Appendix A

Final
Structural Geology Investigation of Landfill No. 3, Parcel 80(6), and Vicinity Fort McClellan Calhoun County, Alabama

Prepared for:

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Task Order CK04/CK09
Contract No. DACA21-96-D-0018
IT Project No. 796886

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List of Acronyms

See Attachment 1 of the Work Plan – List of Abbreviations and Acronyms

A1.0 Introduction

The U.S. Army is conducting studies of the environmental impact of suspected contaminants at Fort McClellan (FTMC), Alabama, under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE has contracted IT Corporation (IT) to perform a structural geology investigation of Landfill No. 3, Parcel 80(6), and vicinity, under Task Order CK09, Contract Number DACA21-96-D-0018. Landfill No. 3 is located near the northwestern corner of the Main Post of FTMC (Figure A1-1).

A1.1 Purpose

The purpose of the structural geology investigation was to evaluate the potential influence bedrock structure may have on the groundwater flow direction and contaminant movement in the vicinity of the landfill. Results from the investigation will be used to aid in placement of groundwater monitoring wells.

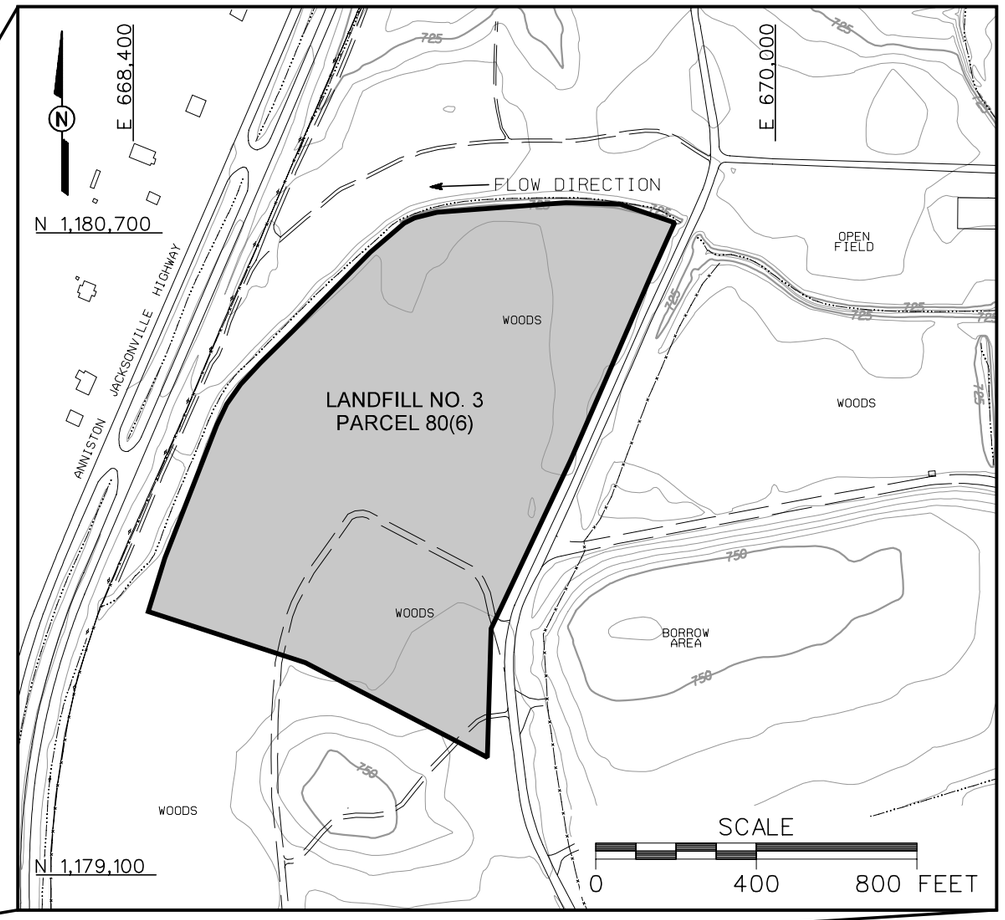
A1.2 Scope of Work

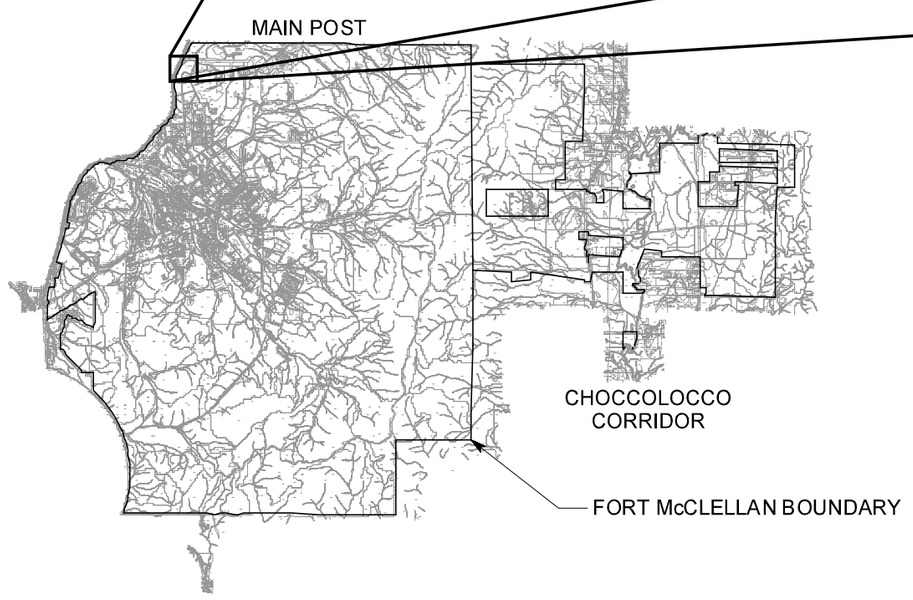
Three borings ranging in depth from 228 to 282 feet were drilled to acquire bedrock cores. The spatial distribution of the borings was staggered to obtain optimum information on local dip and bedrock structure. The Boart Longyear Company was contracted to collect continuous residuum and bedrock cores. Century Geophysical Corporation was contracted to log the bedrock portions of the three borings using borehole geophysical methods.

