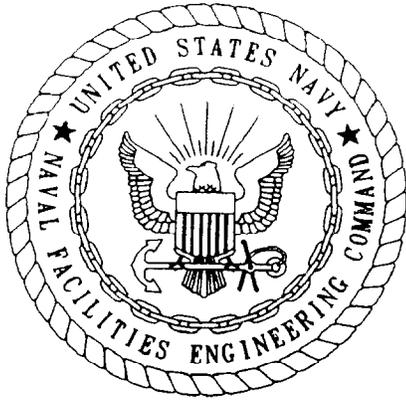


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TECHNICAL MEMORANDUM NOVEMBER 1994 FIELD PROGRAM FOR SITE 11 NSB KINGS
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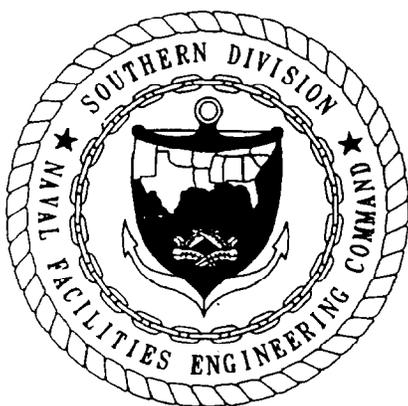


**TECHNICAL MEMORANDUM
NOVEMBER 1994 FIELD PROGRAM**

**SITE 11, OLD CAMDEN COUNTY LANDFILL
NAVAL SUBMARINE BASE KINGS BAY
KINGS BAY, GEORGIA**

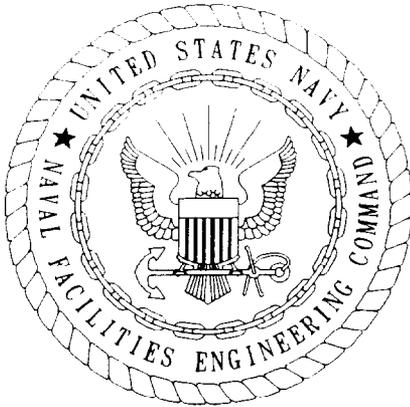
**UNIT IDENTIFICATION CODE (UIC): N42237
CONTRACT NO. N62467-89-D-0317/094**

MAY 1995



**SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
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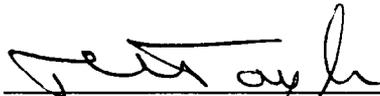


CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/094 are complete, accurate, and comply with all requirements of this contract.

DATE: May 1, 1995

NAME AND TITLE OF CERTIFYING OFFICIAL:



Theodore W. Taylor, P.G.
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NAME AND TITLE OF CERTIFYING OFFICIAL:



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(DFAR 252.227-7036)

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**TECHNICAL MEMORANDUM
NOVEMBER 1994 FIELD PROGRAM
SITE 11, OLD CAMDEN COUNTY LANDFILL**

**NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA**

Unit Identification Code No. N42237

Contract No. N62467-89-D-0317/094

Prepared by:

**ABB Environmental Services, Inc.
2590 Executive Center Circle, East
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Prepared for:

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

Anthony Robinson, Code 18511, Engineer-In-Charge

May 1995



FOREWORD

To meet its mission objectives, the U.S. Navy performs a variety of operations, some requiring the use, handling, storage, or disposal of hazardous materials. Through accidental spills and leaks and conventional methods of past disposal, hazardous materials may have entered the environment in ways unacceptable by today's standards. With growing knowledge of the long-term effects of hazardous materials on the environment, the Department of Defense (DOD) initiated various programs to investigate and remediate conditions related to suspected past releases of hazardous materials at their facilities.

One of these program is the Installation Restoration (IR) program. This program complies with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA), the Resource Conservation and Recover Act (RCRA), and the Hazardous and Solid Waste Amendments (HSWA) of 1984. These acts establish the means to assess and clean up hazardous waste sites for both private-sector and Federal facilities.

The program that has been adopted to address present hazardous material management is RCRA and the HSWA (RCRA/HSWA) corrective action program. RCRA ensures that solid and hazardous wastes are managed in an environmentally sound manner. The law applies to facilities generating or handling hazardous waste. The HSWA corrective action program is designed to identify and clean up releases of hazardous substances at RCRA-permitted facilities.

The RCRA/HSWA program is conducted in four stages as follows.

- RCRA Facility Assessment (RFA),
- RCRA Facility Investigation (RFI),
- Corrective Measures Study (CMS), and
- Corrective Measures Implementation (CMI).

The Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) manages and the USEPA and the Georgia Department of Natural Resources, Environmental Protection Division oversee the Navy environmental program at Naval Submarine Base (NSB), Kings Bay, Georgia. All aspects of the program are conducted in compliance with State and Federal regulations, as ensured by the participation of these regulatory agencies.

Questions regarding the RCRA program at NSB Kings Bay should be addressed to Mr. Anthony Robinson, Code 18511, at (803) 743-0339.

EXECUTIVE SUMMARY

Under contract to the U.S. Department of the Navy (Navy), Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENCOM), this technical memorandum was prepared for Site 11, Old Camden County Landfill, located on the Naval Submarine Base (NSB) in Kings Bay, Georgia. This technical memorandum was prepared under the Comprehensive Long-term Environmental Action, Navy (CLEAN) Contract No. N62467-89-D-0317, Contract Task Order No. 094.

Previous investigations at Site 11, Old Camden County Landfill, indicated that a release of volatile organic compounds (VOC) had occurred. A supplemental Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) program was developed to support both an Interim Measure and development of a site-specific Corrective Action Plan, to collect data to support a Health and Environmental Assessment, and to characterize potentially contaminated media.

The field program conducted in November 1994 included source characterization, surface soil sampling, and sampling of surface water and sediment. Source characterization efforts involved excavation of test trenches in the disposal cells at Site 11, combined with air sampling to evaluate potential VOC emissions from the open trenches. This technical memorandum for the supplemental RFI serves as a transmittal of analytical data for the field event that was conducted in November 1994.

The most noteworthy finding that resulted from the investigative program is that in general the soil and liquid (leachate and/or groundwater) in contact with the waste have only low levels of contamination. Only one of the liquid samples from the trenches contained high concentrations of contaminants relative to other samples from the trenches. The contaminants that were identified at high levels were non-chlorinated solvents that have also been identified in the plume of contaminated groundwater emanating from the landfill. However, chlorinated solvents that are the primary contaminants in groundwater were not detected in samples collected from the disposal cells. This indicates that the source of the solvents may be depleted, is very small relative to the overall size of the landfill, or was possibly a one time disposal of uncontained liquid waste.

The analytical data for surface soil, sediment, and surface water do not indicate that these media have been adversely affected by releases from the waste disposed at Site 11, based on the general absence of organic contaminants.

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GLOSSARY

| | |
|-------------------------|---|
| 4,4'-DDD | 4,4'-dichlorodiphenyl dichloroethane |
| ABB-ES | ABB Environmental Services, Inc. |
| BG | background |
| BHC | benzene hexachloride |
| bls | below land surface |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CLEAN | Comprehensive Long-term Environmental Action, Navy |
| CLP | Contract Laboratory Program |
| D | duplicate sample |
| DDD | dichlorodiphenyl dichloroethane |
| DDE | dichlorodiphenyl dichloroethylene |
| DDT | dichlorodiphenyl trichloroethane |
| DOD | Department of Defense |
| DT | Draeger tube |
| ft. | feet |
| GEPD | Georgia Department of Natural Resources, Environmental Protection Division |
| hr. | hours |
| HS | product sample |
| ID | identification number |
| in. | inches |
| IR | Installation Restoration |
| J | estimated value |
| $\mu\text{g}/\text{kg}$ | micrograms per kilogram |
| $\mu\text{g}/\text{l}$ | micrograms per liter |
| MCL | maximum contaminant level |
| min. | minutes |
| Navy | U.S. Department of the Navy |
| NJ | presumptive evidence for presence of compound at an estimated concentration |
| NSB | Naval Submarine Base |
| PCB | polychlorinated biphenyl |
| RCRA | Resource Conservation and Recovery Act |
| RFA | RCRA Facility Assessment |
| RFI | RCRA Facility Investigation |

GLOSSARY (continued)

| | |
|-----------------------|--|
| SAP | Sampling and Analysis Plan |
| SARA | Superfund Amendments and Reauthorization Act |
| SD | sediment |
| SOUTHNAV- FACENCOM | Southern Division, Naval Facilities, Engineering Command |
| SS | surface soil |
| SVOC | semivolatile organic compound |
| SW | surface water |
| TAL | target analyte list |
| TCL | target compound list |
| TL | trench liquid |
| TS | trench soil |
| USEPA | U.S. Environmental Protection Agency |
| VOA | volatile organic analyte |
| VOC | volatile organic compound |

1.0 INTRODUCTION

Under contract to the U.S. Department of the Navy (Navy), Southern Division, Naval Facilities Engineering Command, this technical memorandum was prepared for Site 11, Old Camden County Landfill, located on the Naval Submarine Base (NSB) in Kings Bay, Georgia. This technical memorandum was prepared under the Comprehensive Long-term Environmental Action, Navy Contract No. N62467-89-D-0317, Contract Task Order No. 094.

The sampling events discussed in this technical memorandum are part of the field sampling events associated with a supplemental Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) being conducted at Site 11. Activities associated with the supplemental RFI are described in the supplemental RFI workplan (ABB Environmental Services, Inc. [ABB-ES], 1994a) and Sampling and Analysis Plan (SAP) (ABB-ES, 1994b). The objective of the supplemental RFI is to support the Interim Measure and the development of a site-specific Corrective Action Plan, Health and Environmental Assessment, and site characterization.

This technical memorandum describes the field activities conducted in November 1994 at Site 11, Old Camden County Landfill, and the nearby residential subdivision. Field activities included collection of surface water and sediment samples, surface soil samples, air samples, and excavation trench soil and liquid samples. An ecological survey was also conducted. A topographic and elevation survey was conducted to locate the surface water and sediment sample locations, the surface soil sample locations, and trenching locations.

Samples were submitted to a contract laboratory for analyses of target compound list (TCL) and target analyte list (TAL) constituents and sulfide. A subset of samples for each media was submitted for analyses for constituents listed in Appendix IX of Part 264 of Title 40 of the Code of Federal Regulations (40 CFR 264). Appendix IX list constituents were analyzed using SW-846 analytical methods (U.S. Environmental Protection Agency [USEPA], 1986). TCL and TAL analyses were performed using Contract Laboratory Program (CLP) protocol. The laboratory analytical reports were submitted to a data validation contractor for evaluation of technical criteria related to data usability. Specific samples collected during the various field activities are discussed in Chapter 2.0. Laboratory analytical results are included in Chapter 3.0.

This technical memorandum is not intended to fully evaluate the analytical data resulting from the field program, but is generally a transmittal of analytical data. The evaluation of the analytical data will continue during the Corrective Measures Study, Health and Environmental Assessment, and preparation of the supplemental RFI report.

2.0 FIELD PROGRAM

Field activities were conducted between November 7 and 22, 1994, and included the following:

- performing a location and elevation survey to locate sampling points identified in the workplan;
- collecting 5 sediment and 5 surface water samples at Porcupine Lake;
- collecting 7 composite surface soil samples from locations at Site 11;
- collecting 14 samples from 13 excavation trenches at Site 11 including 7 subsurface soil samples, 6 liquid samples, and 1 product sample;
- collecting 37 air samples including 11 baseline air samples, 7 perimeter air samples during trench excavation, 12 real time air samples adjacent to the excavation trenches, and 7 air samples from the nearby residential area; and
- performing an ecological survey of Site 11 and surrounding areas including Porcupine Lake.

Guidelines for sampling and decontamination procedures were in accordance with the SAP (ABB-ES, 1994b).

2.1 TOPOGRAPHIC AND ELEVATION SURVEY. A survey of the landfill and surrounding area was conducted on November 7 to 9, 1994, by a Georgia-licensed land surveyor. The survey included horizontal and vertical location of 5 sampling locations in Porcupine Lake in the Crooked River Plantation Subdivision, 10 test trench locations in the landfill, and 35 points associated with 7 grids in and to the east of the landfill and designated for surface soil sampling. The survey of sampling locations was done prior to sampling and was based on locations proposed in the workplan (ABB-ES, 1994b). Because only 10 trenches were planned, three additional trenches that were added were located by field personnel using a tape measure and relative to surveyed locations for other sampling locations.

The survey crew also installed a staff gauge in Porcupine Lake and surveyed the elevation of the zero mark on the gauge and the top of a galvanized pipe on which the gauge is secured. The staff gauge will be used for future correlation of the elevation of the water surface in the lake to groundwater elevation data relative to mean low sea level.

2.2 TEST TRENCH SAMPLING. The purpose of the test trenching was to attempt to characterize the source of contamination by collecting soil and liquid samples from disposal cells in the Old Camden County Landfill and to visually observe and categorize the waste exposed during trenching activities. Ten test trenches were excavated in areas of high magnetic anomalies (possibly suggesting buried metal

containers) in the landfill disposal cells, and near "hot spots" in the plume of contaminated groundwater (Figure 2-1). Because completion of the 10 trenches occurred ahead of schedule, three additional trenches were completed. Trenching activities occurred from November 14 to 23, 1994.

Trench Locations and Dimensions. The first 10 trenches were oriented from northeast by northeast to south by southwest, or perpendicular to the long axis of the disposal cells. The final three trenches were excavated from west by northwest to east by southeast, or parallel to and in the middle of the disposal cells. The locations of Trenches 11 through 13 were selected in areas thought to be in line with contaminated hot spots identified in groundwater. Dimensions for the first 10 trenches varied between 12 and 15 feet wide by 22 to 25 feet long. The dimensions of Trenches 11 through 13 ranged from 6 to 10 feet wide by 50 feet long (for Trenches 12 and 13) to 275 feet long (for Trench 11). Trenches 2 and 11 were excavated from different ends of the same disposal cell.

