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FORT BRAGG, NORTH CAROLINA 28310-5000

REPLY TO
ATTENTION OF

August 12, 2008

Directorate of Public Works

RECEIVED
AUG 28 2008
SOLID WASTE SECTION

Mr. Ed Mussler
North Carolina Department of Environmental
and Natural Resources
Division of Waste Management
Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27609

Dear Mr. Mussler:

Attached for review is Fort Bragg's landfill monitoring report for 2007. The report is the first of two annual reports compiled for the Longstreet Road Municipal Solid Waste Landfill and the Lamont Road Land Clearing, Inert Debris, Construction and Demolition Landfill.

For additional information, please contact Mr. Sid Williamson at (910) 396-3372 or Ms. Audrey Oxendine at (910) 432-8464.

Sincerely,

Gregory G. Bean
Director of Public Works

Enclosure

FINAL

RECEIVED
AUG 28 2008
SOLID WASTE

REPORT
FOR
FIRST 2007 GROUND-WATER, SURFACE-WATER AND METHANE MONITORING

AT

LONGSTREET ROAD MSW LANDFILL AND THE LAMONT ROAD LCID AND C&D LANDFILL

NCDENR LANDFILL PERMIT #26-02
NCDENR LANDFILL PERMIT #26G AND #26-08

FORT BRAGG, NORTH CAROLINA

Prepared by:

US Army Corps of Engineers
Savannah District
Hazardous, Toxic & Radioactive Waste Section
CESAS-EN-GH
110 W. Oglethorpe Avenue
Savannah, GA 31401

July 2008

FINAL REPORT
ON

FIRST 2007 GROUND-WATER, SURFACE-WATER AND METHANE MONITORING PROGRAM

FOR

LONGSTREET ROAD MSW LANDFILL AND THE LAMONT ROAD LCID AND C&D LANDFILL FORT BRAGG, NORTH CAROLINA

Prepared by:

US Army Corps of Engineers
Savannah District
Hazardous, Toxic & Radioactive Waste Section
CESAS-EN-GH
100 W. Oglethorpe Avenue
Savannah, GA 31401

July 2008

SIGNATURE OF CERTIFIED PROFESSIONAL GEOLOGIST	
Robert V. O'Kelley	8/4/08
Robert V. O'Kelley, P. G. Professional License Numbers: North Carolina # 0320	Date

FINAL REPORT

FOR
FIRST 2007 GROUND-WATER, SURFACE-WATER AND METHANE MONITORING

AT
LONGSTREET & LAMONT LANDFILLS
FORT BRAGG, NORTH CAROLINA

Prepared by:

US Army Corps of Engineers
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July 2008

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LIST OF ACRONYMS

BMP	Base Master Plan
CAP	Corrective Action Plan
CESAS	Savannah District, US Army Corps of Engineers
CMS	Corrective Measures Study
COE	Corps of Engineers
IDW	Investigation Derived Waste
IRP	Installation Restoration Plan
LTM	Long Term Monitoring
MCL	Maximum Contaminant Level
mg/kg	Milligrams Per Kilogram
mg/L	Milligrams Per Liter
mm	Millimeter
µg/kg	Micrograms Per Kilogram
µg/L	Micrograms Per Liter
NCDENR	North Carolina Department of Environmental, and Natural Resources
ppm	Parts Per Million
PCE	Tetrachloroethene
pH	Negative Logarithm of the Hydrogen Ion Activity
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI/FS	Remedial Investigation / Feasibility Study
SAR	Site Assessment Report
SVOCs	Semi-Volatile Organic Compounds
SWMU	Solid Waste Management Unit
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbon
USACE	US Army Corps of Engineers
USGS	US Geological Survey
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

Final Report on the First 2007 Sampling Event For Ground-Water, Surface-Water and Methane Monitoring At Longstreet and Lamont Landfills Fort Bragg, North Carolina

1.0 INTRODUCTION

This is the First 2007 Report for Ground-Water, Surface-Water and Methane Monitoring at Longstreet and Lamont Landfills (Figure 1) performed by the United States Army Corps of Engineers (USACE), Savannah District. The monitoring is required by the State of North Carolina Solid Waste Management Division. This report summarizes the ground-water, surface-water and methane sampling activities and the analytical results of the sampling event conducted in May and June 2007.

There was a problem with the analytical laboratory during analysis of the samples taken during this sampling event. The lab held the samples approximately two weeks beyond the holding time allowed by EPA regulations. This could account for some loss of accuracy. Based on the statistical analysis, there was no statistical significance attributed to changes in concentrations. However, this may not have accounted for losses that resulted in no detection or losses in concentrations for samples taken from the six newly added wells. It will not be until the next round of sampling results are recorded that data reliability is determined.

1.1 Project Background

1.1.1 Longstreet Road MSW Landfill

The landfill is a Municipal Solid Waste Landfill Facility (MSWLF) located north of Longstreet Road at Fort Bragg in Cumberland County, North Carolina. Figure 1 is a map of the site location. Ground-water, surface-water, and methane monitoring locations are shown on Figure 2. The United States Army Corps of Engineers (USACE), Savannah District has been contracted by the Fort Bragg Directorate of Public Works (DPW) to conduct water quality sampling for the

Environmental Branch to satisfy the following ground-water and surface-water monitoring requirements:

- The first semi-annual Appendix I (to Part 258 of EPA's Title 40: Protection of the Environment Regulation) detection monitoring event for 2006; and
- The annual Appendix II (to Part 258 of EPA's Title 40: Protection of the Environment Regulation), for triggered constituents only, assessment monitoring event for 2007 (Second round of sampling only).

To complete these requirements, samples from the nine monitoring wells at the site were analyzed for the full Appendix I and triggered Appendix II constituent lists. Two surface-water Longstreet Road MSW Landfill monitoring samples were analyzed for the Appendix I & II constituent lists as well as VOCs. This report also includes Appendix I and triggered Appendix II statistical evaluations. This round of sampling follows the Sampling and Analysis Plan (SAP) approved by NCDENR to include current and future sampling events. The list of wells included in this sampling plan are SLMW-6, SLMW-7, SLMW-8, SLMW-9, SLMW-10, SLMW-11, SLMW-12AR, SLMW-12BR and SLMW-13. Ground-water monitoring locations are shown on Figure 3. All sampling was conducted according to North Carolina Solid Waste Management Guidelines.

1.1.2 Lamont Road LCID and C&D Landfill

The USACE was contracted by the DPW, Fort Bragg, North Carolina to sample the ground water from seven monitoring wells included in the current permit and approved sampling plan. Four of the original eleven have been permanently abandoned, leaving seven locations at the Lamont Road Land Clearing and Inert Debris (LCID) and Construction and Demolition (C&D) Landfill for the DPW Environmental Branch. These four wells have been replaced with wells at different locations at the landfill. This round of sampling follows the Sampling and Analysis Plan (SAP) approved by NCDENR to include current and future

sampling events. The list of wells included in this sampling plan are LMW-3, LMW-3s, LMW-4, LMW-6, LMW-7, LMW-8, LMW-9, LMW-9s, LMW-9d, LMW-10, LMW-14R, LMW-15R, and LMW-16. Ground-water monitoring locations are shown on Figure 3. All sampling was conducted according to North Carolina Solid Waste Management Guidelines.

1.2 Scope and Objectives of this Monitoring Program

- Collect ground-water samples from 9 selected monitoring wells at the Longstreet MSW Landfill for analyses of Appendix I & II constituents.
- Collect ground-water samples from 13 selected monitoring wells at the Lamont Road LCID and C&D Landfill for analyses of Appendix I & IIconstituents.
- Sample two surface-water monitoring locations at the Longstreet Road MSW Landfill and analyze for Appendix I & II constituents as well as VOCs.
- Obtain field sampling measurements (i.e. pH, temperature, etc.).
- Determine ground-water directions at the monitoring well locations.
- Sample for methane at 28 selected methane monitoring wells and 5 buildings on site.
- Evaluate the analytical results and determine the concentration changes of chemicals of concern (COCs) with time.
- Measure ground-water level for all existing wells.
- Prepare progress report with analytical results for this sampling event, including statistical analysis of each constituent as required by NC regulations and all appropriate figures (i.e . potentiometric map).
- The annual monitoring program consists of 2 sampling events (this was the first) to be conducted 6 months apart.

During the sampling event, low levels of VOCs, SVOCs, pesticides, Appendix I metals and Appendix II inorganics were detected, but most detections were below NC 2L standards. Ground water from five wells and one surface-water sample had detections of VOCs that were above the NC 2L standards (Table 2). There were 4 SVOC detections above the 2L standard. There were 2 detections of pesticides, with none above the 2L

standard. No PCBs or organophosphorus pesticides were detected at all. There were various low level detections of inorganics, only two of which were above the 2L standard. In addition, there were 3 wells with nitrate above the 2L and 5 wells with nitrite above the 2L standard. These data will be compared to data from previous sampling events.

2.0 PROJECT HISTORY

2.1 Site Description and History

2.1.1 Longstreet Road MSW Landfill

The landfill is a Municipal Solid Waste Landfill Facility (MSWLF) located north of Longstreet Road at Fort Bragg in Cumberland County, North Carolina. Figures 1 and 2 show the site location. Ground-water (9 monitoring wells) and surface-water (2 locations) sampling locations are shown on Figure 2. In addition to the ground-water samples, 2 surface-water samples have been taken from McPherson Creek and methane gas samples taken from 23 wells and buildings. BPA Environmental monitored the ground water and surface water at the site for several sampling events prior to 2005 sampling events. The USACE has monitored the site since 2005.

2.1.2 Lamont Road LCID and C&D Landfill

The Lamont Road LCID and C&D Landfill are on the west side of Cooleyconch Mountain (Figure 3). The previous use of this site was for: maneuver training conducted continuously for 50 years, borrow pit for sands and clays, and repository for unclassified debris from land clearing and construction demolition. The LCID Landfill started as an uncontrolled dump site associated with reclaiming borrow excavation. Its initial operation pre-dated Federal and State regulations governing waste disposal. The LCID Landfill has been operated as a controlled repository for construction and demolition (C&D) debris as well as for land clearing and inert debris since its permitting under NCDENR Permit No. 26C on August 28, 1987. From February 1993 to date of closure, C&D debris was diverted to the Longstreet Road Sanitary Landfill and only LCID has been accepted at the LCID Landfill site. It is anticipated that asbestos materials are

disposed of in this landfill.

Cooleyconch Mountain is the prominent terrain feature west of the main post. The LCID Landfill site is 1.5 miles west of the Longstreet Road MSW Landfill (closed January 1, 1998) and 200 yards northwest of the Lamont Road C&D Landfill. The area adjacent and east of the LCID Landfill has been excavated as a borrow pit for sandy fill material. To the south of the LCID Landfill (in the C&D Landfill site) petroleum contaminated soils have been spread, dried, and stored for later removal. To the east of the LCID Landfill, petroleum contaminated sludges have been stored in earthen impoundments for later removal. The LCID Landfill drains north to Cypress Creek, which intersects the Little River a mile upstream of the Fort Bragg Water Plant intake.

Ground-water samples have been taken from the original eleven monitoring wells at Lamont Landfill and analyzed during several sampling events conducted by BPA Environmental in conjunction with monitoring events at Longstreet Road MSW Landfill. Currently four of those eleven wells have been permanently abandoned. New wells previously installed by BPA along with two replacement wells installed by USACE, Savannah District, are included in this and future reports. Sampling was done at six of these new wells during this event. Now that the new sampling plan has been approved, these new monitoring wells will be included in all sampling events for a full range of constituents.

2.2 General Site Geology and Hydrology

Lithologic descriptions of soil borings and monitoring well borings from previous investigations at Fort Bragg indicate that in general the area of Fort Bragg is underlain by alternating sands, silty sands, clayey sands, sandy clays, and clays, likely belonging to the Middendorf Formation. The sands and silty sands range in thickness from approximately 2 to 22 ft and are coarse grained. The clay units range in thickness from approximately 2 to 7 ft. and are typically plastic.

2.3 Previous Investigation and Results

Several sampling events have been conducted at the two landfills. Initially, four monthly sampling events were conducted in July, August, September, and October 1996 by R,S & H Architect, Engineering, & Planning, Inc. Law & Company, Inc. conducted two sampling events in March and September 1999, in conjunction with the installation of new wells. All other sampling events were conducted by BPA Environmental & Engineering, Inc., including the sampling event in October 2004.

Ground-water (9 monitoring wells) and surface-water (2 locations) samples were collected during this event at the Longstreet Landfill. Analytical results from the ground-water and surface-water sampling indicated concentrations of five Appendix II constituents that had concentrations at or above 2L standards in one or more of the wells. The specific constituents found were acetone, cis-1,2-Dichloroethene, 3- methylphenol, 4-methylphenol, and vinyl chloride.

Ground-water samples were collected during this event at the Lamont Road Landfill from all eleven ground-water monitoring wells. One RCRA metal constituent (Cadmium) was detected below the 2L standard. No other Appendix I constituents were detected, neither organic nor inorganic.

This sampling event, held in May and June 2007 for Longstreet Landfill and for Lamont Landfill, was conducted by the USACE, Savannah District. There were low level concentrations of VOCs, SVOCs, pesticides, as well as, Appendix I & II metals. However, most were below their NC 2L standards.

3.0 SAMPLING ACIVITY

3.1 Ground-Water Sampling

The ground-water sampling was conducted in accordance with the Work Plan, Ground-Water Monitoring Program for Longstreet Road MSW Landfill and the Lamont (NCDENR Landfill Permit #26-02) Road LCID and C&D Landfill (NCDENR Landfill

Permit # 26G and #26-08) dated April 2005, which has been updated to reflect the newly approved SAP. Ground-water samples were collected from each of 23 selected wells on June 1 & 2, 2007, for Lamont (13 wells) and for Longstreet (9 wells). In addition, 2 surface-water samples were taken at Longstreet Landfill. Water quality parameters were measured during the purge cycle of each well. The field-measured parameter, including pH, specific conductivity, temperature, turbidity, dissolved oxygen and oxidation-reduction potential, are summarized in Table 1.

Low flow purging techniques in conjunction with a flow-through cell was used to collect water samples. Immediately after completion of well purging, or when the field indicator parameters were stabilized, ground water was collected directly from the sampling tube connected with the pump. Samples for VOC analyses were collected first. Immediately after collection of samples and completion of labels, each container was placed into an ice-filled cooler to ensure preservation. Water samples for RCRA metal analysis were un-filtered. The results of the ground-water sampling will be presented in Table 2 and Figures 4 & 5. The ground-water sampling field data logs are presented in Appendix A.

3.2 Water Level Measurement and Ground-Water Mapping

During this sampling event, the water levels in 22 existing monitoring wells were measured. Measured water levels and calculated elevations are presented in Table 4.

Based on the water level measurements of June 2007, ground-water table contour maps were developed and are presented in Figures 7 & 8. The maps show the general direction of the ground-water flow at the Longstreet Landfill is towards the north and east, and that the general direction of the ground-water flow at the Lamont Landfill is towards the west-northwest.

3.3 Investigation Derived Wastes (IDW)

The IDW, including the waste water from well purging and decontamination water, was containerized in 55-gallon drums. Those drums were appropriately labeled, sealed, and

placed within designated areas and remained until analytical results had been received and reviewed. Based on the analytical results of the ground-water samples, the IDW was classified as non-hazardous. With the concurrence of the Fort Bragg IRP Manager, the IDW was disposed of off Fort Bragg at an appropriate disposal facility.

4.0 ANALYTICAL RESULTS

All ground-water samples collected in June 2007 were analyzed for VOCs, SVOCs, Pesticides, PCBs, Organophosphorus Pesticides, as well as, Appendix I Metals and/or Appendix II Inorganics. The summary of detections of the analytical results is presented in Table 2. Figures 4 & 5 show the distribution of the detections and their concentrations from this sampling event. The report of chemical data quality assessment prepared by the Project Chemist is presented in Appendix B. The laboratory reports of analytical results are attached as Appendix C. For comparison, the analytical results of previous investigations are also presented in the Appendix D Statistical Reports.

In accordance with North Carolina guidance, analytical results are compared to North Carolina Groundwater 2L Standards (NC 2L standards). The analytical data of the first 2007 sampling event indicated that some VOCs, SVOCs, a pesticide, and metals were detected at low levels, and most detections were below NC 2L standards (Table 2). Seven wells and both surface-water samples had detections exceeding the NC 2L standards, excluding the 5 nitrate/nitrite exceedances: wells SLMW-7, SLMW-8, SLMW-9, SLMW-10, SLMW-11, SLMW-13, SW-1 and SW-2, as well as LMW-9d. The analytical results for each of those wells are discussed as follows:

4.1 Longstreet Road MSW Landfill

- Well SLMW-7

  In June 2007, benzene was detected at a concentration of 1.2 ug/L, above its 2L standard of 1.0 ug/L.

  The SVOC, 4-methylphenol (p-cresol) was detected above its 2L standard of 3.5

ug/L with a concentration of 13.5 ug/L.

- Well SLMW-8

  In June 2007, benzene, and vinyl chloride were detected above their 2L standards of 1.0 ug/L, and 0.015 ug/L with concentrations of 3.2 ug/L, and 19.0 ug/L, respectively.

  No other constituents were above their 2L standard.

- Well SLMW-9

  In June 2007, benzene was detected at a concentration of 2.2 ug/L, above its 2L standard of 1.0 ug/L.

  Arsenic was also detected above its 2L standard of 10 ug/L with a concentration of 10.8 ug/L.

- Well SLMW-10

  In June 2007, the SVOC, 1,4-dichlorobenzene was detected above its 2L standard of 1.4 ug/L with a concentration of 1.94J ug/L.

  No other constituents were above their 2L standard.

- Well SLMW-10Dup

  In June 2007, the SVOC, 1,4-dichlorobenzene was detected above its 2L standard of 1.4 ug/L with a concentration of 1.75J ug/L.

  No other constituents were above their 2L standard.

- Well SLMW-11

  In June 2007, benzene was detected at a concentration of 2.1 ug/L, above its 2L standard of 1.0 ug/L.

  No other constituents were above their 2L standard.

- SW-1

  In June 2007, benzene was detected at a concentration of 1.6 ug/L, above its 2L standard of 1.0 ug/L.

  Arsenic was also detected above its 2L standard of 10 ug/L with a concentration of 14.0 ug/L.

- SW-2

  In June 2007, the SVOC, 1,4-dichlorobenzene was detected above its 2L standard of 1.4 ug/L with a concentration of 1.87J ug/L.

  No other constituents were above their 2L standard.

Ground-water samples from all other monitoring wells had detections. However all were below NC 2L standards and most were estimated values (Table 2).

4.2 Lamont Road LCID and C&D Landfill

- Well LMW-9d

  In June 2007, benzene was detected at a concentration of 1.3 ug/L, above its 2L standard of 1.0 ug/L.

In addition, LMW-4, LMW-6, LMW-9, LMW-9s and LMW–10 indicated Nitrate/Nitrite concentrations above their 2L standards of 10,000/1000 ug/L with concentrations at 643,000/643,000 ug/L, 1220/1220 ug/L, 17,200/17,200 ug/L, 1020/1020 ug/L, and 1000/1000 ug/L respectively. Though all other wells had constituent detections above reporting limits, all are below the NC 2L standard, and most are estimated values (Table 2).

5.0 CONCLUSIONS AND RECOMMENATIONS FOR GROUND-WATER SAMPLING

This was the first 2007 sampling event for ground-water, surface-water and methane monitoring performed by the USACE, Savannah District at this site. It was actually the 21st sampling event to be performed at the Longstreet Road Landfill and the 14th at the Lamont Road Landfill. Low levels of VOCs, SVOCs, a pesticide and Appendix I & II metals and inorganics were detected, but most detections were below NC 2L standards. Fifteen detections were found to exceed NC 2L standards.

There was a problem with the analytical laboratory during analysis of the samples taken during this sampling event. The lab held the samples approximately two weeks beyond the holding time allowed by EPA regulations. This could account for some loss of accuracy. Based on the statistical analysis, there was no statistical significance attributed to changes in concentrations. However, this may not have accounted for losses that resulted in no detection or losses in concentrations for samples taken from the six newly added wells. It will not be until the next round of sampling results are recorded that data reliability is determined.

Longstreet Road MSW Landfill

The VOC, benzene, was detected above its 2L standard at monitoring wells SLMW-7, SLMW-8, SLMW-9, SLMW-11, as well as, SW-1. Vinyl chloride was found to be above the 2L standard at monitoring well SLMW-8.

The SVOC, 1,4-dichlorobenzene was detected above its 2L standard at SLMW-10, SLMW-10Dup and SW-2. Also, 4-methylphenol (p-cresol) was detected above its 2L standard at SLMW-7 and SLMW-13.

The constituents found in the surface-water sample, SW-1, can most likely be attributed to the nearby vehicle wash rack that produces run-off into the stream. This seems to have volatilized very quickly, because the downstream sample, SW-2, showed only slight contamination with no VOC detections and one SVOC detection.

The methane levels were measured at 20 locations at Longstreet. Eight methane monitoring wells showed high levels of methane with 6 readings at or above 40% methane by volume. Methane vent flares were recommended for this landfill in the 2005 Report.

Lamont Road LCID and C&D Landfill

Low levels of VOCs, SVOCs and Appendix I & II metals and inorganics were detected, but all detections were below NC 2L standards. This year 13 methane monitoring wells were sampled for methane.

According to the Statistical Analysis of Ground-Water Data (Appendix E), there is no evidence of an upward trend in constituent concentrations. There are both downward trends and fluctuating results at the Longstreet Road Landfill. The statistical findings at the Lamont Road Landfill were that any statistical abnormalities were due to downward or variable results with no indications of upward trending. The concentration levels and number of detections at the Lamont Road Landfill have been consistently low.

The LTM was triggered by the NC Solid Waste Landfill Regulations. The full suite of constituent groups was of primary concern for the LTM. Even though some decrease is indicated, the LTM should be continued for the Longstreet Road Landfill site since regulatory requirements have not been met. Long-term monitoring should continue at the Lamont Road Landfill because it is still an active site and NC Solid Waste Regulations requires it.

6.0 REFERENCES

North Carolina Administrative Code, Title 15A, Department of Environment, Health, and Natural Resources, Division of Solid Waste, Management, Subchapter 13B, Solid Waste Management, Section .1600 (January 4, 1994).

North Carolina Administrative Code, Title 15A, Department of Environment, Health, and Natural Resources, Division of Solid Waste, Management, Subchapter 2L, Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina, Sections .0100, .0200, and .0300 (November 8, 1993): from the Environmental Management Commission, Raleigh, North Carolina.

Table 1. Field Measurements of Ground-Water Sampling at Long Street (May/June 2007) and Lamont (June 2007)Landfills, Ft. Bragg, NC

Well ID	Sample Identification	pH	Specific Conductivity (µs/cm)	Temperature (°C)	Turbidity (N.T.U.)	Dissolved Oxygen (mg/L)	ORP
Longstreet							
SLMW-6	GW-SLMW-6-6-07	4.10	7.0	21.44	2.1	6.42	244
SLMW-7	GW-SLMW-7-6-07	5.59	269.9	21.36	31.9	1.78	15
SLMW-8	GW-SLMW-8-6-07	5.13	246.1	22.42	11.1	1.41	60
SLMW-9	GW-SLMW-9-6-07	5.4	460.1	26.1	8.64	0.44	33
SLMW-10	GW-SLMW-10-6-07	5.39	291.2	20.32	9.2	0.36	11
SLMW-11	GW-SLMW-11-6-07	5.21	152.1	32.58	55.1	1.67	84
SLMW-12AR	GW-SLMW-12AR-6-07	5.64	134.0	16.72	7.9	0.78	71
SLMW-12BR	GW-SLMW-12BR-6-07	4.33	40.2	22.97	5.0	0.89	219
SLMW-13	GW-SLMW-13-6-07	3.89	11.2	19.28	3.35	3.5	238
SW-1	SW-1-6-07	5.54	154.7	23.54	3.25	2.16	163
SW-2	SW-2-6-07	5.64	16.5	24.12	7.7	2.72	160

Table 1 Cont'. Field Measurements of Ground-Water Sampling November 2006 at Long Street and Lamont Landfills, Ft. Bragg, NC (Continued)

Well ID	Sample Identification	pH	Specific Conductivity (µs/cm)	Temperature (°C)	Turbidity (N.T.U.)	Dissolved Oxygen (mg/L)	ORP
Lamont							
LMW-3	GW-LMW-3-6-07	4.17	10.4	19.79	3.05	2.83	239
LMW-3s	GW-LMW-3s-6-07	4.26	16.3	20.0	454*	1.33	226
LMW-4	GW-LMW-4-6-07	4.8	22	22.9	9.57	7.9	1480
LMW-6	GW-LMW-6-6-07	5.0	111	20.3	12.6	3.54	131.6
LMW-7	GW-LMW-7-6-07	4.76	18.1	19.2	6.10	5.18	316
LMW-8	GW-LMW-8-6-07	5.55	180.7	20.1	7.44	6.73	155
LMW-9	GW-LMW-9-6-07	5.17	14	25.9	6.13	10.7	188.5
LMW-9s	GW-LMW-9s-6-07	4.77	165	20.5	9.9	0.76	170
LMW-9d	GW-LMW-9d-6-07	6.65	54	20.3	9.78	8.95	111.5
LMW-10	GW-LMW-10-6-07	4.86	35	19.4	8.1	7.96	172.1
LMW-14R	GW-LMW-14R-6-07	5.97	23	20.0	5.14	4.91	166.2
LMW-15R	GW-LMW-15R-6-07	4.9	35	20.0	6.33	8.79	176
LMW-16	GW-LMW-16-6-07	5.29	126	20.0	10.2	1.70	174.1

Note:
N.T.U. --- Nephelometric Turbidity Unit; ORP --- Oxidation Reduction Potential
#Monitoring Wells Permanently Abandoned
*High turbidity has been a continuing problem with this well.

