25								
	28-30 water							w/ sampling string: 18'bls w/ augers: 7'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-3
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-21-93	**COMPLETED:** 03-21-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-21-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-50 water							wl sampling string: 25'bls wl augers: 7'bls * - CH2MHILL 46-50 metals/TPH
50								
55					56.0-67.0 *Sandy Clay (CL)*, 100%, quartz, dark gray, dense, soft, sandy, plastic, moist.		CL	
60								
65								
	67-70 water				67.0-98.0 *Sandy Clay (CL) and Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	wl sampling string: 70'bls. wl augers: 9'bls.
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-3
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-21-93	**COMPLETED:** 03-21-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-21-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
85							CL MARL	
90								
95	94-98 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 77'bls w/ augers: 9'bls bottom hole probe
					End of boring: 98'bls.			
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-4
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 02-23-93	**COMPLETED:** 02-23-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.2 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-23-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			5'spoon	0-2 2.4 2-4 4.8 4-6 82	0-4.5 *Silty Sand (SM)*, 100%, quartz, light yellowish-brown, fine-grained, trace phosphate, organic in top one foot.		SM	0-10'bls: 2 (5'x4") split-spoons
5	6-8 soil 8-10 soil		5'spoon	6-8 370 8-10 521	4.5-11.0 *Sandy Clay (CL)*, 100%, light to medium gray to moderate yellowish-orange, dense, dry to moist, soft, plastic.		CL	
10	11-15 water		8-8 10-10	10-12 31.3	11.0-65.0 *Sand (SP)*, 100%, quartz, colorless to very pale orange, fine-to medium-grained, sub-angular to sub-rounded, moderately well to well sorted, trace phosphates.		SP	groundwater encountered w/ sampling string: 0 w/ augers: dry ∇
15								
20	22-26 water		6-7 6-5	20-22 0				w/ sampling string: n/a w/ augers: n/a
25								
30								
35	36-40 water		18-22 23-34	34-36 0	38.0-65.0 color change: light to medium gray.			w/ sampling string: 18'bls w/ augers: 7'bls
40								

ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-4
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-23-93	**COMPLETED:** 02-23-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-23-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
55								
60								
65			18-18	65-67 0	65.0-71.0 *Sandy Clay (CL)*, 100%, quartz, dark gray, dense, soft, sandy, plastic, moist.		CL	
	67-71 water		22-27					bottom hole augers w/ sampling string: n/a w/ augers: n/a
70					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 71bls.			bottom hole probe
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-5
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-24-93	**COMPLETED:** 03-03-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 120 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-03-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			5'spoon	0-2 0 2-4 0 4-6 281	0-7.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded to sub-angular, moderately well sorted, soft, dry.		SM	0-10'bls: 2 (5'x4") split-spoons
5	6-8 soil		5'spoon	6-8 341	7.0-11.0 *Silty Clay (CL)*, 100%, light to medium gray to moderate yellowish-orange, dense, stiff, dry to moist, plastic.		CL	
	8-10 soil			8-10 583				
10	11-15 water		6-9 12-9	10-12 172	11.0-55.0 *Silty Sand (SM)*, 100%, quartz, light to medium gray, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, soft.		SM	groundwater encountered ▽ w/ sampling string: 0 w/ augers: dry
15								
20			8-10 10-9	20-22 0				
	22-24 water							w/ sampling string: 0 w/ augers: 5'bls
25								
30								
35			18-5 5-5	34-36 80				
	36-40 water							w/ sampling string: 13'bls w/ augers: 12'bls
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-5
CLIENT: SOUTHDIV.NAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-24-93	**COMPLETED:** 03-03-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 120 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-03-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Silty Sand continued.		SM	
45	46-49 water		38-58 80/6"	44-46 55.4				wl sampling string: 35'bls wl augers: 5'bls
50								
55	56-60 water		26-12 14-19	54-56 0	55.0-61.0 *Clay (CL)*, 100%, dark gray, soft, good plasticity, magnesium-rich, non calcareous, moist.		CL	wl sampling string: 56'bls wl augers: 5'bls
60			23-30 30-30	60-62 0	61.0-75.0 *Clayey Sand (SC)*, 100%, quartz, light olive gray, very fine-grained, silty, streaks of marl or dolomitized shell fragments throughout, few phosphate grains, magnesium-rich, moist.		SC	
65	64-68 water							wl sampling string: 56'bls wl augers: 5'bls
70	70-74 water		25-20 34-46	68-70 0				wl sampling string: 54'bls wl augers: 6'bls
75					75.0-90.0 *Sandy Clay (CL)*, 100%, quartz, pale olive green, soft, silty, low plasticity, magnesium-rich, calcareous, some shell fragments, some sandy lenses.		CL	
80	80-84 water		15-60 75-63	78-80 0				wl sampling string: 64'bls wl augers: 5'bls

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-5
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-24-93	**COMPLETED:** 03-03-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 120 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-03-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay (CL) continued.		CL	
85								
			38-42	88-90 0				
			77-57					
90					90.0-120.0 *Dolomite*, 100%, medium gray, micritic, hard, dense, well cemented, some shell replacement features visible.		DOLOMITE	
95								
100								
105								
110								
115								
			11-21	118-120 0	Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
			28-32		End of boring: 120'bls.			bottom hole augers
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-6
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 03-17-93	**COMPLETED:** 03-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.4 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 95 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-18-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-7.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded, moderately well sorted, soft, silty.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 0				
				4-6 0				
5								
	6-8 soil			6-8 0	7.0-11.0 *Silty Clay (CL)*, 100%, light to medium gray to moderate yellowish-orange, dense, dry to moist, plastic.		CL	* - CH2MHILL metals/TPH
			5'spoon					
	8-10 soil			8-10 0				
10				10-12 18				
			10-4					
			5-5		11.0-58.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphate.		SP	groundwater encountered ∇
	12-15 water							wl sampling string 0 wl augers: 7'bls
15								
20								
25								
	28-30 water							wl sampling string 0 wl augers: 7'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-6
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-17-93	**COMPLETED:** 03-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 95 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
			57-77 refusal	48-50 0				
50	50-52 water							wl sampling string 37'bls wl augers: 7'bls
55					56.0-67.0 *Sandy Clay (CL)*, 100%, quartz, dark gray, sandy, dense, soft, plastic, moist.		CL	
60								
65								
	67-70 water				67.0-95.0 *Sandy Clay (CL) and Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell fragments.		CL MARL	wl sampling string 28'bls wl augers: 9'bls * - CH2MHILL metals/TPH
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-6
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-17-93	**COMPLETED:** 03-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 95 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay (CL) and Marl continued.		CL MARL	
85								
90								
	93-95 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 85'bls w/ augers: 7'bls bottom hole probe
95					End of boring: 95'bls.			
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-7
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-18-93	**COMPLETED:** 02-19-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: R. Holloway	**HOLE ABANDONMENT DATE:** 02-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 8.2	0-73.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphate.		SP	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 8.2				
				4-6 6.9				
5								
	6-8 soil			6-8 8.3	7.0-10.0 color change; grayish-orange.			
	8-10 soil		5'spoon	8-10 6.9				
10				10-12 8.3				
	11-15 water		11-13		11.0-12.0 color change; light gray.			groundwater encountered ▽ w/ sampling string 0 w/ augers: dry
			19-20					
15								
	18-22 water							w/ sampling string 0 w/ augers: 10'bls
20								
			8-16	22-24 0	22.0 color change; yellowish-brown.			
			24-27					
25								
30								
	34-38 water							w/ sampling string 17'bls w/ augers: 7'bls
35								
			38-80	38-40 0	38.0 color change; yellowish-gray.			
			refusal					
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-7
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-18-93	**COMPLETED:** 02-19-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: R. Holloway	**HOLE ABANDONMENT DATE:** 02-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-50 water							wl sampling string: 49'bls wl augers: 9'bls
50			7-19 21-30	50-52 0	50.0 color change; grayish-olive.			
55	56-60 water							wl sampling string: 12'bls wl augers: 9'bls
60			18-66 82-50	60-62 n/a				
65								
	67-71 water							wl sampling string: 0 wl augers: 9'bls
70			6-11 17-17	71-73 0	71.0-73.0 color change; light olive gray. Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 73'bls.			bottom hole augers
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-8
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 02-20-93	**COMPLETED:** 02-22-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.3 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 89 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-22-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-3.0 *Silty Sand (SM)*, 100%, quartz, light to medium brown, very fine-to fine-grained, moderately well sorted, soft, dry.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 0				
				4-6 0	3.0-6.5 *Sand (SP)*, 100%, quartz, colorless to very pale orange, fine-to medium-grained, sub-angular to sub-rounded, well sorted, soft, dry.		SP	
5				6-8 0	6.5-11.0 *Sandy Clay (CL)*, 100%, quartz, light to medium gray to yellowish-orange, mottled, soft, dense, dry to moist, mostly dry.		CL	
	8-10 soil		5'spoon	8-10 0				
10	10-12 soil			10-12 202				
	11-15 water		push		11.0-21.5 *Silty Sand (SM)*, 100%, quartz, light to medium gray, fine-to medium-grained, sub-angular, poorly to moderately well sorted, occasionally clayey.		SM	groundwater encountered w/ sampling string: 0 w/ augers: dry ∇
			push	12-14 62				
			push					
			push					
15								
20			push	20-22 0				
			push		21.5-38.0 *Sand (SP)*, 100%, quartz, colorless to very pale orange, medium-grained, occasionally fine-grained, sub-angular to sub-rounded, moderately well sorted.		SP	w/ sampling string: 24'bls w/ augers: 9'bls
	22-25 water							
25								
30								
35			13-29	34-38 0				
			31-50					
	38-40 water							w/ sampling string: 39'bls w/ augers: 10'bls
40					38.0-71.0 *Silty Sand (SM)*, 100%, quartz, medium gray, very fine-to fine-grained, sub-rounded, poorly to moderately well sorted, occasionally clayey, soft.		SM	

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-8
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-20-93	**COMPLETED:** 02-22-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 89 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-22-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Silty Sand continued.		SM	
45	48-50 water		10-15 44-43	44-48 8.1				wl sampling string: 48'bls wl augers: 8'bls
50								
55	58-59 water		26-14 31-24					wl sampling string: 38'bls wl augers: 7'bls
60								
65	67-71 water		15-35 55-63	65-67 2.7				wl sampling string: 0 wl augers: 5'bls
70					71.0-89.0 *Sandy Clay (CL)*, 100%, quartz, medium dark gray, low plasticity, silty, calcareous, magnesium-rich, soft, trace dolomite fragments.		CL	
75	78-80 water		7-8 13-15	74-78 0				wl sampling string: 48'bls wl augers: 8'bls
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-8
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-20-93	**COMPLETED:** 02-22-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 89 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-22-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay continued.		CL	
85	86-89 water		16-36 40-59	84-88 0	Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 27'bls w/ augers: 12'bls bottom hole probe
					End of boring: 89'bls.			
90								
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-9
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 03-04-93	**COMPLETED:** 03-05-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-05-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
		5'spoon		0-2 2 2-4 2.2 4-6 2	0-8.0 *Silty Sand (SM)*, 100%, quartz, colorless to very pale orange, very fine-to fine-grained, sub-rounded, moderately well sorted, soft, dry to moist.		SM	0-10'bls: 2 (5x4") split-spoons
5	6-8 soil 8-10 soil	5'spoon		6-8 109 8-10 141	8.0-11.0 *Sandy Clay (CL)*, 100%, quartz, light to medium gray to yellowish-orange, mottled, dense, dry to moist, plastic.		CL	* - CH2MHIL metals/TPH
10	11-15 water	9-15 21-20		10-12 4.1	11.0-58.0 *Sand (SP)*, 100%, quartz, colorless to very pale orange, medium-grained, sub-angular to sub-rounded, moderately well sorted, occasionally silty.		SP	groundwater encountered w/ sampling string: 0 w/ augers: 4'bls ∇
15								
20								
		21-8 13-17		22-24 0				
25	24-28 water							w/ sampling string: 9'bls w/ augers: 8'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-9
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-04-93	**COMPLETED:** 03-05-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-05-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
55	54-58 water							wl sampling string: 3'bls wl augers: 7'bls
					58.0-98.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, plastic, soft, wet, contains approximately 40-45% quartz sand, medium-grained, sub-rounded, moderately well sorted.		CL	
60								
65								
70								
75	78-78 water		16-9 13-15	74-78 0				wl sampling string: 53'bls wl augers: 6'bls
80								

ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-9
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-04-93	**COMPLETED:** 03-05-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-05-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay continued.		CL	
85								
90								
95	94-95 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 88'bls w/ augers: 6'bls bottom hole probe
					End of boring: 98'bls.			
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-10
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-08-93	**COMPLETED:** 02-08-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 65 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-08-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
		5'spoon	0-2 1.1 2-4 1.7 4-6 2.1	0-8.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-angular to sub-rounded, well sorted, soft, dry.		SP	0-10'bls: 2 (5'x4") split-spoons
5	6-8 soil 8-10 soil	5'spoon	6-8 72.6 8-10 18.2	8.0-11.0 *Sandy Clay (CL)*, 100%, quartz, dark gray to bright yellowish-orange, dense, compact, soft, dry.		CL	
10	11-15 water	3-9 9-9	10-12 8.3	11.0-49.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-angular to sub-rounded, well sorted, soft.		SP	groundwater encountered w/ sampling string 14'bls w/ augers: 7'bls ▽
15							
20	18-22 water						w/ sampling string 0 w/ augers: 5'bls
25	24-28 water						w/ sampling string 23'bls w/ augers: 7'bls
30		13-15 21-29	28-30 3.5				
35	34-38 water						w/ sampling string 0 w/ augers: 7'bls
40		9-6 6-5	38-40 4.5				

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-10
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-08-93	**COMPLETED:** 02-08-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.6 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 85 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-08-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/Bin.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	44-48 water							wl sampling string: 0 wl augers: 7'bls
			20-24	48-50 7.8				
			18-12		48.0-85.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, very fine-to fine-grained, soft, dense, plastic, wet.		SC	
50	50-54 water							wl sampling string: 0 wl augers: 5'bls
55								
60	59-62 water							bottom hole augers wl sampling string: 62'bls wl augers: 8'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
65					End of boring: 85'bls.			bottom hole probe
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-11
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 03-08-93	**COMPLETED:** 03-08-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.1 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ∇** 10.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-08-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-4.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded, moderately well sorted, soft, silty.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 0				
				4-6 0	4.0-11.0 *Silty Clay (CL)*, 100%, quartz, light to medium gray to very pale orange to moderate yellowish-orange, dense, dry to moist, plastic.		CL	
5								
	6-8 soil			6-8 0				
	8-10 soil		5'spoon	8-10 0				* - CH2MHILL metals/TPH
10				10-12 0				groundwater encountered ∇
	11-15 water		14-9		11.0-58.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-angular to sub-rounded, moderately well to well sorted, trace sand-sized phosphate grains.		SP	w/ sampling string: 0
			8-9					w/ augers: dry
15								
20								
			22-18	22-24 0				
			12-24					
	24-27 water							w/ sampling string: 6'bls w/ augers: 3'bls
25								
30								
35								
40								

ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-11
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-08-93	**COMPLETED:** 03-08-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ∇** 10.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-08-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-47 water		160-200 / 183-refusal	44-46 0				wl sampling string: 6'bls wl augers: 6'bls
50								
55								
					58.0-71.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, plastic, soft, wet, contains approximately 40-45% quartz sand, medium-grained, sub-rounded, moderately well sorted.		CL	
60								
65								
	67-71 water							bottom hole augers wl sampling string: 67'bls wl augers: 6'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
70					End of boring: 71bls.			bottom hole probe
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-12
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-17-93	**COMPLETED:** 02-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Auqa Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ▽** 10.5 FT. BLS
LOGGED BY: R. Holloway	**HOLE ABANDONMENT DATE:** 02-17-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-6.0 *Silty Sand (SM)*, 100%, quartz, light yellowish-brown, very fine-to fine-grained, organics from 0-3.5'bls and wet from 3.5 to 5'bls.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 0				
				4-6 0				
5								
	6-8 soil			6-8 0	6.0-12.0 *Clayey Sand (SC)*, 100%, quartz, brownish-yellow, very fine-grained, hard, dry, some iron-oxide staining.		SC	
			5'spoon					
	8-10 soil			8-10 70				
10				10-12 0				groundwater encountered ▽
	11-15 water		1-3 7-13					wl sampling string: 0 wl augers: 7'bls
					12.0-38.0 *Sand (SP)*, 100%, quartz, very pale orange, fine-grained, wet, few pieces of phosphate and phosphitic silt.		SP	
15								
	18-22 water							wl sampling string: 18'bls wl augers: 11'bls
20								
			10-9 13-17	22-24 0				
25								
30								
	34-38 water			38-40 0				wl sampling string: 8'bls wl augers: 8'bls
35								
			12-25 45-45		38.0-52.0 *Silty Sand (SM)*, 100%, quartz, light olive gray, very fine-grained, saturated, slightly calcareous with some pieces of phosphate.		SM	
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-12
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-17-93	**COMPLETED:** 02-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Auqa Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ▽** 10.5 FT. BLS
LOGGED BY: R. Holloway	**HOLE ABANDONMENT DATE:** 02-17-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Silty Sand continued.		SM	
45	46-50 water							wl sampling string: 49'bls wl augers: 4'bls
50								
			9-8	52-54 0	52.0-54.0 *Clay (CH)*, 100%, dark gray, plastic, soft, moist.		CH	
			7-9					
55	56-60 water				54.0-71.0 *Clayey Sand (SC)*, 100%, quartz, medium dark gray, fine-grained, silty, wet, with few clay bands throughout, the silts are slightly calcareous.		SC	wl sampling string: 30'bls wl augers: 1'bls
60			16-25	60-62 0				
			19-72					
65								
	67-71 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers wl sampling string: 60'bls wl augers: 7'bls
70					End of boring: 71'bls.			bottom hole probe
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-13
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 03-07-93	**COMPLETED:** 03-07-93
DRILL RIG: Gus Pech BR22 w/4.25"HSA	**DRILL MTHD.:** n/a / **SAMP. MTHD.:** n/a	**PROTECTION LEVEL:** n/a
GROUND ELEV.: n/a FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-07-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			5'spoon	0-2 0 2-4 12.6 4-6 8.1	0-8.0 *Silty Sand (SM)*, 100%, quartz, colorless to medium brown to light gray, very fine-to fine-grained, sub-rounded, poorly to moderately well sorted, soft, silty.		SM	0-10'bls: 2 (5'x4") split-spoons
5	6-8 soil 8-10 soil		5'spoon	6-8 6 8-10 236	8.0-11.0 *Silty Clay (CL)*, 100%, light to medium gray to very pale orange, plastic, dense, dry to moist.		CL	
10	11-15 water		15-10 10-6	10-12 238	11.0-58.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-angular to sub-rounded, moderately well to well sorted.		SP	groundwater encountered w/ sampling string: 0 w/ augers: 7'bls ∇
15								
20								
	24-28 water		15-10 10-13	22-24 2				w/ sampling string: 8'bls w/ augers: 8'bls
25								
30								
35					36.0 color change: dark gray.			
40								

ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-13
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-07-93	**COMPLETED:** 03-07-93
DRILL RIG: Gus Pech BR22 w/4.25"HSA	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** n/a	**PROTECTION LEVEL:** n/a
GROUND ELEV.: n/a FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-07-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-50 water							wl sampling string 49'bls wl augers: 4'bls
50								
55					58.0-71.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, plastic, soft, wet, contains 40-45% sand, medium-grained, sub-rounded, moderately well sorted.		CL	
60								
65	67-71 water							bottom hole augers wl sampling string 60'bls wl augers: 7'bls
70					Samples collected were analyzed for USEPA Method 8010/8020 and TPH. End of boring: 71'bls.			bottom hole probe
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-14
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 02-18-93	**COMPLETED:** 02-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.0 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 70 FT. BLS	**DEPTH TO ∇** 10.5 FT. BLS
LOGGED BY: R. Holloway	**HOLE ABANDONMENT DATE:** 02-18-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
		5'spoon		0-2 0 2-4 0.9 4-6 44.5	0-6.0 *Silty Sand (SM)*, 100%, quartz, light yellowish-brown to yellow, very fine-to fine-grained, organic, damp at 5'bls.		SM	0-10'bls: 2 (5'x4") split-spoons
5	6-8 soil 8-10 soil	5'spoon		6-8 34.3 8-10 81.3	6.0-11.0 *Clayey Sand (SC)*, 100%, quartz, brownish-yellow, some orange, very fine-grained, hard, dry, some iron-oxide staining.		SC	
10	11-15 water	1-2 5-7		10-12 0	11.0-34.0 *Sand (SP)*, 100%, quartz, pale yellowish-brown to grayish-orange, very fine-to fine-grained, saturated.		SP	groundwater encountered ∇ w/ sampling string: 0 w/ augers: 7'bls
15								
20	18-22 water							w/ sampling string: 0 w/ augers: 10'bls
		13-12 12-13		22-24 0				
25								
30								
35		6-13 64-36		34-36 9	34.0-70.0 *Clayey Sand (SC)*, 100%, quartz, light olive gray, very fine-to fine-grained, wet, magnesium-rich. 34.5-35.5 clay lense: light olive gray, soft, medium plasticity, magnesium-rich. 36.0-70 color change: medium gray.		SC	
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-14
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-18-93	**COMPLETED:** 02-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 70 FT. BLS	**DEPTH TO ∇** 10.5 FT. BLS
LOGGED BY: R. Holloway	**HOLE ABANDONMENT DATE:** 02-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Clayey Sand continued.		SC	
45	46-50 water							w/ sampling string: 53'bls w/ augers: 7'bls
50			12-18	50-52 0				
			19-21					
55								
60								
65								
	68-70 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 20'bls w/ augers: 17'bls bottom hole probe
70					End of boring: 70'bls.			
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-15
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-09-93	**COMPLETED:** 02-09-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 80 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-09-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-5.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-angular to sub-rounded, well sorted, soft, dry.		SP	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 0				
	4-6 soil			4-6 398				
5					5.0-9.5 *Sandy Clay (CL)*, 100%, quartz, light to dark gray to yellowish-orange, dense, compact, moist.		CL	
	6-8 soil			6-8 372				
			5'spoon	8-10 44.2				
10			8-14	10-12 20.1	9.5-39.5 *Sand (SP)*, 100%, quartz, colorless to very pale orange, fine-to medium-grained, sub-angular to sub-rounded, well sorted, sucrosic.		SP	groundwater encountered ∇ w/ sampling string: 0 w/ augers: 7'bls
	11-15 water		15-16					
15								
			15-28	18-20 0				
			32-56		19.0-39.5 color change; dark yellowish-brown.			
20	20-24 water							w/ sampling string: 22'bls w/ augers: 7'bls
25								
			6-6	28-30 3.5				
30	30-34 water		8-21					w/ sampling string: 30'bls w/ augers: 8'bls
35								
			12-47	38-40 4.5				
40			42-107				SC	

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-15
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-09-93	**COMPLETED:** 02-09-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 80 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-09-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					39.5-80.0 *Clayey Sand (SC)*, 100%, quartz, dark to medium gray, soft, dense, clayey, wet.		SC	
45								
	47-51 water							wl sampling string: 17'bls wl augers: 7'bls
50								
55								
			6-9	58-80 7.8	Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers
			12-10					
60					End of boring: 60'bls.			bottom hole spoon
65								
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-16
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-19-93	**COMPLETED:** 03-19-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-7.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded, moderately well sorted.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 440				
				4-6 480				
5								
	6-8 soil			6-8 737	7.0-11.0 *Silty Clay (CL)*, 100%, quartz, light to medium gray to very pale orange, dense, dry, plastic.		CL	* - CH2MHILL metals/TPH
			5'spoon					
	8-10 soil			8-10 888				
10				10-12 295				
			20-14					
	11-15 water		14-14		11.0-58.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphates.		SP	groundwater encountered w/ sampling string: n/a w/ augers: n/a ∇
15								
20								
25								
	28-30 water							w/ sampling string: n/a w/ augers: n/a
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-16
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-19-93	**COMPLETED:** 03-19-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	48-50 water							wl sampling string: 48'bls wl augers: 10'bls
50								
55					56.0-67.0 *Sandy Clay (CL)*, 100% quartz, dark gray to olive green, sandy, dense, soft, plastic, moist.		CL	
60								
65								
	67-70 water				67.0-98.0 *Sandy Clay (CL) with Marl*, sandy clay, 85% quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	wl sampling string: 68'bls wl augers: 7'bls
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-16
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-19-93	**COMPLETED:** 03-19-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
	94-98 water							w/ sampling string: 9'bls w/ augers: 7'bls
95					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 98'bls.			bottom hole augers
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-17
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-20-93	**COMPLETED:** 03-20-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-20-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-6.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded, moderately well sorted, soft, silty.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 328				
	4-6 soil			4-6 382				
5								
				6-8 249	6.0-11.0 *Silty Clay (CL)*, 100%, quartz, light to medium gray to pale yellowish-orange, dense, dry to moist, plastic.		CL	
			5'spoon					
	8-10 soil			8-10 328				* - CH2MHILL metals/TPH
10								groundwater encountered ▽
	11-15 water				11.0-87.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphates.		SP	wl sampling string: 0 wl augers: 8'bls
15								
20								
25								
	28-30 water							wl sampling string: 28'bls wl augers: 8'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-17
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-20-93	**COMPLETED:** 03-20-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-20-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-50 water							wl sampling string: 48'bls wl augers: 8'bls
50								
55								
60								
65								
	67-71 water				67.0-98.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	wl sampling string: 7'bls wl augers: 12'bls
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-17
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-20-93	**COMPLETED:** 03-20-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-20-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
95	94-97 water							wl sampling string: 7'bls wl augers: 5'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 98'bls.			bottom hole augers
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-18
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 02-10-93	**COMPLETED:** 02-15-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-15-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-5.0 *Sand (SP)*, 100%, quartz, colorless to very pale yellow, fine-grained, sub-rounded, moderately well sorted, occasionally clayey.		SP	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 74.5				
				4-6 288				
5					5.0-11.0 *Clayey Sand (SC)*, 100%, quartz, pale yellowish-gray to medium gray, dense, moist, soft.		SC	
	6-8 soil			6-8 332				
			5'spoon					
	8-10 soil			8-10 473				
10				10-12 37.7				
	11-15 water		11-9		11.0-39.0 *Sand (SP)*, 100%, quartz, colorless to pale yellowish-brown, fine-to medium-grained, sub-rounded, moderately well sorted, soft, occasionally clayey, sucrosic.		SP	groundwater encountered w/ sampling string: 0 w/ augers: 8'bls ▽
			8-7					
15								
			10-6	18-20 0				
			8-27					
20	20-24 water							w/ sampling string: 0 w/ augers: 7'bls
25								
			32-48	28-30 22.1				
			47-59					
30								
35	34-38 water							w/ sampling string: 0 w/ augers: 7'bls
			10-50	38-40 0				
40			150/6"				SC	

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-18
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 02-10-93	**COMPLETED:** 02-15-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 02-15-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					39.0-51.0 *Clayey Sand (SC)*, 100%, quartz, pale olive green to medium gray, fine-grained, sub-rounded, moderately well sorted, clayey, plastic, dense.		SC	
45	48-50 water							wl sampling string: 28'bls wl augers: 10'bls
50			8-12 / 14-18	50-52 0	51.0-71.0 *Clay (CH)*, 100%, dark gray, dense, soft, plastic, moist.		CH	
55								
60								
65	67-71 water							bottom hole augers wl sampling string: 60'bls wl augers: 7'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
70					End of boring: 71'bls.			bottom hole probe
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-20
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-08-93	**COMPLETED:** 03-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** mud rotary	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 160 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					0-6.0 *Silty Sand (SM)*, 100%, quartz, colorless to medium brown, very fine-to fine-grained, sub-rounded, moderately well sorted, soft, silty.		SM	
5					6.0-11.0 *Silty Clay (CL)*, 100%, quartz, light to medium gray to very pale orange, dense, dry to moist, plastic.		CL	
10					11.0-56.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphates.		SP	groundwater encountered ∇ pump rate: 1min/ft
15								
20								
25								
30								
35								pump rate: 1min/ft
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-20
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-08-93	**COMPLETED:** 03-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** mud rotary	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 180 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
55								
					56.0-67.0 *Clayey Sand (SC)*, 100%, quartz, colorless to medium gray, fine-grained, sub-rounded, moderately well sorted, approximately 30% of sample is clay, medium gray, small, rounded, flat, platlets, plastic.		SC	
60								pump rate: 1min/ft
65								
					67.0-96.0 *Sand (SP) with Shell and Marl*, sand, 30%, quartz, light gray to colorless, fine-grained, sub-rounded, moderately well sorted; clay, 30%, medium to dark gray, soft, dense, plastic, trace phosphate; shell, 20%, very pale orange, small, thin, angular fragments; marl, 20%, white, calcareous, soft, intermittant lenses, trace limestone.	MARL/SHELL	SP	
70								
75								pump rate: 1min/ft
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-20
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-08-93	**COMPLETED:** 03-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** mud rotary	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.6 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 160 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sand with Shell and Marl continued.		SP MARL/SHELL	
85								
90								
95	98-100 water				98.0-102.0 *Clay (CL) and Shell with Partially Dolomitized Coquina and Limestone*; clay, 20%, medium to dark gray to olive green, soft, plastic, dense; shell, 20%, very pale orange, small, thin, angular fragments; dolomitized coquina, 30%, very pale orange, remnant shell and cemented shell fragments visible, well cemented, hard; limestone, 30%, medium gray, micritic, dense, well cemented, hard.		CL SHELL	could not get sample
100					102.0-108.0 *Partially Dolomitized Limestone*, 100%, medium gray, micritic, dense, hard, well cemented, trace dolomitized coquina.		DOLOMITE	pump rate: 2-3min/ft
105	104-114 water							temporary well point purged 33 gal
					108.0-122.0 *Dolomite and Limestone*; limestone, 40%, medium gray, micritic, hard, dense, well cemented, some shell replacement features visible; dolomite, 60%, moderate yellowish-orange, crystalline, hard, dense, well cemented, sucrosic.		DOLOMITE/	
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-20
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-08-93	**COMPLETED:** 03-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** mud rotary	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 180 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 3			
					Dolomite and Limestone continued.		DOLOMITE/ LIMESTONE	
					122.0-154.0 *Calcareous Clay (CH)*, 100%, white to light gray, soft, plastic, pliable, contains 2-3% phosphate, trace dolomite.		CH	pump rate: 5-8min/ft
125								
130								pump rate: 8-7min/ft
135								
140					*Calcareous Clay* continued.			pump rate: 1-2min/ft
145								
150								
155					154.0-180.0 *Clay (CH)*, 100%, olive green, plastic, dense, moderately soft, phosphate nodules, trace limestone.			
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
180								bottom hole rotary bit

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-21
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 03-22-93	**COMPLETED:** 03-22-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-22-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 9.8 2-4 12.2 4-6 12	0-7.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded, moderately well sorted, soft, silty.		SM	0-10'bls: 2 (5'x4") split-spoons
5	6-8 soil 8-10 soil		5'spoon	6-8 12 8-10 0	7.0-11.0 *Silty Clay (CL)*, 100%, quartz, light to medium gray to moderate yellowish-orange, dense, dry to moist, plastic.		CL	* - CH2MHILL metals/TPH
10	11-14 water				11.0-58.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphates.		SP	groundwater encountered w/ sampling string: 0 w/ augers: dry ▽
15								
20								
25	28-30 water							w/ sampling string: 18'bls w/ augers: 7'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-21
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-22-93	**COMPLETED:** 03-22-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.6 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 96 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-22-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
95	94-96 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 9'bls w/ augers: 8'bls * - CH2MHILL metals/TPH bottom hole probe
					End of boring: 96'bls.			
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-21
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 03-22-93	**COMPLETED:** 03-22-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.8 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-22-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-50 water							wl sampling string: 48'bls wl augers: 8'bls
50								
55					58.0-67.0 *Sandy Clay (CL)*, 100%, quartz, dark gray, sandy, dense, soft, plastic, moist.		CL	
60								
65								
	67-70 water				67.0-98.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	wl sampling string: 66'bls wl augers: 19'bls
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-22
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-23-93	**COMPLETED:** 03-24-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-24-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			5'spoon	0-2 0 2-4 0 4-6 0	0-7.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded, moderately well sorted, soft, silty.		SM	0-10'bls: 2 (5'x4") split-spoons
5	6-8 soil 8-10 soil		5'spoon	6-8 0 8-10 0	7.0-11.0 *Silty Clay (CL)*, 100%, quartz, light to medium gray to moderate yellowish-orange, dense, dry to moist, plastic.		CL	* - CH2MHIL metals/TPH
10	11-15 water				11.0-58.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphates.		SP	groundwater encountered w/ sampling string: 0 w/ augers: dry ∇
15								
20								
25	28-30 water							w/ sampling string: 24'bls w/ augers: 7'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-22
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-23-93	**COMPLETED:** 03-24-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-24-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	48-50 water							wl sampling string: 39'bls wl augers: 9'bls
50								
55					58.0-67.0 *Sandy Clay (CL)*, 100%, quartz, dark gray, sandy, dense, soft, plastic, moist.		CL	
60								
65								
	67-70 water				67.0-98.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	wl sampling string: 60'bls wl augers: 9'bls
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-22
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-23-93	**COMPLETED:** 03-24-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-24-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
95	94-98 water							bottom hole augers w/ sampling string: 70'bls w/ augers: 9'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 98'bls.			bottom hole probe
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-23
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-29-93	**COMPLETED:** 03-30-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-30-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-5.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-rounded, moderately well sorted.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 0				
				4-6 0				
5					5.0-11.0 *Silty Clay (CL)*, 100%, quartz, light to medium gray to moderate yellowish-orange, dense, dry to moist, plastic.		CL	
	6-8 soil			6-8 290				
	8-10 soil		5'spoon	8-10 145				* - CH2MHILL metals/TPH
10								
	11-15 water				11.0-56.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphates.		SP	groundwater encountered wl sampling string: 0 wl augers: 8'bls ∇
15								
20								
25								
	28-30 water							wl sampling string: 12'bls wl augers: 10'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-23
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-29-93	**COMPLETED:** 03-30-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-30-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	48-50 water							wl sampling string: 35'bls wl augers: 8'bls
50								
55					58.0-67.0 *Sandy Clay (CL)*, 100%, quartz, dark gray, sandy, dense, soft, plastic, moist.		CL	
60								
65	67-71 water				67.0-97.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	wl sampling string: 35'bls wl augers: 8'bls
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-23
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-29-93	**COMPLETED:** 03-30-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 03-30-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
95	94-97 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 84'bls w/ augers: 8'bls * - CH2MHILL metals/TPH bottom hole probe
					End of boring: 97'bls.			
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-24
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 03-30-93	**COMPLETED:** 04-01-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▼** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-01-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		5'spoon	0-2 347 2-4 184 4-6 88	0-8.0 *Silty Sand (SM)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded, moderately well sorted, soft, silty.		SM	0-10'bls: 2 (5'x4") split-spoons
5	6-8 soil		5'spoon	6-8 34 8-10 39	8.0-8.0 *Sandy Clay (CL)*, 100%, quartz, light to medium gray to pale yellowish-orange, dense, dry to moist, plastic. 8.0-58.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphates.		CL SP	* - CH2MHIL metals/TPH
10	11-15 water							groundwater encountered wl sampling string: 0 wl augers: dry ▼
15								
20								
25	28-30 water							wl sampling string: 25'bls wl augers: 8'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-24
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 03-30-93	**COMPLETED:** 04-01-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-01-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-50 water							w/ sampling string: n/a w/ augers: n/a
50								
55					56.0-67.0 *Sandy Clay (CL)*, 100%, quartz, dark gray, sandy, dense, soft, plastic, moist.		CL	
60								
65								
	67-71 water				67.0-98.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	w/ sampling string: n/a w/ augers: n/a
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-24
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 03-30-93	**COMPLETED:** 04-01-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.8 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇:** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-01-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
95	94-98 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string 94'bls w/ augers: 8'bls * - CH2NHIL metals/TPH
					End of boring: 98'bls.			bottom hole probe
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-25
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 04-01-93	**COMPLETED:** 04-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.3 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-02-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 47.8	0-7.0 *Silty Sand (SM)*, 100%, quartz, colorless to light gray, very fine-to fine-grained, sub-rounded, moderately well to well sorted, trace phosphates.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 34.4				
	4-6 soil			4-6 49.2				
5				6-8 0				
	8-10 soil		5'spoon	8-10 0	7.0-10.0 *Sandy Clay (CL)*, 100%, quartz, light to medium gray to moderate yellowish-orange to reddish-yellow, dense, dry, slightly plastic.		CL	* - CH2MHILL metals/TPH
10	11-15 water				10.0-58.0 *Sand (SP)*, 100%, quartz, colorless, fine-to medium-grained, sub-rounded, well sorted, trace phosphates.		SP	groundwater encountered w/ sampling string 0 w/ augers: dry ∇
15								
20								
25	28-30 water							w/ sampling string 24'bls w/ augers: 8'bls
30								
35								
40								

ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-25
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 04-01-93	**COMPLETED:** 04-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.3 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-02-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-50 water							wl sampling string: 45'bls wl augers: 8'bls
50								
55					58.0-67.0 *Sandy Clay (CL)*, 100%, quartz, dark gray, sandy, dense, soft, plastic, moist.		CL	
60								
65								
	67-71 water				67.0-97.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	wl sampling string: 56'bls wl augers: 7'bls * - CH2MHILL metals/TPH
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-25
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-01-93	**COMPLETED:** 04-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-02-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
	94-98 water							w/ sampling string 89'bls w/ augers: 1'bls
95					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 97'bls.			bottom hole augers
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-26
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 04-02-93	**COMPLETED:** 04-03-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-02-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		5'spoon	0-2 284 2-4 149 4-6 124	0-7.0 *Silty Sand (SM)*, 100%, quartz, colorless to light gray, very fine-to fine-grained, sub-rounded, moderately well to well sorted, trace phosphates.		SM	0-10'bls: 2 (5'x4") split-spoons
5			5'spoon	6-8 128				
	8-10 soil			8-10 35	7.0-10.0 *Clayey Sand (SC)*, 100%, quartz, light gray to pale yellowish-orange, medium-grained, moderately well sorted, clayey, slightly plastic, dry to moist.		SC	* - CH2MHILL metals/TPH
10	11-15 water				10.0-58.0 *Sand (SP)*, 100%, quartz, colorless to dark brown, fine-to medium-grained, sub-rounded, moderately well sorted, trace phosphates.		SP	groundwater encountered w/ sampling string: 0 w/ augers: dry ∇
15								
20								
25	28-30 water							w/ sampling string: 25'bls w/ augers: 8'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-26
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 04-02-93	**COMPLETED:** 04-03-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-02-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-50 water							w/ sampling string 46'bls w/ augers: 11'bls
50								
55					56.0-67.0 *Sandy Clay (CL)*, 100%, quartz, dark gray to brownish-gray, sandy, dense, soft, plastic, moist.		CL	
60								
65								
	67-71 water				67.0-98.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	w/ sampling string 59'bls w/ augers: 7'bls * - CH2MHILL metals/TPH
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-26
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-02-93	**COMPLETED:** 04-03-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 98 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-02-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
	94-96 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 86'bls w/ augers: 7'bls bottom hole probe
95					End of boring: 98'bls.			
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

,2,7	LOG of WELL:	LOG OF BORING: GS-3-27
		PROJECT NO: 7537-03
Environmental Services	DATE STARTED: 04-04-93	COMPLETED: 04-04-93
DRILL MTHD.: 4.25" ID HSA	SAMP. MTHD.: Aqua Probe	PROTECTION LEVEL: D
MONITOR INST.: Microtip-PID	TOTAL DEPTH: 97 FT. BLS	DEPTH TO ∇ 11 FT. BLS
HOLE ABANDONMENT DATE: 04-04-93		SITE: 3

SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
-7.0 *Silty Sand (SM)*, 100%, quartz, colorless to light gray, very fine-to ne-grained, sub-rounded, moderately well sorted, trace phosphates.		SM	0-10'bls: 2 (5'x4") split-spoons
)-10.0 *Clayey Sand (SC)*, 100%, quartz, light gray to pale yellowish-orange, e-to medium-grained, moderately well to well sorted, clayey, slightly istic, moist.		SC	* - CH2MHILL metals/TPH
0-58.0 *Sand (SP)*, 100%, quartz, colorless to dark brown, fine-to dium-grained, sub-rounded, moderately well sorted, trace phosphates.		SP	groundwater encountered ∇ wl sampling string: 0 wl augers: dry
			wl sampling string: 28'bls wl augers: 10'bls

F BORING: GS-3-27
CT NO: 7537-03
COMPLETED: 04-04-93
CTION LEVEL: D
TO ∇ 11 FT. BLS
3

REMARKS

wl sampling string: 53'bls wl augers: 8'bls
* - CH2MHILL metals/TPH

wl sampling string: 68'bls wl augers: 8'bls

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-28
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 04-05-93	**COMPLETED:** 04-06-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 72.1 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇:** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-06-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 0	0-7.0 *Silty Sand (SM)*, 100%, quartz, colorless to light gray, very fine-to fine-grained, sub-rounded, moderately well sorted, trace phosphates.		SM	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 0				
				4-6 0				
5								
	6-8 soil			6-8 0				
	8-10 soil		5'spoon	8-10 0	7.0-10.0 *Clayey Sand (SC)*, 100%, quartz, light gray to pale yellowish-orange, fine-to medium-grained, moderately well to well sorted, clayey, slightly plastic, moist.		SC	* - CH2MHILL metals/TPH
10	11-15 water				10.0-58.0 *Sand (SP)*, 100%, quartz, colorless to dark brown, fine-to medium-grained, sub-rounded, moderately well sorted, trace phosphates.		SP	groundwater encountered w/ sampling string: 13.5'bls w/ augers: dry ∇
15								
20								
25	28-30 water							w/ sampling string: 30'bls w/ augers: 13'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-28
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 04-05-93	**COMPLETED:** 04-06-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 72.1 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-06-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	48-50 water							wl sampling string: 5'bls wl augers: 8'bls
50								
55					58.0-67.0 *Sandy Clay (CL)*, 100%, quartz, dark gray to brownish-gray, sandy, dense, soft, plastic, moist.		CL	
60								
65	67-71 water				67.0-97.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	wl sampling string: 7'bls wl augers: 9'bls
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-28
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-05-93	**COMPLETED:** 04-06-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 72.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-06-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
	93-98 water							w/ sampling string: 85'bls w/ augers: 9'bls
95					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 97'bls.			bottom hole augers
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-29
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-12-93	**COMPLETED:** 04-13-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 3 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-13-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil			0-2 30.2	0-74.0 *Clayey Sand (SC)*, 100%, quartz, very pale orange to light brown, fine-to medium-grained, sub-rounded, poorly to moderately well sorted, soft.		SC	0-10'bls: 2 (5'x4") split-spoons
	2-4 soil		5'spoon	2-4 22.4	2.5-28.0 color change; dark brown to dark brownish-gray.			* - CH2MHILL metals/TPH groundwater encountered ∇
5				4-6 33.4				
			5'spoon	6-8 47.8				
				8-10 38.2				
10	11-15 water							wl sampling string: 0 wl augers: dry
15								
20								
25	28-28 water							wl sampling string: 28'bls wl augers: 2'bls
					28.0-74.0 color change; pale olive green to medium gray.			
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-29
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 04-12-93	**COMPLETED:** 04-13-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.8 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇:** 3 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-13-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Clayey Sand continued.		SC	
45	46-48 water							wl sampling string: 26'bls wl augers: 3'bls * - CH2MHILL TPH
50								
55								
60								
65	67-71 water							wl sampling string: 7'bls wl augers: 7'bls * - CH2MHILL metals
70								
75					74.0-94.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell, sediments become cemented to semi-consolidated from 89.0-94.0'bls.		CL MARL	
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-29
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-12-93	**COMPLETED:** 04-13-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 3 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-13-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90	90-94 water							w/ sampling string: n/a w/ augers: n/a
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole augers
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-30
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 04-14-93	**COMPLETED:** 04-15-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.9 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 87 FT. BLS	**DEPTH TO ∇** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-15-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil			0-2 9.8	0-87.0 *Clayey Sand (SC)*, 100%, quartz, dark brown to medium dark brown, fine-to medium-grained, sub-rounded, moderately well sorted, clayey.		SC	0-10'bls: 2 (5'x4") split-spoons
	2-4 soil		5'spoon	2-4 12.2				
				4-6 2.5	4.0-87.0 color change; colorless to very pale orange.			
5				6-8 0.4				
	8-10 soil		5'spoon	8-10 0				* - CH2MHILL metals/TPH
10	11-15 water							groundwater encountered ∇ wl sampling string: 0 wl augers: dry
15								
20								
25	28-29 water							wl sampling string: 17'bls wl augers: 12'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-30
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-14-93	**COMPLETED:** 04-15-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 87 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-15-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Clayey Sand continued.		SC	
45	46-48 water							wl sampling string 0 wl augers: 12'bls
50								
55								
60								
65								
	67-71 water				67.0-87.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark to medium gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell		CL MARL	wl sampling string 67'bls wl augers: 10'bls * - CH2MHILL metals/TPH
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-30
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-14-93	**COMPLETED:** 04-15-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 87 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-15-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85	85-87 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			w/ sampling string: 84'bls w/ augers: 10'bls bottom hole augers
					End of boring: 87'bls.			
90								
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-31
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 04-15-93	**COMPLETED:** 04-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.5 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 118 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-17-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil			0-2 189	0-32.0 *Clayey Sand (SC)*, 100%, quartz, colorless to medium brown to reddish-yellow to yellowish-red, fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted, trace phosphate.		SC	0-10'bls: 2 (5'x4") split-spoons
			5'spoon	2-4 70.1				
	4-6 soil			4-6 74.4				
5	6-8 soil		5'spoon	6-8 42.2				* - CH2MHILL metals/TPH
				8-10 4.4				
10	11-15 water							groundwater encountered ▽ wl sampling string: 0 wl augers: dry
15								
20								
25	28-29 water							wl sampling string: 29'bls wl augers: 13'bls
30								
					32.0-87.0 *Sandy Clay (CL)*, 100%, quartz, dark to medium gray, dense, wet, soft, plastic.		CL	
35								pump rate: <1min/ft
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-31
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-15-93	**COMPLETED:** 04-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 118 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-17-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sandy Clay continued.		CL	
45	46-50 water							wl sampling string: 50'bls wl augers: 8'bls
50								
55								
60								
65								
	67-71 water				67.0-99.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	wl sampling string: 7'bls wl augers: 17'bls * - CH2MHILL metals/TPH
70								
75								pump rate: 2min/ft
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-31
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-15-93	**COMPLETED:** 04-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 118 FT. BLS	**DEPTH TO ▽** 11 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-17-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
90								
95	94-95 water							wl sampling string: 90'bls wl augers: 13'bls bottom hole augers
100					99.0-118.0 *Dolomite*, 100%, medium gray to moderate yellowish-brown, moderately well cemented, moderately hard, crystalline, vuggy, dense, many CaCO3 replacement features visible, numerous gastropods, pelecypods, sharks teeth, dolomitized coquina present, trace limestone.		DOLOMITE	
105								
110	108-118 water							temporary well point purged 480 gal pump rate: 1-2min/ft
115					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
120					End of boring: 118'bls.			bottom hole rotary bit

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-32
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-18-93	**COMPLETED:** 04-20-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 118 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-20-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			5'spoon	0-2 88.4	0-5.0 *Silty Sand (SM)*, 100%, quartz, colorless to light gray to light brown, very fine-to fine-grained, sub-angular to sub-rounded, moderately well sorted, trace phosphates, organics.		SM	0-10 bls: 2 (5x4") split-spoons
				2-4 98.8				
	4-6 soil			4-6 104				
5					5.0-9.0 *Clayey Sand (SC)*, 100%, moderate yellowish-brown to pale yellowish-brown, very fine-to fine-grained, sub-rounded, dense, clayey.		SC	
			5'spoon	6-8 102				
	8-10 soil			8-10 21				* - CH2MHILL metals/TPH
					9.0-29.0 *Sand (SP)*, 100%, quartz, colorless to dark brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted, occasionally clayey.		SP	groundwater encountered ∇
10	11-15 water							wl sampling string: 0 wl augers: dry
15								
20								
25	26-30 water							wl sampling string: 27'bls wl augers: 4'bls
					29.0-54.0 *Clayey Sand (SC)*, 100%, quartz, pale olive green to light gray, very fine-to fine-grained, sub-rounded, clayey, soft.		SC	
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-32
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-18-93	**COMPLETED:** 04-20-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 118 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-20-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
45	46-47 water				*Clayey Sand* continued.		SC	wl sampling string 35'bls wl augers: 4'bls
50								
55					54.0-66.0 *Clay (CH)* 100%, dark gray, dense, soft, plastic, homogeneous, sandy.		CH	
60								
65	67-70 water				66.0-94.0 *Clayey Sand (SC) with Shell and Marl* clayey sand, 85%, quartz, medium gray, medium-grained, moderately well to well sorted, clayey; marl, 10%, white, calcareous, soft, plastic; shell, 5%, very pale orange, angular, small to medium sized fragments, trace phosphate.		SC MARL	wl sampling string 60'bls wl augers: 4'bls * - CH2MHILL metals/TPH
70								
75								
80								

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-32
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-18-93	**COMPLETED:** 04-20-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 118 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-20-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell and Marl continued.		SC MARL	
85								
90								
	92-93 water							wl sampling string: 45'bls wl augers: 5'bls
					94.0-105.0 *Clay (CH) with Shell and Partially Dolomitized Limestone*; clay, 20%, medium gray to pale olive green, soft, dense, plastic, phosphatic; shell, 20%, very pale orange, small, thin, angular fragments; limestone, 60%, medium to dark gray, partially dolomitized, micritic, moderately hard to soft, dense, moderately well cemented, sucrosic.		CH SHELL	
95								
100								bottom hole augers
105					105.0-118.0 *Dolomite and Limestone*; limestone, 30%, medium gray, micritic, moderately hard, dense, moderately well cemented, partially dolomitized; dolomite, 70%, moderate yellowish-orange, crystalline, hard, dense, well cemented to moderately well cemented, sucrosic.		DOLOMITE LIMESTONE	
	108-118 water							temporary well point purged 210 gal * - CH2MHILL metals/TPH
110								
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
115					End of boring: 118'bls.			bottom hole rotary bit
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-33
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-21-93	**COMPLETED:** 04-26-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 90 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-26-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
				0-2 n/a	0-52.0 *Sand (SP)*, 100%, quartz, light gray to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well to well sorted.		SP	0-10'bls: 2 (5'x4") split-spoons
	2-4 soil		5'spoon	2-4 30.8				
				4-6 27.8				
5				6-8 27.7				
	8-10 soil		5'spoon	8-10 37.2				* - CH2MHILL metals/TPH
10	11-14 water							groundwater encountered ∇ wl sampling string: 0 wl augers: dry
15								
20								
25	28-30 water							wl sampling string: 24'bls wl augers: 8'bls * - CH2MHILL metals/TPH
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-33
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-21-93	**COMPLETED:** 04-26-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 68.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 90 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-26-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45	46-50 water							wl sampling string: 37'bls wl augers: 9'bls
50								
					52.0-64.0 *Sandy Clay (CL)*, 100%, quartz, dark gray to brownish-gray, sandy, dense, soft, plastic, moist.		CL	
55								
60								
					64.0-90.0 *Sandy Clay (CL) with Marl*, sandy clay, 85%, quartz, dark gray to greenish-gray, sandy, dense, soft, plastic, moist; marl, 15%, white, calcareous, soft, plastic, trace shell.		CL MARL	
65	67-71 water							wl sampling string: 60'bls wl augers: 6'bls
70								
75								
80								

ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-33
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 04-21-93	**COMPLETED:** 04-28-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 90 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 04-28-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay with Marl continued.		CL MARL	
85								
	88-90 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string 84'bls w/ augers: 6'bls bottom hole probe
90					End of boring: 90'bls.			
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-34
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-02-93	**COMPLETED:** 09-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 69.2 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-02-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		2-4	0-2	0-52.0 *Sand (SP)*, 100%, quartz, colorless to pale yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well to well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
			4-6	10.4				
			4-3	2-4 5.8				
			12-16					
	4-6 soil		10-18	4-6 11.3				
5			17-21					
			12-14	6-8 7.8				
			11-10					
	8-12 water							groundwater encountered ∇ w/ sampling string: 0 w/ augers: dry
10								
15								
	18-22 water							w/ sampling string: 0 w/ augers: dry
20								
25								
	28-32 water							w/ sampling string: 29'bls w/ augers: dry
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-34
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-02-93	**COMPLETED:** 09-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 89.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▽** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-02-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water				52.0-91.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, clayey.		SC	w/ sampling string: 5'bls w/ augers: 8'bls
55								
60								
65								
70								
	72-78 water							w/ sampling string: 0 w/ augers: 10'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-34
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-02-93	**COMPLETED:** 09-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 89.2 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-02-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand continued.		SC	
85								
90	91-94 water				91.0-94.0 *Sandy Clay (CL)*, 100%, quartz, medium gray, dense, sandy, soft, plastic, homogeneous, moist.		CL	bottom hole augers w/ sampling string: 90'bls w/ augers: 10'bls bottom hole probe
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-35
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-03-93	**COMPLETED:** 09-04-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 66.0 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ▽** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-04-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			3-4	0-2 29.1	0-54.0 *Sand (SP)*, 100%, quartz, medium to light brown, medium-grained, sub-rounded, occasionally silty.		SP	0-8'bls: continuous split-spoons
	2-4 soil		2-2	2-4 36.2				
			9-7					
			10-11					
	4-6 soil		10-11	4-6 37.7				
5			14-16					
			16-13	6-8 33.5				
			16-16					
	8-12 water							groundwater encountered ▽ wl sampling string: 0 wl augers: dry
10								
15								
	18-22 water							wl sampling string: 0 wl augers: 8'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 8'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-35
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-03-93	**COMPLETED:** 09-04-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.0 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-04-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water							wl sampling string: 0 wl augers: 4'bls
					54.0-70.0 *Clayey Sand (SC)*, 100%, quartz, medium to dark gray, fine-to medium-grained, sub-rounded, moderately well sorted, clayey.		SC	
55								
60								
65								
70					70.0-91.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, dense, sandy, soft to hard, plastic, moist, marly, fine shell fragments visible.		CL	
	72-78 water							wl sampling string: 0 wl augers: dry
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-35
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-03-93	**COMPLETED:** 09-04-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-04-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay continued.		CL	
85								
90	91-93 water				91.0-93.0 *Clay (CH)*, 100%, medium to light gray, dense, soft to hard, moist to dry, homogeneous, plastic.		CH	bottom hole augers w/ sampling string 88'bls w/ augers: 8'bls bottom hole probe
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 93'bls.			
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-36
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-04-93	**COMPLETED:** -05-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:**
GROUND ELEV.: 70.7 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 8 FT.
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-08-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-56 water				52.0-72.0 *Sandy Clay (CL)*(100%, quartz, medium gray to blueish-green, dense, sandy, soft, pliable, moist, homogeneous. fragments visible.		CL	wl sampling string 51'bls wl augers: 10'bls
55								
60								
65								
70								
	72-76 water				72.0-94.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-to medium-grained, sub-rounded, poorly sorted, clayey, marly, soft.		SC	wl sampling string 74'bls wl augers: 10'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-38
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-04-93	**COMPLETED:** 09-05-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 70.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-08-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		2-3	0-2 15.8	0-52.0 *Sand (SP)*, 100%, quartz, moderate yellowish-brown to dark brown, medium-grained, sub-rounded, poorly to moderately well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
			3-2					
	2-4 soil		3-5	2-4 14.7				
			5-6					
			7-10	4-6 14.2				
5			9-4					
			10-7	6-8 8.6				
			8-6					
	8-12 water							groundwater encountered ∇ w/ sampling string: 0 w/ augers: dry
10								
15								
	18-22 water							w/ sampling string: 18'bls w/ augers: 12'bls
20								
25								
	28-32 water							w/ sampling string: 29'bls w/ augers: 8'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-37
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-08-93	**COMPLETED:** 09-07-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 70.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-07-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water				52.0-91.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-grained, sub-angular, moderately well sorted, clayey, soft.		SC	wl sampling string: n/a wl augers: n/a
55								
60								
65								
70								
	72-78 water							wl sampling string: 7'bls wl augers: 10'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-37
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-08-93	**COMPLETED:** 09-07-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 70.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-07-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand continued.		SC	
85								
90	91-94 water				91.0-94.0 *Sandy Clay (CL)*, 100%, quartz, medium gray, dense, soft, sandy, plastic, moist, homogeneous. Samples collected were analyzed for USEPA Method 8010/8020 and TPH. End of boring: 94'bls.		CL	bottom hole augers w/ sampling string: 93'bls w/ augers: 27'bls bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-36
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-04-93	**COMPLETED:** 09-05-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 70.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▽** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-08-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand continued.		SC	
85								
90	91-94 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: n/a w/ augers: n/a bottom hole probe
					End of boring: 93'bls.			
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-37
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-08-93	**COMPLETED:** 09-07-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 70.7 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-07-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-2	0-2 0	0-4.0 *Sand (SP)*, 100%, quartz, colorless to very light brown, medium-grained, sub-rounded, well sorted.		SP	0-10'bls: continuous split-spoons
	2-4 soil		2-3					
			3-4	2-4 7.2				
			6-6					
5			5-7	4-6 4	4.0-6.0 *Sandy Clay (CL)*, 100%, quartz, light brown to dusky red, dense, hard, dry, well compacted, non plastic.		CL	
			7-10					
			7-12	6-8 6	6.0-52.0 *Sand (SP)*, 100%, quartz, light brown, medium-grained, sub-rounded, well sorted, occasionally silty.		SP	
			12-10					
	8-10 soil		3-5	8-10 6.2				
			5-4					
10	10-14 water							groundwater encountered ∇ wl sampling string: 0 wl augers: dry
15								
	18-22 water							wl sampling string: 0 wl augers: 13'bls
20								
25								
	28-32 water							wl sampling string: 32.5'bls wl augers: 12'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-38
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-13-93	**COMPLETED:** 09-14-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-14-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2 21	0-52.0 *Sand (SP)*, 100%, quartz, medium brown to light gray, fine-to medium-grained, sub-rounded, moderately well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
	2-4 soil		2-1	2-4 25.1				
	4-6 soil		3-4	4-6 23.2				
5			4-5					
			12-11	6-8 17.4				
			14-15					
			8-8					
			10-12					
	8-12 water							wl sampling string: 0 wl augers: dry groundwater encountered ∇
10								
15								
	18-22 water							wl sampling string: 13'bls wl augers: 8'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 8'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-38
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-13-93	**COMPLETED:** 09-14-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-14-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-56 water				52.0-72.0 *Sandy Clay (CL)*, 100%, quartz, medium gray to blueish-green, dense, soft, sandy, pliable, moist, homogeneous.		CL	wl sampling string: 46'bls wl augers: 12'bls
55								
60								
65								
70								
	72-76 water				72.0-94.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-to medium-grained, sub-rounded, poorly sorted, clayey, marly, soft.		SC	wl sampling string: 75'bls wl augers: 10'bls
75								
80								

ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-38
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-13-93	**COMPLETED:** 09-14-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-14-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand continued.		SC	
85								
90	90-94 water							bottom hole augers w/ sampling string: 85'bls w/ augers: 10'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-39
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-15-93	**COMPLETED:** 09-16-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 64.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-16-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			2-2	0-2 2.7	0-52.0 *Sand (SP)*, 100%, quartz, medium brown to light gray, medium-grained, sub-angular to sub-rounded, moderately well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
			2-5					
	2-4 soil		4-6	2-4 5.1				
			6-8					
	4-8 soil		8-12	4-8 4.7				
5			15-16					groundwater encountered ∇
			16-18	8-8 2.8				
			21-20					
	8-12 water							wl sampling string 0 wl augers: dry
10								
15								
	18-22 water							wl sampling string 22'bls wl augers: 8'bls
20								
25								
	28-32 water							wl sampling string 33'bls wl augers: 3'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-39
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-15-93	**COMPLETED:** 09-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 84.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▽** 5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water				52.0-72.0 *Sandy Clay (CL)*(100%, quartz, medium gray to blueish-green, dense, soft, sandy, pliable, moist, homogeneous.		CL	wl sampling string: 50'bls wl augers: 5'bls
55								
60								
65								
70								
	72-78 water				72.0-94.0 *Clayey Sand (SC) with Shell*: clayey sand, 80%, quartz, medium gray, fine-to medium-grained, sub-angular, poorly sorted; shell, 20%, very pale orange, small to large angular fragments, some replacement features visible.		SC SHELL	wl sampling string: 69'bls wl augers: 5'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-39
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-15-93	**COMPLETED:** 09-16-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 84.6 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 09-16-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell continued.		SC SHELL	
85								
90	90-94 water							bottom hole augers w/ sampling string 78'bls w/ augers: 8'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-40
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-16-93	**COMPLETED:** 09-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 64.8 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 83 FT. BLS	**DEPTH TO ▽** 8 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-17-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			woh12"	0-2	0-2.0 *Sand (SP) and Silt (SM)*, sand, 90%, quartz, medium to dark gray to medium to dark brown, fine-to medium-grained, sub-angular, moderately well sorted; silt 10%.		SP	0-8'bls: continuous split-spoons
			2-1	5.5				
			2-2	2-4				
			3-2	5.7	2.0-52.0 *Sand (SP)*, 100%, quartz, dark brown to black, fine-grained, sub-angular to sub-rounded, moderately well sorted, occasionally silty or clayey.			
5	4-6 soil		2-2	4-6				
			2-3	12.5				
	6-8 soil		1-2	6-8				
			1-1	10.2				
	8-12 water				8.0-52.0 color change; light gray to medium brown.			groundwater encountered w/ sampling string: 0 w/ augers: 8'bls ▽
10								
15								
	18-22 water							w/ sampling string: 22'bls w/ augers: 8'bls
20								
25								
	28-32 water							w/ sampling string: 23'bls w/ augers: 8'bls
30								
35								
40								
45								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-40
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-16-93	**COMPLETED:** 09-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 64.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 83 FT. BLS	**DEPTH TO ∇:** 8 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-17-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
50								
	52-54 water				52.0-72.0 *Sandy Clay (CL)*(100%, quartz, medium gray to blueish-green, dense, soft, sandy, pliable, moist, homogeneous.		CL	w/ sampling string: 28'bls w/ augers: 5'bls
55								
60								
65								
70								
	72-76 water				72.0-83.0 *Clayey Sand (SC) with Shell* clayey sand, 80%, quartz, medium gray, fine-to medium-grained, sub-angular, poorly sorted; shell, 20%, very pale orange, small to large angular fragments, some replacement features visible.		SC SHELL	w/ sampling string: 68'bls w/ augers: 4'bls
75								
	79-83 water							bottom hole augers w/ sampling string: 76'bls w/ augers: 8'bls
80								
					83.0 *Dolomite*, 100%, pale yellowish-gray, hard, calcareous, fossiliferous, possible 100% CaCO3 replacement of fossils.		DOLOMITE	bottom hole probe
85					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 83'bls.			
90								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-41
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-17-93	**COMPLETED:** 09-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 87.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 87 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
50								
	52-54 water				52.0-87.0 *Sandy Clay (CL)*, 100%, quartz, medium gray to blueish-green, dense, soft, sandy, pliable, moist, homogeneous.		CL	wl sampling string: 5'bls wl augers: 6'bls
55								
60								
65								
70								
	72-76 water							wl sampling string: 69'bls wl augers: 6'bls
75								
80								
	83-87 water							bottom hole augers wl sampling string: 16'bls wl augers: 1'bls
85								
					87.0 *Dolomite*, 100%, pale yellowish-gray, very hard, calcareous, fossiliferous, possible 100% $CaCO_3$ replacement of fossils.		DOLOMITE	bottom hole probe
90					Samples collected were analyzed for USEPA Method 8010/8020 and TPH. End of boring: 87'bls.			