Trench termination depths were determined based on depth to groundwater and the depth of buried refuse. In each trench, an attempt was made to determine the depth of the burial cell by digging into undisturbed soil below the cell. The depth of the disposal cells did not exceed 12 to 14 feet below land surface (bls). Depth to groundwater ranged from 2 to 5 feet bls.

Trench Contents. The waste uncovered during excavation activities included items such as bottles, paper, cans, household appliances, scrap metal, tires, and 10-gallon metal containers. Trench contents are discussed as investigative findings in Chapter 3.0.

Trench Samples. A total of 14 trench samples were collected consisting of 7 subsurface soil samples, 6 liquid samples, and 1 product sample. Six subsurface soil samples, including one duplicate sample, and five liquid samples, including one duplicate sample, were submitted for analyses for TCL and TAL constituents. One soil sample and one liquid sample were submitted for analyses of Appendix IX constituents (USEPA, 1986). Sulfide was analyzed in all of the soil samples. The product sample was analyzed for RCRA F-listed solvents, base and neutral fraction semivolatile organic compounds (SVOCs), and pH. Sample designations and constituents analyzed are included in Table 2-1.

2.3 AIR SAMPLING. Sampling and analyses of air samples were conducted in accordance with USEPA Method TO-14. Parameters for analyses included TCL volatile organic compounds (VOCs). The samples were collected over 2- to 9-hour periods at a flow rate of approximately 0.15 liter per minute using Summa® canisters with pressure activated sampling valves. Real time air samples were also collected using Draeger colorimetric sampling tubes (Draeger tubes). Air sample locations are shown on Figure 2-2. Sample designations and constituents analyzed are included in Table 2-2.

2.3.1 Baseline Air Quality Sampling Prior to the test trenching activities, baseline air quality sampling in the landfill area was conducted between November 8 to 10, 1994, for 2- to 7-hour periods. Eleven air samples, including one duplicate sample, were collected for laboratory analyses.

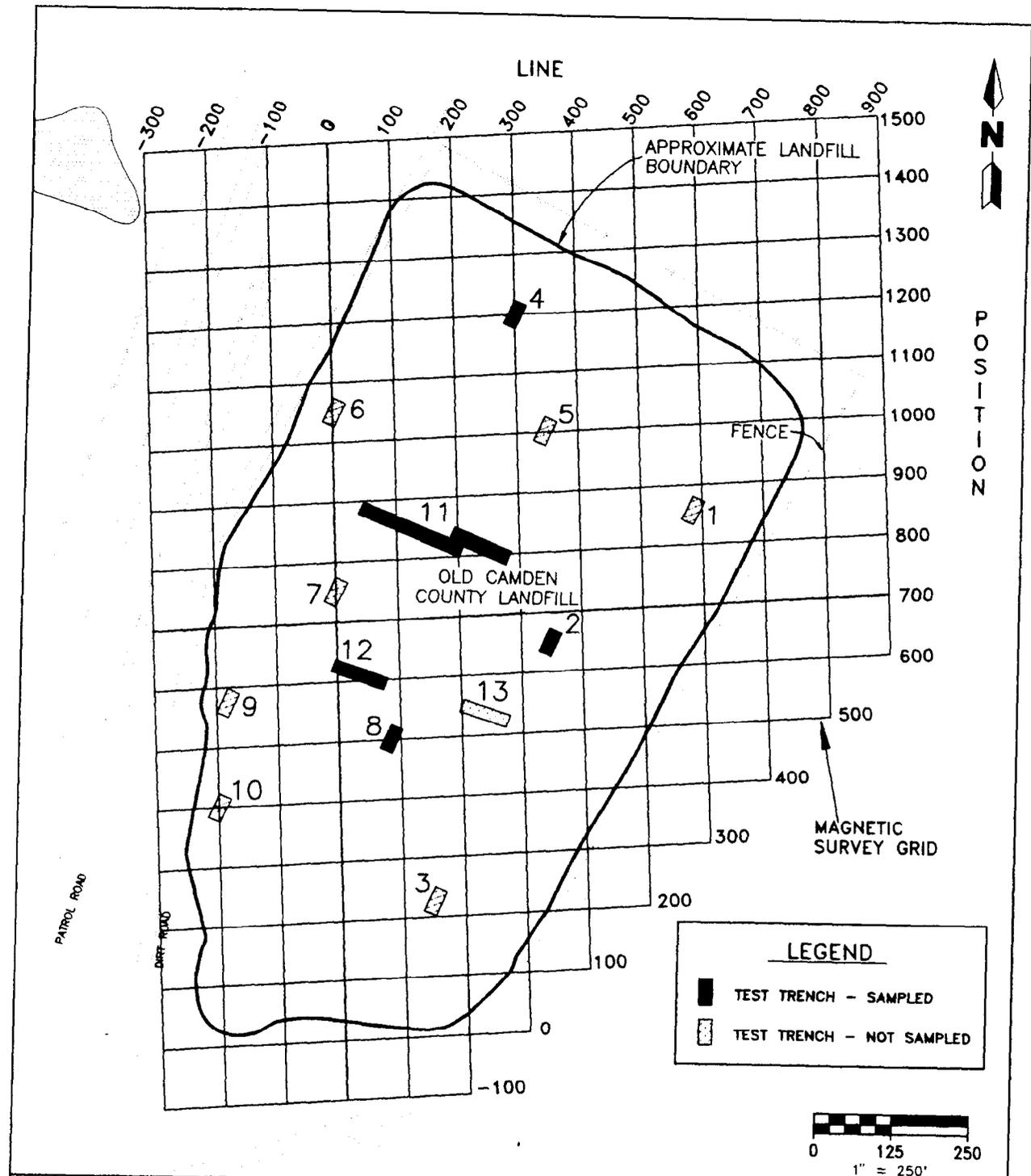


FIGURE 2-1
TEST TRENCH LOCATIONS



TECHNICAL MEMORANDUM
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KINGS BAY, GEORGIA

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**Table 2-1
Summary of Excavation Trench Samples Collected**

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Date | Sample ID ¹ | Location | Media | Analytes |
|----------|------------------------|-----------|----------|-------------------|
| 11/16/94 | 11TL02 | Trench 2 | Liquid | TCL and TAL |
| | 11TS02 | Trench 2 | Soil | TCL and TAL |
| 11/17/94 | 11TL04 | Trench 4 | Liquid | TCL and TAL |
| | 11TS04 | Trench 4 | Soil | TCL and TAL |
| 11/18/94 | 11TL07 11TL07D | Trench 7 | Liquid | TCL and TAL |
| | 11TS07 11TS07D | Trench 7 | Soil | TCL and TAL |
| | 11/19/94 | 11TL08 | Trench 8 | Liquid |
| | 11TS08 | Trench 8 | Soil | Appendix IX |
| 11/22/94 | 11TL11 | Trench 11 | Liquid | TCL and TAL |
| | 11TS11 | Trench 11 | Soil | TCL and TAL |
| | 11TS12 | Trench 12 | Soil | TCL and TAL |
| | 11HS11A | Trench 11 | Product | VOA, pH, and SVOC |

¹ Quality assurance and quality control samples are not included in this table.

Notes: ID = identification number.
 TL = trench liquid.
 TCL = target compound list.
 TAL = target analyte list.
 TS = trench soil.
 D = duplicate sample.
 Appendix IX = Appendix IX of Title 40, Part 264, Code of Federal Regulations.
 HS = liquid compound.
 VOA = volatile organic analyte.
 SVOC = semivolatile organic compound.

**Table 2-2
Summary of Air Samples Collected**

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Date | Sample ID ¹ | Sample Type | Location | Run Time | Duration |
|----------|------------------------|-------------|----------|--------------|----------------|
| 11/8/94 | 11AIR101 | Baseline | Downwind | 0815 to 1240 | 4 hr., 25 min. |
| | 11AIR102 | Baseline | Downwind | 0822 to 1557 | 7 hr., 35 min. |
| | 11AIR102D | | | | |
| 11/9/94 | 11AIR103 | Baseline | Upwind | 0828 to 1603 | 7 hr., 35 min. |
| | 11AIR104 | Baseline | Downwind | 0811 to 1120 | 3 hr., 9 min. |
| | 11AIR104D | Baseline | Downwind | 0811 to 1702 | 8 hr., 15 min. |
| | 11AIR105 | Baseline | Downwind | 0805 to 1513 | 7 hr., 8 min. |
| 11/10/94 | 11AIR106 | Baseline | Upwind | 0815 to 1232 | 4 hr., 17 min. |
| | 11AIR107 | Baseline | Upwind | 0855 to 1614 | 7 hr., 19 min. |
| | 11AIR108 | Baseline | Downwind | 0850 to 1726 | 8 hr., 36 min. |
| 11/18/94 | 11AIR108D | | | | |
| | 11AIR109 | Baseline | Downwind | 0845 to 1729 | 8 hr., 44 min. |
| | 11AIR110 | Perimeter | Downwind | 0859 to 1456 | 5 hr., 57 min. |
| 11/20/94 | 11AIR111 | Perimeter | Downwind | 0854 to 1451 | 5 hr., 57 min. |
| | 11AIR111D | | | | |
| | 11AIR112 | Perimeter | Upwind | 0851 to 1537 | 7 hr., 46 min. |
| 11/15/94 | 11AIR116 | Perimeter | Downwind | 0908 to 1121 | 2 hr., 13 min. |
| | 11AIR117 | Perimeter | Downwind | 0909 to 1118 | 2 hr., 9 min. |
| | 11AIR117D | | | | |
| 11/16/94 | 11AIR118 | Perimeter | Upwind | 0911 to 1115 | 2 hr., 4 min. |
| | 11DT-1 | Trench 1 | Upwind | 1000 | -- |
| | 11DT-2 | Trench 1 | Downwind | 1010 | -- |
| 11/17/94 | 11DT-3 | Trench 7 | Upwind | 0917 | -- |
| | 11DT-4 | Trench 7 | Downwind | 0942 | -- |
| | 11DT-5 | Trench 7 | Downwind | 1144 | -- |
| | 11DT-6 | Trench 8 | Upwind | 1700 | -- |
| | 11DT-7 | Trench 8 | Downwind | 1720 | -- |
| 11/18/94 | 11DT-8 | Trench 6 | Upwind | 0915 | -- |
| | 11DT-9 | Trench 6 | Downwind | 0930 | -- |
| | 11DT-10 | Trench 6 | Downwind | 1032 | -- |
| | 11DT-11 | Trench 5 | Upwind | 1440 | -- |
| | 11DT-12 | Trench 5 | Downwind | 1505 | -- |
| 11/20/94 | 11AIR113 | Residential | Downwind | 0911 to 1523 | 6 hr., 12 min. |
| | 11AIR114 | Residential | Downwind | 0920 to 1336 | 4 hr., 16 min. |
| | 11AIR114D | | | | |
| 11/20/94 | 11AIR115 | Residential | Downwind | 0925 to 1556 | 6 hr., 31 min. |
| | 11AIR119 | Residential | Downwind | 0850 to 1132 | 2 hr., 42 min. |
| | 11AIR120 | Residential | Downwind | 0854 to 1134 | 2 hr., 40 min. |
| | 11AIR121 | Residential | Downwind | 0857 to 1131 | 2 hr., 33 min. |

See notes at end of table.

Table 2-2 (Continued)
Summary of Air Samples Collected

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

¹ Quality assurance and quality control samples are not included in this table.

Notes: Analyses for all Summa® canister air samples include volatile organic compounds. Draeger tube sample results were obtained by observation of the colorimetric tubes immediately upon collection.

ID = identification.
hr. = hours.
min. = minutes.
D = duplicate sample.
DT = Draeger tube sample.

2.3.2 Air Monitoring During Excavation Air monitoring during the test trenching activities included grab sample measurements near the trenches, perimeter monitoring of the landfill area, and nearby residential monitoring.

Real Time Measurements During Excavation. Grab samples were collected during trench excavation using Draeger tubes designed to detect vinyl chloride. One to two upwind samples and one to three downwind samples were collected during excavation of Trenches 1, 5, 6, 7, and 8. A total of 12 samples were collected between November 14 and 17, 1994.

Perimeter Monitoring During Excavation. Eight air samples, including two duplicate samples, were collected for laboratory analyses from perimeter areas of the landfill during trenching activities. Samples were collected between November 18 and 20, 1994.

Residential Air Monitoring During Excavation. Seven air samples, including one duplicate sample, were collected for laboratory analyses in the nearby residential area during trenching activities between November 18 and 20, 1994, to evaluate the potential for exposure of offsite receptors to VOCs in the air.

2.4 SURFACE SOIL SAMPLING. Surface soil samples were collected on November 10 and 11, 1994, from seven grids in and to the east of the landfill (Figure 2-3). The seven grids include two to the east of the landfill (background) and five in the landfill. Five surface soil samples from the landfill, including one duplicate sample, and one background surface soil sample were submitted for analyses for TCL and TAL constituents. One of the background samples and one sample from the landfill were submitted for analyses of Appendix IX constituents (40 CFR 264). Sulfide was analyzed in all samples. Sample designations and constituents analyzed are included in Table 2-3.

2.5 SURFACE WATER AND SEDIMENT SAMPLING. Surface water and sediment samples were collected on November 8 and 9, 1994, from Porcupine Lake in the Crooked River Plantation Subdivision (Figure 2-4). Six samples of each media were collected. Five sediment samples, including one duplicate sample, and five surface water samples, including one duplicate sample, were submitted to a contract laboratory for analyses of TCL and TAL constituents and sulfide. One sediment and one surface water sample were submitted for analyses for Appendix IX constituents (40 CFR 264). Sample designations and constituents analyzed are included in Table 2-4.