A1.3 Geologic and Structural Setting

A1.3.1 Regional Geologic and Structural Setting

FTMC lies within the eastern part of the Southern Appalachian fold-and-thrust belt (Valley and Ridge Province). This belt consists of a sequence of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted towards the northwest, resulting in a series of stacked thrust sheets. Bedrock in the vicinity of FTMC consists of Cambrian and Ordovician age units. The thrust faults dip southeastward, with major structures and faults striking in a northeast-southwest direction. Within an individual thrust sheet, smaller faults may splay off the larger thrust that bounds the lower surface of the thrust sheet, resulting in the imbricate stacking of the rock units. Geologic contacts in the region generally strike parallel to the faults, and repetition of lithologic units may occur in vertical sequences (Osborne and Szabo, 1984).





LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE

FIGURE A1-1
SITE LOCATION MAP
LANDFILL NO. 3
PARCEL 80(6)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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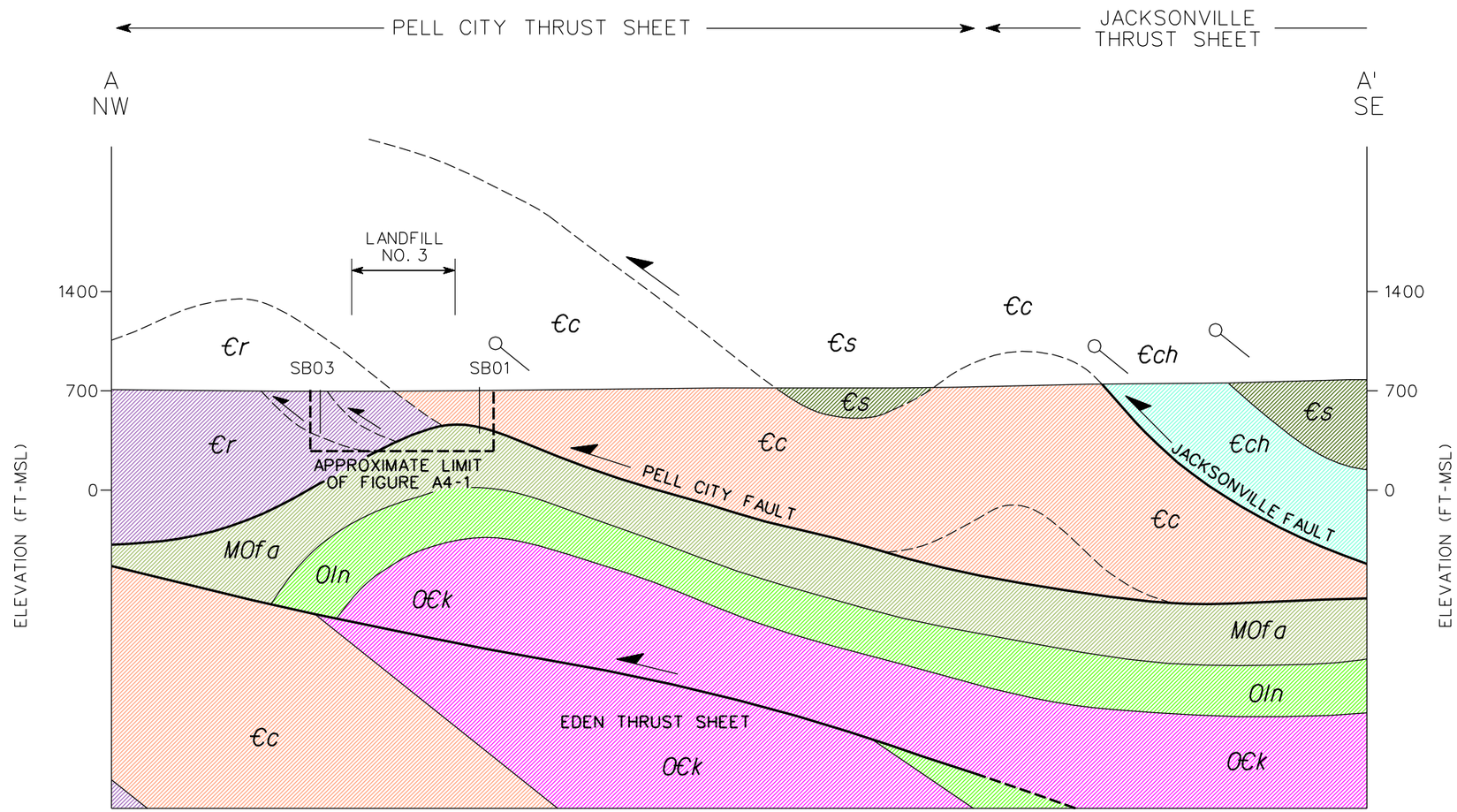
The Jacksonville and Pell City Thrust Faults are the most significant structural features in the FTMC area, by virtue of their influence both on stratigraphic position of units and on regional water supply. The Jacksonville Thrust Fault is interpreted as a major splay of the Pell City Fault. Exposures of the Jacksonville Thrust Fault are rare, due to deep weathering and thick colluvium accumulation. The Jacksonville Thrust Fault contact has been observed, however, in an excavated trench on the south side of Reservoir Ridge at FTMC. Here the fault zone is represented by a 6-foot interval of brecciated shale and mudstone in thrust contact with colluvium of older, overriding beds.

A regional, northwest-southeast cross section, which crosses Landfill No. 3, was constructed for the northern portion of the FTMC area (Figure A1-2). The cross section location is shown on Figure A1-3. Surface dips reported by Osborne and Szabo (1984) and general information from the borings drilled in the area were utilized in the construction of the cross section. The thrust faults are assumed to dip at 30 to 40 degrees to the southeast. The Jacksonville thrust is considered a footwall imbricate splay of the Pell City Fault because the Jacksonville thrust sheet carries younger rocks.

