

FINAL

**SUPPLEMENTAL SITE INVESTIGATION REPORT
SITE 14 - FENTRESS LANDFILL
SITE 17 - FIREFIGHTING TRAINING AREA
NAVAL AUXILIARY LANDING FIELD,
FENTRESS, VIRGINIA**

CONTRACT TASK ORDER 0040

Prepared For:

**NAVAL FACILITIES
ENGINEERING COMMAND
ATLANTIC DIVISION
Norfolk, Virginia**

Under:

Contract N62470-89-D-4814

Prepared By:

**FOSTER WHEELER ENVIRONMENTAL SERVICES
Livingston, New Jersey**

Under the Direction of:

**BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania**

OCTOBER 1, 1993

TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1

1.0 INTRODUCTION 1-1

 1.1 Purpose and Objective 1-1

 1.2 Report Organization 1-2

2.0 BACKGROUND 2-1

 2.1 Site History 2-1

 2.2 Environmental Location and Setting 2-1

 2.3 Geology 2-1

 2.4 Hydrology 2-2

 2.5 Soils 2-3

 2.6 Groundwater 2-3

 2.7 Previous Investigations 2-4

 2.7.1 Soils 2-5

 2.7.2 Groundwater 2-6

 2.7.3 Surface Water 2-6

3.0 TECHNICAL APPROACH 3-1

 3.1 Groundwater Investigation 3-1

 3.1.1 Sample Location and Frequency 3-1

 3.1.2 Sample Designation 3-1

 3.1.3 Sampling Procedures and Equipment 3-2

 3.1.4 Sample Control 3-2

 3.1.5 Laboratory Analysis 3-2

 3.1.6 Contaminated Materials Handling 3-3

 3.2 Soil Gas Survey 3-3

 3.2.1 Soil Gas Sample Collection and Locations 3-3

 3.2.2 Soil Gas Sample Field Analysis and QA/QC 3-4

 3.3 Soil Borings 3-5

 3.3.1 Sample Locations 3-5

 3.3.2 Sample Designations 3-5

 3.3.3 Sampling Procedures and Equipment 3-6

 3.3.4 Sample Control 3-6

 3.3.5 Laboratory Analysis 3-6

 3.3.6 Contaminated Materials Handling 3-6

4.0 RESULTS OF SUPPLEMENTAL SITE INVESTIGATION 4-1

 4.1 Site 14 - Fentress Landfill 4-1

 4.1.1 Physical Data - Groundwater 4-1

 4.1.2 Analytical Data - Groundwater 4-1

 4.2 Site 17 - Firefighting Training Area 4-3

 4.2.1 Soil Gas Analytical Data 4-3

 4.2.2 Soil Analytical Data 4-3

- 5.0 CONCLUSIONS AND RECOMMENDATIONS 5-1
 - 5.1 Conclusions 5-1
 - 5.1.1 Site 14 - Fentress Landfill 5-1
 - 5.1.2 Site 17 - Firefighting Training Area 5-1
 - 5.2 Recommendations 5-1
 - 5.2.1 Site 14 - Fentress Landfill 5-1
 - 5.2.2 Site 17 - Firefighting Training Area 5-2

- REFERENCES R-1

TABLES

<u>Table Number</u>		<u>Following Page</u>
2-1	Summary of Previous Groundwater Analytical Results, Volatile Organic Compounds - Site 14	2-5
2-2	Summary of Previous Groundwater Analytical Results, Total Metals and Cyanide - Site 14	2-5
2-3	Summary of Previous Groundwater Analytical Results, Inorganic Analytes - Site 14	2-5
2-4	Summary of Previous Surface Water Analytical Results, Volatile Organic Compounds - Site 14	2-5
2-5	Summary of Previous Surface Water Analytical Results, Inorganic Analytes - Site 14	2-5
2-6	Summary of Previous Groundwater Analytical Results, Volatile Organic Compounds - Site 17	2-5
2-7	Summary of Previous Groundwater Analytical Results, Semi-Volatile Organic Compounds - Site 17	2-5
2-8	Summary of Previous Groundwater Analytical Results, Total Petroleum Hydrocarbons - Site 17	2-5
2-9	Summary of Previous Groundwater Analytical Results, Total Lead - Site 17	2-5
2-10	Summary of Previous Soil Analytical Results, Volatile Organic Compounds - Site 17	2-5
2-11	Summary of Previous Soil Analytical Results, Semi-Volatile Organic Compounds - Site 17	2-5
2-12	Summary of Previous Soil Analytical Results, Total Petroleum Hydrocarbons - Site 17	2-5
2-13	Summary of Previous Soil Analytical Results, Total Lead - Site 17	2-5
3-1	Groundwater Samples and Summary of Analytical and QA/QC Samples with Analytical Parameters - Site 14	3-2
3-2	Soil Gas Sample Depths - Site 17	3-4
3-3	Soil Boring Depths - Site 17	3-5
3-4	Summary of Analytical and QA/QC Samples with Analytical Parameters - Site 17	3-6
4-1	Groundwater Elevations - Site 14	4-1
4-2	Groundwater Field Parameters - Site 14	4-1
4-3	USEPA Maximum Contaminant Levels of Constituents of Concern - Site 14	4-1
4-4	Virginia State Water Control Board Regulations - Water Quality Standards of Constituents of Concern - Site 14	4-1
4-5	Groundwater Analytical Results, TCL Volatile Organic Compounds - Site 14	4-2
4-6	Groundwater Analytical Results, TAL Metals - Site 14	4-2

4-7	Groundwater Analytical Results, General Chemistry - Site 14	4-2
4-8	Soil Gas Survey Results - Site 17	4-3
4-9	Soil Analytical Results, TCL Volatile Organic Compounds - Site 17	4-3
4-10	Soil Analytical Results, Total BTEX - Site 17	4-3
4-11	Soil Analytical Results, TCL Semi-Volatile Organic Compounds - Site 17	4-3
4-12	Soil Analytical Results, Total Lead - Site 17	4-3
4-13	Soil Analytical Results, Total Petroleum Hydrocarbons - Site 17	4-3

FIGURES

<u>Figure Number</u>		<u>Following Page</u>
1-1	Site Location Map	1-1
1-2	Site Map - Site 14	1-1
1-3	Site Map - Site 17	1-1
2-1	Previous Surface Water Sample Locations - Site 14	2-1
2-2	Previous Soil Sample Locations - Site 17	2-1
3-1	Site Map - Site 14	3-1
3-2	Soil Gas Sample Locations - Site 17	3-3
3-3	Soil Boring Locations - Site 17	3-5
4-1	Contoured Static Water Levels - Site 14	4-1
4-2	Soil Gas Results - Site 17	4-3
4-3	Total Petroleum Hydrocarbon Results - Site 17	4-5
4-4	Total Petroleum Hydrocarbons - Iso-Concentrations in 0-2 ft. Interval - Site 17	4-5
4-5	Total Petroleum Hydrocarbons - Iso-Concentrations in 2-4 ft. Interval - Site 17	4-5
4-6	Approximate Limits of Excavation of TPH Impacted Soils	4-5

APPENDICES

<u>Appendix Tab</u>		<u>Tab</u>
A.	Soil Gas Data Report	A
B.	Soil Boring Logs	B
C.	Chain-of-Custody Forms	C
D.	Analytical Results	D

EXECUTIVE SUMMA

Foster Wheeler Enviresponse, Inc. (FWEI), as a member of the Baker Environmental, Inc. (BAKER) Team for the Navy CLEAN Program, conducted a Supplemental Site Investigation (SI) of Sites 14 and 17 at the Naval Auxiliary Landing Field (NALF), Fentress, Virginia. The specific objectives of the Supplemental SI were to: 1) collect and analyze a second round of groundwater samples from existing wells at Site 14; 2) delineate constituents of concern in soils at Site 17; 3) determine to what extent either site may pose a threat to human health and the environment; and, 4) determine the need for remedial action.

Data was obtained by execution of the Supplemental SI in accordance with the scope presented in the Implementation Plan and Fee Proposal (IP/FP) "Modification to CTO-0040 Additional Site Investigation Work", dated August 13, 1992 and the "Final Work Plan Addendum", dated April 26, 1993. Background information, which included results of previous investigations, was utilized to formulate the technical approach implemented during field activities.

During field activities groundwater samples were collected, soil gas samples were collected and analyzed in the field, and confirmatory soil samples were collected. Protocols for sample handling and management, laboratory quality assurance/quality control, and contaminated materials handling were employed in accordance with the site-specific work plans and are discussed in the technical approach section of the Supplemental SI report.

Results of the Supplemental SI were consistent with prior findings and conclusions. The second round of groundwater sampling and analysis at Site 14 revealed that constituents of concern were below federal and state maximum contaminant levels for groundwater quality. Soil screening at Site 17 revealed detectable vapor concentrations of volatile organic compounds (VOC) along the edges of the runway at that site. Confirmatory soil sampling analytical results at Site 17 indicated concentrations of total petroleum hydrocarbons (TPH), centered around soil gas samples with VOC concentrations, of up to 9,200 ug/g (parts per million).

Based on the results of the Baker Team investigation, it was recommended that a remedial action be conducted to remove soils contaminated with TPHs at Site 17. The removal quantity to implement this remedial action is estimated to be 7,400 cubic yards of soil. As part of this remedial action, a downgradient monitoring well should be monitored to measure the effectiveness of the remedial action in eliminating future impacts to the groundwater beneath Site 17. It was recommended that no further action be conducted at Site 14.

1.0 INTRODUCTION

This report presents results of the Supplemental Site Investigation (SI) completed at the Naval Auxiliary Landing Field (NALF), Fentress, Virginia. Figure 1-1 presents the location of NALF-Fentress. The Supplemental SI included two sites. The first site is Site 14, the Fentress Landfill. The second site is Site 17, the Firefighting Training Area. Figures 1-2 and 1-3 provide the site maps for the Fentress Landfill and the Firefighting Training Area, respectively. This Supplemental SI was prepared for the Atlantic Division, Naval Facilities Engineering Command (LANTDIV) by Foster Wheeler Enviresponse, Inc. as part of the Baker Environmental, Inc. Team, under the Comprehensive Long Term Environmental Action Navy (CLEAN) Program, Contract No. N62470-89-D-4814, Contract Task Order (CTO)-0040. Data obtained from conducting the Supplemental SI are presented in this report and are based on the scope presented in the Implementation Plan and Fee Proposal (IP/FP) "Modification to CTO - 0040 Additional Site Investigation Work," dated August 13, 1992 and on the "Final Work Plan Addendum," dated April 26, 1993.

1.1 Purpose and Objective

The purpose of the Supplemental SI is to report on the additional data collected at Sites 14 and 17. The objective of this report is to present the results of the Supplemental SI in sufficient detail to satisfy the requirements contained in the IP/FP dated August 13, 1992, issued by LANTDIV and the "Work Plan Addendum", dated April 26, 1993. The additional elements of this project included:

Site 14-Fentress Landfill

- Sample and analysis of ten groundwater samples from existing wells to confirm the absence or presence of constituents of concern; and,
- Determination of remedial requirements at the site.

Site 17-Firefighting Training Area

- Sample and field analysis of thirty-three soil gas samples to generate an estimated delineation of constituents of concern;
- Sample and analysis of forty-nine soil samples from twenty-five soil borings to confirm the estimated delineation if constituents of concern; and,
- Determination of remedial requirements at the site.

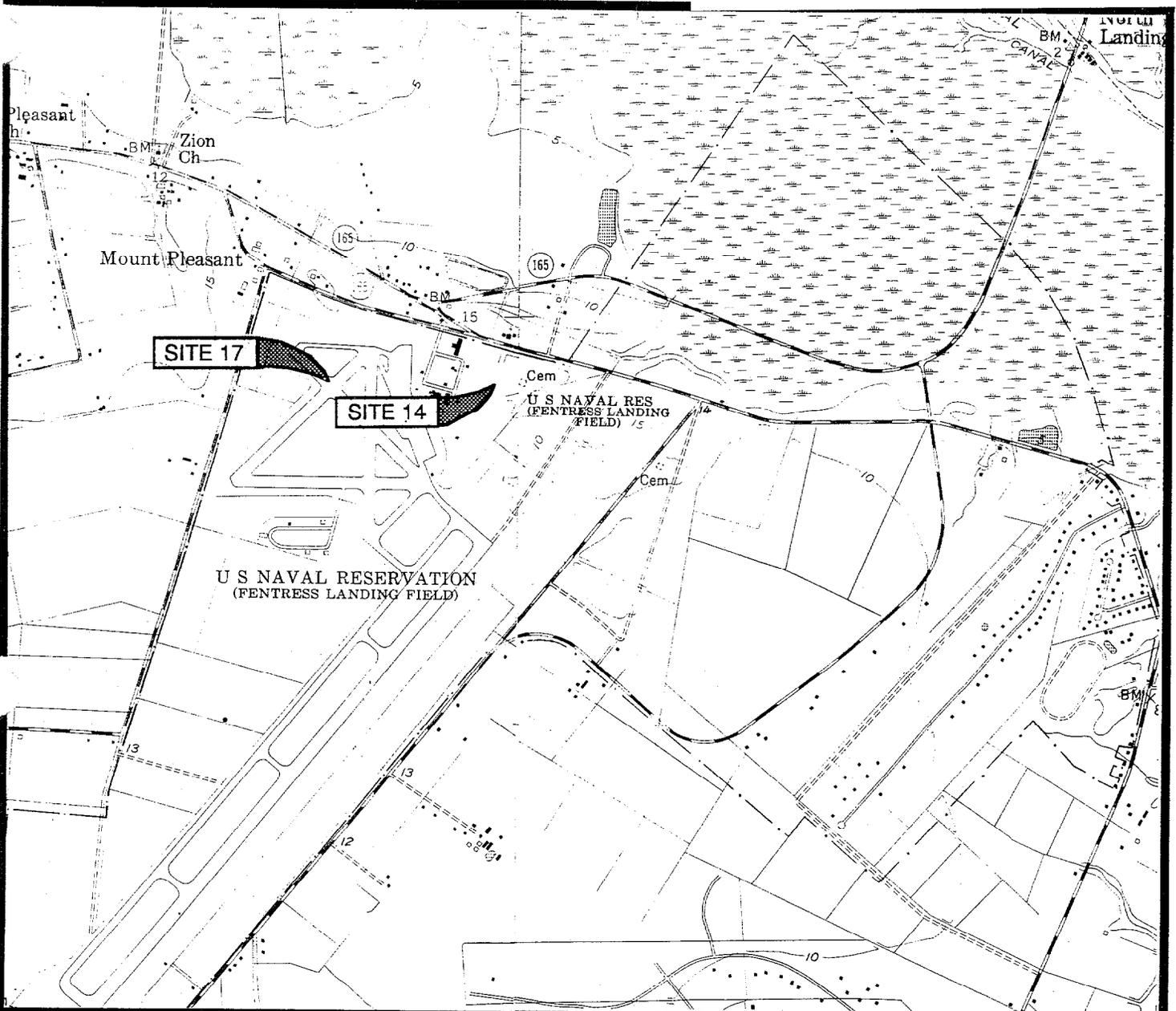
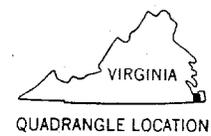
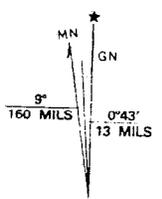


FIGURE 1-1
SITE LOCATION MAP
SITE 14 - FENTRESS LANDFILL
AND
SITE 17 - FIREFIGHTING TRAINING AREA
NAVAL AUXILIARY LANDING FIELD
FENTRESS, VIRGINIA



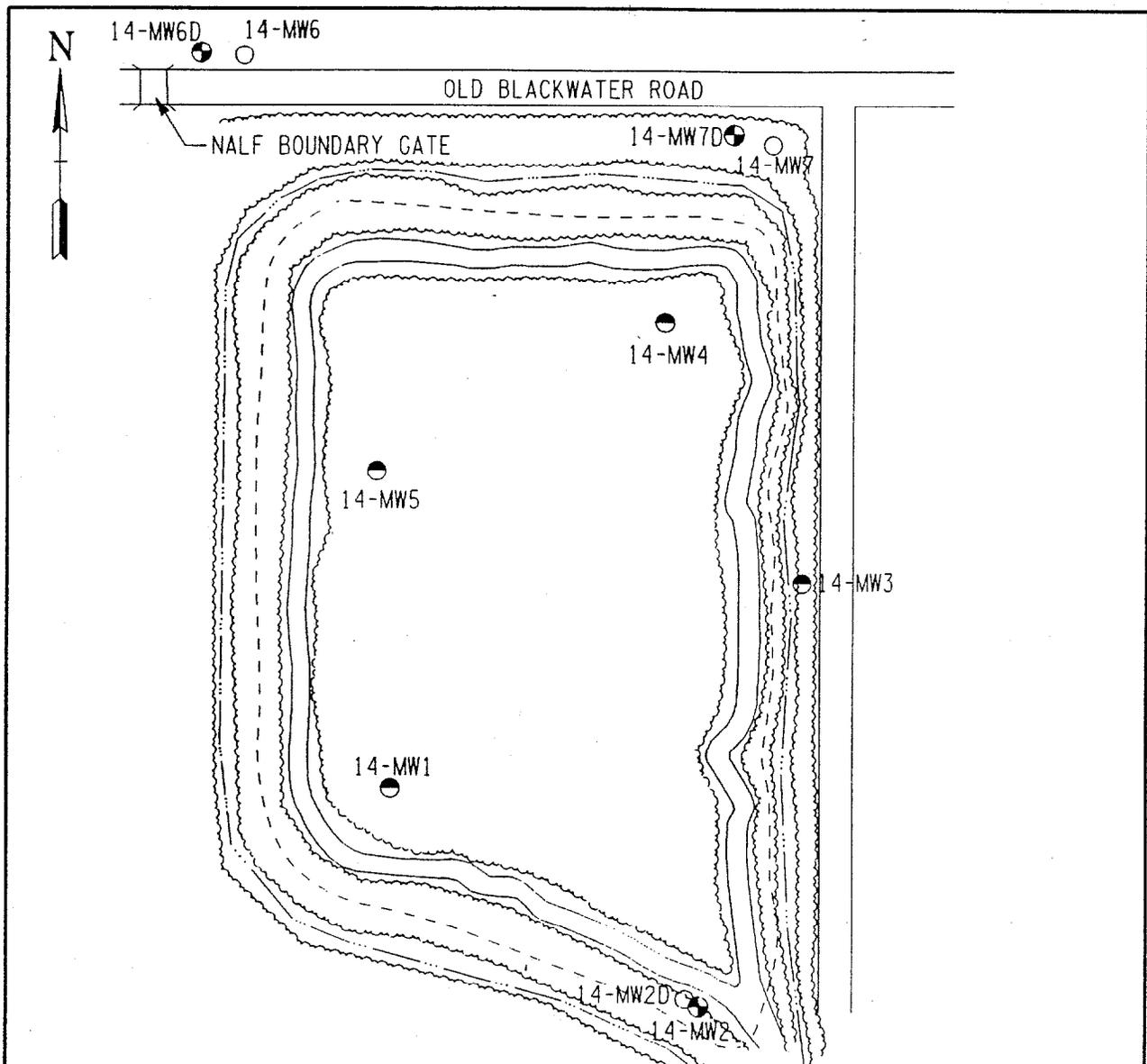
UTM GRID AND 1986 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Fentress and Pleasant Ridge VA Quadrangles
 7.5 Minute Topographic Series

Prepared by:
 Foster Wheeler Enviroresponse, Inc.

Date: July, 1993

Scale: 1" = 2000'



LEGEND

- CH2M HILL DEEP MONITORING WELL
- EXISTING SHALLOW MONITORING WELL
- CH2M HILL SHALLOW MONITORING WELL
- APPROXIMATE LANDFILL BOUNDARY
- - - DRAINAGE DITCH
- Jeep PATH WITHIN LANDFILL BOUNDARY
- ~ ~ ~ APPROXIMATE TREE LINE BOUNDARY

GRAPHIC SCALE

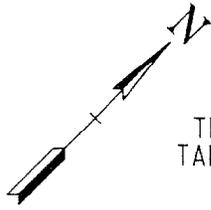


FIGURE 1-2
SITE MAP
SITE 14
FENTRESS LANDFILL

DRAWN BY:	WAG	7/16/93	SCALE: GRAPHIC
-----------	-----	---------	----------------

THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

esd145008:f1g1-2.dgn FENT5.REF



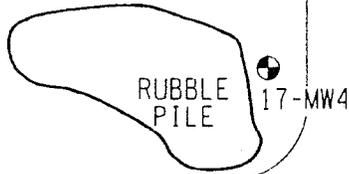
TREES & TALL WEEDS

TREES & TALL WEEDS

CONCRETE RUNWAY

ABANDONED TANKER TRUCKS

17-MW1



FIRE TRAINING LOCATION

CONCRETE RUNWAY

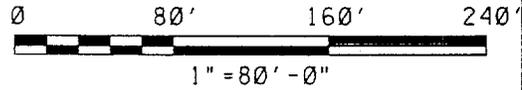
17-MW3

GRASS AREA

17-MW2

GRASS AREA

GRAPHIC SCALE



LEGEND

⊕ EXISTING MONITORING WELL

FIGURE 1-3
SITE MAP
SITE 17
FIREFIGHTING TRAINING AREA
FENTRESS, VIRGINIA

DRAWN BY: AULD 7/16/93 SCALE: 1" = 80' - 0"



THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

1.2 Report Organization

This report is organized into five sections. Section 1.0 - Introduction, presents the purpose and objectives of this project. Section 2.0 - Background, provides the site history, the environmental setting, geology, hydrology, and a summary of previous investigations. Section 3.0 - Technical Approach, provides a detailed description of the approach used to collect and analyze environmental media of the study areas for both sites. Section 4.0 - Results of Supplemental Site Investigation, presents the physical and chemical analysis of data collected at both sites. Section 5.0 - Conclusions and Recommendations, presents the evaluation and recommended approach for further action at both sites. The recommendations provided are intended to introduce actions to be developed in detail upon consideration of remedial alternatives.

2.0 BACKGROUND

2.1 Site History

The NALF was established during World War II and served as a U.S. Naval Air Landing Field from the mid 1940's to 1970. Presently, the facility is used as a training site for Navy personnel and is maintained and operated by the Navy. The landing strip is used for training police recruits from Chesapeake and Virginia Beach, Virginia. The facility currently provides air training services for operations and command/control of fleet units and other Department of Defense (DOD) agencies in the Atlantic.

Site 14, now a closed landfill, is located at the north end of Runway 23. The landfill was used between 1945 and 1970 and covers approximately 10 to 11 acres. Previous reports address asbestos, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), oil, and other chlorinated solvents as potential contaminants. Site 14 is depicted on Figure 2-1.

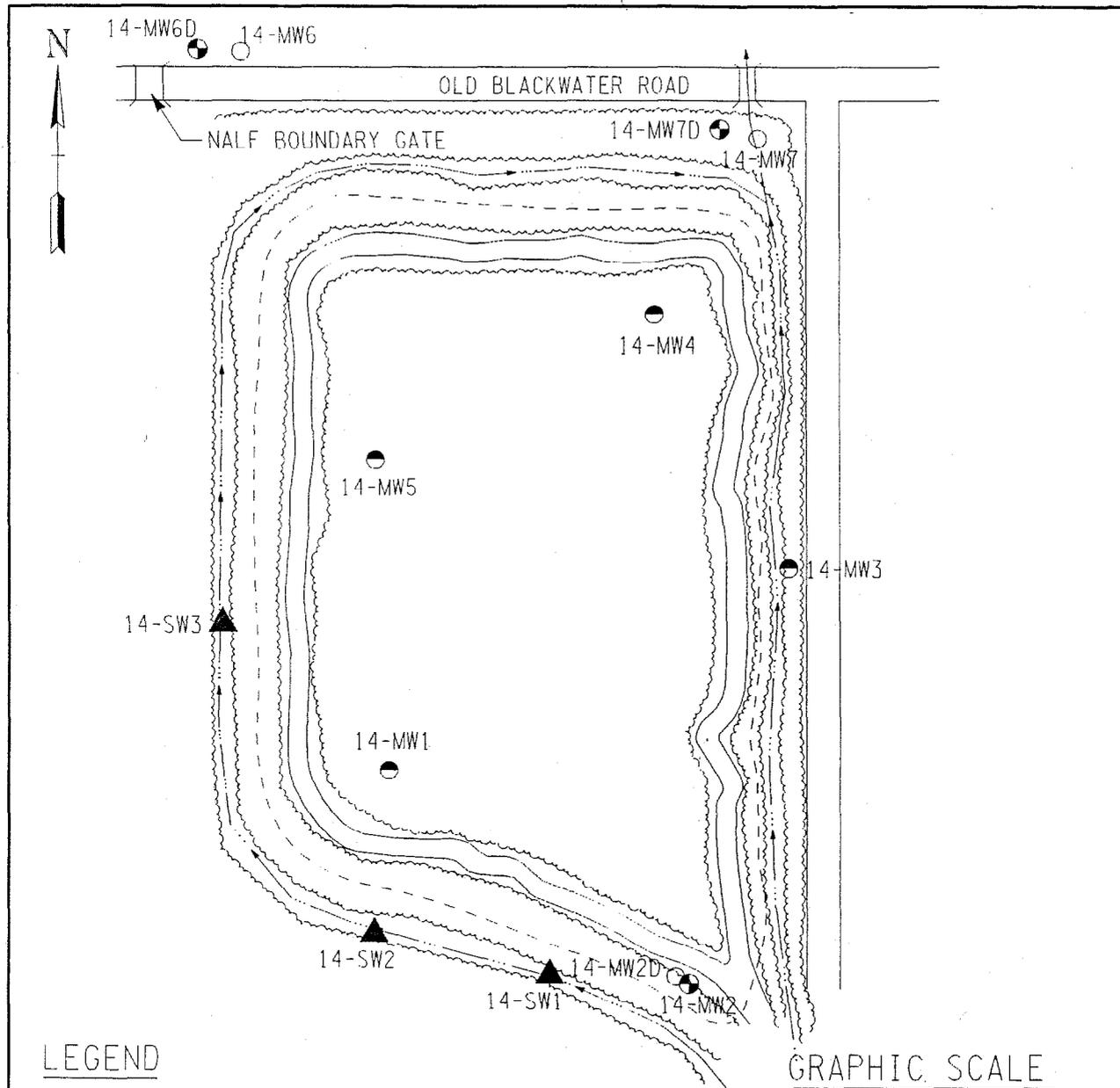
Site 17, located at the intersection of two abandoned aircraft runways, was used as a training area where jet fuel and spent oils were ignited to teach firefighting skills to Navy personnel (CH₂M Hill, 1991). Site 17 is currently abandoned. Site 17 is depicted on Figure 2-2.

2.2 Environmental Location and Setting

The NALF is located in Fentress, Virginia, south of the City of Chesapeake at longitude 76°07'30" west and latitude 36°42'30" north. The local terrain is flat, with relief varying between ten and fifteen above mean sea level, over much of the facility. Surface water runoff is managed by a system of drainage ditches and surface channels, which direct runoff north and east of the facility towards the Intercoastal Waterway.