Table 2. Summary of Ground-Water and Surface-Water Detections From the Second Sampling Event (May/June 2007) at Longstreet and Lamont Landfills, Ft. Bragg

COMPOUNDS (µg/L)	Groundwater NC 2L Standard (ug/l)	EPA Drinking water MCL (ug/l)	SLMW-6 04/05	SLMW-6 10/05	SLMW-6 4/06	SLMW-6 11/06	SLMW-6 05/07	SLMW-7 04/05	SLMW-7 10/05	SLMW-7 4/06	SLMW-7 11/06	SLMW-7 05/07	SLMW-8 04/05	SLMW-8 10/05	SLMW-8 4/06	SLMW-8 11/06	GW-SLMW-8 06/07	SLMW-9 04/05	SLMW-9 10/05	SLMW-9 4/06	SLMW-9 11/06	GW-SLMW-9 06/07	SLMW-10 04/05	SLM-DUP1 04/05	SLMW-10 10/05	SLMW-10 4/06	SLMW-10 Dup 4/06	SLMW-10 11/06	SLMW-10 05/07	SLMW-10 Dup 05/07	SLMW-11 04/05	SLMW-11 10/05	SLMW-11 4/06	SLMW-11 11/06	GW-SLMW-11 06/07	SLMW-12A 04/05 (Long Street)	SLMW-12B 04/05 (Long Street)
VOCs (EPA 8260B)																																					
1,1-dichloroethane	700	810*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.91 J	3.43	2.11	2.86	<2	2.99	2.04	1.38J	1.39J	<2	1.25 J	1.41 J	1.6J	1.91J	1.85J	1.12J	<2	<2	3.86	2.18	1.68J	2.07	<2	<2	4.25
1,2-dichloroethane	0.38	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	**0.58J**	**0.61J**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-dichloropropane	0.56	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	**2.12**	**2.28**	**3.32**	**3.97**	**3.72**	**2.93**	<2	<2	**1.3 J**	<2	0.5J	**0.6J**	<2	<2	<2
1,4-dichlorobenzene	75	75	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.28J	0.36J	0.43J	<2	0.91 J	0.54J	0.43J	0.4J	<2	2.75	2.63	3.99	5.6	4.7	3.9	4.1	3.4	<2	<2	<2	<2	<2	<2	1.11 J
benzene	1	5	<2	<2	<2	<2	<2	<2	0.51J	0.68J	0.36J	**1.2**	**3.22**	**4.99**	**2.54**	**4.03**	**3.2**	**1.92 J**	**1.09J**	0.71J	0.8J	**2.2**	**1.8 J**	**1.72 J**	**1.32J**	**1.31J**	**1.24J**	0.96J	<2	<2	**4.58**	**1.54J**	0.83J	0.93J	**2.1**	<2	<2
2-butanone	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	2.29J	<2	<2	<2
chlorobenzene	50	100	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.78 J	2.75	1.69J	3.46	2.2	0.52 J	0.34J	0.25J	0.28J	1.1	0.33 J	0.35 J	0.43J	0.59J	0.50J	0.4J	<2	<2	<2	<2	<2	<2	<2	<2	1.01 J
chloroethane	2800	4.6*	<2	<2	<2	<2	<2	2.74	1.47J	2.27	0.72J	<2	0.76 J	0.96J	0.30J	0.38J	<2	<2	<2	<2	0.22J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.42J	0.56J	0.82J	<2	<2	0.4 J
chloromethane (methyl chloride)	2.6	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	2.13	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	2.44	<2	<2	<2
chloroform	0.19	80	0.24 J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
cis-1,2-dichloroethene	70	70	<2	<2	<2	<2	<2	0.21 J	<2	<2	<2	<2	55.9	**105**	42.5	42.4	25	1.78 J	1.26J	0.88J	0.71J	3.0	9.33	10	13.4	15.8	15.5	8.96	9.1	8.9	9.47	4.56	2.88	1.71J	5.7	<2	10.7
dichlorodifluoromethane	1400	390*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.61J	0.58J	<2	1.66 J	<2	<2	<2	<2	2.96	3.5	2.13	1.5J	1.18J	0.62J	<2	<2	4.85	0.8J	<2	0.68J	<2	<2	3.73
diisopropyl ether	70	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.54 J	0.56 J	1.04J	1.15J	1.22J	0.88J	<2	<2	<2	<2	<2	<2	<2	<2	<2
isopropylbenzene	70	660*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.5 J
methylene chloride (dichloromethane)	4.6	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.75J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
MTBE	200	13*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.54J	<2	0.21J	<2	0.39 J	0.39J	0.22J	<2	<2	0.2 J	0.2 J	0.37J	0.44J	0.42J	0.28J	<2	<2	<2	<2	<2	<2	<2	<2	<2
sec-butylbenzene	70	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.28J	0.22J	0.21J	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p xylene	530#	10000#	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.23J	<2	<2	<2	<2	<2
o-xylene	530#	10000#	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.24 J	0.71J	0.41J	0.46J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.34 J	0.26J	<2	<2	<2	<2	<2
tetrachloroethene	0.7	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	**5.34**	**2.18**	**2.4**	**2.69**	<2	0.32 J	0.32J	0.29J	0.21J	<2	**0.75 J**	0.45 J	**0.71J**	**0.96J**	**0.74J**	0.55J	<2	<2	**2.64**	0.46J	<2	0.49J	<2	<2	0.42 J
toluene	1000	1000	<2	<2	0.43J	<2	<2	<2	0.26J	0.39J	0.51J	<2	0.22 J	0.55J	0.58J	0.49J	1.2 J	<2	<2	0.46J	<2	<2	<2	<2	<2	0.35J	0.55J	<2	<2	<2	<2	<2	3.16	<2	<2	<2	<2
trans-1,2-dichloroethene	70	100	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.28 J	0.52J	0.28J	3.65	<2	<2	<2	<2	<2	<2	0.24 J	0.23 J	0.24J	0.29J	0.30J	0.59J	<2	<2	<2	<2	<2	<2	<2	<2	0.22 J
trichloroethene	2.8	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	2.29	**6.66**	2.22	**3.54**	1.6	0.7 J	<2	0.45J	0.43J	0.6 J	0.88 J	1.01 J	1.15J	1.27J	1.29J	0.89J	<2	<2	**3.01**	1.28J	0.59J	0.96J	2.0	<2	2.14
trichlorofluoromethane	2100	1300*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.53J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.28J	<2	<2	<2	<2	<2
vinyl chloride	0.015	2	<2	<2	<2	<2	<2	**0.52 J**	**0.36J**	**0.64J**	**0.35J**	<2	**59**	**54.2**	**24.6**	**36.6**	**19**	**2.81**	**1.45J**	**0.69J**	0.73J	<2	**1.91 J**	**3.58**	**2.48**	**2.8**	**2.62**	**1.7**	<2	<2	**3.57**	**0.9J**	**0.78J**	0.8J	<2	<2	**5.41**
acetone	700	NA	NA	2.2	<2	<2	<2	NA	6.97	<2	1.34J	<2	NA	1.27J	<2	<2	<2	NA	<2	<2	<2	<2	NA	NA	<2	<2	<2	<2	<2	<2	NA	<2	<2	13.9	100	NA	NA
acrolein	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
carbon disulfide	700	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.24J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.54J	<2	<2	<2	<2	<2	<2	<2	<2	<2
SVOCs (EPA 8270C)																																					
1,4-dichlorobenzene (para)	1.4	75	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1.31 J	1.57 J	1.75J	2.79J	2.62J	**2.7J**	**1.94 J**	**1.75 J**	<10	<10	<10	<10	<10	<10	<10
4-methylphenol (p-cresol)	3.5	180*	<10	<10	<10	<10	<10	1.87 J	<10	**14.6**	<10	**13.5**	**7.44 J**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
diethylphthalate	5000	29000*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**1.06J**	<10	<10	<10	<10	<10	<10	<10	2.55 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	3.49 J
di-n-butylphthalate	700	3600*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate	2.5	6	<10	<10	3.62	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5.02	<10	<10	<10	<10	<10	<10	4.41	<10	<10	<10	<10
phenol	300	NA					<10					2.89 J					<10					<10							<10	<10					<10		
Pesticides (EPA 8081)																																					
delta-BHC	NA	NA				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505						<.0505	<.0505	<.0505				<.0505	<.0505		
alpha-Chlordane*	0.1	2				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505						**0.1**	<.0505	<.0505				<.0505	<.0505		
gamma-Chlordane*	0.1	2				0.0202J	0.0202J				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505						**0.11J**	<.0505	<.0505				<.0505	<.0505		
Aldrin	NA	NA				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505						<.0505	<.0505	<.0505				<.0505	<.0505		
Dieldrin	0.0022	NA				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505						<.0505	<.0505	<.0505				<.0505	<.0505		
Endosulfan I	NA	NA					<0.025					0.0143 J					<0.025					<0.025							<0.025	<0.025					<0.025		
Heptachlor	0.0078	0.4				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505				<.0505	<.0505						**0.06J**	<.0505	<.0505				<.0505	<.0505		
PCBs (EPA 8082)																																					
No Detections																																					
Organophosphorus Pesticides (EPA 8141A)																																					
No Detections																																					
Appendix I Metals (EPA 6010B/6020A)																																					
Arsenic	10	10																																			
Barium	2000	2000																																			
Cadmium	5	5																																			
Cobalt	NA	NA																																			
Chromium	50	100																																			
Copper	1000	1000																																			
Lead	15	15																																			
Nickel	100	730*																																			
Selenium	50	50																																			
Vanadium	NA	260*																																			
Zinc	2100	5000																																			
Appendix II Inorganics (EPA 6010B/6020A)																																					
Arsenic	10	10	<2	<2	<2	<2	<2	5.76	8.44	9.41	4.84	9.45	5.17	6.67	4.63	3.32	5.92	3.91	6.28	**11**	**11.4**	**10.8**	1.13 J	1.17 J	<2	1.31J	1.31J	1.88J	3.62	3.75	10.4	7.5	7.92	2.65	**25.5**	<2	1.95 J
Barium	2000	2000	5.7 J	5.5	<2	6.07	7.22	46.8	47.5	50	37.7	63.2	95.7	65.2	70	85.5	76.3	40.7	39	40	49.3	70.4	77.9	79.2	76.8	<2	110	123	139	129	28.8	19.1	30	116	50.0	36	40.1
Chromium	50	100					<5					<5					<5					<5							<5	<5					4.61 J		

Table 2. Summary of Ground-Water and Surface-Water Detections From the Second Sampling Event (May/June 2007) at Longstreet and Lamont Landfills, Ft. Bragg

Cobalt	NA	NA	<1	<1	<1	<1	<1	<1	<1	<1	0.586J	<1	<1	<1	<1	1	<1	<1	<1	0.01J	1.25	<1	<1	<1	<1	<1	<1	1.45	<1	1.29 J	<1	<1	0.01J	2.13	1.02 J	<1	<1
Copper	1000	1000	<1	<1	<1	<1	<1	<1	<1	<1	3.41J	10.8	<1	<1	<1	<1	<1	<1	<1	0.01J	13.8	5.59 J	<1	<1	<1	<1	<1	<1	6.64 J	5.65 J	<1	<1	0.01J	<1	9.94 J	<1	<1
Cadmium	5	5	<1	<1	<1	<1	<1	5.8 J	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.50J	<1	0.532 J	0.518 J	<1	<1	<1	<1	<1	<1	<1
Lead	15	15	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.66J	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.22	<1	<1	<1	<1
Nickel	100	730*	<50	<50	<50	4.96	<50	<50	<50	<50	1.74J	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	1.41J	<50	<50	<50
Selenium	50	50	<2	<2	<2	<2	<2	1.34 J	<2	1.34J	<2	<2	1.63 J	1.52J	1.04J	<2	<2	1.54 J	1.83J	1.32J	<2	<2	<2	<2	<2	<2	1.04J	<2	<2	<2	<2	<2	1.39J	1.12J	<2	<2	1.89 J
Silver	18	100*	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
Vanadium	NA	NA	<30	<30	<30	<30	<30	<30	<30	<30	<30	8.33	<30	<30	<30	4.47J	12.0	<30	<30	<30	<30	3.07 J	<30	<30	<30	<30	<30	<30	3.77 J	4.23	<30	<30	<30	<30	5.32	<30	<30
Zinc	2100	5000	<60	<60	<60	<60	<60	<60	<60	<60	5J	73.8	<60	<60	<60	6.59J	51.6	<60	<60	<60	5.56J	56.6	<60	<60	<60	<60	<60	<60	62.4	62.8	<60	<60	0.02J	<60	39.7	<60	<60
Other Analyses																																					
Sulfide (EPA 376.1)	250,000	250,000	NA	<200	<200	<200	<200	NA	<200	<200	<200	<200	NA	<200	<200	<200	<200	NA	<200	<200	<200	<200	NA	NA	<200	<200	<200	<200	<200	<200	NA	<200	<200	<200	<200	NA	NA
Cyanide (EPA 335.2)	154	200	NA	<20	<20	<20	14 J	NA	<20	<20	<20	<20	NA	<20	<20	<20	<20	NA	<20	<20	<20	<20	NA	NA	<20	<20	<20	<20	<20	<20	NA	<20	<20	<20	14 J	NA	NA
Mercury	1.05	2					<0.20					<0.20					<0.20					<0.20							<0.20	<0.20					<0.20		
Nitrate (EPA 353.3)	10,000	10,000	NA	60	0.055	0.021J	36 J	NA	91	0.022J	0.058	74	NA	332	<40	0.017J	35 J	NA	<40	0.01J	0.015J	29 J	NA	NA	19	0.038J	0.038J	<40	38 J	49	NA	51	0.018J	0.060	33 J	NA	NA
Nitrite (EPA 353.3)	1000	1000	NA	<40	<40	<40	36 J	NA	<40	<40	<40	74	NA	<40	<40	<40	35 J	NA	<40	<40	<40	29 J	NA	NA	<40	<40	<40	<40	38 J	49	NA	<40	<40	<40	33 J	NA	NA

Note: NA -- Not Available; U -- Target analytes were not detected above the reporting limits; J -- Analyte was present but concentration is an estimated value. **Bold**--Concentration exceeds NC 2L Std. * No MCL, used PRG. #Used total values. **Used values for Chlordane.

Table 2. Summary of Ground-Water and Surface-Water Detections From the Second Sampling Event (May/June 2007) at Longstreet and Lamont Landfills, Ft. Bragg

COMPOUNDS (µg/L)	Groundwater NC 2L Standard (ug/l)	EPA Drinking water MCL (ug/l)	SLMW-12AR 04/05	SLMW-12AR 10/05	SLMW-12AR Dup 10/05	SLMW-12AR 4/06	SLMW-12AR 11/06	SLMW-12AR 05/07	SLMW-12BR 04/05	SLMW-12BR Dup 04/05	SLMW-12BR 10/05	SLMW-12BR 4/06	SLMW-12BR 11/06	SLMW-12BR 05/07	SLMW-13 04/05	SLMW-13 10/05	SLMW-13 4/06	SLMW-13 11/06	GW-SLMW-13 06/07	SW-1 04/05	SW-1 10/05	SW-1 4/06	SW-1 11/06	SW-1 06/07	SW-2 04/05	SW-2 10/05	SW-2 4/06	SW-2 11/06	SW-2 06/07	GW-Blank 11/06	GW-Blank 05/07	GW-Blank 06/07	Trip Blank 11/06	Trip Blank 05/07	Trip Blank 06/07	LMW-3 04/05
VOCs (EPA 8260B)																																				
1,1-dichloroethane	700	810*	<2	1.21J	1.22J	1.39J	0.83J	<2	1.41J	1.39J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	7.64	7.8	3.93	7.7	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-dichloroethane	0.38	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.41J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-dichloropropane	0.56	5	<2	<2	<2	<2	<2	<2	0.42J	0.45J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,4-dichlorobenzene	75	75	<2	1.05J	0.94J	1.14J	0.84J	<2	1.07J	1.15J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.76J	0.96J	0.51J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
benzene	1	5	<2	**1.03J**	0.95J	**1.04J**	0.76J	<2	**1.11J**	**1.15J**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	**1.59J**	**1.72J**	0.87J	**1.6**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
2-butanone	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.78J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chlorobenzene	50	100	<2	0.57J	0.53J	0.62J	0.53J	<2	0.58J	0.6J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.35J	0.37J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chloroethane	2800	4.6*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.51J	0.52J	0.23J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chloromethane (methyl chloride)	2.6	NA	<2	<2	<2	<2	2.05	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.51J	0.52J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chloroform	0.19	80	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
cis-1,2-dichloroethene	70	70	<2	2.9	2.58	3.19	1.09J	<2	3.79	4.02	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	5.02	5.01	1.79J	**6.1**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
dichlorodifluoromethane	1400	390*	<2	5.11	5.15	4.41	3.61	<2	10.2	11.6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	10.4	7.07	5.78	**8.4**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
diisopropyl ether	70	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
isopropylbenzene	70	660*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.2J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
methylene chloride (dichloromethane)	4.6	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
MTBE	200	13*	<2	0.32J	0.35J	0.31J	<2	<2	0.36J	0.38J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.2J	0.86J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
sec-butylbenzene	70	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p xylene	530#	10000#	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-xylene	530#	10000#	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
tetrachloroethene	0.7	5	<2	0.32J	0.3J	0.35J	<2	<2	0.4J	0.38J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	**1.41J**	**1.36J**	**0.77J**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
toluene	1000	1000	<2	<2	<2	0.37J	<2	<2	<2	<2	<2	0.24J	<2	<2	<2	<2	1.15J	<2	<2	<2	<2	0.42J	<2	<2	<2	<2	1.62J	<2	<2	0.22J	<2	<2	<2	<2	<2	<2
trans-1,2-dichloroethene	70	100	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.27J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
trichloroethene	2.8	5	<2	0.64J	0.52J	0.55J	0.35J	<2	0.71J	0.68J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	2.36	2.21	1.12J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
trichlorofluoromethane	2100	1300*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.59J	0.54J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.25 J
vinyl chloride	0.015	2	<2	**2.08**	**1.82J**	**2.44**	**1.17**	<2	**3.25**	**3.5**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	**2.78**	**3.52**	**1.89J**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
acetone	700	NA	NA	<2	<2	<2	<2	<2	NA	NA	<2	<2	<2	<2	NA	<2	<2	<2	<2	NA	<2	<2	<2	<2	NA	3.5	<2	<2	<2	<2	<2	<2	2.23	<2	<2	NA
acrolein	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	2.59J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
carbon disulfide	700	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.28J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
SVOCs (EPA 8270C)																																				
1,4-dichlorobenzene (para)	1.4	75	<10	<10	<10	<10	<10	<10	<10	<10	<10	1.98J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**1.87 J**	<10	<10	<10	<10	<10	<10	<10
4-methylphenol (p-cresol)	3.5	180*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**13.1**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
diethylphthalate	5000	29000*	<10	1.51J	1.23J	<10	1.15J	1.28 J	1.46J	2.2J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2.81J	3.19J	2.02J	2.51 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
di-n-butylphthalate	700	3600*	1.06J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate	2.5	6	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1.35J	<10	<10	<10	1.44 J	<10	<10	<10
phenol	300	NA						<10						<10					<10					<10						<10		<10	<10		<10	<10	
Pesticides (EPA 8081)																																				
delta-BHC	NA	NA					<.0505	<.0505					<.0505	<.0505				<.0505	<.0505				<.0505	<.0505					<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	
alpha-Chlordane*	0.1	2					<.0505	<.0505					<.0505	<.0505				0.0306J	<.0505				<.0505	<.0505					<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	
gamma-Chlordane*	0.1	2					<.0505	<.0505					<.0505	<.0505				0.0255J	<.0505				0.0354J	<.0505					<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	
Aldrin	NA	NA					0.095	<.0505					0.0918	<.0505				0.0306J	<.0505				0.131	<.0505					<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	
Dieldrin	0.0022	NA					<.0505	<.0505					<.0505	<.0505				<.0505	<.0505				**0.0505J**	<.0505					**0.0306J**	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	<.0505	
Endosulfan I	NA	NA						<0.025						<0.025					<0.025					<0.025						<0.025		<0.025	<0.025		<0.025	<0.025	
Heptachlor	0.0078	0.4					0.125	<.0505					**0.0255J**	<.0505				<.0505	<.0505				<.0505	<.0505					<.0505	<.0505	**0.0101J**	<.0505	<.0505	<.0505	<.0505	<.0505	
PCBs (EPA 8082)																																				
No Detections																																				
Organochlorine Pesticides (EPA 8141A)																																				<0.169
No Detections																																				
Appendix I Metals (EPA 6010B/6020A)																																				<2
Arsenic	10	10																																		<10
Barium	2000	2000																																		<1
Cadmium	5	5																																		<2
Cobalt	NA	NA																																		<20
Chromium	50	100																																		<20
Copper	1000	1000																																		<1
Lead	15	15																																		<50
Nickel	100	730*																																		<2
Selenium	50	50																																		<20
Vanadium	NA	260*																																		<60
Zinc	2100	5000																																		
Appendix II Inorganics (EPA 6010B/6020A)																																				
Arsenic	10	10	<2	2.02	1.61J	<2	1.05J	1.05 J	1.26J	1.61J	<2	<2	<2	<2	<2	<2	<2	<2	1.11 J	<2	2.37	3.89	5.69	**14.0**	<2	1.09J	1.08J	<2	1.18 J	<2	<2	<2	<2	<2	<2	
Barium	2000	2000	43.4	27.7	27.7	30	33.2	34.1	27.2	28.4	35	30	34.5	41.5	8.7 J	<2	5	5.43	10.9	10.2	31.7	20	22	35.0	10.3	15.6	10	11.6	9.3	<2	<2	<2	<2	113	<2	
Chromium	50	100						<5						<5					<5					<5					<5		<5	<5		<5	<5	

Table 2. Summary of Ground-Water and Surface-Water Detections From the Second Sampling Event (May/June 2007) at Longstreet and Lamont Landfills, Ft. Bragg

Cobalt	NA	NA	<1	<1	<1	<1	0.698J	<1	<1	<1	<1	<1	1.46	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Copper	1000	1000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	7.68 J	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Cadmium	5	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.774J	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Lead	15	15	0.611	<1	<1	0.50J	<1	0.819 J	<1	<1	0.623J	0.50J	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.08	<1	<1	1.85	<1	<1	2.36	0.56J	<1	<1	<1	<1	<1	<1	<1		
Nickel	100	730*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	2.29	<50	<50	<50	<50	<50	1.27J	<50	<50	22.9J	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		
Selenium	50	50	<2	1.54J	2.24	<2	<2	<2	1.48J	1.46J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.07J	1.16J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2		
Silver	18	100*	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	10.1J	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30		
Vanadium	NA	NA	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	10.1J	<30	<30	13.1	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30		
Zinc	2100	5000	21.4	<60	<60	<60	<60	12.6 J	99.7	<60	<60	<60	6.33J	<60	<60	<60	<60	10.3	<60	<60	55.3J	<60	5.73J	117	37.1 J	<60	0.02J	34.5	24.5 J	<60	<60	<60	<60	<60	<60		
Other Analytes																																						
Sulfide (EPA 376.1)	250,000	250,000	NA	<200	<200	<200	<200	<200	NA	NA	<200	<200	<200	<200	NA	<200	<200	<200	<200	NA	<200	<200	<200	<200	NA	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200		NA
Cyanide (EPA 335.2)	154	200	NA	<20	<20	<20	<20	<20	NA	NA	<20	<20	<20	<20	NA	<20	<20	<20	<20	NA	<20	<20	<20	18 J	NA	<20	<20	<20	18 J	<20	<20	<20	<20	39	<20		NA
Mercury	1.05	2						<0.20						<0.20					0.12 J					<0.20					<0.20		<0.20	<0.20		<0.20	<0.20		
Nitrate (EPA 353.3)	10,000	10,000	NA	25J	<40	0.033J	0.276	217	NA	NA	48	0.033J	0.022J	20 J	NA	36J	0.068	0.094	140	NA	78	0.058J	0.03J	11 J	NA	<40	0.331J	0.492	68	0.031J	<40	<40	<40	69	<40		NA
Nitrite (EPA 353.3)	1000	1000	NA	<40	<40	<40	<40	217	NA	NA	<40	<40	<40	20 J	NA	<40	<40	<40	140	NA	<40	<40	<40	11 J	NA	<40	<40	<40	68	<40	<40	<40	<40	69	<40		NA

Note: NA -- Not Available; U -- Target analytes were not detected abo

Table 2. Summary of Ground-Water and Surface-Water Detections From the Second Sampling Event (May/June 2007) at Longstreet and Lamont Landfills, Ft. Bragg

COMPOUNDS (µg/L)	Groundwater NC 2L Standard (ug/l)	EPA Drinking water MCL (ug/l)	LMW-3 10/05	LMW-3 06/06	LMW-3 11/06	GW-LMW-3 06/07	LMW-4 04/05	LMW-4 10/05	LMW-4 10/05 Dup	LMW-4 06/06	LMW-4 11/06	GW-LMW-4 06/07	LMW-6 04/05	LMW-6 10/05	LMW-6 6/06	LMW-6 11/06	LMW-6 Dup 11/06	GW-LMW-6 06/07	GW-LMW-6 Dup 06/07	LMW-7 04/05	LMW-7 10/05	LMW-7 6/06	LMW-7 6/06 Dup	LMW-7 11/06	GW-LMW-7 06/07	LMW-8 04/05	LMW-8 10/05	LMW-8 6/06	LMW-8 11/06	GW-LMW-8 06/07	LMW-9 04/05	MW-DUP2 04/05	LMW-9 10/05	LMW-9 6/06	LMW-9 11/06	GW-LMW-9 06/07	LMW-10 04/05	LMW-10 10/05
																																							Lamont
VOCs (EPA 8260B)																																							
1,1-dichloroethane	700	810*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-dichloroethane	0.38	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-dichloropropane	0.56	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,4-dichlorobenzene	75	75	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
benzene	1	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
2-butanone	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chlorobenzene	50	100	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chloroethane	2800	4.6*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chloromethane (methyl chloride)	2.6	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chloroform	0.19	80	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
cis-1,2-dichloroethene	70	70	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.27J	0.43J	0.300J	<2	<2	0.44 J	<2	<2	<2	<2	<2	<2	<2
dichlorodifluoromethane	1400	390*	<2	<2	<2	<2	<2	<2	<2	0.57J	0.92J	<2	<2	<2	0.93J	2.67	2.80	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
diisopropyl ether	70	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
isopropylbenzene	70	660*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
methylene chloride (dichloromethane)	4.6	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
MTBE	200	13*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
sec-butylbenzene	70	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p xylene	530#	10000#	<2	<2	<2	<2	<2	0.25J	<2	<2	0.23J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.230J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-xylene	530#	10000#	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
tetrachloroethene	0.7	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.6J	<2	0.370J	<2	<2	1.87 J	<2	<2	<2	<2	<2	<2	<2
toluene	1000	1000	<2	<2	<2	<2	0.33 J	<2	<2	<2	0.47J	<2	<2	<2	<2	<2	<2	<2	<2	1.07 J	<2	<2	<2	0.850J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.26 J	<2
trans-1,2-dichloroethene	70	100	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
trichloroethene	2.8	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.24J	0.23J	<2	<2	<2	0.83 J	<2	<2	<2	<2	0.39 J	0.56J
trichlorofluoromethane	2100	1300*	0.34J	0.52J	<2	<2	2.37	0.68J	0.47J	2.53	2.37	<2	0.63 J	1.54J	1.13J	<2	0.860J	<2	<2	<2	<2	<2	<2	<2	<2	2.5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.26J
vinyl chloride	0.015	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
acetone	700	NA	<2	<2	<2	<2	NA	<2	<2	<2	<2	<2	NA	<2	<2	<2	<2	<2	<2	NA	<2	<2	<2	<2	<2	NA	<2	<2	<2	<2	NA	NA	<2	<2	<2	<2	NA	<2
acrolein	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
carbon disulfide	700	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
SVOCs (EPA 8270C)																																							
1,4-dichlorobenzene (para)	1.4	75	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-methylphenol (p-cresol)	3.5	180*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
diethylphthalate	5000	29000*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
di-n-butylphthalate	700	3600*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate	2.5	6	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
phenol	300	NA				<10						<10						<10	<10						<10					<10						<10		
Pesticides (EPA 8081)																																							
delta-BHC	NA	NA																																					
alpha-Chlordane*	0.1	2																																					
gamma-Chlordane*	0.1	2																																					
Aldrin	NA	NA																																					
Dieldrin	0.0022	NA																																					
Endosulfan I	NA	NA																																					
Heptachlor	0.0078	0.4																																					
PCBs (EPA 8082)																																							
No Detections																																							
Organochlorine Pesticides (EPA 8141A)																																							
No Detections			<0.5	<0.5	<0.5		<0.169	<0.5	<0.5	<0.5	<0.5		<0.169	<0.5	<0.5	<0.5	<0.5			<0.169	<0.5	<0.5	<0.5	<0.5		<0.169	<0.5	<0.5	<0.5		<0.169	<0.169	<0.5	<0.5	<0.5		<0.169	
Appendix I Metals (EPA 6010B/6020A)																																							
Arsenic	10	10	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.13 J	<2	<2	<2	<2	<2	1.1 J	<2	<2	<2	<2	<2	<2	1.05 J	<2	<2	<2	<2	<2	1.04 J	<2	<2	1.52J	<2	1.12 J	<2	<2
Barium	2000	2000	7.2J	5.0J	7.4	5.33	14.2	12.5	11.8	10	13.6	24.7	9.5 J	12.3	20	33.9	33.7	52.4	46.4	31.7	30	20	10	11.6	27.4	48.5	38.1	40	32.0	34.0	<10	<10	<10	10	3.84	6.29	13.5	<10
Cadmium	5	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.701J	0.57J	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cobalt	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.734J	0.733J	<2	<2	<2	<2	<2	<2	1.03	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chromium	50	100	<20	<20	<20	<20	10.8 J	<20	<20	<20	<20	21.7	<20	<20	<20	<20	<20	4.74 J	3.75 J	19.0 J	23.2	<20	<20	5.28	24.7	<20	<20	<20	<20	<20	<20	<20	<20	10J	<20	7.14	<20	<20
Copper	1000	1000	<20	<20	<20	<20	<20	<20	<20	<20	<20	8.06 J	<20	<20	<20	<20	<20	7.78 J	<20	10.8 J	11.1	10J	<20	6.64	6.05 J	<20	<20	<20	<20	<20	<20	<20	<20	10J	<20	5.28 J	<20	<20
Lead	15	15	<1	<1	<1	<1	<1	<1	0.534J	<1	0.644J	3.52	<1	<1	<1	<1	<1	0.839 J	0.873 J	3.11	3.07	3.37	2.31	1.81	3.51	<1	<1	<1	<1	<1	0.525 J	<1	<1	0.87J	0.989J	1.40	<1	<1
Nickel	100	730*	<50	<50	<50	<50	<50	<50	<50	<50	1.6J	6.98	<50	<50	<50	1.13J	1.12J	5.53 J	<50	18.9 J	<50	<50	<50	4.23	7.73	<50	<50	<50	1.72J	<50	<50	<50	<50	<50	<50	3.26 J	<50	<50
Selenium	50	50	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.8J	2.12	2.83	2.91	2.93	2.46	<2	<2	<2	<2	<2	<2	3.28	1.67J	1.87J	1.67J	1.04 J	<2	<2	<2	<2	<2	<2	<2	<2
Vanadium	NA	260*	<20	<20	<20	<20	<20	<20	<20	<20	<20	15.8	<20	<20	<20	<20	<20	3.7 J	4.21	12.6 J	18.5J	8.0J	<20	3.56J	14.8	<20	<20	<20	<20	<20	8.4 J	8.4 J	<20	30	<20	7.06	<20	<20
Zinc	2100	5000	<60	<60	6.46J	<60	<60	<60	<60	<60	11.1	47.0	<60	<60	20J	7.63J	7.85J	17.3 J	15.2 J	27.5 J	31.4J	40J	20J	21.6	51.0	<60	<60	<60	<60	<60	<60	<60	<60	20J	<60	17.1 J	<60	<60
Appendix II Inorganics (EPA 6010B/6020A)																																							
Arsenic	10	10																																					
Barium	2000	2000																																					
Chromium	50	100																																					

Table 2. Summary of Ground-Water and Surface-Water Detections From the Second Sampling Event (May/June 2007) at Longstreet and Lamont Landfills, Ft. Bragg