2.6 ECOLOGICAL SURVEY. An ecological aquatic and terrestrial survey was conducted in the area in and around the landfill on November 7 to 9, 1994. Natural Resource Department personnel at the NSB were interviewed and provided information and reference material related to habitat and endangered, rare, or threatened species known or potentially present in the study area. Personnel conducted a walkover survey of Site 11 and surrounding area. Aquatic flora and fauna in Porcupine Lake adjacent to Site 11 were observed during the surface water and sediment sampling activity. Samples of sediment from each of the five

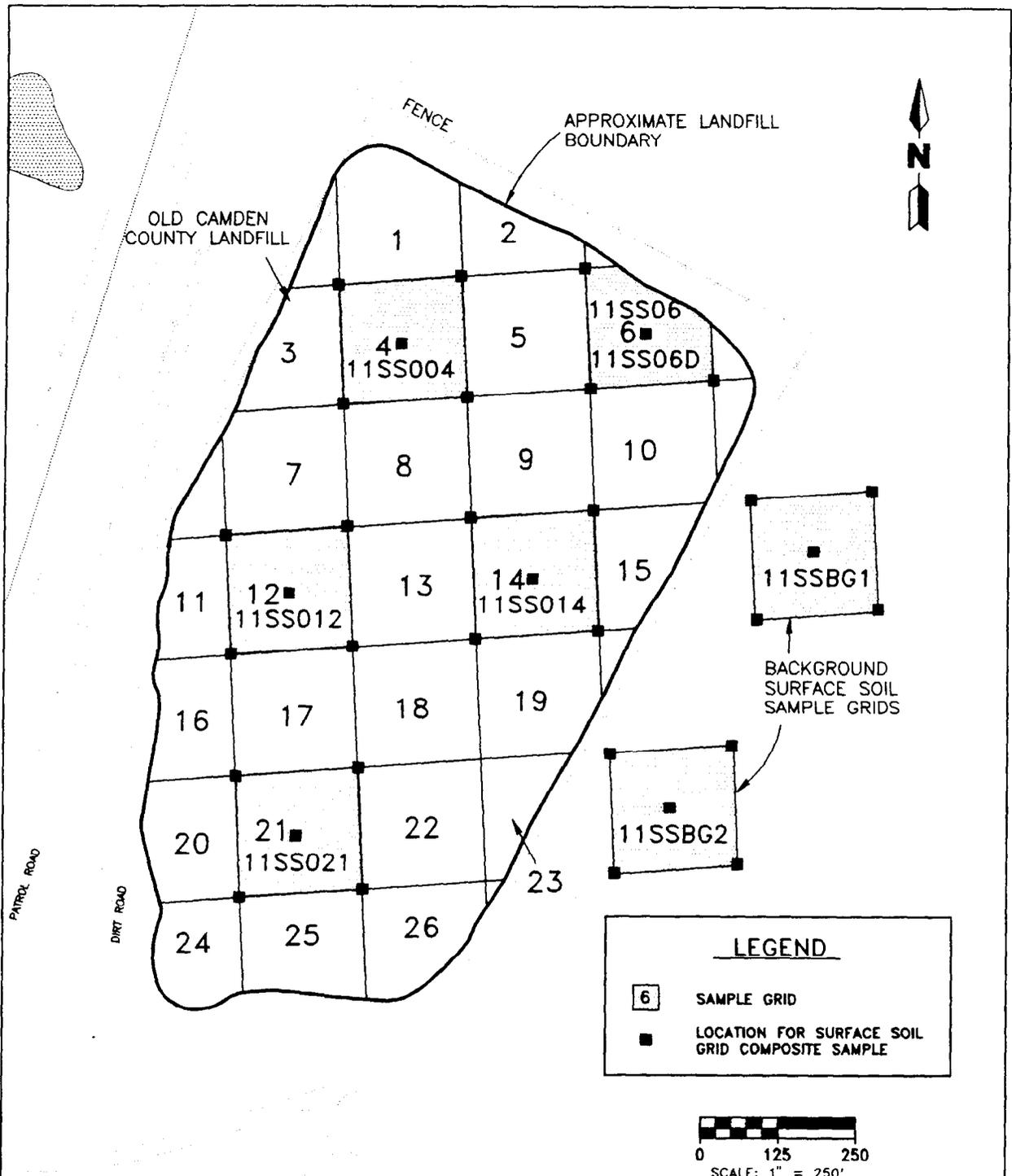


FIGURE 2-3

LOCATIONS FOR COMPOSITE SURFACE SOIL SAMPLES AND SEDIMENT AND SURFACE WATER SAMPLE LOCATIONS



TECHNICAL MEMORANDUM
NOVEMBER 1994
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NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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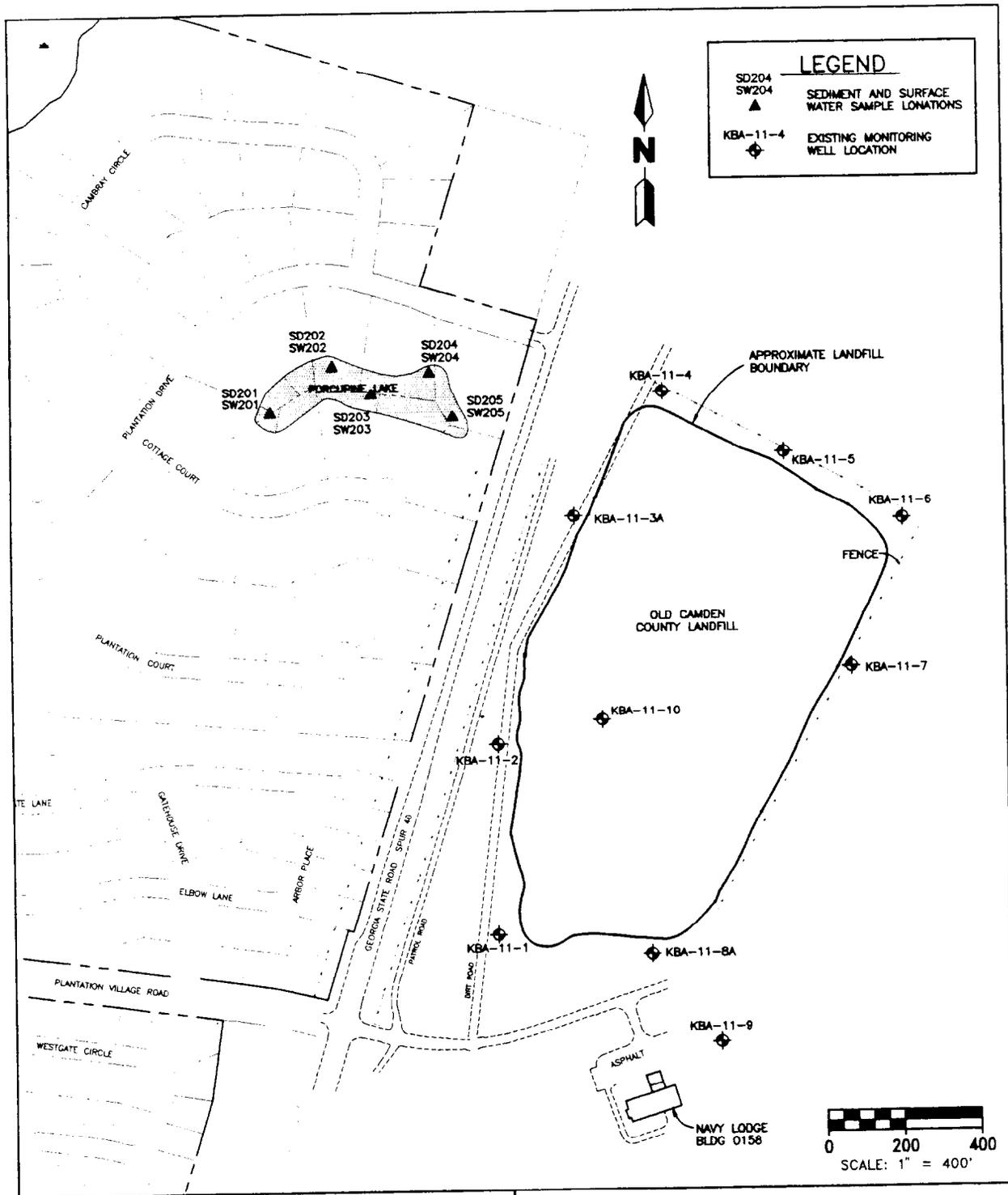


FIGURE 2-4

SEDIMENT AND SURFACE WATER
SAMPLE LOCATIONS



TECHNICAL MEMORANDUM
NOVEMBER 1994
FIELD PROGRAM

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

**Table 2-4
Summary of Surface Water and Sediment Samples Collected**

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Date | Sample ID ¹ | Sample Depth | Media | Analytes |
|------------------|------------------------|--------------|---------------|---------------|
| November 8, 1994 | 11SW201 | 4 ft., 7 in. | Surface water | TCL and TAL |
| | 11SD201 | 5 ft., 7 in. | Sediment | TCL and TAL |
| | 11SW202 11SW202D | 5 ft., 8 in. | Surface water | TCL and TAL |
| | 11SD202 11SD202D | 6 ft., 8 in. | Sediment | TCL and TAL |
| | November 9, 1994 | 11SW203 | 4 ft., 0 in. | Surface water |
| | 11SD203 | 5 ft., 0 in. | Sediment | TCL and TAL |
| | 11SW204 | 4 ft., 8 in. | Surface water | TCL and TAL |
| | 11SD204 | 5 ft., 8 in. | Sediment | TCL and TAL |
| | 11SW205 | 4 ft., 3 in. | Surface water | Appendix IX |
| | 11SD205 | 5 ft., 3 in. | Sediment | Appendix IX |

¹ Quality assurance and quality control samples are not included in this table.

Notes: ID = identification number. SW = surface water.
ft. = feet. in. = inches.
TCL = target compound list. TAL = target analyte list.
SD = sediment. D = duplicate sample.
Appendix IX = Appendix IX of Title 40, Part 264, Code of Federal Regulations.

sample locations were collected and submitted for qualitative analyses. These analyses include identification of taxa and calculation of species diversity. Findings of the ecological survey will be reported in the future health and environmental report.

3.0 INVESTIGATIVE RESULTS

Site data collected for purposes of contaminant characterization are evaluated relative to background concentrations to assess whether waste disposal has adversely affected environmental media. Decisions regarding corrective action to reduce contaminant levels or contain contaminants within the disposal area are based on regulations governing the site and individual contaminants. Therefore, contaminants may be identified based on comparison to background levels, but they do not require corrective action because regulatory limits are not exceeded. Conversely, regulatory limits may be lower than site background levels, in which case the background level would replace the regulatory limit.

The concentrations that are considered representative of conditions unaffected by waste disposal at Site 11 have not been formally submitted to Georgia Department of Natural Resources, Environmental Protection Division (GEPD), and, as such, are not available for use in the discussions presented in this technical memorandum. However, with regard to discussion of analytical data for surface soil samples, data for surface soil samples collected from locations within the boundaries of the site are compared to corresponding data for samples from site background sample locations to the east of the landfill. The following paragraph describes further the basis for discussions presented in this chapter that relate to evaluating the concentrations of analytes detected in samples of environmental media.

In the absence of other promulgated regulations that include values for evaluating acceptable contaminant levels at sites falling under the jurisdiction of Title 40, Code of Federal Regulations, Part 264.101, as incorporated by reference in the Georgia Hazardous Waste Management Rules of Chapter 391-3-11-.10, ABB-ES is currently citing promulgated regulations from Chapter 391-3-19, Hazardous Site Response, GEPD (July 1994), to determine the potential significance of contaminant concentrations detected in samples of environmental media. The requirements of Chapter 391-3-19 are applicable and appropriate requirements for Site 11 because Site 11 is a listed site on the Hazardous Site Inventory under Chapter 391-3-19. The risk reduction standards that are used for comparison to site data are concentrations that trigger corrective action or that demonstrate compliance with requirements under Chapter 391-3-19. However, compliance with the requirements does not preclude the need to comply with any stricter requirements applicable under other State or Federal laws or regulations. Type 1 risk reduction criteria from Chapter 391-3-19 are equal to maximum contaminant levels (MCLs) promulgated under the Safe Drinking Water Act. Chapter 391-3-19 has criteria for many compounds that do not have MCLs as well as criteria for soil and groundwater. Therefore, the Type 1 risk reduction criteria from Chapter 391-3-19 provide the most complete listing of promulgated criteria upon which comparisons can be based.

3.1 SOURCE CHARACTERIZATION. This section discusses results of the trenching effort and associated sampling and analyses. The discussion is divided into subsections that include a description of the waste observed and results of analyses of a product sample, followed by separate discussions presenting results of the trench soil and liquid sampling.

Trench Contents. The disposal cells at the old Camden County Landfill are covered with approximately 2 to 3 feet of fill material. The fill is brown, fine-grained sand with little silt. Most excavations revealed thin (less than 1.0 foot), black, organic-rich, fine-grained sand lenses in the fill. Beneath the fill, a mixture of refuse and disturbed soil extended 7 to 14 feet below where undisturbed soil was encountered. The undisturbed soil is gray, fine-grained sand with little silt.

The waste uncovered in the trenches was primarily household items, such as bottles, paper, cans, household appliances, scrap metal, and tires. Two newspapers, dated February 7, 1979, and March 18, 1979, were found in Trench 7. Unique items included part of a jeep, several shrimp nets, file cabinets, and a motorcycle. Two 10-gallon metal containers constructed of black, painted steel with plastic liners were identified in Trench 2. One metal container appeared to be leaking a brown paint-like substance. The other metal container was leaking an unidentifiable liquid into the groundwater. The liquid leaking from the metal container was green upon release into the groundwater but changed to blue following several seconds exposure to air. Dates between late 1978 to early 1979 were noticed on several of the metal containers. Approximately 20 metal containers were discovered in Trench 11 with size and construction similar to those in Trench 2. One of the metal containers labeled "Monoethanolamine" was seeping a light green liquid. A similar metal container was leaking a clear, viscous liquid and was sampled for laboratory analyses (Sample 11HS11A). Five more metal containers similar to those found in Trenches 2 and 11 were found in Trench 12.