2.3 Geology

NALF, Fentress is situated on the outer edge of the Atlantic Coastal Plain physiographic province. The Atlantic Coastal Plain is a broad wedge of unconsolidated sediments that dip and thicken to the east. The sediments consist of several thousand feet of unconsolidated sand, clay, silt, and gravels and are underlain by granite basement rock.



LEGEND

- ▲ SURFACE WATER SAMPLE LOCATIONS
- CH2M HILL DEEP MONITORING WELL
- EXISTING SHALLOW MONITORING WELL
- CH2M HILL SHALLOW MONITORING WELL
- APPROXIMATE LANDFILL BOUNDARY
- DRAINAGE DITCH (ARROW SHOWS FLOW DIRECTION)
- == JEEP PATH WITHIN LANDFILL BOUNDARY
- ~ APPROXIMATE TREE LINE BOUNDARY

GRAPHIC SCALE

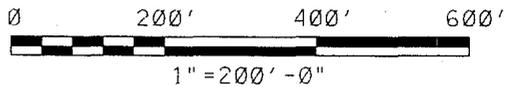


FIGURE 2-1
SURFACE WATER SAMPLE LOCATIONS
SITE 14
FENTRESS LANDFILL

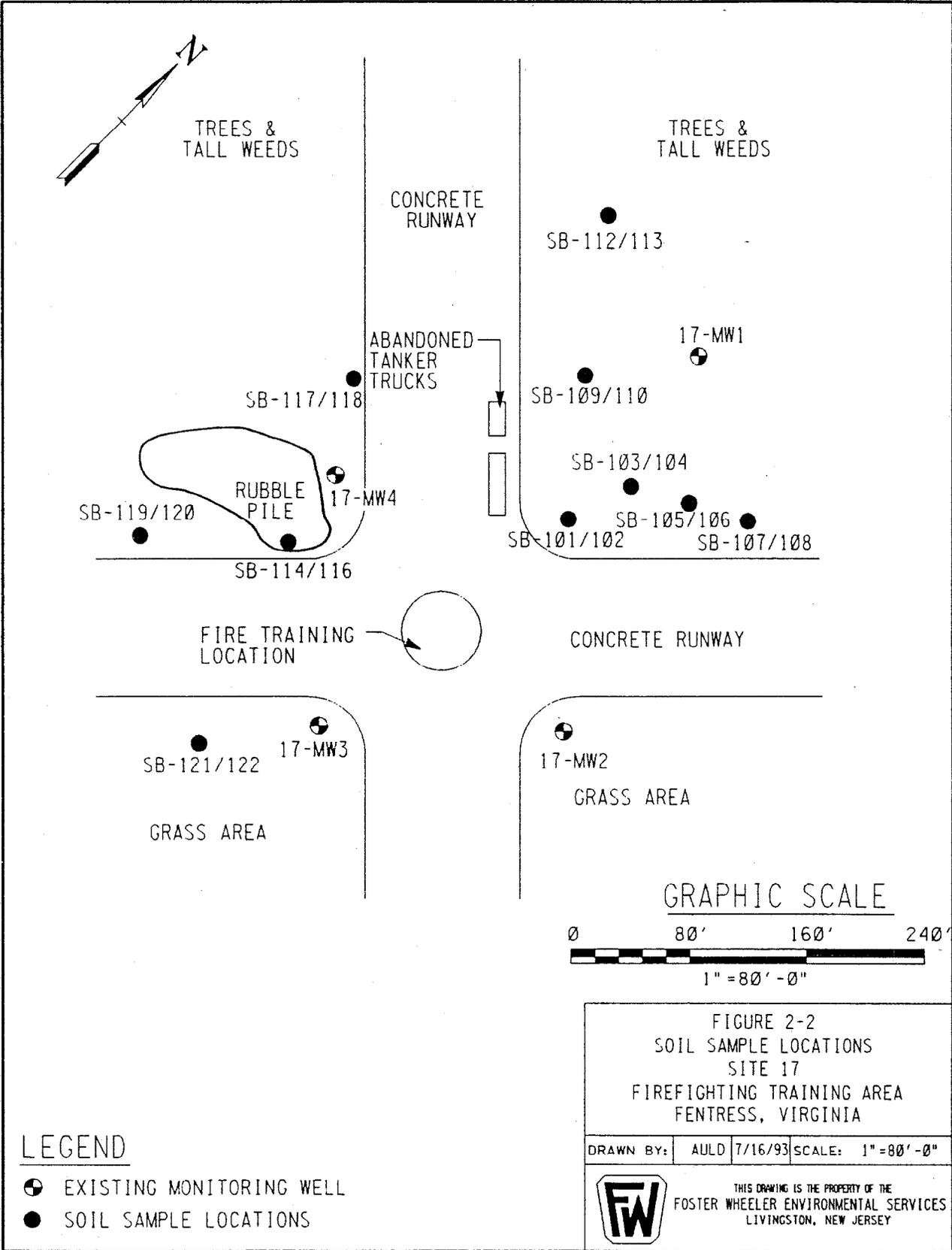
DRAWN BY: WAG 7/16/93 SCALE: 1"=200'-0"



THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

REV. A DATE: 07-15-93

esd145008:f1g2-1.dgn FENT5.REF



LEGEND

- ⊕ EXISTING MONITORING WELL
- SOIL SAMPLE LOCATIONS

FIGURE 2-2
SOIL SAMPLE LOCATIONS
SITE 17
FIREFIGHTING TRAINING AREA
FENTRESS, VIRGINIA

DRAWN BY:	AULD	7/16/93	SCALE: 1"=80'-0"
-----------	------	---------	------------------



THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

esd145008:fig2-2.dgn FENTS.REF

From oldest to youngest, the five principal sedimentary units are the Potomac Formation, unnamed Upper Cretaceous deposits, the Pamunkey Group, the Chesapeake Group, and the Columbia Group (Meng and Harsh, 1984).

The Columbia Group sediments and the uppermost portion of the Chesapeake Group or the Yorktown Aquifer, comprise one of the principal aquifers used locally for water supply. The Yorktown Aquifer is described as consisting of interbedded shell-rich layers of very fine to coarse sands, clayey sands and sandy clay (Sidulya, et al. 1981). Regionally, a layer of silt and clay separates the Yorktown Aquifer from the sediments of the Columbia Group. This clay layer has been designated as the Yorktown Confining Unit by Meng and Harsh (1984), because of its role in the regional hydrogeology. At Fentress, the Yorktown Confining Unit was identified as being a layer of olive-gray clay and silty clay 15-feet thick, which was encountered at approximately 30 feet below the land surface. The Yorktown Aquifer, was encountered at approximately 45 feet below the land surface, directly beneath the Yorktown Confining Unit. The aquifer consists primarily of gray, very fine to medium sand, and in some cases coarse sand and gravel.

The sediments of the Columbia Group comprise the surface materials and consist of interbedded gravels, sands, silts, and clays. In the vicinity of Fentress, the thickness of these sediments is less than 30 feet, and typically the depth to groundwater is relatively shallow, less than 10 feet below the land surface. As a result, an unconfined aquifer with a saturated thickness of approximately 20 feet is present in the sediments beneath NALF-Fentress.

The site lies wholly within the embayed section of the Atlantic Coastal Plain Province which includes coastal areas from eastern New York to Central North Carolina. The area is underlain by unconsolidated sediments that dip gently eastward to the sea and rest upon a basement-rock complex of Per-Cretaceous Age.

2.4 Hydrology

Site 14 is surrounded by drainage ditches. Site 17 is located in a low lying area.

Site 14 - Fentress Landfill

A Shallow drainage ditch surrounds Site 14. Surface water flows in the ditch in a northeast direction at a low flow rate. The drainage ditch splits before it reaches the landfill area, with one branch flowing around the site in an

easterly direction and the other branch flowing in a westerly direction. Both branches meet at a point on the northeastern end of the site before flowing north towards Old Blackwater Road.

Site 17 - Firefighting Training Area.

Surface water bodies at Site 17 consist of intermittent ponding on the north corner of the site. During wet periods, the north corner contains stagnant surface water runoff. Due to the poor drainage properties of the soils, ponding occurs for periods of one or more weeks.

2.5 Soils

Surficial soils at the facility are primarily organic rich (humic) material. The following provides a description of soils observed at each site.

Site 14-Fentress Landfill.

Most of the facility is covered by marsh. Soils at Site 14 are fine to coarse-grained sands with little interbedded clay and silt to a depth of 30 feet below the ground surface. Below a depth of 30 feet, soils have been described in prior reports as soft clays, light olive gray in color. Soils at a depth of 35 to 45 feet are very fine to medium-grained sands, light gray in color and loose. Deeper borings drilled at Site 14 indicate that soils beyond the depth of 45 feet are also sands, light greenish, wet and very loose up to a depth of 60 feet, CH₂M Hill, 1991.

Site 17-Firefighting Training Area.

Borings were drilled during previous investigations to a depth of four feet at Site 17. No deep borings were drilled at Site 17. Soils in this interval are described as dark brown in color at the surface, tending to light grayish-green, clay material at a depth of two to four feet.

2.6 Groundwater

Monitoring wells at Sites 14 and 17 were drilled during previous investigations and were initially sampled during March 1991. The following provides the physical groundwater characteristics measured at each site.

Site 14 - Fentress Landfill.

On-site field measurements collected by CH₂M Hill during March 1991 indicated that the shallow groundwater movement at Site 14 is towards the northeast. Deep wells installed at Site 14 indicate that deep groundwater movement in the Upper Yorktown Aquifer generally flows in a northeasterly direction.

Groundwater elevations collected on December 10 and 16, 1991 indicate that groundwater movement is predominantly in a northeast direction towards the drainage ditch located in this part of the site and Old Blackwater Road. The difference in elevation between the shallow and deep wells also indicate that the vertical hydraulic gradient is locally upward. Static water levels at Site 14 were recorded in the wells between 3.66 and 7.99 feet below grade.

Site 17 - Firefighting Training Area.

Results of previous water-level measurements taken in all four on-site wells indicate that the principal direction of shallow groundwater flow at this site is to the west with a shallow hydraulic gradient. Static water level measurements were collected on December 10 and 16, 1991. Static water levels collected from wells 17GW-01 through 17GW-04 indicate groundwater movement is primarily to the west. Static water levels range from 4.98 to 7.18 feet below top of casing.

2.7 Previous Investigations

Previous field investigations conducted at Sites 14 and 17 have included the installation of monitoring wells, and collection and analysis of groundwater and soil samples. The following reports of previous investigations are applicable to this report:

- "Initial Assessment Study of Naval Air Station, Oceana, Virginia Beach, Virginia, NEESA B-067," dated December 1984 and prepared by Naval Energy and Environmental Support Activity (NEESA), Port Hueneme, California;
- "Environmental Investigation of the Landfill and Firefighting Training Area Auxiliary Landing Field, Fentress, Chesapeake, Virginia, Draft Report," dated March 1991, and prepared by CH₂M Hill, Inc.; and,

- "Site Inspection Report, Site 14 - Fentress Landfill, Site 17 - Firefighting Training Area and Naval Auxiliary Landing Field," dated July 31, 1992, and prepared by Baker Environmental/Foster Wheeler Enviresponse.

Figures 2-1 and 2-2 present the sampling locations of the previous studies. Tables 2-1 through 2-13 present summaries of constituents detected at these locations. The constituents of concern for analysis were selected in order to provide a comprehensive screening of Sites 14 and 17. These constituents included: TCL VOCs, TAL Metals/Cyanide, Total Organic Carbon (TOC), Hexavalent Chromium, Chloride, Sulfate, and Alkalinity for Site 14; and, TCL VOCs, Total Petroleum Hydrocarbons, Lead, BNAs, and ignitability for Site 17.

The analytical results from previous investigations provided the basis for this investigation. The data was compared to U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) or Commonwealth of Virginia State Water Control Board Regulations (VAWCBR) water quality standards. The following sections provide a summary and interpretation of the analytical results for each site.

2.7.1 Soils

The following provides results of previous soil sampling at site 17.

Site 17 - Firefighting Training Area

Total volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and TPHs were detected at Site 17. These constituents were found in the north and west corners of the site. TPHs were detected above 100mg/kg in ten soil samples in the northerly corner and in three soil samples in the westerly corner. A summary of this data is presented in Table 2-12.

TABLE 2

SUMMARY OF VOLATILE ORGANIC COMPOUNDS
DETECTED IN GROUNDWATER
SITE 14 - LANDFILL
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
DECEMBER 16, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	14-MW1 MW1 Water ug/l	MW2 14-MW2 Water ug/l	14-MW2D MW2D Water ug/l	14-MW3 MW3 Water ug/l	14-MW4 MW4 Water ug/l	14-MW5 MW5 Water ug/l	14-MW6 MW6 Water ug/l	14-MW6C MW6C Water ug/l	14-MW6D MW6D Water ug/l	14-MW7 MW7 Water ug/l	14-MW7D MW7D Water ug/l	FIELD BLANK Water ug/l	TRIP BLANK Water ug/l
VOLATILE ORGANIC COMPOUNDS:													
Methylene Chloride		2 J										4 J	2 J
Acetone			47										
Carbon Disulfide			11										
TOTAL VOCs:		2	58									4	2

NOTES:

Blank indicates compound was not detected
ug/l indicates micrograms per liter
J indicates estimated concentration
D indicates sample taken from deep well

**SUMMARY OF TOTAL METALS AND CYANIDE
DETECTED IN GROUNDWATER
SITE 14 - LANDFILL
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
DECEMBER 16, 1991**

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	14-MW1 MW1 Water ug/l	14-MW1D (Lab Dup.) Water ug/l	14-MW2 MW2 Water ug/l	14-MW2D MW2D Water ug/l	14-MW3 MW3 Water ug/l	14-MW4 MW4 Water ug/l	14-MW5 MW5 Water ug/l	14-MW6 MW6 Water ug/l	14-MW6C (Dup.MW6D) Water ug/l	14-MW6D MW6D Water ug/l	14-MW7 MW7 Water ug/l	14-MW7D MW7D Water ug/l	FIELD BLANK Water ug/l
TOTAL METALS AND CYANIDE:													
Aluminum	1,440.00	1,507.50	177.00 B	187.00 B	702.00	281.00	179.00 B	4,280.00	778.00	854.00	4,860.00	219.00	177.00 B
Arsenic								9.60 B			5.40 B		
Barium	13.00 B	15.00 B	11.00 B	14.00 B	109.00 B	34.00 B	31.00 B	44.00 B	52.00 B	54.00 B	173.00 B	32.00 B	I
Beryllium	4.00 B	10.00 B	4.00 B	4.00 B	4.00 B	4.00 B	4.00 B	4.00 B	4.00 B	4.00 B	4.00 B	4.00 B	4.00 B
Cadmium					17.00								4.00 B
Calcium	1,860.00 B	748.00 B	2,090.00 B	3,240.00 B	43,100.00	18,500.00	1,200.00 B	5,280.00	24,500.00	24,300.00	13,100.00	10,000.00	55.00 B
Chromium	10.00	20.00 B	7.00 B	8.00 B	7.00 B	7.00 B	8.00 B	13.00	10.00	11.00	12.00	9.00 B	10.00
Copper	15.00 B	35.00 B	8.00 B	20.00 B	10.00 B	7.00 B	7.00 B	8.00 B	24.00 B	20.00 B	8.00 B	16.00 B	3.00 B
Iron	1,150.00	1,087.00	7,090.00	2,090.00	126,000.00	10,100.00	5,380.00	14,200.00	4,080.00	4,240.00	25,500.00	2,710.00	40.00 B
Lead	1.10 B			1.80 B			2.20 B	4.00	2.10 B	2.20 B	2.80 B	1.60 B	
Magnesium	1,100.00 B	1,052.50	1,540.00 B	1,530.00 B	19,100.00	10,600.00	1,360.00 B	2,760.00 B	3,030.00 B	3,060.00 B	4,890.00 B	1,970.00 B	
Manganese	29.00	25.00 B	99.00	68.00	849.00	222.00	49.00	49.00	120.00	115.00	259.00	118.00	1.00 B
Nickel		30.00 B				16.00 B	16.00 B	13.00 B			12.00 B		
Potassium				3,530.00 B	2,940.00 B				21,100.00	20,400.00	5,930.00		
Sodium			5,380.00	10,600.00	22,800.00	5,820.00	5,480.00	5,520.00	16,800.00	16,000.00	14,800.00	9,390.00	
Vanadium	4.00 B				25.00 B		6.00 B	11.00 B	4.00 B		11.00 B	4.00 B	5.00 B
Zinc	9.00 B	12.50 B	12.00 B	84.00	22.00	5.00 B	6.00 B	16.00 B	56.00	48.00	47.00	72.00	

NOTES:

- ug/l indicates micrograms per liter
- Dup. indicates duplicate sample
- B indicates compound was detected in the lab blank
- Blank indicates compound was not detected
- D indicates sample taken from deep well

OC-00137-03.13-10/01/93

TABLE 2-3

GROUNDWATER ANALYTICAL RESULTS
 INORGANIC ANALYTES
 SITE 14 - LANDFILL
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 DECEMBER 16, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	14MW1 MW1 Water ug/l	14MW2 MW2 Water ug/l	14MW2D MW2D Water ug/l	14MW3 MW3 Water ug/l	14MW4 MW4 Water ug/l	14MW5 MW5 Water ug/l	14MW6 MW6 Water ug/l	14MW6C (Dup.MW6D) Water ug/l	14MW6D MW6D Water ug/l	14MW7 MW7 Water ug/l	14MW7D MW7D Water ug/l	FIELD BLANK Water ug/l
INORGANIC ANALYTES USEPA METHOD SW846												
Alkalinity	3	7	38		6	6	5	133	135	12	55	
Chloride	4	6	7	19	9	5	5	10	7	17	11	
Hexavalent Chromium												
Sulfate	10	13		114	86	12	35	4	3	103	3	
Total Organic Carbon	3	4	3	2	1	1	2	4	4	3	4	

NOTES:

- ug/l indicates micrograms per liter
- Dup. indicates duplicate sample
- Blank indicates compound was not detected
- D indicates sample taken from deep well

OC-00137-03.13-10/01/93

TABLE 2-4

OC-00137-03.13-10/01/93

SUMMARY OF VOLATILE ORGANICS
 DETECTED IN SURFACE WATER
 SITE 14 - LANDFILL
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 DECEMBER 17, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	SW-101 14SW-101 Water ug/l	SW-102 14SW-102 Water ug/l	SW-103 14SW-103 Water ug/l	TRIP BLANK Water ug/l
VOLATILE ORGANIC COMPOUNDS:				
Methylene Chloride				2J
TOTAL VOCs:				2
TOTAL TICs:		20 J		

NOTES:

ug/l indicates micrograms per liter
 Blank indicates compound was not detected
 J indicates estimated concentration
 SW indicates Surface Water

TABLE 2-5

SURFACE WATER ANALYTICAL RESULTS
INORGANIC ANALYTES
SITE 14 - LANDFILL
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
DECEMBER 16, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	14-SW101 SW101 Water ug/l	14-SW102 SW102 Water ug/l	14-SW103 SW103 Water ug/l	FIELD BLANK Water ug/l
INORGANIC ANALYTES:				
Alkalinity	20	21	20	
Chloride	11	18	16	
Hexavalent Chromium				
Sulfate	39	37	36	
Total Organic Carbon	11	4	3	

NOTES:

Blank indicates compound was not detected
 ug/l indicates micrograms per liter

TABLE 2-6

SUMMARY OF VOLATILE ORGANIC COMPOUNDS
DETECTED IN GROUNDWATER
SITE 17 - FIREFIGHTING TRAINING AREA
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
DECEMBER 14 AND 16, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	17-MW1 MW1 Water ug/l	17-MW2 MW2 Water ug/l	17-MW3 MW3 Water ug/l	17-MW4 MW4 Water ug/l	17-MW5 (Dup. 17-MW4) Water ug/l	17-MW6 (Dup. 17-MW1) Water ug/l	TRIP BLANK Water ug/l
VOLATILE ORGANIC COMPOUNDS:							
Methylene Chloride	1 J	1 J	1 J	1 J	2 J	2 J	3 J
Acetone				11			
Tetrachloroethene	5J	5J	5J			5J	
Toluene	10			35	35	9	
Ethylbenzene	17			14	14	16	
Total Xylenes	68			90	92	61	
TOTAL VOLATILE ORGANIC COMPOUNDS:	101	6	6	151	143	93	3
TOTAL TICs:	185			214	206		

NOTES:

Blank indicates compound was not detected
ug/l indicates micrograms per liter
J indicates concentrations above detection level
Dup. indicates duplicate sample

OC-00137-03.13-10/01/93

TABLE 2-7

SUMMARY OF BASE/NEUTRAL SEMI-VOLATILE ORGANIC COMPOUNDS
 DETECTED IN GROUNDWATER
 SITE 17 - FIREFIGHTING TRAINING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 DECEMBER 14 AND 16, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	17-MW1 MW1 Water ug/l	17-MW2 MW2 Water ug/l	17-MW3 MW3 Water ug/l	17-MW4 MW4 Water ug/l	17-MW5 (Dup. 17-MW4) Water ug/l	17-MW6 (Dup. 17-MW1) Water ug/l	SBLK01 Blank Water ug/l
BASE/NEUTRAL ORGANIC COMPOUNDS							
Isophorone						1 J	
Naphthalene	14			59	47	22	
2-Methylnaphthalene				15 J	22	8 J	
Acenaphthylene						1 J	
2,6-Dinitrotoluene	2 J						
Fluorene						1 J	
bis (2-Ethylhexyl) Phthalate	2 J	6 J	5 J	16 J	3 J	2 J	
TOTAL BASE/NEUTRAL COMPOUNDS:	18	6	5	90	72	35	
TOTAL BASE/NEUTRAL ORGANIC COMPOUNDS (1):	16			74	69	33	
TOTAL TICs:	639J				539J	491J	

NOTE:

ug/l indicates micrograms per liter

J Indicates concentrations above the detection limit

Dup. indicates duplicate sample

(1) indicates total does not include Dimethyl Phthalate, Di-n-butylphthalate, and bis (2-Ethylhexyl) Phthalate

OC-00137-03.13-10/01/93

TABLE 2-8

GROUNDWATER ANALYTICAL RESULTS
 TOTAL PETROLEUM HYDROCARBONS
 SITE 17 - FIREFIGHTING TRAINING AREA
 NAVAL AUXILIARY LANDING FIELD
 FENTRESS, VIRGINIA
 DECEMBER 13, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	MW1 17-MW1 Water mg/l	MW2 17-MW2 Water mg/l	MW3 17-MW3 Water mg/l	MW4 17-MW4 Water mg/l	MW4 Dup. 17-MW5 Water mg/l	MW1 Dup. 17-MW6 Water mg/l	Virginia GW Standard mg/l	Virginia SW Standard mg/l	Federal MCL mg/l
TOTAL PETROLEUM HYDROCARBONS	2			1	2	2	1	-	-

NOTES:

- Mg/l indicates milligrams per liter
- Blank space indicates compound was not detected
- indicates that the standard does not exist
- Dup. indicates duplicate sample
- GW indicates Groundwater
- SW indicates Surface Water
- MCL indicates the Maximum Contaminant Level

OC-00137-03.13-10/01/93

TABLE 2-9

GROUNDWATER ANALYTICAL RESULTS
 TOTAL LEAD
 SITE 17 - FIREFIGHTING TRAINING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 DECEMBER 14 AND 16, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	17-MW1 MW1 Water ug/l	17-MW2 MW2 Water ug/l	17-MW3 MW3 Water ug/l	17-MW4 MW4 Water ug/l	17-MW5 (Dup. 17-MW4) Water ug/l	17-MW6 (Dup. 17-MW1) Water ug/l
TOTAL LEAD USEPA METHOD 239.2						
TOTAL LEAD	1.00B	4.30	9.70	1.40B	1.40B	1.30B

NOTES:

- ug/l indicates micrograms per liter
- B indicates analyte found in blank as well as the sample
- Blank space indicates compound was not detected
- Dup. indicates duplicate sample

TABLE 10

SUMMARY OF VOLATILE ORGANIC COMPOUNDS
 DETECTED IN SOIL
 SITE 17 - FIREFIGHTING TRAINING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 DECEMBER 13, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE DEPTH SAMPLE MATRIX UNITS	17SB-101 SB-101 0 - 2 ft. Soil ug/kg	17SB-102 SB-102 2 - 4 ft. Soil ug/kg	17SB-103 SB-103 0 - 2 ft. Soil ug/kg	17SB-104 SB-104 2 - 4 ft. Soil ug/kg	17SB-105 SB-105 0 - 2 ft. Soil ug/kg	17SB-106 SB-106 2 - 4 ft. Soil ug/kg	17SB-107 SB-107 0 - 2 ft. Soil ug/kg	17SB-108 SB-108 2 - 4 ft. Soil ug/kg	17SB-109 SB-109 0 - 2 ft. Soil ug/kg	17SB-110 SB-110 2 - 4 ft. Soil ug/kg	17SB-111 SB-111 (Dup. 17SB-110) Soil ug/kg
VOLATILE ORGANIC COMPOUNDS:											
Methylene Chloride		4 BJ	5 BJ		7 BJ	2 BJ				18 BJ	8 BJ
Acetone	2 J	49	43	35 J	26 J	18		7 J	17	75	74
2-Butanone											
Benzene		4 J		47						110	14 J
Toluene											31 J
Chlorobenzene		15	16	33							
Ethylbenzene		5 J	6 J	72						81	28 J
Total Xylenes		37	64	450	9 J	2 J				730	260
TOTAL VOCs:	2	114	134	637	42	22		7	17	1014	
TOTAL VOCs (1):		61	86	602	9	2					
TOTAL TICs:	2,062 J	7,310 J	24,700 J	1,319 J	849 J			860 J	18,600 J	10,940 J	4,530 J

NOTES:

- Blank indicates compound was not detected
- ug/kg indicates micrograms per kilogram
- B indicates compound detected in lab blank
- J indicates compound detected below the contract required quantification level
- Dup. indicates duplicate sample
- (1) indicates total does not include Methylene Chloride and Acetone

OC-00137-03.13-10/01/93

TABLE 2-10 (CONTINUED)

SUMMARY OF VOLATILE ORGANIC COMPOUNDS
 DETECTED IN SOIL
 SITE 17 - FIREFIGHTING TRAINING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 DECEMBER 13, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17SB-112 SB-112 0 - 2 ft. Soil ug/kg	17SB-113 SB-113 2 - 4 ft. Soil ug/kg	17SB-114 SB-114 0 - 2 ft. Soil ug/kg	17SB-115 SB-115 (Dup. 17SB-114) Soil ug/kg	17SB-116 SB-116 2 - 4 ft. Soil ug/kg	17SB-117 SB-117 0 - 2 ft. Soil ug/kg	17SB-118 SB-118 2 - 4 ft. Soil ug/kg	17SB-119 SB-119 0 - 2 ft. Soil ug/kg	17SB-120 SB-120 2 - 4 ft. Soil ug/kg	17SB-121 SB-121 0 - 2 ft. Soil ug/kg	17SB-122 SB-122 2 - 4 ft. Soil ug/kg
VOLATILE ORGANIC COMPOUNDS:											
Methylene Chloride						1 J	2 J				
Acetone	53 J	38 J			5 BJ	20 B	77		5 BJ		
2-Butanone						7 J	9 J				
Benzene											
Toluene											
Chlorobenzene											
Ethylbenzene		9 J									
Total Xylenes	30 J	56									
TOTAL VOCs:	83	103			5	28	88		5		
TOTAL VOCs (1):	30	65				7	9				
TOTAL TICs:	5,680 J					178 J					