Cobalt	NA	NA																																			
Copper	1000	1000																																			
Cadmium	5	5																																			
Lead	15	15																																			
Nickel	100	730*																																			
Selenium	50	50																																			
Silver	18	100*																																			
Vanadium	NA	NA																																			
Zinc	2100	5000																																			
Other Analytes																																					
Sulfide (EPA 376.1)	250,000	250,000	<200	NA	<200	<200	NA	<200	<200	NA	<200	<200	NA	<200	NA	<200	<200	<200	<200	NA	<200	NA	NA	<200	<200	NA	<200	NA	<200	<200	NA	NA	<200	NA	<200	<200	NA	<200
Cyanide (EPA 335.2)	154	200	<20	NA	<20	<20	NA	<20	<20	NA	<20	<20	NA	<20	NA	<20	<20	<20	<20	NA	<20	NA	NA	<20	<20	NA	<20	NA	<20	<20	NA	NA	<20	NA	<20	<20	NA	<20
Mercury	1.05	2				0.24						0.30						<0.20	<0.20						0.38					0.20						0.18 J		
Nitrate (EPA 353.3)	10,000	10,000	<40	NA	0.333	209	NA	<40	<40	NA	#####	**643,000**	NA	<40	NA	1.15	1.14	1,220	1,290	NA	<40	NA	NA	0.119	295	NA	<40	NA	0.216	398	NA	NA	<40	NA	0.0990	**17,200**	NA	<40
Nitrite (EPA 353.3)	1000	1000	<40	NA	<40	209	NA	<40	<40	NA	<40	**643,000**	NA	<40	NA	<40	<40	**1,220**	**1,290**	NA	<40	NA	NA	<40	295	NA	<40	NA	<40	398	NA	NA	<40	NA	<40	**17,200**	NA	<40

Note: NA -- Not Available; U -- Target analytes were not detected ab

Table 2. Summary of Ground-Water and Surface-Water Detections From the Second Sampling Event (May/June 2007) at Longstreet and Lamont Landfills, Ft. Bragg

COMPOUNDS (µg/L)	Groundwater NC 2L Standard (ug/l)	EPA Drinking water MCL (ug/l)	LMW-10 6/06	LMW-10 11/06	GW-LMW-10 06/07	GW-BLK 11/06	LMW-1 11/06	LMW-3S 11/06	GW-LMW-3S 06/07	LMW-9D 11/06	GW-LMW-9D 06/07	LMW-9S 11/06	GW-LMW-9S 06/07	LMW-15 11/06	LMW-16 11/06	GW-LMW-16 06/07	GW-LMW-14R 06/07	GW-LMW-15R 06/07	GW-BLK 06/07	Trip Blank 06/07
VOCs (EPA 8260B)																				
1,1-dichloroethane	700	810*	<2	<2	<2	0.43J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-dichloroethane	0.38	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-dichloropropane	0.56	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,4-dichlorobenzene	75	75	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
benzene	1	5	<2	<2	<2	<2	<2	<2	<2	<2	1.3	<2	<2	<2	<2	<2	<2	<2	<2	<2
2-butanone	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chlorobenzene	50	100	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chloroethane	2800	4.6*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chloromethane (methyl chloride)	2.6	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
chloroform	0.19	80	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
cis-1,2-dichloroethene	70	70	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
dichlorodifluoromethane	1400	390*	2.02	9.35	2.5	<2	<2	12.6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
diisopropyl ether	70	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
isopropylbenzene	70	660*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
methylene chloride (dichloromethane)	4.6	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
MTBE	200	13*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
sec-butylbenzene	70	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p xylene	530#	10000#	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-xylene	530#	10000#	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
tetrachloroethene	0.7	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
toluene	1000	1000	<2	<2	<2	0.57J	<2	<2	1.4	<2	<2	<2	<2	<2	0.240J	<2	<2	<2	<2	<2
trans-1,2-dichloroethene	70	100	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
trichloroethene	2.8	5	0.91J	0.440J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
trichlorofluoromethane	2100	1300*	2.07	7.01	3.3	<2	<2	0.330J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
vinyl chloride	0.015	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
acetone	700	NA	<2	<2	<2	<2	1.60J	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
acrolein	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
carbon disulfide	700	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
SVOCs (EPA 8270C)																				
1,4-dichlorobenzene (para)	1.4	75	<10	<10	<10	0.46J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-methylphenol (p-cresol)	3.5	180*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
diethylphthalate	5000	29000*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
di-n-butylphthalate	700	3600*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate	2.5	6	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
phenol	300	NA			<10				<10		<10		<10			<10	<10	<10	<10	<10
Pesticides (EPA 8081)																				
delta-BHC	NA	NA																		
alpha-Chlordane*	0.1	2																		
gamma-Chlordane*	0.1	2																		
Aldrin	NA	NA																		
Dieldrin	0.0022	NA																		
Endosulfan I	NA	NA																		
Heptachlor	0.0078	0.4																		
PCBs (EPA 8082)																				
No Detections																				
Organophosphorus Pesticides (EPA 8141A)																				
No Detections																				
Appendix I Metals (EPA 6010B/6020A)																				
Arsenic	10	10	<2	<2	1.15 J	<2	<2	<2	<2	7.67	7.66	<2	1.68 J	<2	<2	2.13	1.11 J	<2	<2	<2
Barium	2000	2000	20	11.9	21.3	<10	<10	5.95	18.7	13.9	5.57	77.3	80.9	37.4	23.1	41.3	14.6	38.5	<10	43.0
Cadmium	5	5	0.94J	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cobalt	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.27	1.04 J	<2	<2	<2	<2	<2	<2	<2
Chromium	50	100	<20	<20	2.72 J	<20	<20	<20	11.6	6.51	<20	<20	5.73	<20	<20	20.7	<20	<20	<20	<20
Copper	1000	1000	<20	<20	<20	<20	8.51	2.54J	<20	6.37	<20	<20	<20	3.66J	<20	7.37 J	<20	5.33 J	<20	<20
Lead	15	15	0.78J	<1	4.15	<1	<1	<1	3.71	3.60	3.97	<1	2.16	0.559J	0.643J	5.28	4.42	<1	<1	<1
Nickel	100	730*	<50	<50	<50	<50	<50	2.41	4.92 J	2.16	<50	1.15J	<50	1.80J	1.03J	<50	<50	<50	<50	<50
Selenium	50	50	<2	<2	<2	<2	1.15J	<2	<2	<2	<2	4.56	4.53	<2	<2	<2	<2	<2	<2	<2
Vanadium	NA	260*	8.0J	<20	3.12 J	<20	<20	<20	9.91	10.0	5.73	<20	5.99	<20	<20	41.9	2.30 J	<20	<20	<20
Zinc	2100	5000	<60	<60	<60	<60	<60	10.1	16.6 J	7.91	<60	<60	<60	14.0	<60	16.5 J	15.4 J	<60	<60	<60
Appendix II Inorganics (EPA 6010B/6020A)																				
Arsenic	10	10																		
Barium	2000	2000																		
Chromium	50	100																		

Table 2. Summary of Ground-Water and Surface-Water Detections From the Second Sampling Event (May/June 2007) at Longstreet and Lamont Landfills, Ft. Bragg

Cobalt	NA	NA																			
Copper	1000	1000																			
Cadmium	5	5																			
Lead	15	15																			
Nickel	100	730*																			
Selenium	50	50																			
Silver	18	100*																			
Vanadium	NA	NA																			
Zinc	2100	5000																			
Other Analytes																					
Sulfide (EPA 376.1)	250,000	250,000	NA	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Cyanide (EPA 335.2)	154	200	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Mercury	1.05	2			<0.20				0.22		0.24		0.33			0.22	<0.20	0.12 J	<0.20	<0.20
Nitrate (EPA 353.3)	10,000	10,000	NA	0.551	1,020	<40	<40	0.321	196	0.107	461	0.190	1,000	4.78	0.0520	166	326	1,400	<40	171
Nitrite (EPA 353.3)	1000	1000	NA	<40	**1,020**	<40	<40	<40	196	<40	461	<40	**1,000**	<40	<40	166	326	**1,400**	<40	171

Note: NA -- Not Available; U -- Target analytes were not detected ab

Table 3. Methane Monitoring Results
Longstreet and Lamont Landfills, Ft. Bragg, NC

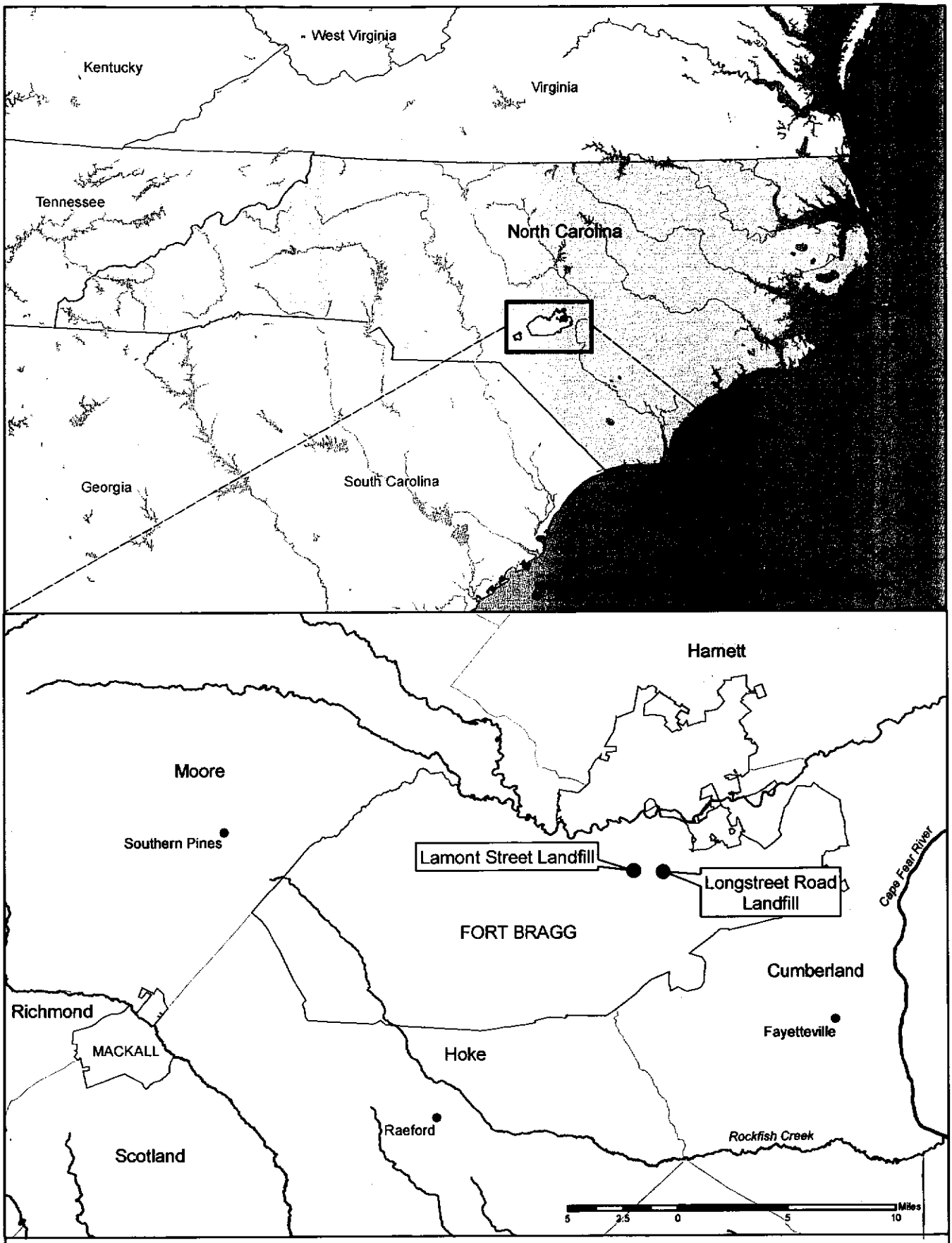
Well ID	Date Sampled	Time Sampled	%Methane by Volume	%Oxygen
Longstreet				
Gas-MW-1	June 2007	1623	49.0	0.4
Gas-MW-2	June 2007	1628	40.0	5.3
Gas-MW-3	June 2007	1632	0.0	18.1
Gas-MW-4	June 2007	1636	17.9	0.4
Gas-MW-5	June 2007	1639	1.4	3.9
Gas-MW-6	June 2007	1647	0.0	17.3
Gas-MW-7	June 2007	1654	0.0	20.1
Gas-MW-8	June 2007	1542	52.8	3.1
Gas-MW-9	June 2007	1536	0.2	18
Gas-MW-10	June 2007	1547	0.3	2.1
Gas-MW-11	June 2007	1549	22.6	0.4
Gas-MW-12	June 2007	1607	41.8	0.3
Gas-MW-13	June 2007	1610	35.1	0.4
Gas-MW-14	June 2007	1615	47.8	0.3
Gas-MW-15	June 2007	1619	59.3	0.4
Bldg O-3554	June 2007	0710	0.0	20.1
Bldg O-9383	June 2007	0714	0.0	20.1
Bldg O-9389	June 2007	0721	0.0	19.9
Bldg O-9388	June 2007	0724	0.0	20.1
Office	June 2007	0731	0.0	20.0
Lamont				
Gas-MW-1	June 2007	1345	0.2	14.1
Gas-MW-2	June 2007	1430	0.1	18.3
Gas-MW-3	June 2007	1438	0.1	18.2
Gas-MW-4	June 2007	1452	0.1	19.5
Gas-MW-5	June 2007	1456	0.1	17.5
Gas-MW-6	June 2007	1502	0.1	18.9
Gas-MW-7	June 2007	1508	0.2	18.7
Gas-MW-8	June 2007	1513	0.1	18.3
Gas-MW-9	June 2007	1413	0.2	6.8
Gas-MW-10	June 2007	1420	3.6	0.2
Gas-MW-11	June 2007	1403	0.1	18.8
Gas-MW-12	June 2007	1352	0.1	13.6
Gas-MW-13	June 2007	1340	17.5	0.2

Note:
TOC – Top of casing, btoc – Below top of casing, NA – Not Available
bgs – Below ground surface, amsl – Above mean sea level
Δ --- Selected Well for Long Term Monitoring
TOC elevation is based on vertical datum NGVD29 (source: USGS RFI, Aug. 1999)
*Not accessible.

Table 4. Ground-Water Elevation Data
Longstreet and Lamont Landfills, Ft. Bragg, NC

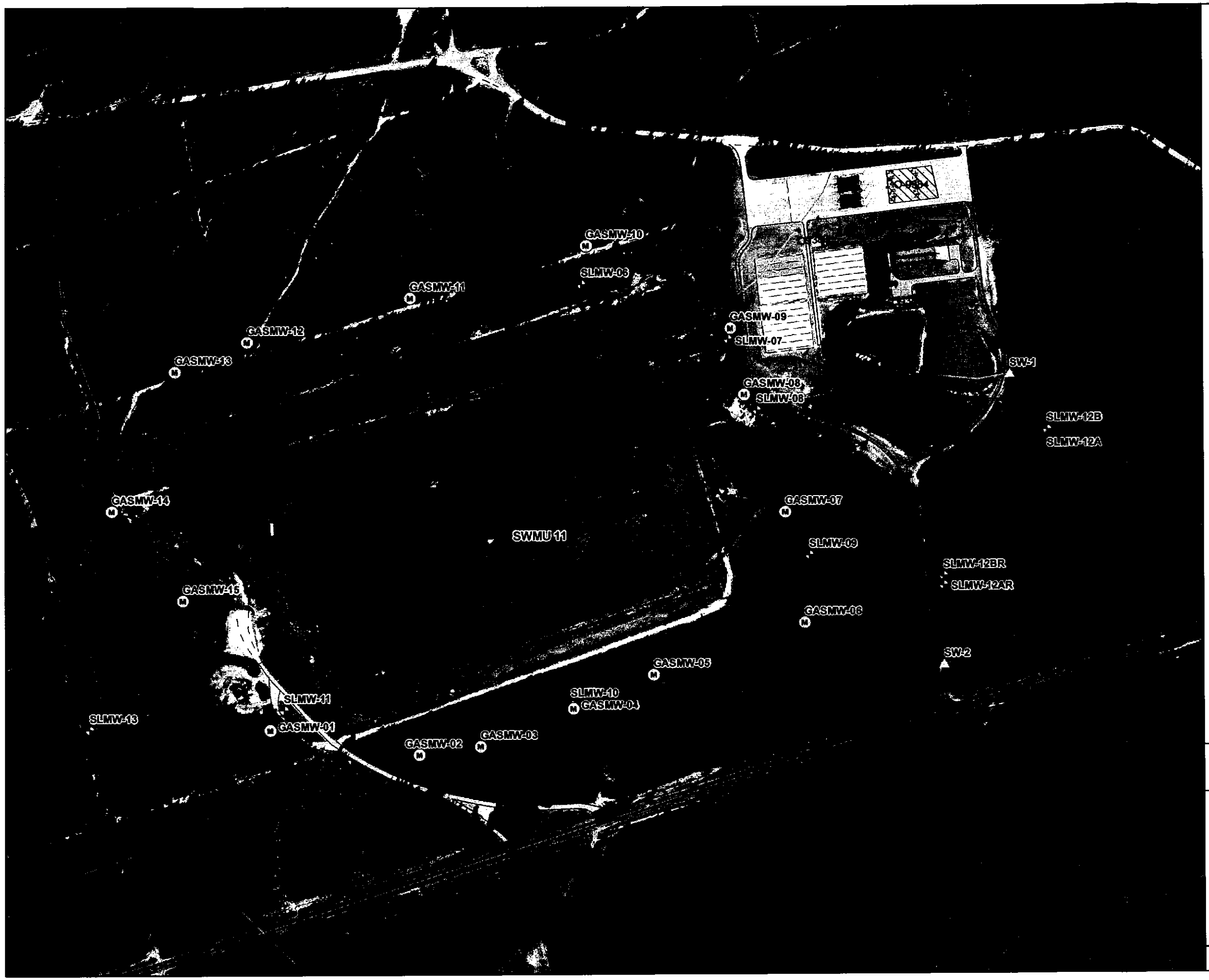
Well ID	TOC Elev. (ft. amsl)	Water Level (ft. btoc) 10/05	Water Elev. (ft. amsl) 10/05	Water Level (ft. btoc) 4/06	Water Elev. (ft. amsl) 4/06	Water Level (ft. btoc) 11/06	Water Elev. (ft. amsl) 11/06	Water Level (ft. btoc) 5/07to 6/07	Water Elev. (ft. amsl) 5/07to 6/07
Longstreet									
SLMW-6	293.55	27.72	265.83	27.3	266.25	27.27	266.28	25.24	268.31
SLMW-7	290.5	19.37	271.13	20.69	269.81	21.48	269.02	20.03	270.47
SLMW-8	290.34	24.11	266.23	22.9	267.44	23.2	267.14	22.93	267.41
SLMW-9	289.54	39.26	250.28	39.2	250.34	39.57	249.97	37.3	252.24
SLMW-10	305.99	20.59	285.4	20.32	285.67	20.3	285.69	19.31	286.68
SLMW-11	357.80	77.4	280.4	78.36	279.44	78	279.8	74.83	282.97
SLMW-12AR	243.36	9.67	233.69	8.75	234.61	8.12	235.24	20.12	223.24
SLMW-12BR	243.42	8.82	234.6	9.0	234.42	9.1	234.32	9	234.42
SLMW-13	340.02	19.37	271.13	54.20	285.82	53.98	286.04	50.79	289.23
Lamont									
LMW-3	408.32	102.49	305.83	103.51	304.81	102.95	305.37	101.3	307.02
LMW-3s	*	NA	NA	NA	NA	NA	NA	58.1	*
LMW-4	441.79	75.42	366.37	75.54	366.25	75.12	366.67	74.71	367.08
LMW-6	431.45	80.65	350.8	80.62	350.83	81.25	350.2	79.12	352.33
LMW-7	436.62	126.56	310.06	126.0	310.62	125.86	310.76	125.42	311.2
LMW-8	354.07	48.73	305.34	49.81	304.26	47.08	306.99	45.48	308.59
LMW-9	364.79	82.87	281.92	83.78	281.01	83.15	281.64	84.71	280.08
LMW-9s	*	NA	NA	NA	NA	NA	NA	49.46	*
LMW-9d	*	NA	NA	NA	NA	NA	NA	74.51	*
LMW-10	428.68	76.65	352.03	77.24	351.44	76.22	352.46	75.13	353.55
LMW-14R	*	NA	NA	NA	NA	NA	NA	48.82	*
LMW-15R	*	NA	NA	NA	NA	NA	NA	37.85	*
LMW-16	*	NA	NA	NA	NA	NA	NA	37.2	*

Note:
TOC – Top of casing, btoc – Below top of casing, NA – Not Available
bgs – Below ground surface, amsl – Above mean sea level NS – Not Surveyed
Δ --- Selected Well for Long Term Monitoring *Well & ground-water elevations unavailable at this time.
TOC elevation is based on vertical datum NGVD29 (source: USGS RFI, Aug. 1999)



U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

Figure 1
Site Map -- Ft. Bragg, NC



LEGEND

- METHANE SAMPLE
- SURFACE WATER SAMPLE
- MONITORING WELL
- STREAM
- PAVED ROAD
- DIRT ROAD
- WASH RACK AREA
- BUILDING
- SWMU AREA

1 inch equals 400 feet

0 200 400 800'

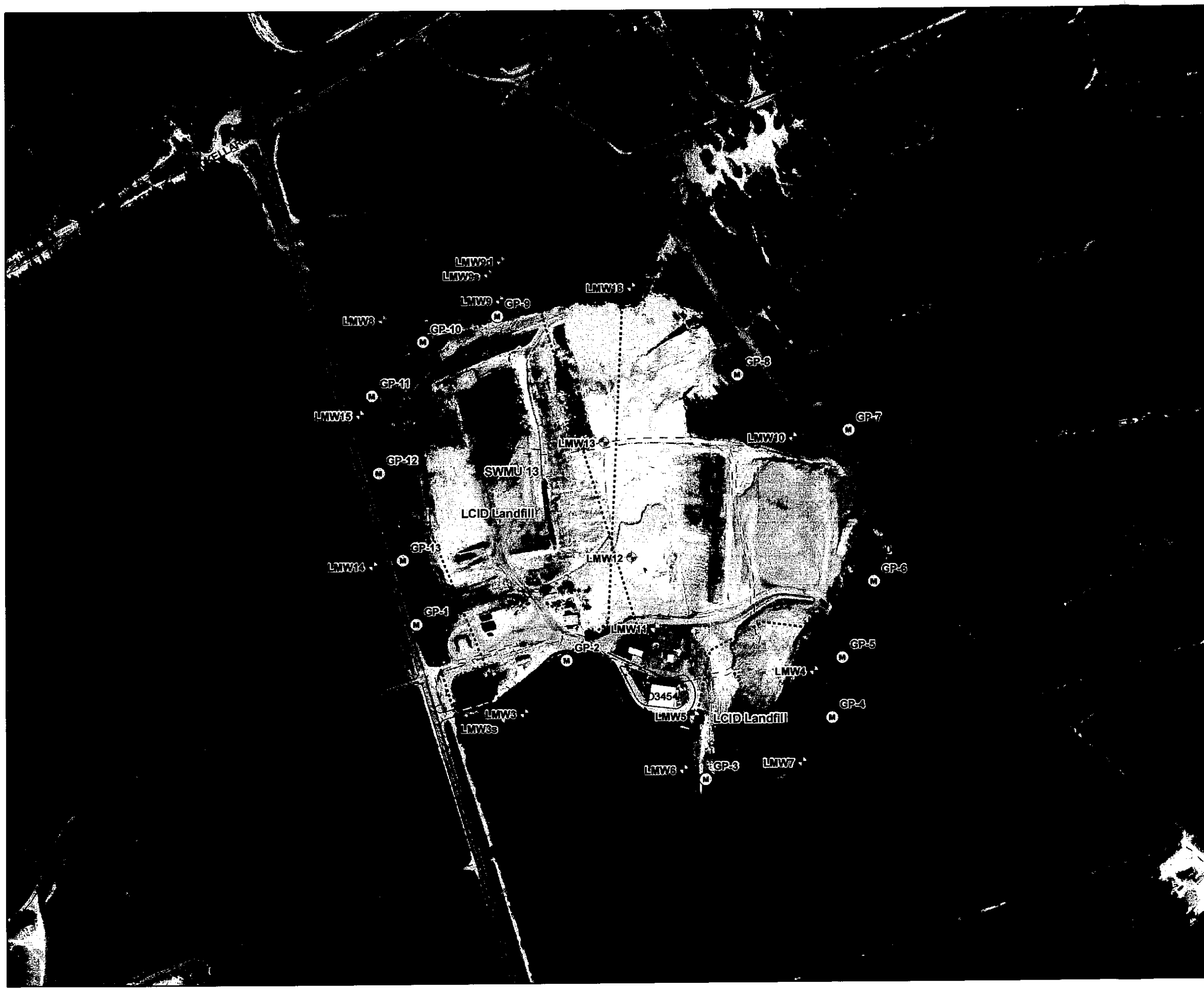
N

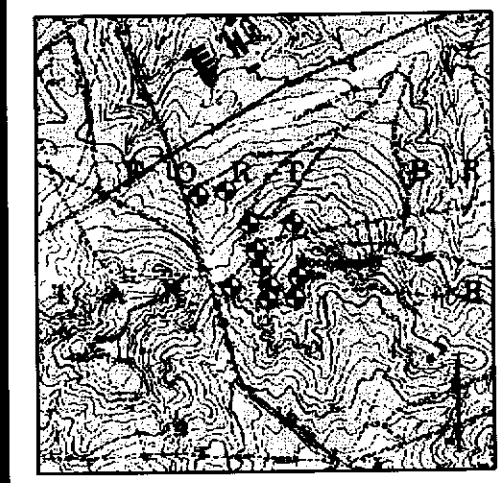
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

LONGSTREET RD LANDFILL, FORT BRAGG, NC

SITE MAP
LONGSTREET RD LANDFILL

DATE: OCT 2007 | FIGURE 2





LEGEND

- METHANE SAMPLE
- MONITORING WELL
- MONITORING WELL (REMOVED)
- STREAM
- PAVED ROAD
- DIRT ROAD
- BUILDING
- SWMU AREA

1 inch equals 400 feet

0 200 400 800'

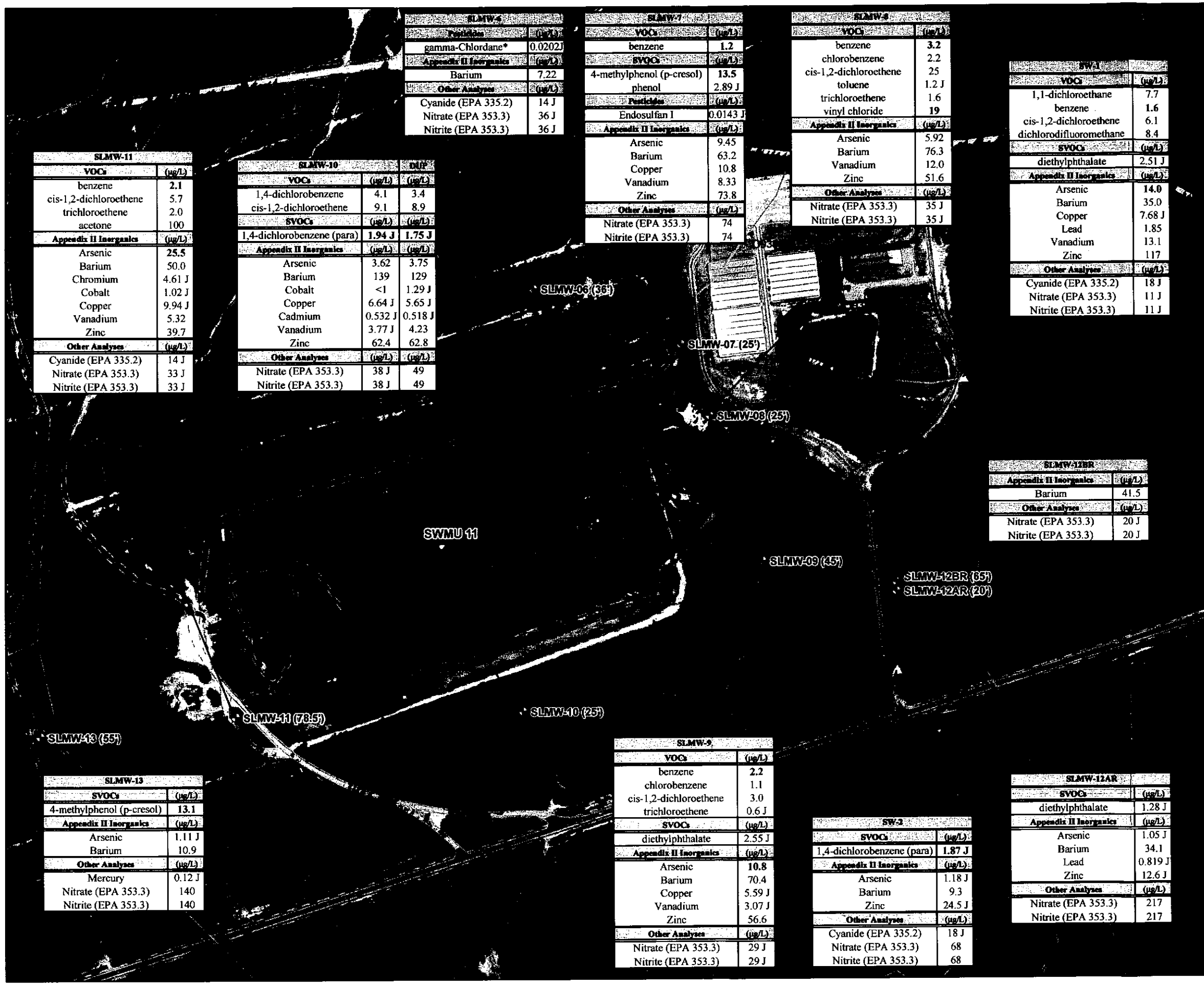
N

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

LAMONT ST LANDFILL, FORT BRAGG, NC

SITE MAP
LAMONT ST LANDFILL

DATE: OCT 2007 | FIGURE 3



SLMW-6	
Pesticides	**(µg/L)**
gamma-Chlordane*	0.0202J
Appendix II Inorganics	**(µg/L)**
Barium	7.22
Other Analyses	**(µg/L)**
Cyanide (EPA 335.2)	14 J
Nitrate (EPA 353.3)	36 J
Nitrite (EPA 353.3)	36 J