A1.3.2 Local Geologic and Structural Setting

As shown in Figure A1-2, Landfill No. 3 is located on the footwall block of the Jacksonville Thrust Fault on the Pell City thrust sheet, with the contact between the Rome and the Cambrian Conasauga Formations bisecting the site. The site is situated approximately 1 mile to the northwest of the trace of the Jacksonville Thrust Fault and approximately 0.6 mile to the north of an eroded window, or fenster, (FTMC window) in the Pell City thrust sheet. Osborne and Szabo (1984) interpret that the trace of the Pell City Fault delineates the southeastern edge of the Pell City thrust sheet and frames the northwestern edge of the Ordovician geologic window on the Main Post of FTMC. The leading edge of the Pell City thrust sheet (as delineated by the Pell City Fault) is located over 5,000 feet northwest of Landfill No. 3. There is little information regarding the structure of the Pell City Fault in the vicinity of FTMC.

Osborne and Szabo (1984) mapped the surface residuum at the site as being developed on the Rome Formation, with a narrow band of the Conasauga Formation present to the east (Figure A1-3). Only residuum and/or fill is present at the surface of the landfill, so that direct confirmation of the Rome by examination of outcrops cannot be made. However, two



LEGEND

MOfa	MISSISSIPPIAN-ORDOVICIAN FLOYD AND ATHENS SHALE
Oln	LITTLE OAK AND NEWALA LIMESTONE
O€k	KNOX GROUP
€c	CONASAUGA FORMATION
€r	ROME FORMATION
€s	SHADY DOLOMITE
€ch	CHILHOWEE GROUP
	MEASURED FORMATION DIP
	RELATIVE MOVEMENT OF THRUST FAULT

NOTE:

LOCATION OF CROSS SECTION A-A' IS SHOWN ON FIGURE A1-3.

SCALE

0 1000 2000 FEET

FIGURE A1-2
GENERALIZED REGIONAL CROSS SECTION
LANDFILL NO.3
PARCEL 80(6)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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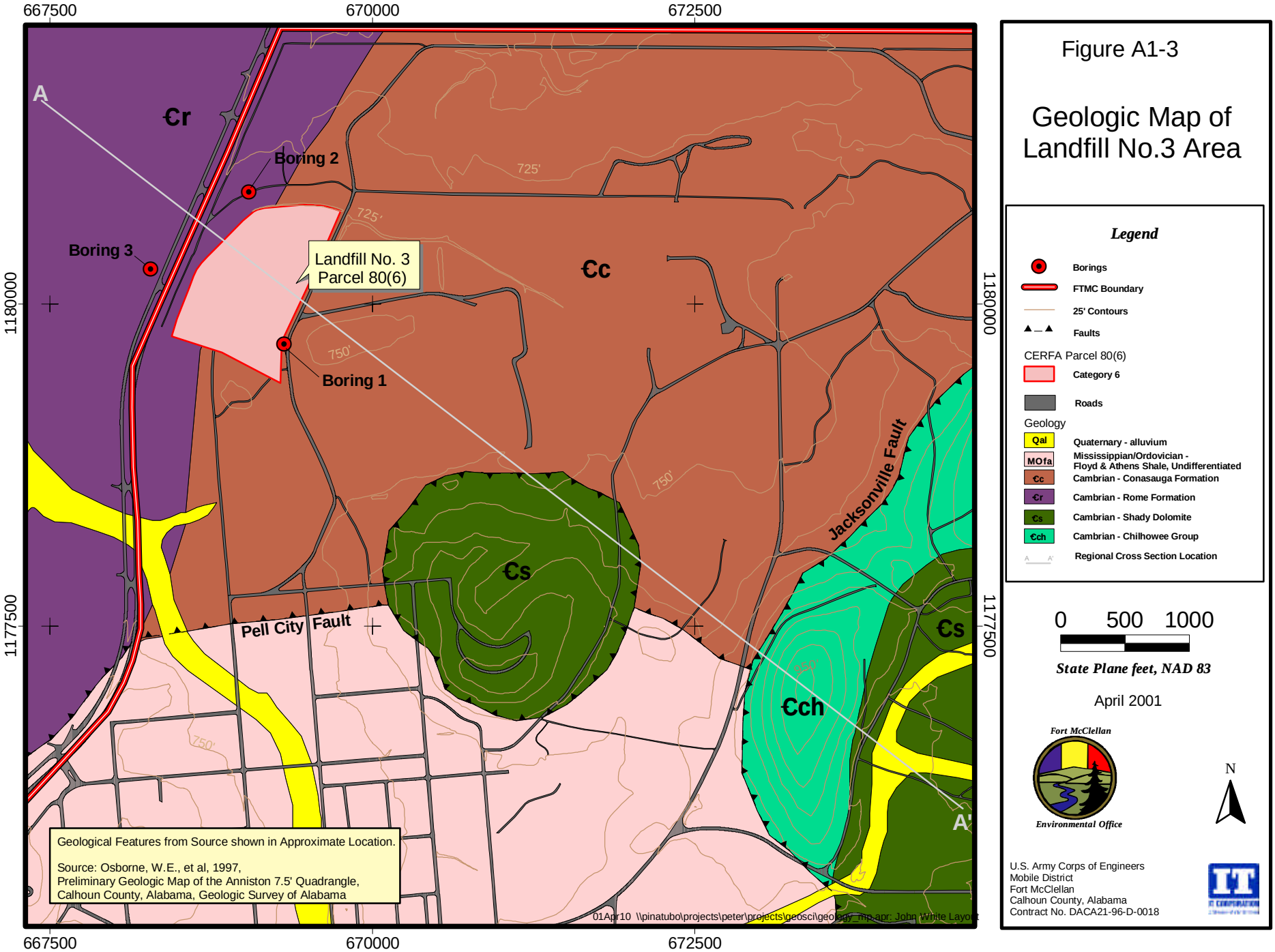