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-41
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-17-93	**COMPLETED:** 09-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 87.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 87 FT. BLS	**DEPTH TO ▽** 8 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		woh12"	0-2 19.5	0-2.0 *Sand (SP) and Silt (SM)*, sand, 95%, quartz, dark brown to light brown, fine-to medium-grained, sub-angular, moderately well sorted; silt 5%.		SP	0-8'bls: continuous split-spoons
			woh6"-					
			2-1	2-4 12	2.0-52.0 *Sand (SP)*, 100%, quartz, light gray to medium brown, fine-to medium-grained, sub-angular, moderately well sorted, occasionally silty.			
			3-2					
	4-6 soil		4-5	4-6 14.5	4.0-8.0 color change; medium reddish-gray to reddish-brown.			
5			7-2					
			10-20	6-8 3.5				
			21-18					
	8-12 water				8.0-52.0 color change; light gray to medium brown.			groundwater encountered w/ sampling string: 0 w/ augers: 8'bls
10								
15								
	18-22 water							w/ sampling string: 24'bls w/ augers: 10'bls
20								
25								
	28-32 water							w/ sampling string: 32'bls w/ augers: 8'bls
30								
35								
40								
45								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-42
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-19-93	**COMPLETED:** 09-19-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 82.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 83 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2	0-2.0 *Sand (SP) and Silt (SM)*, sand, 95%, quartz, dark brown to black with pinkish-light gray, fine-to medium-grained, sub-angular to rounded, well sorted; silt, 5%.		SP	0-8'bls: continuous split-spoons
			2-3	3.5				
	2-4 soil		3-3	2-4	2.0-4.0 *Sand (SP) and Silt (SM)*, sand, 90%, quartz, dark gray to dark brown to black, fine-to medium-grained, sub-angular, well sorted, homogenous, very wet; silt, 10%.			
			4-5	4.8				
	4-8 water		3-3	4-6				groundwater encountered ∇
5			3-5	2.1				wl sampling string: 0
	6-8 soil		3-3	6-8	4.0-52.0 *Sand (SP)*, 100%, quartz, medium gray to reddish-gray with zones of dark gray to dark brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well to well sorted, occasionally silty or clayey.			wl augers: dry
			4-4	3.3				
					8.0-52.0 color change; light gray to medium brown.			
10								
15								
	18-22 water							wl sampling string: 22'bls wl augers: 4'bls
20								
25								
	28-32 water							wl sampling string: 28'bls wl augers: 4'bls
30								
35								
40								
45								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-42
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-19-93	**COMPLETED:** 09-19-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 62.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 83 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
50								
	52-54 water				52.0-83.0 *Sandy Clay (CL)*, 100%, quartz, medium gray to blueish-green, dense, plastic and pliable in zones, homogeneous, soft, wet.		CL	w/ sampling string: 48'bls w/ augers: 5'bls
55								
60								
65								
70								
75								
	78-82 water							w/ sampling string: 88'bls w/ augers: 8'bls
80								
					83.0 *Dolomite*, 100%, pale yellowish-gray, very hard, calcareous, fossiliferous, possible 100% CaCO3 replacement of fossils, difficult to fracture.		DOLOMITE	bottom hole augers
85					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 83'bls.			
90								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-43
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-20-93	**COMPLETED:** 09-20-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 88 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-20-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1	0-2	0-2.0 *Sand (SP) and Silt (SM)*, sand, 95%, quartz, dark brown to dark gray with zones of tan to gray, fine-to medium-grained, sub-angular to rounded, well sorted; silt, 5%.		SP	0-8'bls: continuous split-spoons
			1-1	23.2				
	2-4 soil		2-3	2-4 7.8	2.0-52.0 *Sand (SP)*, 100%, quartz, gray to brown to black, fine-to medium-grained, sub-angular to sub-rounded, well sorted, some silt and organics.			
			3-5					
	4-8 water		4-6	4-6 5.1				groundwater encountered ∇ w/ sampling string: 0 w/ augers: dry
5			3-10		4.0-8.0 color change; medium gray to reddish-gray to brown.			
			7-11	6-8 0				
			13-20		8.0-52.0 color change; light gray to medium brown.			
10								
15								
	18-22 water							w/ sampling string: 23'bls w/ augers: 7'bls
20								
25								
	28-32 water							w/ sampling string: 30'bls w/ augers: 9'bls
30								
35								
40								
45								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-43
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-20-93	**COMPLETED:** 09-20-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 88.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 86 FT. BLS	**DEPTH TO ▽** 4 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-20-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
50								
	52-55 water				52.0-85.0 *Sandy Clay (CL)*, 100%, quartz, medium gray to blueish-green, dense, plastic and pliable, homogeneous, soft, wet.		CL	wl sampling string: 53'bls wl augers: 10'bls
55								
60								
65								
70								
	72-75 water							wl sampling string: 88'bls wl augers: 10'bls
75								
80								
	82-86 water							wl sampling string: 80'bls wl augers: 6'bls
85					85.0-86.0 *Dolomite*, 100%, pale yellowish-gray, very hard, calcareous, fossiliferous, possible 100% $CaCO_3$ replacement of fossils, difficult to fracture.		DOLOMITE	bottom hole augers bottom hole probe
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 86'bls.			
90								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-44
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-21-93	**COMPLETED:** 09-22-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 84.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 82 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-22-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1	0-2 0	0-2.0 *Sand (SP) and Silt (SM)*, sand, 95%, quartz, dark brown to dark gray with zones of gray to black, fine-to medium-grained, sub-angular to rounded, well sorted; silt, 5%.		SP	0-8'bls: continuous split-spoons
			1-1					
			1-3	2-4 0	2.0-52.0 *Sand (SP)*, 100%, quartz, gray to brown to black, fine-to medium-grained, sub-angular to sub-rounded, well sorted, some silt and organics.			
			3-3					
	4-6 soil		4-2	4-6 0				
5			2-3					
	6-10 water		5-8	6-8 0	4.0-8.0 color change; medium gray to reddish-gray to brown.			groundwater encountered wl sampling string: 0 wl augers: dry ∇
			8-6		8.0-52.0 color change; light gray to medium brown.			
10								
15								
	18-22 water							wl sampling string: 23'bls wl augers: 10'bls
20								
25								
	28-32 water							wl sampling string: 34'bls wl augers: 1f'bls
30								
35								
40								
45								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-44
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-21-93	**COMPLETED:** 09-22-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 84.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 82 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-22-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
50								
	52-55 water				52.0-82.0 *Sandy Clay (CL)*, 100%, quartz, medium gray to bluelsh-green, dense, plastic and pliable, homogeneous, soft, wet.		CL	wl sampling string 53'bls wl augers: 10'bls
55								
60								
65								
70								
75								
80	80-82 water							bottom hole augers wl sampling string 7'bls wl augers: 7'bls bottom hole probe
					82.0 *Dolomite*, 100%, pale yellowish-gray, very hard, calcareous, fossiliferous, possible 100% CaCO3 replacement of fossils, difficult to fracture.		DOLOMITE	
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
85					End of boring: 82'bls.			
90								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-45
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-27-93	**COMPLETED:** 09-28-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 89.9 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇:** 10 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-28-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			woh12"	0-2 10.2	0-52.0 *Sand (SP)*, 100%, quartz, pale yellow to dark brown, fine-grained, sub-rounded, well sorted, organics in darker zone.		SP	0-8'bls: continuous split-spoons
			woh8"-					
	2-4 soil		2-3	2-4 10.7	2.0-4.0 color change; white to pale gray.			
			4-5					
5			4-5	4-6 5.5	4.0-6.0 color change; pale gray to zones of yellowish-orange and medium to dark gray.			
			8-8					
	6-8 soil		6-8	6-8 11.1	6.0-15.0 color change; pale gray.			
			9-9					
	8-12 water							wl sampling string: 0 wl augers: dry groundwater encountered ∇
10								
15					15.0-18.0 color change; yellowish-orange.			
	18-22 water				18.0-52.0 color change; light gray to medium brown.			wl sampling string: 0 wl augers: 13'bls
20								
25								
	28-32 water							wl sampling string: 32'bls wl augers: 17'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-45
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-27-93	**COMPLETED:** 09-28-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 89.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-28-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-55 water				52.0-90.0 *Sandy Clay (CL)*, 100%, quartz, medium gray to bluish-green, dense, plastic and pliable, homogeneous, soft, wet, some traces of fossil material near 90'bls.		CL	w/ sampling string: 54'bls w/ augers: 9'bls
55								
60								
65								
70								
	72-75 water							w/ sampling string: 7'bls w/ augers: 9'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-45
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-27-93	**COMPLETED:** 09-28-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 89.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▼** 10 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 09-28-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sandy Clay continued.		CL	
85								
90	90-94 water				90.0-94.0 *Dolomite*, 100%, pale yellowish-gray, very hard, calcareous, fossiliferous, possible 100% CaCO3 replacement of fossils, difficult to fracture.		DOLOMITE	bottom hole augers w/ sampling string: 92'bls w/ augers: 9'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-46
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 09-30-93	**COMPLETED:** 10-01-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 83.2 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 80 FT. BLS	**DEPTH TO ∇** 5 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 10-01-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2	0-2.0 *Sand (SP)*, 100%, quartz, dark brown to black, fine-grained, sub-rounded, well sorted, some organics and calcareous fragments.		SP	0-8'bls: continuous split-spoons
			1-4	0				
			1-1	2-4	2.0-4.0 *Sand (SP) and Silt (SM)*, sand, 90%, quartz, black, fine-to medium-grained, sub-angular, well sorted, very wet.			
			3-5	6.5				
	4-6 soil		6-10	4-6	4.0-52.0 *Sand (SP)*, 100%, quartz, pale gray to white to dark brown to black, fine-to medium-grained, sub-angular, well sorted, occasionally silty.			
5			8-11	15.4				groundwater encountered ∇
	6-8 soil		4-12	6-8	6.0-8.0 color change; pale gray to light gray to medium brown.			wl sampling string: 0
	8-10 water		12-16	22.3	8.0-52.0 color change; light gray to medium brown.			wl augers: dry
10								
15								
	18-22 water							wl sampling string: 0
20								wl augers: 5'bls
25								
	28-32 water							wl sampling string: 25'bls
30								wl augers: 4'bls
35								
40								
45								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-46
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 09-30-93	**COMPLETED:** 10-01-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 83.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 80 FT. BLS	**DEPTH TO ∇:** 5 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 10-01-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
50								
	52-58 water				52.0-80.0 *Sandy Clay (CL)*, 100%, quartz, medium gray to blueish-green, dense, plastic and pliable, homogeneous, soft, wet, increased clay content from 74.0-80.0'bls.		CL	wl sampling string: 10'bls wl augers: 5'bls
55								
60								
65								
70								
	72-78 water							wl sampling string: 75'bls wl augers: 4'bls
75								
	78-80 water							wl sampling string: 78'bls wl augers: 8'bls
80					80.0 *Dolomite*, 100%, pale yellowish-gray, very hard, calcareous, fossiliferous, possible 100% CaCO3 replacement of fossils, difficult to fracture.		DOLOMITE	bottom hole augers
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 80'bls.			
85								
90								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-47
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-01-93	**COMPLETED:** 10-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 56.4 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 79 FT. BLS	**DEPTH TO ∇** 6 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 10-02-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		woh12"	0-2 14.7	0-3.0 *Sand (SP)*, 100%, quartz, dark brown to black, fine-grained, sub-angular, well sorted, some organics.		SP	0-8'bls: continuous split-spoons
	2-4 soil		woh6"-	2-4 28.6				
			1-3		3.0-52.0 *Sand (SP)*, 100%, quartz, light to medium brown to dark brown, fine-to medium-grained, sub-angular, well sorted, occasionally silty.			
			11-7	4-6 6.6				
5			4-7					
			6-7	6-8 0				
	8-10 water		2-4					groundwater encountered ∇ w/ sampling string: 0 w/ augers: dry
			3-2		8.0-52.0 color change: medium to dark gray.			
10								
15								
	18-22 water							w/ sampling string: 0 w/ augers: 18'bls
20								
25								
	28-32 water							w/ sampling string: 0 w/ augers: 29'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-47
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-01-93	**COMPLETED:** 10-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 58.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 79 FT. BLS	**DEPTH TO ∇** 6 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 10-02-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
47								
52	52-58 water				52.0-79.0 *Sandy Clay (CL)*, 100%, quartz, grayish-brown, dense, fine-to medium-grained, slightly plastic, homogeneous, soft, wet, dolomite fragments at 79'bls		CL	w/ sampling string: 0 w/ augers: 40'bls
57								
62								
67								
72								
77	78-79 water							bottom hole augers w/ sampling string: 78'bls w/ augers: 1'bls bottom hole probe
					79.0 *Dolomite*, 100%, pale yellowish-gray, very hard, calcareous, fossiliferous, possible 100% CaCO3 replacement of fossils, difficult to fracture.		DOLOMITE	
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
82					End of boring: 79'bls.			

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-48
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-01-93	**COMPLETED:** 10-02-93
DRILL RIG: Mobil Drill B-57	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 59.3 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 74 FT. BLS	**DEPTH TO ▽** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-02-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1	0-2 0	0-74.0 *Silty Sand (SM)*, 100%, quartz, very dark brown to medium gray to grayish-blue, very fine-to fine-grained, sub-rounded, poorly sorted, silty.		SM	0-4'bls: continuous split-spoons
			1-2					
	2-4 soil		3-4	2-4 0				groundwater encountered ▽
	2-6 water		5-6					wl sampling string: 0 wl augers: dry
5								
	8-12 water							wl sampling string: 0 wl augers: dry
10								
15								
	18-22 water							wl sampling string: 0 wl augers: 8'bls
20								
25								
	28-32 water							wl sampling string: 24 wl augers: 7'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-48
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-01-93	**COMPLETED:** 10-02-93
DRILL RIG: Mobil Drill B-57	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 59.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 74 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-02-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Silty Sand continued.		SM	
45								
50								
	52-54 water							wl sampling string 44'bls wl augers: 8'bls
55								
60								
65								
70	70-74 water							bottom hole augers wl sampling string 66'bls wl augers: 8'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 74'bls.			bottom hole probe
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-49
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-02-93	**COMPLETED:** 10-03-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 65.8 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 90 FT. BLS	**DEPTH TO ∇** 5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-03-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2	0-90.0 *Sand (SP)*, 100%, quartz, medium brown to colorless, very fine-to fine-grained, sub-rounded, moderately well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
			1-2	0				
	2-4 soil		7-13	2-4 0				wl sampling string: 0
	3-7 water		8-10					wl augers: dry
5	4-8 soil		7-13	4-8 0				groundwater encountered ∇
			13-13					
10	10-14 water							wl sampling string: 0 wl augers: dry
15								
20	18-22 water							wl sampling string: 22'bls wl augers: 17'bls
25								
30	28-32 water							wl sampling string: 30'bls wl augers: 8'bls
35								
40								

ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-49
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-02-93	**COMPLETED:** 10-03-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 85.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 90 FT. BLS	**DEPTH TO ∇** 5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-03-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water							wl sampling string 50'bls wl augers: 4'bls
55								
60								
65								
70								
	72-75 water							wl sampling string 72'bls wl augers: 8'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-49
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-02-93	**COMPLETED:** 10-03-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:**
GROUND ELEV.: 85.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 90 FT. BLS	**DEPTH TO ∇** 5 FT.
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-03-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Sand continued.		SP	
85	88-90 water							bottom hole augers w/ sampling string: n/a w/ augers: n/a
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
90					End of boring: 90'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-50
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-03-93	**COMPLETED:** 10-03-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 53.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 88 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 10-03-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		3-2	0-2 19.2	0-52.0 *Sand (SP)*, 100%, quartz, medium gray to blueish-green, fine-grained, sub-angular, well sorted, occasionally silty in zones, organics at top 4'bls, increasing clay content at deeper intervals.		SP	0-4'bls: continuous split-spoons
			2-2					
	2-4 soil		2-1	2-4 13.4				
			2-2					groundwater encountered ∇
5	8-10 water							wl sampling string: 0 wl augers: 3'bls
10								
15								
	18-22 water							wl sampling string: 20'bls wl augers: 14'bls
20								
25								
	28-32 water							wl sampling string: 2'bls wl augers: 3'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-50
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-03-93	**COMPLETED:** 10-03-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 53.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 88 FT. BLS	**DEPTH TO ∇:** 4 FT. BLS
LOGGED BY: J. Weatherly	**HOLE ABANDONMENT DATE:** 10-03-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-56 water				52.0-88.0 *Sandy Clay (CL)*, 100%, quartz, grayish-brown to light gray, dense, plastic in zones, fine-to medium-grained, fossil fragments present in deeper zones.		CL	w/ sampling string: 45'bls w/ augers: 1'bls
55								
60								
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
65	65-68 water				End of boring: 68'bls.			bottom hole augers w/ sampling string: 0 w/ augers: 0'bls bottom hole probe
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-51
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-04-93	**COMPLETED:** 10-05-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 53.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 87 FT. BLS	**DEPTH TO ▽** 5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-05-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil	1-2, 2-3	0-2 19.8	0-24.0 *Sand (SP)*, 100%, quartz, very dark to light brown, fine-grained, sub-angular to sub-rounded, poorly to moderately well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
	2-4 soil	2-2, 2-3	2-4 8.2				
	3-7 water		4-6 3.4				wl sampling string: 0 wl augers: dry groundwater encountered ▽
5		5-4, 4-5					
		3-4, 2-2	6-8 2.8				
10	10-14 water						wl sampling string: 0 wl augers: dry
15							
	18-22 water						wl sampling string: 19'bls wl augers: 10'bls
20							
25				24.0-27.0 *Clay (CH)*, 100%, very dark gray, plastic, soft, dense, sandy, wet.		CL	
	28-32 water			27.0-87.0 *Sand (SP)*, 100%, quartz, medium to light gray, fine-grained, sub-angular to sub-rounded, poorly to moderately well sorted, occasionally silty.		SP	wl sampling string: 0 wl augers: 12'bls
30							
35							
40							