SLMW-7	
VOCs	**(µg/L)**
benzene	**1.2**
SVOCs	**(µg/L)**
4-methylphenol (p-cresol)	**13.5**
phenol	2.89 J
Pesticides	**(µg/L)**
Endosulfan I	0.0143 J
Appendix II Inorganics	**(µg/L)**
Arsenic	9.45
Barium	63.2
Copper	10.8
Vanadium	8.33
Zinc	73.8
Other Analyses	**(µg/L)**
Nitrate (EPA 353.3)	74
Nitrite (EPA 353.3)	74

SLMW-8	
VOCs	**(µg/L)**
benzene	**3.2**
chlorobenzene	2.2
cis-1,2-dichloroethene	25
toluene	1.2 J
trichloroethene	1.6
vinyl chloride	**19**
Appendix II Inorganics	**(µg/L)**
Arsenic	5.92
Barium	76.3
Vanadium	12.0
Zinc	51.6
Other Analyses	**(µg/L)**
Nitrate (EPA 353.3)	35 J
Nitrite (EPA 353.3)	35 J

SW-1	
VOCs	**(µg/L)**
1,1-dichloroethane	7.7
benzene	**1.6**
cis-1,2-dichloroethene	6.1
dichlorodifluoromethane	8.4
SVOCs	**(µg/L)**
diethylphthalate	2.51 J
Appendix II Inorganics	**(µg/L)**
Arsenic	**14.0**
Barium	35.0
Copper	7.68 J
Lead	1.85
Vanadium	13.1
Zinc	117
Other Analyses	**(µg/L)**
Cyanide (EPA 335.2)	18 J
Nitrate (EPA 353.3)	11 J
Nitrite (EPA 353.3)	11 J

SLMW-11	
VOCs	**(µg/L)**
benzene	**2.1**
cis-1,2-dichloroethene	5.7
trichloroethene	2.0
acetone	100
Appendix II Inorganics	**(µg/L)**
Arsenic	**25.5**
Barium	50.0
Chromium	4.61 J
Cobalt	1.02 J
Copper	9.94 J
Vanadium	5.32
Zinc	39.7
Other Analyses	**(µg/L)**
Cyanide (EPA 335.2)	14 J
Nitrate (EPA 353.3)	33 J
Nitrite (EPA 353.3)	33 J

SLMW-10		DUP
VOCs	**(µg/L)**	**(µg/L)**
1,4-dichlorobenzene	4.1	3.4
cis-1,2-dichloroethene	9.1	8.9
SVOCs	**(µg/L)**	**(µg/L)**
1,4-dichlorobenzene (para)	**1.94 J**	**1.75 J**
Appendix II Inorganics	**(µg/L)**	**(µg/L)**
Arsenic	3.62	3.75
Barium	139	129
Cobalt	<1	1.29 J
Copper	6.64 J	5.65 J
Cadmium	0.532 J	0.518 J
Vanadium	3.77 J	4.23
Zinc	62.4	62.8
Other Analyses	**(µg/L)**	**(µg/L)**
Nitrate (EPA 353.3)	38 J	49
Nitrite (EPA 353.3)	38 J	49

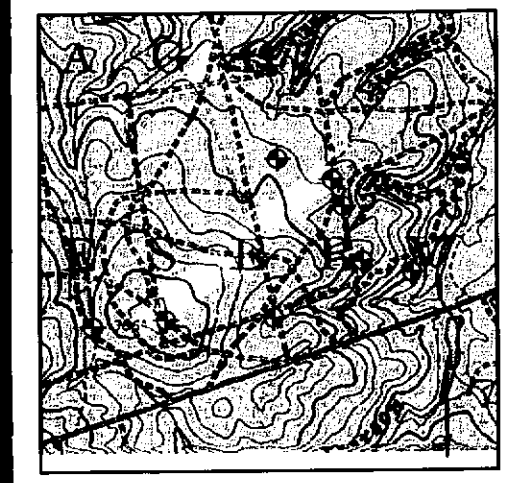
SLMW-12BR	
Appendix II Inorganics	**(µg/L)**
Barium	41.5
Other Analyses	**(µg/L)**
Nitrate (EPA 353.3)	20 J
Nitrite (EPA 353.3)	20 J

SLMW-13	
SVOCs	**(µg/L)**
4-methylphenol (p-cresol)	**13.1**
Appendix II Inorganics	**(µg/L)**
Arsenic	1.11 J
Barium	10.9
Other Analyses	**(µg/L)**
Mercury	0.12 J
Nitrate (EPA 353.3)	140
Nitrite (EPA 353.3)	140

SLMW-9	
VOCs	**(µg/L)**
benzene	**2.2**
chlorobenzene	1.1
cis-1,2-dichloroethene	3.0
trichloroethene	0.6 J
SVOCs	**(µg/L)**
diethylphthalate	2.55 J
Appendix II Inorganics	**(µg/L)**
Arsenic	**10.8**
Barium	70.4
Copper	5.59 J
Vanadium	3.07 J
Zinc	56.6
Other Analyses	**(µg/L)**
Nitrate (EPA 353.3)	29 J
Nitrite (EPA 353.3)	29 J

SW-2	
SVOCs	**(µg/L)**
1,4-dichlorobenzene (para)	**1.87 J**
Appendix II Inorganics	**(µg/L)**
Arsenic	1.18 J
Barium	9.3
Zinc	24.5 J
Other Analyses	**(µg/L)**
Cyanide (EPA 335.2)	18 J
Nitrate (EPA 353.3)	68
Nitrite (EPA 353.3)	68

SLMW-12AR	
SVOCs	**(µg/L)**
diethylphthalate	1.28 J
Appendix II Inorganics	**(µg/L)**
Arsenic	1.05 J
Barium	34.1
Lead	0.819 J
Zinc	12.6 J
Other Analyses	**(µg/L)**
Nitrate (EPA 353.3)	217
Nitrite (EPA 353.3)	217



LEGEND

- MONITORING WELL
- SURFACE WATER SAMPLE
- STREAM
- PAVED ROAD
- DIRT ROAD
- WASH RACK AREA
- BUILDING
- SWMU AREA

NOTE: Only detected analytes shown.
Well labels show total well depth below ground surface in parenthesis.
NA - Not Available
U - Target analytes were not detected above the reporting limits
J - Analyte was present but concentration is an estimated value.
Bold - Concentrations exceed NC 2L standards.
*IMAC - Interim maximum allowable concentration
**PRG based on carcinogenic factor.

1 inch equals 400 feet

0 200 400 800'

N

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

LONGSTREET RD LANDFILL, FORT BRAGG, NC

FIRST SAMPLING EVENT FOR 2007 GROUND-WATER ANALYTICAL RESULTS

MAY-JUNE 2007

DATE: OCT 2007 | FIGURE 4

LMW-8	
Appendix I Metals	**(µg/L)**
Barium	34.0
Selenium	1.04 J
Other Analyses	**(µg/L)**
Mercury	0.20
Nitrate (EPA 353.3)	398
Nitrite (EPA 353.3)	398

LMW-15R	
Appendix I Metals	**(µg/L)**
Barium	38.5
Copper	5.33 J
Other Analyses	**(µg/L)**
Mercury	0.12 J
Nitrate (EPA 353.3)	1,400
Nitrite (EPA 353.3)	**1,400**

LMW-14R	
Appendix I Metals	**(µg/L)**
Arsenic	1.11 J
Barium	14.6
Lead	4.42
Vanadium	2.30 J
Zinc	15.4 J
Other Analyses	**(µg/L)**
Nitrate (EPA 353.3)	326
Nitrite (EPA 353.3)	326

LMW-3	
Appendix I Metals	**(µg/L)**
Barium	5.33
Other Analyses	**(µg/L)**
Mercury	0.24
Nitrate (EPA 353.3)	209
Nitrite (EPA 353.3)	209

LMW-3S	
VOCs	**(µg/L)**
toluene	1.4
Appendix I Metals	**(µg/L)**
Barium	18.7
Chromium	11.6
Lead	3.71
Nickel	4.92 J
Vanadium	9.91
Zinc	16.6 J
Other Analyses	**(µg/L)**
Mercury	0.22
Nitrate (EPA 353.3)	196
Nitrite (EPA 353.3)	196

LMW-6		DUP
Appendix I Metals	**(µg/L)**	**(µg/L)**
Arsenic	1.1 J	<2
Barium	52.4	46.4
Chromium	4.74 J	3.75 J
Copper	7.78 J	<20
Lead	0.839 J	0.873 J
Nickel	5.53 J	<50
Selenium	2.93	2.46
Vanadium	3.7 J	4.21
Zinc	17.3 J	15.2 J
Other Analyses	**(µg/L)**	**(µg/L)**
Nitrate (EPA 353.3)	1,220	1,290
Nitrite (EPA 353.3)	**1,220**	**1,290**

LMW-9s	
Appendix I Metals	**(µg/L)**
Arsenic	1.68 J
Barium	80.9
Cobalt	1.04 J
Chromium	5.73
Lead	2.16
Selenium	4.53
Vanadium	5.99
Other Analyses	**(µg/L)**
Mercury	0.33
Nitrate (EPA 353.3)	1,000
Nitrite (EPA 353.3)	**1,000**

LMW-9D	
VOCs	**(µg/L)**
benzene	**1.3**
Appendix I Metals	**(µg/L)**
Arsenic	7.66
Barium	5.57
Lead	3.97
Vanadium	5.73
Other Analyses	**(µg/L)**
Mercury	0.24
Nitrate (EPA 353.3)	461
Nitrite (EPA 353.3)	461

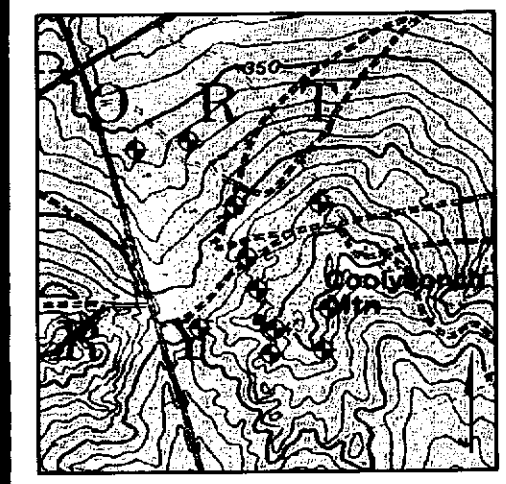
LMW-18	
Appendix I Metals	**(µg/L)**
Arsenic	2.13
Barium	41.3
Chromium	20.7
Copper	7.37 J
Lead	5.28
Vanadium	41.9
Zinc	16.5 J
Other Analyses	**(µg/L)**
Mercury	0.22
Nitrate (EPA 353.3)	166
Nitrite (EPA 353.3)	166

LMW-9	
Appendix I Metals	**(µg/L)**
Arsenic	1.12 J
Barium	6.29
Chromium	7.14
Copper	5.28 J
Lead	1.40
Nickel	3.26 J
Vanadium	7.06
Zinc	17.1 J
Other Analyses	**(µg/L)**
Mercury	0.18 J
Nitrate (EPA 353.3)	**17,200**
Nitrite (EPA 353.3)	**17,200**

LMW-10	
VOCs	**(µg/L)**
dichlorodifluoromethane	2.5
trichlorofluoromethane	3.3
Appendix I Metals	**(µg/L)**
Arsenic	1.15 J
Barium	21.3
Chromium	2.72 J
Lead	4.15
Vanadium	3.12 J
Other Analyses	**(µg/L)**
Nitrate (EPA 353.3)	1,020
Nitrite (EPA 353.3)	**1,020**

LMW-4	
Appendix I Metals	**(µg/L)**
Arsenic	1.13 J
Barium	24.7
Chromium	21.7
Copper	8.06 J
Lead	3.52
Nickel	6.98
Vanadium	15.8
Zinc	47.0
Other Analyses	**(µg/L)**
Mercury	0.30
Nitrate (EPA 353.3)	**643,000**
Nitrite (EPA 353.3)	**643,000**

LMW-7	
VOCs	**(µg/L)**
trichlorofluoromethane	2.5
Appendix I Metals	**(µg/L)**
Arsenic	1.05 J
Barium	27.4
Chromium	24.7
Copper	6.05 J
Lead	3.51
Nickel	7.73
Vanadium	14.8
Zinc	51.0
Other Analyses	**(µg/L)**
Mercury	0.38
Nitrate (EPA 353.3)	295
Nitrite (EPA 353.3)	295



LEGEND

- MONITORING WELL
- MONITORING WELL (REMOVED)
- PAVED ROAD
- DIRT ROAD
- WASH RACK AREA
- BUILDING
- SWMU AREA

NOTE: Only detected analytes shown.
Well labels show total well depth below ground surface in parenthesis.
NA - Not Available
U - Target analytes were not detected above the reporting limits
J - Analyte was present but concentration is an estimated value.
Bold - Concentrations exceed NC 2L standards.
*IMAC - Interim maximum allowable concentration
**PRG based on carcinogenic factor.

1 inch equals 300 feet

0 150 300 600'

N

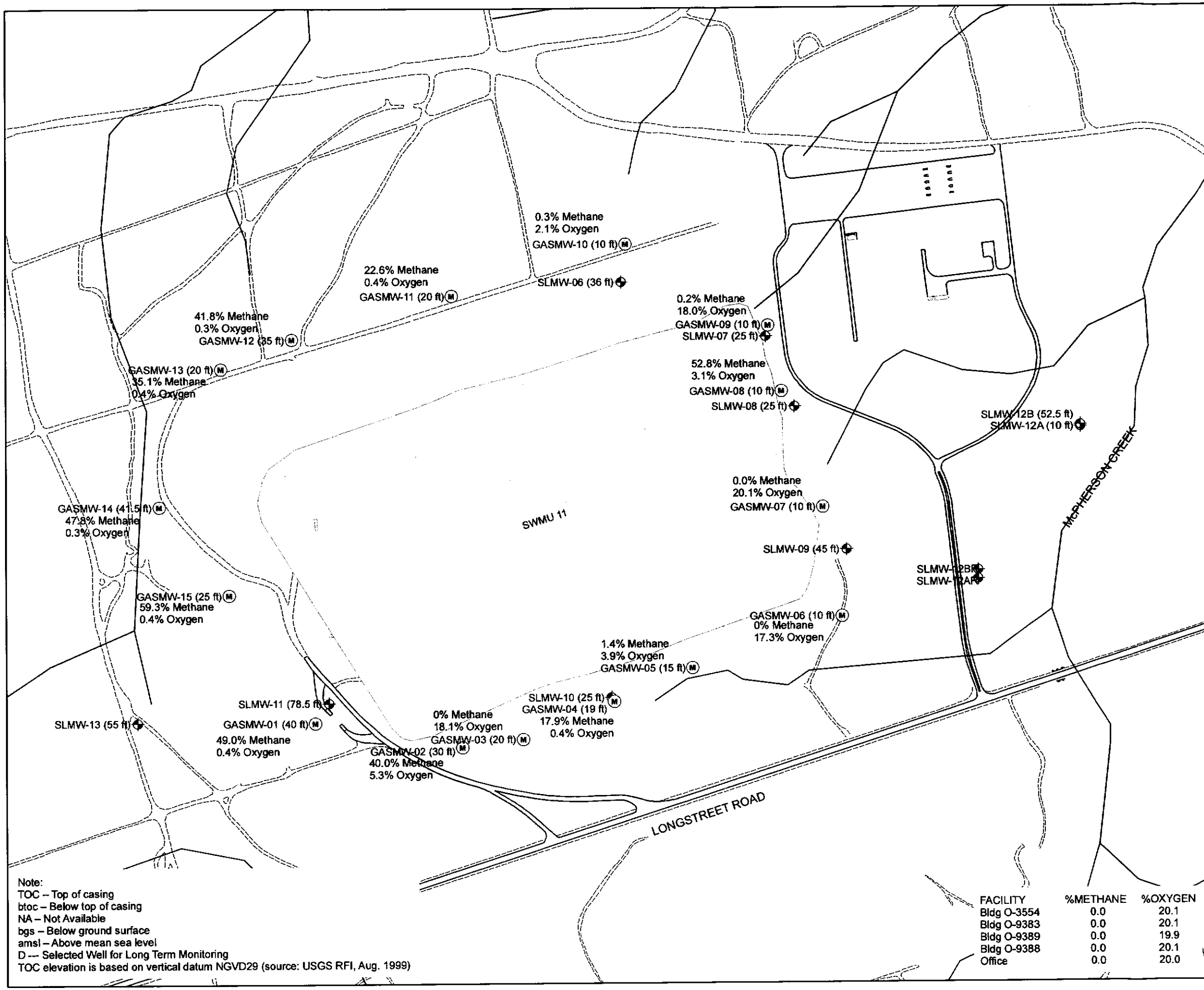
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

LAMONT ST LANDFILL, FORT BRAGG, NC

FIRST SAMPLING EVENT FOR 2007 GROUND-WATER ANALYTICAL RESULTS MAP

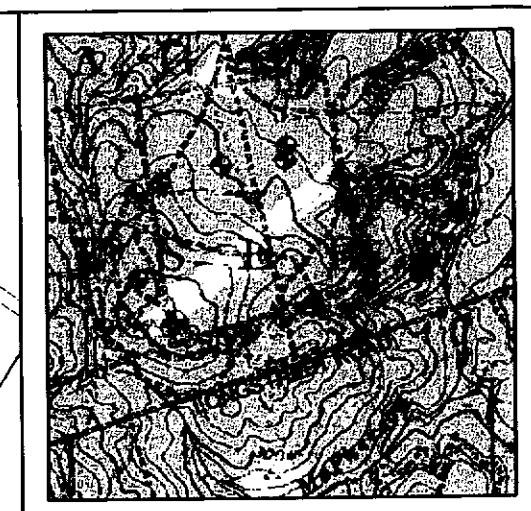
JUNE 2007

DATE: OCT 2007 | FIGURE 5



Note:
TOC – Top of casing
btoc – Below top of casing
NA – Not Available
bgs – Below ground surface
amsl – Above mean sea level
D --- Selected Well for Long Term Monitoring
TOC elevation is based on vertical datum NGVD29 (source: USGS RFI, Aug. 1999)

FACILITY	%METHANE	%OXYGEN
Bldg O-3554	0.0	20.1
Bldg O-9383	0.0	20.1
Bldg O-9389	0.0	19.9
Bldg O-9388	0.0	20.1
Office	0.0	20.0



LEGEND

- METHANE SAMPLE
- MONITORING WELL
- STREAM
- BUILDING
- SWMU AREA
- ROAD
- TRAIL

1 inch equals 400 feet

0 200 400 800'

N

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

METHANE RESULTS
FROM THE FIRST SAMPLING
EVENT FOR 2007

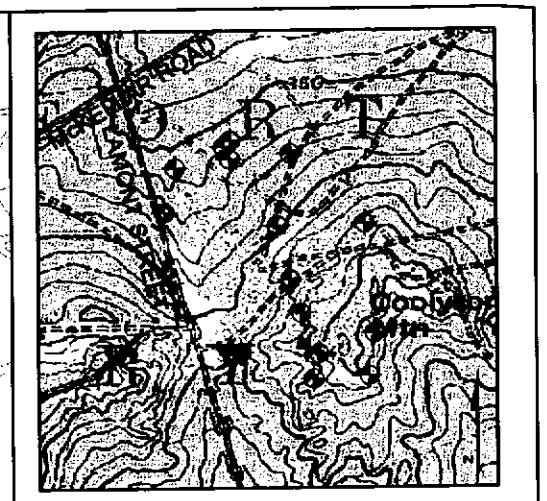
LONGSTREET LANDFILL
FT. BRAGG, NC

DATE: OCT 2007 | FIGURE 6

McKELLAR ROAD

LMW9d (85 ft)
LMW9s (60 ft)
LMW16 (42 ft)
LMW9 (137 ft)
GP-9
0.2% Methane
6.8% Oxygen
LMW8 (60 ft)
GP-10
3.6% Methane
0.2% Oxygen
SWMU 13
GP-8
0.1% Methane
18.3% Oxygen
GP-11
0.1% Methane
18.8% Oxygen
LMW15 (35 ft)
GP-7
0.2% Methane
18.7% Oxygen
LMW13 (25.6 ft)
LMW10 (80 ft)
GP-12
0.1% Methane
13.6% Oxygen
LCID LANDFILL
GP-13
17.5% Methane
0.2% Oxygen
LMW14 (49 ft)
LMW12 (55 ft)
GP-6
0.1% Methane
18.9% Oxygen
GP-1
0.2% Methane
14.1% Oxygen
LMW11 (67 ft)
GP-2
0.1% Methane
18.3% Oxygen
GP-5
0.1% Methane
17.5% Oxygen
LMW4 (80 ft)
LCID LANDFILL
LMW3 (120 ft)
LMW3s (67 ft)
LMW5 (84 ft)
GP-4
0.1% Methane
19.5% Oxygen
LAMONT STREET
LMW6 (95 ft)
GP-3
0.1% Methane
18.2% Oxygen
LMW7 (130 ft)

Note:
TOC – Top of casing
btoc – Below top of casing
NA – Not Available
bgs – Below ground surface
amsl – Above mean sea level
D — Selected Well for Long Term Monitoring
TOC elevation is based on vertical datum NGVD29 (source: USGS RFI, Aug. 1999)



LEGEND

- METHANE SAMPLE
- MONITORING WELL
- MONITORING WELL (REMOVED)
- STREAM
- BUILDING
- SWMU AREA
- ROAD
- TRAIL

1 inch equals 400 feet

0 200 400 800'

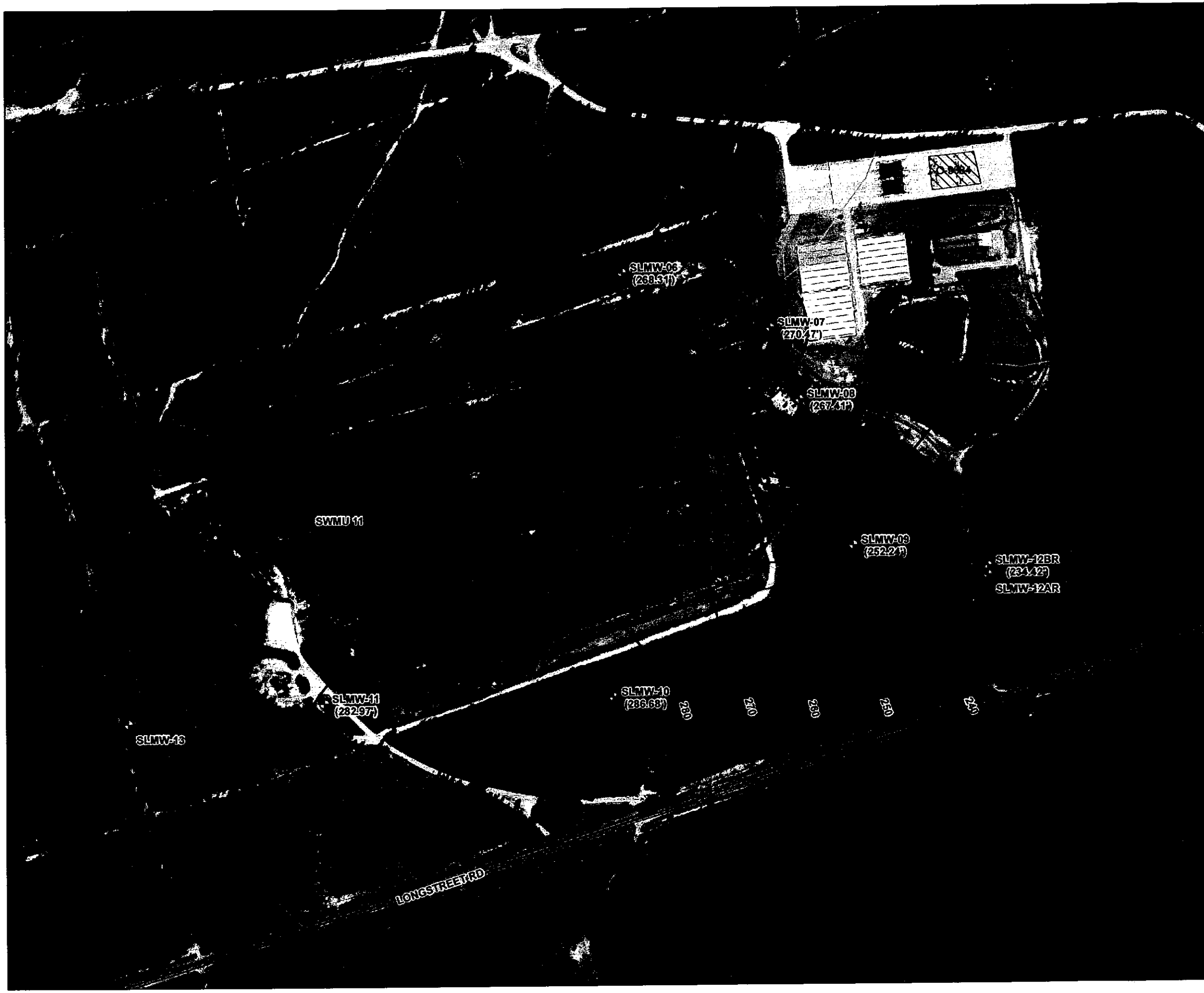
N

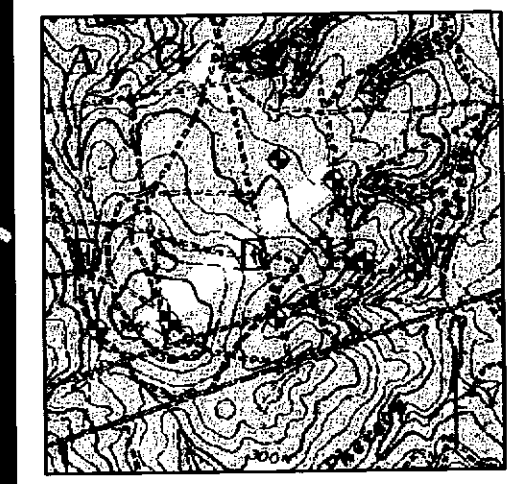
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

METHANE RESULTS
FROM THE FIRST SAMPLING
EVENT FOR 2007

LAMONT STREET LANDFILL
FT. BRAGG, NC

DATE: OCT 2007 | FIGURE 7





LEGEND

- MONITORING WELL
- GROUND-WATER CONTOUR
- STREAM
- WASH RACK AREA
- SWMU AREA
- GROUND-WATER FLOW

Note: Monitoring wells used for potentiometric surface are displayed with elevations in feet above MSL in parenthesis below the label.

1 inch equals 400 feet

0 200 400 800'

N

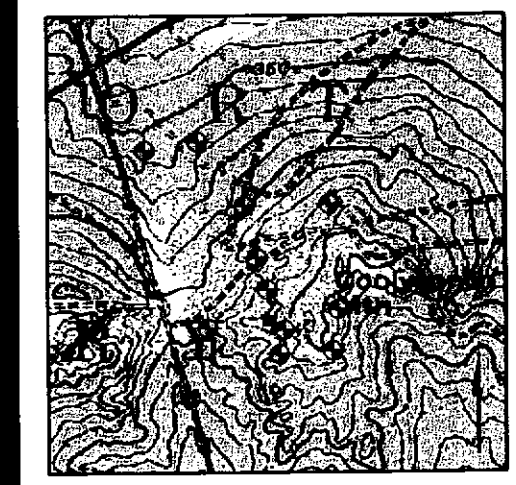
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

LONGSTREET RD LANDFILL, FORT BRAGG, NC

FIRST SAMPLING EVENT
FOR 2007
GROUND-WATER CONTOUR MAP

JUNE 2007

DATE: OCT 2007 | FIGURE 8



LEGEND

- MONITORING WELL
- MONITORING WELL (REMOVED)
- GROUND-WATER CONTOUR
- WASH RACK AREA
- SWMU AREA
- GROUND-WATER FLOW

Note: Monitoring wells used for potentiometric surface are displayed with elevations in feet above MSL in parenthesis below the label.