NOTES:

- Blank indicates compound was not detected
- ug/kg indicates micrograms per kilogram
- B indicates compound detected in lab blank
- J indicates compound detected below the contract required quantification level
- Dup. indicates duplicate sample
- (1) indicates total does not include Methylene Chloride and Acetone

SUMMARY OF SEMI-VOLATILE ORGANIC COMPOUNDS
 DETECTED IN SOIL
 SITE 17 - FIREFIGHTING TRAINING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 DECEMBER 13, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE DEPTH SAMPLE MATRIX UNITS	17SB-101 SB-101 0 - 2 ft. Soil ug/kg	17SB-102 SB-102 2 - 4 ft. Soil ug/kg	17SB-103 SB-103 0 - 2 ft. Soil ug/kg	17SB-104 SB-104 2 - 4 ft. Soil ug/kg	17SB-105 SB-105 0 - 2 ft. Soil ug/kg	17SB-106 SB-106 2 - 4 ft. Soil ug/kg	17SB-107 SB-107 0 - 2 ft. Soil ug/kg	17SB-108 SB-108 2 - 4 ft. Soil ug/kg	17SB-109 SB-109 0 - 2 ft. Soil ug/kg	17SB-110 SB-110 2 - 4 ft. Soil ug/kg	17SB-111 SB-111 (Dup. 17SB-110) Soil ug/kg
SEMI-VOLATILE ORGANIC COMPOUNDS:											
2-Chlorophenol										72 J	
Isophorone											1400
Naphthalene		210 J	1,500 J	580	190 J	95 J				500	840 J
2-Methylnaphthalene		840	3,600	1,600	890	390 J				1,200	2,500
Dimethyl Phtalate											
Dibenzofuran		48 J	270 J	87 J						110 J	
2,4-Dinitrotoluene											
Fluorene										94 J	
Phenanthrene			180 J							26 J	
Di-n-Butylphthalate	130 BJ	130 BJ	220 BJ	160 BJ	130 BJ	98 BJ	110 BJ	95 BJ	120 BJ	120 BJ	140 BJ
Fluoranthene											
Pyrene										48 J	
bis (2-Ethylhexyl) Phthalate	670	4,000	790 J	160 J	2,200	380 J			2,000	8,700 B	16,000
Benzo (b) Fluoranthene											
TOTAL SEMI-VOLATILE COMPOUNDS:	800	5,288	6,560	2,587	3,160	963	110	95	2,120	10,800	20,880
TOTAL TICs:	50,650	89,300	312,700	81,000	39,400	25,750	13,040	9,100	39,820	66,000	254,200

NOTES:

ug/kg indicates micrograms per kilogram
 J indicates concentrations above the detection limit
 B indicates compound was detected in the lab blank
 Dup. indicates duplicate sample

OC-00137-03.13-10/01/93

TABLE (CONTINUED)

SUMMARY OF SEMI-VOLATILE ORGANIC COMPOUNDS
DETECTED IN SOIL
SITE 17 - FIREFIGHTING TRAINING AREA
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
DECEMBER 13, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE DEPTH SAMPLE MATRIX UNITS	17SB-112 SB-112 0 - 2 ft. Soil ug/kg	17SB-113 SB-113 2 - 4 ft. Soil ug/kg	17SB-114 SB-114 0 - 2 ft. Soil ug/kg	17SB-115 SB-115 (Dup. 17SB-114) Soil ug/kg	17SB-116 SB-116 2 - 4 ft. Soil ug/kg	17SB-117 SB-117 0 - 2 ft. Soil ug/kg	17SB-118 SB-118 2 - 4 ft. Soil ug/kg	17SB-119 SB-119 0 - 2 ft. Soil ug/kg	17SB-120 SB-120 2 - 4 ft. Soil ug/kg	17SB-121 SB-121 0 - 2 ft. Soil ug/kg	17SB-122 SB-122 2 - 4 ft. Soil ug/kg
SEMI-VOLATILE ORGANIC COMPOUNDS:											
2-Chlorophenol											
Isophorone											
Naphthalene		110 J									
2-Methylnaphthalene	690	510					84 J				
Dimethyl Phtalate											440 J
Dibenzofuran	130 J										
2,4-Dinitrotoluene	180 J										
Fluorene	140 J										
Phenanthrene	56 J										
Di-n-Butylphthalate	140 BJ	140 BJ	110 BJ	150 BJ	130 BJ	150 BJ	120 BJ	160 BJ	120 BJ		
Fluoranthene				68 J							
Pyrene				45 J							
bis (2-Ethylhexyl) Phthalate	120 J		98 J	140 J	200 J	100 J	130 J	46 J		290J	2,200
Benzo (b) Fluoranthene				54 J							
TOTAL SEMI-VOLATILE COMPOUNDS:	1,456	760	276	359	330	250	334	206	120	290	2,640
TOTAL TICs:	118,100	75,200	16,310	10,460	20,350	42,750	70,440	18,470	13,100	11,730	20,690

NOTES:

ug/kg indicates micrograms per kilogram
J indicates concentrations above the detection limit
B indicates compound was detected in the lab blank
Dup. indicates duplicate sample

TABLE 2-12

SOIL ANALYTICAL RESULTS
 TOTAL PETROLEUM HYDROCARBONS
 SITE 17 - FIREFIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 DECEMBER 13, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	SB-101 17SB-101 Soil mg/kg	SB-101 (Dup.17SB-101) Soil mg/kg	SB-102 17SB-102 Soil mg/kg	SB-103 17SB-103 Soil mg/kg	SB-104 17SB-104 Soil mg/kg	SB-105 17SB-105 Soil mg/kg	SB-106 17SB-106 Soil mg/kg	SB-107 17SB-107 Soil mg/kg	SB-108 17SB-108 Soil mg/kg	SB-109 17SB-109 Soil mg/kg	SB-110 17SB-110 Soil mg/kg
TOTAL PETROLEUM HYDROCARBONS	1,200	1,400	480	5,800	1,400	330	130			360	1,600

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	SB-111 17SB-111 Soil mg/kg	SB-112 17SB-112 Soil mg/kg	SB-113 17SB-113 Soil mg/kg	SB-114 17SB-114 Soil mg/kg	SB-115 17SB-115 Soil mg/kg	SB-116 17SB-116 Soil mg/kg	SB-117 17SB-117 Soil mg/kg	SB-118 17SB-118 Soil mg/kg	SB-119 17SB-119 Soil mg/kg	SB-120 17SB-120 Soil mg/kg	SB-121 17SB-121 Soil mg/kg	SB-122 17SB-122 Soil mg/kg
TOTAL PETROLEUM HYDROCARBONS	2,700	1,700	160	46	65	210	330	260	74		NA	NA

NOTES:

- mg/kg indicates milligrams per kilogram
- Blank space indicates compound was not detected
- Dup. indicates duplicate sample
- NA indicates Not Analyzed

OC-00137-03.13-10/01/93

TABLE 2-13

SOIL ANALYTICAL RESULTS
 TOTAL LEAD
 SITE 17 - FIREFIGHTING TRAINING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 DECEMBER 14 AND 16, 1991

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	SB-101 17SB-101 Soil mg/kg	SB-101 (Dup.17SB-101) Soil mg/kg	SB-102 17SB-102 Soil mg/kg	SB-103 17SB-103 Soil mg/kg	SB-104 17SB-104 Soil mg/kg	SB-105 17SB-105 Soil mg/kg	SB-106 17SB-106 Soil mg/kg	SB-107 17SB-107 Soil mg/kg	SB-108 17SB-108 Soil mg/kg	SB-109 17SB-109 Soil mg/kg	SB-110 17SB-110 Soil mg/kg	SB-111 17SB-111 Soil mg/kg
TOTAL LEAD	13.40 J	14.27 J	15.40 J	20.10 J	9.80 J	10.50 J	11.40 J	9.80 J	9.20 J	9.50 J	10.20 J	11.50 J

SAMPLE LOCATION SAMPLE NUMBER SAMPLE MATRIX UNITS	SB-112 17SB-112 Soil mg/kg	SB-113 17SB-113 Soil mg/kg	SB-114 17SB-114 Soil mg/kg	SB-115 17SB-115 Soil mg/kg	SB-116 17SB-116 Soil mg/kg	SB-117 17SB-117 Soil mg/kg	SB-118 17SB-118 Soil mg/kg	SB-119 17SB-119 Soil mg/kg	SB-120 17SB-120 Soil mg/kg	SB-121 17SB-121 Soil mg/kg	SB-122 17SB-122 Soil mg/kg
TOTAL LEAD	13.20 J	5.60 J	36.40 J	227.0 J	10.80 J	18.80 J	15.40 J	17.30 J	17.20 J	9.22	11.70

NOTES:

mg/kg indicates milligrams per kilogram
 Blank space indicates compound was not detected
 J indicates estimated concentration

OC-00137-03.13-10/01/93

2.7.2 Groundwater

The following presents the results of previous groundwater sampling at Sites 14 and 17.

Site 14 - Fentress Landfill.

Tables 2-1 through 2-5 provide a summary of the constituents detected in Site 14 groundwater. Based on these tables, groundwater at Site 14 did not contain any constituents of concern at or above USEPA MCLs.

Site 17 - Firefighting Training Area.

Previous groundwater sample results indicated the presence of (TPHs) and associated volatile organic compounds (VOCs) in the groundwater. However, these constituents were not detected at concentrations above USEPA MCLs.

2.7.3 Surface Water

The results of previous surface water sampling are presented in this section.

Site 14 - Fentress Landfill.

During previous investigations, surface water samples were collected from the perimeter drainage ditch at Site 14. Surface water sampling locations are presented in Figure 2-1. These samples were analyzed for VOCs and inorganic analyses, which include alkalinity, chloride, hexavalent chromium, sulfate, and total organic carbon (TOC). A summary of these results is presented in Tables 2-4 and 2-5.

One of the samples analyzed contained constituents of concern above USEPA MCLs. Sample SW-101 contained TOC at a concentration of 11.0 mg/l, which is above the federal MCL of 10.0 mg/l.

Site 17 - Firefighting Training Area.

As indicated in Section 2.4, surface water is only intermittently present at Site 17. Consequently, surface water samples were not collected at Site 17.

3.0 TECHNICAL APPROACH

The Supplemental SI was conducted to characterize both sites through the collection of environmental data. Constituents were targeted for both Sites 14 and 17 based on the previous site inspection.

A soil gas survey, which consisted of the collection and field analysis of 33 soil gas samples, was performed at Site 17 to screen for VOCs and total volatile hydrocarbons (TVHCs). Based on the soil gas survey, 25 soil borings were located and 49 soil samples were collected. Laboratory analysis was performed to confirm soil gas results and delineate the constituents of concern in the soils of Site 17. These field activities and methodologies performed under this Supplemental SI were based on the results of previous investigations listed in Section 1.2.5, and in accordance with the "Work Plan Addendum", dated April 26, 1993.

The FWEI field team conducted the field activities at NALF between April 26, 1993 and April 30, 1993. The following sections present the methods used to perform the Supplemental SI.

3.1 Groundwater Investigation - Site 14

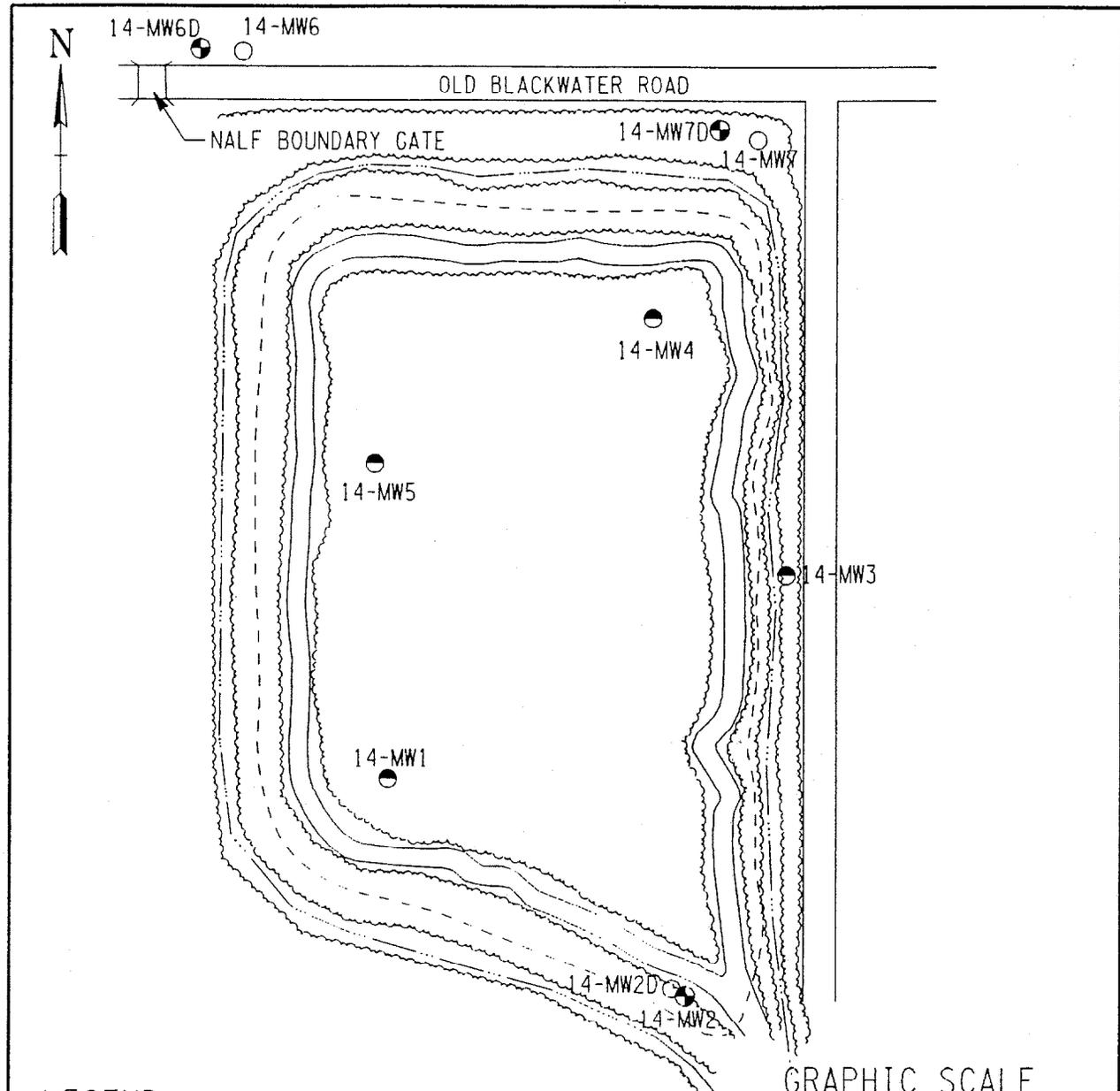
Groundwater sampling was conducted at Site 14 to confirm the groundwater quality data obtained during the first round of groundwater sampling and during previous investigations. The CTO-0040 Sampling Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) were used as references during implementation of the field activities. Sections 3.1.1 through 3.1.6 provide a description of groundwater sampling and analysis activity for this project.

3.1.1 Sample Locations and Frequency

A total of ten groundwater samples were collected from the existing monitoring wells at Site 14. Groundwater wells sampled at Site 14 included MW-1, MW-2, MW-2D, MW-3, MW-4, MW-5, MW-6, MW-6D, MW-7, and MW-7D. Figure 3-1 provides the location of the site 14 wells.

3.1.2 Sample Designation

A sample numbering system was used to identify each sample. This numbering system provides a tracking procedure to allow retrieval of information about a particular sample and to assure that each sample is uniquely



LEGEND

- CH2M HILL DEEP MONITORING WELL
- EXISTING SHALLOW MONITORING WELL
- CH2M HILL SHALLOW MONITORING WELL
- APPROXIMATE LANDFILL BOUNDRY
- - - DRAINAGE DITCH
- JEEP PATH WITHIN LANDFILL BOUNDARY
- ~ APPROXIMATE TREE LINE BOUNDARY

GRAPHIC SCALE

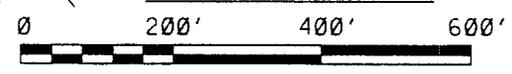


FIGURE 3-1
SITE MAP
SITE 14
FENTRESS LANDFILL

DRAWN BY:	WAG	7/16/93	SCALE: GRAPHIC
-----------	-----	---------	----------------

THIS DRAWING IS THE PROPERTY OF THE
 FOSTER WHEELER ENVIRONMENTAL SERVICES
 LIVINGSTON, NEW JERSEY

esd145008:fig3-1.dgn FENT5.REF

numbered. An example of the sample designation for each sample is as follows; Sample 14-GW-201 indicates the sample was collected from Site 14 groundwater (GW) during the second round (2) of sampling from monitoring well 1 (01). Table 3-1 summarizes sample designations for each sample.

3.1.3 Sampling Procedures and Equipment

Prior to sampling, a water level was taken from each monitoring well. These results are discussed in Section 4.1.1. Each monitoring well was purged until a minimum of three well volume of water was removed. Each well was purged by hand using a dedicated, disposable polyethylene bailer. Purged water was then containerized in contractor supplied 55-gallon drums which were stored near sampled drums. Prior to the collection of each sample, the field parameters from each well were recorded. These parameters, which include Ph, specific conductivity, and temperature are discussed in Section 4.1.1. Samples were collected using the dedicated, disposal polyethylene bailer from that well and placed in laboratory prepared sample containers. A number of QA/QC samples, which included a duplicate sample, a field blank, and an equipment rinsate were also collected and packed for shipment. Samples were shipped, accompanied by the appropriate chain-of-custody documentation, via Federal Express on the same day they were collected.

3.1.4 Sample Control

The purpose of sample control was to maintain the quality of samples during collection, transportation, and storage for analysis. Sample control for groundwater samples consisted of: 1) use of laboratory prepared containers for collection; 2) use of temperature blanks in each shipment cooler; 3) use of ice to maintain temperatures of samples; 4) use of individual packing to eliminate breakage during transportation; and, 5) use of chain-of-custody forms and seals to ensure QA/QC.

3.1.5 Laboratory Analysis

Groundwater samples collected from Site 14 were submitted to the laboratory for analysis of VOCs, metals, alkalinity, chloride, hexavalent chromium, sulfate, and total organic carbon. Table 3-1 also provides the total number of groundwater samples analytical parameters, and number of QA/QC samples.

TABLE 3-1

GROUNDWATER SAMPLES D
 TOTAL NUMBER OF AN,
 QA/QC SAMPLES WITH PARAMETERS
 SITE 14 - LANDFILL
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 27, 1993

OC-00137-03.13-10/01/93

MONITORING WELL NUMBER	SAMPLE DESIGNATION
MW-1	14-GW-201
MW-2	14-GW-202
MW-2D	14-GW-202D
MW-3	14-GW-203
MW-4	14-GW-204
MW-5	14-GW-205
MW-6	14-GW-206
MW-6D	14-GW-206D
MW-7	14-GW-207
MW-7D	14-GW-207D

ANALYTICAL PARAMETER	NUMBER AND TYPE OF SAMPLES PER PARAMETER					
	ANALYTICAL SAMPLES	QA/QC SAMPLES				
		SAMPLE DUPLICATES	TRIP BLANKS	TEMPERATURE BLANKS	FIELD BLANKS	EQUIPMENT RINSATES
TCL VOCs	10	1	2		1	1
TAL METALS	10	1			1	1
Wet Chem.	10	1			1	1
TOC	10	1			1	1
TEMPERATURE				2		

NOTES:

Wet Chem. denotes wet chemistry, which includes Hexavalent Chromium, Chloride, Sulfate, and Alkalinity
 TOC denotes Total Organic Carbon

The requirements for sample containers, preservation, analytical methods, quality control samples, and laboratory control are described in the CTO-0040 Quality Assurance Project Plan (QAPP), Sections 5.0, and 7.0 through 11.0 inclusive.

3.1.6 Contaminated Materials Handling

Liquids generated as a result of well purging and decontamination procedures were contained in contractor supplied 55-gallon drums and neatly stored near the sampled wells. A total of four drums were used at site 14 and appropriately labeled. Two drums are staged near 14-MW7 and the other two are staged near 14-MW2. Disposition of the drum contents and determination of which drums to sample for hazardous constituents shall be made by the Navy based on the analytical results provided in this report.

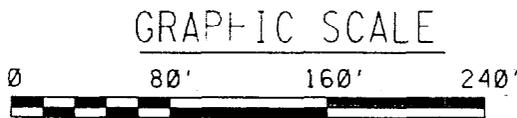
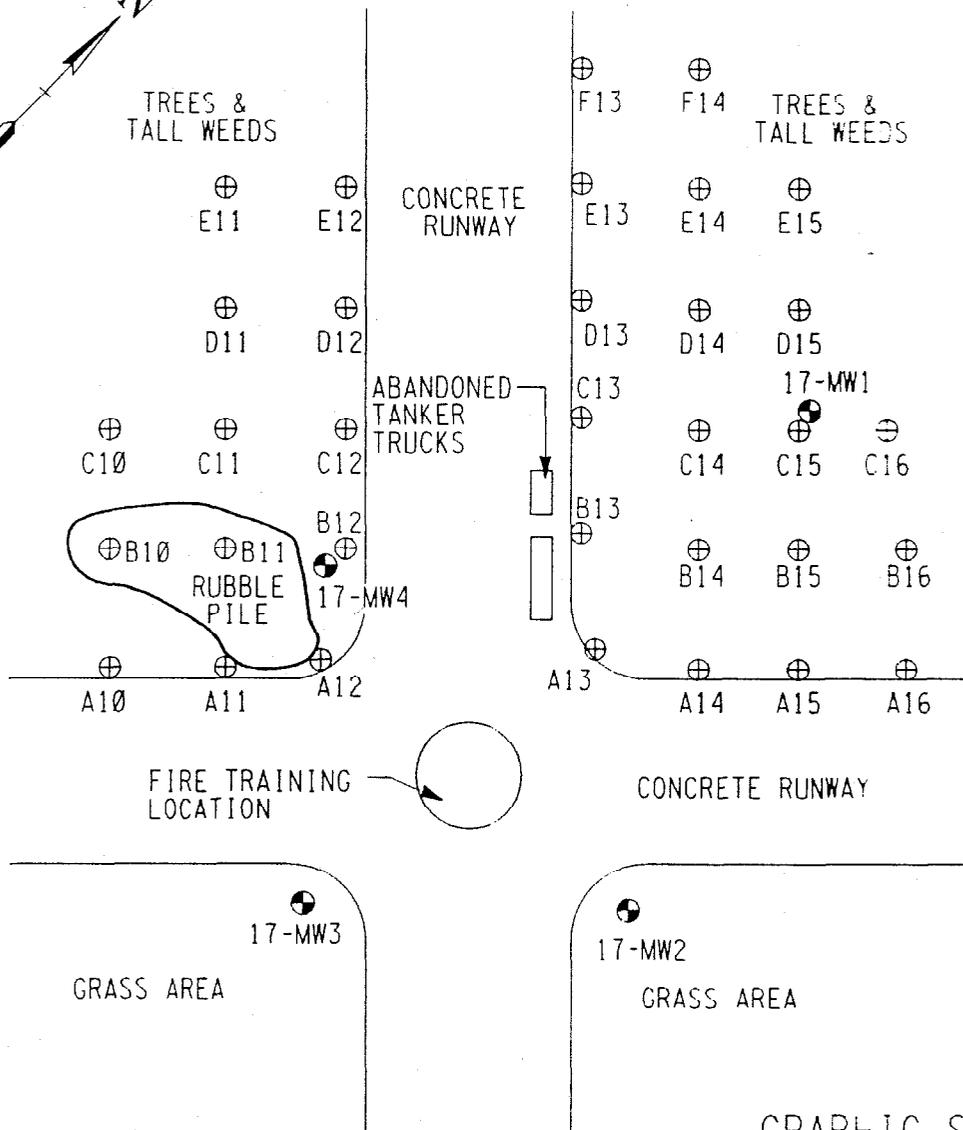
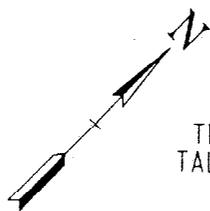
3.2 Soil Gas Survey - Site 17

The soil gas survey (SGS) was conducted at Site 17 by Target Environmental Services Inc. and supervised by FWEI. The soil gas samples collected were field analyzed for total volatile hydrocarbons (TVHC) and VOC constituents of concern. Methods used to conduct the SGS are discussed below and in the "Soil Gas Data" report, dated May 1993, provided as Appendix A.

3.2.1 Soil Gas Sample Collection and Locations

Based on previous analytical results, there are two areas of concern (AOC) at Site 17. The first AOC is located to the north of the fire training area. The second AOC is located to the west of the fire training area. Soil analytical results from previous investigations were utilized to establish grids for collecting soil gas samples as shown on Figure 3-2. Sampling nodes were established by measuring grid lines in perpendicular directions at 50-foot centers. A total of 33 soil gas samples were collected and field analyzed.

At the first AOC, soil gas samples were collected at 20 grid nodes. These nodes are labeled consecutively starting with A13, A14, A15, A16, B13, and so on. One subsurface soil gas sample was collected at either seven feet below grade or the shallow groundwater table, whichever was less.



LEGEND

- ⊕ SOIL GAS SAMPLE LOCATION
- MONITORING WELL

SOURCE: TARGET ENVIRONMENTAL, MAY 1993
SOIL GAS DATA HALF FENTRESS, VIRGINIA

FIGURE 3-2
SOIL GAS SAMPLE LOCATIONS
SITE 17
FIREFIGHTING TRAINING AREA
FENTRESS, VIRGINIA

DRAWN BY: AULD 7/16/93 SCALE: GRAPHIC



THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

REV. # DATE: 01-19-93

esd:45008:flg3-2.dgn FENT5.REF

At the west area, soil gas samples were collected at 13 grid nodes. These nodes are labeled consecutively starting with A10, A11, A12, B10, and so on. One subsurface soil gas sample was collected at either seven feet below grade or the shallow groundwater table, whichever was less.

3.2.2 Soil Gas Sample Field Analysis and QA/QC

A trailer equipped with a hydraulic ground penetrator and gas chromatograph (GC) was mobilized to the site. This trailer was used for collection and on-site analysis of soil gas samples for screening constituents of concern. The GC was equipped with a flame ionization detector (FID) and an electron capture detector (ECD). Steel soil gas probes were used for sampling and were decontaminated prior to arriving on-site. Each sample was collected in accordance with QA/QC procedures, which included the following:

- Analytical equipment was calibrated prior to the beginning of the work and after every five samples;
- The equipment was tested using system blanks prior to beginning of the work;
- Steel probes were properly decontaminated for each sample;
- An end plug for each probe was used to eliminate cross-contamination or interferences resulting from soils at depths other than sample collection depth;
- New, sterile silicon tubing was used for each sample; and,
- New, sterile syringes with steel needles and glass vials were used for the collection of each sample.