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-51
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-04-93	**COMPLETED:** 10-05-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 53.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 87 FT. BLS	**DEPTH TO ∇** 5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-05-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50	52-58 water							wl sampling string: 4'bls wl augers: 1'bls
55								
60	63-66 water							wl sampling string: 60'bls wl augers: 16'bls
65					67.0 *Dolomite*, 100%, moderate yellowish-brown, angular pebbles, microcrystalline, fracture traces visible as calcite recrystallizes on open faces, dense, hard, occasionally vuggy.		DOLOMITE	bottom hole augers
70					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 67'bls.			
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-52
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-05-93	**COMPLETED:** 10-06-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 55.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 76 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-06-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-2	0-2 0	0-52.0 *Sand (SP)*, 100%, quartz, medium brown to light gray to colorless, fine-grained, sub-angular to sub-rounded, moderately well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
			2-1					
			2-2	2-4 0				
			4-5					
			4-3	4-6 0				
5			4-4					
	6-8 soil		4-4	6-8 0				
			5-5					
	8-12 water							groundwater encountered ∇ wl sampling string: 0 wl augers: dry
10								
15								
	18-22 water							wl sampling string: 21'bls wl augers: 8'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 10'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-52
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-05-93	**COMPLETED:** 10-06-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 55.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 78 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-06-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water				52.0-78.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, plastic, soft, dense, sandy, trace shell fragments.		CL	wl sampling string: 5'bls wl augers: 8'bls
55								
60								
65								
70								bottom bottom hole augers
	72-78 water							wl sampling string: 65'bls wl augers: 15'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
75					End of boring: 78'bls.			bottom hole probe
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-53
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-11-93	**COMPLETED:** 10-12-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 54.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ∇** 7 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-12-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2	0-52.0 *Sand (SP)*, 100%, quartz, medium brown to colorless, fine-grained, sub-angular to sub-rounded, moderately well sorted, soft, occasionally silty.		SP	0-8'bls: continuous split-spoons
			1-1	7.4				
	2-4 soil		2-3	2-4 11.2				
			3-3					
	4-6 soil		2-2	4-6 9.3				
5			4-8					
	6-10 water		5-6	6-8 27.3				wl sampling string: 0 wl augers: dry groundwater encountered ∇
			8-8					
10								
15								
	18-22 water							wl sampling string: 0 wl augers: 17'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 10'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-53
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-11-93	**COMPLETED:** 10-12-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 54.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 71 FT. BLS	**DEPTH TO ∇:** 7 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-12-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water				52.0-71.0 *Sandy Clay (CL)*, 100%, quartz, gray to gray-green, plastic, soft, dense, sandy, moist.		CL	wl sampling string 55'bls wl augers: 2'bls
55								
60								
65								
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
70	70-71 water				End of boring: 71'bls.			bottom bottom hole augers wl sampling string 69'bls wl augers: 5'bls bottom hole probe
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-54
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-11-93	**COMPLETED:** 10-12-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 81.0 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 73 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: M. House	**HOLE ABANDONMENT DATE:** 10-12-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1	0-2 5	0-73.0 *Sand (SP)*, 100%, quartz, dark brown, fine-grained, sub-angular, well sorted, occasionally silty, wet.		SP	0-4'bls: continuous split-spoons
			1-1					
	2-4 soil		1-1	2-4 10				
			2-2					
	4-8 water							groundwater encountered ∇ wl sampling string: 0 wl augers: dry
5								
10								
15								
	18-22 water							wl sampling string: 21'bls wl augers: 4'bls
20								
25					28.0-54.0 color change: pale gray.			
	28-32 water							wl sampling string: 10'bls wl augers: 4'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-54
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-11-93	**COMPLETED:** 10-12-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 81.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 73 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: M. House	**HOLE ABANDONMENT DATE:** 10-12-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water							w/ sampling string: 50'bls w/ augers: 8'bls
					54.0-70.0 color change; olive gray.			
55								
60								
65								
70	70-73 water				70.0-73.0 color change; pale gray.			bottom hole augers w/ sampling string: 63'bls w/ augers: 33'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 73'bls.			bottom hole probe
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-55
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-12-93	**COMPLETED:** 10-13-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.2 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-13-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2	0-5.5 *Sand (SP)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-angular to sub-rounded, moderately well to well sorted, soft, clean.		SP	0-12'bls: continuous split-spoons
			2-2	29.3				
			2-3	2-4 48.6				
			5-7					
	4-6 soil		7-7	4-6 71.8				
5			9-13		5.5-9.5 *Clay (CL)*, 100%, moderate yellowish-brown to reddish-yellow, dense, dry, sandy, non plastic.		CL	
	6-8 soil		4-6	6-8 0				
			8-6					
	8-12 water		3-5	8-10 0				wl sampling string: 0
10			8-8	10-12 0	9.5-52.0 *Sand (SP)*, 100%, quartz, colorless to light brown to medium gray, fine-grained, sub-rounded, poorly to moderately well sorted, occasionally silty.		SP	wl augers: dry groundwater encountered ∇
			6-7					
			10-10					
15								
	18-22 water							wl sampling string: 19'bls wl augers: 14'bls
20								
25								
	28-32 water							wl sampling string: 31'bls wl augers: 8'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-55
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-12-93	**COMPLETED:** 10-13-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-13-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
45					*Sand* continued.		SP	
50								
	52-58 water				52.0-72.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-grained, sub-rounded, poorly sorted, sandy, soft, plastic.		SC	wl sampling string: 5'bls wl augers: 18'bls
55								
60								
65								
70								
	72-78 water				72.0-94.0 *Clayey Sand (SC) with Marl and Shell*, clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, poorly sorted, soft, plastic, pliable; marl, 15%, white, calcareous, soft, wet; shell, 15%, very pale orange, small fragments.		SC MARL	wl sampling string: 44'bls wl augers: 14'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-55
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-12-93	**COMPLETED:** 10-13-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.2 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-13-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Marl and Shell continued.		SC MARL	
85								
90	90-94 water							bottom hole augers w/ sampling string 83'bls w/ augers: 10'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-56
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-12-93	**COMPLETED:** 10-13-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 55.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 89 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-13-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		2-4	0-2 14	0-89.0 *Sand (SP)*, 100%, quartz, light brown to orange, fine-grained, sub-angular, well sorted, occasionally silty, wet.		SP	0-8'bls: continuous split-spoons
			4-5					
			2-3	2-4 12				
			3-4					
	4-6 soil		3-4	4-6 31	4.0 color change: gray to dark gray.			
5			4-3					
	6-10 water							groundwater encountered wl sampling string: 0 wl augers: dry ∇
					8.0 color change: dark gray to orange.			
10								
15								
	18-22 water							wl sampling string: 0 wl augers: 17'bls
20					20.0 color change: dark gray.			
25								
	28-32 water							wl sampling string: 0 wl augers: 15'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-56
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-12-93	**COMPLETED:** 10-13-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 55.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 69 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-13-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water							wl sampling string: 0 wl augers: 15'bls
55					58.0 color change; light gray.			
60								
65					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
	68-69 water				End of boring: 69'bls.			bottom hole augers wl sampling string: 68'bls wl augers: 13'bls bottom hole probe
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-57
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-13-93	**COMPLETED:** 10-14-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 92 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-14-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2	0-52.0 *Sand (SP)*, 100%, quartz, colorless, fine-grained, sub-rounded, moderately well sorted, soft, occasionally silty.		SP	0-8'bls: continuous split-spoons
			1-2	0				
	2-4 soil		3-3	2-4 0				
			5-6					
			7-14	4-6 0				
5			14-14					
	6-8 soil		7-10	6-8 0				
			13-18					
	8-12 water							groundwater encountered ∇ wl sampling string: 0 wl augers: dry
10								
15								
	18-22 water							wl sampling string: 0 wl augers: 20'bls
20								
25								
	28-32 water							wl sampling string: 32'bls wl augers: 12'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-57
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-13-93	**COMPLETED:** 10-14-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 92 FT. BLS	**DEPTH TO ▽** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-14-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
45					*Sand* continued.		SP	
50								
	52-58 water				52.0-72.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-to medium-grained, sub-rounded, poorly sorted, clayey, pliable, plastic, soft, wet.		SC	w/ sampling string: 5'bls w/ augers: 1'bls
55								
60								
65								
70								
	72-78 water				72.0-92.0 *Clayey Sand (SC) with Marl and Shell* clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, poorly sorted, soft, plastic, pliable, wet; marl, 15%, white, soft, calcareous, wet; shell, 15%, very pale orange, very small fragments.		SC MARL	w/ sampling string: 75'bls w/ augers: 13'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-57
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-13-93	**COMPLETED:** 10-14-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 92 FT. BLS	**DEPTH TO ▽** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-14-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Marl and Shell continued.		SC MARL	
85								
90	91-92 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers
					End of boring: 92'bls.			w/ sampling string: 91'bls w/ augers: 12'bls bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-58
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-13-93	**COMPLETED:** 10-14-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 54.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 69 FT. BLS	**DEPTH TO ∇** 6 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-14-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			2-2	0-2	0-69.0 *Sand (SP)*, 100%, quartz, brown to dark brown, fine-grained, sub-angular, well sorted, occasionally silty, wet.		SP	0-6'bls: continuous split-spoons
			3-2	3				
	2-4 soil		3-4	2-4 8				
			3-3					
	4-6 soil		2-3	4-6 12				
5			3-4					
	6-10 water							groundwater encountered w/ sampling string: 0 w/ augers: dry ∇
10								
15								
	18-22 water							w/ sampling string: 0 w/ augers: 16'bls
20								
25								
	28-32 water							w/ sampling string: 0 w/ augers: 9'bls
30								
					32.0 color change; dark gray. 32.0 increased silt content: 5%			
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-58
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-13-93	**COMPLETED:** 10-14-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 54.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 69 FT. BLS	**DEPTH TO ∇** 6 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-14-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-56 water							wl sampling string: 0 wl augers: 15'bls
55					56.0 color change; light gray. 56.0 shell fragments present to total depth.			
60								
65	65-69 water							bottom hole augers wl sampling string: 60'bls wl augers: 15'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 69'bls.			bottom hole probe
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-59
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-14-93	**COMPLETED:** 10-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2	0-4.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-angular to sub-rounded, well sorted.		SP	0-12'bls: continuous split-spoons
			1-2	0				
	2-4 soil		3-7	2-4				
			6-6	0				
			5-7	4-6	4.0-10.0 *Sandy Clay (CL)*, 100%, moderate yellowish-brown to reddish-yellow, dense, dry, sandy, plastic, homogeneous.		CL	
5			10-10	0				
			8-8	6-8				
			8-10	0				
	8-10 soil		5-5	8-10				
	9-13 water		5-6	38				wl sampling string: 0 ∇
10			5-5	10-12	10.0-52.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-angular to sub-rounded, well sorted.		SP	wl augers: dry groundwater encountered
			8-10	242				
15								
	18-22 water							wl sampling string: 0 wl augers: 7'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 10'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-59
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-14-93	**COMPLETED:** 10-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
45					*Sand* continued.		SP	
50								
	52-58 water				52.0-72.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-to medium-grained, sub-angular, poorly sorted, clayey.		SC	w/ sampling string: 0 w/ augers: 18'bls
55								
60								
65								
70								
	72-74 water				72.0-94.0 *Clayey Sand (SC) with Marl and Shell* clayey sand, 70%, quartz, medium gray, fine-to medium-grained, sub-angular, poorly sorted; marl, 15%, white, calcareous, soft, wet; shell, 15%, very pale orange, small fragments.		SC MARL	w/ sampling string: 74'bls w/ augers: 14'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-59
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-14-93	**COMPLETED:** 10-16-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-16-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Marl and Shell continued.		SC MARL	
85								
90	90-94 water							bottom hole augers w/ sampling string: 90'bls w/ augers: 12'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-60
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-14-93	**COMPLETED:** 10-15-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 87.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 77 FT. BLS	**DEPTH TO ∇** 10 FT. BLS
LOGGED BY: M. House	**HOLE ABANDONMENT DATE:** 10-15-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			2-3	0-2 14	0-24.0 *Silty Sand (SM)*, 100%, quartz, medium to pale brown, very fine-to fine-grained, sub-angular to sub-rounded, well sorted, loose, dry.		SM	0-12'bls: continuous split-spoons
			3-2					
			2-4	2-4 15				
			4-9					
			3-4	4-6 15				
5			3-4					
			6-5	6-8 7	6.0-8.0 color change; gray to dark brown.			
			5-7					
	8-10 soil		8-9	8-10 23	8.0-24.0 color change; medium to dark brown.			
			9-10					
10	10-12 soil		9-5	10-12 340				groundwater encountered ∇
	10-14 water		11-13					w/ sampling string: 0 w/ augers: dry
15								
	18-22 water							w/ sampling string: 0 w/ augers: 15'bls
20								
25					24.0-74.0 *Sand (SP)*, 100%, quartz, yellowish-gray, fine-grained, sub-angular, well sorted, occasionally silty, loose, saturated.		SP	
30	31-32 water							w/ sampling string: 0 w/ augers: 14'bls
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-60
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-14-93	**COMPLETED:** 10-15-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 87.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 77 FT. BLS	**DEPTH TO ▽** 10 FT. BLS
LOGGED BY: M. House	**HOLE ABANDONMENT DATE:** 10-15-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued. 40.0 color change: light olive gray.		SP	
45								
50								
	52-56 water							wl sampling string: 0 wl augers: 10'bls
55								
60								
65								
70								
	73-77 water							bottom hole augers wl sampling string: 0 wl augers: 12'bls
75					74.0-77.0 *Clayey Sand (SC)*, 100%, quartz, medium dark gray, fine-grained, non plastic, soft, wet, with shell fragments.		SC	
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 77'bls.			bottom hole probe
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-81
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-18-93	**COMPLETED:** 10-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-17-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			3-3	0-2	0-52.0 *Sand (SP)*, 100%, quartz, colorless to very dark brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted.		SP	0-8'bls: continuous split-spoons
			2-4	318				
	2-4 soil		7-12	2-4 88				
			12-15	4-6 72.4				
5			12-12					
			12-12					
	6-8 soil		12-11	6-8 97.2				
			10-8					
	8-12 water							wl sampling string: 0 wl augers: dry groundwater encountered ∇
10								
15								
	18-22 water							wl sampling string: 22'bls wl augers: 8'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 10'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-61
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-16-93	**COMPLETED:** 10-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-17-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-56 water				52.0-72.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-to medium-grained, sub-angular, poorly sorted, clayey.		SC	wl sampling string: 0 wl augers: 8'bls
55								
60								
65								
70								
	72-76 water				72.0-94.0 *Clayey Sand (SC) with Marl and Shell* clayey sand, 70%, quartz, medium gray, fine-to medium-grained, sub-angular, poorly sorted, clayey; marl, 15%, white, calcareous, soft, wet; shell, 15%, very pale orange, small fragments.		SC MARL	wl sampling string: 69'bls wl augers: 12'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-61
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-16-93	**COMPLETED:** 10-17-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-17-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Marl and Shell continued.		SC MARL	
85								
90	90-94 water							bottom hole augers w/ sampling string 92'bls w/ augers: 34'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-62
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-16-93	**COMPLETED:** 10-17-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 58.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 88 FT. BLS	**DEPTH TO ▽** 4 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-17-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		2-2	0-2 21	0-88.0 *Sand (SP)*, 100%, quartz, dark gray to black, very fine-to fine-grained, sub-angular to sub-rounded, well sorted, loose, dry.		SP	0-4'bls: continuous split-spoons
			3-2					
	2-4 soil		3-4	2-4 90				
			3-4					
	4-8 water							groundwater encountered ▽ w/ sampling string: 0 w/ augers: dry
5								
10								
15								
	18-22 water							w/ sampling string: 21'bls w/ augers: 8'bls
20								
25								
	28-32 water							w/ sampling string: 0 w/ augers: 27'bls
30					30.0 increasing silt content.			
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-62
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-18-93	**COMPLETED:** 10-17-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 56.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 66 FT. BLS	**DEPTH TO ▽** 4 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-17-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water							wl sampling string: 0 wl augers: dry
55								
60								
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
65	65-66 water				End of boring: 66'bls.			bottom hole augers wl sampling string: 65'bls wl augers: 9'bls bottom hole probe
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-63
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-17-93	**COMPLETED:** 10-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 69.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			2-4	0-2 18.7	0-4.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-grained, sub-rounded, moderately well sorted.		SP	0-8'bls: continuous split-spoons
			6-5					
			3-5	2-4 17.1				
			5-5					
	4-6 soil		5-8	4-6 19.2	4.0-6.0 *Sandy Clay (SC)*, 100%, quartz, light brown to pale yellowish-brown, dense, dry, homogeneous, non plastic to slighly plastic, sandy.		CL	
5			9-9					
	6-8 soil		8-9	6-8 19.9	6.0-52.0 *Sand (SP)*, 100%, quartz, colorless to light brown, very fine-to fine-grained, sub-rounded, moderately well sorted, occasionally silty.		SP	
			12-12					
	8-12 water							wl sampling string: 0 wl augers: dry groundwater encountered ∇
10								
15								
	18-22 water							wl sampling string: 0 wl augers: 7'bls
20								
25								
	28-32 water							wl sampling string: 29'bls wl augers: 8'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-63
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-17-93	**COMPLETED:** 10-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 69.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO** [illegible] 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water				52.0-72.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, very fine-to fine-grained, sub-rounded, poorly to moderately well sorted, clayey.		SC	wl sampling string: 0 wl augers: 8'bls
55								
60								
65								
70								
	72-78 water				72.0-94.0 *Clayey Sand (SC) with Marl and Shell*, clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, moderately well sorted, clayey; marl, 15%, white, calcareous, soft, wet; shell, 15%, very pale orange, small fragments.		SC MARL	wl sampling string: 0 wl augers: 13'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-63
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-17-93	**COMPLETED:** 10-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 69.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Marl and Shell continued.		SC MARL	
85								
90	90-94 water							bottom hole augers w/ sampling string: 88'bls w/ augers: 12'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-84
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-17-93	**COMPLETED:** 10-18-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 58.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 68 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		4-5	0-2 0	0-25.0 *Sand (SP)*, 100%, quartz, light to medium brown, fine-to medium-grained, sub-angular to sub-rounded, well sorted, loose, dry.		SP	0-4'bls: continuous split-spoons
			3-7					
	2-4 soil		6-5	2-4 180				
			8-9					
	4-8 water							groundwater encountered ∇ w/ sampling string: 0 w/ augers: dry
5								
10					13.0-25.0 color change; pale gray.			
15								
	18-22 water							w/ sampling string: 0 w/ augers: 12'bls
20								
25					25.0-35.0 *Silty Clay (CL)*, 100%, medium to dark gray, plastic, very soft, wet.		CL	
	28-32 water							w/ sampling string: 0 w/ augers: dry
30								
35					35.0-68.0 *Sand (SP)*, 100%, quartz, medium to dark gray, fine-to medium-grained, sub-angular to sub-rounded, well sorted, loose, wet.		SP	
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-84
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-17-93	**COMPLETED:** 10-18-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 58.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 68 FT. BLS	**DEPTH TO ∇:** 4 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-18-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water							wl sampling string: 52'bls wl augers: 33'bls
55								
60								
65					65.0 shell fragments, increasing silt content.			
	66-68 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers wl sampling string: 0 wl augers: 53'bls bottom hole probe
					End of boring: 68'bls.			
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-65
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-18-93	**COMPLETED:** 10-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 83.3 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 90 FT. BLS	**DEPTH TO ∇** 3 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-19-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		3-3	0-2 18.1	0-50.0 *Silty Sand (SM)*, 100%, quartz, very dark brown, very fine-to fine-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SM	0-4'bls: continuous split-spoons
			3-3					
	2-4 soil		6-5	2-4 4.1				
	3-7 water		7-9					groundwater encountered ∇ wl sampling string: 0 wl augers: dry
5								
10	10-14 water							wl sampling string: 0 wl augers: 9'bls
15								
	18-22 water							wl sampling string: 0 wl augers: 10'bls
20								
25								
	28-32 water							wl sampling string: 30'bls wl augers: 4'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-65
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-18-93	**COMPLETED:** 10-19-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 83.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 90 FT. BLS	**DEPTH TO ∇** 3 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Silty Sand continued.		SM	
45								
50					50.0-68.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, very fine-to fine-grained, sub-rounded, moderately well sorted, clayey.		SC	
	52-58 water							w/ sampling string: 49'bls w/ augers: 8'bls
55								
60								
65								
					68.0-90.0 *Clayey Sand (SC) with Dolomite and Marl* clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, moderately well sorted; dolomite, 25%, moderate yellowish-brown, hard, microcrystalline, dense, some replacement features visible, pebbles to cobbles; marl, 5%, white, calcareous, soft, wet;		SC DOLOMITE	
70								
	72-78 water							w/ sampling string: 68'bls w/ augers: 10'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-65
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-18-93	**COMPLETED:** 10-19-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 63.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 90 FT. BLS	**DEPTH TO ∇** 3 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Dolomite and Marl continued.		SC DOLOMITE	
85	85-90 water							bottom hole augers w/ sampling string 88'bls w/ augers: 9'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
90					End of boring: 90'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-66
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-18-93	**COMPLETED:** 10-19-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 55.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 69 FT. BLS	**DEPTH TO ▽** 4 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-19-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		2-4	0-2 17	0-24.0 *Sand (SP)*, 100%, quartz, light gray to dark brown, very fine-to fine-grained, sub-angular to sub-rounded, well sorted, soft, damp.		SP	0-4'bls: continuous split-spoons
			2-3					
	2-4 soil		1-3	2-4 15				
			3-5					
	4-8 water							groundwater encountered ▽ wl sampling string 0 wl augers: dry
5								
10								
15								
	18-22 water							wl sampling string 0 wl augers: 18'bls
20					20.0 color change; dark gray.			
					24.0-48.0 *Silty Clay (CL)*, 100%, dark gray, slightly plastic, soft, saturated, trace fine sand.		CL	
25								
	28-32 water							wl sampling string 0 wl augers: 28'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-66
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-18-93	**COMPLETED:** 10-19-93
DRILL RIG: Mobil Drill B-59	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 55.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 69 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: M. Gagne	**HOLE ABANDONMENT DATE:** 10-19-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Silty Clay continued.		CL	
45								
					48.0-69.0 *Sand (SP)*, 100%, quartz, light gray, fine-to medium-grained, sub-angular to sub-rounded, well sorted, loose, wet.		SP	
50								
	52-56 water							wl sampling string: 0 wl augers: 49'bls
55					56.0 shell fragments, increasing silt content.			
60								
65								
	67-69 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers wl sampling string: 68'bls wl augers: 58'bls bottom hole probe
					End of boring: 69'bls.			
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-67
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-25-93	**COMPLETED:** 10-26-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 81.4 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 78 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-26-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			2-2	0-2	0-52.0 *Silty Sand (SM)*, 100%, quartz, light brown to colorless, fine-to medium-grained, sub-rounded, moderately well sorted, occasionally silty.		SM	0-8'bls: continuous split-spoons
			3-4	18.2				
	2-4 soil		4-4	2-4 19.1				
			6-6					
			6-10	4-6 18.8				
5			8-9					
	6-8 soil		5-6	6-8 316				
			9-9					
10	10-15 water							wl sampling string: 0 wl augers: dry
15								
20	18-22 water							wl sampling string: 0 wl augers: 7'bls
25								
30	28-32 water							wl sampling string: 0 wl augers: 8'bls
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-67
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-25-93	**COMPLETED:** 10-26-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 81.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 78 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-26-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Silty Sand continued.		SM	
45								
50								
	52-58 water				52.0-68.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-to medium-grained, sub-rounded, poorly to moderately well sorted, clayey.		SC	wl sampling string: 54'bls wl augers: 38'bls
55								
60								
65								
					68.0-78.0 *Clayey Sand (SC) with Dolomite and Marl*, clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, poorly to moderately well sorted; dolomite, 20%, moderate yellowish-brown, hard, microcrystalline, vuggy, pebbles; marl, 10%, white, calcareous, soft, wet		SC DOLOMITE	
70								
75	78-78 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers wl sampling string: 65'bls wl augers: 23'bls bottom hole probe
					End of boring: 78'bls.			
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-68
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-28-93	**COMPLETED:** 10-27-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-27-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1	0-2 30.7	0-54.0 *Sand (SP)*, 100%, quartz, light brown to colorless, fine-to medium-grained, sub-rounded, moderately well sorted, soft, occasionally silty.		SP	0-8'bls: continuous split-spoons
			1-1	2-4 14.1				
			3-4					
			4-4	4-6 18.4				
5			5-5					
			6-8	6-8 29.4				
	6-8 soil		8-7					
			7-6					
	8-12 water							groundwater encountered ∇ wl sampling string: 0 wl augers: dry
10								
15								
	18-22 water							wl sampling string: 0 wl augers: dry
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 26'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-68
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-28-93	**COMPLETED:** 10-27-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-27-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water							wl sampling string: 0 wl augers: 34'bls
					54.0-73.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, dense, moist to dry, homogeneous, plastic, pliable.		CL	
55								
60								
65								
70								
	72-78 water							wl sampling string: 7'bls wl augers: 26'bls
					73.0-97.0 *Clay (CL)*, 100%, medium to light gray, dense, dry, hard, homogeneous, pliable, slightly plastic, trace shell fragments.		CH	
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-68
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-26-93	**COMPLETED:** 10-27-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.1 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 97 FT. BLS	**DEPTH TO ▽** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-27-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
85							CH	
90								
95	94-97 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 90'bls w/ augers: 40'bls
					End of boring: 97'bls.			bottom hole probe
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-69
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-27-93	**COMPLETED:** 10-28-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 63.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 119 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-28-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1	0-2 194	0-48.0 *Sand (SP)*, 100%, quartz, medium to dark brown, fine-to medium-grained, sub-rounded, moderately well sorted, occasionally silty.		SP	0-4'bls: continuous split-spoons
			4-2					
	2-4 soil		3-4	2-4 18.8				
			6-6					
	4-8 water							groundwater encountered ∇ wl sampling string: 0 wl augers: dry
5								
10	10-14 water							wl sampling string: 0 wl augers: dry
15								
	18-22 water							wl sampling string: 22'bls wl augers: 12'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 14'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-69
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-27-93	**COMPLETED:** 10-28-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 83.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 119 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-28-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
					48.0-70.0 *Sandy Clay (CL)*, 100%, quartz, medium gray, dense, moist to wet, plastic, pliable, grades to clayey sand.		CL	
50								
	52-56 water							wl sampling string: 0 wl augers: 49'bls
55								
60								
65								
70	70-74 water				70.0-85.0 *Clayey Sand (SC) with Shell and Marl* clayey sand, 70%, quartz, medium gray, fine-to medium-grained, sub-rounded, poorly to moderately well sorted; shell, 20%, very pale orange, fine fragments; marl, 10%, white, calcareous, soft, wet.		SC MARL	wl sampling string: 68'bls wl augers: 18'bls
75								
80	80-83 water							bottom hole augers wl sampling string: wl augers: 17'bls