1 inch equals 300 feet

0 150 300 600'

N

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

LAMONT ST LANDFILL, FORT BRAGG, NC

FIRST SAMPLING EVENT
FOR 2007
GROUND-WATER CONTOUR MAP

JUNE 2007

DATE: OCT 2007 | FIGURE 9

CESAS-EN-GG

9 August 2007

MEMORANDUM THRU:

~~EN-GG~~ ~~EN-GR~~

FOR: EN-GH (McCumber-Kahn)

SUBJECT: Chemical Data Quality Assessment for Fort Bragg Lamont Landfill Ground-Water Sampling (June 2007)

SUMMARY: Ground-water samples were collected at Fort Bragg's Lamont Landfill and analyzed for Appendix I metals by EPA 6010B/6020A/7471A, Nitrate/Nitrite by EPA 353.3, and Volatile Organic Compounds (VOCs) by EPA 8260B. Target analytes were detected in all the samples. The narratives below describe any problems with the sample data as well as the quality control data. Table 1 lists the sample results for quick review.

1. Sample MW-Dup1-6-07: This is the duplicate to GW-LMW-6-6-07. There was good reproducibility between the duplicates although there were several outliers. The reason for this is unknown.

2. Sample Lamont-Blank-06-07: This is the field blank for this sample set. The source of Barium, Mercury, and Nitrate/Nitrite in the field blank is unknown but may have come from the water used to prepare the blank or was present in the sample container prior to sampling. If it was a container artifact, it is possible there was some impact on the sample data.

3. Quality Control: The Quality Control samples analyzed with this sample set were within established control limits except as follows. Several VOCs had matrix spike recoveries outside established control limits. An additional matrix spike sample was prepared and analyzed and all VOC recoveries were acceptable.

Mark S. Harvison
MARK S. HARVISON
Chemist, Geology/Hydrogeology
and HTRW Design Section

CF: EN-SF

TABLE 1

FORT BRAGG
LAMONT LANDFILL
June 2007

Sample Number	Sample Date & Time	EPA 6010B/6020A/7471A Appendix I metals	EPA 353.3 Nitrate/Nitrite	EPA 8260B VOCs
GW-LMW-6-6-07	01 Jun 07 1035	1.10 µg/L Arsenic	1.22 mg/L Nitrate	U
		52.4 µg/L Barium	1.22 mg/L Nitrate/Nitrite	
		4.74 µg/L Chromium J		
		7.78 µg/L Copper J		
		0.839 µg/L Lead J		
		5.53 µg/L Nickel J		
		2.93 µg/L Selenium J		
		3.70 µg/L Vanadium J		
		17.3 µg/L Zinc J		
MW-Dup1-6-07	01 Jun 07 0800	46.4 µg/L Barium	1.29 mg/L Nitrate	U
Duplicate to GW-LMW-6-6-07		3.75 µg/L Chromium J	1.29 mg/L Nitrate/Nitrite	
		0.873 µg/L Lead J		
		2.46 µg/L Selenium		
		4.21 µg/L Vanadium		
		15.2 µg/L Zinc J		
GW-LMW-7-6-07	01 Jun 07 1350	1.05 µg/L Arsenic J	0.295 mg/L Nitrate	2.5 µg/L Trichlorofluoromethane
		27.4 µg/L Barium	0.295 mg/L Nitrate/Nitrite	
		24.7 µg/L Chromium		
		6.05 µg/L Copper J		
		0.38 µg/L Mercury		
		3.51 µg/L Lead		
		7.73 µg/L Nickel		
		14.8 µg/L Vanadium		
		51.0 µg/L Zinc		
GW-LMW-4-6-07	01 Jun 07 1500	1.13 µg/L Arsenic J	643 mg/L Nitrate	3.1 µg/L Trichlorofluoromethane
		24.7 µg/L Barium	643 mg/L Nitrate/Nitrite	
		21.7 µg/L Chromium		
		8.06 µg/L Copper J		
		0.30 µg/L Mercury		
		3.52 µg/L Lead		
		6.98 µg/L Nickel		
		15.8 µg/L Vanadium		
		47.0 µg/L Zinc		
GW-LMW-10-6-07	01 Jun 07 1615	1.15 µg/L Arsenic J	1.02 mg/L Nitrate	2.5 µg/L Dichlorodifluoromethane
		21.3 µg/L Barium	1.02 mg/L Nitrate/Nitrite	3.3 µg/L Trichlorofluoromethane
		2.72 µg/L Chromium J		
		4.15 µg/L Lead		
		3.12 µg/L Vanadium J		
GW-LMW-9-6-07	01 Jun 07 1758	1.12 µg/L Arsenic J	17.2 mg/L Nitrate	U
		6.29 µg/L Barium	17.2 mg/L Nitrate/Nitrite	
		7.14 µg/L Chromium		
		5.28 µg/L Copper J		
		1.40 µg/L Lead		
		0.18 µg/L Mercury J		
		3.26 µg/L Nickel J		
		7.06 µg/L Vanadium		
		17.1 µg/L Zinc J		

TABLE 1

FORT BRAGG
LAMONT LANDFILL
June 2007

Sample Number	Sample Date & Time	EPA 6010B/6020A/7471A Appendix I metals	EPA 353.3 Nitrate/Nitrite	EPA 8260B VOCs
GW-LMW-9S-6-07	02 Jun 07 0850	1.68 µg/L Arsenic J	1.00 mg/L Nitrate	U
		80.9 µg/L Barium	1.00 mg/L Nitrate/Nitrite	
		5.73 µg/L Chromium		
		1.04 µg/L Cobalt J		
		2.16 µg/L Lead		
		0.33 µg/L Mercury		
		4.53 µg/L Selenium		
		5.99 µg/L Vanadium		
GW-LMW-9D-6-07	02 Jun 07 0925	7.66 µg/L Arsenic	0.461 mg/L Nitrate	1.3 µg/L Benzene
		5.57 µg/L Barium	0.461 mg/L Nitrate/Nitrite	
		3.97 µg/L Lead		
		0.24 µg/L Mercury		
		5.73 µg/L Vanadium		
GW-LMW-16-6-07	02 Jun 07 1025	2.13 µg/L Arsenic	0.166 mg/L Nitrate	U
		41.3 µg/L Barium	0.166 mg/L Nitrate/Nitrite	
		20.7 µg/L Chromium		
		7.37 µg/L Copper J		
		5.28 µg/L Lead		
		0.22 µg/L Mercury		
		41.9 µg/L Vanadium		
		16.5 µg/L Zinc J		
GW-LMW-8-6-07	02 Jun 07 1130	34.0 µg/L Barium	0.398 mg/L Nitrate	U
		0.20 µg/L Mercury	0.398 mg/L Nitrate/Nitrite	
		1.04 µg/L Selenium J		
GW-LMW-15R-6-07	02 Jun 07 1415	38.5 µg/L Barium	1.40 mg/L Nitrate	U
		5.33 µg/L Copper J	1.40 mg/L Nitrate/Nitrite	
		0.12 µg/L Mercury J		
GW-LMW-14R-6-07	02 Jun 07 1531	1.11 µg/L Arsenic J	0.326 mg/L Nitrate	U
		14.6 µg/L Barium	0.326 mg/L Nitrate/Nitrite	
		4.42 µg/L Lead		
		2.30 µg/L Vanadium J		
		15.4 µg/L Zinc J		
GW-LMW-3S-6-07	02 Jun 07 1345	18.7 µg/L Barium	0.196 mg/L Nitrate	1.4 µg/L Toluene
		11.6 µg/L Chromium	0.196 mg/L Nitrate/Nitrite	
		4.92 µg/L Nickel J		
		3.71 µg/L Lead		
		0.22 µg/L Mercury		
		9.91 µg/L Vanadium		
		16.6 µg/L Zinc J		
GW-LMW-3-6-07	02 Jun 07 1435	5.33 µg/L Barium	0.209 mg/L Nitrate	U
		0.24 µg/L Mercury	0.209 mg/L Nitrate/Nitrite	
Lamont-Blank-06-07	02 Jun 07 1730	43.0 µg/L Barium	0.171 mg/L Nitrate	U
		0.20 µg/L Mercury J	0.171 mg/L Nitrate/Nitrite	
Trip Blank		NA	NA	U

TABLE 1

FORT BRAGG
LAMONT LANDFILL
June 2007

Sample Number	Sample Date & Time	EPA 6010B/6020A/7471A Appendix I metals	EPA 353.3 Nitrate/Nitrite	EPA 8260B VOCs
Method Blank		U	U	U
KEY:				
VOCs = Volatile Organic Compounds				
J = Analyte was present, but reported value may not be accurate or precise.				
U = Analytes were not detected above the analytical reporting limits.				
NA = Sample was not analyzed by this method.				

CESAS-EN-GG 31 August, 2007

MEMORANDUM THRU

~~EN-GG~~ for Delene
~~EN-G~~ RJC

FOR: EN-GH (Schlenker)

SUBJECT: Ground-water samples were collected at the Fort Bragg Lamont Landfill (June 2007)

SUMMARY: Ground-water samples were collected at the Fort Bragg, N.C. Lamont Landfill (June 2007) and analyzed for the 40CFR258 Appendix I Listing. This listing includes Volatile Organic Compounds (VOCs) by EPA8260B, and Appendix I Metals by EPA 6010B/6020A/7470A. In addition, the site was also sampled for Nitrate/Nitrite by EPA 353.3. The narratives below describe any problems with the sample data as well as the quality control data. Table 1 lists the sample results for quick review.

1. Sample GW-LMW-Dup1-6-07: This is the duplicate to GW-LMW-6 -6-07. There was good reproducibility between the duplicates with the exceptions of several inorganics. This was likely due to the low concentrations detected in the samples.

2. Quality Control: The Quality Control samples analyzed with this sample set were within established control limits except for the following listed below.

3. Copper, nickel and vanadium did not pass the initial QC criteria. The laboratory reran the samples at two times the concentration with acceptable recoveries. The CCV for cadmium was slightly above the QC limits. Affected samples have been flagged "Q1" accordingly.

4. Matrix spike recoveries for EPA 8260B were outside control limits for 2-butanone, acrylonitrile, carbon disulfide and vinyl acetate.

JUDSON D. SMITH.
Chemist, Geology/Hydrogeology
and HTRW Design Section

CF: EN-SF

TABLE 1
Fort Bragg, North Carolina
Lamont Landfill
June 2007

Sample Number	Sample Collection Date and Time	EPA 8260B VOCs	Appendix I Metals EPA 6010B/6020A	Mercury EPA 7470A	EPA 353.3 Nitrate/Nitrite
GW-LMW-6 -6-07	6/1/07 10:35	U	1.1 µg/L Arsenic J 52.4 µg/L Barium 4.74 µg/L Chromium J 7.78 µg/L Copper J 0.839 µg/L Lead J 5.53 µg/L Nickel J 2.93 µg/L Selenium 3.7 µg/L Vanadium J 17.3 µg/L Zinc J	U	1.22 mg/L Nitrate as N 1.22 mg/L Nitrate/Nitrite as N
GW-LMW-7 -6-07	6/1/07 13:50	2.5 µg/L Trichlorofluoromethane	1.05 µg/L Arsenic J 27.4 µg/L Barium 24.7 µg/L Chromium 6.05 µg/L Copper J 3.51 µg/L Lead 7.73 µg/L Nickel 14.8 µg/L Vanadium 51.0 µg/L Zinc	0.38 µg/L Mercury	0.295 mg/L Nitrate as N 0.295 mg/L Nitrate/Nitrite as N
GW-LMW-Dup1-6-07	6/1/07 8:00	U	46.4 µg/L Barium 3.75 µg/L Chromium J 0.873 µg/L Lead J 2.46 µg/L Selenium 4.21 µg/L Vanadium 15.2 µg/L Zinc J	U	1.29 mg/L Nitrate as N 1.29 mg/L Nitrate/Nitrite as N

KEY:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
J = Analyte was present, but reported value may not be accurate or precise.
B= Analyte detected in Method Blank
U = Target analyte was not detected above the analytical reporting limits.

TABLE 1
Fort Bragg, North Carolina
Lamont Landfill
June 2007

Sample Number	Sample Collection Date and Time	EPA 8260B VOCs	Appendix I Metals EPA 6010B/6020A	Mercury EPA 7470A	EPA 353.3 Nitrate/Nitrite
GW-LMW-4-6-07	6/1/07 15:00	3.1 µg/L Trichlorofluoromethane	1.13 µg/L Arsenic J 24.7 µg/L Barium 21.7 µg/L Chromium 8.06 µg/L Copper J 3.52 µg/L Lead 6.98 µg/L Nickel 15.8 µg/L Vanadium 47.0 µg/L Zinc	0.30 µg/L Mercury	643 mg/L Nitrate as N 643 mg/L Nitrate/Nitrite as N
GW-LMW-10-6-07	6/1/07 16:15	2.5 µg/L Dichlorodifluoromethane 3.3 µg/L Trichlorofluoromethane	1.15 µg/L Arsenic J 21.3 µg/L Barium 2.72 µg/L Chromium J 4.15 µg/L Lead 3.12 µg/L Vanadium J	U	1.02 mg/L Nitrate as N 1.02 mg/L Nitrate/Nitrite as N
GW-LMW-9-6-07	6/1/07 17:58	U	1.12 µg/L Arsenic J 6.29 µg/L Barium 7.14 µg/L Chromium 5.28 µg/L Copper J 1.40 µg/L Lead 3.26 µg/L Nickel J 7.06 µg/L Vanadium 17.1 µg/L Zinc J	0.18 µg/L Mercury J	17.2 mg/L Nitrate as N 17.2 mg/L Nitrate/Nitrite as N

KEY:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
J = Analyte was present, but reported value may not be accurate or precise.
B= Analyte detected in Method Blank
U = Target analyte was not detected above the analytical reporting limits.

TABLE 1
Fort Bragg, North Carolina
Lamont Landfill
June 2007

Sample Number	Sample Collection Date and Time	EPA 8260B VOCs	Appendix I Metals EPA 6010B/6020A	Mercury EPA 7470A	EPA 353.3 Nitrate/Nitrite
GW-LMW-9S-6-07	6/2/07 8:50	U	1.68 µg/L Arsenic J 80.9 µg/L Barium 5.73 µg/L Chromium 1.04 µg/L Cobalt J 2.16 µg/L Lead 4.53 µg/L Selenium 5.99 µg/L Vanadium	0.33 µg/L Mercury	1.00 mg/L Nitrate as N 1.00 mg/L Nitrate/Nitrite as N
GW-LMW-9D-6-07	6/2/07 9:25	1.3 µg/L Benzene	7.66 µg/L Arsenic 5.57 µg/L Barium 3.97 µg/L Lead 5.73 µg/L Vanadium	0.24 µg/L Mercury	0.461 mg/L Nitrate as N 0.461 mg/L Nitrate/Nitrite as N
GW-LMW-16-6-07	6/2/07 10:25	U	2.13 µg/L Arsenic 41.3 µg/L Barium 20.7 µg/L Chromium 7.37 µg/L Copper J 5.28 µg/L Lead 41.9 µg/L Vanadium 16.5 µg/L Zinc J	0.22 µg/L Mercury	0.166 mg/L Nitrate as N 0.166 mg/L Nitrate/Nitrite as N
GW-LMW-8-6-07	6/2/07 11:30	U	34.0 µg/L Barium 1.04 µg/L Selenium J	0.20 µg/L Mercury	0.398 mg/L Nitrate as N 0.398 mg/L Nitrate/Nitrite as N

KEY:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
J = Analyte was present, but reported value may not be accurate or precise.
B= Analyte detected in Method Blank
U = Target analyte was not detected above the analytical reporting limits.

TABLE 1
Fort Bragg, North Carolina
Lamont Landfill
June 2007

Sample Number	Sample Collection Date and Time	EPA 8260B VOCs	Appendix I Metals EPA 6010B/6020A	Mercury EPA 7470A	EPA 353.3 Nitrate/Nitrite
GW-LMW-15R-6-07	6/2/07 14:15	U	38.5 µg/L Barium 5.33 µg/L Copper J	0.12 µg/L Mercury J	1.40 mg/L Nitrate as N 1.40 mg/L Nitrate/Nitrite as N
GW-LMW-14R-6-07	6/2/07 15:31	U	1.11 µg/L Arsenic J 14.6 µg/L Barium 4.42 µg/L Lead 2.30 µg/L Vanadium J 15.4 µg/L Zinc J	U	0.326 mg/L Nitrate as N 0.326 mg/L Nitrate/Nitrite as N
GW-LMW-3S-6-07	6/2/07 13:45	1.4 µg/L Toluene	18.7 µg/L Barium 11.6 µg/L Chromium 3.71 µg/L Lead 4.92 µg/L Nickel J 9.91 µg/L Vanadium 16.6 µg/L Zinc J	0.22 µg/L Mercury	0.196 mg/L Nitrate as N 0.196 mg/L Nitrate/Nitrite as N
GW-LMW-3-6-07	6/2/07 14:35	U	5.33 µg/L Barium	0.24 µg/L Mercury	mg/L Nitrate as N J mg/L Nitrate/Nitrite as N
Lamont Blank-6-07	6/2/07 17:30	U	43.0 µg/L Barium	U	0.171 mg/L Nitrate as N 0.171 mg/L Nitrate/Nitrite as N
Method Blank (water)		U	U	U	U

KEY:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
J = Analyte was present, but reported value may not be accurate or precise.
B= Analyte detected in Method Blank
U = Target analyte was not detected above the analytical reporting limits.

CESAS-EN-GG 31 August, 2007

MEMORANDUM THRU

EN-GG AB for Delano
~~EN-G~~

FOR: EN-GH (Schlenker)

SUBJECT: Ground-water samples were collected at the Fort Bragg Longstreet Landfill (June 2007)

SUMMARY: Ground-water samples were collected at the Fort Bragg, N.C. Longstreet Landfill (June 2007) and analyzed for the 40CFR258 Appendix II Listing. This listing includes Volatile Organic Compounds (VOCs) by EPA8260B, Semi-volatile Organic Compounds (SVOCs) by EPA 8270C, Organochlorine Pesticides by EPA 8081A, Polychlorinated Biphenyls (PCBs) by EPA 8082, Appendix II Metals by EPA 6010B/6020A/7470A, Cyanide (total) by EPA 335.2, Sulfide by EPA 376.2. In addition, the site was also sampled for Nitrate/Nitrite by EPA 353.3. The narratives below describe any problems with the sample data as well as the quality control data. Table 1 lists the sample results for quick review.

1. The presence of bis (2-ethylhexyl) phthalate detected in the method blank is thought to be due to laboratory contamination. The Continuing Calibration Verification (CCV) for EPA 8270C was outside the QC criteria for 3-nitroanaline. Affected samples have been "Q1" flagged accordingly.

2. The laboratory control sample (LCS) for EPA 8081A was outside QC limits. Because the laboratory control sample duplicate (LCSD) surrogate recoveries are within QC limits, the EPA 8081A data is not qualified.

3. Matrix spike recoveries for EPA 8260B were outside control limits for 2-butanone, acrylonitrile, carbon disulfide and vinyl acetate. Matrix spikes could not be performed on EPA 8270C, EPA 8081A and EPA 8082 due to sample volume. In the absent of Matrix spike data, laboratory QC is used to determine sample data validity.

4. Copper, nickel and vanadium did not pass the initial QC criteria. The laboratory reran the samples at two times the concentration with acceptable recoveries. The CCV for selenium was slightly above the QC limits. Affected samples have been flagged "Q1" accordingly.

CESAS-EN-GG

SUBJECT: Ground-water samples were collected at the Fort Bragg Longstreet Landfill (June 2007)

5. This laboratory data package consisted of samples that were part of an extensive field sampling project. Multiple shipments were required to maintain holding times. Field QC for this site was included in a different lab package.

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Chemist, Geology/Hydrogeology
and HTRW Design Section

CF: EN-SF

TABLE 1
Fort Bragg, North Carolina
Longstreet Landfill
June 2007

Sample Number	Sample Collection Date and Time	EPA 8260B VOCs	EPA 8270C SVOCs	EPA 8081A Organochlorine Pesticides	EPA 8082 Polychlorinated Biphenyls (PCBs)	Appendix II Metals EPA 6010B/6020A	Mercury EPA 7470A	EPA 353.3 Nitrate/Nitrite	EPA 335.2 Cyanide (total)	EPA 376.2 Sulfide
GW-SLMW-8-06-07	6/1/07 10:40	3.2 µg/L Benzene 2.2 µg/L Chlorobenzene 25 µg/L cis-1,2-Dichloroethene 1.2 µg/L Toluene J 1.6 µg/L Trichloroethene 19 µg/L Vinyl chloride	U	U	U	5.92 µg/L Arsenic 76.3 µg/L Barium 12.0 µg/L Vanadium 51.6 µg/L Zinc	U	0.035 mg/L Nitrate as N J 0.035 mg/L Nitrate/Nitrite as N	U	U
GW-SLMW-9-06-07	6/1/07 14:15	2.2 µg/L Benzene 1.1 µg/L Chlorobenzene 3.0 µg/L cis-1,2-Dichloroethene 0.6 µg/L Trichloroethene J	2.55 µg/L Diethyl phthalate J	U	U	10.8 µg/L Arsenic 70.4 µg/L Barium 5.59 µg/L Copper J 3.07 µg/L Vanadium J 56.6 µg/L Zinc	U	0.029 mg/L Nitrate as N J 0.029 mg/L Nitrate/Nitrite as N J	U	U
GW-SLMW-11-06-07	6/1/07 16:25	100 µg/L Acetone 2.1 µg/L Benzene 5.7 µg/L cis-1,2-Dichloroethene 2.0 µg/L Trichloroethene	U	U	U	25.5 µg/L Arsenic 50.0 µg/L Barium 4.61 µg/L Chromium J 1.02 µg/L Cobalt J 9.94 µg/L Copper J 5.32 µg/L Vanadium 39.7 µg/L Zinc	U	0.033 mg/L Nitrate as N J 0.033 mg/L Nitrate/Nitrite as N J	0.014 mg/L Cyanide (total) J	U
GW-SLMW-13-06-07	6/2/07 10:35	U	13.1 µg/L 4-Methylphenol	U	U	1.11 µg/L Arsenic J 10.9 µg/L Barium	0.12 µg/L Mercury J	0.14 mg/L Nitrate as N 0.14 mg/L Nitrate/Nitrite as N	U	U
SW-1-06-07	6/2/07 7:55	7.7 µg/L 1,1-Dichloroethane 1.6 µg/L Benzene 6.1 µg/L cis-1,2-Dichloroethene 8.4 µg/L Dichlorodifluoromethane	2.51 µg/L Diethyl phthalate J	U	U	14.0 µg/L Arsenic 35.0 µg/L Barium 7.68 µg/L Copper J 1.85 µg/L Lead 13.1 µg/L Vanadium 117 µg/L Zinc	U	0.011 mg/L Nitrate as N J 0.011 mg/L Nitrate/Nitrite as N J	0.018 mg/L Cyanide (total) J	U

KEY:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
J = Analyte was present, but reported value may not be accurate or precise.
B= Analyte detected in Method Blank
U = Target analyte was not detected above the analytical reporting limits.

TABLE 1 (cont.)
Fort Bragg, North Carolina
Longstreet Landfill
June 2007

Sample Number	Sample Collection Date and Time	EPA 8260B VOCs	EPA 8270C SVOCs	EPA 8081A Organochlorine Pesticides	EPA 8082 Polychlorinated Biphenyls (PCBs)	Appendix II Metals EPA 6010B/6020A	Mercury EPA 7470A	EPA 353.3 Nitrate/Nitrite	EPA 335.2 Cyanide (total)	EPA 376.2 Sulfide
SW-2-06-07	6/2/07 8:30	U	1.87 J µg/L 1,4-Dichlorobenzene	U	U	1.18 µg/L Arsenic J 9.3 µg/L Barium 24.5 µg/L Zinc J	U	0.068 mg/L Nitrate as N 0.068 mg/L Nitrate/Nitrite as N	0.018 mg/L Cyanide (total) J	U
Trip Blank		U								
Method Blank (water)		U	1.44 µg/L Bis(2-ethylhexyl) phthalate J	U	U	U	U	U	U	U

KEY:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
J = Analyte was present, but reported value may
B= Analyte detected in Method Blank
U = Target analyte was not detected above the analytical reporting limits.

CESAS-EN-GG 31 August, 2007

MEMORANDUM THRU

EN-GG AB for Deleno
~~EN-G~~ RJO

FOR: EN-GH (Schlenker)

SUBJECT: Ground-water samples were collected at the Fort Bragg Longstreet Landfill (May 2007)

SUMMARY: Ground-water samples were collected at the Fort Bragg, N.C. Longstreet Landfill (May 2007) and analyzed for the 40CFR258 Appendix II Listing. This listing includes Volatile Organic Compounds (VOCs) by EPA8260B, Semi-volatile Organic Compounds (SVOCs) by EPA 8270C, Organochlorine Pesticides by EPA 8081A, Polychlorinated Biphenyls (PCBs) by EPA 8082, Organophosphorus Pesticides by EPA 8141A, Appendix II Metals by EPA 6010B/6020A/7470A, Cyanide (total) by EPA 335.2, Sulfide by EPA 376.2. In addition, the site was also sampled for Nitrate/Nitrite by EPA 353.3. The narratives below describe any problems with the sample data as well as the quality control data. Table 1 lists the sample results for quick review.

1. Sample SLMW-DUP-05-07: This is the duplicate to SLMW-10-05-07. There was good reproducibility between the duplicates with the exception of several inorganics. This was likely due to the low concentrations detected in the samples.

2. Quality Control: The Quality Control samples analyzed with this sample set were within established control limits except for the following listed below.

3. The holding times were exceeded for all the EPA 8260B (VOCs) analysis. All samples were analyzed outside the 14 day analytical hold time but within the two (2x) times the 14 day hold time. All volatile data must be treated as estimates.

4. The relative percent difference (RPD) for several analytes from the EPA 8270C (SVOCs) matrix spike/ matrix spike duplicate (MS/MSD) list exceeded the laboratory percent recovery limits. The percent recoveries on the MS/MSD were within Department of Defense (DOD) limits as listed in the DOD Quality Systems Manual for Environmental Laboratories.

5. The initial and continuing calibration data for the EPA 8081A analysis were outside QC limits on the first analysis. All samples were re-analyzed for EPA 8081A. The QC data for the re-analysis was within acceptable limits. The re-analysis took place outside the analytical hold time but within the two (2x) times the 40 day hold time. All EPA 8081A data must be treated as estimates.

CESAS-EN-GG

SUBJECT: Ground-water samples were collected at the Fort Bragg Longstreet Landfill (May 2007)

6. The initial and continuing calibration data for the EPA 8082 were outside QC limits on the first analysis. All samples were re-analyzed for EPA 8082. The QC data for the re-analysis was within acceptable limits. The re-analysis took place outside the analytical hold time but within the two (2x) times the 40 day hold time. The RPD for the MS/MSDs are outside QC limits for both laboratory and DOD standards. All EPA 8082 data must be treated as estimates.

7. The initial analysis for EPA 6010B metals were outside acceptable QC criteria for copper, nickel and vanadium. The samples were re-analyzed at two (2x) times the concentration with acceptable recoveries.