Figure A1-3

Geologic Map of Landfill No.3 Area

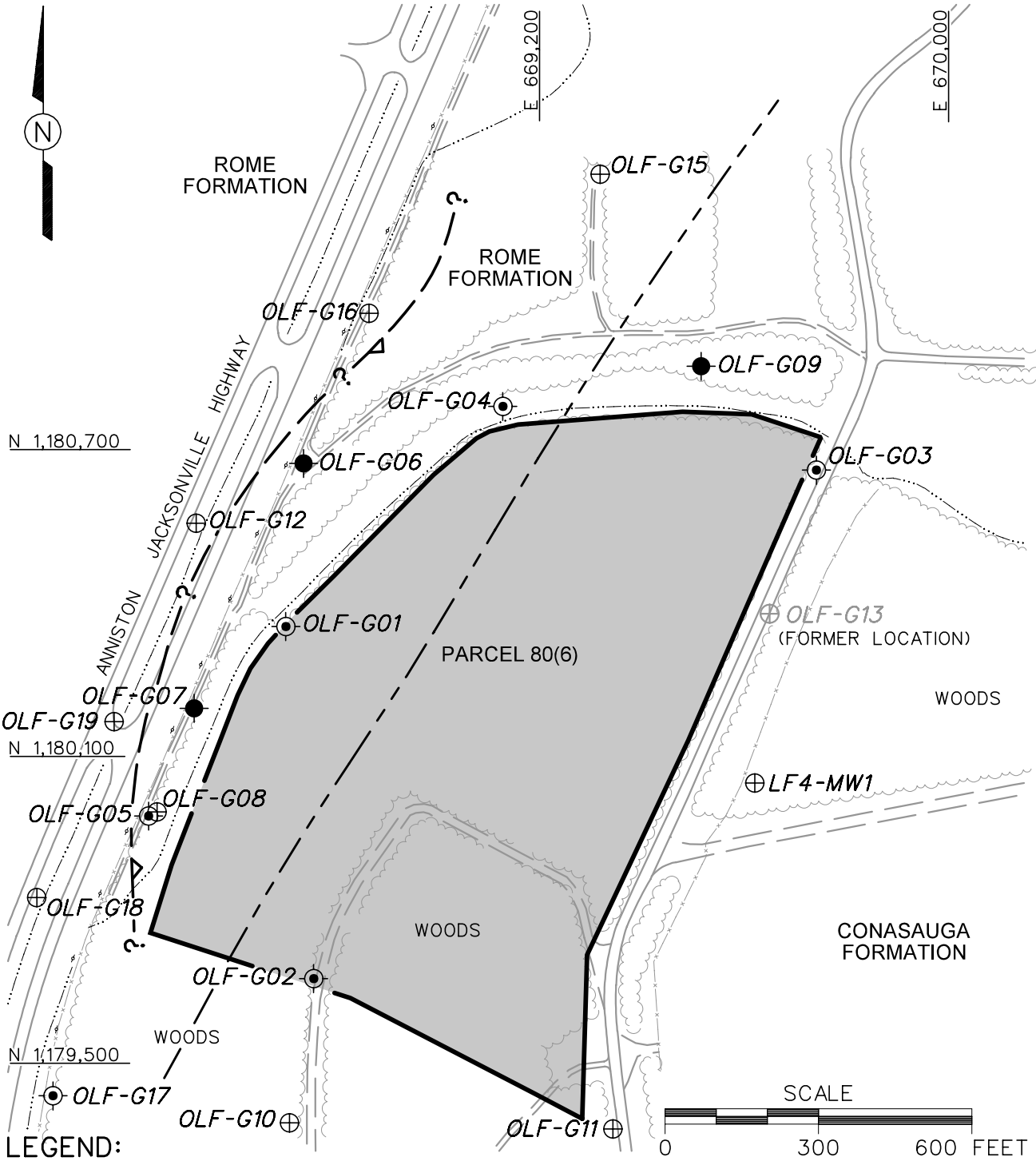
outcrops are entirely consistent with the Rome interpretation, one located approximately 2,100 feet to the north of Landfill No. 3 and one directly to the west; the lithology is identified as dark red to reddish brown and pale olive mudstones and siltstones with occasional thin-bedded sandstone.

At the northernmost of the two outcrops, bedding dip reversals indicate the presence of a small, tight synclinal fold (close to Highway 21), with a broader anticlinal fold to the west. Both folds plunge to the north-northeast. Well-developed, generally southeast-dipping cleavage is evident in mudstones across the exposure. Loss of bed continuity and apparent displacement of units on the southeast flank of the small anticline suggest the possibility that a small splay fault dipping to the southeast may be present. The cut of the southern outcrop is parallel to strike on the west side of Highway 21, opposite Landfill No. 3, and exposes dark red to reddish brown siltstones and mudstones of the Rome. Dip of these beds appears to be to the west.

A1.4 Results of Previous Investigations

A1.4.1 Borings

During the course of site investigation and remedial investigation studies conducted at Landfill No. 3, twenty monitoring wells have been installed. Existing monitoring wells are shown on Figure A1-4. These wells were installed between 1986 and 1992 and were logged during drilling by collection of cuttings, split spoons, and continuous coring. Boring depths for the installation of the wells ranged from 16 to 87 feet below ground surface (bgs). The boring logs for existing wells are included in Attachment A1. Based on the geologic data from these investigations, it was determined that a structural/stratigraphic discontinuity may exist between borings drilled near the landfill to the east of the dashed line on Figure A1-4 and those drilled to the west of this line. The geologic data collected from borings logged east of the dashed line is generally characterized in split spoon samples by vertical and horizontal fractures and lithologic descriptions indicating shales or claystones and hard drilling. The sequence encountered to the west of the dashed line, however, suggests unconsolidated red and sandy silts exist from ground surface to approximately 60 feet bgs (OLF-G12, OLF-G16, OLF-G18), followed by approximately 25 feet of red silty sand (OLF-G12).