The sample collected from the leaking metal container in Trench 11 was submitted for analyses of base and neutral SVOCs, RCRA F-listed solvents, and pH. All of the results of the analyses are presented in Appendix A. The detection limits for the analyses are necessarily elevated because the material analyzed was a highly concentrated, unknown chemical.

The only analyte detected was naphthalene at an estimated concentration of 8,200 micrograms per liter ($\mu\text{g}/\ell$). Several unidentified compounds are listed on the SVOC analytical report with estimated concentrations ranging from 12,000 to more than 7 million $\mu\text{g}/\ell$. The pH of the sample was 13.

The containers observed in the trenches were basically identical in appearance, but appeared to be leaking different types of liquids. The analytical data for the sample that was collected from one of the containers did not reveal that the material was comprised of the same organic compounds that had contaminated the groundwater. Groundwater contamination is characterized by chlorinated and non-chlorinated solvents that were included in the analyses conducted on the material from the container. Naphthalene was detected in the sample of waste material and has been detected in groundwater samples.

Trench Soil. Table 3-1 summarizes analytical data for analytes that were detected in one or more of the soil samples collected from the disposal cells. Data tables for all compounds analyzed will be presented in the future supplemental RFI report.

Table 3-1
Summary of Laboratory Analyses of Trench Soil Samples Collected

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Compounds Detected | Type I Risk Reduction Standard ¹ | Sample Identification | | | | | | |
|---|---|-----------------------|---------|---------|---------|--------|---------|---------|
| | | 11TS02 | 11TS04 | 11TS07 | 11TS07D | 11TS08 | 11TS11 | 11TS12 |
| Volatile Organic Compound (µg/kg) | | | | | | | | |
| 2-Butanone | 790 | 11 U | 13 U | 12 U | 12 U | 3 J | 12 UJ | 11 U |
| Semivolatile Organic Compounds (µg/kg) | | | | | | | | |
| Acenaphthene | 300,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 24 J | 360 U |
| Anthracene | 500,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 34 J | 360 U |
| Benzo(a)pyrene | 1,640 | 360 U | 420 U | 400 U | 400 U | 410 U | 54 J | 360 U |
| Benzo(b)fluoranthene | 5,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 74 J | 360 U |
| Benzo(ghi)perylene | 500,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 36 J | 360 U |
| Benzo(k)fluoranthene | 5,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 30 J | 360 U |
| di-n-Butylphthalate | 13,700 | 64 J | 420 U | 400 U | 400 U | 410 U | 360 U | 360 U |
| Fluoranthene | 500,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 220 J | 360 U |
| Fluorene | 360,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 22 J | 360 U |
| Indeno(1,2,3-cd)pyrene | 500,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 37 J | 360 U |
| Naphthalene | 100,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 180 J | 360 U |
| Phenanthrene | 110,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 150 J | 360 U |
| Pyrene | 500,000 | 360 U | 420 U | 400 U | 400 U | 410 U | 160 J | 360 U |
| Pesticides (µg/kg) | | | | | | | | |
| 4,4'-DDD | 660 | 3.5 UJ | 3.4 J | 3.9 UJ | 4.1 UJ | 20 U | 4.0 UJ | 3.6 UJ |
| 4,4'-DDE | 660 | 3.5 UJ | 2.3 J | 3.9 UJ | 4.1 UJ | 20 U | 4.0 UJ | 3.6 UJ |
| 4,4'-DDT | 660 | 31 UJ | 4.2 UJ | 3.9 UJ | 4.1 UJ | 20 U | 25 UJ | 32 J |
| Endrin ketone | None | 0.25 NJ | 4.2 UJ | 3.9 UJ | 4.1 UJ | NA | 4.0 UJ | 0.41 NJ |
| Inorganic Analytes (mg/kg) | | | | | | | | |
| Aluminum | None | 1,160 | 1,980 J | 1,460 J | 1,410 J | NA | 2,780 J | 1,640 J |
| Barium | 1,000 | 2.3 J | 4.5 J | 5.3 J | 5.1 J | 2.5 | 7.1 J | 4.5 J |
| Calcium | None | 94.6 U | 274 J | 216 J | 205 J | NA | 2,580 | 545 J |
| Chromium | 100 | 1.3 J | 2.2 J | 2.2 J | 2.2 J | 2.5 U | 3.6 | 1.9 J |
| Cobalt | 20 | 0.43 U | 0.87 J | 0.81 J | 0.74 J | 6.2 U | 0.78 J | 0.73 J |
| Copper | 100 | 0.43 U | 0.51 UJ | 0.48 UJ | 0.59 J | 2.6 | 0.93 J | 0.44 UJ |
| Iron | None | 550 | 607 | 722 | 693 | NA | 1,140 | 838 |
| Lead | 75 | 1.8 | 2.8 | 1.8 | 2.1 | 1.8 | 7.9 | 3 |

See notes at end of table.

Table 3-1 (Continued)
Summary of Laboratory Analyses of Trench Soil Samples Collected

Technical Memorandum
 November 1994 Field Program
 Site 11, Old Camden County Landfill
 Naval Submarine Base Kings Bay
 Kings Bay, Georgia

| Compounds Detected | Type I Risk Reduction Standard ¹ | Sample Identification | | | | | | |
|-----------------------------------|---|-----------------------|--------|--------|---------|--------|--------|--------|
| | | 11TS02 | 11TS04 | 11TS07 | 11TS07D | 11TS08 | 11TS11 | 11TS12 |
| Inorganic Analytes (mg/kg) | | | | | | | | |
| Magnesium | None | 41.8 J | 99.5 J | 92.3 J | 91.5 J | NA | 305 J | 143 J |
| Manganese | None | 3.4 | 11.3 J | 8.9 J | 7.4 J | NA | 14.6 J | 7.9 J |
| Nickel | 50 | 0.77 J | 1.1 J | 0.72 J | 0.58 J | 5 U | 1.1 J | 0.85 J |
| Potassium | None | 22.7 U | 33.7 J | 36.3 J | 34.6 J | NA | 55.7 J | 33.6 J |
| Sodium | None | 109 U | 204 J | 175 J | 176 J | NA | 211 J | 172 J |
| Vanadium | 100/BG | 1.7 J | 3 J | 2.1 J | 2.1 J | 6.2 U | 4.8 J | 2.2 J |
| Zinc | 100 | 3 U | 14.9 | 7.4 U | 7.7 U | 7.4 | 15.7 | 6.7 U |
| Sulfide | None | 55 U | 61 UJ | 62 UJ | 61 UJ | 62 U | 64 J | 54 UJ |

¹ The Type I risk reduction standards are concentrations that trigger corrective action when exceeded under Rules of Chapter 391-3-19, Georgia Department of Natural Resources, Environmental Protection Division, July 1994.

Notes: $\mu\text{g}/\text{kg}$ = micrograms per kilogram.
 U = not detected, sample quantitation limit reported.
 J = estimated value.
 DDD = dichlorodiphenyl dichloroethane.
 DDE = dichlorodiphenyl dichloroethylene.
 DDT = dichlorodiphenyl trichloroethane.
 UJ = reported quantitation limit is estimated.
 mg/kg = milligrams per kilogram.
 NA = not analyzed.
 NJ = presumptive evidence for presence of compound at an estimated concentration.
 /BG = The number preceding the slash is the Type I risk reduction standard unless the background concentration is greater, in which case the background value is the Type I risk reduction standard.

The most notable characteristic of the trench soil is that the soil is relatively free of contamination. The soil samples were collected from material in contact with the disposed waste. Except for a low concentration of 2-butanone in one sample, a common laboratory contaminant, VOCs were not detected in the trench soil samples. VOCs are characterized as having high solubilities and are less likely to adsorb to solids than other potential contaminants such as SVOCs. The SVOC analyses also indicate little or no contamination of soil within the trenches. One of the samples, 11TS11 on Table 3-1, contained detectable concentrations of polycyclic aromatic hydrocarbons at estimated concentrations (flagged with a J qualifier) that range from 22 J to 220 J micrograms per kilogram ($\mu\text{g}/\text{kg}$). All concentrations are well below the corresponding Type 1 standards that trigger corrective action under Rules of Chapter 391-3-19.

Three of the trench soil samples contained detectable concentrations of four pesticide compounds. Concentrations range from 0.25 NJ to 32 J $\mu\text{g}/\text{kg}$. The concentrations are estimated as indicated by the J qualifier. Two of the concentrations detected are qualified with NJ indicating that replicate measurements had a large degree of difference such that the presence of the compound in the sample, as indicated by the analysis, is suspect. Three of the pesticide compounds detected have Type 1 risk reduction standards. The concentrations detected were well below the Type 1 standards that trigger corrective action. The remaining pesticide that does not have a promulgated risk reduction standard was detected at estimated concentrations of 0.25 NJ and 0.41 NJ $\mu\text{g}/\text{kg}$, that were not confirmed by replicate analyses.

Sixteen inorganic constituents were detected in the trench soil samples. Eight of the 16 constituents have Type 1 risk reduction standards. None of the concentrations of these eight constituents exceeded the Type 1 standards that trigger corrective action. The remaining eight constituents are aluminum, calcium, iron, magnesium, manganese, potassium, sodium, and sulfide. With the possible exception of sulfide, these constituents are not of a nature that would cause health risk upon exposure.

Trench Liquid. Table 3-2 summarizes analytical data for analytes that were detected in one or more of the liquid samples collected from the disposal cells. Data tables for all compounds analyzed will be presented in the future supplemental RFI report.

With the exception of one trench liquid sample, 11TL02, the trench liquid samples are characterized by low concentrations of organic chemicals. The VOCs and SVOCs detected represent the soluble fraction of potential contaminants at the site. Another noteworthy characteristic of the liquid in the trenches is relatively high concentrations of lead.

With regard to VOC concentrations in trench liquid, the sample from Trench 2, 11TL02, contained high concentrations of the ketones 2-butanone and 4-methyl-2-pentanone. The high concentrations of these ketones required that the sample be diluted to avoid damaging the laboratory analytical equipment. As a result of the dilution, other VOCs that may have been present at significant concentrations were not detectable during the analyses. The information obtained from the analytical data for sample 11TL02 is that the liquid in Trench 2 contains non-chlorinated solvents at concentrations that are more than 2 orders of magnitude

Table 3-2
Summary of Laboratory Analyses of Trench Liquid Samples Collected

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Compounds Detected | Type I Risk Reduction Standard ¹ | Sample Identification | | | | | |
|---|---|-----------------------|--------|--------|---------|--------|--------|
| | | 11TL02 | 11TL04 | 11TL07 | 11TL07D | 11TL08 | 11TL11 |
| Volatile Organic Compounds ($\mu\text{g}/\ell$) | | | | | | | |
| 2-Butanone | 2,000 | 16,000 J | 5 UR | 25 UR | 25 UR | 3 J | 25 UR |
| 2-Hexanone | None | 12,000 U | 5 U | 25 U | 25 U | 2 J | 8 U |
| 4-Methyl-2-pentanone | 2,000 | 210,000 | 5 U | 25 U | 7 J | 4 J | 8 U |
| Chlorobenzene | 100 | 2,500 U | 1 U | 14 | 14 | 1 U | 3 |
| Dichlorodifluoromethane | 1,000 | NA | NA | NA | NA | 7 | NA |
| Ethylbenzene | 700 | 2,500 U | 1 U | 73 | 70 | 2 | 30 |
| Methylene chloride | 5 | 5,000 U | 2 U | 17 | 18 | 1 | 3 U |
| Toluene | 1,000 | 2,500 U | 0.5 J | 13 | 14 | 2 | 6 |
| Trichlorofluoromethane | 2,000 | NA | NA | NA | NA | 2 | NA |
| Xylenes, total | 10,000 | 4,000 | 1 U | 42 | 43 | 16 | 10 |
| Semivolatile Organic Compounds ($\mu\text{g}/\ell$) | | | | | | | |
| 1,4-Dichlorobenzene | 75 | 100 U | 10 U | 4 J | 4 J | 10 U | 3 J |
| 2,4-Dimethylphenol | 700 | 16 J | 10 U | 40 U | 40 U | 10 U | 10 U |
| 2-Methylnaphthalene | None | 100 U | 10 U | 6 J | 6 J | 10 U | 2 J |
| 2-Methylphenol | None | 100 U | 10 U | 40 U | 40 U | 2 J | 10 U |
| 4-Methylphenol | None | 740 | 1 J | 40 U | 2 J | 7 J | 19 |
| Di-n-octyl phthalate | 700 | 100 U | 10 U | 40 U | 40 U | 10 U | 0.6 J |
| Diethyl phthalate | 5,000 | 100 U | 0.50 J | 4 J | 5 J | 10 U | 2 J |
| Isophorone | 100 | 100 U | 10 U | 40 U | 40 U | 24 | 10 U |
| Naphthalene | 20 | 100 U | 10 U | 190 | 200 | 8 J | 58 |
| Phenol | 4,000 | 130 | 0.8 J | 6 J | 9 J | 1 J | 8 J |

See notes at end of table.