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Chemist, Geology/Hydrogeology
and HTRW Design Section

CF: EN-SF

TABLE 1
Fort Bragg, North Carolina
Longstreet Landfill
May 2007

Sample Number	Sample Collection Date and Time	EPA 8260B VOCs	EPA 8270C SVOCs	EPA 8081A Organochlorine Pesticides	EPA 8082 Polychlorinated Biphenyls (PCBs)	EPA 8141A Organophosphorus Pesticides	Appendix II Metals EPA 6010B/6020A	Mercury EPA 7470A	EPA 353.3 Nitrate/Nitrite	EPA 335.2 Cyanide (total)	EPA 376.2 Sulfide
SLMW-6-05-07	5/24/07 16:20	U	U	U	U	U	7.22 µg/L Barium	U	0.036 mg/L Nitrate as N J 0.036 mg/L Nitrate/Nitrite as N J	0.014 mg/L Cyanide J	U
SLMW-7-05-07	5/23/07 13:50	1.2 µg/L Benzene	13.5 µg/L 4-Methylphenol 2.89 µg/L Phenol J	0.0143 µg/L Endosulfan I J	U	U	9.45 µg/L Arsenic 63.2 µg/L Barium 10.8 µg/L Copper 8.33 µg/L Vanadium 73.8 µg/L Zinc	U	0.074 mg/L Nitrate as N 0.074 mg/L Nitrate/Nitrite as N	U	U
SLMW-10-05-07	5/23/07 16:03	4.1 µg/L 1,4-Dichlorobenzene 9.1 µg/L cis-1,2-Dichloroethene	1.94 µg/L 1,4-Dichlorobenzene J	U	U	U	3.62 µg/L Arsenic 139 µg/L Barium 0.532 µg/L Cadmium J 6.64 µg/L Copper J 3.77 µg/L Vanadium J 62.4 µg/L Zinc	U	0.038 mg/L Nitrate as N J 0.038 mg/L Nitrate/Nitrite as N J	U	U
SLMW-12AR-05-07	5/24/07 8:40	U	1.28 µg/L Diethylphthalate J	U	U	U	1.05 µg/L Arsenic J 34.1 µg/L Barium 0.819 µg/L Lead J 12.6 µg/L Zinc J	U	0.217 mg/L Nitrate as N 0.217 mg/L Nitrate/Nitrite as N	U	U
SLMW-12BR-05-07	5/24/07 14:30	U	U	U	U	U	41.5 µg/L Barium	U	0.02 mg/L Nitrate as N J 0.02 mg/L Nitrate/Nitrite as N J	U	U
SLMW-DUP-05-07	5/23/07 17:00	3.4 µg/L 1,4-Dichlorobenzene 8.9 µg/L cis-1,2-Dichloroethene	1.75 µg/L 1,4-Dichlorobenzene J	U	U	U	3.75 µg/L Arsenic 129 µg/L Barium 0.518 µg/L Cadmium J 1.29µg/L Cobalt J 5.65 µg/L Copper J 4.23 µg/L Vanadium 62.8 µg/L Zinc	U	0.049 mg/L Nitrate as N 0.049 mg/L Nitrate/Nitrite as N	U	U
BLANK-05-07	5/24/07 17:00	U	U	U	U	U	113 µg/L Barium	U	0.069 mg/L Nitrate as N 0.069 mg/L Nitrate/Nitrite as N	0.039 mg/L Cyanide	U
Method Blank (water)		U	U	U	U	U	U	U	U	U	U

KEY:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
J = Analyte was present, but reported value may not be accurate or precise.
B= Analyte detected in Method Blank

US Army Corps
of Engineers
Savannah District

DIRECTORATE OF PUBLIC
WORKS and ENVIRONMENT
Fort Bragg, North Carolina

Statistical Analysis of Ground-Water Data
Lamont Road Land Clearing and Inert Debris Landfill
Fort Bragg, North Carolina
Rounds N1 through N14

Permit No. 26G and 26-08

September 2007

Prepared by
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Statistical Analysis of Ground-Water Data
Lamont Road Land Clearing and Inert Debris Landfill
Fort Bragg, North Carolina
Rounds N1 through N14

EXECUTIVE SUMMARY

Fort Bragg authorized the U.S. Army Corps of Engineers, Savannah District to perform the required sampling of the Lamont Land Clearing and Inert Debris Landfill. The evaluation of ground-water data was in accordance with 15A NC3AC 13B.1634 for detection monitoring systems.

Sampling activities occurred in June 2, 2007. The background and compliance wells sampled are listed on Table 1. Six additional compliance wells have been installed. These new monitoring wells require additional analytical data before inclusion in the statistical report. Ground-water data were statistically analyzed to determine if the mean concentration for each analyte deviated significantly from the mean concentration from the background well data. All ground-water samples were analyzed for Appendix I Organics by EPA method 8260B and Appendix I Inorganics by EPA methods 6010B and 6020A. All Appendix I Inorganics detected are listed on Table 2. All Appendix I Organics detected are listed on Table 3. The non-parametric Kruskal-Wallis test method was selected as the most appropriate procedure for the analysis of this data set. Any analyte with at least one detection since the beginning of the study was analyzed with the Kruskal Wallis test.

Appendix I Inorganics failing the Kruskal-Wallis test were: arsenic, barium, cobalt, copper, and vanadium. The only Appendix I Organic failing the Kruskal-Wallis test was trichloroethene.

Statistically, the barium data from monitoring well LMW-6 exhibits evidence of contamination and an upward trend, but the highest concentration detected was 52.4ppb. Concentrations of barium detected at that site have ranged from 109ppb to below detection limit. The fluctuation in barium data in monitoring well LMW-6 can be considered statistically insignificant. The few abnormalities in ground-water data were due to either decreasing or fluctuating concentrations. Compliance well concentrations do not vary significantly from background concentrations for any of the other parameters analyzed. Future analytical results will be evaluated using the same procedures.

REGISTERED PROFESSIONAL GEOLOGIST CERTIFICATION

I certify that I am a qualified ground-water scientist who has received a baccalaureate or post graduate degree in the natural sciences or engineering and have sufficient training and experience in ground-water hydrology and related fields as demonstrated by state registration and completion of accredited university courses that enable me to make sound professional judgments regarding ground-water monitoring and contaminant fate and transport. I further certify that this report was prepared by me or by a subordinate working under my direction.

James A. Biddle, P.G.

Reviewed by:

Matthew Delano, P.G.
Chief, Geology/Hydrogeology
and HTRW Design Section

DATE: September, 2007

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FIGURES

Figure 1: Flowchart of the Statistical Tests Performed for Each Analyte Detected in Compliance Wells 3

LIST OF ATTACHMENTS

Attachment A ..... Statistical Data

1.0 BACKGROUND

Fort Bragg authorized the U.S. Army Corps of Engineers, Savannah District to perform the required sampling of the Lamont LCID Landfill. Sampling activities for the fourteenth round of sampling (N=14) were conducted during June 2, 2007. This facility is a Land Clearing and Inert Debris Landfill (LCID) located east of Lamont Road at Fort Bragg in Cumberland County, North Carolina.

A comparison of statistical procedures was performed using this data to determine an adequate statistical analysis for future monitoring at the facility. Guidance for determining proper statistical methods was obtained from the EPA guidance document titled: Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities - Interim Final Guidance, April 1989 (herein referenced as the Guidance) and it's addendum Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance, July 1992 (herein referenced as the Addendum). The statistical computer software ChemStat (version 5.0) used for this analysis is based on the guidance documents referenced above.

Factors that were considered in selecting a statistical method include departures from normality, unequal variances, temporal and spatial variability, and the percentage of non-detects. Tests for normality that were considered include: Probability Plots, Chi-Squared, Shapiro-Wilk Test, and Shapiro-Francia Test. Statistical analysis procedures considered were: parametric Two Sample t-Test, non-parametric Wilcoxin Rank-Sum Test; parametric ANOVA Tests, non-parametric Kruskal-Wallis Test, Tolerance and Prediction Intervals, and Control Charts.

2.0 DETERMINATION OF APPROPRIATE DISTRIBUTIONAL MODEL

A statistical test predicts the average behavior (distribution) of a random variable by comparing the means (normal distribution) or medians (lognormal and non-parametric distributions) of the compliance well data to background well data. Before conducting a statistical analysis, a distributional assumption must be tested to determine whether the data conform to the assumed distribution.

Prior to testing for significance, the distribution of each parameter is determined to be normal, lognormal, or neither. First, the dataset is used to test the assumption that the distribution is normal. If this assumption is rejected, the same data are log transformed and the hypothesis that the distribution is lognormal is tested. If these assumptions are rejected, it is concluded that the data are neither normally nor lognormally distributed. The data is determined to be non-normal if the distribution of each parameter is determined to be neither normal nor lognormal.

The Shapiro-Francia Test was selected as the main test to determine whether the data conform to the assumed distribution. This test has a good likelihood of distinguishing between the target distribution (normal) and other common distributions (for example, uniform or skewed), and is recommended for data sets with 50 or more samples.

3.0 SELECTION OF STATISTICAL METHOD

The ground-water samples were analyzed for Appendix I organics and inorganics. Monitoring wells MW-4 serves as the background well. The laboratory data for the recently installed compliance wells: MW-1, MW-3S, MW-9D, MW-9S, MW-15, and MW-16 were added to the statistical data, but will require additional rounds of data for valid calculations. The remaining compliance monitoring wells: MW-3, MW-6, MW-7, MW-8, MW-9, and MW-10 were sampled and included in this report. The compliance monitoring well results compared to the background results by means of the applicable statistical procedure. These monitoring wells are listed on Table 1.

Table 1 Ground-Water Monitoring Network

WELL NAME	STATUS
MW-3	**Active - Compliance Monitoring Well**
MW-5	**Abandoned - Compliance Monitoring Well**
MW-6	**Active - Compliance Monitoring Well**
MW-7	**Active - Compliance Monitoring Well**
MW-8	**Active - Compliance Monitoring Well**
MW-9	**Active - Compliance Monitoring Well**
MW-10	**Active - Compliance Monitoring Well**
MW-11	**Abandoned - Compliance Monitoring Well**
MW-12	**Abandoned - Compliance Monitoring Well**
MW-13	**Abandoned - Compliance Monitoring Well**
MW-4	**Active - Compliance Monitoring Well (Background)**
MW-1	**Recently Installed / Active - Compliance Monitoring Well**
MW-3S	**Recently Installed / Active - Compliance Monitoring Well**
MW-9D	**Recently Installed / Active - Compliance Monitoring Well**
MW-9S	**Recently Installed / Active - Compliance Monitoring Well**
MW-15	**Recently Installed / Active - Compliance Monitoring Well**
MW-16	**Recently Installed / Active - Compliance Monitoring Wells**

For this report, contamination is described as the difference in average concentrations between the background and compliance sample data. Random variation of the sample results occurred, but this variation does not necessarily represent contamination. The statistical test used for this report predicted the average behavior (distribution) of a random variable by comparing the means (normal) or medians (lognormal and non-parametric) of compliance well data to background data. It tested the hypothesis that all background and compliance wells have the same median concentration of a constituent. If the hypothesis of equal medians was rejected, then additional calculations were required to determine which compliance wells showed evidence of contamination.

Different statistical tests were used as appropriate for the different distribution patterns that occur within the data. Prior to testing for statistical significance, the distribution of each parameter was determined to be normal, lognormal, or non-parametric. The Shapiro-Francia Test was selected as the primary test to determine whether the data conform to the assumed distribution. This test has a good likelihood of distinguishing between the target distribution (normal) and other common distributions (for example, uniform or skewed) and is valid for samples with 50 or more observations. The process of choosing the appropriate statistical analyses is illustrated on Figure 1.

The ANOVA Test assumed that there were at least three groups of data (including background), with a minimum of four samples per group. It also assumed that the results were normally or lognormally distributed. This test calculated the F-statistic and its corresponding significance probability. If the computed F-statistic was not significant (less than the tabulated F-statistic), it was concluded that there was no significant difference between the average background concentration and the average concentrations of compliance wells. If the F-statistic was significant, it was concluded that at least one pair of well groups is probably different. In this case, ANOVA proceeded to make individual comparisons between background and compliance well data to isolate which well(s) showed evidence of contamination.

If the data were neither normally nor lognormally distributed, or the fraction of nondetects exceeds 15%, then the non-parametric ANOVA Test was applicable. For this test to be sufficiently sensitive, the sample size for any group must be at least 4. A non-parametric ANOVA can be used in any situation that the parametric analysis of variance can be used. The non-parametric method recommended in the Addendum for non-normal data is the Kruskal-Wallis Test. This test computes the H-statistic, adjusts it for ties, and compares it to the appropriate chi-square critical value. If the H-statistic is less than the critical value, the null-hypothesis is accepted, and it is concluded that there are no differences between median background and compliance well concentrations. If the H-statistic is greater than the critical value, it is concluded that at least one pair of well groups is probably different.

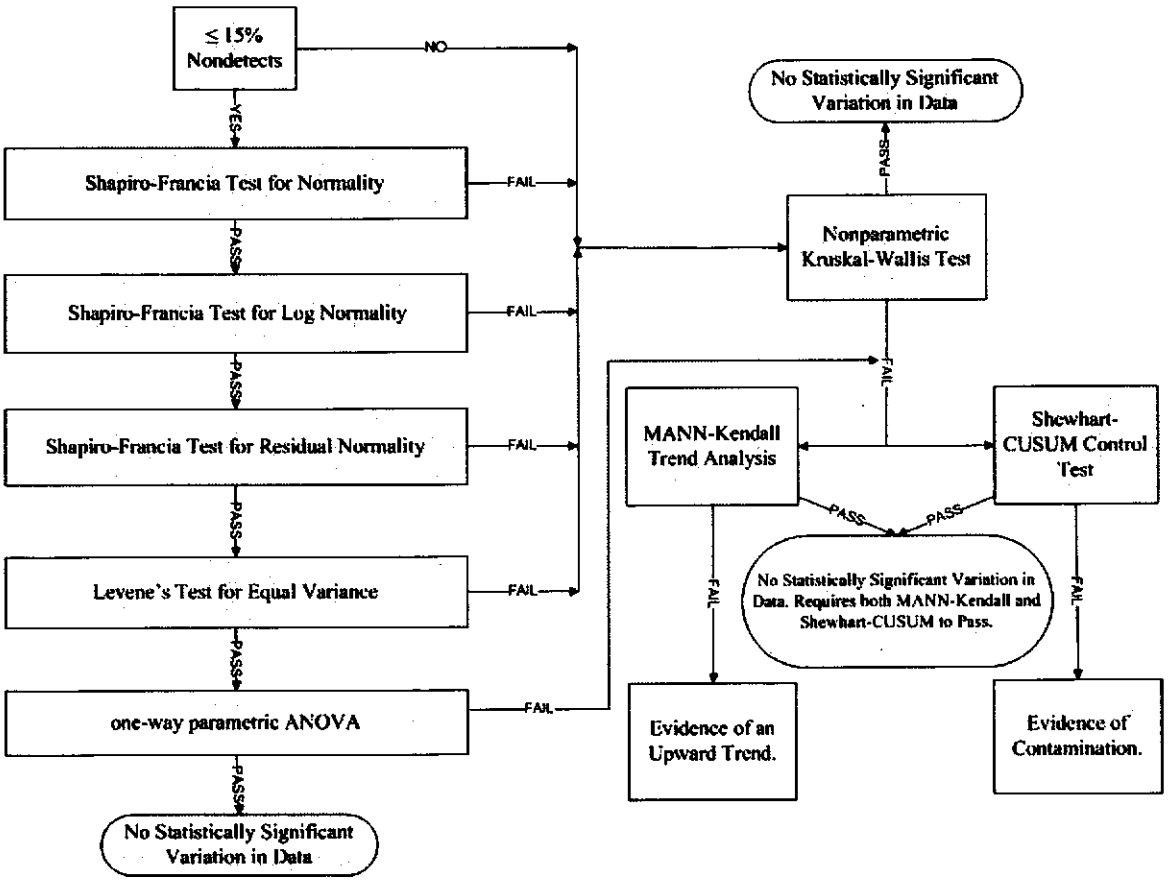
In this case, the Kruskal-Wallis Test performs post-hoc comparisons between background and compliance well data to isolate which well(s) show evidence of contamination. If the difference between the average ranks and the mean background rank of any individual well exceeds the critical difference calculated for that well, then evidence of contamination exists. The only drawback to the non-parametric ANOVA analysis is the dependence on background samples. Fewer background samples will result in an increase of incidence of false positives.

Additional statistical analyzes can help to determine the validity of the positive results. Intra-well comparisons of data from a single well to previous data from the same well are performed to determine if a trend of increasing concentration is occurring. The Mann-Kendall Trend Analysis and the Shewhart-CUSUM Control Chart Statistical Tests were selected for these additional analyses.

The purpose for the Mann-Kendall Trend Analysis is to determine trends in sets of data. The assumption of the Mann-Kendall Trend Analysis procedure is the idea that, if an increasing trend really exists, the sample taken first from any randomly selected pair of measurements should, on average, have a lower concentration than the measurement collected at a later point. The result for a data set being examined by the Mann-Kendall Trend Analysis is either a downward trend, an upward trend, or no trend.

The Shewhart-CUSUM Control Chart is a graphical method to assess contamination levels for individual wells. This analysis visually tracks concentrations at a given well over time to determine whether they exceed critical thresholds, thus implying a significant increase over the baseline value. Shewhart-CUSUM Control Charts are very susceptible to false positives. However, the graph is useful in providing a visual indication of changing trends in parameter concentrations.

Figure 1: Flowchart of the Statistical Tests Performed for Each Analyte Detected in Compliance Wells



4.0 FIELD ACTIVITIES

This section describes the procedures that were followed for equipment decontamination, ground-water sampling, quality assurance sampling, preservation, handling, and shipment of samples. All sampling procedures that were used at the landfill are in

accordance with EPA, Region IV, *Standard Operating Procedures and Quality Assurance Manual*, Revision 1 (November 2001).

Ground-water samples were collected using a low-flow purge method with a bladder pump. Immediately before purging a well, the static water level below the top of the well casing and the total depth of the well were measured to the nearest 0.01 foot and recorded in the field notebook. The volume of water in the well, including the saturated pore volume (assumed to be 30%) of the sand-packed annulus, was calculated based on the static water level and the well construction information. Well volume calculations were placed in the field notebook. The inlet of the sampling pump was placed at the mid-point of the screened interval. This level was adjusted for wells where the static water level is within the well screen. The monitoring wells were purged using a variable-flow bladder pump at a rate of 500 ml/min or less. Temperature and specific conductance were monitored to ensure the water quality had stabilized to within 10% of the previous reading. Turbidity readings should either stabilize at or be lower than 10 Nephelometric Turbidity Units (NTUs). Stabilization occurs with pH measurements when readings remain constant within 0.1 Standard Units (SU). The rate of pumping was determined and noted in the field notebook. The purge rate was adjusted, as necessary, to avoid purging any well to dryness and to equal the recharge of the aquifer. All sampling equipment was protected from contaminated soil surfaces to prevent contamination of the samples (e.g., equipment may be placed on disposable polyethylene plastic sheeting). Ground-water sampling data (including sample number, location, quantity of water purged, field parameters, site conditions, etc.) were documented in the field notebook.

5.0 RESULTS

The U.S. Army Corps of Engineers, Savannah District performed the required sampling of the Lamont Road LCID Landfill in accordance with the Fort Bragg request. The evaluation of ground-water data is according to 15A NC3AC 13B.1634 for detection monitoring systems.

Sampling activities were completed during June 2, 2007. The background and compliance wells sampled are on Table 1. Ground-water data were statistically analyzed to determine if the mean concentration for each sample analyte deviates significantly from the mean concentration from the background well. All ground-water samples were analyzed for Appendix I Organics by EPA method 8260B and Appendix I Inorganics by EPA methods 6010B and 6020A. Appendix I Inorganics detected are listed on Table 2; Appendix I Organics detected are listed on Table 3. The non-parametric Kruskal-Wallis test method was selected as the most appropriate procedure for the analysis of this data set. Any analyte with at least one detection since the beginning of the study will be analyzed with Kruskal Wallis test.

Statistically, the barium data from monitoring well LMW-6 exhibits evidence of contamination and an upward trend, but the highest concentration detected was 52.4ppb. Concentrations of barium detected at that site have ranged from 109ppb to below detection limit. The fluctuation in barium data in monitoring well LMW-6 can be considered statistically insignificant. The few abnormalities in ground-water data were due to either

decreasing or fluctuating concentrations. Compliance well concentrations do not vary significantly from background concentrations for any of the other parameters analyzed.

6.0 CONCLUSIONS

Lamont Road Land Clearing and Inert Debris Landfill have neither evidence of contamination nor an upward trend. The few abnormalities were due to either decreasing or fluctuating concentration. Compliance well concentrations do not vary significantly from background concentrations for any of the other parameters analyzed. Future analytical results will be evaluated using the same procedures.

7.0 REFERENCES

EPA, Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities - Interim Final Guidance, April 1989

EPA, Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance, July 1992

EPA, Region IV, Standard Operating Procedures and Quality Assurance Manual, Revision 1, November, 2001.

Table 2. Statistical Evaluation Results for Inorganics

Appendix I Metals	% Non-Detect	Normality	Test	Pass/Fail
Antimony, total	100%	N/A	N/A	N/A
Arsenic, total	83.2%	Non-normal	Kruskal-Wallis	Group Fail
Barium, total	43.2%	Non-normal	Kruskal-Wallis	Group Fail
Beryllium, total	100%	N/A	N/A	N/A
Cadmium, total	86.3%	Non-normal	Kruskal-Wallis	Pass
Chromium, total	66.3%	Non-normal	Kruskal-Wallis	Pass
Cobalt, total	93.7%	Non-normal	Kruskal-Wallis	Group Fail
Copper, total	75.8%	Non-normal	Kruskal-Wallis	Group Fail
Lead, total	63.2%	Non-normal	Kruskal-Wallis	Pass
Mercury	88.4%	Non-normal	Kruskal-Wallis	Pass
Nickel, total	82.1%	Non-normal	Kruskal-Wallis	Pass
Selenium, total	87;4%	Non-normal	Kruskal-Wallis	Failed LMW-9S
Silver, total	100%	N/A	N/A	N/A
Thallium, total	100%	N/A	N/A	N/A
Vanadium	78.8%	Non-normal	Kruskal-Wallis	Group Fail
Zinc, total	71.6%	Non-normal	Kruskal-Wallis	Pass

Table 3. Statistical Evaluation Results for Appendix I Organic Compounds

Volatile Organic Compounds	% Non-Detect	Normality	Test	Pass/Fail
1,1,1,2-Tetrachloroethane	100%	N/A	N/A	N/A
1,1,1-Trichloroethane	100%	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	100%	N/A	N/A	N/A
1,1,2-Trichloroethane	100%	N/A	N/A	N/A
1,1-Dichloroethane	100%	N/A	N/A	N/A
1,1-Dichloroethene (-ethylene)	100%	N/A	N/A	N/A
1,2,3-Trichloropropane	100%	N/A	N/A	N/A
1,2-Dibromo-3-chloropropane; DBCP	100%	N/A	N/A	N/A
1,2-Dibromoethane; Ethylene dibromide	100%	N/A	N/A	N/A
1,2-Dichlorobenzene	100%	N/A	N/A	N/A
1,2-Dichloroethane	100%	N/A	N/A	N/A
1,2-Dichloropropane	100%	N/A	N/A	N/A
1,4-Dichloro-2-butene	100%	N/A	N/A	N/A
1,4-Dichlorobenzene	100%	N/A	N/A	N/A
2-Butanone (Methyl ethyl ketone)	100%	N/A	N/A	N/A
2-Chloroethyl vinyl ether	100%	N/A	N/A	N/A
2-Hexanone	100%	N/A	N/A	N/A
4-Methyl-2-Pentanone	100%	N/A	N/A	N/A

Table 3.(Cont) Statistical Evaluation Results for Appendix I Organic Compounds

Volatile Organic Compounds	% Non-Detect	Normality	Test	Pass/Fail
Acetone	98.9%	Non-normal	Kruskal-Wallis	Pass
Acetonitrile; Methyl cyanide	100%	N/A	N/A	N/A
Acrylonitrile	100%	N/A	N/A	N/A
Benzene	98.9%	N/A	N/A	N/A
Bromochloromethane	100%	N/A	N/A	N/A
Bromodichloromethane	100%	N/A	N/A	N/A
Bromoform	100%	N/A	N/A	N/A
Bromomethane	100%	N/A	N/A	N/A
Carbon Disulfide	100%	N/A	N/A	N/A
Carbon tetrachloride	100%	N/A	N/A	N/A
Chlorobenzene	100%	N/A	N/A	N/A
Chloroethane	100%	N/A	N/A	N/A
Chloroform	96.8%	Non-normal	Kruskal-Wallis	Pass
Chloromethane		N/A	N/A	N/A
cis-1,2-Dichloroethene (-ethylene)	96.8%	Non-normal	Kruskal-Wallis	Pass
cis-1,3-Dichloropropene (-propylene)	100%	N/A	N/A	N/A
Dibromochloromethane	100%	N/A	N/A	N/A
Dibromomethane	100%	N/A	N/A	N/A
Dichlorodifluoromethane	91.6%	Non-normal	Kruskal-Wallis	Pass
Ethylbenzene	100%	N/A	N/A	N/A
Ethylene dibromide or Ethane, 1,2-dibromo-	100%	N/A	N/A	N/A
Iodomethane	100%	N/A	N/A	N/A
Methyl Bromide	100%	N/A	N/A	N/A
Methyl Chloride	100%	N/A	N/A	N/A
Methyl Ethyl Ketone (MEK) (2-Butanone)	100%	N/A	N/A	N/A
Methyl Iodide	100%	N/A	N/A	N/A
Methylene Bromide	100%	N/A	N/A	N/A
Methylene Chloride	100%	N/A	N/A	N/A
Styrene	100%	N/A	N/A	N/A
Tetrachloroethene (-ethylene)	97.9%	Non-normal	Kruskal-Wallis	Pass
Toluene	92.6%	Non-normal	Kruskal-Wallis	Pass
Total Xylenes	96.8%	Non-normal	Kruskal-Wallis	Pass
trans-1,2-Dichloroethene (-ylene)	100%	N/A	N/A	N/A
trans-1,3-Dichloropropene (-propylene)	100%	N/A	N/A	N/A
trans-1,4-Dichloro-2-Butene	100%	N/A	N/A	N/A
Trichloroethene (-ethylene)	93.6%	Non-normal	Kruskal-Wallis	Group Fail
Trichlorofluoromethane	83.2%	Non-normal	Kruskal-Wallis	Pass
Vinyl acetate	100%	N/A	N/A	N/A
Vinyl chloride	100%	N/A	N/A	N/A

Table 4. Mann-Kendall Statistical Evaluation Results

Monitoring Well	Analyte	Test	Trend
LMW-4	Arsenic	Mann-Kendall	No Upward Trend
LMW-6	Arsenic	Mann-Kendall	No Upward Trend
LMW-7	Arsenic	Mann-Kendall	No Upward Trend
LMW-9	Arsenic	Mann-Kendall	No Upward Trend
LMW-10	Arsenic	Mann-Kendall	No Upward Trend
LMW-3	Barium	Mann-Kendall	No Upward Trend
LMW-6	Barium	Mann-Kendall	Upward Trend
LMW-7	Barium	Mann-Kendall	No Upward Trend
LMW-8	Barium	Mann-Kendall	No Upward Trend
LMW-9	Barium	Mann-Kendall	No Upward Trend
LMW-10	Barium	Mann-Kendall	No Upward Trend*
LMW-6	Cobalt	Mann-Kendall	No Upward Trend
LMW-7	Cobalt	Mann-Kendall	No Upward Trend
LMW-9	Cobalt	Mann-Kendall	No Upward Trend
LMW-3	Copper, total	Mann-Kendall	No Upward Trend
LMW-6	Copper, total	Mann-Kendall	No Upward Trend
LMW-7	Copper, total	Mann-Kendall	No Upward Trend
LMW-8	Copper, total	Mann-Kendall	No Upward Trend**
LMW-9	Copper, total	Mann-Kendall	No Upward Trend
LMW-6	Vanadium	Mann-Kendall	No Upward Trend
LMW-7	Vanadium	Mann-Kendall	No Upward Trend
LMW-8	Vanadium	Mann-Kendall	No Upward Trend
LMW-9	Vanadium	Mann-Kendall	No Upward Trend
LMW-10	Vanadium	Mann-Kendall	No Upward Trend
LMW-8	Trichloroethene (-ethylene)	Mann-Kendall	No Upward Trend
LMW-10	Trichloroethene (-ethylene)	Mann-Kendall	No Upward Trend

* Readings only slightly exceed reporting limits. Critical values not exceeded for any well (Group Fail). Results indicate locations where Upward Trends may occur.

** All readings are below the reporting limit; therefore no conclusion can be drawn from the data.

Table 5. Shewhart-CUSUM Statistical Evaluation Results

Monitoring Well	Analyte	Test	Evidence of Contamination
LMW-4	Arsenic	Shewhart-CUSUM	No Evidence
LMW-6	Arsenic	Shewhart-CUSUM	No Evidence
LMW-7	Arsenic	Shewhart-CUSUM	No Evidence
LMW-9	Arsenic	Shewhart-CUSUM	No Evidence
LMW-10	Arsenic	Shewhart-CUSUM	No Evidence
LMW-3	Barium	Shewhart-CUSUM	No Evidence
LMW-6	Barium	Shewhart-CUSUM	Evidence of Contamination
LMW-7	Barium	Shewhart-CUSUM	No Evidence
LMW-8	Barium	Shewhart-CUSUM	No Evidence
LMW-9	Barium	Shewhart-CUSUM	No Evidence
LMW-10	Barium	Shewhart-CUSUM	No Evidence
LMW-6	Cobalt	Shewhart-CUSUM	No Evidence
LMW-7	Cobalt	Shewhart-CUSUM	No Evidence
LMW-9	Cobalt	Shewhart-CUSUM	No Evidence
LMW-3	Copper, total	Shewhart-CUSUM	No Evidence
LMW-6	Copper, total	Shewhart-CUSUM	No Evidence
LMW-7	Copper, total	Shewhart-CUSUM	No Evidence
LMW-8	Copper, total	Shewhart-CUSUM	No Evidence
LMW-9	Copper, total	Shewhart-CUSUM	No Evidence
LMW-6	Vanadium	Shewhart-CUSUM	No Evidence
LMW-7	Vanadium	Shewhart-CUSUM	No Evidence
LMW-8	Vanadium	Shewhart-CUSUM	No Evidence
LMW-9	Vanadium	Shewhart-CUSUM	No Evidence
LMW-10	Vanadium	Shewhart-CUSUM	No Evidence
LMW-8	Trichloroethene (-ethylene)	Shewhart-CUSUM	No Evidence
LMW-10	Trichloroethene (-ethylene)	Shewhart-CUSUM	No Evidence

Attachment A

Statistical Data

Data Available Electronically

Statistical Analysis of Ground-Water Data
Longstreet Road MSW Landfill
Fort Bragg, North Carolina
Rounds N1 through N21

EXECUTIVE SUMMARY

Fort Bragg authorized the U.S. Army Corps of Engineers, Savannah District to perform required sampling of the Longstreet Road Municipal Solid Waste (MSW) Landfill. Sampling activities for the twenty-first round of sampling (N=21) were conducted May 23, 2007. All background and compliance wells were sampled. Ground-water data were statistically analyzed to determine if the mean concentration for each analyte deviated significantly from the mean concentration of the analytes detected in the background well. Appendix II analysis was performed on all ground-water samples collected. The non-parametric Kruskal-Wallis test method was selected as the most appropriate procedure for the analysis of this data set. Any analyte with at least one detection since the beginning of the study was analyzed with the Kruskal Wallis tests.