LEGEND:

- LINE OF APPARENT STRUCTURAL/ STRATIGRAPHIC DISCONTINUITY
- GEOLOGIC CONTACT (APPROXIMATE)
- EXISTING RESIDUUM/BEDROCK MONITORING WELL LOCATION
- EXISTING BEDROCK MONITORING WELL LOCATION
- EXISTING RESIDUUM MONITORING WELL LOCATION

NOTE:

OLF-G13 WAS ABANDONED MARCH 1999 FOLLOWING ALABAMA DEPARTMENT OF ENVIRONMENT MANAGEMENT GUIDELINES.

FIGURE A1-4
EXISTING MONITORING WELL LOCATIONS
LANDFILL NO. 3
PARCEL 80(6)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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A1.4.2 Groundwater Contamination

In February 1998, IT collected groundwater samples from existing wells at Landfill No. 3. The results indicate that groundwater contamination exists at two wells, OLF-G07 and OLF-G12, west and hydraulically downgradient of Landfill No. 3 (IT, 1998). These results support the results of previous groundwater sampling performed by Science Applications International Corporation (SAIC, 2000). Wells OLF-G07 and OLF-G12 are located along the apparent discontinuity mentioned in Section A1.4.1. Earlier characterizations of groundwater, surface water and sediment analysis are included in the FTMC remedial investigation (SAIC, 2000).

A1.5 Hydrogeology

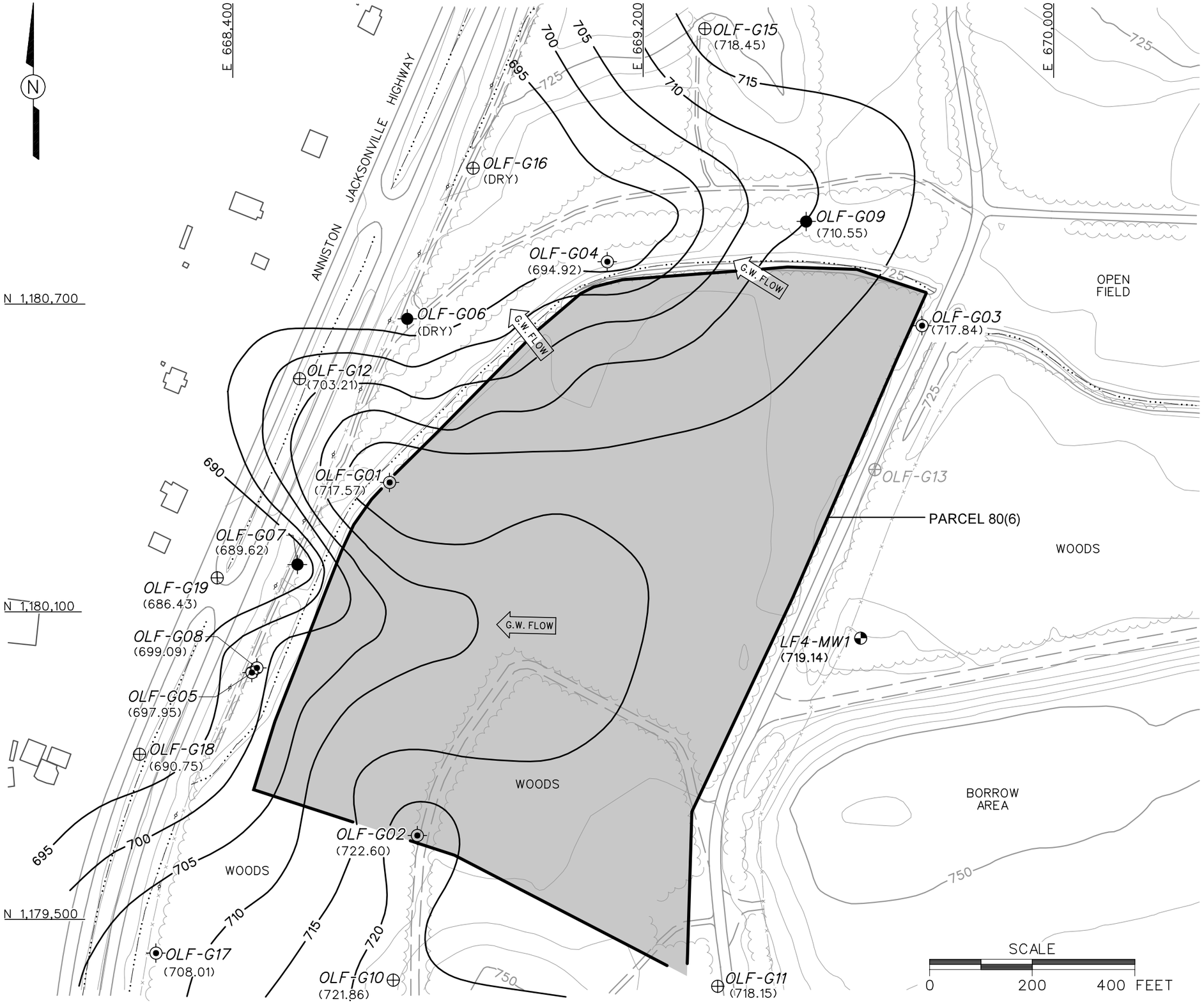
A1.5.1 Regional Groundwater Flow

Groundwater moves to the west-northwest across the main cantonment area of FTMC (SAIC, 2000). Groundwater is found in residuum derived from weathered bedrock, within fractured bedrock, along fault zones, and from conduit flow within karst development (Scott et al., 1987). Karst features have not been identified in the vicinity of Landfill No. 3. Because of these complexities, the use of surface topography as an indicator of groundwater flow direction is approximate.

The source of most of the recharge to the groundwater system is by infiltration of precipitation in the form of rain. SAIC (2000), noted that thrust fault zones, typical of the county, form large storage reservoirs for groundwater.