Table 3-2 (Continued)
Summary of Laboratory Analyses of Trench Liquid Samples Collected

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Compounds Detected | Type I Risk Reduction Standards ¹ | Sample Identification | | | | | |
|---|--|-----------------------|---------|---------|---------|---------|----------|
| | | 11TL02 | 11TL04 | 11TL07 | 11TL07D | 11TL08 | 11TL11 |
| Pesticides ($\mu\text{g}/\ell$) | | | | | | | |
| 4,4'-DDD | 0.1 | 0.13 J | 0.10 UJ | 0.10 UJ | 0.10 UJ | 0.10 U | 0.10 UJ |
| alpha-BHC | 0.2 | 0.05 UJ | 0.05 UJ | 0.05 UJ | 0.05 UJ | 0.050 U | 0.032 J |
| alpha-Chlordane | 2 | 0.22 J | 0.05 UJ | 0.05 UJ | 0.05 UJ | NA | 0.05 UJ |
| Endosulfan II | 2 | 0.10 UJ | 0.10 UJ | 0.011 J | 0.012 J | 0.10 U | 0.10 UJ |
| Endrin ketone | None | 0.015 NJ | 0.10 UJ | 0.10 UJ | 0.10 UJ | NA | 0.10 UJ |
| gamma-BHC (lindane) | 0.2 | 0.05 UJ | 0.05 UJ | 0.05 UJ | 0.05 UJ | NA | 0.018 NJ |
| gamma-Chlordane | 2 | 0.48 J | 0.05 UJ | 0.05 UJ | 0.05 UJ | NA | 0.05 UJ |
| Methoxychlor | 40 | 0.50 UJ | 0.50 UJ | 0.50 UJ | 0.50 UJ | 0.50 U | 0.17 NJ |
| 0,0,0-Triethylphosphorothidate | | NA | NA | NA | NA | 0.67 | NA |
| Inorganics ($\mu\text{g}/\ell$) | | | | | | | |
| Aluminum | None | 14,600 | 10,800 | 128 U | 166 J | NA | 29,800 |
| Antimony | 6 | 18.4 J | 2.0 U | 2.0 U | 2.0 U | 300 U | 2.1 J |
| Arsenic | 50 | 13 | 3.6 J | 3.0 U | 3.7 J | 10 | 8.2 J |
| Barium | 2,000 | 292 | 136 J | 161 J | 157 J | 120 | 165 J |
| Cadmium | 5 | 10.5 | 1.8 J | 1.0 U | 1.0 U | 10 U | 4.2 J |
| Calcium | None | 117,000 | 123,000 | 136,000 | 133,000 | NA | 165,000 |
| Chromium | 100 | 39.1 | 11.3 U | 2.0 U | 2.0 U | 20 U | 39.5 |
| Cobalt | None | 12.1 J | 6.2 U | 3.3 U | 3.1 U | 50 U | 9.0 U |
| Copper | 1,300 | 309 | 67.8 | 2.0 J | 2.0 U | 66 | 52.7 |
| Cyanide | 200 | 10.0 U | 10.0 U | 10.0 U | 10.0 U | 6 | 32.1 J |
| Iron | None | 48,400 | 72,300 | 44,600 | 43,700 | NA | 53,100 |
| Lead | 15 | 219 | 41.2 | 1.0 U | 1.0 U | 59 | 85.4 |

See notes at end of table.

Table 3-2 (Continued)
Summary of Laboratory Analyses of Trench Liquid Samples Collected

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Compounds Detected | Type I Risk Reduction Standards ¹ | Sample Identification | | | | | |
|--------------------|--|-----------------------|---------|---------|---------|--------|---------|
| | | 11TL02 | 11TL04 | 11TL07 | 11TL07D | 11TL08 | 11TL11 |
| Magnesium | None | 11,900 | 7,910 | 11,700 | 11,500 | NA | 13,700 |
| Manganese | None | 1,080 | 1,250 | 344 | 335 | NA | 536 |
| Mercury | 2 | 1.1 | 0.20 U | 0.20 U | 0.20 U | 0.26 | 0.42 |
| Nickel | 100 | 64.6 | 28.3 J | 2.0 U | 2.0 U | 40 U | 22.6 J |
| Potassium | None | 6,960 J | 2,810 J | 4,440 J | 4,370 J | NA | 8,600 J |
| Selenium | 50 | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 5 U | 4.5 J |
| Silver | 100 | 1.4 J | 1.0 U | 1.0 U | 1.0 U | 10 UJ | 3.4 J |
| Sodium | None | 12,900 | 6,200 | 6,600 | 6,600 | NA | 11,700 |
| Vanadium | 200 | 17.5 J | 11.1 J | 1.0 U | 1.0 U | 50 U | 30.3 J |
| Zinc | 2,000 | 2,180 | 653 J | 30.6 U | 33.6 U | 730 | 838 J |
| Sulfide | None | 1,000 U | 1,000 U | 1,000 U | 1,000 U | 10,000 | 15,000 |

¹ The Type I risk reduction standards are concentrations that trigger corrective action when exceeded under Rules of Chapter 391-3-19, Georgia Department of Natural Resources, Environmental Protection Division, July 1994.

Notes: $\mu\text{g}/\text{l}$ = micrograms per liter.
 J = estimated value.
 UR = not detected, quantitation limit rejected because quality control criteria were not met.
 U = not detected, sample quantitation limit reported.
 NA = not applicable.
 $\mu\text{g}/\text{l}$ = micrograms per liter.
 UJ = reported quantitation limit is estimated.
 DDD = dichlorodiphenyl dichloroethane.
 BHC = benzene hexachloride.
 NJ = presumptive evidence for presence of compound at an estimated concentration.

greater than concentrations of non-chlorinated solvents in groundwater downgradient of the landfill. Additionally, chlorinated solvents that are characteristic of the contaminated groundwater downgradient of the landfill were not detected in sample 11TL02 or any other trench liquid sample.

The concentrations of VOCs in trench liquid samples other than 11TL02 were relatively low, methylene chloride being the only VOC detected that exceeded its Type 1 risk reduction standard and MCL of 5 $\mu\text{g}/\ell$.

Trench liquid sample 11TL02 contained the highest SVOC concentrations detected in the samples of liquids collected from the trenches. The SVOC analysis of sample 11TL02 also was performed on a diluted sample because of the concentration of 4-methylphenol. However, the dilution was not of the same magnitude as the VOC analysis; therefore, the detection limit was not as elevated. The concentrations of SVOCs exceeded the Type 1 risk reduction criteria for naphthalene in samples from two locations, Trench 7 (11TL07 and 11TL07D) and Trench 11 (11TL11). The concentrations of naphthalene in samples from these locations ranged from 58 to 200 $\mu\text{g}/\ell$. Naphthalene has been detected in groundwater samples at a maximum concentration of 47 $\mu\text{g}/\ell$.

Nine pesticide compounds were detected in samples of liquid from the trenches. The concentrations are estimated and range from 0.011 J to 0.67 J $\mu\text{g}/\ell$. One of the pesticide compounds detected, 4,4'-dichlorodiphenyl dichloroethane (4,4'-DDD) in sample 11TL02, was measured at an estimated concentration of 0.13 J $\mu\text{g}/\ell$, that is equivalent to the Type 1 risk reduction standard of 0.1 $\mu\text{g}/\ell$.

The inorganic analytical data indicate that lead is present in the trench liquids at concentrations well above the Type 1 risk reduction standard and MCL of 15 $\mu\text{g}/\ell$ for lead. Other inorganic constituents detected at concentrations that exceeded the corresponding risk reduction standards and/or MCLs are antimony, cadmium, and zinc. With the exception of lead, these analyte concentrations were present in liquid from Trench 2 (sample 11TL02).

3.2 AIR QUALITY CHARACTERIZATION. Table 3-3 summarizes analytical data for air samples collected during two phases of sampling. Appendix B provides more complete lists of analytical data for analytes detected in one or more of the air samples. The future supplemental RFI report will provide lists of validated analytical data for all compounds analyzed in the air samples.

Air quality characterization includes comparison of analytical data for air samples collected during the baseline characterization to air analytical data for samples collected during the trenching activities. The objective of the comparison is to evaluate for emissions of VOCs from the open trenches.

The two data sets for the air samples are very similar, indicating that trenching had little or no effect on VOCs in air in and around the landfill. Some differences can be observed in the two data sets, but the similarities are far greater than the differences.

Table 3-3
Ranges and Frequency of Detection for Air Samples

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Detected Compounds | Baseline | | During Trenching | |
|---|--------------|------------------------|------------------|------------------------|
| | Range | Frequency ¹ | Range | Frequency ¹ |
| Volatle Organic Compounds (ppbv) | | | | |
| Dichlorodifluoromethane | 0.51 to 0.57 | 12/13 | 0.51 to 1.71 | 7/15 |
| Vinyl chloride | 0.01 | 2/13 | 0.01 | 1/15 |
| Trichlorofluoromethane | 0.30 to 0.43 | 13/13 | 0.27 to 0.69 | 15/15 |
| Methylene chloride | 0.49 to 1.26 | 5/13 | 6.89 J to 33.3 J | 6/15 |
| Freon 113 | 0.13 to 0.31 | 6/13 | 0.10 to 4.37 | 15/15 |
| Chloroform | 0.30 | 1/13 | 0.09 to 1.25 | 5/15 |
| 1,1,1-Trichloroethane | 0.12 to 0.14 | 13/13 | 0.13 to 0.34 | 15/15 |
| Benzene | 0.11 to 2.02 | 13/13 | 0.19 to 1.86 | 15/15 |
| Carbon tetrachloride | 0.12 to 0.14 | 13/13 | 0.12 to 0.21 | 15/15 |
| Toluene | 0.14 to 1.82 | 12/13 | 0.42 to 2.44 | 10/15 |
| Ethylbenzene | 0.18 | 1/13 | 0.08 to 0.14 | 5/15 |
| m,p-Xylene | 0.09 to 0.79 | 5/13 | 0.09 to 0.53 | 15/15 |
| o-Xylene | 0.05 to 0.42 | 4/13 | 0.06 to 0.20 | 7/15 |
| 1,3,5-Trimethylbenzene | 0.10 | 1/13 | --- | 0/15 |
| 1,2,4-Trimethylbenzene | 0.05 to 0.15 | 8/13 | 0.06 to 0.13 | 13/15 |

¹ The first number represents the number of detections and the second number represents the number of samples analyzed.

Notes: ppbv = parts per billion volume.
J = estimated value.
--- = no data.

The two data sets are most notably similar with regard to compounds detected. All of the VOCs detected in air samples collected during trenching were also detected in baseline air samples. With few minor exceptions described in the following paragraph, the frequency of detection and concentrations of analytes were consistent during the two phases of sampling.

Differences in the two data sets are that the frequency of detection increased for some analytes during trenching, and some analytes were detected at relatively higher concentrations during trenching. Five analytes, including Freon 113, chloroform, ethylbenzene, and xylenes showed a higher frequency of detection during trenching. Comparison of the maximum detected concentrations for corresponding analytes indicates that methylene chloride, Freon 113, and chloroform were present at higher concentrations during the trenching effort.

With regard to air quality, the primary VOC of concern is vinyl chloride, because of its volatility and toxicity. Vinyl chloride was detected in one sample from each of the phases of sampling. In both instances, the concentration detected was 0.01 part per billion volume (ppbv). None of the real-time measurements of vinyl chloride resulted in detectable concentrations (at a detection limit of 0.5 part per billion).

3.3 SURFACE SOIL CHARACTERIZATION. Surface soil samples were collected from two background locations to the east of Site 11 and from five locations in the limits of the landfill. The analytical data will be used primarily in support of evaluating risk to potential human and ecological receptors.

Table 3-4 summarizes analytical data for analytes detected in one or more of the surface soil samples. Complete lists of validated analytical data will be presented in the future supplemental RFI report.

One VOC, toluene, was detected in two of the soil samples at low concentrations of 3 J and 4 J $\mu\text{g}/\ell$, well below the Type 1 risk reduction standard of 14,000 $\mu\text{g}/\ell$. Two of the samples contained detectable concentrations of SVOCs. One of the two samples, 11SSBG2, was from a background location. The other sample was from grid 12 (Figure 2-3). Sample 11SS012 from grid 12 contained concentrations of polycyclic aromatic hydrocarbons ranging from 42 J to 2,400 $\mu\text{g}/\ell$. All of the concentrations detected were well below the corresponding Type 1 risk reduction standards. The source of the polycyclic aromatic hydrocarbons in surface soil is attributed to burning of the landfill in late 1991 or to deposition by exhaust from equipment such as tractors, drilling rigs, or other vehicles that have been used on the surface of the landfill. The source of the SVOCs is not attributed to waste disposal because the landfill is covered with 2 feet of fill material and the compounds detected are not mobile in the environment.

Six pesticide compounds and one polychlorinated biphenyl (PCB) isomer (Arochlor 1260) were detected in the surface soil samples at concentrations ranging from 0.27 NJ to 81 J $\mu\text{g}/\text{kg}$. The concentrations are estimated, as indicated by the J qualifier. The compounds flagged with an N qualifier in Table 3-4 are presumed to be present but were not confirmed by replicate measurements. Five of the pesticides have Type 1 risk reduction standards that range from 660 to 1,650 $\mu\text{g}/\text{kg}$. The risk reduction standard for PCBs is 1,550 $\mu\text{g}/\text{kg}$. None of the concentrations detected in soil samples exceeded the corresponding risk reduction standard.