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-69
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-27-93	**COMPLETED:** 10-28-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 83.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 119 FT. BLS	**DEPTH TO ▽** 4 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 10-28-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell and Marl continued.		SC MARL	
85					85.0-106.0 *Dolomite*, 100%, moderate yellowish-brown to light gray to medium gray, hard, microcrystaline, shell replacement features visible, vuggy, sucrosic.		DOLOMITE	85-93 hard pump rate 3-4min/ft
90								93-98 softer pump rate 1 min/ft
95	95-105 water							temporary well point
								98-102 hard pump rate 5-6 min/ft
100								102-104 softer pump rate 1 min/ft
								104-106 hard pump rate 3-4 min/ft
105					106.0-119.0 *Clay (CH)*, 100%, calcareous, white, soft, non plastic, wet, trace phosphate.		CH	
110								
115					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 119'bls.			bottom hole rotary bit
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-70
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 10-29-93	**COMPLETED:** 11-01-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 58.7 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 108 FT. BLS	**DEPTH TO ▽** 7 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-01-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		woh"8-	0-2 19.8	0-8.0 *Sand (SP)*, 100%, quartz, medium to light brown, fine-to medium-grained, sub-rounded, poorly to moderately well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
			4-1					
			1-2	2-4 18				
			3-5					
	4-6 soil		5-4	4-6 23.4				
5			4-2					
			5-7	6-8 16.8	8.0-8.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-grained, sub-rounded, moderately well sorted, clayey.		SC	groundwater encountered ▽
			8-10					
	8-12 water				8.0-46.0 *Sand (SP)*, 100%, quartz, light brown, medium-grained, sub-rounded, moderately well sorted, occasionally silty.		SP	wl sampling string: 0 wl augers: dry
10								
15								
	18-22 water							wl sampling string: 0 wl augers: dry
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 27'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-70
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-29-93	**COMPLETED:** 11-01-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 58.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 108 FT. BLS	**DEPTH TO ▽** 7 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-01-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45					46.0-69.0 *Sandy Clay (CL)*, 100%, quartz, medium gray, dense, moist to wet, plastic, pliable, grades to clayey sand.		CL	
50	52-56 water							wl sampling string: 0 wl augers: 28'bls
55								
60								
65	68-69 water							wl sampling string: 36'bls wl augers: 34'bls
70					69.0-82.0 *Clayey Sand (SC) with Shell and Marl* clayey sand, 70%, quartz, medium gray, fine-to medium-grained, sub-rounded, moderately well sorted; shell, 20%, very pale orange, fine fragments; marl, 10%, white, calcareous, soft, wet.		SC MARL	
75								
80	80-82 water							wl sampling string: 68'bls wl augers:

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-70
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 10-29-93	**COMPLETED:** 11-01-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 58.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 108 FT. BLS	**DEPTH TO ∇** 7 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-01-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell and Marl continued.		SC MARL	
					82.0-96.0 *Dolomite*, 100%, moderate yellowish-brown, hard, well cemented, microcrystalline, shell replacement features visible, vuggy, sucrosic, oolitic-like-replacement features visible, trace phosphate.		DOLOMITE	bottom hole augers
85								pump rate 6-7 min/ft
								pump rate 4-5 min/ft
90	90-92 water							temporary well point 500 gal purged
								pump rate 4-5 min/ft
95					96.0-106.0 *Clay (CH)*, 100%, calcareous, white to light gray, soft, non plastic, wet.		CH	pump rate 30 sec/ft
100								
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
105					End of boring: 106'bls.			bottom hole rotary bit
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-71
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-01-93	**COMPLETED:** 11-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 84.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 105 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-02-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2	0-44.0 *Sand (SP)*, 100%, quartz, medium to light brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
			2-3	21.1				
			3-5	2-4 9				
			6-8					
	4-6 soil		6-10	4-6 26.4				
5			15-19					
	6-8 soil		10-18	6-8 58.7				
			27-27					
	8-12 water							groundwater encountered ∇ wl sampling string: 0 wl augers: dry
10								
15								
	18-22 water							wl sampling string: 0 wl augers: 18'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 14'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-71
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 11-01-93	**COMPLETED:** 11-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 84.1 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 105 FT. BLS	**DEPTH TO ▽** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-02-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45					44.0-67.0 *Sandy Clay (CL)*, 100%, quartz, medium gray, dense, moist to wet, plastic, pliable, homogenous.		CL	
50								
	52-56 water							wl sampling string: 53'bls wl augers: 16'bls
55								
60								
65								
					67.0-75.0 *Clayey Sand (SC) with Shell and Marl* clayey sand, 70%, quartz, medium gray, fine-to medium-grained, sub-rounded, moderately well sorted; shell, 20%, very pale orange, fine fragments; marl, 10%, white, calcareous, soft, wet.		SC MARL	
70								
	72-76 water							wl sampling string: 72'bls wl augers: 14'bls
75					75.0-98.0 *Dolomite*, 100%, moderate yellowish-brown, hard, well cemented, microcrystalline, shell replacement features visible, vuggy, sucrosic, oolitic-like-replacement features visible, trace phosphate.		DOLOMITE	bottom hole augers pump rate 55 sec/ft
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-71
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-01-93	**COMPLETED:** 11-02-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 84.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 105 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-02-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Dolomite continued.		DOLOMITE	
85								pump rate 1-2 min/ft
90	91-101 water							pump rate 2-3 sec/ft temporary well point 1040 gal purged pump rate 1-2 min/ft
95								pump rate 1-3 min/ft
					98.0-105.0 *Clay (CH)* 100%, calcareous, white to light gray, soft, non plastic, wet.		CH	pump rate 30 sec/ft
100								
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
105					End of boring: 105'bls.			bottom hole rotary bit
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-72
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-08-93	**COMPLETED:** 11-09-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 72.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-09-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-2	0-2	0-5.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-rounded, moderately well sorted.		SP	0-8'bls: continuous split-spoons
			1-2	35.3				
			2-4	2-4				
			5-7	40.6				
	4-6 soil		4-5	4-6				
5			8-10	180	5.0-9.0 *Sandy Clay (CL)*, 100%, light brown to light gray, dense, moderately hard, pliable, plastic, homogeneous, moist to dry, sandy.		CL	
	6-8 soil		5-8	6-8				
			8-11	94				
					9.0-54.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-rounded, moderately well sorted, occasionally silty.		SP	groundwater encountered ▽
10	10-14 water							wl sampling string: 0 wl augers: dry
15								
	18-22 water							wl sampling string: 0 wl augers: 19'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 28'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-72
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-08-93	**COMPLETED:** 11-09-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 72.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-09-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50	52-56 water							wl sampling string: 44'bls wl augers: 14'bls
					54.0-74.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, dense, soft, wet, sandy, pliable, plastic, homogeneous.		CL	
55								
60								
65								
70	72-76 water							wl sampling string: 58'bls wl augers: 24'bls
					74.0-94.0 *Clayey Sand (SC) with Shell and Marl*, clayey sand, 70%, quartz, medium gray, fine-to medium-grained, sub-rounded, moderately well sorted; shell, 20%, very pale orange, fine fragments; marl, 10%, white, calcareous, soft, wet.		SC MARL	
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**		**LOG OF BORING:** GS-3-72
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-08-93	**COMPLETED:** 11-09-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 72.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-09-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell and Marl continued.		SC MARL	
85								
90	90-94 water							bottom hole augers w/ sampling string: 93'bls w/ augers: 30'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-73
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-09-93	**COMPLETED:** 11-10-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 72.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-10-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1	0-2 7.9	0-4.0 *Sand (SP)*, 100%, quartz, light gray to moderate brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted.		SP	0-10'bls: continuous split-spoons
			2-2					
			2-2	2-4 4.8				
			5-4					
			4-4	4-6 5.3	4.0-9.0 *Sandy Clay (CL)*, 100%, moderate yellowish-brown to reddish-yellow, dense, slightly plastic, homogeneous, dry.		CL	
5			7-7					
			5-6	6-8 5.8				
			10-9					
	8-10 soil		10-7	8-10 8.5				
	9-13 water		7-8		9.0-54.0 *Sand (SP)*, 100%, quartz, colorless to medium gray, fine-to medium-grained, sub-rounded, moderately well sorted, occasionally silty.		SP	groundwater encountered w/ sampling string: 12.5'bls w/ augers: 5.5'bls ∇
10								
15								
	18-22 water							w/ sampling string: 0 w/ augers: 10'bls
20								
25								
	28-32 water							w/ sampling string: 32'bls w/ augers: 19'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-73
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-09-93	**COMPLETED:** 11-10-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 72.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-10-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-56 water							wl sampling string: 0 wl augers: 22'bls
					54.0-74.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, dense, soft, wet, sandy, pliable, plastic, homogeneous.		CL	
55								
60								
65								
70								
	72-73 water							wl sampling string: 83'bls wl augers: 80'bls
					74.0-93.0 *Clayey Sand (SC) with shell and marl*, clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, moderately well sorted; shell, 20%, very pale orange, fine fragments; marl, 10%, white, calcareous, soft, wet.		CL MARL	
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-73
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-09-93	**COMPLETED:** 11-10-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 72.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-10-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with shell and marl continued.		CL MARL	
85								
90	90-93 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 92'bls w/ augers: 28'bls bottom hole probe
					End of boring: 93'bls.			
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-74
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 11-10-93	**COMPLETED:** 11-12-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-12-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1 1-1 2-2 4-5 5-4 5-8 6-10 10-10	0-2 18.2 2-4 18.1 4-6 18 6-8 18.8	0-4.0 *Sand (SP)*, 100%, quartz, light gray to moderate brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted.		SP	0-8'bls: continuous split-spoons
5	6-8 soil				4.0-9.0 *Sandy Clay (CL)*, 100%, moderate yellowish-brown to reddish-yellow, dense, slightly plastic, homogeneous, dry.		CL	
10	9-13 water				9.0-54.0 *Sand (SP)*, 100%, quartz, colorless to medium gray, fine-to medium-grained, sub-rounded, moderately well sorted, occasionally silty.		SP	groundwater encountered ∇ wl sampling string: 0 wl augers: dry
15								
20	18-22 water							wl sampling string: 0 wl augers: dry
25								
30	28-32 water							wl sampling string: 34'bls wl augers: 14'bls
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-74
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-10-93	**COMPLETED:** 11-12-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-12-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50	52-56 water							wl sampling string: 42'bls wl augers: 16'bls
					54.0-74.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, dense, soft, wet, sandy, pliable, plastic, homogeneous.		CL	
55								
60								
65								
70	72-76 water							wl sampling string: 0 wl augers: 9'bls
75					74.0-94.0 *Clayey Sand (SC) with Shell and Marl* clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, moderately well sorted; shell, 20%, very pale orange, fine fragments; marl, 10%, white, calcareous, soft, wet.		SC MARL	
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-74
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 11-10-93	**COMPLETED:** 11-12-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.7 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 94 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-12-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell and Marl continued.		SC MARL	
85								
90	90-94 water							bottom hole augers w/ sampling string 89'bls w/ augers: 9'bls
					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 94'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-75
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 11-12-93	**COMPLETED:** 11-13-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.8 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-13-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2 0	0-5.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted.		SP	0-8'bls: continuous split-spoons
			4-2					
			2-4	2-4 0				
			4-3					
	4-6 soil		2-4	4-6 0				
5			6-6		5.0-9.0 *Sandy Clay (CL)*, 100%, light gray to light brown, dense, moderately hard, moist to dry, homogeneous, sandy.		CL	
	6-8 soil		5-6	6-8 0				
			8-8					
	8-12 water							groundwater encountered w/ sampling string: 0 w/ augers: dry ∇
					9.0-54.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-rounded, well sorted, occasionally silty.		SP	
10								
15								
	18-22 water							w/ sampling string: 22'bls w/ augers: 13'bls
20								
25								
	28-32 water							w/ sampling string: 0 w/ augers: 10'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-75
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-12-93	**COMPLETED:** 11-13-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-13-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water							wl sampling string: 54'bls wl augers: 7'bls
					54.0-74.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, dense, soft, wet, sandy, pliable, plastic, homogeneous.		CL	
55								
60								
65								
70								
	72-75 water							wl sampling string: 7'bls wl augers: 8'bls
					74.0-93.0 *Clayey Sand (SC) with Shell and Marl* clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, well sorted; shell, 20%, very pale orange, fine fragments; marl, 10%, white, calcareous, soft, wet.		SC MARL	
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-75
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-12-93	**COMPLETED:** 11-13-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-13-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell and Marl continued.		SC MARL	
85								
90	90-93 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 92'bls w/ augers: 8'bls
					End of boring: 93'bls.			bottom hole probe
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-76
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-14-93	**COMPLETED:** 11-14-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 59.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 66 FT. BLS	**DEPTH TO ▽** 6 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-14-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50					50.0-62.0 *Clayey Sand (SC)*, 100%, quartz, medium gray, fine-to medium-grained, poorly to moderately well sorted, clayey.		SC	
	52-56 water							wl sampling string: n/a wl augers: n/a
55								
60								
	62-76 water				62.0-66.0 *Clayey Sand (SC) with Shell and Marl* clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, poorly sorted; shell, 20%, very pale orange, fine fragments, soft, brittle; marl, 10%, white, calcareous, soft, wet.		SC MARL	bottom hole augers wl sampling string: n/a wl augers: n/a
65					Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			
					End of boring: 66'bls.			bottom hole probe
70								
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-76
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 11-14-93	**COMPLETED:** 11-14-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 59.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 66 FT. BLS	**DEPTH TO ▽** 6 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-14-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
			1-1	0-2	0-10.0 *Sand (SP) with Organics (OL)* sand, 60%, quartz, light gray to dark brown, fine-to medium-grained, sub-angular to sub-rounded, poorly sorted; organics, 40%, very dark brown, soft, spongy, peat-like wood fragments.		SP OL	0-8'bls: continuous split-spoons
			1-1	0				
	2-4 soil		4-10	2-4 0				
			7-5					
	4-6 soil		5-7	4-6 0				
5			12-6					groundwater encountered ▽
	8-12 water							wl sampling string: 0 wl augers: dry
10					10.0-50.0 *Sand (SP)*, 100%, quartz, light gray to light brown, fine-to medium-grained, sub-angular to sub-rounded, poorly sorted, occasionally silty.		SP	
15								
	18-22 water							wl sampling string: 0 wl augers: 18'bls
20								
25								
	28-32 water							wl sampling string: n/a wl augers: n/a
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-77
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 11-15-93	**COMPLETED:** 11-18-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.5 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 92 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-18-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1	0-2	0-5.0 *Sand (SP)*, 100%, quartz, colorless to light brown, fine-to medium-grained, sub-rounded, moderately well sorted.		SP	0-8'bls: continuous split-spoons
			1-1	23.9				
			2-3	2-4 11.4				
			5-5					
			3-5	4-6 10.7				
5			6-10		5.0-9.0 *Sandy Clay (CL)*, 100%, light gray to reddish-brown, dense, moderately hard, well compacted, pliable, non plastic, sandy, homogeneous.		CL	
	6-8 soil		9-9	6-8 12.4				
			11-14					
					9.0-54.0 *Sand (SP)*, 100%, quartz, light gray to light brown, fine-grained, sub-rounded, moderately well sorted.		SP	groundwater encountered ∇
10	10-14 water							wl sampling string: 0 wl augers: dry
15								
	18-22 water							wl sampling string: 0 wl augers: 20'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 18'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-77
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-15-93	**COMPLETED:** 11-16-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 92 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-16-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-58 water							wl sampling string: 54'bls wl augers: 8'bls
					54.0-72.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, dense, sandy, slightly pliable, homogeneous.		CL	
55								
60								
65								
70								
	72-78 water				72.0-92.0 *Clayey Sand (SC) with Shell and Marl* clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, poorly sorted, clayey; shell, 20%, very pale orange, fine fragments, soft, brittle; marl, 10%, white, calcareous, soft, wet.		SC MARL	wl sampling string: 0 wl augers: 10'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-77
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-15-93	**COMPLETED:** 11-16-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 92 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-16-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell and Marl continued.		SC MARL	
85								
90	90-92 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 88'bls w/ augers: 7'bls bottom hole probe
					End of boring: 92'bls.			
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-78
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 11-17-93	**COMPLETED:** 11-29-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.8 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-29-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-1	0-2 15.5	0.0-54.0 *Sand (SP)*, 100%, quartz, light gray to light brown, fine-grained, sub-rounded, moderately well sorted.		SP	0-8'bls: continuous split-spoons
			2-2	2-4 0				
			3-6					
			6-8	4-6 0				
5			8-10					
			10-12	6-8 0				
	6-8 soil		8-10					
			10-12					
	8-12 water							wl sampling string: 0 wl augers: dry groundwater encountered ∇
10								
15								
	18-22 water							wl sampling string: 24'bls wl augers: 12'bls
20								
25								
	28-32 water							wl sampling string: 0 wl augers: 18'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-78
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-17-93	**COMPLETED:** 11-29-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-29-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50	52-58 water							wl sampling string: 50'bls wl augers: 17'bls
					54.0-72.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, dense, sandy, slightly pliable, homogeneous.		CL	
55								
60								
65								
70	72-78 water				72.0-93.0 *Clayey Sand (SC) with Shell and Marl*, clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, poorly sorted, clayey; shell, 20%, very pale orange, fine fragments, soft, brittle; marl, 10%, white, calcareous, soft, wet.		SC MARL	wl sampling string: 68'bls wl augers: 17'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-78
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-17-93	**COMPLETED:** 11-29-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.6 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ▽** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-29-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell and Marl continued.		SC MARL	
85								
90	90-93 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string: 88'bls w/ augers: 16'bls bottom hole probe
					End of boring: 93'bls.			
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** GS-3-79
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services	**DATE STARTED:** 11-29-93	**COMPLETED:** 11-30-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA / **SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.0 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ∇:** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-30-93	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-2 soil		1-2	0-2 12.6	0.0-54.0 *Sand (SP)*, 100%, quartz, light brown, fine-to medium-grained, sub-rounded, moderately well to well sorted, occasionally silty.		SP	0-8'bls: continuous split-spoons
			1-2					
			4-5	2-4 9.2				
			7-7					
			7-10	4-6 9.2				
5			10-10					
	6-8 soil		7-10	6-8 10.8				
			14-13					
	8-12 water							wl sampling string: 11'bls ∇ wl augers: dry groundwater encountered
10								
15								
	18-22 water							wl sampling string: 22'bls wl augers: 12'bls
20								
25								
	28-32 water							wl sampling string: 32'bls wl augers: 15'bls
30								
35								
40								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-79
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-29-93	**COMPLETED:** 11-30-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ∇** 9 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-30-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 1			
					Sand continued.		SP	
45								
50								
	52-56 water							wl sampling string: 56'bls wl augers: 7'bls
					54.0-72.0 *Sandy Clay (CL)*, 100%, quartz, medium to dark gray, dense, sandy, slightly pliable, homogeneous.		CL	
55								
60								
65								
70								
	72-76 water				72.0-93.0 *Clayey Sand (SC) with Shell and Marl*, clayey sand, 70%, quartz, medium gray, fine-grained, sub-rounded, poorly sorted, clayey; shell, 20%, very pale orange, fine fragments, soft, brittle; marl, 10%, white, calcareous, soft, wet.		SC MARL	wl sampling string: 6'bls wl augers: 7'bls
75								
80								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** GS-3-79
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 7537-03
DRILLING SUBCONTRACTOR: Layne Environmental Services		**DATE STARTED:** 11-29-93	**COMPLETED:** 11-30-93
DRILL RIG: Gus Pech BR22	**DRILL MTHD.:** 4.25" ID HSA	**SAMP. MTHD.:** Aqua Probe	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 93 FT. BLS	**DEPTH TO ∇** 8 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-30-93		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
					Continued from PAGE 2			
					Clayey Sand with Shell and Marl continued.		SC MARL	
85								
90	90-93 water				Samples collected were analyzed for USEPA Method 8010/8020 and TPH.			bottom hole augers w/ sampling string 89'bls w/ augers: 8'bls bottom hole probe
					End of boring: 93'bls.			
95								
100								
105								
110								
115								
120								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB1/CF3SS1
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-20-94	**COMPLETED:** 11-20-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a / **SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.1 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 4 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-20-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil			0-2 0	0-4.0 *Sand (SP)*, 100%, quartz, medium gray to black to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	0-1'bls: ecological sampling
	2-4 soil			2-4 0	Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 4'bls.			groundwater encountered bottom hole ∇
5								
10								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB10/CF3SS10
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-19-94	**COMPLETED:** 11-19-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 70.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 3 FT. BLS	**DEPTH TO ∇** 3 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-19-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil			0-1 3.3	0-3.0 *Sand (SP)*, 100%, quartz, medium gray to black to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
	1-3 soil			1-3 4				
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 3'bls.			groundwater encountered bottom hole ∇
5								
10								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** CF3SB3/CF3SS3
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a		**DATE STARTED:** 11-18-94	**COMPLETED:** 11-18-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-18-94		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil 0.5-2.5 soil			0-1 0.2 .5-2.5 0.8	0-2.5 *Sand (SP)*, 100%, quartz, medium gray to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty. Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs. End of boring: 2.5'bls.		SP	groundwater encountered bottom hole ∇
5								
10								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB4/CF3SS4
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-18-94	**COMPLETED:** 11-18-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a / **SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.8 FT. NGVD	**MONITOR INST.:** Microtip-PID / **TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-18-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil 0.5-2.5 soil			0-1 0 .5-2.5 0	0-2.5 *Sand (SP)*, 100%, quartz, medium gray to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty. Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.		SP	0-1'bls ecological sampling
					End of boring: 2.5'bls.			groundwater encountered bottom hole ∇
5								
10								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** CF3SB5/CF3SS5
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a		**DATE STARTED:** 11-18-94	**COMPLETED:** 11-18-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-18-94		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil 0.5-2.5 soil			0-1 0 .5-2.5 0	0-2.5 *Sand (SP)*, 100%, quartz, medium gray to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty. Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs. End of boring: 2.5'bls.		SP	groundwater encountered bottom hole ∇
5								
10								

 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB6/CF3SS6
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-18-94	**COMPLETED:** 11-18-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-18-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil 0.5-2.5 soil			0-1 0 .5-2.5 25	0-2.5 *Sand (SP)*, 100%, quartz, medium gray to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 2.5'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** CF3SB7/CF3SS7
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a		**DATE STARTED:** 11-19-94	**COMPLETED:** 11-19-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.5 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 3.5 FT. BLS	**DEPTH TO ∇** 3.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-19-94		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil			0-1 2.8	0-3.5 *Sand (SP)*, 100%, quartz, medium gray to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
	1.5-2.5 soil			1.5-3.5				
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
				43.8	End of boring: 3.5'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB8/CF3SS8
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-19-94	**COMPLETED:** 11-19-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 73.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 3.5 FT. BLS	**DEPTH TO ∇** 3.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-19-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil			0-1 12.4	0-3.5 *Sand (SP)*, 100%, quartz, medium gray to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
	1.5-2.5 soil			1.5-3.5				
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
				98.4	End of boring: 3.5'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB9
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-19-94	**COMPLETED:** 11-19-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 71.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-19-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil 1.5-2.5 soil			0-1 0 .5-2.5 0	0-2.5 *Sand (SP)*, 100%, quartz, medium gray to black to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	0-fbls: ecological sampling
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 2.5'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB10/CF3SS10
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-19-94	**COMPLETED:** 11-19-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 70.7 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 3 FT. BLS	**DEPTH TO ∇** 3 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-19-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil			0-1 3.3	0-3.0 *Sand (SP)*, 100%, quartz, medium gray to black to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
	1-3 soil			1-3 4				
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 3'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB11/CF3SS11
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-19-94	**COMPLETED:** 11-19-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 83.0 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2 FT. BLS	**DEPTH TO ∇** 4 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-19-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil			0-1 0	0-4.0 *Sand (SP)*, 100%, quartz, black to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	0-2,2-4'bls: geotech samples
	1-2 soil			1-2 0				
								groundwater encountered
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 4'bls.			bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** CF3SB12/CF3SS12
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a		**DATE STARTED:** 11-19-94	**COMPLETED:** 11-19-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 82.9 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2 FT. BLS	**DEPTH TO ∇** 2 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-19-94		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil			0-1 0	0-2.0 *Sand (SP)*, 100%, quartz, black to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	0-fbls: ecological samples
	1-2 soil			1-2 0	Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 2'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB13/CF3SS13
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-19-94	**COMPLETED:** 11-19-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 83.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2 FT. BLS	**DEPTH TO ∇** 2 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-19-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0-1 soil			0-1 0	0-2.0 *Sand (SP)*, 100%, quartz, black to moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
	1-2 soil			1-2 0	Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 2'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB25
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-20-94	**COMPLETED:** 11-20-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-20-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0.5-2.5 soil			.5-2.5 5	0-2.5 *Sand (SP)* 100%, quartz, moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty. Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs. End of boring: 2.5'bls.		SP	groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** CF3SB26
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a		**DATE STARTED:** 11-20-94	**COMPLETED:** 11-20-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-20-94		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0.5-2.5 soil			.5-2.5 14.6	0-2.5 *Sand (SP)*, 100%, quartz, moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 2.5'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB27
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-20-94	**COMPLETED:** 11-20-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.3 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-20-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0.5-2.5 soil			.5-2.5 4.1	0-2.5 *Sand (SP)*, 100%, quartz, moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 2.5'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** CF3SB28
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a		**DATE STARTED:** 11-20-94	**COMPLETED:** 11-20-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 74.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-20-94		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0.5-2.5 soil			.5-2.5 4.4	0-2.5 *Sand (SP)*, 100%, quartz, moderate to dark yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty. Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs. End of boring: 2.5'bls.		SP	groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB29
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-20-94	**COMPLETED:** 11-20-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 75.4 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-20-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0.5-2.5 soil			.5-2.5 48.3	0-2.5 *Sand (SP)* 100%, quartz, moderate yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty. Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs. End of boring: 2.5'bls.		SP	groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7		**LOG of WELL:**	**LOG OF BORING:** CF3SB30
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a		**DATE STARTED:** 11-20-94	**COMPLETED:** 11-20-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 85.2 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-20-94		**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0.5-2.5 soil			.5-2.5 5.7	0-2.5 *Sand (SP)*, 100%, quartz, dark gray to dark yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 2.5'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB31
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-20-94	**COMPLETED:** 11-20-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 84.8 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** 11-20-94	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0.5-2.5 soil			.5-2.5 32.8	0-2.5 *Sand (SP)* 100%, quartz, black to dark yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 2.5'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: NAS Cecil Field RI OUs 1,2,7	**LOG of WELL:**	**LOG OF BORING:** CF3SB32
CLIENT: SOUTHDIVNAVFACENGCOM		**PROJECT NO:** 8520.22
DRILLING SUBCONTRACTOR: n/a	**DATE STARTED:** 11-20-94	**COMPLETED:** 11-20-94
DRILL RIG: n/a	**DRILL MTHD.:** n/a	**SAMP. MTHD.:** Hand Auger	**PROTECTION LEVEL:** D
GROUND ELEV.: 64.1 FT. NGVD	**MONITOR INST.:** Microtip-PID	**TOTAL DEPTH:** 2.5 FT. BLS	**DEPTH TO ∇** 2.5 FT. BLS
LOGGED BY: M. Pijnenburg	**HOLE ABANDONMENT DATE:** n/a	**SITE:** 3

DEPTH FT.	SAMP. DEPTH /MATRIX.	SAMPLE INTERVAL	BLOWS/6in.	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	REMARKS
	0.5-2.5 soil			.5-2.5 0	0-2.5 *Sand (SP)* 100%, quartz, black to dark yellowish-brown, fine-to medium-grained, sub-angular to sub-rounded, poorly to moderately well sorted, silty.		SP	
					Samples collected were analyzed for USEPA Level IV analysis of VOCs, SVOCs, TPH, Metals, and Pesticides and PCBs.			
					End of boring: 2.5'bls.			groundwater encountered bottom hole ∇
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 ABB ENVIRONMENTAL SERVICES, INC.