A1.5.2 Local Groundwater Flow

Landfill No. 3 is located within the floodplain of Cave Creek and its tributaries. Groundwater flow across the landfill is in a westerly direction from Landfill No. 4 (east of Landfill No. 3) across Highway 21, with a hydraulic gradient of approximately 0.04 foot per foot. However, as shown on Figure A1-5, the gradient across the landfill appears much flatter than the gradient on the western perimeter of the landfill. A northwesterly groundwater flow component is interpreted in the northern section of the site. Based on slug tests from five wells installed in residuum at the site, the average hydraulic conductivity is 4.61×10^{-5} centimeters per second (SAIC, 2000). Figure A1-5 presents a groundwater elevation map constructed from data collected in March 2000.



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- 725 — TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- 700 — GROUNDWATER ELEVATION CONTOUR
- (719.14) — GROUNDWATER ELEVATION (FT MSL) (MARCH 14, 2000)
- G.W. FLOW — GROUNWATER FLOW DIRECTION
- TREES / TREELINE
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- EXISTING RESIDUUM/BEDROCK MONITORING WELL
- EXISTING BEDROCK MONITORING WELL LOCATION
- EXISTING RESIDUUM MONITORING WELL LOCATION

NOTE:

1. OLF-G13 WAS ABANDONED MARCH 1999 FOLLOWING ALABAMA DEPARTMENT OF ENVIRONMENT MANAGEMENT GUIDELINES.

FIGURE A1-5
GROUNDWATER ELEVATION MAP
LANDFILL NO. 3
PARCEL 80(6)

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MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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A2.0 Project Description

A2.1 Introduction

The structural geology investigation included collection of residuum and bedrock cores at three boring locations on the perimeter of Landfill No. 3 (Figure A1-3). The Boart Longyear Company was contracted to perform coring and soil sampling using a Gus Pech® drilling rig equipped with rotosonic drilling and wireline coring drill heads. The spatial distribution of the borings was staggered to obtain optimum information on local dip and bedrock structure. Century Geophysical Corporation was contracted to log Boring 1, Boring 2, and Boring 3 using borehole geophysical methods.

A2.2 Residuum/Bedrock Sampling Procedures

Residuum was collected continuously from ground surface to the top of competent bedrock using a rotosonic core barrel. The core barrel was advanced ahead of a temporary outer casing. The temporary casing was advanced to maintain borehole integrity in soft formations. Residuum samples were retrieved in 5-or 10-foot sections and placed in clear plastic sleeves provided by the subcontractor. No samples were collected for laboratory analysis. The residuum samples collected were logged in accordance with American Society for Testing and Materials Method D 2488 using the Unified Soil Classification System and screened in the field using a photoionization detector. Lithologic samples were described to provide a detailed lithologic log.

The driller determined when competent bedrock was encountered by observing changes in drilling pressure and penetration rates. When competent bedrock was determined, the temporary outer casing was advanced to the top of competent bedrock and the borehole was cleaned out with the rotosonic core barrel. The bedrock was subsequently cored by inserting a 5-foot long, 4-inch diameter, longitudinally split, dual tube, diamond tipped, wireline, core barrel through the temporary casing. Bedrock cores and associated core pieces large enough to be recovered were stored in wooden core boxes and labeled.

Bedrock cores were described by the site geologist to provide detailed lithologic logs (Attachment A2) in accordance with methods outlined in USACE South Atlantic Division Manual DM 1110-1-1 (July 1983).

A2.3 Borehole Geophysical Logging

Each borehole was logged using downhole geophysical techniques to augment the bedrock core data, provide additional information on correlation of lithologic units, and establish bedding and fracture orientation. Borehole geophysical methods included caliper logging, natural gamma ray logging, resistivity logging, and acoustic televiewer (ATV) logging. Borehole geophysical data are included in Attachment A3.

A2.3.1 Caliper Logging

A Century Geophysical 9065 logging tool with a three-arm configuration was used for caliper logging. Caliper log data was acquired to determine changes in borehole diameter that may indicate the presence of fractures and borehole washouts. This information was compared with features observed in the bedrock cores to evaluate the potential of groundwater movement through discrete zones. Caliper logging was performed by inserting the tool through the temporary steel surface casing to the bottom of the borehole. Upon reaching bottom, the tool was activated and retrieved at a rate of approximately 20 feet per minute. Caliper logging was performed in the uncased portion of each borehole.

A2.3.2 Natural Gamma Ray Logging

A Century Geophysical 9041 multi-purpose logging tool was used for natural gamma ray logging. The purpose of the natural gamma ray logging was to provide information on the lithology as well as stratigraphic correlation between borings. The natural gamma ray tool was calibrated to the American Petroleum Institute Standard.

Natural gamma ray logging was initiated by inserting the tool through the temporary steel surface casing to the bottom of the borehole. Upon reaching bottom, the tool was activated and slowly retrieved at a rate of approximately 20 feet per minute. Natural gamma ray logging was performed in cased and uncased boreholes, from the bottom to the top of each borehole.

A2.3.3 Resistivity Logging

A Century Geophysical 9041 multi-purpose logging tool was used for resistivity logging, which was performed to provide indirect correlation of the lithology and stratigraphy in the uncased portions of the boreholes. Resistivity logging consisted of single point, short normal (16-inch), and long normal (64-inch) resistivity log. Resistivity logging measured the

response of rock formations when subjected to applied electric current. The response was affected by lithologic factors such as porosity, bedrock density, and the electrical resistivity of fluids within the pore spaces of the bedrock.

Resistivity logging was initiated by inserting the tool through the temporary steel surface casing to the bottom of the borehole. Upon reaching bottom, the tool was activated and slowly retrieved at a maximum rate of approximately 20 feet per minute. The resistivity logging was performed concurrently with the natural gamma ray logging.

A2.3.4 Acoustic Televiewer Logging

A Century Geophysical 9800 ATV logging tool was used to acquire oriented "pictures" of features in the boreholes by measuring the reflectivity variances in the received signals. The ATV used a high-resolution acoustic signal as a source and recorded data in uncased portions of the boreholes. The acoustic picture was displayed in both amplitude and travel time. This information was used to provide information about the location, character, and orientation of features in the boreholes without the need to have clear fluid filling the boreholes.