Each glass syringe, containing the soil gas sample, was sealed by airtight gaskets and submitted for analysis. Analysis was completed on-site by use of the trailer equipped GC.

Sample depths were obtained by measuring penetration depths of standard five or seven foot probe lengths. The actual depths for each soil gas sample is provided in Table 3-2. Once the desired depth was reached, the probe was purged by vacuum to remove air in the probe not representative of the sample point. Once purged, new silicon tubing was attached to the vacuum source inducing a constant gas flow from the sample point. The soil gas sample was collected by withdrawing soil gas through the syringe needle which was inserted into the silicon tubing.

Each soil gas sample was analyzed by introducing a measured volume of sample gas from the syringe into the GC. The GC was run for a minimum of ten minutes per sample. To improve the quantification of targeted constituents when high concentrations were detected, the sample was re-analyzed in the precise same manner using a smaller volume of sample gas.

TABLE 3-2

OC-00137-03.13-10/01/93

SOIL GAS SAMPLING
SITE 17 - FIREFIGHTING AREA
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
APRIL 26-28, 1993

SAMPLE	DEPTH (ft)
A-10	5
A-11	5
A-12	5
A-13	5
A-14	6
A-15	7
A-16	8
B-10	4
B-11	4
B-12	5
B-13	5
B-14	4
B-15	4
B-16	4
C-10	4
C-11	4
C-12	5

SAMPLE	DEPTH (ft)
C-13	4
C-14	4
C-15	4
C-16	4
D-11	4
D-12	5
D-13	5
D-14	4
D-15	4
E-11	4
E-12	5
E-13	5
E-14	4
E-15	4
F-13	5
F-14	4

3.3 Soil Borings - Site 17

A soil boring program was conducted at Site 17 to confirm soil gas results and determine the extent of the constituents of concern. Soil samples were collected continuously using a drill rig and hollow stem augers with 2-inch by two foot long split spoon samplers. The CTO-040 Sampling Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) were used as references during implementation of the field activities. Sections 3.3.1 through 3.3.6 provide a description of soil sampling and analysis activity for this project.

3.3.1 Sample Locations

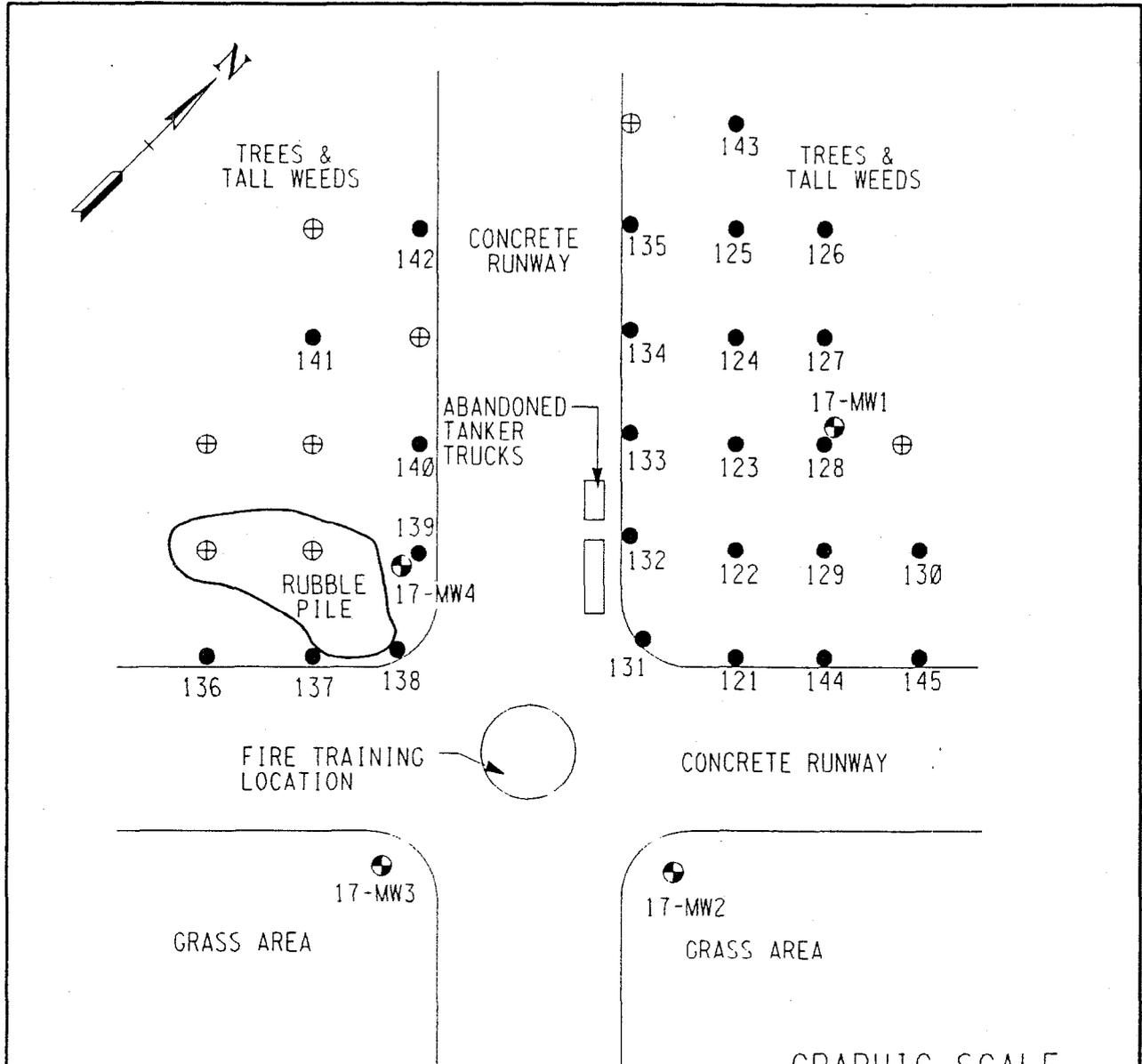
Soil sample locations were determined by the project geologist in the field based on the location of elevated soil gas sample results. Figure 3-3 provides the soil boring locations. At each boring location, continuous two foot split spoons were advanced to a depth of seven feet below grade or the groundwater table, whichever was less. Table 3-3 provides actual depths for each soil boring. Two samples from each boring location, with the exception of sample 17-SB-121, were submitted for laboratory analysis for a total of 49 samples.

The head space of each split spoon was screened prior to opening with an Hnu photoionization detection meter to measure potential volatile constituents. One soil sample was submitted for laboratory analysis from the split spoon interval immediately above groundwater. The other soil sample was submitted for laboratory analysis from the split spoon containing the highest Hnu reading.

The sample borings were logged by the site geologist. Copies of these boring logs can be found in Appendix B.

3.3.2 Sample Designation

A sample numbering system was used to identify each sample. The numbering system used provides a tracking procedure to allow retrieval of information about a particular sample and to assure that each sample is uniquely numbered. An example of the sample designation for each sample is as follows; Sample 17-SB-121 indicates the sample was collected from Site 17 soil boring (SB) at boring location number 121.



LEGEND

- SOIL BORING LOCATION
- ⊕ SOIL GAS SAMPLE NODE
- ⊗ MONITORING WELL

SOURCE: TARGET ENVIRONMENTAL, MAY 1993
SOIL GAS DATA NALF FENTRESS, VIRGINIA

FIGURE 3-3
SOIL BORING LOCATIONS
SITE 17
FIREFIGHTING TRAINING AREA
FENTRESS, VIRGINIA

DRAWN BY: AULD 7/16/93 SCALE: GRAPHIC



THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

REV. # DATE: 07-19-93

esd145008:fig3-3.dgn FENT5.REF

TABLE 3-3

OC-00137-03.13-10/01/93

SOIL BORING DE
SITE 17 - FIREFIGHTING AREA
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
APRIL 26-28, 1993

BORING NUMBER	DEPTH (ft)
17-SB-121	6
17-SB-122	6
17-SB-123	4
17-SB-124	4
17-SB-125	4
17-SB-126	4
17-SB-127	4
17-SB-128	4
17-SB-129	4
17-SB-130	4
17-SB-131	4
17-SB-132	4
17-SB-133	4

BORING NUMBER	DEPTH (ft)
17-SB-134	4
17-SB-135	4
17-SB-136	4
17-SB-137	4
17-SB-138	4
17-SB-139	4
17-SB-140	4
17-SB-141	4
17-SB-142	4
17-SB-143	4
17-SB-144	4
17-SB-145	4

3.3.3 Sampling Procedures and Equipment

Each sample was collected using stainless steel split-spoon samplers and dedicated stainless steel spoons. The split spoons were decontaminated by the driller between each sample. Samples were contained in laboratory prepared sample containers and packed for shipment. Samples were shipped, accompanied by the appropriate chain-of-custody documentation, via Federal Express on the same day they were collected.

3.3.4 Sample Control

The purpose of sample control was to maintain the quality of samples during collection, transportation, and storage for analysis. Sample control for soil samples consisted of: 1) use of laboratory prepared containers for collection; 2) use of temperature blanks in each shipment cooler; 3) use of ice to maintain temperatures of samples; 4) use of individual packing to eliminate breakage during transportation; and, 5) use of chain-of-custody forms and seals to ensure QA/QC.

3.3.5 Laboratory Analysis

All of the 49 soil samples were submitted to the laboratory for analysis of TPH and ethylbenzene, and xylenes (BTEX) compounds. Additionally, 25 of these samples were analyzed for Target Compound List (TCL) VOCs, TCL semi-volatile organic compounds (SVOCs), and lead.

Table 3-4 provides the total number of soil samples, analytical parameters, and QA/QC samples. The requirements for sample containers, preservation, analytical methods, and QA/QC samples. The requirements for sample methods, preservation, analytical methods, QA/QC samples, and laboratory control are described in the CTO-0040 QAPP, Sections 5.0 & 7.0 through 11.0 inclusive.

3.3.6 Contaminated Materials Handling

Potentially contaminated soils were not generated during the sampling event because drill cuttings were not recoverable. Liquids generated as a result of decontamination procedures were contained in one contractor supplied 55-gallon drums and stored on the concrete near the sampling abandoned tanker trucks. Disposition of the drum and its contents will be determined by the Navy based on the results provided in this report.

TABLE 3-4

TOTAL NUMBER OF ANALYTICAL AND QA/QC
 SAMPLES WITH PARAMETERS
 SITE 17 - FIREFIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 26-28, 1993

ANALYTICAL PARAMETER	NUMBER AND TYPE OF SAMPLES PER PARAMETER						
	ANALYTICAL SAMPLES	QA/QC SAMPLES					
		SAMPLE DUPLICATES	MS/MSDs	TRIP BLANKS	TEMPERATURE BLANKS	FIELD BLANKS	EQUIPMENT RINSATES
TPH	49	10	10				
BTEX	49	10	10				
TCL VOCs	25	5	5	3		2	1
TCL SVOCs	25	5	5				
LEAD	25	5	5				
TEMPERATURE					3		

4.0 RESULTS OF SUPPLEMENTAL SI

Results of the Supplemental SI consist of the following:

- Physical and analytical data for groundwater at Site 14;
- Soil gas field analytical data for soils at Site 17; and,
- Soil analytical data for soils at Site 17.

The following sections provide a detailed presentation of these results.

4.1 Site 14 - Fentress Landfill

4.1.1 Physical Data - Groundwater

Physical data collected from the ten groundwater monitoring wells at Site 14 consists of water level readings and pH, specific conductance, and temperature measurements. Table 4-1 provides static water levels for each well. Figure 4-1 provides a site water table contour map based on these water levels. As indicated on Figure 4-1, groundwater flow is to the northeast in both the shallow and deep zones. The potentiometric head in monitoring wells screened in the deeper zone is greater than the head in the monitoring wells screened in the shallow zone. This indicates an upward gradient exists on-site.

The pH, specific conductance, and temperature levels recorded during well sampling are fairly consistent throughout all the wells. This indicates that these conditions remain constant within the units screened. Table 4-2 presents these results.

4.1.2 Analytical Data - Groundwater

Analytical data was compared to the USEPA MCLs to determine whether or not constituents of concern exceed these levels. Table 4-3 provides a list of the USEPA MCLs applicable to this project. For constituents of concern not listed on the USEPA MCI list, the VA-WCBR water quality standards were used. Table 4-4 provides a list of the VA-WCBR standards applicable to this project.

Groundwater samples from the ten monitoring wells at Site 14 were analyzed for VOC, TAL metals, alkalinity, chloride, hexavalent chromium, sulfate and total organic carbon (TOC). Samples were collected from seven shallow wells, through MW-7, at depths ranging from 17 to 28 feet. Samples were collected from three deep wells, MW-

TABLE 4-1

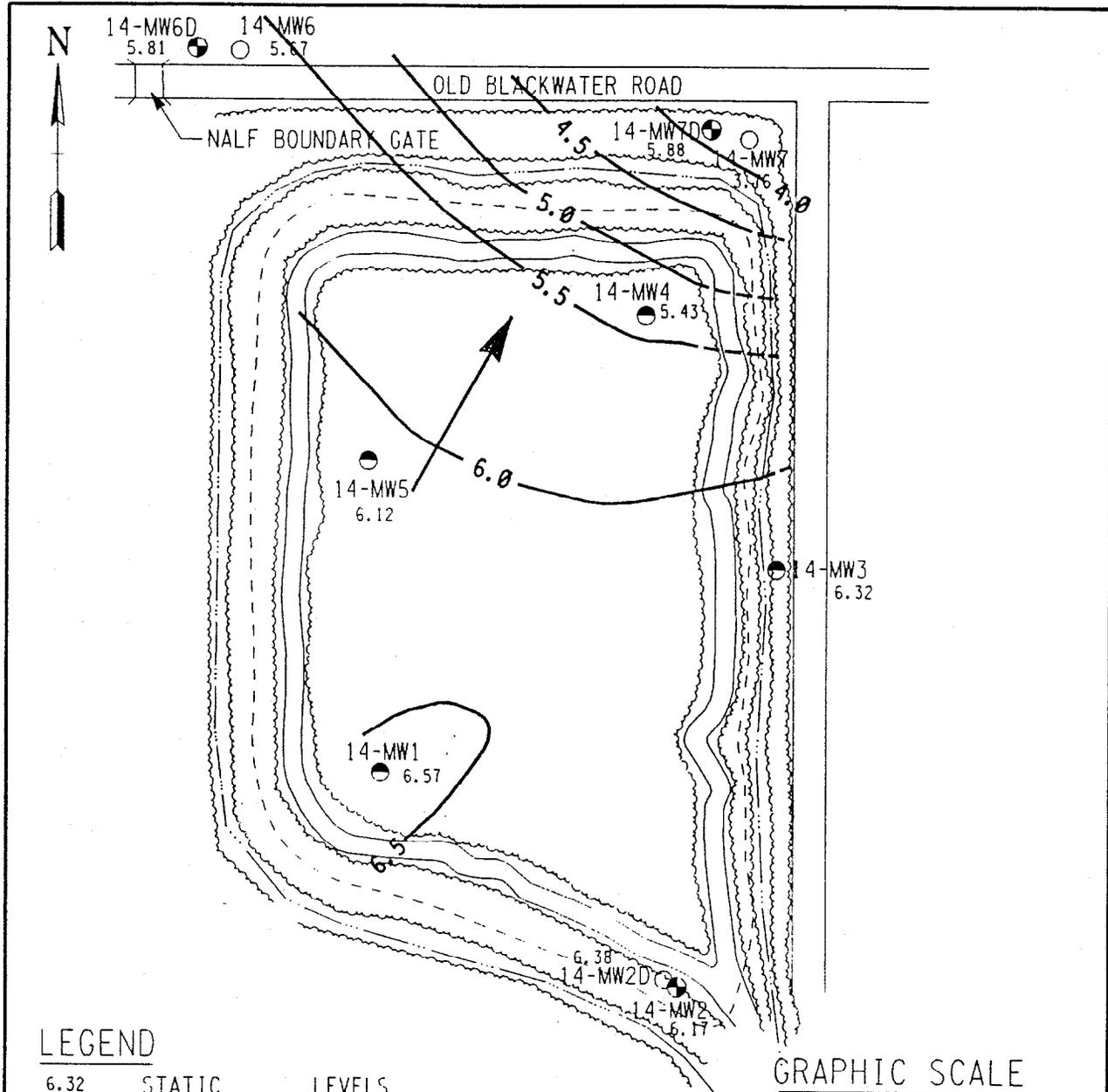
OC-00137-03.13-10/01/93

GROUNDWATER ELEV
SITE 14 - LANDFILL
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
APRIL 26 AND 29, 1993

WELL DESIGNATION	DATE OF MEASUREMENT	MEASURING POINT (FT. ABOVE MSL)	DEPTH TO WATER (FT. BELOW MP)	WATER LEVEL ELEVATION (FT. ABOVE MSL)
MW-1	4/26/93	13.37	6.81	6.56
	4/29/93		6.80	6.57
MW-2	4/26/93	12.49	6.32	6.17
	4/29/93		6.32	6.17
MW-2D	4/26/93	13.27	6.91	6.36
	4/29/93		6.89	6.38
MW-3	4/26/93	10.82	4.50	6.32
	4/29/93		4.50	6.32
MW-4	4/26/93	10.48	5.03	5.45
	4/29/93		5.05	5.43
MW-5	4/26/93	11.75	5.59	6.16
	4/29/93		5.63	6.12
MW-6	4/26/93	12.09	6.41	5.68
	4/29/93		6.42	5.67
MW-6D	4/26/93	12.44	6.61	5.83
	4/29/93		6.63	5.81
MW-7	4/26/93	9.31	5.54	3.77
	4/29/93		5.55	3.76
MW-7D	4/26/93	8.96	3.08	5.88
	4/29/93		3.08	5.88

NOTES:

- MSL indicates Mean Sea Level
- MP indicates Measuring Point
- D after well number indicates deep well
- Measuring Points are constant for each well



LEGEND

- | | | |
|------|-----------------------------|--------|
| 6.32 | STATIC | LEVELS |
| ● | CH2M H. P MONITORING WELL | |
| ● | EXISTIN LOW MONITORING WELL | |
| ○ | CH2M HI LOW MONITORING WELL | |
| --- | APPROXI. LANDFILL BOUNDRY | |
| --- | DRAINAGE | |
| --- | JEEP PA IN LANDFILL BOUNDRY | |
| --- | APPROXIM EE LINE BOUNDARY | |
| 6.5 | STATIC W LEVEL ABOVE MSL | |
| → | APPROXIM GROUNDWATER FLOW | |

GRAPHIC SCALE



FIGURE 4-1
 CONTOURED STATIC WATER LEVELS
 IN MONITORING WELLS ABOVE MSL
 SITE 14
 FENTRESS LANDFILL

DRAWN BY: WAG 7/16/93 SCALE: GRAPHIC

FW
 THIS DRAWING IS THE PROPERTY OF THE
 FOSTER WHEELER ENVIRONMENTAL SERVICES
 LIVINGSTON, NEW JERSEY

esd145008: f1g4-1.dgn FENT5.REF

TABLE 4-2

**GROUNDWATER FIELD PARAMETERS
 SITE 14 - LANDFILL
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 27, 1993**

FIELD PARAMETER	GROUNDWATER MONITORING WELL NUMBER									
	MW-1	MW-2	MW-2D	MW-3	MW-4	MW-5	MW-6	MW-6D	MW-7	MW-7D
pH	6.76	7.21	6.94	4.7	5.3	5.64	4.3	5.45	5.82	6.51
Specific Conductance (umhos/cm)	1,180	3,700	1,180	1,830	1,400	1,240	1,150	1,160	1,120	1,520
Temperature (°F)	54.6	54.7	54.3	57.3	56.6	54.7	55.0	55.6	56.3	56.8

NOTES:

D after the well number indicates a deep well

OC-00137-03.13-10/01/93

TABLE 4-3

OC-00137-03.13-10/01/93

USEPA MAXIMUM CONTAMINANT
OF CONSTITUENTS OF CONCERN
DETECTED IN GROUNDWATER AT
SITE 14 - LANDFILL
SITE 17 - FIRE FIGHTING TRAINING AREA
NAVAL AUXILIARY LANDING FIELD
FENTRESS, VIRGINIA

CHEMICAL	USEPA MCL ¹ mg/L
Methylene Chloride	0.005
Aluminum	.05 to .02 ²
Arsenic	0.05
Barium	5
Iron	0.3 ²
Lead	0.005
Manganese	0.05 ²
Sodium	NAS
Thallium	0.002
Chloride	250 ²
Sulfate	250 ²
Alkalinity	NAS
Total Organic Carbon	NAS

Notes:

NAS indicates that there is currently No
Applicable Standard.

¹ MCL stands for Maximum Contaminant Level.

² Secondary Maximum Contaminant Level.

TABLE 4-4

OC-00137-03.13-10/01/93

VIRGINIA STATE
 WATER CONTROL BOARD REGULATIONS
 WATER QUALITY STANDARDS (VA-WCBB)
 OF CONSTITUENTS OF CONCERN
 DETECTED IN GROUNDWATER AT
 SITE 14 - LANDFILL
 SITE 17 - FIRE FIGHTING TRAINING AREA
 NAVAL AUXILIARY LANDING FIELD
 FENTRESS, VIRGINIA

CHEMICAL	VA-WCBB	ug/L
Methylene Chloride	NAS	
Aluminum	NAS	
Arsenic	50	
Barium	1000	
Iron	300	¹
Lead	50	
Manganese	50	¹
Sodium	100000	¹
Thallium	NAS	
Chloride	50000	¹
Sulfate	50000	¹
Alkalinity	30000 to 500000	¹
Total Organic Carbon	10000	¹

Notes:

NAS indicates that there is currently No Applicable Standard.

¹ Virginia State groundwater standard applicable to the Coastal Plain physiographic province.

2D, MW-6D, and MW-7D, at depths of 47, 55 and 56 feet, respectively at Site 14 are summarized in Tables 4-5, 4-6, and 4-7 and presented in detail in Appendix D.

Data qualifiers were attached to the data during the data validation. The qualifier symbol used is J.

The data qualifier indicated by the letter "J" designates an estimated value. The qualifier means that the analyte is present, but the reported value may not be precise. According to data validation guidelines there are several criteria for qualifying reported data as estimated which include: a compound being found in blanks; poor surrogate recoveries; compounds detected and reported below the Contract Required Detection Limit (CRDL); poor agreement of results between duplicate analysis; and, all tentatively identified compounds (TICs).

VOCs were not detected in the groundwater above MCLs. Methylene chloride was detected in the MW-3 duplicate sample at a concentration of 4J ug/l. No other VOCs were detected.

Twenty-three metals were analyzed and none were detected in the groundwater above primary MCLs. Aluminum was detected in one of ten samples at a detected concentration of 691 ug/L in 14 GW-207. This concentration is above the nonenforceable secondary MCL of 50 ug/l. This concentration is below aluminum concentrations reported during the first round of groundwater sampling at Site 14.

Manganese was detected in all 10 samples. The detected concentrations ranged from 55.7 ug/l to 452.0 ug/L. The highest concentration was detected in 14-GW-211. All ten of these concentrations are above the proposed, nonenforceable secondary MCL of 50 ug/L. These concentrations are either slightly below or slightly above manganese concentrations reported during the first round of groundwater sampling at Site 14.

Thallium was detected in 4 of 10 samples. The detected concentrations ranged from 0.8 ug/L to 3.5 ug/L. The highest concentration was detected in 14-GW-203. Three of these concentrations are above the proposed MCL of 2 ug/L. Thallium was also detected in the rinsate sample at 0.8 ug/l. Thallium was not detected during the first round of groundwater sampling at Site 14. Thallium is a heavy metal that is often found at concentrations within the range of magnitude detected at Site 14 in some beach sands.

Alkalinity was detected in nine of the ten samples. The detected concentrations ranged from 5.0 mg/L to 100 mg/L. The highest concentration was detected in 14-GW-206D. These concentrations are within or below the maximum allowable range on concentration for alkalinity set by the VA-WCBB of between 30 and 500 mg/L. Alkalinity was detected at 135 mg/l in this well during the first round of groundwater sampling at Site 14.

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
 TCL VOLATILE ORGANIC COMPOUNDS
 SITE 14 - LANDFILL
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 27, 1993

SAMPLE NUMBER GROUNDWATER MONITORING WELL LOCATION SAMPLE MATRIX UNITS	14-GW-201 MW-1 Water µg/L	14-GW-202 MW-2 Water µg/L	14-GW-202D MW-2D Water µg/L	14-GW-203 MW-3 Water µg/L	14-GW-211 MW-3 Duplicate Water µg/L	14-GW-204 MW-4 Water µg/L	FIELD BLANK-1 Water µg/L	TRIP BLANK - 1 Water µg/L
TCL VOLATILE ORGANIC COMPOUNDS: METHOD 8240 Methylene Chloride					4 J			

SAMPLE NUMBER GROUNDWATER MONITORING WELL LOCATION SAMPLE MATRIX UNITS	14-GW-205 MW-5 Water µg/L	14-GW-206 MW-6 Water µg/L	14-GW-206-ER MW-6 Water µg/L	14-GW-206D MW-6D Water µg/L	14-GW-207 MW-7 Water µg/L	14-GW-207D MW-7D Water µg/L	TRIP BLANK - 2 Water µg/L	USEPA GROUNDWATER Water µg/L	VIRGINIA STATE GROUNDWATER Water µg/L
TCL VOLATILE ORGANIC COMPOUNDS: METHOD 8240 Methylene Chloride								5	NAS

NOTES:

Blank indicates compound Not Detected
 µg/L indicates micrograms per liter.
 D after well number indicates deep well
 ER indicates Equipment Rinsate sample
 J indicates analyte present. Reported value may not be accurate or precise.
 NAS indicates that there is currently No Applicable Standard

**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
TAL METALS
SITE 14 - LANDFILL
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
APRIL 27, 1993**

SAMPLE NUMBER GROUNDWATER MONITORING WELL LOCATION SAMPLE MATRIX UNITS	14-GW-201 MW-1 Water µg/L	14-GW-202 MW-2 Water µg/L	14-GW-202D MW-2D Water µg/L	14-GW-203 MW-3 Water µg/L	14-GW-211 MW-3 Duplicate Water µg/L	14-GW-204 MW-4 Water µg/L	FIELD BLANK - 1 Water µg/L
TAL METALS:							
Aluminum							
Arsenic		0.5					
Barium					62.5		
Calcium	2000.0	2590.0	3420.0	24200.0	25500.0	22200.0	
Iron	121.0	2360.0	3420.0	27900.0	38000.0	8330.0	
Lead							1.0
Magnesium	742.0	1840.0	1850.0	10900.0	11500.0	12300.0	
Manganese		110.0	78.5	428.0	452.0	185.0	
Potassium		593.0	1200.0	1520.0	1810.0	1290.0	
Sodium	3230.0	5770.0	9230.0	11800.0	12600.0	6160.0	
Thallium	0.8			3.5 J	3.0 J		

SAMPLE NUMBER GROUNDWATER MONITORING WELL LOCATION SAMPLE MATRIX UNITS	14-GW-205 MW-5 Water µg/L	14-GW-206 MW-6 Water µg/L	14-GW-206-ER MW-6 Water µg/L	14-GW-206D MW-6D Water µg/L	14-GW-207 MW-7 Water µg/L	14-GW-207D MW-7D Water µg/L	USEPA GROUNDWATER Water µg/L	VIRGINIA STATE GROUNDWATER Water µg/L
TAL METALS:								
Aluminum								
Arsenic	0.6	3.0					50 to 20 ²	NAS
Barium					691.0		50	50
Calcium	1640.0	7020.0	91.3	17400.0	15600.0	10600.0	5,000	
Iron	1480.0	1580.0	8.2	2020.0	13600.0	5670.0	NAS	
Lead							300 ²	
Magnesium	1690.0	5400.0		1440.0	4550.0	2130.0	5	
Manganese	55.7	107.0		144.0	221.0	154.0	NAS	
Potassium	608.0	778.0		14400.0	4950.0	1190.0	50 ²	
Sodium	5420.0	9750.0	185.0	11900.0	15400.0	11100.0	NAS	1
Thallium		2.2 J	0.8				2	

NOTES:

Blank indicates compound Not Detected

µg/L indicates micrograms per liter.