Appendix II inorganics failing the Kruskal-Wallis test included arsenic chromium and vanadium. Appendix II organic compounds failing the Kruskal-Wallis test included: 1,1,1-trichloroethane, 1,1-dichlorothane, 1,2-dichloropropane, 1,3,5-trimethylbenzene, 1,4-dichlorobenzene, acetone, benzene, chlorobenzene, chloroethane, chloroform, cis-1,2-dichloroethene, dichlorodifluoromethane, diisopropyl ether, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, trichlorofluoromethane, total xylene, and vinyl chloride.

The samples collected at the Longstreet Road Municipal Solid Waste (MSW) Landfill did not exhibit any evidence of contamination or an upward trend in the analytical results with the following exceptions: arsenic data from MW-11 and SW-1. Traditionally, arsenic data for these locations were lower. Additional sampling rounds are required to determine if these fluctuations are due to an upward trend. With the remaining data, the few abnormalities were due to either decreasing or fluctuating concentration. Compliance well concentrations do not vary significantly from background concentrations for any of the other parameters analyzed. Future analytical results will be evaluated using the same procedures.

REGISTERED PROFESSIONAL GEOLOGIST CERTIFICATION

I certify that I am a qualified ground-water scientist who has received a baccalaureate or post graduate degree in the natural sciences or engineering and have sufficient training and experience in ground-water hydrology and related fields as demonstrated by state registration and completion of accredited university courses that enable me to make sound professional judgments regarding ground-water monitoring and contaminant fate and transport. I further certify that this report was prepared by me or by a subordinate working under my direction.

James A. Biddle, P.G.

Reviewed by:

Matthew Delano, P.G.
Chief, Geology/Hydrogeology
and HTRW Design Section

DATE: September, 2007

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Attachment A ..... Statistical Data

1.0 BACKGROUND

Fort Bragg authorized the U.S. Army Corps of Engineers, Savannah District to perform the required sampling of the Longstreet Road MSW Landfill. Sampling activities for the twentieth round of sampling (N=20) were conducted November 18, 2006. The landfill is a Municipal Solid Waste Landfill Facility (MSWLF) located north of Longstreet Road at Fort Bragg in Cumberland County, North Carolina.

A comparison of statistical procedures was performed using this data to determine an adequate statistical analysis for future monitoring at the facility as required. Guidance for determining proper statistical methods was obtained from the EPA guidance document titled: Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities - Interim Final Guidance, April 1989 (herein referenced as the Guidance) and it's addendum Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance, July 1992 (herein referenced as the Addendum). The statistical computer software ChemStat (version 5.0) used for this analysis is based on the guidance documents referenced above.

Factors that were considered in selecting a statistical method include departures from normality, unequal variances, temporal and spatial variability, and the percentage of non-detects. Tests for normality that were considered include Probability Plots, Chi-Squared, Shapiro-Wilk Test, and Shapiro-Francia Test. Statistical analysis procedures considered were parametric Two Sample t-Test and non-parametric Wilcoxin Rank-Sum Test, parametric ANOVA Tests and non-parametric Kruskal-Wallis Test, Tolerance and Prediction Intervals' and Control Charts.

2.0 DETERMINATION OF APPROPRIATE DISTRIBUTION MODEL

A statistical test predicts the average behavior (distribution) of a random variable by comparing the means (normal distribution) or medians (lognormal and non-parametric distributions) of the compliance well data to background well data. Before conducting a statistical analysis, a distributional assumption must be tested to determine whether the data conforms to the assumed distribution.

Prior to testing for significance, the distribution of each parameter is determined to be normal, lognormal, or neither. First, the dataset is used to test the assumption that the distribution is normal. If this assumption is rejected, the same data are log transformed and the hypothesis that the distribution is lognormal is tested. If these assumptions are rejected, it is concluded that the data are neither normally nor lognormally distributed. The data is determined to be non-normal if the distribution of each parameter is determined to be neither normal nor lognormal.

The Shapiro-Francia Test was selected as the main test to determine whether the data conform to the assumed distribution. This test has a good likelihood of distinguishing between the target distribution (normal) and other common distributions (for example, uniform or skewed), and is recommended for data sets with 50 or more samples.

3.0 SELECTION OF STATISTICAL METHOD

The ground-water samples were analyzed for Appendix II organics and inorganics. Monitoring well MW-13 serves as the background well. The eight compliance wells (MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12A and MW-12B) were compared to the background concentrations by means of the applicable statistical procedure. These monitoring wells are listed on Table 1.

Table 1. Ground-Water Monitoring Network

WELL NAME	STATUS
MW-6	**Active - Compliance Monitoring Well**
MW-7	**Active - Compliance Monitoring Well**
MW-8	**Active - Compliance Monitoring Well**
MW-9	**Active - Compliance Monitoring Well**
MW-10	**Active - Compliance Monitoring Well**
MW-11	**Active - Compliance Monitoring Well**
MW-12A	**Active - Compliance Monitoring Well**
MW-12B	**Active - Compliance Monitoring Well**
MW-13	**Active - Compliance Monitoring Well (Background)**

For this report, contamination is described as the difference in average concentrations between the background and compliance sample data. Random variation of the sample results will occur, but this variation does not necessarily represent contamination. The statistical test used for this report will predict the average behavior (distribution) of a random variable by comparing the means (normal) or medians (lognormal and non-parametric) of compliance well data to background data. It tests the hypothesis that all background and compliance wells have the same median concentration of a constituent. If the hypothesis of equal medians is rejected, then additional calculations are required to determine which compliance wells show evidence of contamination.

Different statistical tests are used as appropriate for the different distribution patterns that occur within the data. Prior to testing for statistical significance, the distribution of each parameter was determined to be normal, lognormal, or non-parametric. The Shapiro-Francia Test was selected as the primary test to determine whether the data conform to the assumed distribution. This test has a good likelihood of distinguishing between the target distribution (normal) and other common distributions (for example, uniform or skewed) and is valid for samples with 50 or more observations. The process of choosing the appropriate statistical analyses is illustrated on Figure 1.

The ANOVA Test assumes that there are at least three groups of data (including background), with a minimum of four samples per group. It also assumes that the results are normally or lognormally distributed. This test calculates the F-statistic and its corresponding significance probability. If the computed F-statistic is not significant (less than the tabulated F-statistic), it is concluded that there is no significant difference between the average background

concentration and the average concentrations of compliance wells. If the F-statistic is significant, it is concluded that at least one pair of well groups is probably different. In this case, ANOVA proceeds to make individual comparisons between background and compliance well data to isolate which well(s) show evidence of contamination.

If the data are neither normally nor lognormally distributed, or the fraction of nondetects exceeds 15%, then the non-parametric ANOVA Test is applicable. For this test to be sufficiently sensitive, the sample size for any group must be at least 4. A non-parametric ANOVA can be used in any situation where the parametric analysis of variance can be used. The non-parametric method recommended in the Addendum for non-normal data is the Kruskal-Wallis Test. This test computes the H-statistic, adjusts it for ties, and compares it to the appropriate chi-square critical value. If the H-statistic is less than the critical value, the null-hypothesis is accepted, and it is concluded that there are no differences between median background and compliance well concentrations. If the H-statistic is greater than the critical value, it is concluded that at least one pair of well groups is probably different.

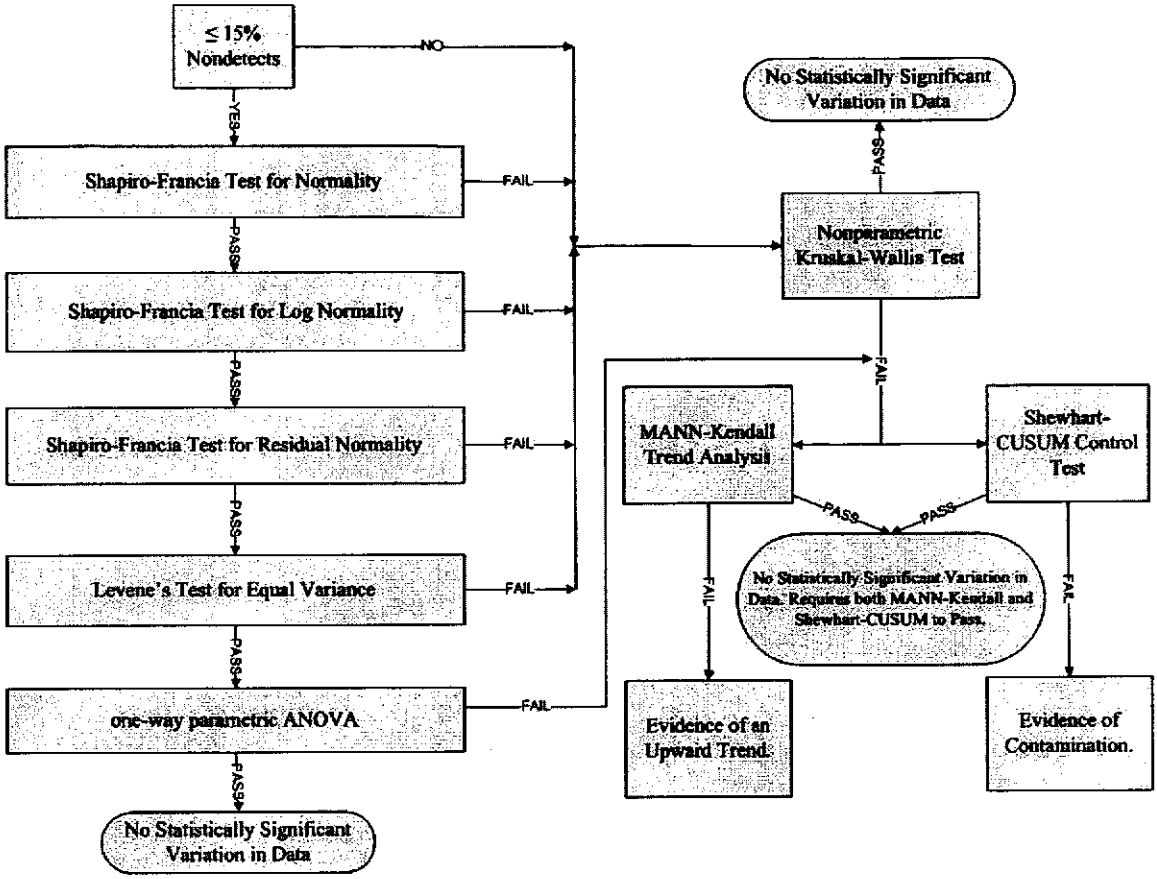
In this case, the Kruskal-Wallis Test performs post-hoc comparisons between background and compliance well data to isolate which well(s) show evidence of contamination. If the difference between the average ranks and the mean background rank of any individual well exceeds the critical difference calculated for that well, then evidence of contamination exists. The only drawback to the non-parametric ANOVA analysis is the dependence on background samples. Fewer background samples will result in an increase of incidence of false positives.

Additional statistical analyzes can help to determine the validity of the positive results. Intra-well comparisons comparing data from a single well to previous data from the same well are performed to determine if a trend of increasing concentration is occurring. The Mann-Kendall Trend Analysis and the Shewhart-CUSUM Control Tests were selected for these additional analyses.

The purpose for the Mann-Kendall Trend Analysis is to determine trends in sets of data. The assumption of the Mann-Kendall Trend Analysis procedure is the idea that, if an increasing trend really exists, the sample taken first from any randomly selected pair of measurements should, on average, have a lower concentration than the measurement collected at a later point. The result for a data set being examined by the Mann-Kendall Trend Analysis is either an upward trend, a downward trend or no trend.

The Shewhart-CUSUM Control Test is a graphical method to assess contamination levels for individual wells. This analysis visually tracks concentrations at a given well over time to determine whether they exceed critical thresholds, thus implying a significant increase over the baseline value. Shewhart-CUSUM Control Tests are very susceptible to false positives. However, the graph is useful in providing a visual indication of changing trends in parameter concentrations.

Figure 1: Flowchart of the Statistical Tests Performed for Each Analyte Detected in Compliance Wells



4.0 FIELD ACTIVITIES

This section describes the procedures that were followed for equipment decontamination, ground-water sampling, quality assurance sampling, preservation, handling, and shipment of samples. All sampling procedures that were used at the landfill are in accordance with EPA, Region IV, *Standard Operating Procedures and Quality Assurance Manual*, Revision 1 (November 2001).

Ground-water samples were collected using a low-flow purge method with a bladder pump. Immediately before purging a well, the static water level below the top of the well casing and the total depth of the well were measured to the nearest 0.01 foot and recorded in the field notebook. The volume of water in the well, including the saturated pore volume (assumed to be 30%) of the sand-packed annulus, was calculated based on the static water level and the well construction information. Well volume calculations were placed in the field notebook. The inlet of the sampling pump was placed at the mid-point of the screened interval. This level was adjusted for wells where the static water level is within the well screen. The monitoring wells were purged using a variable-flow bladder pump at a rate of 500 ml/min or less. Temperature and specific conductance were monitored to ensure the water quality had stabilized to within 10% of the previous reading. Turbidity readings were stabilized at or be lower than 10 Nephelometric Turbidity Units (NTUs). Stabilization occurs with pH measurements when readings remain

constant within 0.1 Standard Units (SU). The rate of pumping was determined and noted in the field notebook. The purge rate was adjusted, as necessary, to avoid purging any well to dryness and to equal the recharge of the aquifer. All sampling equipment was protected from contaminated soil surfaces to prevent contamination of the samples (e.g., equipment may be placed on disposable polyethylene plastic sheeting). Ground-water sampling data (including sample number, location, quantity of water purged, field parameters, site conditions, etc.) were documented in the field notebook.

5.0 RESULTS

Fort Bragg authorized the U.S. Army Corps of Engineers, Savannah District to perform the required sampling of the Longstreet Road MSW Landfill. On November 18, 2006, sampling activities began for the twentieth round of sampling (N=20). All background and compliance wells were sampled. These monitoring wells are listed on Table 1. Ground-water data were statistically analyzed to determine if the mean concentration for each analyte deviates significantly from the mean concentration from the background well. Appendix II analysis was performed on all ground-water samples collected. The non-parametric Kruskal-Wallis test method was selected as the most appropriate procedure for the analysis of this data set. Any analyte with at least one detection since the beginning of the study will be analyzed with Kruskal Wallis test.

The evaluation of ground-water data is according to 15A NC3AC 13B.1634 for detection monitoring systems.

The appendix II inorganics failing the Kruskal-Wallis Test are listed on Table 2. The Kruskal-Wallis Test consists of two parts. First, the analytical results for each detected constituent are compared on a site wide basis. The combined data for these analytes over a site wide basis have enough variation to be considered statistically significant. These analytes are listed as "Group Fail" on Table 2. All monitoring wells which have any detection in the above analytes were further statistically evaluated using the Mann-Kendall Trend Analysis and the Shewhart-CUSUM Control Tests.

The second part of the test compares the critical difference for compliance wells to the background wells to determine if significant evidence of contamination exists. 1,1-dichlorothane, 1,2-dichloropropane, benzene, cis-1,2-dichloroethene, dichlorodifluoromethane, tetrachloroethene, trichloroethene, and vinyl chloride failed the second part of the Kruskal-Wallis test. The monitoring well data that exceeded their critical values for the above analytes are listed on Table 2. All Appendix II inorganic analytes detected are listed on Table 3, and all Appendix II organic analytes detected are listed on Table 4. Tables 3 and 4, located at the end of this report, lists all the Kruskal-Wallis test results including the analytes that passed, failed on a site wide basis (Group Fail), and failed on an individual monitoring well basis.

Table 2. Analytes and Corresponding Wells Which Failed the Kruskal-Wallis Test

Analyte	Monitoring Well
Arsenic, total	Group Fail
Chromium, total	Group Fail
Vanadium, total	Group Fail
1,1,1-Trichloroethane	Group Fail
1,1-Dichloroethane	MW-8, MW-10, MW-11 and MW-12A
1,2-Dichloropropane	MW-10
1,3,5-Trimethylbenzene	Group Fail
1,4-Dichlorobenzene	Group Fail
Acetone	Group Fail
Benzene	MW-11
Chlorobenzene	Group Fail
Chloroethane	Group Fail
Chloroform	Group Fail
cis-1,2-Dichloroethene (-ethylene)	MW-8, MW-10 and MW-11
Dichlorodifluoromethane	MW-11
Diethylphthalate	Group Fail
Diisopropyl ether	Group Fail
Diethylphthalate	Group Fail
Tetrachloroethene	MW-8
trans-1,2-Dichloroethene	Group Fail
Trichlorofluoromethane	Group Fail
Trichloroethene (-ethylene)	MW-8 and MW-11
Xylene, Total	Group Fail
Vinyl chloride	MW-8

Because the analytes listed in Table 2 showed evidence of variation, the following tests were performed: the Mann-Kendall Trend Analysis and the Shewhart-CUSUM Control Tests. The purpose of the Mann-Kendall Trend Analysis is to show evidence of an upward trend. The Shewhart-CUSUM Control Tests determines if evidence of contamination exists. The analytes listed in the previous paragraph which failed the Kruskal-Wallis Test were analyzed using the Mann-Kendall Trend Analysis and Shewhart-CUSUM Control Tests. The results of both tests are listed on Table 5 and Table 6.

False positives in the Mann-Kendall Trend Analysis were also found in the well data for arsenic in MW-8 and MW-9, 1,4-dichlorobenzene in MW-10 and chloroethane in MW-7. The concentrations slightly exceeded the reporting limits. The fluctuations when analyzed with the Kruskal-Wallis test in data were sufficient to indicate a group difference, but insufficient to exceed the critical limits for individual monitoring wells. Due to the low concentrations, addition data is required for these analytes. This location was flagged on Table 5 with a single asterisk. These results are not indications of contamination or an upward trend.

False positives in the Mann-Kendall Trend Analysis were found for the following analytes: chromium, total in MW-12B, 1,1,1-trichloroethane in MW-11, 1,3,5-trimethylbenzene

in MW-11, chloroethane in MW-10, chloroform in MW-9 and MW-11, and trichlorofluoromethane in MW-6. The well data at these locations never exceeded the reporting limits. No statistical determination can be made on data below the reporting limits. These data sets were flagged on Table 5 with a double asterisk. These results are not indications of contamination or an upward trend.

The arsenic data from failed the Kruskal-Wallis Test and is listed in Table 2 as a "Group Failed". All monitoring wells were further analyzed with the Mann-Kendall Trend Analysis and the Shewhart-CUSUM Control Tests. The arsenic data from MW-11 and SW-1 failed both the Mann-Kendall Trend Analysis and the Shewhart-CUSUM Control Tests. Evidence of contamination and an upward trend were found in the arsenic data from these locations. The concentration of arsenic from MW-11 was 25.5 ppb and from SW-1 was 14.0 ppb. Historically, the arsenic results from these locations were lower. These locations will require additional data to determine if this upward trend continues.

6.0 CONCLUSIONS

The samples collected at the Longstreet Road Municipal Solid Waste (MSW) Landfill did not exhibit any evidence of contamination or an upward trend in the analytical results with the following exceptions: arsenic data from MW-11 and SW-1. Traditionally, arsenic data for these locations were lower. Additional sampling rounds are required to determine if these fluctuations are due to an upward trend. With the remaining data, the few abnormalities were due to either decreasing or fluctuating concentration. Compliance well concentrations do not vary significantly from background concentrations for any of the other parameters analyzed. Future analytical results will be evaluated using the same procedures.

7.0 REFERENCES

EPA, Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities - Interim Final Guidance, April 1989.

EPA, Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance, July 1992.

EPA, Region IV, *Standard Operating Procedures and Quality Assurance Manual,* Revision 1, November, 2001.

North Carolina Administrative Code, Title 15A, Department of Environment, Health, and Natural Resources, Division of Solid Waste, Management, Subchapter 13B, Solid Waste Management, Section .1600, January 4, 1994.

Table 3. Statistical Evaluation Results for Appendix II Inorganics

Appendix II Inorganics	% Non-Detect	Normality	Test	Pass/Fail
Antimony, total	98.9%	non-normal	Kruskal-Wallis	Pass
Arsenic, total	69.5%	non-normal	Kruskal-Wallis	Group Fail
Barium, total	62.0%	non-normal	Kruskal-Wallis	Pass
Beryllium, total	99.5%	non-normal	Kruskal-Wallis	Pass
Cadmium, total	85.6%	non-normal	Kruskal-Wallis	Pass
Chromium, total	80.2%	non-normal	Kruskal-Wallis	Group Fail
Cobalt, total	94.7%	non-normal	Kruskal-Wallis	Pass
Copper, total	90.9%	non-normal	Kruskal-Wallis	Pass
Iron	87.4%	non-normal	Kruskal-Wallis	Pass
Lead, total	75.9%	non-normal	Kruskal-Wallis	Pass
Manganese	96.7%	non-normal	Kruskal-Wallis	Pass
Mercury	94.1%	non-normal	Kruskal-Wallis	Pass
Nickel, total	90.9%	non-normal	Kruskal-Wallis	Pass
Selenium, total	88.2%	non-normal	Kruskal-Wallis	Pass
Silver, total	98.9%	non-normal	Kruskal-Wallis	Pass
Thallium, total	98.9%	non-normal	Kruskal-Wallis	Pass
Tin, total	100%	N/A	N/A	N/A
Vanadium	80.2%	non-normal	Kruskal-Wallis	Group Fail
Zinc, total	69.5%	non-normal	Kruskal-Wallis	Pass
Cyanide, total	97.9%	N/A	N/A	N/A
Nitrate	76.0%	non-normal	Kruskal-Wallis	Pass
Nitrate/Nitrite	83.7	non-normal	Kruskal-Wallis	Pass
Nitrite	100%	N/A	N/A	N/A
Sulfide, total	100%	N/A	N/A	N/A

Table 4. Statistical Evaluation Results for Appendix II Organic Compounds

Volatile Organic Compounds	% Non-Detect	Normality	Test	Pass/Fail
1,1,1,2-Tetrachloroethane	100%	N/A	N/A	N/A
1,1,1-Trichloroethane	93.6%	non-normal	Kruskal-Wallis	Group Fail
1,1,2,2-Tetrachloroethane	100%	N/A	N/A	N/A
1,1,2-Trichloroethane	99.5%	non-normal	Kruskal-Wallis	Pass
1,1-Dichloroethane	59.9%	non-normal	Kruskal-Wallis	Failed: MW-8, MW-10, MW-11, MW-12A
1,1-Dichloroethene (-ethylene)	96.3%	non-normal	Kruskal-Wallis	Pass
1,1-Dichloropropene (-propylene)	100%	N/A	N/A	N/A
1,2,3-Trichlorobenzene	100%	N/A	N/A	N/A
1,2,3-Trichloropropane	100%	N/A	N/A	N/A
1,2,4-Trimethylbenzene	97.9%	non-normal	Kruskal-Wallis	Pass
1,2-Dibromo-3-chloropropane; DBCP	100%	N/A	N/A	N/A

Table 4.(Cont) Statistical Evaluation Results for Appendix II Organic Compounds

Volatile Organic Compounds	% Non-Detect	Normality	Test	Pass/Fail
1,2-Dibromoethane; Ethylene dibromide	100%	N/A	N/A	N/A
1,2-Dichlorobenzene	99.5%	non-normal	Kruskal-Wallis	Pass
1,2-Dichloroethane	98.4%	non-normal	Kruskal-Wallis	Pass
1,2-Dichloropropane	89.3%	non-normal	Kruskal-Wallis	Failed: MW-10
1,3,5-Trimethylbenzene	98.4%	non-normal	Kruskal-Wallis	Group Fail
1,3-Dichlorobenzene	100%	N/A	N/A	N/A
1,3-Dichloropropane	100%	N/A	N/A	N/A
1,4-Dichloro-2-butene	100%	N/A	N/A	N/A
1,4-Dichlorobenzene	84.0%	non-normal	Kruskal-Wallis	Group Fail
1-Naphthylamine	100%	N/A	N/A	N/A
2,2-Dichloropropane	100%	N/A	N/A	N/A
2-Butanone (Methyl ethyl ketone)	98.9%	non-normal	Kruskal-Wallis	Pass
2-Chlorotoluene	100%	N/A	N/A	N/A
2-Hexanone	100%	N/A	N/A	N/A
4-Chlorotoluene	100%	N/A	N/A	N/A
4-Isopropyltoluene	100%	N/A	N/A	N/A
4-Methyl-2-Pentanone	100%	N/A	N/A	N/A
Acetone	86.6%	non-normal	Kruskal-Wallis	Group Fail
Acetonitrile; Methyl cyanide	100%	N/A	N/A	N/A
Acrolein	99.5%	non-normal	Kruskal-Wallis	Pass
Acrylonitrile	100%	N/A	N/A	N/A
Benzene	71.7%	non-normal	Kruskal-Wallis	Failed: MW-11
Bromobenzene	100%	N/A	N/A	N/A
Bromochloromethane	99.5%	non-normal	Kruskal-Wallis	Pass
Bromodichloromethane	100%	N/A	N/A	N/A
Bromoform	100%	N/A	N/A	N/A
Bromomethane	100%	N/A	N/A	N/A
Carbon Disulfide	97.3%	non-normal	Kruskal-Wallis	Pass
Carbon tetrachloride	100%	N/A	N/A	N/A
Chlorobenzene	88.8%	non-normal	Kruskal-Wallis	Group Fail
Chloroethane	88.6%	non-normal	Kruskal-Wallis	Group Fail
Chloroform	95.7%	non-normal	Kruskal-Wallis	Group Fail
Chloromethane (Methylchloride)	96.8%	non-normal	Kruskal-Wallis	Pass
Chloroprene	100%	N/A	N/A	N/A
cis-1,2-Dichloroethene (-ethylene)	57.8%	non-normal	Kruskal-Wallis	Failed: MW-8, MW-10, MW-11
cis-1,3-Dichloropropene	99.5%	non-normal	Kruskal-Wallis	Pass
Dibromochloromethane	100%	N/A	N/A	N/A
Dibromomethane	100%	N/A	N/A	N/A
Dichlorodifluoromethane	71.1%	non-normal	Kruskal-Wallis	Failed: MW-11
Diisopropyl ether	97.9%	non-normal	Kruskal-Wallis	Group Fail
Ethyl methacrylate	100%	N/A	N/A	N/A

Table 4.(Cont) Statistical Evaluation Results for Appendix II Organic Compounds

Volatile Organic Compounds	% Non-Detect	Normality	Test	Pass/Fail
Ethylbenzene	100%	N/A	N/A	N/A
Hexachlorobutadiene	100%	N/A	N/A	N/A
Iodomethane	99.5%	non-normal	Kruskal-Wallis	Pass
Isobutyl alcohol	100%	N/A	N/A	N/A
Isopropylbenzene	97.9%	non-normal	Kruskal-Wallis	Pass
Methyl methacrylate	100%	N/A	N/A	N/A
Methylene Chloride	95.7%	non-normal	Kruskal-Wallis	Pass
Methyl-Tert-Butyl Ether	93.6%	non-normal	Kruskal-Wallis	Pass
n-Butylbenzene	100%	N/A	N/A	N/A
n-Propylbenzene	100%	N/A	N/A	N/A
Propionitrile; Ethyl cyanide	100%	N/A	N/A	N/A
Sec-Butylbenzene	98.9%	non-normal	Kruskal-Wallis	Pass
Styrene	100%	N/A	N/A	N/A
Tert-Butylbenzene	100%	N/A	N/A	N/A
Tetrachloroethene (-ethylene)	74.9%	non-normal	Kruskal-Wallis	Failed: MW-8
Toluene	89.8%	non-normal	Kruskal-Wallis	Pass
trans-1,2-Dichloroethene	90.4%	non-normal	Kruskal-Wallis	Group Fail
trans-1,3-Dichloropropene	100%	N/A	N/A	N/A
Trichloroethene (-ethylene)	66.3%	non-normal	Kruskal-Wallis	Failed: MW-8, MW-11
Trichlorofluoromethane	87.2%	non-normal	Kruskal-Wallis	Group Fail
Vinyl acetate	98.4%	non-normal	Kruskal-Wallis	Pass
Vinyl chloride	70.1%	non-normal	Kruskal-Wallis	Failed: MW-8
Xylene, Total	92.5%	non-normal	Kruskal-Wallis	Group Fail
Semi-volatile Organic Compounds	**% Non-Detect**	**Normality**	**Test**	**Pass/Fail**
1,2,4,5-Tetrachlorobenzene	100%	N/A	N/A	N/A
1,2,4-Trichlorobenzene	100%	N/A	N/A	N/A
1,3,5-Trinitrobenzene	100%	N/A	N/A	N/A
1,3-Dinitrobenzene	100%	N/A	N/A	N/A
1,4-Naphthoquinone	100%	N/A	N/A	N/A
2,3,4,6-Tetrachlorophenol	100%	N/A	N/A	N/A
2,4,5-Trichlorophenol	100%	N/A	N/A	N/A
2,4,6-Trichlorophenol	100%	N/A	N/A	N/A
2,4-Dichlorophenol	100%	N/A	N/A	N/A
2,4-Dimethylphenol	100%	N/A	N/A	N/A
2,4-Dinitrophenol	100%	N/A	N/A	N/A
2,4-Dinitrotoluene	100%	N/A	N/A	N/A
2,6-Dichlorophenol	100%	N/A	N/A	N/A
2,6-Dinitrotoluene	100%	N/A	N/A	N/A
2-Acetylaminofluorene; 2-AAF	100%	N/A	N/A	N/A