ATV logging was performed in the uncased portion of the borehole by inserting the tool through the temporary steel casing to the bottom of the borehole. Upon reaching bottom, the tool was activated and slowly retrieved at a rate of approximately 6 feet per minute.

Dip and azimuth (compass direction) data of bedding planes and fractures, and other features associated with secondary porosity within each borehole were summarized in the form of 'tadpole' plots, rose diagrams, and polar dip plots (Attachment A3).

Supplemental analyses of the bed and fracture dip information were conducted using stereographic projections to separate the bed and fracture dip data sets. Once separated, the data sets were plotted independently for the boreholes. A comparison was then made as to the strike relationships between the beds and the fractures. A final evaluation of the strike relationships was developed by plotting total bed and total fracture dip data. This process was considered a necessary step in order to supplement conclusions that were drawn relative to possible groundwater flow directions related to localized contaminant concentrations in the Landfill No. 3 area.

A2.4 Borehole Abandonment

Boreholes were abandoned at the completion of the borehole geophysical investigations following Alabama Department of Environmental Management guidelines. Temporary surface casing was retrieved and abandonment procedures were followed as outlined in Section 4.7.2 of the installation-wide sampling and analysis plan (SAP) (IT, 2000).

A2.5 Equipment Decontamination

Decontamination of sampling and geophysical logging equipment was performed to ensure that potential contaminants were not introduced from one location to another. Decontamination of sampling and geophysical equipment was performed in accordance with the requirements presented in Sections 4.10.1.1 and 4.10.1.2 of the SAP (IT, 2000), respectively.

A2.6 Surveying of Borehole Locations

Horizontal coordinates were referenced to the Alabama State Plane Coordinate System, 1983 North American Datum. Elevations were referenced to the North American Vertical Datum of 1988. Procedures used for global positioning system surveying are described in Section 4.3 of the SAP (IT, 2000). Borehole locations were surveyed using global positioning system survey techniques.

A2.7 Investigation-Derived Waste Management

Investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000). The IDW generated from the investigation was segregated as follows:

- Drill cuttings
- Personal protective equipment
- Decontamination fluids.

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in a lined rolloff bin prior to final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analyses. Based on the results, drill cuttings and personal protective equipment generated during the investigation were disposed as nonregulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

Liquid IDW was contained in the existing 20,000-gallon sump associated with the Building T-338 vehicle wash rack. Liquid IDW was characterized by VOC, SVOC and metals analyses. Based on the analyses, liquid IDW was discharged as nonregulated waste to the FTMC wastewater treatment plant on the Main Post.

A3.0 Data Evaluation

A3.1 Introduction

The data evaluation process consisted of a detailed analysis of the cores from the three borings and comparison of the borehole geophysical data to the cores. Particular attention was paid to features that may indicate the presence of fault zones, such as intervals of intense fracturing, breccia, and tightly folded bedding.

Composite logs presenting borehole geophysical and lithologic information were developed for the three borings (Figure A3-1). Detailed lithologic logs are provided in Attachment A2. The borehole geophysical plots generated by Century Geophysical Corporation are included in Attachment A3.

A3.2 Boring 1

A3.2.1 Lithology and Structure

Boring 1, drilled to a depth of 228 feet bgs, was located east of Landfill No. 3 in an area mapped as the Cambrian Conasauga Formation. A 6-inch rotosonic core barrel was used to drill from ground surface to 95 feet bgs. A 6-inch temporary casing was installed in the borehole from ground surface to 95 feet bgs. A 5-foot long, 4-inch diameter, longitudinally split, dual tube, diamond tipped, PQ3 wireline, core barrel was used to continuously core from 95 to 228 feet bgs. Approximately 121 feet of bedrock core was recovered from Boring 1.

Figure A3-1 presents a composite log of Boring 1, Boring 2, and Boring 3. The detailed lithologic log for Boring 1 is provided in Attachment A2. The log for Boring 1 indicates that residuum was encountered from ground surface to approximately 75 feet bgs. Residuum in Boring 1 is characterized by thick alternating layers of silt, clay, and sandy clay. First groundwater was observed during drilling activities in sandy silt at approximately 59.5 feet bgs. There was no core recovery from 60 to 65 feet bgs. Relic bedding was observed throughout the silt and clay units. Tightly folded bedding was observed between 10 and 20 feet bgs and also at approximately 54 feet bgs.

Competent bedrock in Boring 1 was encountered at approximately 75 feet bgs and consisted of a thick sequence of carbonate units, including light gray to pale red argillaceous limestone;

STARTING DATE: 8/31/00	DATE LAST REV.:	DRAFT. CHCK. BY:	INITIATOR: J. DENDY	DWG. NO.: 796886ES.046
DRAWN BY: D. BILLINGSLEY	DRAWN BY:	ENGR. CHCK. BY: J. JENKINS	PROJ. MGR.: J. YACOUB	PROJ. NO.: 796886

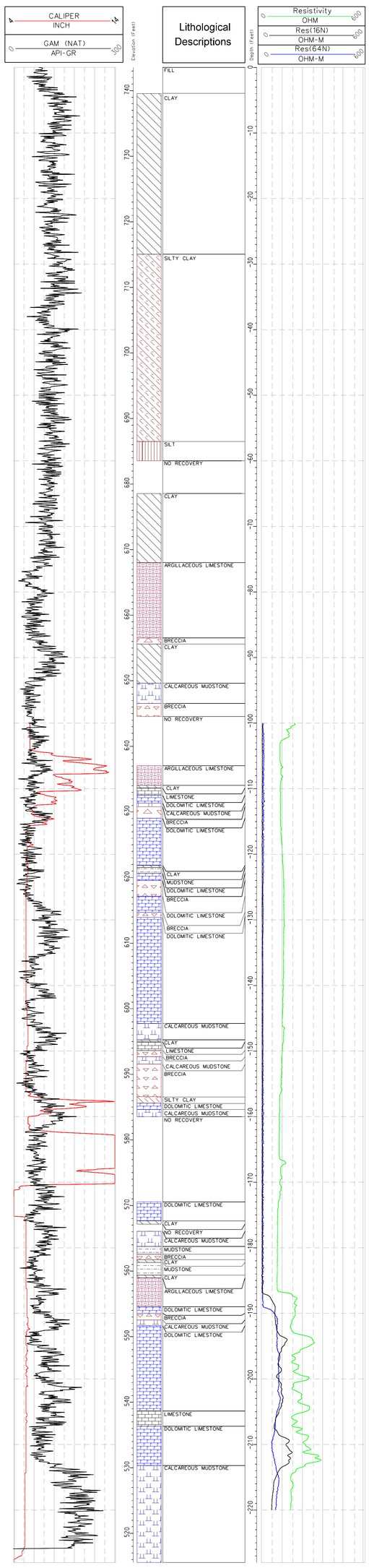
HTRW DRILLING LOG
IT Corporation

Log ID: Boring 1 (GS80-SB01)