D after well number indicates deep well.

ER indicates equipment rinse sample.

J indicates analyte present. Reported value may not be accurate or precise.

NAS indicates that there is currently No Applicable Standard

¹ indicates Virginia State groundwater standard applicable to the Coastal Plain physiographic province

² indicates a Secondary Maximum Contaminant Level

OC-00137-03.13-10/01/93

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
GENERAL CHEMISTRY
SITE 14 - LANDFILL
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
APRIL 27, 1993

SAMPLE NUMBER GROUNDWATER MONITORING WELL LOCATION SAMPLE MATRIX UNITS	14-GW-201 MW-1 Water mg/L	14-GW-202 MW-2 Water mg/L	14-GW-202D MW-2D Water mg/L	14-GW-203 MW-3 Water mg/L	14-GW-211 MW-3 Duplicate Water mg/L	14-GW-204 MW-4 Water mg/L	FIELD BLANK - 1 Water mg/L
Chloride	4	4	8	17	17	13	
Sulfate	6	13		120	120	110	1
Alkalinity		11	27	8	15	11	
Total Organic Carbon	2				1		

SAMPLE NUMBER GROUNDWATER MONITORING WELL LOCATION SAMPLE MATRIX UNITS	14-GW-205 MW-5 Water mg/L	14-GW-206 MW-6 Water mg/L	14-GW-206-ER MW-6 Water mg/L	14-GW-206D MW-6D Water mg/L	14-GW-207 MW-7 Water mg/L	14-GW-207D MW-7D Water mg/L	USEPA GROUNDWATER Water mg/L	VIRGINIA STATE GROUNDWATER Water mg/L
Chloride	7	10		8	17	10	250 ²	50 ¹
Sulfate	10	33			60		250 ²	50 ¹
Alkalinity	5	14	2	100	20	60	NAS	30 to 50 ¹
Total Organic Carbon		2		1			NAS	10 ¹

NOTES:

Blank indicates compound Not Detected.

mg/L indicates milligrams per liter.

ER indicates Equipment Rinsate sample.

D after well number indicates deep well.

NAS indicates that there is currently No Applicable Standard

¹ indicates Virginia State groundwater standard applicable to the Coastal Plain physiographic province² indicates a Secondary Maximum Contaminant Level

Sulfate was detected in seven of ten samples. The detected concentration highest concentration was detected in 14-GW-203. Three of these concentrations are above the VA-WCBB level of 50 mg/L. Sulfate was detected at 103 mg/L in this well during the first round of groundwater sampling at Site 14.

No other constituents of concern were detected at levels exceeding guidance maximum concentration.

In summary, analytical results at Site 14 indicate that constituents of concern are below acceptable levels as established by USEPA MCLs and VA-WCBB.

4.2 Site 17 - Firefighting Training Area

4.2.1 Soil Gas Field Analytical Data

A total of 33 soil gas samples were collected and analyzed. The soil gas field analytical data is summarized in Table 4-8 and described in detail in the "Soil Gas Data" report provided as Appendix A. Figure 4-2 depicts 7 soil gas samples with detectable total volatile soil gas concentrations. These soil gas samples were A11, A12, A13, C11, C12, C13, and D13. These soil gas locations were located immediately adjacent to the runway.

4.2.2 Soil Analytical Data

A total of 25 soil borings and 49 soil samples were collected and analyzed. The soil boring locations were selected based on the results of the soil gas sampling. Soil samples were collected at and directly adjacent to the six soil gas samples with the highest soil gas concentrations. The Commonwealth of Virginia Department of Waste Management "Guidelines for the Disposal of Soil Contaminated with Petroleum Products", dated January 15, 1991, were used to evaluate concentrations of some constituents.

Soil samples were to be collected at seven feet below grade, if possible. However, groundwater was encountered between 4 and 6^{1/2} feet below grade. Therefore, soil samples were collected between zero and six feet below grade. Sampling depths and analytical results for soils at Site 17 are summarized in Tables 4-9, 4-10, 4-11, 4-12 and 4-13, and are presented in detail in Appendix D.

TABLE 4-8

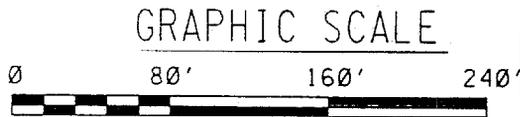
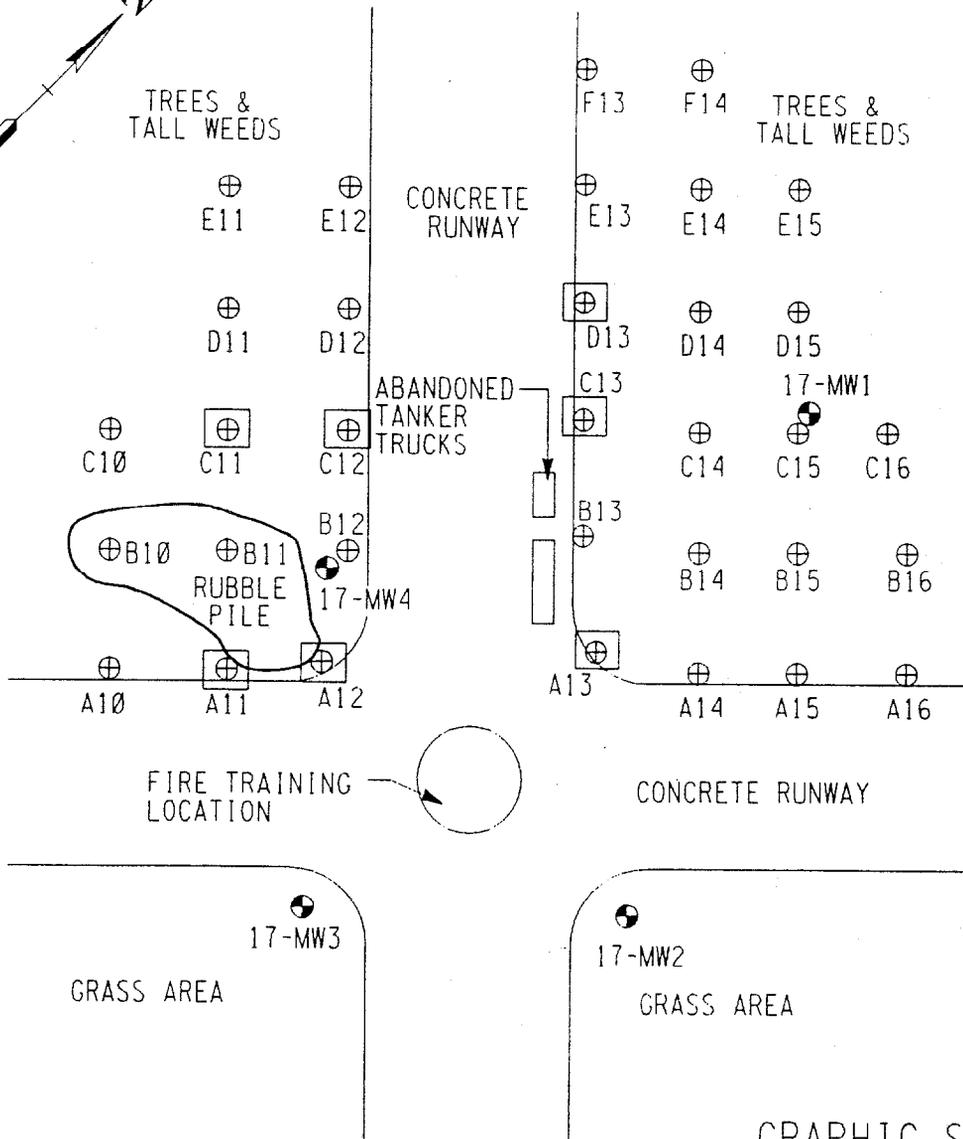
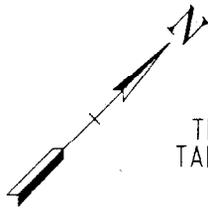
SOIL GAS ANALYTICAL R
 ANALYTE CONCENTRATIONS
 SITE 17 - FIREFIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 26-28, 1993

OC-00137-03.13-10/01/93

SAMPLE	DEPTH (ft)	BENZENE μg/L	TOLUENE μg/L	ETHYL- BENZENE μg/L	XYLENES μg/L	TOTAL FID VOLATILES ² μg/L
A-10	5					
A-11	5		1.3	1.5	3.5	53.0
A-12	5		14.0	10.0	22.0	638.0
A-13	5					
A-14	6					
A-15	7					
A-16	8					
B-10	4					
B-11	4					
B-12	5					
B-13	5					
B-14	4					
B-15	4					
B-16	4					
C-10	4					
C-11	4					
C-12	5					11.0
C-13	4		21.0	9.0	19.0	386.0
C-14	4					
C-15	4					
C-16	4					
D-11	4					
D-12	5					
D-13	5	11.0	125.0	10.0	41.0	2360.0
D-14	4					
D-15	4					
E-11	4					
E-12	5					
E-13	5					
E-14	4					
E-15	4					
F-13	5					
F-14	4					
REPORTING LIMIT		1.0	1.0	1.0	1.0	10.0

NOTES:

- ¹ Analysis performed by TARGET Environmental Services, Inc. in the field utilizing a gas chromatograph/flame ionization device (GC/FID).
 - ² Calculated using the sum of the areas of all integrated chromatogram peaks and the instrument response factor for toluene.
- Blank indicates compound was Not Detected.
 μg/L indicates micrograms per liter of air.



LEGEND

- TOTAL FID VOLATILES ABOVE 10 ug/l
- ⊕ SOIL GAS SAMPLE LOCATION
- MONITORING WELL

NOTE: ALL OTHER SOIL GAS SAMPLES HAD NON DETECTABLE CONCENTRATIONS

SOURCE: TARGET ENVIRONMENTAL, MAY 1993
SOIL GAS DATA NALF FENTRESS, VIRGINIA

FIGURE 4-2
SOIL GAS RESULTS
SITE 17
FIREFIGHTING TRAINING AREA
FENTRESS, VIRGINIA

DRAWN BY: AULD 7/16/93 SCALE: GRAPHIC



THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

esd145008: f1g4-2.dgn FENT5.REF

54-

**SUMMARY OF ANALYTICAL RESULTS
TCL VOLATILE ORGANIC COMPOUNDS
SITE 17 - FIREFIGHTING TRAINING AREA
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
APRIL 28-29, 1993**

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-121	17-SB-122	17-SB-123	17-SB-124	17-SB-146 (Dup. 124)	17-SB-125	17-SB-126	17-SB-127	17-SB-128	17-SB-147 (Dup. 128)
	03 4-6 Soil µg/kg	03 4-6 Soil µg/kg	02 2-4 Soil µg/kg	02 2-4 Soil µg/kg	02 2-4 Soil µg/kg	01 0-2 Soil µg/kg	02 2-4 Soil µg/kg	01 0-2 Soil µg/kg	01 0-2 Soil µg/kg	01 0-2 Soil µg/kg
TCL VOLATILE ORGANIC COMPOUNDS: METHOD 8240										
Acetone										
2-Butanone										
Chlorobenzene								82 J		3 J
Ethylbenzene			410 J							
Methylene Chloride	14									
Styrene								14		
Toluene	7 J		410 J							
Xylenes (Total)		1600 J	2600 J	2100 J	1000 J			3 J	3 J	39

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-129	17-SB-130	17-SB-131	17-SB-148 (Dup. 131)	17-SB-132	17-SB-133	17-SB-134	17-SB-135	17-SB-136	17-SB-137
	02 2-4 Soil µg/kg	02 2-4 Soil µg/kg	01 0-2 Soil µg/kg	01 0-2 Soil µg/kg	02 2-4 Soil µg/kg	02 2-4 Soil µg/kg	02 2-4 Soil µg/kg	03 2-4 Soil µg/kg	02 2-4 Soil µg/kg	02 2-4 Soil µg/kg
TCL VOLATILE ORGANIC COMPOUNDS: METHOD 8240										
Acetone										
2-Butanone										
Chlorobenzene					8 J 70					
Ethylbenzene										
Methylene Chloride							35			
Styrene				2 J					3 J	
Toluene		4 J	3 J		320					
Xylenes (Total)					30	1200 J	6 J 190	4 J	2 J	

NOTES:

Blank indicates compound Not Detected
µg/kg indicates micrograms per kilogram
D after well number indicates deep well
J indicates analyte present. Reported value may not be accurate or precise.

OC-00137-03.13-10/01/93

SUMMARY OF ANALYTICAL RESULTS
 TCL VOLATILE ORGANIC COMPOUNDS
 SITE 17 - FIREFIGHTING TRAINING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 28-29, 1993

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-149	17-SB-138	17-SB-139	17-SB-150	17-SB-140	17-SB-141	17-SB-142	17-SB-143	17-SB-144	17-SB-145
	(Dup. 137)			(Dup. 139)						
	02 2-4 Soil µg/kg									
TCL VOLATILE ORGANIC COMPOUNDS: METHOD 8240										
Acetone										
2-Butanone										
Chlorobenzene										
Ethylbenzene										
Methylene Chloride										
Styrene									3 J	
Toluene										
Xylenes (Total)		1200 J	6 J	3 J		2 J		4 J	2 J	3 J

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	TRIP BLANK-3	TRIP BLANK-4	TRIP BLANK-5	17-FB-01	17-SB-121 -ER
	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Water µg/L
TCL VOLATILE ORGANIC COMPOUNDS: METHOD 8240					
Acetone					
2-Butanone					
Chlorobenzene					
Ethylbenzene					
Methylene Chloride					
Styrene					
Toluene					
Xylenes (Total)					

NOTES:

Blank indicates compound Not Detected
 µg/L indicates micrograms per liter
 ER indicates Equipment Rinse sample
 D after well number indicates deep well
 J indicates analyte present. Reported value may not be accurate or precise.

OC-00137-03.13-10/01/93

TABLE 10

SUMMARY OF SOIL ANALYTICAL RESULTS
TOTAL BTEX (BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES)
SITE 17 - FIRE FIGHTING AREA
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
APRIL 28 AND 29, 1993

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-121		17-SB-122		17-SB-123		17-SB-124	
	03 4 - 6 Soil µg/kg		01 0 - 2 Soil µg/kg	03 4 - 6 Soil µg/kg	01 0 - 2 Soil µg/kg	02 2 - 4 Soil µg/kg	01 0 - 2 Soil µg/kg	02 2 - 4 Soil µg/kg
TOTAL BTEX: METHOD 8240								
Toluene						240 J		
Ethylbenzene						1400		
Total Xylenes			1900			2700		
TOTAL BTEX			1900			4340		

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-146 (Dup. 124)		17-SB-125		17-SB-126		17-SB-127	
	01 0 - 2 Soil µg/kg	02 2 - 4 Soil µg/kg						
TOTAL BTEX: METHOD 8240								
Toluene								
Ethylbenzene								
Total Xylenes		2100						
TOTAL BTEX		2100						

NOTES:

Blank indicates compound was Not Detected
 µg/kg indicates micrograms per kilogram.
 Dup. indicates duplicate sample

OC-00137-03.13-10/01/93

TABLE 4-10 (CONTINUED)

SOIL ANALYTICAL RESULTS
 TOTAL BTEX (BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES)
 SITE 17 - FIRE FIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 28 AND 29, 1993

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-128		17-SB-147 (Dup. 128)		17-SB-129		17-SB-130	
	01	02	01	02	01	02	01	02
	0 - 2 Soil µg/kg	2 - 4 Soil µg/kg						
TOTAL BTEX: METHOD 8240								
Toluene								
Ethylbenzene								
Total Xylenes	1300							
TOTAL BTEX	1300							

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-131		17-SB-148 (Dup. 131)		17-SB-132		17-SB-133	
	01	02	01	02	01	02	01	02
	0 - 2 Soil µg/kg	2 - 4 Soil µg/kg						
TOTAL BTEX: METHOD 8240								
Toluene								
Ethylbenzene						2400	1200	2200
Total Xylenes						5400		
TOTAL BTEX						7800	1200	2200

NOTES:

Blank indicates compound was Not Detected

µg/kg indicates micrograms per kilogram.

Dup. indicates duplicate sample

J indicates analyte present. Reported value may not be accurate or precise.

OC-00137-03.13-10/01/93

TABLE 4-10 (CONTINUED)

SOIL ANALYTICAL RESULTS
 TOTAL BTEX (BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES)
 SITE 17 - FIRE FIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 28 AND 29, 1993

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-134		17-SB-135		17-SB-136		17-SB-137	
	01 0 - 2 Soil µg/kg	02 2 - 4 Soil µg/kg						
TOTAL BTEX: METHOD 8240								
Toluene								
Ethylbenzene								
Total Xylenes								
TOTAL BTEX								

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-149 (Dup. 137)		17-SB-138		17-SB-139		17-SB-150 (Dup. 139)	
	01 0 - 2 Soil µg/kg	02 2 - 4 Soil µg/kg						
TOTAL BTEX: METHOD 8240								
Toluene								
Ethylbenzene								
Total Xylenes								
TOTAL BTEX								

NOTES:

- Blank indicates compound was Not Detected
- µg/kg indicates micrograms per kilogram.
- Dup. indicates duplicate sample
- J indicates analyte present. Reported value may not be accurate or precise.

TABLE 4-10 (CONTINUED)

SOIL ANALYTICAL RESULTS
 TOTAL BTEX (BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES)
 SITE 17 - FIRE FIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 28 AND 29, 1993

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-140		17-SB-141		17-SB-142		17-SB-143	
	01	02	01	02	01	02	01	02
	0 - 2 Soil µg/kg	2 - 4 Soil µg/kg						
TOTAL BTEX: METHOD 8240								
* Toluene								
Ethylbenzene								
Total Xylenes								
TOTAL BTEX								

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-144		17-SB-145	
	01	02	01	02
	0 - 2 Soil µg/kg	2 - 4 Soil µg/kg	0 - 2 Soil µg/kg	2 - 4 Soil µg/kg
TOTAL BTEX: METHOD 8240				
Toluene				
Ethylbenzene				
Total Xylenes				
TOTAL BTEX				

NOTES:

Blank indicates compound was Not Detected
 µg/kg indicates micrograms per kilogram.
 Dup. indicates duplicate sample

OC-00137-03.13-10/01/93

TABLE 4-11

SUMMARY OF SOIL ANALYTICA
 TCL SEMI-VOLATILE ORGANIC C
 SITE 17 - FIRE FIGHTING TRAIL
 NAVAL AUXILIARY LANDING FIELD
 FENTRESS, VIRGINIA
 APRIL 28-29, 1993

OC-00137-03.13-10/01/93

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-121	17-SB-122	17-SB-123	17-SB-124
		03 4 - 6 Soil µg/kg	03 4 - 6 Soil µg/kg	02 2 - 4 Soil µg/kg
TCL SEMI-VOLATILE ORGANIC COMPOUNDS: METHOD 8240				
Naphthalene		1100 J	1100 J	
2-Methylnaphthalene		2900 J	3600 J	
Dibenzofuran				
Di-n-butylphthalate				
Butylbenzylphthalate				
bis(2-ethylhexyl)phthalate				
Di-n-octylphthalate				
Benzo(b)fluoranthene				
Benzo(k)fluoranthene				

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-146 (Dup. 124)	17-SB-125	17-SB-126	17-SB-127
		02 2 - 4 Soil µg/kg	01 0 - 2 Soil µg/kg	02 2 - 4 Soil µg/kg
TCL SEMI-VOLATILE ORGANIC COMPOUNDS: METHOD 8240				
Naphthalene	680 J			
2-Methylnaphthalene	2400 J			
Dibenzofuran				
Di-n-butylphthalate				
Butylbenzylphthalate				
bis(2-ethylhexyl)phthalate		43 J		110
Di-n-octylphthalate				
Benzo(b)fluoranthene				
Benzo(k)fluoranthene				

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-128	17-SB-147 (Dup. 128)	17-SB-129	17-SB-130
		01 0 - 2 Soil µg/kg	01 0 - 2 Soil µg/kg	02 2 - 4 Soil µg/kg
TCL SEMI-VOLATILE ORGANIC COMPOUNDS: METHOD 8240				
Naphthalene			72 J	
2-Methylnaphthalene				
Dibenzofuran				
Di-n-butylphthalate				
Butylbenzylphthalate				
bis(2-ethylhexyl)phthalate	690 J	670 J	47 J	
Di-n-octylphthalate	750 J			
Benzo(b)fluoranthene				
Benzo(k)fluoranthene				

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-131	17-SB-148 (Dup. 131)	17-SB-132	17-SB-133
		01 0 - 2 Soil µg/kg	01 0 - 2 Soil µg/kg	02 2 - 4 Soil µg/kg
TCL SEMI-VOLATILE ORGANIC COMPOUNDS: METHOD 8240				
Naphthalene			42000	2300 J
2-Methylnaphthalene			89000	5700 J
Dibenzofuran			1900 J	
Di-n-butylphthalate		300 J		
Butylbenzylphthalate				
bis(2-ethylhexyl)phthalate	32 J	840 J	2100 J	
Di-n-octylphthalate		430 J		
Benzo(b)fluoranthene				
Benzo(k)fluoranthene				

NOTES:

Blank indicates compound Not Detected
 µg/kg indicates micrograms per kilogram
 D after well number indicates deep well
 J indicates analyte present. Reported value may not be accurate or precise.

TABLE 4-11 (CONTINUED)

SUMMARY OF SOIL ANALYTIC
 TCL SEMI-VOLATILE ORGANIC
 SITE 17 - FIRE FIGHTING TR.
 NAVAL AUXILIARY LANDING FIEL
 FENTRESS, VIRGINIA
 APRIL 28-29, 1993

OC-00137-03.13-10/01/93

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-134 02 2 - 4 Soil µg/kg	17-SB-135 03 2 - 4 Soil µg/kg	17-SB-136 02 2 - 4 Soil µg/kg	17-SB-137 02 2 - 4 Soil µg/kg
TCL SEMI-VOLATILE ORGANIC COMPOUNDS: METHOD 8240				
Naphthalene	2100 J			
2-Methylnaphthalene	6300 J			
Dibenzofuran				
Di-n-butylphthalate				
Butylbenzylphthalate				
bis(2-ethylhexyl)phthalate	280 J		15 J	42 J
Di-n-octylphthalate				
Benzo(b)fluoranthene				41 J
Benzo(k)fluoranthene				54 J

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-149 (Dup. 137) 02 2 - 4 Soil µg/kg	17-SB-138 02 2 - 4 Soil µg/kg	17-SB-139 02 2 - 4 Soil µg/kg	17-SB-150 (Dup. 139) 02 2 - 4 Soil µg/kg
TCL SEMI-VOLATILE ORGANIC COMPOUNDS: METHOD 8240				
Naphthalene		330 J		
2-Methylnaphthalene		1900 J		45 J
Dibenzofuran				
Di-n-butylphthalate				
Butylbenzylphthalate				
bis(2-ethylhexyl)phthalate	14 J	910 J		25 J
Di-n-octylphthalate		700 J		
Benzo(b)fluoranthene				30 J
Benzo(k)fluoranthene				39 J

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-140 02 2 - 4 Soil µg/kg	17-SB-141 02 2 - 4 Soil µg/kg	17-SB-142 02 2 - 4 Soil µg/kg	17-SB-143 02 2 - 4 Soil µg/kg
TCL SEMI-VOLATILE ORGANIC COMPOUNDS: METHOD 8240				
Naphthalene				
2-Methylnaphthalene				
Dibenzofuran				
Di-n-butylphthalate				
Butylbenzylphthalate				
bis(2-ethylhexyl)phthalate	26 J			27 J
Di-n-octylphthalate				16 J
Benzo(b)fluoranthene				20 J
Benzo(k)fluoranthene				

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-144 02 2 - 4 Soil µg/kg	17-SB-145 02 2 - 4 Soil µg/kg
TCL SEMI-VOLATILE ORGANIC COMPOUNDS: METHOD 8240		
Naphthalene		
2-Methylnaphthalene		
Dibenzofuran		
Di-n-butylphthalate		
Butylbenzylphthalate		
bis(2-ethylhexyl)phthalate		
Di-n-octylphthalate		
Benzo(b)fluoranthene		
Benzo(k)fluoranthene		

NOTES:

Blank indicates compound Not Detected
 µg/kg indicates micrograms per kilogram
 ER indicates Equipment Rinse sample
 D after well number indicates deep well
 J indicates analyte present. Reported value may not be accurate or precise.

TABLE 4-12

SOIL ANALYTICAL R
TOTAL LEAD
SITE 17 - FIRE FIGHTING AREA
NAVAL AUXILIARY LANDING FIELD - FENTRESS
FENTRESS, VIRGINIA
APRIL 28 AND 29, 1993

OC-00137-03.13-10/01/93

SOIL BORING LOCATION	17-SB-121	17-SB-122	17-SB-123	17-SB-124
SAMPLE NUMBER	03	03	02	02
SAMPLE DEPTH (FEET)	4 - 6	4 - 6	2 - 4	2 - 4
SAMPLE MATRIX UNITS	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
TOTAL LEAD	12 J	11.6 J	11.6 J	8.2 J

SOIL BORING LOCATION	17-SB-146 (Dup. 124)	17-SB-125	17-SB-126	17-SB-127
SAMPLE NUMBER	02	01	02	01
SAMPLE DEPTH (FEET)	2 - 4	0 - 2	2 - 4	0 - 2
SAMPLE MATRIX UNITS	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
TOTAL LEAD	8.9 J	16.7 J	10.9 J	24.8 J

SOIL BORING LOCATION	17-SB-128	17-SB-147 (Dup. 128)	17-SB-129	17-SB-130
SAMPLE NUMBER	01	01	02	02
SAMPLE DEPTH (FEET)	0 - 2	0 - 2	2 - 4	2 - 4
SAMPLE MATRIX UNITS	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
TOTAL LEAD	7.2 J	17.7 J	6.7 J	17.3

SOIL BORING LOCATION	17-SB-131	17-SB-148 (Dup. 131)	17-SB-132	17-SB-133
SAMPLE NUMBER	02	02	02	02
SAMPLE DEPTH (FEET)	2 - 4	2 - 4	2 - 4	2 - 4
SAMPLE MATRIX UNITS	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
TOTAL LEAD	18.1 J	7.8 J	10.5	7.3 J

NOTES:

Blank indicates compound was Not Detected

mg/kg indicates milligrams per kilogram

Dup. indicates duplicate sample

J indicates analyte present. Reported value may not be accurate or precise.