Table 3-4
Summary of Analytes Detected in Surface Soil Samples

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Compounds Detected | Type I Risk Reduction Standard ¹ | Sample Identification | | | | | | | |
|---|---|-----------------------|---------|----------|---------|---------|---------|---------|---------|
| | | 11SSBG1 | 11SS006 | 11SS006D | 11SSBG2 | 11SS021 | 11SS014 | 11SS004 | 11SS012 |
| Volatile Organic Compound (µg/kg) | | | | | | | | | |
| Toluene | 14,400 | 11 U | 3 J | 4 J | 6 U | 5 U | 11 U | 12 U | 11 U |
| Semivolatile Organic Compounds (µg/kg) | | | | | | | | | |
| 2-Methylnaphthalene | None | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 42 J |
| Acenaphthene | 300,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 260 J |
| Aniline | 330 (DL) | NA | NA | NA | 43 J | 360 U | NA | NA | NA |
| Anthracene | 500,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 370 |
| Benzo(a)anthracene | 5,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 980 J |
| Benzo(a)pyrene | 1,640 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 590 |
| Benzo(b)fluoranthene | 5,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 840 |
| Benzo(ghi)perylene | 500,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 270 J |
| Benzo(k)fluoranthene | 5,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 300 J |
| Carbazole | None | 360 UJ | 410 U | 350 U | NA | NA | 380 U | 380 U | 180 J |
| Chrysene | 5,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 920 |
| Di-n-butyl phthalate | 13,700 | 360 U | 560 U | 560 U | 63 J | 1,200 U | 380 U | 380 U | 470 U |
| Dibenz(a,h)anthracene | 5,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 98 J |
| Fluoranthene | 500,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 2,400 |
| Fluorene | 360,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 210 J |
| Indeno(1,2,3-cd)pyrene | 500,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 290 J |
| Phenanthrene | 110,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 1,600 |
| Pyrene | 500,000 | 360 U | 410 U | 350 U | 370 U | 360 U | 380 U | 380 U | 1,600 |
| Pesticides (µg/kg) | | | | | | | | | |
| 4,4'-DDE | 660 | 3.6 UJ | 4.1 UJ | 0.32 NJ | 18 U | 17 U | 3.8 UJ | 3.8 UJ | 7.3 UJ |
| 4,4'-DDT | 660 | 13 UJ | 35 UJ | 81 J | 18 U | 17 U | 64 UJ | 25 UJ | 15 UJ |
| beta-BHC | 660 | 1.9 UJ | 2.1 UJ | 1.8 UJ | 8.9 U | 8.7 U | 0.51 J | 2.0 UJ | 3.8 UJ |
| Dieldrin | 660 | 3.6 UJ | 4.6 UJ | 15 J | 18 U | 17 U | 10 UJ | 4.1 UJ | 7.3 UJ |

See notes at the end of table.

Table 3-4 (Continued)
Summary of Analytes Detected in Surface Soil Samples

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Compounds Detected | Type I Risk Reduction Standard ¹ | Sample Identification | | | | | | | |
|---------------------------------------|---|-----------------------|---------|----------|---------|---------|---------|---------|---------|
| | | 11SSBG1 | 11SS006 | 11SS006D | 11SSBG2 | 11SS021 | 11SS014 | 11SS004 | 11SS012 |
| Pesticides (µg/kg) (continued) | | | | | | | | | |
| Endrin ketone | None | 3.6 UJ | 4.1 UJ | 0.5 NJ | NA | NA | 0.27 NJ | 3.8 UJ | 7.3 UJ |
| Heptachlor epoxide | 1,650 | 1.9 UJ | 2.1 UJ | 1.8 UJ | 8.9 U | 8.7 U | 1.9 UJ | 2.0 UJ | 0.4 NJ |
| Aroclor-1260 | 1,550 | 36 UJ | 41 UJ | 35 UJ | 180 U | 170 U | 38 UJ | 38 UJ | 17 J |
| Inorganic Analytes (mg/kg) | | | | | | | | | |
| Aluminum | None | 806 | 1,810 | 1,530 | NA | NA | 1,680 | 1,380 | 1,780 |
| Arsenic | 20 | 0.66 U | 0.75 U | 0.65 J | 0.55 U | 0.54 U | 0.83 U | 0.69 U | 0.74 U |
| Barium | 1,000 | 2.2 J | 4 J | 3.3 U | 2 | 4.3 | 7.1 J | 4.1 J | 8 J |
| Calcium | None | 684 J | 401 J | 335 J | NA | NA | 500 J | 834 J | 2,110 J |
| Chromium | 100 | 1.2 J | 2.7 | 2.3 J | 2.2 U | 2.8 | 1.9 J | 1.9 J | 2.6 |
| Cobalt | 20 | 0.67 J | 0.89 J | 0.66 J | 5.5 U | 5.4 U | 0.45 U | 0.5 J | 0.93 J |
| Copper | 100 | 0.44 U | 0.5 U | 0.44 U | 1.1 U | 1.1 | 0.75 U | 0.91 U | 3.6 J |
| Iron | None | 651 | 637 | 423 | NA | NA | 752 | 504 | 1,760 |
| Lead | 75 | 2.4 | 3.6 | 3.1 J | 2.5 | 2.9 | 2.5 | 3.2 | 4.9 |
| Magnesium | None | 74 J | 85.5 J | 66.8 | NA | NA | 104 J | 106 J | 263 J |
| Manganese | None | 17 | 8.7 | 5.8 | NA | NA | 5.2 | 7.6 | 12.7 |
| Nickel | 50 | 0.67 J | 0.9 J | 0.79 J | 4.4 U | 4.3 U | 0.89 J | 0.9 J | 2.4 J |
| Potassium | None | 19.1 U | 24.6 U | 20.4 U | NA | NA | 28.5 U | 34.5 J | 88.2 J |
| Vanadium | 100/BG | 2.4 J | 3.1 J | 2.5 | 5.5 U | 5.4 U | 2.9 J | 2.4 J | 3.3 J |
| Zinc | 100 | 1.9 U | 4.7 U | 5.3 U | 5.5 U | 5.7 | 2.9 U | 4.4 U | 38.1 |
| Sulfide | None | 56 U | 54 U | 98 | 55 U | 54 U | 85 | 80 | 56 U |

See notes at the end of table.

Table 3-4 (Continued)
Summary of Analytes Detected in Surface Soil Samples

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

¹ The Type I risk reduction standards are concentrations that trigger corrective action when exceeded under Rules of Chapter 391-3-19, Georgia Department of Natural Resources, Environmental Protection Division, July 1994.

Notes: $\mu\text{g}/\text{kg}$ = micrograms per kilogram.

U = not detected, sample quantitation limit reported.

J = estimated value.

DL = detection limit (330 mg/kg).

NA = not analyzed.

UJ = not detected, quantitation limit estimated.

DDE = dichlorodiphenyl dichloroethylene.

NJ = presumptive evidence for presence of the compound at an estimated concentration.

DDT = dichlorodiphenyl trichloroethane.

BHC = benzene hexachloride.

mg/kg = milligrams per kilogram.

/BG = The number preceding the slash is the Type I risk reduction standard unless the background concentration is greater, in which case the background value is the Type I risk reduction standard.

Concentrations of inorganic constituents in surface soil samples from locations in the landfill were compared to corresponding concentrations detected in surface soil samples from the two site background locations east of the landfill. Because the landfill is covered with fill material from an unknown offsite location, some differences in concentrations of naturally occurring inorganic constituents is expected. Except for concentrations of manganese in samples from the landfill, all of the inorganic constituents were detected in one or more samples at concentrations greater than the corresponding site background locations. However, only seven of the analytes were detected at concentrations more than 2 times greater than the corresponding site background concentration. The seven analytes are aluminum, barium, calcium, chromium, iron, magnesium, and nickel. Five other analytes that were detected in surface soil samples from the landfill were not detected in the site background samples. The five analytes are arsenic, copper, potassium, zinc, and sulfide. All of the inorganic constituents detected in the surface soil samples from the landfill and from the site background locations were at concentrations well below the Type 1 risk reduction criteria that trigger corrective action under Chapter 391-3-19.

3.4 SURFACE WATER AND SEDIMENT CHARACTERIZATION. Tables 3-5 and 3-6 summarize analytical data for analytes detected in one or more of the surface water and sediment samples, respectively. Complete lists of validated analytical data for the surface water and sediment samples will be presented in the future supplemental RFI report.

Surface Water. The objective of characterization of surface water chemistry was to assess whether contaminated groundwater is discharging to Porcupine lake, resulting in contamination of the lake water. The analytical data for the surface water samples do not indicate that groundwater has resulted in contamination of lake water. Groundwater is contaminated with VOCs and SVOCs. The only organic analyte detected in surface water samples was chloroform. All of the surface water samples contained chloroform at a concentration of 4 $\mu\text{g}/\ell$. No other organic analytes were detected in the surface water samples.

There are no background surface water samples to use for comparison to the inorganic analytical data for the surface water samples. However, two inorganic analytes, iron and cadmium, that were detected in the trench liquid samples at relatively high concentrations were not detected in surface water samples.

Sediment. Six SVOC analytes were detected in the sediment samples collected from three sampling locations in Porcupine lake (Table 3-5). Concentrations range from 32 J to 130 J $\mu\text{g}/\text{kg}$. With the exception of pentachloroethane, the SVOCs detected in the sediment samples have also been detected in other environmental media at Site 11. However, this similarity does not necessarily mean that Site 11 is the source of the SVOCs detected in the sediment samples because human activities rarely result in pristine conditions. Low concentrations of manmade organic chemicals is not unexpected, especially considering that a bulldozer was used to construct Porcupine lake and the lake is located in a populated area.

**Table 3-5
Summary of Analytes Detected in Surface Water Samples**

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Compounds Detected | Sample Identification | | | | | |
|--|-----------------------|---------|----------|---------|----------|----------|
| | 11SW201 | 11SW202 | 11SW202D | 11SW203 | 11SW204 | 11SW205 |
| Volatile Organic Compound ($\mu\text{g}/\text{l}$) | | | | | | |
| Chloroform | 4 | 4 | 4 | 4 | 4 | 4 |
| Inorganic Analytes ($\mu\text{g}/\text{l}$) | | | | | | |
| Aluminum | 64.9 J | 35.0 U | 34.9 U | 32.8 U | 38.7 U | NA |
| Antimony | 2.0 U | 2.0 U | 2.0 U | 3.3 J | 2.0 U | 300 U |
| Arsenic | 3.0 U | 4.7 J | 3.0 U | 3.0 U | 4.3 J | 5 U |
| Barium | 18.7 J | 18.8 J | 18.2 J | 19.5 J | 18.6 J | 17 |
| Calcium | 29,300 | 30,700 | 30,000 | 30,700 | 29,200 | NA |
| Iron | 7,560 | 100 | 118 | 142 | 154 | NA |
| Magnesium | 12,400 | 13,000 | 12,700 | 12,900 | 12,400 | NA |
| Manganese | 43.5 | 3.4 J | 3.5 J | 4.4 J | 5.5 J | NA |
| Potassium | 1,920 J | 1,970 J | 1,940 J | 1,950 J | 1,980 J | NA |
| Sodium | 11,000 | 11,700 | 11,300 | 11,600 | 11,300 | NA |
| Zinc | 3.1 U | 5.6 U | 4.5 U | 3.0 U | 6.8 U | 66 |
| Sulfide | 1,000 U | 1,000 U | 1,000 U | 4,000 J | 1,000 UR | 1,000 UR |
| Notes: $\mu\text{g}/\text{l}$ = micrograms per liter. NA = not analyzed. J = estimated value. U = not detected, sample quantitation limit reported. UR = not detected, reported quantitation limit rejected. | | | | | | |

Table 3-6
Summary of Analytes Detected in Sediment Samples

Technical Memorandum
 November 1994 Field Program
 Site 11, Old Camden County Landfill
 Naval Submarine Base Kings Bay
 Kings Bay, Georgia

| Compounds Detected | Sample Identification | | | | | |
|--|-----------------------|---------|----------|---------|---------|---------|
| | 11SD201 | 11SD202 | 11SD202D | 11SD203 | 11SD204 | 11SD205 |
| Semivolatile Organic Compounds ($\mu\text{g}/\text{kg}$) | | | | | | |
| 1,4-Dichlorobenzene | 580 U | 610 U | 600 U | 33 J | 460 U | 480 U |
| Anthracene | 32 J | 610 U | 600 U | 420 U | 460 U | 480 U |
| Diethyl phthalate | 580 U | 610 U | 49 J | 420 U | 460 U | 480 U |
| Pentachloroethane | NA | NA | NA | NA | NA | 170 J |
| Phenanthrene | 580 U | 610 U | 39 J | 420 U | 460 U | 480 U |
| Phenol | 130 J | 130 J | 130 J | 420 U | 460 U | 480 U |
| Pesticide ($\mu\text{g}/\text{kg}$) | | | | | | |
| 4,4'-DDE | 5.9 UJ | 6.1 UJ | 6.0 UJ | 4.2 UJ | 0.26 J | 23 U |
| Inorganic Analytes (mg/kg) | | | | | | |
| Aluminum | 2,520 | 7,390 | 7,160 | 2,220 | 5,700 | NA |
| Barium | 10.7 J | 22.5 J | 22.1 J | 4.7 J | 7 J | 3.2 |
| Calcium | 1,000 J | 2,260 J | 2,400 J | 302 J | 340 J | NA |
| Chromium | 2.6 J | 5.9 | 5.8 | 3 | 4.4 | 3.2 |
| Cobalt | 0.7 U | 0.74 U | 0.73 U | 0.82 J | 0.55 U | 7.2 U |
| Copper | 0.7 U | 1.3 U | 1.4 U | 0.65 U | 0.74 U | 1.4 |
| Iron | 929 | 1,400 | 1,170 | 499 | 755 | NA |
| Lead | 2.8 | 7.3 | 6.5 | 2.6 | 3.4 | 3.2 |
| Magnesium | 226 J | 472 J | 453 J | 94 J | 121 J | NA |
| Manganese | 7.9 | 14.9 | 13.5 | 13.8 | 4.2 | NA |
| Nickel | 0.75 J | 1.9 J | 1.5 J | 1 J | 1.1 J | 5.8 U |
| Potassium | 83.1 J | 105 J | 86 J | 40.8 J | 61.9 J | NA |
| Vanadium | 2.2 J | 4.5 J | 3.8 J | 2.2 J | 2.6 J | 7.2 U |
| Sulfide | 320 | 280 | 100 U | 130 | 150 | 72 U |
| Notes: $\mu\text{g}/\text{kg}$ = micrograms per kilogram. U = not detected, sample quantitation limit reported. J = estimated value. NA = not analyzed. DDE = dichlorodiphenyl dichloroethylene. UJ = reported quantitation limit is estimated. mg/kg = milligrams per kilogram. | | | | | | |

The concentrations of inorganic analytes detected in the sediment samples are difficult to evaluate relative to background conditions because there are no background data to use for comparison. The concentrations of inorganic analytes are well below corresponding Type 1 risk reduction standards for soil. Additionally, there is no mechanism for transport of potentially contaminated soil in the landfill to Porcupine lake.