Table 4.(Cont) Statistical Evaluation Results for Appendix II Organic Compounds

Semi-volatile Organic Compounds	% Non-Detect	Normality	Test	Pass/Fail
2-Chloronaphthalene	100%	N/A	N/A	N/A
2-Chlorophenol	100%	N/A	N/A	N/A
2-Methyl-4,6-Dinitrophenol	100%	N/A	N/A	N/A
2-Methylnaphthalene	100%	N/A	N/A	N/A
2-Methylphenol	100%	N/A	N/A	N/A
2-Naphthylamine	100%	N/A	N/A	N/A
2-Nitroaniline	100%	N/A	N/A	N/A
2-Nitrophenol	100%	N/A	N/A	N/A
3,3'-Dichlorobenzidine	100%	N/A	N/A	N/A
3,3'-Dimethylbenzidine	100%	N/A	N/A	N/A
3-Methylcholanthrene	100%	N/A	N/A	N/A
3-Methylphenol	96.3%	non-normal	Kruskal-Wallis	Pass
3-Nitroaniline	100%	N/A	N/A	N/A
4-Aminobiphenyl	100%	N/A	N/A	N/A
4-Bromophenyl phenyl ether	100%	N/A	N/A	N/A
4-Chloro-3-Methylphenol	100%	N/A	N/A	N/A
4-Chloroaniline	100%	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	100%	N/A	N/A	N/A
4-Methylphenol	97.3%	non-normal	Kruskal-Wallis	Pass
4-Nitroaniline	100%	N/A	N/A	N/A
5-Nitro-o-toluidine	100%	N/A	N/A	N/A
7,12-Dimethylbenzo(a)anthracene	100%	N/A	N/A	N/A
Acenaphthene (1,2-dihydro-acenapthylene)	100%	N/A	N/A	N/A
Acenaphthylene	100%	N/A	N/A	N/A
Acetophenone	100%	N/A	N/A	N/A
Anthracene	100%	N/A	N/A	N/A
Benzo(a)anthracene	100%	N/A	N/A	N/A
Benzo(a)pyrene	100%	N/A	N/A	N/A
Benzo(b)fluoranthene	100%	N/A	N/A	N/A
Benzo(ghi)perylene	100%	N/A	N/A	N/A
Benzo(k)fluoranthene	100%	N/A	N/A	N/A
Benzoic Acid	100%	N/A	N/A	N/A
Benzyl Alcohol	100%	N/A	N/A	N/A
Benzylbutyl phthalate	100%	N/A	N/A	N/A
Bis (2-chloroethoxy) methane	100%	N/A	N/A	N/A
Bis (2-chloroethyl) ether	100%	N/A	N/A	N/A
Bis (2-chloroisopropyl) ether	100%	N/A	N/A	N/A
Bis (2-ethylhexyl) phthalate	97.9%	non-normal	Kruskal-Wallis	Pass
Butyl benzyl phthalate	100%	N/A	N/A	N/A
Carbazole	100%	N/A	N/A	N/A

Table 4.(Cont) Statistical Evaluation Results for Appendix II Organic Compounds

Semi-volatile Organic Compounds	% Non-Detect	Normality	Test	Pass/Fail
Chlorobenzilate	100%	N/A	N/A	N/A
Chrysene	100%	N/A	N/A	N/A
Diallate	100%	N/A	N/A	N/A
Dibenzo(ah)anthracene	100%	N/A	N/A	N/A
Dibenzofuran	100%	N/A	N/A	N/A
Diethylphthalate	95.2%	non-normal	Kruskal-Wallis	Group Fail
Dimethylphthalate	100%	N/A	N/A	N/A
Di-n-Butylphthalate	100%	N/A	N/A	N/A
Di-n-Octylphthalate	100%	N/A	N/A	N/A
Diphenylamine	100%	N/A	N/A	N/A
Ethyl methanesulfonate	100%	N/A	N/A	N/A
Fluoranthene	100%	N/A	N/A	N/A
Fluorene	100%	N/A	N/A	N/A
Hexachlorobenzene	100%	N/A	N/A	N/A
Hexachlorocyclopentadiene	100%	N/A	N/A	N/A
Hexachloroethane	100%	N/A	N/A	N/A
Hexachloropropene	100%	N/A	N/A	N/A
Indeno(123-cd)pyrene	100%	N/A	N/A	N/A
Isodrin	100%	N/A	N/A	N/A
Isophorone	100%	N/A	N/A	N/A
Isosafrole	100%	N/A	N/A	N/A
Kepone	100%	N/A	N/A	N/A
m-Dinitrobenzene	100%	N/A	N/A	N/A
Methapyrilene	100%	N/A	N/A	N/A
Methyl methanesulfonate	100%	N/A	N/A	N/A
Napththalene	100%	N/A	N/A	N/A
Nitrobenzene	100%	N/A	N/A	N/A
N-Nitrosodiethylamine	100%	N/A	N/A	N/A
N-Nitrosodimethylamine	100%	N/A	N/A	N/A
N-Nitroso-di-n-butylamine	100%	N/A	N/A	N/A
N-Nitrosodiphenylamine	100%	N/A	N/A	N/A
N-Nitroso-dipropylamine	100%	N/A	N/A	N/A
N-Nitrosomethylethylamine	100%	N/A	N/A	N/A
N-Nitroso-N-dipropylamine	100%	N/A	N/A	N/A
N-Nitrosopiperidine	100%	N/A	N/A	N/A
N-Nitrosopyrrolidine	100%	N/A	N/A	N/A
0,0,0-Triethyl phosphorothioate	100%	N/A	N/A	N/A
p-Dimethylaminoazobenzene	100%	N/A	N/A	N/A
Pentachlorobenzene	100%	N/A	N/A	N/A
Pentachloronitrobenzene	100%	N/A	N/A	N/A
Phenacetin	100%	N/A	N/A	N/A
Phenanthrene	100%	N/A	N/A	N/A

Table 4.(Cont) Statistical Evaluation Results for Appendix II Organic Compounds

Semi-volatile Organic Compounds	% Non-Detect	Normality	Test	Pass/Fail
Phenol	99.0%	non-normal	Kruskal-Wallis	Pass
p-Phenylenediamine	100%	N/A	N/A	N/A
Pronamide	100%	N/A	N/A	N/A
Pyrene	100%	N/A	N/A	N/A
Safrole	100%	N/A	N/A	N/A
Thionazin	100%	N/A	N/A	N/A
Organochlorine Pesticides	**% Non-Detect**	**Normality**	**Test**	**Pass/Fail**
Aldrin	97.9%	non-normal	Kruskal-Wallis	Pass
BHC, alpha	100%	N/A	N/A	N/A
BHC, beta	98.9%	non-normal	Kruskal-Wallis	Pass
BHC, delta	99.5%	non-normal	Kruskal-Wallis	Pass
BHC, gamma (Lindane; 1,2,3,4,5,6-Cl Cyclohexa	100%	N/A	N/A	N/A
Chlordane	97.9%	non-normal	Kruskal-Wallis	Pass
DDD	100%	N/A	N/A	N/A
DDE	100%	N/A	N/A	N/A
DDT or p,p'-DDT or 4,4'-DDT	100%	N/A	N/A	N/A
Dieldrin	98.9%	non-normal	Kruskal-Wallis	Pass
Endosulfan I	99.5%	non-normal	Kruskal-Wallis	Pass
Endosulfan II	100%	N/A	N/A	N/A
Endosulfan sulfate	100%	N/A	N/A	N/A
Endrin	100%	N/A	N/A	N/A
Endrin aldehyde	100%	N/A	N/A	N/A
Heptachlor	98.4%	non-normal	Kruskal-Wallis	Pass
Heptachlor epoxide	100%	N/A	N/A	N/A
Methoxychlor	100%	N/A	N/A	N/A
Toxaphene	100%	N/A	N/A	N/A
Polychlorinated Biphenyls	**% Non-Detect**	**Normality**	**Test**	**Pass/Fail**
PCB: Aroclor 1016	100%	N/A	N/A	N/A
PCB: Aroclor 1221	100%	N/A	N/A	N/A
PCB: Aroclor 1232	100%	N/A	N/A	N/A
PCB: Aroclor 1242	100%	N/A	N/A	N/A
PCB: Aroclor 1248	100%	N/A	N/A	N/A
PCB: Aroclor 1254	100%	N/A	N/A	N/A
PCB: Aroclor 1260	100%	N/A	N/A	N/A

Table 4.(Cont) Statistical Evaluation Results for Appendix II Organic Compounds

Organophosphorous Pesticides	% Non-Detect	Normality	Test	Pass/Fail
Atrazine	100%	N/A	N/A	N/A
Azinphos ethyl	100%	N/A	N/A	N/A
Azinphos methyl	100%	N/A	N/A	N/A
Bolstar (Sulprofor)	100%	N/A	N/A	N/A
Carbophenothion	100%	N/A	N/A	N/A
Chlorfenvinphos	100%	N/A	N/A	N/A
Clorpyrifos	100%	N/A	N/A	N/A
Coumaphos	100%	N/A	N/A	N/A
Demeton-o	100%	N/A	N/A	N/A
Demeton-s	100%	N/A	N/A	N/A
Diazinon	99.5%	non-normal	Kruskal-Wallis	Pass
Dichorvos	100%	N/A	N/A	N/A
Dimethoate	100%	N/A	N/A	N/A
Dioxathion	100%	N/A	N/A	N/A
Disulfoton	99.5%	non-normal	Kruskal-Wallis	Pass
EPN	100%	N/A	N/A	N/A
Ethion	100%	N/A	N/A	N/A
Ethoprop	100%	N/A	N/A	N/A
Famphur	100%	N/A	N/A	N/A
Fensulfothion	100%	N/A	N/A	N/A
Fenthion	100%	N/A	N/A	N/A
Leptophos	100%	N/A	N/A	N/A
Malathion	100%	N/A	N/A	N/A
Merphos	100%	N/A	N/A	N/A
Methyl parathion; Parathion methyl	100%	N/A	N/A	N/A
Mevinphos (Phosdrin)	100%	N/A	N/A	N/A
Monocrotophos	100%	N/A	N/A	N/A
Naled	100%	N/A	N/A	N/A
Parathion	100%	N/A	N/A	N/A
Phorate	100%	N/A	N/A	N/A
Phosmet	100%	N/A	N/A	N/A
Phosphamidon	100%	N/A	N/A	N/A
Ronnel	100%	N/A	N/A	N/A
Sulfotepp	100%	N/A	N/A	N/A
Terbufos	100%	N/A	N/A	N/A
Tetrachlorovinphos (Stirphos)	100%	N/A	N/A	N/A
Tetraethyl pyrophosphate	100%	N/A	N/A	N/A
Tokuthion (Prothiofos)	100%	N/A	N/A	N/A
Trichloronate	100%	N/A	N/A	N/A
Tri-o-cresylphosphate	100%	N/A	N/A	N/A

Table 4.(Cont) Statistical Evaluation Results for Appendix II Organic Compounds

Chlorinated Herbicides	% Non-Detect	Normality	Test	Pass/Fail
2,4,5-T;2,4,5-Trichlorophenoxyacetic acid	100%	N/A	N/A	N/A
2,4,5-Trichlor-phenoxypropionic acid	100%	N/A	N/A	N/A
2,4-Dichlorophenoxyacetic acid	100%	N/A	N/A	N/A
3,5-Dichlorobenzoic acid	100%	N/A	N/A	N/A
4-Nitrophenol	100%	N/A	N/A	N/A
Acifluoren	100%	N/A	N/A	N/A
Bentazon	100%	N/A	N/A	N/A
Dalapon	100%	N/A	N/A	N/A
Dicamba	100%	N/A	N/A	N/A
Dichloroprop	100%	N/A	N/A	N/A
Dinoseb;DNBP;2-sec-Butyl-4,6-dinitrophenol	100%	N/A	N/A	N/A
MCPA	100%	N/A	N/A	N/A
MCPP	100%	N/A	N/A	N/A
Pentachlorophenol	100%	N/A	N/A	N/A
Picloram	100%	N/A	N/A	N/A

Table 5. Mann-Kendall Statistical Evaluation Results

Monitoring Well	Analyte	Test	Trend
MW-6	Arsenic, total	Mann-Kendall	No Upward Trend
MW-7	Arsenic, total	Mann-Kendall	No Upward Trend
MW-8	Arsenic, total	Mann-Kendall	No Upward Trend*
MW-9	Arsenic, total	Mann-Kendall	No Upward Trend*
MW-10	Arsenic, total	Mann-Kendall	No Upward Trend
MW-11	Arsenic, total	Mann-Kendall	Upward Trend
MW-12A	Arsenic, total	Mann-Kendall	No Upward Trend
MW-12B	Arsenic, total	Mann-Kendall	No Upward Trend
SW-1	Arsenic, total	Mann-Kendall	Upward Trend
SW-2	Arsenic, total	Mann-Kendall	No Upward Trend
MW-6	Chromium, total	Mann-Kendall	No Upward Trend*
MW-7	Chromium, total	Mann-Kendall	No Upward Trend
MW-8	Chromium, total	Mann-Kendall	No Upward Trend
MW-9	Chromium, total	Mann-Kendall	No Upward Trend
MW-10	Chromium, total	Mann-Kendall	No Upward Trend
MW-11	Chromium, total	Mann-Kendall	No Upward Trend
MW-12A	Chromium, total	Mann-Kendall	No Upward Trend
MW-12B	Chromium, total	Mann-Kendall	No Upward Trend**
MW-6	Vanadium, total	Mann-Kendall	No Upward Trend
MW-7	Vanadium, total	Mann-Kendall	No Upward Trend
MW-8	Vanadium, total	Mann-Kendall	No Upward Trend
MW-9	Vanadium, total	Mann-Kendall	No Upward Trend
MW-10	Vanadium, total	Mann-Kendall	No Upward Trend
MW-11	Vanadium, total	Mann-Kendall	No Upward Trend
MW-12A	Vanadium, total	Mann-Kendall	No Upward Trend
MW-12B	Vanadium, total	Mann-Kendall	No Upward Trend
SW-1	Vanadium, total	Mann-Kendall	No Upward Trend
MW-7	1,1,1-Trichloroethane	Mann-Kendall	No Upward Trend
MW-8	1,1,1-Trichloroethane	Mann-Kendall	No Upward Trend
MW-9	1,1,1-Trichloroethane	Mann-Kendall	No Upward Trend
MW-11	1,1,1-Trichloroethane	Mann-Kendall	No Upward Trend**
MW-8	1,1-Dichloroethane	Mann-Kendall	No Upward Trend
MW-10	1,1-Dichloroethane	Mann-Kendall	No Upward Trend
MW-11	1,1-Dichloroethane	Mann-Kendall	No Upward Trend
MW-12A	1,1-Dichloroethane	Mann-Kendall	No Upward Trend
MW-10	1,2-Dichloropropane	Mann-Kendall	No Upward Trend
MW-11	1,3,5-Trimethylbenzene	Mann-Kendall	No Upward Trend**
MW-9	1,4-Dichlorobenzene	Mann-Kendall	No Upward Trend
MW-10	1,4-Dichlorobenzene	Mann-Kendall	No Upward Trend*
MW-11	1,4-Dichlorobenzene	Mann-Kendall	No Upward Trend
MW-12A	1,4-Dichlorobenzene	Mann-Kendall	No Upward Trend
MW-12B	1,4-Dichlorobenzene	Mann-Kendall	No Upward Trend
SW-1	1,4-Dichlorobenzene	Mann-Kendall	No Upward Trend
SW-2	1,4-Dichlorobenzene	Mann-Kendall	No Upward Trend

* Readings only slightly exceed reporting limits. Critical values not exceeded for any well (Group Fail). Results indicate locations where Upward Trends may occur.

** All readings are below the reporting limit; therefore no conclusion can be drawn from the data.

Table 5.(Cont) Mann-Kendall Statistical Evaluation Results

Monitoring Well	Analyte	Test	Trend
MW-6	Acetone	Mann-Kendall	No Upward Trend
MW-7	Acetone	Mann-Kendall	No Upward Trend
MW-8	Acetone	Mann-Kendall	No Upward Trend
MW-9	Acetone	Mann-Kendall	No Upward Trend
MW-10	Acetone	Mann-Kendall	No Upward Trend
MW-11	Acetone	Mann-Kendall	No Upward Trend
SW-2	Acetone	Mann-Kendall	No Upward Trend
MW-11	Benzene	Mann-Kendall	No Upward Trend
MW-8	Chlorobenzene	Mann-Kendall	No Upward Trend
MW-9	Chlorobenzene	Mann-Kendall	No Upward Trend
MW-10	Chlorobenzene	Mann-Kendall	No Upward Trend
MW-12A	Chlorobenzene	Mann-Kendall	No Upward Trend
MW-12B	Chlorobenzene	Mann-Kendall	No Upward Trend
SW-1	Chlorobenzene	Mann-Kendall	No Upward Trend
MW-7	Chloroethane	Mann-Kendall	No Upward Trend**
MW-8	Chloroethane	Mann-Kendall	No Upward Trend
MW-10	Chloroethane	Mann-Kendall	No Upward Trend*
MW-11	Chloroethane	Mann-Kendall	No Upward Trend
MW-12B	Chloroethane	Mann-Kendall	No Upward Trend
SW-1	Chloroethane	Mann-Kendall	No Upward Trend
MW-6	Chloroform	Mann-Kendall	No Upward Trend
MW-9	Chloroform	Mann-Kendall	No Upward Trend**
MW-11	Chloroform	Mann-Kendall	No Upward Trend**
MW-8	cis-1,2-Dichloroethene (-ethylene)	Mann-Kendall	No Upward Trend
MW-10	cis-1,2-Dichloroethene (-ethylene)	Mann-Kendall	No Upward Trend
MW-11	cis-1,2-Dichloroethene (-ethylene)	Mann-Kendall	No Upward Trend
MW-11	Dichlorodifluoromethane	Mann-Kendall	No Upward Trend
MW-8	Diethylphthalate	Mann-Kendall	No Upward Trend
MW-9	Diethylphthalate	Mann-Kendall	No Upward Trend
MW-12A	Diethylphthalate	Mann-Kendall	No Upward Trend
MW-12B	Diethylphthalate	Mann-Kendall	No Upward Trend
SW-1	Diethylphthalate	Mann-Kendall	No Upward Trend
MW-10	Diisopropyl ether	Mann-Kendall	No Upward Trend
MW-8	Tetrachloroethene (-ethylene)	Mann-Kendall	No Upward Trend
MW-8	trans-1,2-Dichloroethene	Mann-Kendall	No Upward Trend
MW-10	trans-1,2-Dichloroethene	Mann-Kendall	No Upward Trend
MW-11	trans-1,2-Dichloroethene	Mann-Kendall	No Upward Trend
MW-12B	trans-1,2-Dichloroethene	Mann-Kendall	No Upward Trend
SW-1	trans-1,2-Dichloroethene	Mann-Kendall	No Upward Trend
MW-8	Trichloroethene (-ethylene)	Mann-Kendall	No Upward Trend
MW-11	Trichloroethene (-ethylene)	Mann-Kendall	No Upward Trend
MW-6	Trichlorofluoromethane	Mann-Kendall	No Upward Trend**
MW-7	Trichlorofluoromethane	Mann-Kendall	No Upward Trend

* Readings only slightly exceed reporting limits. Critical values not exceeded for any well (Group Fail). Results indicate locations where Upward Trends may occur.

** All readings are below the reporting limit; therefore no conclusion can be drawn from the data.

Table 5.(Cont) Mann-Kendall Statistical Evaluation Results

Monitoring Well	Analyte	Test	Trend
MW-8	Trichlorofluoromethane	Mann-Kendall	No Upward Trend
MW-9	Trichlorofluoromethane	Mann-Kendall	No Upward Trend
MW-11	Trichlorofluoromethane	Mann-Kendall	No Upward Trend
SW-1	Trichlorofluoromethane	Mann-Kendall	No Upward Trend
MW-8	Vinyl chloride	Mann-Kendall	No Upward Trend
MW-8	Xylene, Total	Mann-Kendall	No Upward Trend
MW-11	Xylene, Total	Mann-Kendall	No Upward Trend

* Readings only slightly exceed reporting limits. Critical values not exceeded for any well (Group Fail). Results indicate locations where Upward Trends may occur.

** All readings are below the reporting limit; therefore no conclusion can be drawn from the data.

Table 6. Shewhart-CUSUM Statistical Evaluation Results

Monitoring Well	Analyte	Test	Evidence of Contamination
MW-6	Arsenic, total	Shewhart-CUSUM	No Evidence
MW-7	Arsenic, total	Shewhart-CUSUM	No Evidence
MW-8	Arsenic, total	Shewhart-CUSUM	No Evidence
MW-9	Arsenic, total	Shewhart-CUSUM	No Evidence
MW-10	Arsenic, total	Shewhart-CUSUM	No Evidence
MW-11	Arsenic, total	Shewhart-CUSUM	Evidence of Contamination
MW-12A	Arsenic, total	Shewhart-CUSUM	No Evidence
MW-12B	Arsenic, total	Shewhart-CUSUM	No Evidence
SW-1	Arsenic, total	Shewhart-CUSUM	Evidence of Contamination
SW-2	Arsenic, total	Shewhart-CUSUM	No Evidence
MW-6	Chromium	Shewhart-CUSUM	No Evidence
MW-7	Chromium	Shewhart-CUSUM	No Evidence
MW-8	Chromium	Shewhart-CUSUM	No Evidence
MW-9	Chromium	Shewhart-CUSUM	No Evidence
MW-10	Chromium	Shewhart-CUSUM	No Evidence
MW-11	Chromium	Shewhart-CUSUM	No Evidence
MW-12A	Chromium	Shewhart-CUSUM	No Evidence
MW-12B	Chromium	Shewhart-CUSUM	No Evidence
MW-6	Vanadium	Shewhart-CUSUM	No Evidence
MW-7	Vanadium	Shewhart-CUSUM	No Evidence
MW-8	Vanadium	Shewhart-CUSUM	No Evidence
MW-9	Vanadium	Shewhart-CUSUM	No Evidence
MW-10	Vanadium	Shewhart-CUSUM	No Evidence
MW-11	Vanadium	Shewhart-CUSUM	No Evidence
MW-12A	Vanadium	Shewhart-CUSUM	No Evidence
MW-12B	Vanadium	Shewhart-CUSUM	No Evidence

Table 6.(Cont) Shewhart-CUSUM Statistical Evaluation Results

Monitoring Well	Analyte	Test	Evidence of Contamination
SW-1	Vanadium	Shewhart-CUSUM	No Evidence
MW-7	1,1,1-Trichloroethane	Shewhart-CUSUM	No Evidence
MW-8	1,1,1-Trichloroethane	Shewhart-CUSUM	No Evidence
MW-9	1,1,1-Trichloroethane	Shewhart-CUSUM	No Evidence
MW-11	1,1,1-Trichloroethane	Shewhart-CUSUM	No Evidence
MW-8	1,1-Dichloroethane	Shewhart-CUSUM	No Evidence
MW-10	1,1-Dichloroethane	Shewhart-CUSUM	No Evidence
MW-11	1,1-Dichloroethane	Shewhart-CUSUM	No Evidence
MW-12A	1,1-Dichloroethane	Shewhart-CUSUM	No Evidence
MW-10	1,2-Dichloropropane	Shewhart-CUSUM	No Evidence
MW-11	1,3,5-Trimethylbenzene	Shewhart-CUSUM	No Evidence
MW-9	1,4-Dichlorobenzene	Shewhart-CUSUM	No Evidence
MW-10	1,4-Dichlorobenzene	Shewhart-CUSUM	No Evidence
MW-11	1,4-Dichlorobenzene	Shewhart-CUSUM	No Evidence
MW-12A	1,4-Dichlorobenzene	Shewhart-CUSUM	No Evidence
MW-12B	1,4-Dichlorobenzene	Shewhart-CUSUM	No Evidence
SW-1	1,4-Dichlorobenzene	Shewhart-CUSUM	No Evidence
SW-2	1,4-Dichlorobenzene	Shewhart-CUSUM	No Evidence
MW-6	Acetone	Shewhart-CUSUM	No Evidence
MW-7	Acetone	Shewhart-CUSUM	No Evidence
MW-8	Acetone	Shewhart-CUSUM	No Evidence
MW-9	Acetone	Shewhart-CUSUM	No Evidence
MW-10	Acetone	Shewhart-CUSUM	No Evidence
MW-11	Acetone	Shewhart-CUSUM	No Evidence
SW-2	Acetone	Shewhart-CUSUM	No Evidence
MW-11	Benzene	Shewhart-CUSUM	No Evidence
MW-8	Chlorobenzene	Shewhart-CUSUM	No Evidence
MW-9	Chlorobenzene	Shewhart-CUSUM	No Evidence
MW-10	Chlorobenzene	Shewhart-CUSUM	No Evidence
MW-12A	Chlorobenzene	Shewhart-CUSUM	No Evidence
MW-12B	Chlorobenzene	Shewhart-CUSUM	No Evidence
SW-1	Chlorobenzene	Shewhart-CUSUM	No Evidence
MW-7	Chloroethane	Shewhart-CUSUM	No Evidence
MW-8	Chloroethane	Shewhart-CUSUM	No Evidence
MW-10	Chloroethane	Shewhart-CUSUM	No Evidence
MW-11	Chloroethane	Shewhart-CUSUM	No Evidence
MW-12B	Chloroethane	Shewhart-CUSUM	No Evidence
SW-1	Chloroethane	Shewhart-CUSUM	No Evidence
MW-6	Chloroform	Shewhart-CUSUM	No Evidence
MW-9	Chloroform	Shewhart-CUSUM	No Evidence
MW-11	Chloroform	Shewhart-CUSUM	No Evidence
MW-8	cis-1,2-Dichloroethene (-ethylene)	Shewhart-CUSUM	No Evidence

Table 6.(Cont) Shewhart-CUSUM Statistical Evaluation Results

Monitoring Well	Analyte	Test	Evidence of Contamination
MW-10	cis-1,2-Dichloroethene (-ethylene)	Shewhart-CUSUM	No Evidence
MW-11	cis-1,2-Dichloroethene (-ethylene)	Shewhart-CUSUM	No Evidence
MW-11	Dichlorodifluoromethane	Shewhart-CUSUM	No Evidence
MW-8	Diethylphthalate	Shewhart-CUSUM	No Evidence
MW-9	Diethylphthalate	Shewhart-CUSUM	No Evidence
MW-12A	Diethylphthalate	Shewhart-CUSUM	No Evidence
MW-12B	Diethylphthalate	Shewhart-CUSUM	No Evidence
SW-1	Diethylphthalate	Shewhart-CUSUM	No Evidence
MW-10	Diisopropyl ether	Shewhart-CUSUM	No Evidence
MW-8	Tetrachloroethene (-ethylene)	Shewhart-CUSUM	No Evidence
MW-8	trans-1,2-Dichloroethene	Shewhart-CUSUM	No Evidence
MW-10	trans-1,2-Dichloroethene	Shewhart-CUSUM	No Evidence
MW-11	trans-1,2-Dichloroethene	Shewhart-CUSUM	No Evidence
MW-12B	trans-1,2-Dichloroethene	Shewhart-CUSUM	No Evidence
SW-1	trans-1,2-Dichloroethene	Shewhart-CUSUM	No Evidence
MW-8	Trichloroethene (-ethylene)	Shewhart-CUSUM	No Evidence
MW-11	Trichloroethene (-ethylene)	Shewhart-CUSUM	No Evidence
MW-6	Trichlorofluoromethane	Shewhart-CUSUM	No Evidence
MW-7	Trichlorofluoromethane	Shewhart-CUSUM	No Evidence
MW-8	Trichlorofluoromethane	Shewhart-CUSUM	No Evidence
MW-9	Trichlorofluoromethane	Shewhart-CUSUM	No Evidence
MW-11	Trichlorofluoromethane	Shewhart-CUSUM	No Evidence
SW-1	Trichlorofluoromethane	Shewhart-CUSUM	No Evidence
MW-8	Vinyl chloride	Shewhart-CUSUM	No Evidence
MW-8	Xylene, Total	Shewhart-CUSUM	No Evidence
MW-11	Xylene, Total	Shewhart-CUSUM	No Evidence

Attachment A

Statistical Data

Data Available Electronically