TABLE 4-12 (CONTINUED)

OC-00137-03.13-10/01/93

SOIL ANALYTICAL REPORT
 TOTAL LEAD
 SITE 17 - FIRE FIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 28 AND 29, 1993

SOIL BORING LOCATION	17-SB-134	17-SB-135	17-SB-136	17-SB-137
SAMPLE NUMBER	02	02	02	02
SAMPLE DEPTH (FEET)	2 - 4	2 - 4	2 - 4	2 - 4
SAMPLE MATRIX UNITS	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
TOTAL LEAD	25.2	32.1 J	10.5 J	7.1 J

SOIL BORING LOCATION	17-SB-149 (Dup. 137)	17-SB-138	17-SB-139	17-SB-150 (Dup. 139)
SAMPLE NUMBER	02	02	02	02
SAMPLE DEPTH (FEET)	2 - 4	2 - 4	2 - 4	2 - 4
SAMPLE MATRIX UNITS	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
TOTAL LEAD	20.7 J	23.8 J	11.2 J	21.9 J

SOIL BORING LOCATION	17-SB-140	17-SB-141	17-SB-142	17-SB-143
SAMPLE NUMBER	02	02	02	02
SAMPLE DEPTH (FEET)	2 - 4	2 - 4	2 - 4	2 - 4
SAMPLE MATRIX UNITS	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
TOTAL LEAD	8.3 J	8.4 J	8.6 J	8.3 J

SOIL BORING LOCATION	17-SB-144	17-SB-145
SAMPLE NUMBER	02	02
SAMPLE DEPTH (FEET)	2 - 4	2 - 4
SAMPLE MATRIX UNITS	Soil mg/kg	Soil mg/kg
TOTAL LEAD	9.9 J	13.2 J

NOTES:

Blank indicates compound was Not Detected

mg/kg indicates milligrams per kilogram

Dup. indicates duplicate sample

J indicates analyte present. Reported value may not be accurate or precise.

TABLE 4-13

SOIL ANALYTICAL RESULTS
 TOTAL PETROLEUM HYDROCARBONS
 SITE 17 - FIRE FIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 28 AND 29, 1993

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-121		17-SB-122		17-SB-123		17-SB-124	
	03		01	03	01	02	01	02
	4 - 6		0 - 2	4 - 6	0 - 2	2 - 4	0 - 2	2 - 4
	Soil		Soil	Soil	Soil	Soil	Soil	Soil
	$\mu\text{g/g}$		$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$
TOTAL PETROLEUM HYDROCARBONS METHOD 8015 - MODIFIED	380		720	3600	9200	3700	1400	550

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-146 (Dup. 124)		17-SB-125		17-SB-126		17-SB-127	
	01	02	01	02	01	02	01	02
	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$
TOTAL PETROLEUM HYDROCARBONS METHOD 8015 - MODIFIED	800	1700	2400	340			3700	890

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-128		17-SB-147 (Dup. 128)		17-SB-129		17-SB-130	
	01	02	01	02	01	02	01	02
	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$	$\mu\text{g/g}$
TOTAL PETROLEUM HYDROCARBONS METHOD 8015 - MODIFIED	4700	1500	3100	3200				

NOTES:

Blank indicates compound was Not Detected
 $\mu\text{g/g}$ indicates micrograms per gram.
 Dup. indicates duplicate sample

OC-00137-03.13-10/01/93

TABLE 4-13 (CONTINUED)

SOIL ANALYTICAL RESULTS
 TOTAL PETROLEUM HYDROCARBONS
 SITE 17 - FIRE FIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 28 AND 29, 1993

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-131		17-SB-148 (Dup. 131)		17-SB-132		17-SB-133	
	01	02	01	02	01	02	01	02
	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
TOTAL PETROLEUM HYDROCARBONS METHOD 8015 - MODIFIED	1400	110	1300	2300	4200	1700	310	1600

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-134		17-SB-135		17-SB-136		17-SB-137	
	01	02	01	02	01	02	01	02
	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
TOTAL PETROLEUM HYDROCARBONS METHOD 8015 - MODIFIED	3400	1500						

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-149 (Dup. 137)		17-SB-138		17-SB-139		17-SB-150 (Dup. 137)	
	01	02	01	02	01	02	01	02
	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 4
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
TOTAL PETROLEUM HYDROCARBONS METHOD 8015 - MODIFIED			2100	4300	500	690	320	1200

NOTES:

Blank indicates compound was Not Detected
 µg/g indicates micrograms per gram.
 Dup. indicates duplicate sample

OC-00137-03.13-10/01/93

TABLE 4-13 (CONTINUED)

SOIL ANALYTICAL RESULTS
 TOTAL PETROLEUM HYDROCARBONS
 SITE 17 - FIRE FIGHTING AREA
 NAVAL AUXILIARY LANDING FIELD - FENTRESS
 FENTRESS, VIRGINIA
 APRIL 28 AND 29, 1993

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-140		17-SB-141		17-SB-142		17-SB-143	
	01 0 - 2 Soil µg/g	02 2 - 4 Soil µg/g						
TOTAL PETROLEUM HYDROCARBONS METHOD 8015 - MODIFIED	2500	410			110			

SOIL BORING LOCATION SAMPLE NUMBER SAMPLE DEPTH (FEET) SAMPLE MATRIX UNITS	17-SB-144		17-SB-145	
	01 0 - 2 Soil µg/g	02 2 - 4 Soil µg/g	01 0 - 2 Soil µg/g	02 2 - 4 Soil µg/g
TOTAL PETROLEUM HYDROCARBONS METHOD 8015 - MODIFIED			130	

NOTES:

Blank indicates compound was Not Detected
 µg/g indicates micrograms per gram.
 Dup. indicates duplicate sample

OC-00137-03.13-10/01/93

Total xylenes were detected in seven of the twenty-five samples.

$\mu\text{g}/\text{kg}$ to 2,600.0 $\mu\text{g}/\text{kg}$ (J). The highest concentration was detected in SB-123.

Methylene Chloride was detected in five of the twenty-five samples. The detected concentrations ranged from 2.0 $\mu\text{g}/\text{kg}$ (J) to 14.0 $\mu\text{g}/\text{kg}$. The highest concentration was detected in 17-SB-123.

Chlorobenzene was detected in two of the twenty-five samples. The detected concentrations ranged from 70 $\mu\text{g}/\text{kg}$ to 410 $\mu\text{g}/\text{kg}$ (J). The highest concentration was detected in 17-SB-123.

Isolated levels of 2-butanone, ethylbenzene, and styrene were also detected. 2-butanone was detected in 17-SB-132 at a concentration of 8.0 $\mu\text{g}/\text{kg}$ (J). Ethylbenzene was detected in 17-SB-134 at a concentration of 35 $\mu\text{g}/\text{kg}$. Styrene was detected at a concentration of 320 $\mu\text{g}/\text{kg}$ in 17-SB-132.

Total benzene, toluene, ethylbenzene, and total xylenes (BTEX) compounds were detected in seven of the forty-nine soil samples. BTEX concentrations ranged from 1,200 $\mu\text{g}/\text{kg}$ to 7,800 $\mu\text{g}/\text{kg}$, with the highest concentration being detected in 12-SB-132-02. These confirm both soil gas sample results at these locations and results of previous investigations, which indicated the presence of fuel linked VOCs at these locations. Benzene was the only BTEX constituent not detected in these samples. These concentrations are below the Virginia "Guidelines for Disposal of Soils Contaminated with Petroleum Products" for BTEX of 10,000 $\mu\text{g}/\text{kg}$.

Semi-volatile compounds were detected in seventeen of the twenty-five soil samples collected. Naphthalene was detected in seven of the twenty-five samples. The detected concentrations ranged from 330 $\mu\text{g}/\text{kg}$ (J) to 42,000 $\mu\text{g}/\text{kg}$. The highest concentration was detected in 17-SB-132.

2-Methylnaphthalene was detected in nine of the twenty-five samples. The detected concentrations ranged from 45 $\mu\text{g}/\text{kg}$ (J) to 89,000 $\mu\text{g}/\text{kg}$. The highest concentration was detected in 17-SB-132.

Bis(2-ethylhexyl)phthalate was detected in twelve of the twenty-five samples. The detected concentrations ranged from 15 $\mu\text{g}/\text{kg}$ (J) to 2,100 $\mu\text{g}/\text{kg}$. The highest concentration was detected in 17-SB-132.

Di-n-ocylphthalate was detected in four of the twenty-five samples. The detected concentrations ranged from 20 $\mu\text{g}/\text{kg}$ (J) to 750 $\mu\text{g}/\text{kg}$. The highest concentration was detected in 17-SB-126.

Di-n-ocylphtalate was detected in four of the twenty-five samples.

$\mu\text{g}/\text{kg}$ (J) to 750 $\mu\text{g}/\text{kg}$. The highest concentration was detected in 17-SB-126.

Benzo(b)fluouranthene was detected in two of the twenty-five samples. The detected concentrations ranged from 30 $\mu\text{g}/\text{kg}$ (J) to 41 $\mu\text{g}/\text{kg}$. The highest concentration was detected in 17-SB-137.

Benzo(k)fluouranthene was detected in two of the twenty-five samples. The detected concentrations ranged from 39 $\mu\text{g}/\text{kg}$ (J) to 54 $\mu\text{g}/\text{kg}$. The highest concentration was detected in 17-SB-137.

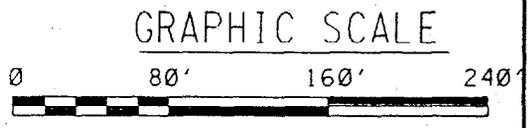
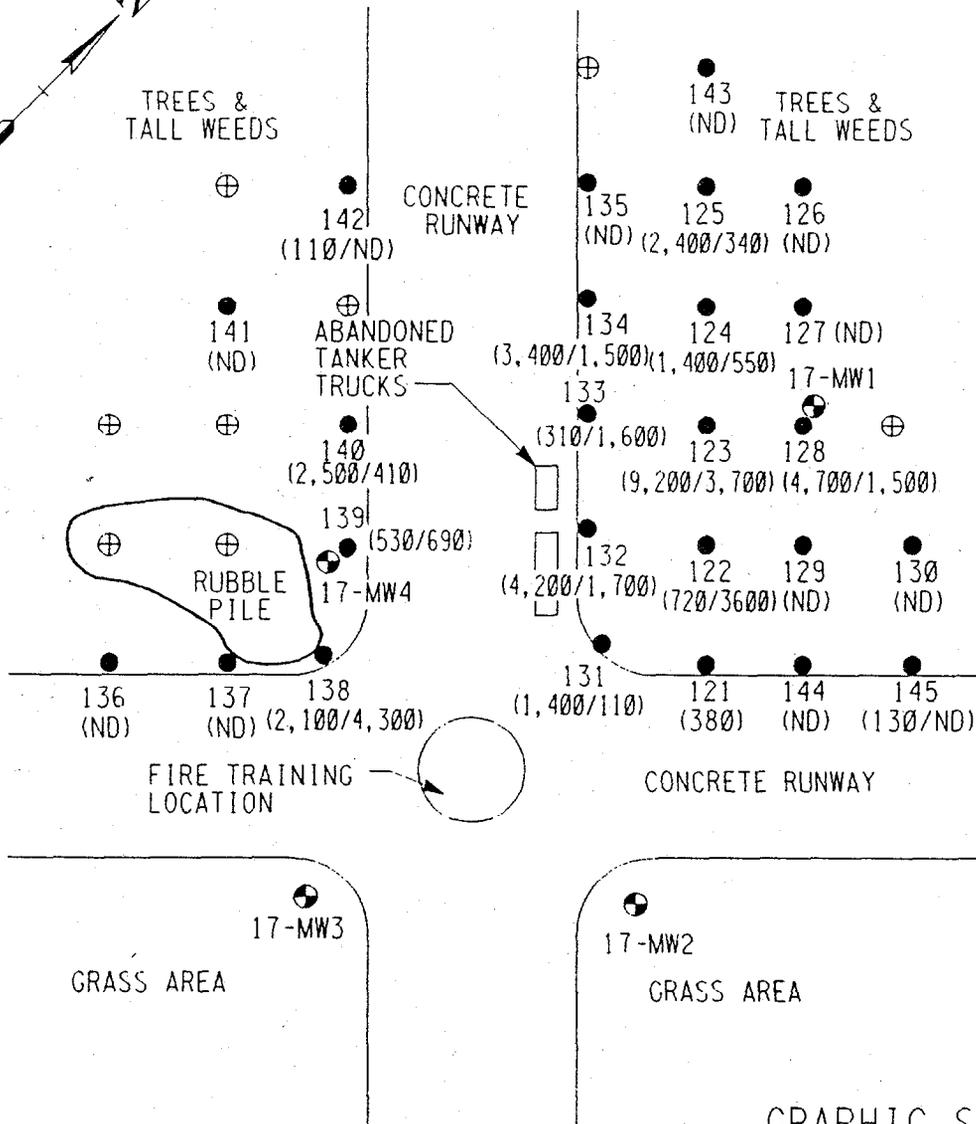
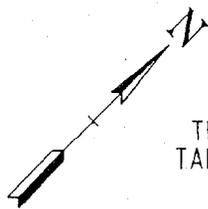
Isolated levels of dibenzofuran, di-n-butylphtalate and butylphtalate were also detected. Dibenzofuran was detected at 1,900 $\mu\text{g}/\text{kg}$ in 17-SB-132. Di-n-butylphtalate was detected at 300 $\mu\text{g}/\text{kg}$ (J) in 17-SB-148. Butylbenzylphtalate was detected at 27 $\mu\text{g}/\text{kg}$ in 17-SB-143.

Total lead was detected in twenty five of twenty-five soil samples. The detected concentrations ranged from 6.7 mg/kg (J) to 32.1 mg/kg (J). The highest concentration was detected in 17-SB-135.

TPHs were detected above 100 ppm in twenty-nine of forty-nine samples. The Virginia "Guidelines for Disposal of Soils with Petroleum Products" recommends action for soils with TPH concentrations above 100 ppm. These actions correspond with different concentration levels of TPHs in soils and are summarized as follows:

- For TPHs less than 50 ppm, soils may be used as "clean fill";
- For TPHs greater than 50 ppm and less than 100 ppm, soils may be disposed of in any permitted sanitary or industrial landfill;
- For TPHs greater than 100 ppm and less than 500 ppm, soils may be disposed of in permitted sanitary or industrial landfills equipped with liners and leachate collection systems; and,
- For TPHs greater than 500 ppm, soils may not be disposed of in any permitted industrial or sanitary landfill.

The detected concentrations ranged from 110 $\mu\text{g}/\text{kg}$ to 9,200 $\mu\text{g}/\text{kg}$. The highest concentration was detected in 17-SB-123. Figure 4-3 summarizes the TPH results in plain view in numerical form. Figures 4-4 and 4-5 provide iso-concentration plots of the TPH results for depths between 0 to 2 feet and 2 to 4 feet below grade, respectively. The iso-concentration plots graphically delineate soils impacted by TPHs.



LEGEND

- (720/3600) TPH CONCENTRATION 0'-2' / 2'-4' (ug/g)
- SOIL BORING LOCATION
- ⊕ SOIL GAS SAMPLE NODE
- ⊗ MONITORING WELL
- (ND) NOT DETECTED

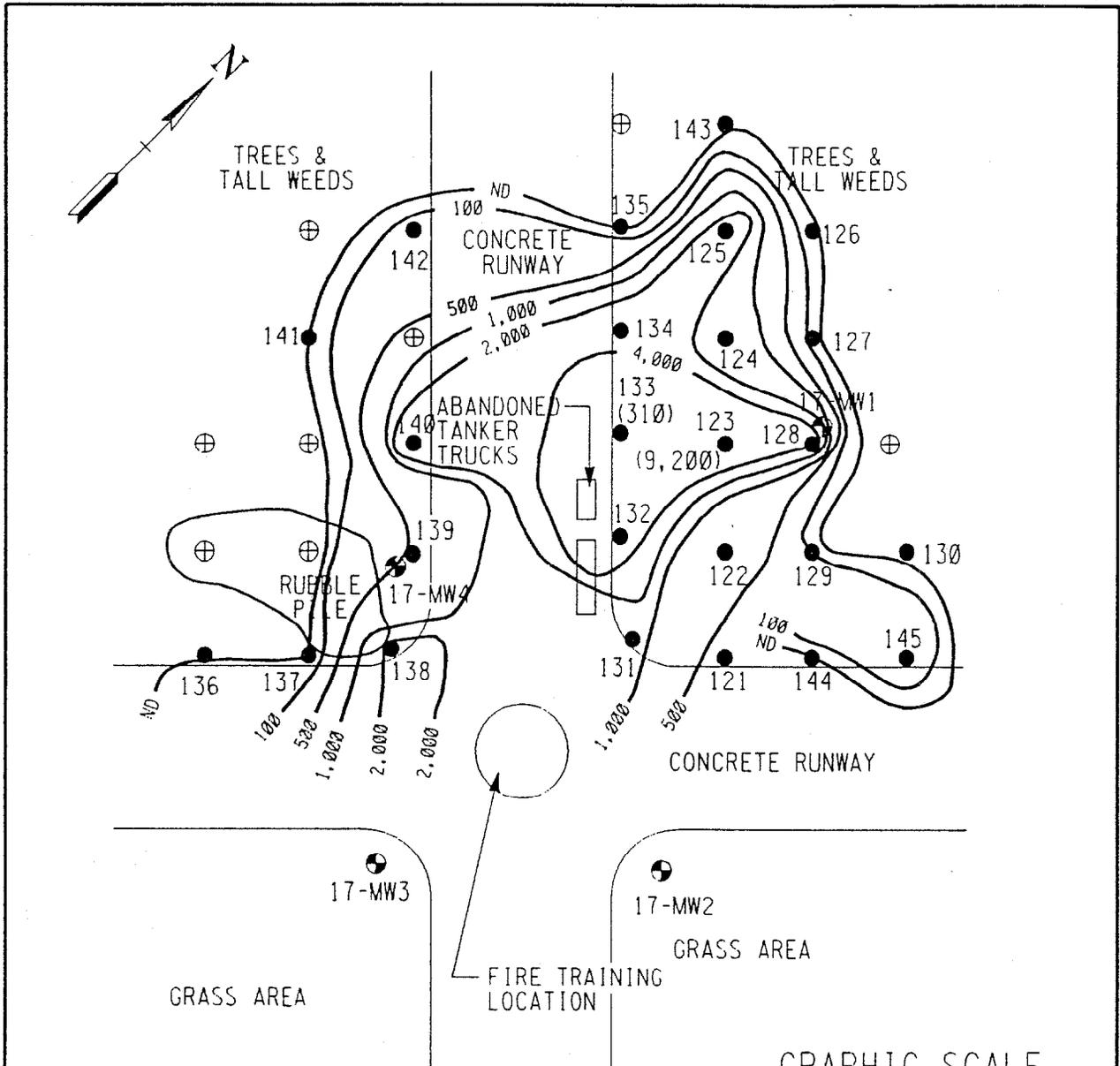
SOURCE: TARGET ENVIRONMENTAL, MAY 1993
SOIL GAS DATA NALF FENTRESS, VIRGINIA

FIGURE 4-3
TPH RESULTS
SITE 17
FIREFIGHTING TRAINING AREA
FENTRESS, VIRGINIA

DRAWN BY:	AULD	7/16/93	SCALE:	GRAPHIC
-----------	------	---------	--------	---------

FW FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

esd145008:f1g4-3.dgn FENTS.REF



LEGEND

- 100 - ISO-CONCENTRATION CONTOUR (ug/g)
- SOIL BORING LOCATION
- ⊕ SOIL GAS SAMPLE NODE
- ⊙ MONITORING WELL
- (ND) NOT DETECTED

SOURCE: TARGET ENVIRONMENTAL, MAY 1993
SOIL GAS DATA NALF FENTRESS, VIRGINIA

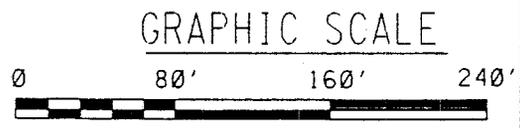
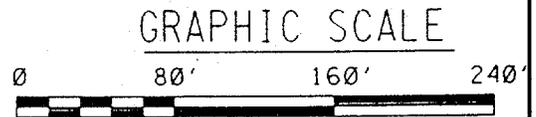
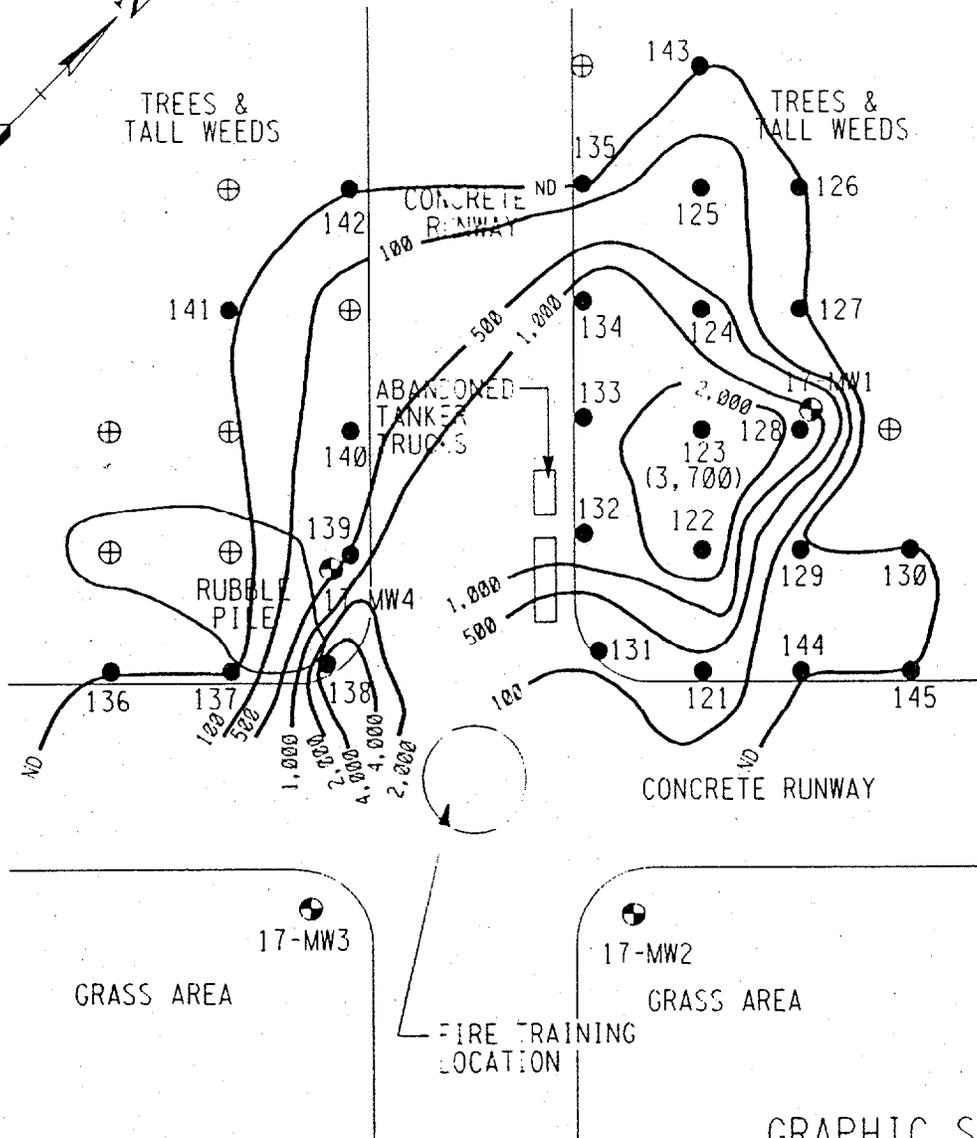
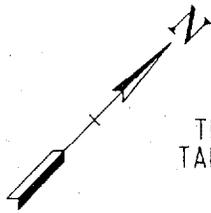


FIGURE 4-4
TPH ISO-CONCENTRATION
0-2 FEET BELOW GRADE
SITE 17
FIREFIGHTING TRAINING AREA
FENTRESS, VIRGINIA

DRAWN BY:	AULD 7/16/93	SCALE: GRAPHIC
-----------	--------------	----------------

THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

esd145008:fig4-4.dgn FENT5.REF



LEGEND

- 100 — ISO-CONCENTRATION CONTOUR ug/g
- SOIL BORING LOCATION
- ⊕ SOIL GAS SAMPLE NODE
- ⊙ MONITORING WELL
- (ND) NOT DETECTED

SOURCE: TARGET ENVIRONMENTAL, MAY 1993
SOIL GAS DATA NALF FENTRESS, VIRGINIA

FIGURE 4-5
TPH ISO-CONCENTRATION
2-4 FEET BELOW GRADE
SITE 17
FIREFIGHTING TRAINING AREA
FENTRESS, VIRGINIA

DRAWN BY:	AULD	7/16/93	SCALE: GRAPHIC
-----------	------	---------	----------------

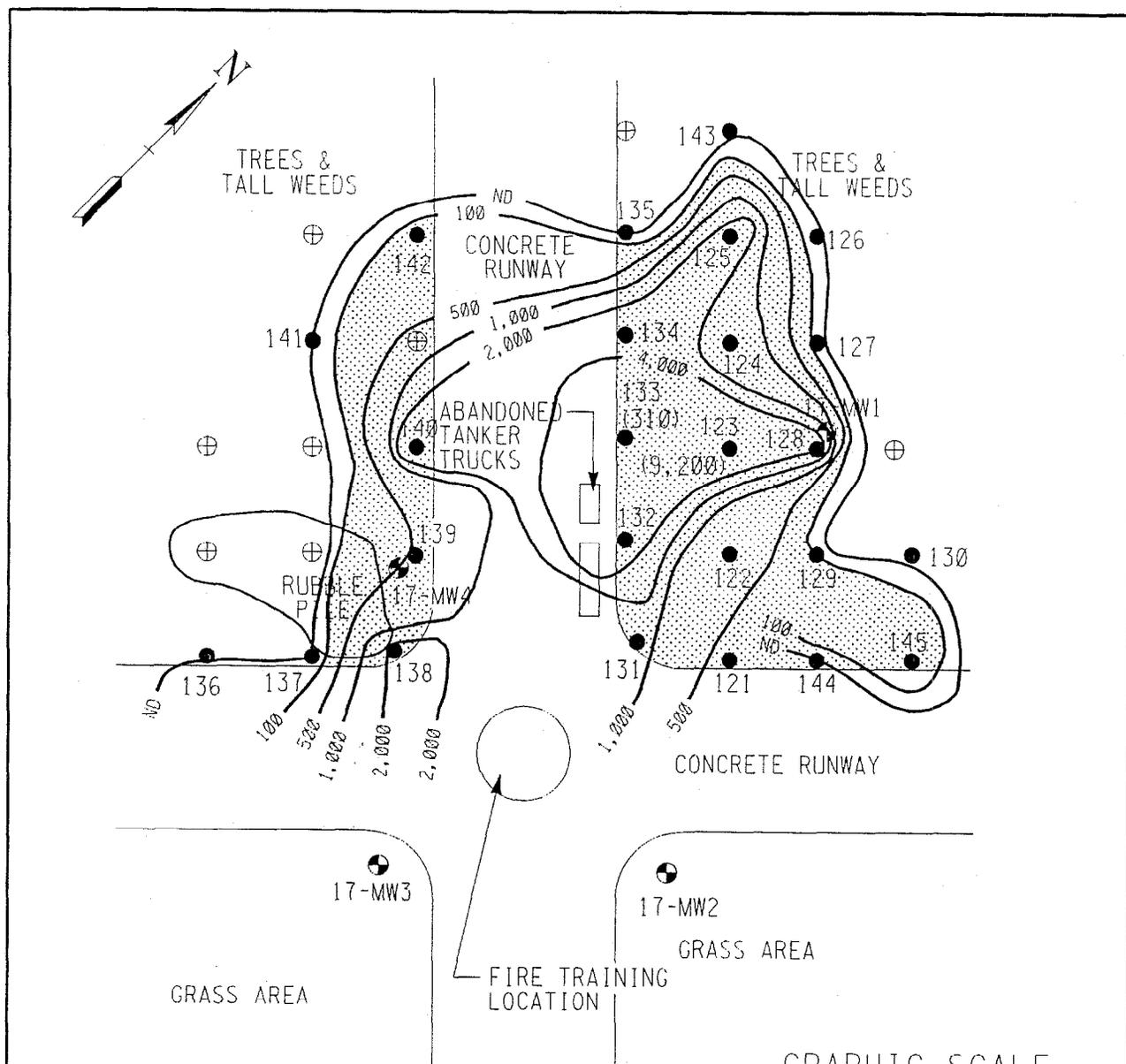
THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

esd145008:fig4-5.dgn FENT5.REF

In summary, the analytical results at Site 17 indicate that TPHs are at elevated levels in soils at this site. The estimated volume of soils containing TPHs at or above 50 ppm is 7,400 cubic yards. This estimated volume includes 1,800 cubic yards of soil on the west side of the runway and 5,600 cubic yards of soil on the north side. The estimated volume of soils containing TPHs at or above 100 ppm is approximately the same as the volume of soils at or above 50 ppm.