4.0 CONCLUSIONS

This chapter presents conclusions regarding significant findings associated with sampling of environmental media at Site 11 and adjacent areas during the November 1994 field program. The data interpretations and conclusions presented in this technical memorandum will be further developed in the future supplemental RFI report.

The waste that was observed during the trenching effort at the landfill did not reveal a source of chlorinated solvents that have been detected in groundwater samples from locations in and downgradient of the landfill. Several of the trenches contained 10-gallon cans, some of which were labeled monoethanolamine. A sample of the material in one of the cans was analyzed for VOCs and SVOCs. Chlorinated and nonchlorinated solvents that are characteristic contaminants in groundwater were not detected in the product from the can.

The soil samples collected from within the waste disposal cells and liquid from the trenches were relatively uncontaminated. Nonchlorinated solvents were found at high concentrations in a sample of liquid from one of the trenches. The analytical data for samples of environmental media from the trenches indicate that the source of the solvents in contaminated groundwater is depleted, is very small relative to the overall size of the landfill, or was possibly a one time disposal of uncontained liquid waste.

The analytical data for the air samples collected during two phases of sampling during the field program did not indicate elevated VOC concentrations in air during the trenching effort. The data set for samples collected before excavation into the waste is similar to the data set for samples collected during excavation.

The surface of the landfill is covered with fill material. Surface soil samples were collected from the landfill and from background locations to support risk evaluations that have not yet been completed. SVOCs were detected in one of the samples, but the source of the SVOCs is not likely to be waste in the landfill because the landfill is covered with fill material and the SVOCs detected are not mobile in the environment.

Analytical results for surface water and sediments samples were assessed for contamination related to discharge of contaminated groundwater into Porcupine lake. The results do not indicate that groundwater contamination has affected the lake. One VOC was detected in all of the surface water samples at the same concentration. Also, SVOCs were detected in sediment samples from three sampling locations. The concentrations of the organic compounds in the samples of environmental media from Porcupine lake were low and could be attributed to human activities unrelated to operations at Site 11. The potential risk to human and ecological receptors associated with the analytes and concentrations detected will be discussed in the future health and environmental assessment report.

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APPENDIX A
ANALYTICAL DATA FOR PRODUCT SAMPLE

ABB ENVIRONMENTAL SERVICES, INC

11HS11A 11-22-94

WO #: A1GNQ101
LAB #: A4K230105-001
MATRIX: LIQUID

DATE SAMPLED: 11/22/94
DATE RECEIVED: 11/23/94

----- GC/MS Semi-Volatiles -----

1 OF 4

| <u>PARAMETER</u> | <u>RESULT</u> (ug/kg) | <u>REPORTING</u> <u>LIMIT</u> | <u>METHOD</u> | <u>EXTRACTION-</u> <u>ANALYSIS DATE</u> | <u>QC</u> <u>BATCH</u> |
|------------------------------------|--------------------------|----------------------------------|---------------|--|---------------------------|
| Acenaphthene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Acenaphthylene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Anthracene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Benzo (a) anthracene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Benzo (b) fluoranthene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Benzo (k) fluoranthene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Benzo (ghi) perylene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Benzo (a) pyrene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Bis (2-chloroethoxy) methane | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Bis (2-chloroethyl) ether | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2,2'-oxybis (1-Chloro- propane) | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Bis (2-ethylhexyl) phthalate | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 4-Bromophenyl phenyl ether | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Butyl benzyl phthalate | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Carbazole | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 4-Chloroaniline | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2-Chloronaphthalene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 4-Chlorophenyl phenyl ether | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Chrysene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Dibenzo (a, h) anthracene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Dibenzofuran | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Di-n-butyl phthalate | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 1,2-Dichlorobenzene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |

SURROGATE RECOVERY

‡

ACCEPTABLE LIMITS

| | | |
|----------------------|------|-------------|
| Nitrobenzene-d5 | 95 | (52 - 131) |
| 2-Fluorobiphenyl | 98 | (43 - 109) |
| Terphenyl-d14 | 132 | (37 - 150) |
| Phenol-d5 | 0.0* | (37 - 117) |
| 2-Fluorophenol | 0.0* | (28 - 101) |
| 2,4,6-Tribromophenol | 11 | (10 - 170) |

NOTE: AS RECEIVED

ND NOT DETECTED AT THE STATED REPORTING LIMIT

* SURROGATES OUT OF CONTROL



ABB ENVIRONMENTAL SERVICES, INC

11HS11A 11-22-94

WO #: A1GNQ101
 LAB #: A4K230105-001
 MATRIX: LIQUID

DATE SAMPLED: 11/22/94
 DATE RECEIVED: 11/23/94

GC/MS Semi-Volatiles

2 OF 4

| PARAMETER | RESULT (ug/kg) | REPORTING LIMIT | METHOD | EXTRACTION- ANALYSIS DATE | QC BATCH |
|---------------------------|-------------------|--------------------|-------------|------------------------------|-------------|
| 1,3-Dichlorobenzene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 1,4-Dichlorobenzene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 3,3'-Dichlorobenzidine | ND | 40,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Diethyl phthalate | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Dimethyl phthalate | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2,4-Dinitrotoluene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2,6-Dinitrotoluene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Di-n-octyl phthalate | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Fluoranthene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Fluorene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Hexachlorobenzene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Hexachlorobutadiene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Hexachlorocyclopentadiene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Hexachloroethane | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Indeno (1,2,3-cd) pyrene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Isophorone | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2-Methylnaphthalene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Naphthalene | 8,200 J | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Nitrobenzene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2-Nitroaniline | ND | 100,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 3-Nitroaniline | ND | 100,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 4-Nitroaniline | ND | 100,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| N-Nitrosodiphenylamine | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |

SURROGATE RECOVERY

‡

ACCEPTABLE LIMITS

| | | |
|----------------------|------|-------------|
| Nitrobenzene-d5 | 95 | (52 - 131) |
| 2-Fluorobiphenyl | 98 | (43 - 109) |
| Terphenyl-d14 | 132 | (37 - 150) |
| Phenol-d5 | 0.0* | (37 - 117) |
| 2-Fluorophenol | 0.0* | (28 - 101) |
| 2,4,6-Tribromophenol | 11 | (10 - 170) |

NOTE: AS RECEIVED

ND NOT DETECTED AT THE STATED REPORTING LIMIT

* SURROGATES OUT OF CONTROL

J ESTIMATED VALUE. (DETECTED), BUT BELOW QUANTITATION LIMIT.

ABB ENVIRONMENTAL SERVICES, INC

11HS11A 11-22-94

WO #: A1GNQ101
LAB #: A4K230105-001
MATRIX: LIQUID

DATE SAMPLED: 11/22/94
DATE RECEIVED: 11/23/94

----- GC/MS Semi-Volatiles -----

3 OF 4

| <u>PARAMETER</u> | <u>RESULT</u> (ug/kg) | <u>REPORTING</u> <u>LIMIT</u> | <u>METHOD</u> | <u>EXTRACTION-</u> <u>ANALYSIS DATE</u> | <u>QC</u> <u>BATCH</u> |
|---------------------------|--------------------------|----------------------------------|---------------|--|---------------------------|
| N-Nitrosodi-n-propylamine | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Phenanthrene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Pyrene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 1,2,4-Trichlorobenzene | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |

SURROGATE RECOVERY

%

ACCEPTABLE LIMITS

| | | |
|----------------------|------|-------------|
| Nitrobenzene-d5 | 95 | (52 - 131) |
| 2-Fluorobiphenyl | 98 | (43 - 109) |
| Terphenyl-d14 | 132 | (37 - 150) |
| Phenol-d5 | 0.0* | (37 - 117) |
| 2-Fluorophenol | 0.0* | (28 - 101) |
| 2,4,6-Tribromophenol | 11 | (10 - 170) |

NOTE: AS RECEIVED

ND NOT DETECTED AT THE STATED REPORTING LIMIT

* SURROGATES OUT OF CONTROL



ABB ENVIRONMENTAL SERVICES, INC

11HS11A 11-22-94

WO #: A1GNQ101
 LAB #: A4K230105-001
 MATRIX: LIQUID

DATE SAMPLED: 11/22/94
 DATE RECEIVED: 11/23/94

----- GC/MS Semi-Volatiles -----

4 OF 4

| <u>PARAMETER</u> | <u>RESULT</u> (ug/kg) | <u>REPORTING</u> <u>LIMIT</u> | <u>METHOD</u> | <u>EXTRACTION-</u> <u>ANALYSIS DATE</u> | <u>QC</u> <u>BATCH</u> |
|--------------------------------|--------------------------|----------------------------------|---------------|--|---------------------------|
| 4-Chloro-3-methylphenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2-Chlorophenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2,4-Dichlorophenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2,4-Dimethylphenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2,4-Dinitrophenol | ND | 100,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 4,6-Dinitro- 2-methylphenol | ND | 100,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2-Methylphenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 4-Methylphenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2-Nitrophenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 4-Nitrophenol | ND | 100,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Pentachlorophenol | ND | 100,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| Phenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2,4,5-Trichlorophenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |
| 2,4,6-Trichlorophenol | ND | 20,000 | SW846 8270A | 11/28-12/06/94 | 4332129 |

SURROGATE RECOVERY

%

ACCEPTABLE LIMITS

| | | |
|----------------------|------|-------------|
| Nitrobenzene-d5 | 95 | (52 - 131) |
| 2-Fluorobiphenyl | 98 | (43 - 109) |
| Terphenyl-d14 | 132 | (37 - 150) |
| Phenol-d5 | 0.0* | (37 - 117) |
| 2-Fluorophenol | 0.0* | (28 - 101) |
| 2,4,6-Tribromophenol | 11 | (10 - 170) |

NOTE: AS RECEIVED

ND NOT DETECTED AT THE STATED REPORTING LIMIT

* SURROGATES OUT OF CONTROL



ABB ENVIRONMENTAL SERVICES, INC

11HS11A 11-22-94

WO #: A1GNQ101
LAB #: A4K230105-001
MATRIX: LIQUID

DATE SAMPLED: 11/22/94
DATE RECEIVED: 11/23/94
DATE EXTRACTED: 11/28/94
DATE ANALYZED: 12/06/94

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

| <u>PARAMETER</u> | <u>RESULT</u> | <u>UNIT</u> | <u>QC BATCH</u> |
|------------------|---------------|-------------|---------------------|
| Unknown | 7,700,000 | ug/kg | 4332129 |
| Unknown | 1,200,000 | ug/kg | 4332129 |
| Unknown Aromatic | 25,000 | ug/kg | 4332129 |
| Unknown | 44,000 | ug/kg | 4332129 |
| Unknown | 12,000 | ug/kg | 4332129 |
| Unknown | 59,000 | ug/kg | 4332129 |

OTHER COMPOUNDS

| <u>PARAMETER</u> | <u>RESULT</u> | <u>UNIT</u> | <u>QC BATCH</u> |
|------------------|---------------|-------------|---------------------|
| None | | | 4332129 |



ABB ENVIRONMENTAL SERVICES, INC

11HS11A 11-22-94

WO #: A1GNQ104
 LAB #: A4K230105-001
 MATRIX: LIQUID

DATE SAMPLED: 11/22/94
 DATE RECEIVED: 11/23/94

GC Volatiles

1 OF 2

| PARAMETER | RESULT (%) | REPORTING LIMIT | METHOD | EXTRACTION-ANALYSIS DATE | QC BATCH |
|-----------------------|------------|-----------------|-------------|--------------------------|----------|
| o-Cresol | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| m-Cresol | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| p-Cresol | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| 2-Butanone | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Pyridine | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Nitrobenzene | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Xylenes, Total | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Chlorobenzene | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Ethylbenzene | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Isobutanol | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| o-Dichlorobenzene | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Cyclohexanone | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| 4-Methyl-2-pentanone | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Toluene | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Benzene | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| 2-Ethoxyethanol | ND | 0.020 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| 2-Nitropropane | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Tetrachloroethene | ND | 0.020 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Trichloroethene | ND | 0.020 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Ethyl acetate | ND | 0.020 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Ethyl ether | ND | 0.020 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| 1,1,1-Trichloroethane | ND | 0.020 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Acetone | ND | 0.020 | SW846 8015A | 12/02-12/07/94 | 4341059 |

SURROGATE RECOVERY

‡

ACCEPTABLE LIMITS

n-Butyl acetate

128

(50 - 150)

NOTE: AS RECEIVED

ND NOT DETECTED AT THE STATED REPORTING LIMIT

ABB ENVIRONMENTAL SERVICES, INC

11HS11A 11-22-94

WO #: A1GNQ104
LAB #: A4K230105-001
MATRIX: LIQUID

DATE SAMPLED: 11/22/94
DATE RECEIVED: 11/23/94

----- GC Volatiles -----

2 OF 2

| <u>PARAMETER</u> | <u>RESULT</u> (%) | <u>REPORTING</u> <u>LIMIT</u> | <u>METHOD</u> | <u>EXTRACTION-</u> <u>ANALYSIS DATE</u> | <u>QC</u> <u>BATCH</u> |
|---|----------------------|----------------------------------|---------------|--|---------------------------|
| 1,1,2-Trichloroethane | ND | 0.020 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Methanol | ND | 0.050 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| 1,1,2-Trichloro- 1,2,2-trifluoroethane | ND | 0.050 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Methylene chloride | ND | 0.050 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Carbon tetrachloride | ND | 0.10 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Trichlorofluoromethane | ND | 0.10 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Carbon disulfide | ND | 0.20 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| n-Butanol | ND | 0.010 | SW846 8015A | 12/02-12/07/94 | 4341059 |
| Cresylic Acid | ND | 0.10 | SW846 8015A | 12/02-12/07/94 | 4341059 |

| <u>SURROGATE RECOVERY</u> | <u>%</u> | <u>ACCEPTABLE LIMITS</u> |
|---------------------------|----------|--------------------------|
| n-Butyl acetate | 128 | (50 - 150) |

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT



ABB ENVIRONMENTAL SERVICES, INC

11HS11A 11-22-94

WO #: A1GNQ
LAB #: A4K230105-001
MATRIX: LIQUID

DATE SAMPLED: 11/22/94
DATE RECEIVED: 11/23/94

----- INORGANIC ANALYTICAL REPORT -----

| <u>PARAMETER</u> | <u>RESULT</u> | <u>REPORTING</u> <u>LIMIT</u> | <u>UNIT</u> | <u>METHOD</u> | <u>PREPARATION -</u> <u>ANALYSIS DATE</u> | <u>QC</u> <u>BATCH</u> |
|------------------|---------------|----------------------------------|-------------|---------------|--|---------------------------|
| pH Aqueous | *13.0 | | su | SW846 9040 | 12/05/94 | 4339129 |

NOTE: AS RECEIVED
*ANALYZED BY PH PAPER METHOD DUE TO MI.