For the west side, soil volume was estimated assuming an area of 12,500 square feet by four feet deep. For the north side, soil volume was estimated assuming an area of 38,000 square feet by four feet deep. Figure 4-6 depicts the approximate surface limits of soils impacted by TPHs over 100 ppm. The limits of soils impacted by TPHs between two and four feet deep are less expansive, which makes the total removal estimate of 7,400 cubic yards conservative.

The estimated volume of soils containing TPHs at or above 500 ppm is 5,540 cubic yards. This estimated volume includes 1,620 cubic yards of soil on the west side of the runway and 3,920 cubic yards of soil on the north side.



LEGEND

-  AREA OF EXCAVATION
-  100 — ISO-CONCENTRATION CONTOUR (ug/g)
-  SOIL BORING LOCATION
-  SOIL GAS SAMPLE NODE
-  MONITORING WELL
- (ND) NOT DETECTED

SOURCE: TARGET ENVIRONMENTAL, MAY 1993
SOIL GAS DATA NALF FENTRESS, VIRGINIA

GRAPHIC SCALE



FIGURE 4-6
APPROXIMATE LIMITS OF EXCAVATION
OF TPH IMPACTED SOILS
SITE 17
FIREFIGHTING TRAINING AREA
FENTRESS, VIRGINIA

DRAWN BY:	AULD 7/16/93	SCALE: GRAPHIC
-----------	--------------	----------------



THIS DRAWING IS THE PROPERTY OF THE
FOSTER WHEELER ENVIRONMENTAL SERVICES
LIVINGSTON, NEW JERSEY

REV. B DATE: 07-19-93

esd145008:fig4-6.dgn FENT5.REF

c:\145008\fig4-6.dgn Jul. 23, 1993 12:56:26

5.0 CONCLUSIONS AND RECOM

5.1 Conclusions

The following provides the conclusions for Sites 14 and 17.

5.1.1 Site 14 - Fentress Landfill

Results of the second round of groundwater sampling indicates no constituents of concern have been above the USEPA primary MCLs. Aluminum, iron, and manganese, which were detected above USEPA proposed, nonenforceable secondary MCLs during this round of sampling, were detected at concentrations relatively consistent with concentrations detected during the first round.

5.1.2 Site 17 - Firefighting Training Area

Soil gas sample results identified the locations which required confirmatory soil sampling for analysis of the constituents of concern. Detectable concentrations of total VOCs, primarily toluene and total xylenes, were localized near the edges of the runway. This indicates that the source of these constituents may have been from activities conducted on the runway.

TPH concentrations detected at Site 17 indicate the presence of residual fuel constituents in the soils between zero and four feet below grade. These results, combined with results of the previous groundwater sampling, indicate that fuel constituents present in the vadose zone soils have reached the groundwater. However, recent impact to the groundwater cannot be assessed since the groundwater was not sampled during this investigation.

5.2 Recommendations

The following provides the recommendations for Sites 14 and 17.

5.2.1 Site 14 - Fentress Landfill

Based on the conclusions, it is recommended that no further action be taken at Site 14.

5.2.2 Site 17 - Firefighting Training Area

Based on the conclusions, the following recommendations are made:

- Conduct soil remediation to eliminate the future potential of impacting the groundwater with VOCs or TPHs over 50 ppm;
- Survey existing groundwater wells at Site 17 to provide data necessary to determine the direction of groundwater flow; and,
- Monitor a downgradient monitoring well after soil remediation to determine if the proposed soil remediation effectively reduced or eliminated the source of constituents of concern in the groundwater.

Based on the cleanup level for TPHs of 50 ppm, it is estimated that 7,400 cubic yards are necessary to be remediated. Several potential remedial action alternatives exist for handling these soils. For soils containing concentrations of TPHs below 100 ppm, an industrial or sanitary landfill should be evaluated. For soils containing concentrations of TPHs above 100 ppm or below 500 ppm, a lined industrial or sanitary landfill should be evaluated. For soils containing concentrations of TPHs above 500 ppm, incineration or soil treatment to reduce soil concentrations should be considered.

In addition to landfilling or incineration, in-situ soil treatment of these soils should be evaluated with regard to cost effectiveness, implementability, and long-term effectiveness. Treatment methods such as soil vapor extraction, bioremediation, or bioventing have been successfully implemented to remediate TPHs and VOCs at similar sites.

REFERENCES

National Weather Service, Norfolk, VA, Personnel Communications, 26 August 1991.

USEPA, Office of Research and Development, "Practical Guide for Groundwater Sampling," EPA/600/2-85/104, Ada, Oklahoma.

State Census Bureau, Virginia, July 1991.

USEPA, Guidance for Conducting Remedial Investigation and Feasibility Studies (EPA/540/G-89/004), Office of Solid Waste and Emergency Response (OSWER), Washington, D. C.

USEPA, A Compendium of Superfund Field Operations Methods (EPA/540/P-87/001), Office of Solid Waste and Emergency Response (OSWER), Washington, D. C.

NEESA 20.2-047B "Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program," June 1988, Port Hueneme, California.

USEPA, Office of Solid Waste and Emergency Response, "Superfund Exposure Assessment Manual," April 1988.

USEPA, Office of Solid Waste and Emergency Response, "Superfund Public Health Evaluation Manual (SPHEM), EPA/540/1086/060, Washington, D. C.

USEPA, Office of Solid Waste and Emergency Response, "CERCLA Compliance with Other Laws Manual," Directive 9234.1-01, Washington, D. C., May 1988.

USEPA, Office of Solid Waste and Emergency Response, "Community Relations in Superfund: A Handbook, Directive 9230.0-3A, Washington, D. C., June 1988.

CH2M Hill, Inc. Environmental Investigation of the Landfill and Firefighting Training Area, Naval Auxiliary Landing Field, Fentress, Virginia. Draft prepared for LANTDIV, March 1991.

OC-00137-03.13-10/01/93

SOIL GAS DATA

**NALF
FENTRESS, VIRGINIA**

PREPARED FOR

**BAKER ENVIRONMENTAL, INC.
420 ROUSER ROAD, BUILDING 3
CORAOPOLIS, PENNSYLVANIA 15108**

PREPARED BY

**TARGET ENVIRONMENTAL SERVICES, INC.
9180 RUMSEY ROAD
COLUMBIA, MARYLAND 21045
(410) 992-6622**

MAY 1993

SAMPLE COLLECTION AND ANALYSIS

On April 26-28, 1993, TARGET Environmental Services, Inc. (TARGET) conducted a soil gas survey at NALF, 2500 Lockheed Road, Fentress, Virginia. Under the direction of Foster Wheeler Environmental Services, a total of 33 soil gas samples were collected at the site at the sampling locations shown in Figure 1. The sampling depths varied from 4 to 8 feet due to the presence of shallow groundwater and are reported in Table 1.

Two sampling procedures were employed. For both methods, the entire sampling system was first purged with ambient air drawn through an organic vapor filter cartridge. In general, at locations with vehicle access, samples were collected using a van-mounted hydraulic probe to advance connected 3 foot sections of 1 inch diameter threaded steel casing down to the sampling depth. A teflon line was inserted into the casing to the bottom of the hole, and threaded through a plug which isolates the bottom-hole sampling chamber from the up-hole annulus. At locations without vehicle access, samples were collected manually using a drive rod to produce a 1/2 inch hole to the sampling depth. A stainless steel probe was inserted to the full depth of the hole and sealed off from the atmosphere.

Following isolation of the sampling zone, a sample of in-situ soil gas was then withdrawn through the probe or line and used to purge atmospheric air from the sampling system. A second sample of soil gas was withdrawn through the probe and encapsulated in a pre-evacuated glass vial at two atmospheres of pressure (15 psig). The self-sealing vial was detached from the sampling system, packaged, labeled, and stored for laboratory analysis.

Prior to the day's field activities all sampling equipment, slide hammer rods and probes were decontaminated by washing with a solution of Alconox (a biodegradable, laboratory-grade detergent) and rinsing thoroughly with distilled water. Internal surfaces were flushed dry using

pre-purified nitrogen or filtered ambient air, and external surfaces were wiped clean using clean paper towels.

All of the samples collected during the field phase of the survey were analyzed in TARGET's on-site mobile laboratory according to EPA Method 602 (modified) on a gas chromatograph equipped with a flame ionization detector (GC/FID), and using direct injection. Analytes selected for standardization were:

- benzene
- toluene
- ethylbenzene
- meta- and para- xylene
- ortho-xylene

These compounds were chosen because of their utility in evaluating the presence of petroleum products such as fuels, lubricating oils, and non-halogenated solvents.

The analytical equipment was calibrated using a 3-point instrument-response curve and injection of known concentrations of the target analytes. Retention times of the standards were used to identify the peaks in the chromatograms of the field samples, and their response factors were used to calculate the analyte concentrations.

Total FID Volatiles values were generated by summing the areas of all integrated chromatogram peaks and calculated using the instrument response factor for toluene. Injection peaks, which also contain the light hydrocarbon methane, were excluded to avoid the skewing of Total FID Volatiles values due to injection disturbances and biogenic methane. For samples with low hydrocarbon concentrations, the calculated Total FID Volatiles concentration is occasionally lower than the sum of the individual analytes. This is because the response factor used for the Total FID Volatiles calculation is a constant, whereas the individual analyte response

factors are compound specific. It is important to understand that the Total FID Volatiles levels reported are relative, not absolute, values.

The tabulated results of the laboratory analysis of the soil gas samples are reported in micrograms per liter ($\mu\text{g/l}$) in Table 1. Although "micrograms per liter" is equivalent to "parts per billion (v/v)" in water analyses, they are not equivalent in gas analyses, due to the difference in the mass of equal volumes of water and gas matrices. The xylenes concentrations reported in the data table are the sum of the m- and p-xylene and the o-xylene concentrations for each sample.

Quality Assurance/Quality Control (QA/QC) Evaluation

Field QA/QC Samples

Field control samples were collected at the beginning and end of each day's field activities. These QA/QC samples were obtained by filtering ambient air through a dust and organic vapor filter cartridge and encapsulating as described above. The laboratory results of the analysis of these samples are reported in Table 1. Concentrations of all analytes were below the reporting limit in all field control samples.

Laboratory QA/QC Samples

A duplicate analysis was performed on every tenth field sample. Laboratory blanks of nitrogen gas were also analyzed after every tenth field sample. The results of these analyses are reported in Table 1. All duplicate analyses were within acceptable limits. Concentrations of all analytes were below the reporting limit in all laboratory blanks.

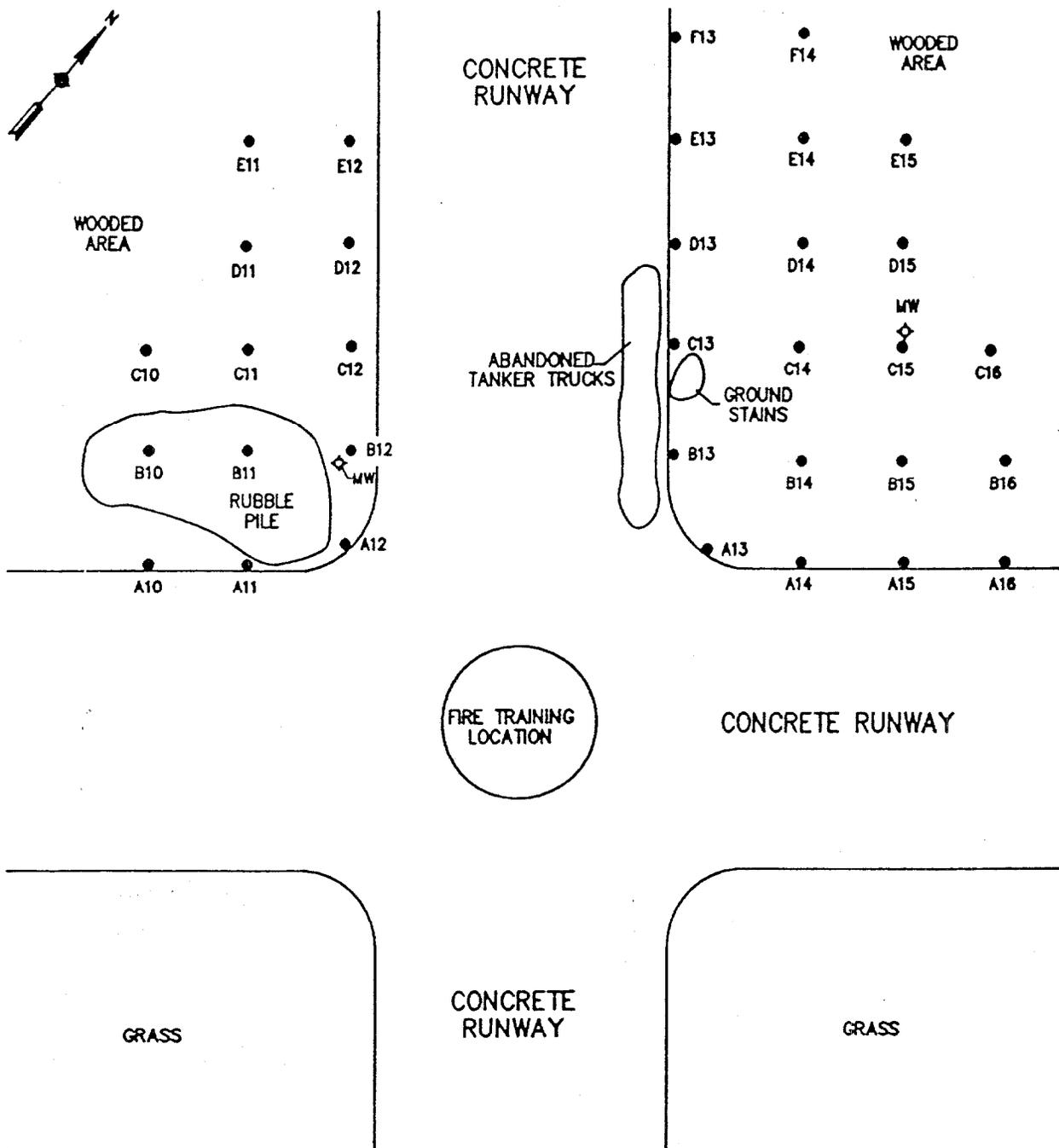


FIGURE 1. Sample Locations

- SOIL GAS SAMPLE LOCATION
- ◇ MONITORING WELL

NALF
FENTRESS, VIRGINIA

TARGET Project MBFV

TABLE 1

ANALYTE CONCENTRATIONS VIA GC/FID ($\mu\text{g/l}$)

SAMPLE	DEPTH (FT)	BENZENE	TOLUENE	ETHYL-		TOTAL FID VOLATILES*
				BENZENE	XYLENES	
REPORTING LMT		1.0	1.0	1.0	1.0	10
A-10	5	<1.0	<1.0	<1.0	<1.0	<10
A-11	5	<1.0	1.3	1.5	3.5	53
A-12	5	<1.0	14	10	22	638
A-13	5	<1.0	<1.0	<1.0	<1.0	<10
A-14	6	<1.0	<1.0	<1.0	<1.0	<10
A-15	7	<1.0	<1.0	<1.0	<1.0	<10
A-16	8	<1.0	<1.0	<1.0	<1.0	<10
B-10	4	<1.0	<1.0	<1.0	<1.0	<10
B-11	4	<1.0	<1.0	<1.0	<1.0	<10
B-12	5	<1.0	<1.0	<1.0	<1.0	<10
B-13	5	<1.0	<1.0	<1.0	<1.0	<10
B-14	4	<1.0	<1.0	<1.0	<1.0	<10
B-15	4	<1.0	<1.0	<1.0	<1.0	<10
B-16	4	<1.0	<1.0	<1.0	<1.0	<10
C-10	4	<1.0	<1.0	<1.0	<1.0	<10
C-11	4	<1.0	<1.0	<1.0	<1.0	<10
C-12	5	<1.0	<1.0	<1.0	<1.0	11
C-13	4	<1.0	21	9.0	19	386
C-14	4	<1.0	<1.0	<1.0	<1.0	<10
C-15	4	<1.0	<1.0	<1.0	<1.0	<10
C-16	4	<1.0	<1.0	<1.0	<1.0	<10
D-11	4	<1.0	<1.0	<1.0	<1.0	<10
D-12	5	<1.0	<1.0	<1.0	<1.0	<10
D-13	5	11	125	10	41	2,360
D-14	4	<1.0	<1.0	<1.0	<1.0	<10
D-15	4	<1.0	<1.0	<1.0	<1.0	<10
E-12	5	<1.0	<1.0	<1.0	<1.0	<10
E-13	5	<1.0	<1.0	<1.0	<1.0	<10
E-11	4	<1.0	<1.0	<1.0	<1.0	<10
E-14	4	<1.0	<1.0	<1.0	<1.0	<10
E-15	4	<1.0	<1.0	<1.0	<1.0	<10
F-13	5	<1.0	<1.0	<1.0	<1.0	<10
F-14	4	<1.0	<1.0	<1.0	<1.0	<10

* CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS AND THE INSTRUMENT RESPONSE FACTOR FOR TOLUENE

TARGET Project MBFV

TABLE 1 (CONT.)

ANALYTE CONCENTRATIONS VIA GC/FID ($\mu\text{g/l}$)

SAMPLE	DEPTH (FT)	BENZENE	TOLUENE	ETHYL- BENZENE	XYLENES	TOTAL FID VOLATILES*
REPORTING LMT		1.0	1.0	1.0	1.0	10
<u>FIELD CONTROL SAMPLES</u>						
101	N/A	<1.0	<1.0	<1.0	<1.0	<10
102	N/A	<1.0	<1.0	<1.0	<1.0	<10
103	N/A	<1.0	<1.0	<1.0	<1.0	<10
104	N/A	<1.0	<1.0	<1.0	<1.0	<10
<u>LABORATORY DUPLICATE ANALYSIS</u>						
B-12	N/A	<1.0	<1.0	<1.0	<1.0	<10
B-12R	N/A	<1.0	<1.0	<1.0	<1.0	<10
C-13	N/A	<1.0	21	9.0	19	386
C-13R	N/A	<1.0	20	8.3	19	347
104	N/A	<1.0	<1.0	<1.0	<1.0	<10
104R	N/A	<1.0	<1.0	<1.0	<1.0	<10
<u>LABORATORY BLANKS</u>						
B-12B	N/A	<1.0	<1.0	<1.0	<1.0	<10
C-13B	N/A	<1.0	<1.0	<1.0	<1.0	<10
104B	N/A	<1.0	<1.0	<1.0	<1.0	<10

* CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS AND THE INSTRUMENT RESPONSE FACTOR FOR TOLUENE

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-121
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location A-14
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 5.5'

REMARKS: Boring advanced on a slightly bermed area. Sample taken: 17-SB-121-03

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-121-01	1.5	<u>3-3-4-5</u> 0920	Top 8" brown top soil with organics, then dark grey/brown CLAY. Trace of F SAND.	0
2 - 4	17-SB-121-02	1.4	<u>5-6-7-9</u> 0922	Top half of spoon same as bottom of last, then grading into brown and grey mottled CLAY. Last 6" damp.	0
4 - 6	17-SB-121-03	1.4	<u>3-3-9-13</u> 0928	Top 1' dark grey CLAY with trace brown CLAY, then rest mottled grey and brown F SAND, wet.	0

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-122
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location B-14
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4.5'

REMARKS: Boring advanced on a slightly bermed area. Samples taken: 17-SB-122-01 and -03

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-122-01	1.5	<u>3-3-4-5</u> 0941	Top 1' brown top soil with organics, then light brown CLAY.	0
2 - 4	17-SB-122-02	1.5	<u>4-5-5-4</u> 0942	Light brown and grey mottled CLAY grading into grey CLAY with some brown CLAY.	0
4 - 6	17-SB-122-03	1.5	<u>7-9-9-7</u> 0943	Top 4" grey CLAY with petroleum odor, then grey F SAND, wet.	5

FOSTER WHEELER ENVIRESPONSE, INC.
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-123
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location C-14
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 3'

REMARKS: Samples taken: 17-SB-123-01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-123-01	1.8	<u>1-2-2-1</u> 1005	Top 4" brown top soil with organics grading into grey and brown CLAY with trace of organics. Petroleum odor.	20
2 - 4	17-SB-123-02	1.8	<u>2-2-2-3</u> 1006	Entire spoon brown and grey CLAY. Last 1' wet. Petroleum odor. Last 2" grey F SAND.	20

FOSTER WHEELER ENVIRONMENTAL INC.
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-124
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location D-14
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-124-01 and -02. Duplicate sample taken: 17-SB-146-01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-124-01	1.6	<u>2-2-2-3</u> 1050	Top 4" brown top soil with organics then light grey CLAY. Slight petroleum odor.	3
2 - 4	17-SB-124-02	1.5	<u>3-3-4-5</u> 1051	Grey and brown mottled CLAY, then last 2" grey F SAND. Last 6" wet.	10

TD = 4 Feet
FENT124.LOG

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-125
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location E-14
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-125-01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-125-01	1.9	2-3-2-2 1107	Top 3" brown top soil with organics, then brown CLAY. Petroleum odor.	14
2 - 4	17-SB-125-02	1.7	3-4-5-5 1108	Entire spoon grey CLAY. Last 1" grey F SAND. Slight petroleum odor. Last 6" wet.	5

TD = 4 Feet
FENT125.LOG

**FOSTER WHEELER ENVIRESPONSE. INC.
TEST BORING**

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-126
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location E-15
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO **SCREEN:** _____ **LENGTH** _____ **TO** _____ **FEET**
GROUND WATER DEPTH: Approximately 3.5'

REMARKS: Samples taken: 17-SB-126-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-126-01	1.8	<u>3-4-4-3</u> 1123	Top 6" brown top soil with organics, then grey CLAY.	0
2 - 4	17-SB-126-02	1.6	<u>3-5-4-4</u> 1124	Grey and brown mottled CLAY top half, then grey and brown mottled F SAND. Last 6" wet.	0

FOSTER WHEELER ENVIRESPONSE. INC.
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-127
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location D-15
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-127-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-127-01	1.8	<u>3-3-3-3</u> 1141	Top 4" brown top soil with organics, then grey CLAY with trace of organics.	10
2 - 4	17-SB-127-02	0.8	<u>3-4-8-7</u> 1142	6" grey CLAY, then rest grey F SAND. Last 2" wet.	5

TD = 4 Feet
FENT17.LOG

FOSTER WHEELER ENVIRESPONSE. INC.
TEST BORIN

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-128
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location C-15
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO **SCREEN:** _____ **LENGTH** _____ **TO** _____ **FEET**
GROUND WATER DEPTH: Approximately 3.5'

REMARKS: Samples taken: 17-SB-128-01 and -02. Duplicate sample taken: 17-SB-147-01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-128-01	1.8	<u>2-2-3-1</u> 1237	Top 4" brown top soil with organics grading into grey CLAY with trace of organics. Petroleum odor.	20
2 - 4	17-SB-128-02	1.7	<u>2-2-2-2</u> 1238	Top 1.5' same as bottom of last, then rest grey and brown F SAND. Petroleum odor. Last 6" wet.	10

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-129
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location B-15
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 3.5'

REMARKS: Samples taken: 17-SB-129-01 and -02. MS/MSD sample taken: -01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-129-01	1.8	<u>2-3-4-4</u> 1252	Top 4" brown top soil with organics, then brown and grey CLAY with trace of organics.	4
2 - 4	17-SB-129-02	1.6	<u>3-4-5-10</u> 1253	Brown to grey CLAY grading into grey to brown F SAND. Slight petroleum odor. Last 6" wet.	5

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-130
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location B-16
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 3.5'

REMARKS: Samples taken: 17-SB-130-01 and -02. MS/MSD sample taken: -01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-130-01	1.7	<u>5-6-3-3</u> 1311	Top 4" brown top soil with organics, then grey and brown CLAY.	0
2 - 4	17-SB-130-02	1.6	<u>3-5-7-8</u> 1312	Grey and brown CLAY, then last 2" grey F SAND. Last 6" wet.	0

**FOSTER WHEELER-ENVIRESPONSE, INC.
TEST BORING**

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-131
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location A-13
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO **SCREEN:** _____ **LENGTH** _____ **TO** _____ **FEET**
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-131-01 and -02. Duplicate sample taken: 17-SB-148-01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-131-01	1.2	<u>2-5-5-6</u> 1333	Top 6" brown top soil with organics, then 3" fill material, then rest dark brown CLAY with trace of F SAND. Petroleum odor.	0
2 - 4	17-SB-131-02	1.0	<u>4-5-4-5</u> 1334	Brown and grey CLAY with last 1" grey to brown F SAND. Slight petroleum odor. Last 6" wet.	0

FOSTER WHEELER ENVIRESPONSE, INC.
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-132
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location B-13
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES ___ NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 3.5'

REMARKS: Samples taken: 17-SB-132-01 and -02. MS/MSD sample taken: -01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-132-01	1.6	<u>2-6-5-2</u> 1351	Top 2" wet organic materials, then rest solid dark grey CLAY with trace of F SAND. Petroleum odor.	20
2 - 4	17-SB-132-02	1.9	<u>3-3-2-3</u> 1352	Grey CLAY entire spoon. Last 1" grey F SAND. Petroleum odor. Last 6" wet.	20