APPENDIX B
ANALYTICAL DATA FOR AIR SAMPLES

Table B-1
Summary of Laboratory Analytical Data for Baseline Air Samples

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Detected Compounds | 11AIRFB1 | 11AIR102D | 11AIR105 | 11AIR108 | 11AIR107 | 11AIR104 | 11AIR106 | 11AIR102 |
|--|----------|-----------|----------|----------|----------|----------|----------|----------|
| Volatile Organic Compounds (ppbv) | | | | | | | | |
| Dichlorodifluoromethane | 0.05 | 0.51 | 0.57 | 0.56 | 0.53 | 0.56 | 0.54 | 0.55 |
| Vinyl chloride | 0.01U | 0.01U | 0.01U | 0.01U | 0.01U | 0.01U | 0.01U | 0.01U |
| Trichlorofluoromethane | 0.05U | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.35 |
| Methylene chloride | 2.21U | 0.82U | 0.59U | 0.35U | 0.31U | 0.48U | 1.38U | 0.44U |
| Freon 113 | 0.22 | 0.35U | 0.21U | 0.18U | 0.18U | 0.29U | 0.18U | 0.26U |
| Chloroform | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U |
| 1,1,1-Trichloroethane | 0.05U | 0.13 | 0.13 | 0.12 | 0.13 | 0.13 | 0.13 | 0.13 |
| Benzene | 0.05U | 0.12 | 0.16 | 0.12 | 2.02 | 0.21 | 0.15 | 0.18 |
| Carbon tetrachloride | 0.05U | 0.13 | 0.13 | 0.12 | 0.14 | 0.12 | 0.13 | 0.14 |
| Toluene | 0.05U | 0.23 | 0.24 | 0.18 | 1.82 | 0.28 | 0.23 | 0.14 |
| Ethylbenzene | 0.05U | 0.05U | 0.05U | 0.05U | 0.18 | 0.05U | 0.05U | 0.05U |
| m,p-Xylene | 0.05U | 0.05U | 0.10 | 0.09 | 0.79 | 0.17 | 0.09 | 0.05U |
| o-Xylene | 0.05U | 0.05U | 0.05U | 0.05U | 0.42 | 0.06 | 0.05U | 0.05U |
| 1,3,5-Trimethylbenzene | 0.05U | 0.05U | 0.05U | 0.05U | 0.10 | 0.05U | 0.05U | 0.05U |
| 1,2,4-Trimethylbenzene | 0.05U | 0.05U | 0.06 | 0.05 | 0.15 | 0.10 | 0.05U | 0.05U |
| Notes: ppbv = parts per billion volume. U = not detected, sample quantitation limit reported. | | | | | | | | |

Table B-2
Summary of Laboratory Analytical Data for Baseline Air Samples

Technical Memorandum
November 1994 Field Program
Site 11, Old Camden County Landfill
Naval Submarine Base Kings Bay
Kings Bay, Georgia

| Detected Compounds | 11AIR108D | 11AIR104D | 11AIR101 | 11AIR109 | 11AIR108DD | 11AIR103 |
|--|-----------|-----------|----------|----------|------------|----------|
| Volatile Organic Compounds (ppbv) | | | | | | |
| Dichlorodifluoromethane | 0.53 | 0.51 | 0.55 | 0.52 | 0.54 | 0.58U |
| Vinyl chloride | 0.01 | 0.01U | 0.01U | 0.01 | 0.01U | 0.01U |
| Trichlorofluoromethane | 0.43 | 0.30 | 0.32 | 0.32 | 0.32 | 0.38 |
| Methylene chloride | 0.94 | 0.60 | 1.26 | 0.49 | 0.60 | 1.59U |
| Freon 113 | 0.31 | 0.20 | 0.16 | 0.13 | 0.15 | 0.16 |
| Chloroform | 0.05U | 0.05U | 0.05U | 0.30 | 0.05U | 0.05U |
| 1,1,1-Trichloroethane | 0.13 | 0.13 | 0.13 | 0.13 | 0.14 | 0.13 |
| Benzene | 0.11 | 0.13 | 0.13 | 0.15 | 0.12 | 0.19 |
| Carbon tetrachloride | 0.12 | 0.12 | 0.12 | 0.13 | 0.13 | 0.14 |
| Toluene | 0.25 | 0.24 | 0.14 | 0.35 | 0.29 | 0.20U |
| Ethylbenzene | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U |
| m,p-Xylene | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U |
| o-Xylene | 0.05 | 0.05U | 0.05U | 0.05U | 0.06 | 0.05U |
| 1,3,5-Trimethylbenzene | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U |
| 1,2,4-Trimethylbenzene | 0.06 | 0.06 | 0.05U | 0.07 | 0.07 | 0.05U |

Notes: ppbv = parts per billion volume.
U = U = not detected, sample quantitation limit reported.

Table B-3
Summary of Laboratory Analytical Data for Trenching Activity Air Samples

Technical Memorandum
 November 1994 Field Program
 Site 11, Old Camden County Landfill
 Naval Submarine Base Kings Bay
 Kings Bay, Georgia

| Detected Compounds | 11AIR111 | 11AIR111D | 11AIR112 | 11AIR112D | 11AIR113 | 11AIR114 | 11AIR114D | 11AIR115 |
|--|----------|-----------|----------|-----------|----------|----------|-----------|----------|
| Volatile Organic Compounds (ppbv) | | | | | | | | |
| Dichlorodifluoromethane | 1.85U | 0.47U | 0.47U | 0.48U | 0.95U | 0.50U | 0.44U | 0.48U |
| Vinyl chloride | 0.01 | 0.01U | 0.01U | 0.01U | 0.01U | 0.01U | 0.01U | 0.01U |
| Trichlorofluoromethane | 0.32 | 0.27 | 0.28 | 0.27 | 0.28 | 0.27 | 0.31 | 0.28 |
| Methylene chloride | 7.84J | 0.36U | 0.51U | 0.82U | 0.88U | 0.56U | 0.30U | 0.55U |
| Freon 113 | 1.07 | 0.10 | 0.11 | 0.12 | 0.15 | 0.12 | 0.10 | 0.12 |
| Chloroform | 0.09 | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U |
| 1,1,1-Trichloroethane | 0.16 | 0.13 | 0.13 | 0.13 | 0.14 | 0.13 | 0.13 | 0.13 |
| Benzene | 0.18 | 0.19 | 0.19 | 0.19 | 0.19 | 0.20 | 0.19 | 0.23 |
| Carbon tetrachloride | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.12 | 0.13 |
| Toluene | 0.57 | 0.56 | 0.26U | 0.30U | 0.35U | 1.24 | 0.35U | 0.35U |
| Ethylbenzene | 0.08 | 0.08 | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U |
| m,p-Xylene | 0.28 | 0.29 | 0.09 | 0.11 | 0.12 | 0.14 | 0.13 | 0.13 |
| o-Xylene | 0.10 | 0.08 | 0.05U | 0.05U | 0.05U | 0.05U | 0.06 | 0.05U |
| 1,3,5-Trimethylbenzene | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U | 0.05U |
| 1,2,4-Trimethylbenzene | 0.09 | 0.07 | 0.06 | 0.06 | 0.06 | 0.05 | 0.07 | 0.06 |
| Notes: ppbv = parts per billion volume. U = not detected, sample quantitation limit reported. | | | | | | | | |

Table B-4
Summary of Laboratory Analytical Data for Trenching Activity Air Samples

Technical Memorandum
 November 1994 Field Program
 Site 11, Old Camden County Landfill
 Naval Submarine Base Kings Bay
 Kings Bay, Georgia

| Detected Compounds | 11AIR117D | 11AIR117 | 11AIR119 | 11AIR119D | 11AIR116 | 11AIR118 | 11AIR121 | 11AIRFB2 |
|---|-----------|----------|----------|-----------|----------|----------|----------|----------|
| Volatle Organic Compounds (bbpv) | | | | | | | | |
| Dichlorodifluoromethane | 0.73 | 0.63 | 1.22 | 1.71 | 0.51 | 0.69 | 0.55 | 0.05U |
| Vinyl chloride | 0.10U | 0.10U | 0.05U | 0.08U | 0.09U | 0.08U | 0.05U | 0.01U |
| Trichlorofluoromethane | 0.42 | 0.37 | 0.60 | 0.69 | 0.37 | 0.44 | 0.37 | 0.05U |
| Methylene chloride | 9.34J | 6.89J | 21.7J | 33.3J | 1.94U | 12.4J | 2.09U | 0.10U |
| Freon 113 | 0.29 | 0.29 | 3.47 | 4.37 | 0.15 | 0.28 | 0.20 | 0.05U |
| Chloroform | 0.10U | 1.25 | 0.67 | 0.78 | 0.09U | 0.08U | 0.17 | 0.05U |
| 1,1,1-Trichloroethane | 0.23 | 0.17 | 0.34 | 0.31 | 0.14 | 0.19 | 0.16 | 0.05U |
| Benzene | 0.31 | 0.39 | 1.86 | 1.80 | 0.24 | 0.29 | 0.28 | 0.05U |
| Carbon tetrachloride | 0.21 | 0.16 | 0.16 | 0.16 | 0.14 | 0.18 | 0.17 | 0.05U |
| Toluene | 0.42 | 0.84 | 2.44 | 2.43 | 0.42 | 0.59 | 0.69 | 0.05U |
| Ethylbenzene | 0.10U | 0.10U | 0.13 | 0.14 | 0.09U | 0.08U | 0.07 | 0.05U |
| m,p-Xylene | 0.16 | 0.19 | 0.53 | 0.53 | 0.21 | 0.29 | 0.26 | 0.05U |
| o-Xylene | 0.10U | 0.10U | 0.19 | 0.20 | 0.09U | 0.10 | 0.09 | 0.05U |
| 1,3,5-Trimethylbenzene | 0.10U | 0.10U | 0.05U | 0.08U | 0.09U | 0.08U | 0.05U | 0.05U |
| 1,2,4-Trimethylbenzene | 0.10U | 0.10U | 0.11 | 0.10 | 0.13 | 0.09 | 0.07 | 0.05U |

Notes: ppbv = parts per billion volume.
 U = not detected, sample quantitation limit reported.
 J = estimated value.

Table B-5
Ranges and Frequency of Detection for Air Samples

Technical Memorandum
 November 1994 Field Program
 Site 11, Old Camden County Landfill
 Naval Submarine Base Kings Bay
 Kings Bay, Georgia

| Detected Compounds | Baseline | | During Trenching | |
|--|--------------|------------------------|------------------|------------------------|
| | Range | Frequency ¹ | Range | Frequency ¹ |
| Volatile Organic Compounds (ppbv) | | | | |
| Dichlorodifluoromethane | 0.51 to 0.57 | 12/13 | 0.51 to 1.71 | 7/15 |
| Vinyl chloride | 0.01 | 2/13 | 0.01 | 1/15 |
| Trichlorofluoromethane | 0.30 to 0.43 | 13/13 | 0.27 to 0.69 | 15/15 |
| Methylene chloride | 0.49 to 1.26 | 5/13 | 6.89J to 33.3J | 6/15 |
| Freon 113 | 0.13 to 0.31 | 6/13 | 0.10 to 4.37 | 15/15 |
| Chloroform | 0.30 | 1/13 | 0.09 to 1.25 | 5/15 |
| 1,1,1-Trichloroethane | 0.12 to 0.14 | 13/13 | 0.13 to 0.34 | 15/15 |
| Benzene | 0.11 to 2.02 | 13/13 | 0.19 to 1.86 | 15/15 |
| Carbon tetrachloride | 0.12 to 0.14 | 13/13 | 0.12 to 0.21 | 15/15 |
| Toluene | 0.14 to 1.82 | 12/13 | 0.42 to 2.44 | 10/15 |
| Ethylbenzene | 0.18 | 1/13 | 0.08 to 0.14 | 5/15 |
| m,p-Xylene | 0.09 to 0.79 | 5/13 | 0.09 to 0.53 | 15/15 |
| o-Xylene | 0.05 to 0.42 | 4/13 | 0.06 to 0.20 | 7/15 |
| 1,3,5-Trimethylbenzene | 0.10 | 1/13 | — | 0/15 |
| 1,2,4-Trimethylbenzene | 0.05 to 0.15 | 8/13 | 0.06 to 0.13 | 13/15 |

¹ The first number represents the number of detections and the second number represents the number of samples analyzed.

Notes: ppbv = parts per billion volume.
 J = estimated value.