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-133
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location C-13
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-133-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-133-01	1.3	<u>1-2-1-1</u> 1415	Top 3" wet organic materials, then rest grey CLAY with trace of F SAND.	10
2 - 4	17-SB-133-02	1.6	<u>2-2-3-4</u> 1416	Grey CLAY entire spoon. Last 6" wet.	10

TD = 4 Feet
FENT133.LOG

FOSTER WHEELER ENVIRESPONSE. INC.
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-134
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location D-13
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-134-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-134-01	1.7	3-3-3-3 1430	Top 2" brown top soil with organics, then 3" brown sandy CLAY, then brown CLAY with trace of F SAND. Petroleum odor.	40
2 - 4	17-SB-134-02	1.6	2-2-2-2 1431	Top half same as bottom of last grading into brown and grey mottled CLAY with last 1" grey F SAND. Petroleum odor. Last 1" wet.	50

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-135
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 28, 1993
LOCATION: Soil-Gas Location E-13
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/28/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-135-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-135-01	2.0	<u>3-3-5-5</u> 1447	Top 8" intermittent layers of fill and organics, then 6" brown sandy CLAY, then dark grey CLAY.	0
2 - 4	17-SB-135-02	1.5	<u>3-4-4-4</u> 1448	Entire spoon grey and brown mottled CLAY. Last 1" grey F SAND. Last 3" wet.	0

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-136
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
LOCATION: Soil-Gas Location A-10
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/29/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-136-01 and -02. MS/MSD sample taken: -01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-136-01	1.1	<u>8-7-9-2</u> 0854	Top 2" brown top soil with organics, then dark grey and brown CLAY with a trace of F SAND.	0
2 - 4	17-SB-136-02	1.3	<u>5-7-4-5</u> 0855	Grey and brown mottled CLAY. Last 4" wet.	0

FOSTER WHEELER ENVIRESPONSE, INC.
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-137
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
LOCATION: Soil-Gas Location A-11
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/29/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-137-01 and -02. Duplicate sample taken: 17-SB-149-01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-137-01	0.8	<u>2-4-6-7</u> 0916	Top half brown top soil with organics, then dark brown CLAY with a trace of F SAND.	0
2 - 4	17-SB-137-02	1.3	<u>5-7-5-8</u> 0917	Top half dark brown CLAY with trace of F SAND, then grey and brown mottled CLAY. Last 2" grey F SAND, wet.	0

TD = 4 Feet
FENT137.LOG

FOSTER WHEELER ENVIRESPONSE. INC.
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-138
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
LOCATION: Soil-Gas Location A-12
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/29/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-138-01 and -02. MS/MSD sample taken: -01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-138-01	1.8	<u>2-4-5-8</u> 0928	Top 2" brown top soil with organics, then 3" brown CLAY, then 3" black stained CLAY, then rest brown/grey sandy CLAY. Petroleum odor.	10
2 - 4	17-SB-138-02	1.5	<u>5-5-6-5</u> 0929	Top 6" same as bottom of last, then rest grey CLAY. Petroleum odor. Last 3" wet.	20

FOSTER WHEELER ENVIRESPONSE. INC.
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-139
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
LOCATION: Soil-Gas Location B-12
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/29/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-139-01 and -02. Duplicate sample taken: 17-SB-150-01 and -02

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-139-01	1.4	<u>2-3-4-5</u> 0945	Top 2" brown top soil with organics, then 8" brown sandy CLAY, then rest brown CLAY. Petroleum odor.	0
2 - 4	17-SB-139-02	1.2	<u>5-7-7-9</u> 0946	Top 2" same as bottom of last, then rest grey and brown mottled CLAY. Last 2" wet.	3

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-140
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
LOCATION: Soil-Gas Location C-12
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/29/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-140-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-140-01	1.6	<u>2-3-3-5</u> 1004	Top 2" brown top soil with organics, then 8" brown sandy CLAY, then rest black stained sandy CLAY.	0
2 - 4	17-SB-140-02	1.5	<u>7-5-3-5</u> 1005	Dark grey CLAY grading into very dark grey CLAY. Last 3" wet.	0

**FOSTER WHEELER ENVIRESPONSE. INC.
TEST BORING**

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-141
 PROJECT NO./NAME: Fentress - Navy Clean
 GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
 LOCATION: Soil-Gas Location D-11
 DRILLING CONTRACTOR: McCallum Testing
 DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
 SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
 START/FINISH DATE: 4/29/93

WELL INSTALLED? YES ___ NO SCREEN: _____ LENGTH _____ TO _____ FEET
 GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-141-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-141-01	1.7	<u>2-2-3-4</u> 1016	Top 2" brown top soil with organics, then dark grey CLAY grading into light grey CLAY.	0
2 - 4	17-SB-141-02	1.6	<u>4-5-7-12</u> 1017	Entire spoon brown and grey mottled CLAY. Last 1" grey_sandy CLAY. Last 3" wet.	0

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-142
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
LOCATION: Soil-Gas Location E-12
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/29/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken; 17-SB-142-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-142-01	1.4	<u>2-6-5-5</u> 1030	Top 2" brown top soil with organics, then brown/grey sandy CLAY grading into dark grey CLAY.	0
2 - 4	17-SB-142-02	1.8	<u>3-3-3-3</u> 1031	Entire spoon dark grey CLAY. Last 3" wet.	0

TD = 4 Feet
FENT142.LOG

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-143
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
LOCATION: Soil-Gas Location F-14
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/29/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken; 17-SB-143-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-143-01	1.5	<u>2-3-3-3</u> 1044	Top 3" brown top soil with organics, then 8" dark grey crumbly CLAY, then rest grey CLAY.	0
2 - 4	17-SB-143-02	1.4	<u>4-3-4-6</u> 1045	Entire spoon grey CLAY. Last 3" wet.	0

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-144
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
LOCATION: Soil-Gas Location A-15
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/29/93

WELL INSTALLED? YES ___ NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 4'

REMARKS: Samples taken: 17-SB-144-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-144-01	1.7	<u>2-7-6-6</u> 1113	Top 3" brown top soil with organics, then 8" dark grey CLAY, then rest brown sandy CLAY.	0
2 - 4	17-SB-144-02	1.6	<u>4-6-6-4</u> 1114	Entire spoon grey CLAY. Last 4" wet.	0

FOSTER WHEELER ENVIRONMENTAL INC
TEST BORING

OC-00137-03.13-10/01/93

BORING NO.: 17-SB-145
PROJECT NO./NAME: Fentress - Navy Clean
GEOLOGIST/OFFICE: M. Schmidt/LIVINGSTON

DATE: April 29, 1993
LOCATION: Soil-Gas Location A-16
DRILLING CONTRACTOR: McCallum Testing
DRILLER: Tom Jones

DRILLING EQUIPMENT/METHOD: ATV Rig/Hollow Stem Auger
SAMPLE METHOD: Splitspoon

SIZE/TYPE OF BIT: 4 1/4" ID HSA
START/FINISH DATE: 4/29/93

WELL INSTALLED? YES NO SCREEN: _____ LENGTH _____ TO _____ FEET
GROUND WATER DEPTH: Approximately 3.5'

REMARKS: Samples taken: 17-SB-145-01 and -02.

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0 - 2	17-SB-145-01	1.5	<u>3-4-3-3</u> 1123	Top 2" brown top soil with organics, then next 4" brown CLAY with black, ash-like lenses, then brown CLAY.	0
2 - 4	17-SB-145-02	1.9	<u>4-4-4-4</u> 1124	Entire spoon grey CLAY. Last 6" wet.	0

OC-00137-03.13-10/01/93



90776

**CHAIN-OF-CUSTODY RECORD
Analytical Request**

Water Wheeler
8 Peach Tree Hill Rd.
Livingston, NJ 07039
201-535-2215

Report To: Jim Emery
Bill To: ~~John~~
P.O. # / Billing Reference
Project Name / No. Leffress

Pace Client No.
Pace Project Manager
Pace Project No.
*Requested Due Date: Standard

By (PRINT): Michael Schmidt
Signature: Michael Schmidt Date Sampled: 4/27/93

NO. OF CONTAINERS	PRESERVATIVES				ANALYSES REQUEST				REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	TCL VOCs	TML Metals	Cr+6, Cl, SO ₄ , ALKAL	TOC	

	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.	NO. OF CONTAINERS	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	TCL VOCs	TML Metals	Cr+6, Cl, SO ₄ , ALKAL	TOC	Temperature	REMARKS
1	14-FB-01	1325	Water		6	✓	✓	✓	✓	✓	✓	✓	✓		
2	14-GW-206-ER	1340	Water		6	✓	✓	✓	✓	✓	✓	✓	✓		
3	14-GW-206	1400	Water		6	✓	✓	✓	✓	✓	✓	✓	✓		
4	14-GW-206D	1420	Water		6	✓	✓	✓	✓	✓	✓	✓	✓		
5	14-GW-204	1445	Water		6	✓	✓	✓	✓	✓	✓	✓	✓		
6	14-GW-207	1510	Water		6	✓	✓	✓	✓	✓	✓	✓	✓		
7	14-GW-207D	1530	Water		6	✓	✓	✓	✓	✓	✓	✓	✓		
8	Temperature Blank	-	Water		1	✓							✓		

COOLER NOS.	BAILERS	SHIPMENT METHOD	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
			1 Michael Schmidt / Pace			

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90777

CHAIN-OF-CUSTODY RECORD Analytical Request

Customer: Foster Wheeler
8 Peach Tree Hill Rd.
Livingston, NJ 07039
201-535-2215

Report To: Jim Emery
Bill To: _____
P.O. # / Billing Reference _____
Project Name / No. _____

Pace Client No. _____
Pace Project Manager _____
Pace Project No. _____
*Requested Due Date: Standard

Collected By (PRINT): Michael Schmidt
Signature: Michael Schmidt Date Sampled: 4/27/93

NO. OF CONTAINERS	PRESERVATIVES				ANALYSES REQUEST	REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		
3				✓	TCL VOCs	
1						Trip Blank - 1
2						
3						
4						
5						
6						
7						
8						

COOLER NOS.	TRAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
OUT DATE	RETURNED DATE							
				2	<u>Michael Schmidt / PW</u>			

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90778

CHAIN-OF-CUSTODY RECORD
Analytical Request

Foster Wheeler
8 Peach Tree Hill Rd.
Livingston, NJ 07039
201-535-2215

Report To: Jim Emery
Bill To: _____
P.O. # / Billing Reference _____
Project Name / No. Fentress

Pace Client No. _____
Pace Project Manager _____
Pace Project No. _____
Requested Due Date: Standard

Requested By (PRINT): Michael Schmidt
Signature: Michael Schmidt Date Sampled: 4/27/93

NO. OF CONTAINERS	PRESERVATIVES				ANALYSES REQUEST	REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		
					TCL VOCs TSA Metals Cr, Ni, Cd, Se, Pb, ALKAL TOC Temperature	

NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	ANALYSES REQUEST	REMARKS
1	14-GW-203	1660	Water		6	✓	✓	✓	✓	✓	
2	14-GW-211	1605	Water		6	✓	✓	✓	✓	✓	
3	14-GW-202	1635	Water		6	✓	✓	✓	✓	✓	
4	14-GW-2020	1655	Water		6	✓	✓	✓	✓	✓	
5	14-GW-201	1715	Water		6	✓	✓	✓	✓	✓	
6	14-GW-205	1740	Water		6	✓	✓	✓	✓	✓	
7	Temperature Blank	-	Water		1	✓				✓	
8	Trip Blank-2		Water		2	✓				✓	

COOLER NOS.	RAILERS	EQUIPMENT METHOD	OUT DATE	RETURNED DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					1	Michael Schmidt / FW			
Additional Comments									

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90779

CHAIN-OF-CUSTODY RECORD
Analytical Request

Foster Wheeler
8 Peach Tree Hill Rd.
Livingston, NJ 07039
201-535-2215

Report To: Jim Emery
Bill To: _____
P.O. # / Billing Reference _____
Project Name / No. Fentress

Pace Client No. _____
Pace Project Manager _____
Pace Project No. _____
*Requested Due Date: Standard

Collected By (PRINT): Michael Schmidt
Signature: Michael Schmidt Date Sampled: 4/28/93

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST						REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	TPH	BTEX	ICH VOLS	ICH SVCS	Lead	Temperature	
2					✓	✓	✓					
4					✓	✓	✓	✓	✓			
2					✓	✓						
4					✓	✓	✓	✓	✓			Both MS and MSO in same containers
2					✓	✓						
4					✓	✓	✓	✓	✓			
2					✓	✓						Both MS and MSO in same container
4					✓	✓	✓	✓	✓			

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
OUT DATE	RETURNED DATE							
				1	<u>Michael Schmidt</u>			

Additional Comments
S=Soil

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93

one 201-535-2215

Project Name / No. Fentress

*Requested Due Date: Standard

Sampled By (PRINT): Michael Schmidt

Sampler Signature: Michael Schmidt Date Sampled: 4/28/93

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.		

EM ID	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.
1	17-SB-126-01	1123	Res Soil	2
2	17-SB-126-02	1124	Soil	4
3	17-SB-129-01-MS/MSO	1252	Soil	2
4	17-SB-129-02-MS/MSO	1253	S	4
5	17-SB-130-01	1311	S	2
6	17-SB-130-02	1312	S	4
7	17-SB-130-01-MS/MSO	1311	S	2
8	17-SB-130-02-MS/MSO	1312	S	4

NO. OF CONTAINERS	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	TPH	BIEX	TCH VOCs	TCH SVOCs	Lead	Temperature	REMARKS
2					✓	✓	✓					
4					✓	✓	✓	✓	✓			
2					✓	✓	✓					Both MS and MSO in same containers
4					✓	✓	✓	✓	✓			
2					✓	✓	✓					Both MS and MSO in same container
4					✓	✓	✓	✓	✓			

COOLER NOS.	BAILERS	SHIPMENT METHOD	OUT DATE	RETURNED DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
						<u>Michael Schmidt</u>			

Additional Comments: S=Soil

SEE REVERSE SIDE FOR INSTRUCTIONS



90780

CHAIN-OF-CUSTODY RECORD Analytical Request

Client: Foster Wheeler
 Address: 8 Peach Tree Hill Rd

Bill To: Jim Emery

Pace Client No. _____
 Pace Project Manager _____

OC-00137-03.13-10/01/93



90780

**CHAIN-OF-CUSTODY RECORD
Analytical Request**

Client: Foster Wheeler
 Address: 8 Peach Tree Hill Rd
Livingston, NJ 07039
 Phone: 201-535-2215

Report To: Jim Emery
 Bill To: _____
 P.O. # / Billing Reference _____
 Project Name / No. _____

Pace Client No. _____
 Pace Project Manager _____
 Pace Project No. _____
 *Requested Due Date: Standard

Collected By (PRINT): Michael Schmidt
 Collector Signature: Michael Schmidt Date Sampled: 4/28/93

NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST					REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	TPH	BTEX	TCL VOCs	TCL SVOCs	Lead	
1	17-SB-131-01	1333	S		4					✓	✓	✓	✓	✓		
2	17-SB-131-02	1334	S		2					✓	✓					
3	17-SB-132-01	1351	S		2					✓	✓					
4	17-SB-132-02	1352	S		4					✓	✓	✓	✓	✓		
5	17-SB-132-01-MS/MSD	1351	S		2					✓	✓					MS and MSD
6	17-SB-132-02-MS/MSD	1352	S		4					✓	✓	✓	✓	✓		in same containers
7	17-SB-133-01	1415	S		2					✓	✓					
8	17-SB-133-02	1416	S		4					✓	✓	✓	✓	✓		

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
OUT DATE	RETURNED DATE							
				2	<u>Michael Schmidt</u>			

Additional Comments: S: Soil

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90781

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client: Foster Wheeler
 Address: 8 Peach Tree Hill Rd.
Livingston, NJ 07039
 Phone: 201-535-2215

Report To: Jim Emery
 Bill To: _____
 P.O. # / Billing Reference: _____
 Project Name / No.: _____

Pace Client No.: _____
 Pace Project Manager: _____
 Pace Project No.: _____
 *Requested Due Date: Standard

Prepared By (PRINT): Michael Schmidt
 Preparer Signature: Michael Schmidt Date Sampled: 4/28/93

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST					REMARKS	
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	TPN	BTEX	TCL VOCs	TCL SVOCs	Lead		Temperature
2					✓	✓	✓					
5					✓	✓	✓	✓	✓			
2					✓	✓						
4					✓	✓	✓	✓	✓			
4					✓	✓	✓	✓	✓			
2					✓	✓						
3					✓		✓					
1					✓					✓		

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
OUT DATE	RETURNED DATE							
				3	<u>Michael Schmidt</u>			

Additional Comments: S: Soil

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90782

**CHAIN-OF-CUSTODY RECORD
Analytical Request**

Client: Foster Wheeler
 Address: 8 Peach Tree Hill Rd
Livingston, NJ 07039
 Phone: 201-535-2215

Report To: Jim Emery
 Bill To: _____
 P.O. # / Billing Reference: _____
 Project Name / No.: _____

Pace Client No.: _____
 Pace Project Manager: _____
 Pace Project No.: _____
 *Requested Due Date: Standard

Sampled By (PRINT): Michael Schmidt
 Sampler Signature: Michael Schmidt Date Sampled: 4/28-29/93

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST					REMARKS	
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	TPH	STEX	TCL VOCs	TCL SVOCs	Leach		Temperature
4					✓	✓	✓	✓	✓			
2					✓	✓						
4					✓	✓	✓	✓	✓			
2					✓	✓						
4					✓	✓	✓	✓	✓			
2					✓	✓						
4					✓	✓	✓	✓	✓			
1					✓					✓		

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.
1	17-SB-121-03	0928	S	
2	17-SB-122-01	0941	S	
3	17-SB-122-03	0943	S	
4	17-SB-123-01	1005	S	
5	17-SB-123-02	1006	S	
6	17-SB-124-01	1050	S	
7	17-SB-124-02	1051	S	
8	Temperature Blank	-	W	

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT DATE	RETURNED DATE		<u>Michael Schmidt</u>			

Additional Comments: S: Soil

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90783

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client: Foster Wheeler
 Address: 8 Peach Tree Hill Rd.
Livingston, NJ 07039
 Phone: 201-535-2215

Report To: Jim Emery
 Bill To: _____
 P.O. # / Billing Reference _____
 Project Name / No. _____

Pace Client No. _____
 Pace Project Manager _____
 Pace Project No. _____
 *Requested Due Date: Standard

Collected By (PRINT): Michael Schmidt
 Sampler Signature: Michael Schmidt Date Sampled: 4/28-29/93

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST						REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	TPH	BTEX	TCL VOCs	TCL SVOCs	Lead	Temperature	

ITEM	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.
1	17-SB-149-01	1300	S	
2	17-SB-149-02	1301	S	
3	17-SB-144-01	1113	S	
4	17-SB-144-02	1114	S	
5	17-SB-128-01	1237	S	
6	17-SB-128-02	1238	S	
7	17-SB-125-01	1107	S	
8	17-SB-125-02	1108	S	

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT DATE	RETURNED DATE					
				2	<u>Michael Schmidt</u>			

Additional Comments: S-soil

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90784

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client: Foster Wheeler
 Address: 8 Peach Tree Hill Rd.
Livingston, NJ 07039
 Phone: 201-535-2215

Report To: Jim Emery
 Bill To: _____
 P.O. # / Billing Reference: _____
 Project Name / No.: _____

Pace Client No. _____
 Pace Project Manager _____
 Pace Project No. _____
 *Requested Due Date: Standard

Collected By (PRINT): Michael Schmidt
 Sampler Signature: Michael Schmidt Date Sampled: 4/28-29/93

NO. OF CONTAINERS	PRESERVATIVES				ANALYSES REQUEST						REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	TPH	BTEX	ICL VOCs	ICL SVOCs	Lead	
4					✓	✓	✓	✓	✓		
2					✓	✓					
4					✓	✓	✓	✓	✓		
2					✓	✓					
2					✓	✓					
4					✓	✓	✓	✓	✓		
2					✓	✓					
4					✓	✓	✓	✓	✓		

ITEM	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.
1	17-SB-147-01	1615	S	
2	17-SB-147-02	1616	S	
3	17-SB-127-01	1141	S	
4	17-SB-127-02	1142	S	
5	17-SB-146-01	1600	S	
6	17-SB-146-02	1601	S	
7	17-SB-129-01	1252	S	
8	17-SB-129-02	1253	S	

COOLER NOS.	BAGS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
OUT DATE	RETURNED DATE							
				3	<u>Michael Schmidt</u>			

Additional Comments: S-Soil

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90785

**CHAIN-OF-CUSTODY RECORD
Analytical Request**

Client: Foster Wheeler
 Address: 8 Peach Tree Hill Rd.
Livingston, NJ 07039
 Phone: 201-535-2215

Report To: Jim Emery
 Bill To: _____
 P.O. # / Billing Reference _____
 Project Name / No. _____

Pace Client No. _____
 Pace Project Manager _____
 Pace Project No. _____
 *Requested Due Date: Standard

Collected By (PRINT): Michael Schmidt
 Collector Signature: Michael Schmidt Date Sampled: 4/28-29/93

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST					REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	TOPN	BTEX	TCL VOCs	TCL SVOCs	Lead	
2					/	/	/	/	/	/	
4					/	/	/	/	/	/	
3					/						
3					/						
3					/						

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.
1	17-SB-145-01	1123	S	
2	17-SB-145-02	1124	S	
3	Trip Blank-4	-	W	
4	17-FB-01	0900	W	
5	17-SB-121-ER	0930	W	
6				
7				
8				

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
OUT DATE	RETURNED DATE							
				4	<u>Michael Schmidt</u>			

Additional Comments: S-sol

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90786

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client: Foster Wheeler
 Address: 8 Peach Tree Hill Rd.
Livingston, NT 07039
 Phone: 201-535-2215

Report To: Tim Emery
 Bill To: _____
 P.O. # / Billing Reference _____
 Project Name / No. _____

Pace Client No. _____
 Pace Project Manager _____
 Pace Project No. _____
 *Requested Due Date: Standard

Sampled By (PRINT): Michael Schmidt
 Sampler Signature: Michael Schmidt Date Sampled: 4/29/93

NO. OF CONTAINERS	PRESERVATIVES				ANALYSES REQUEST	REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		
					TPH	
					BTEX	
					TCL VOCs	
					TCL SVOCs	
					Lead	
					Temperature	

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.	NO. OF CONTAINERS	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	ANALYSES REQUEST	REMARKS
1	17-SB-138-01-MS/MSD	0925	S		2					✓	✓ ✓	MS and MSD in same containers
2	17-SB-138-02-MS/MSD	0929	S		4					✓	✓ ✓ ✓ ✓	
3	17-SB-138-01	0928	S		2					✓	✓ ✓	
4	17-SB-138-02	0929	S		4					✓	✓ ✓ ✓ ✓	
5	17-SB-136-01	0854	S		2					✓	✓ ✓	
6	17-SB-136-02	0855	S		4					✓	✓ ✓ ✓ ✓	
7	17-SB-141-01	1016	S		2					✓	✓ ✓	
8	17-SB-141-02	1017	S		4					✓	✓ ✓ ✓ ✓	

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT DATE	RETURNED DATE		<u>Michael Schmidt</u>			

Additional Comments: S: Soil

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90787

CHAIN-OF-CUSTODY RECORD Analytical Request

Client: Foster Wheeler
Address: 8 Peach Tree Hill Rd.
Livingston, NJ 07039
Phone: 201-535-2215

Report To: Tim Emery
Bill To:
P.O. # / Billing Reference
Project Name / No.

Pace Client No.
Pace Project Manager
Pace Project No.
*Requested Due Date: Silanda

Sampled By (PRINT): Michael Schmidt
Sample Signature: Michael Schmidt Date Sampled: 4/29/93

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST					REMARKS	
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	Temp.	TOX	BTEX	TCL VOCs	TCL SVOCs	Lead		Temperature
2					✓	✓	✓	✓	✓	✓		
4					✓	✓	✓	✓	✓	✓		
2					✓	✓	✓	✓	✓	✓		
4					✓	✓	✓	✓	✓	✓		
2					✓	✓	✓	✓	✓	✓		
4					✓	✓	✓	✓	✓	✓		
2					✓	✓	✓	✓	✓	✓		
4					✓	✓	✓	✓	✓	✓		

COOLER NOS.	BAILERS	SHIPMENT METHOD	OUT DATE	RETURNED DATE	ITLM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
						<u>2 / Michael Schmidt</u>			

Additional Comments: S: Soil

SEE REVERSE SIDE FOR INSTRUCTIONS

OC-00137-03.13-10/01/93



90788

**CHAIN-OF-CUSTODY RECORD
Analytical Request**

Client: Foster Wheeler
 Address: 8 Peach Tree Hill Rd.
Livingston, NJ 07039
 Phone: 201-535-2215

Report To: Jim Emery
 Bill To: _____
 P.O. # / Billing Reference _____
 Project Name / No. _____

Pace Client No. _____
 Pace Project Manager _____
 Pace Project No. _____
 *Requested Due Date: Standard

Sampled By (PRINT): Michael Schmidt
 Sampler Signature: Michael Schmidt Date Sampled: 4/29/93

NO. OF CONTAINERS	PRESERVATIVES				ANALYSES REQUEST	REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		
2				Temp. ✓	TPH ✓ BTEX ✓ TCL VOCs ✓ TCL SVOCs ✓ Lead ✓ Temperature ✓	
4				Temp. ✓	TPH ✓ BTEX ✓ TCL VOCs ✓ TCL SVOCs ✓ Lead ✓ Temperature ✓	
2				Temp. ✓	TPH ✓ BTEX ✓ TCL VOCs ✓ TCL SVOCs ✓ Lead ✓ Temperature ✓	
4				Temp. ✓	TPH ✓ BTEX ✓ TCL VOCs ✓ TCL SVOCs ✓ Lead ✓ Temperature ✓	
2				Temp. ✓	TPH ✓ BTEX ✓ TCL VOCs ✓ TCL SVOCs ✓ Lead ✓ Temperature ✓	
4				Temp. ✓	TPH ✓ BTEX ✓ TCL VOCs ✓ TCL SVOCs ✓ Lead ✓ Temperature ✓	
3				Temp. ✓	TPH ✓ BTEX ✓ TCL VOCs ✓ TCL SVOCs ✓ Lead ✓ Temperature ✓	
3				Temp. ✓	TPH ✓ BTEX ✓ TCL VOCs ✓ TCL SVOCs ✓ Lead ✓ Temperature ✓	

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.
1	17-SB-136-01-MS/MSD	0854	S	
2	17-SB-136-02-MS/MSD	0855	S	
3	17-SB-139-01	0945	S	
4	17-SB-139-02	0946	S	
5	17-SB-150-01	1315	S	
6	17-SB-150-02	1316	S	
7	17-FB-2	0830	W	
8	Trip Blank - 3	-	W	
	Temperature Blank	-	W	

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
OUT DATE	RETURNED DATE							
				3	<u>Michael Schmidt</u>			

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

The following page(s) is/are not available.
A search was instituted, however the page(s)
was/were not found.

Appendix D - ANALYTICAL RESULTS