Total Depth: 228 feet
Location: Landfill No. 3, FTMC, AL
Easting: 669312.12
Northing: 1179685.37
Casing Diameter: 5.5"
Elevation (Ground Surface): 743.55
Drilling Date: May 2000
Drilled By: Boart Longyear
Geologist: Corey Wallace

Landfill No. 3
Fort McClellan
Calhoun County,
Alabama

(Resistivity data begins at 100.0' bgs)



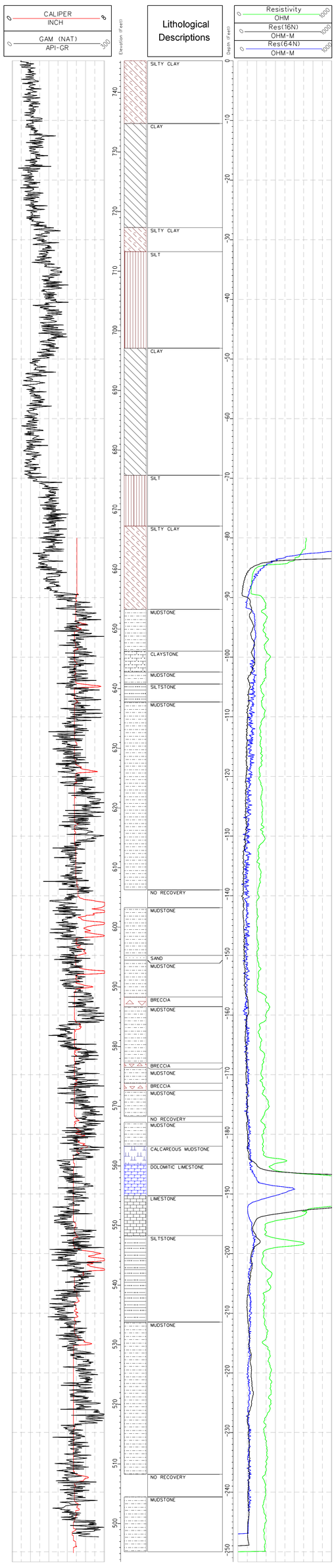
HTRW DRILLING LOG
IT Corporation

Log ID: Boring 2 (GS80-SB02)

Total Depth: 250 feet
Location: Landfill No. 3, FTMC, AL
Easting: 669041.15
Northing: 1180864.91
Casing Diameter: 5.5"
Elevation (Ground Surface): 745.29
Drilling Date: May 2000
Drilled By: Boart Longyear
Geologist: Corey Wallace

Landfill No. 3
Fort McClellan
Calhoun County,
Alabama

(Resistivity data begins at 80.0' bgs)



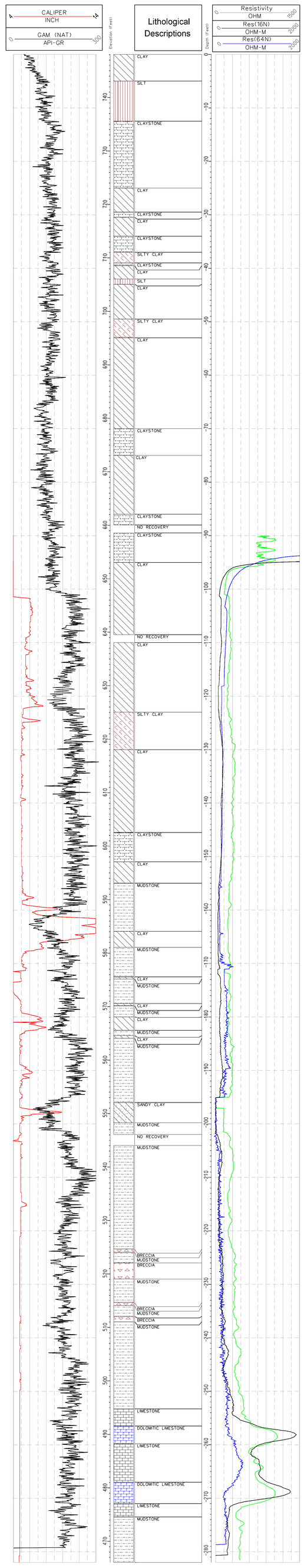
HTRW DRILLING LOG
IT Corporation

Log ID: Boring 3 (GS80-SB03)

Total Depth: 282 feet
Location: Landfill No. 3, FTMC, AL
Easting: 668279.70
Northing: 1180266.38
Casing Diameter: 5.5"
Elevation (Ground Surface): 748.07
Drilling Date: April 2000
Drilled By: Boart Longyear
Geologist: Corey Wallace

Landfill No. 3
Fort McClellan
Calhoun County,
Alabama

(Resistivity data begins at 90.0' bgs)



LEGEND:

GAM	NATURAL GAMMA RAY LOG
OHM-M	OHM METERS
API-GR	AMERICAN PETROLEUM INSTITUTE GAMMA RAY UNITS
Res	RESISTIVITY LOG - SINGLE ELECTRODE
Res(16N)	RESISTIVITY LOG - 16-INCH ELECTRODE SPACING
Res(64N)	RESISTIVITY LOG - 64-INCH ELECTRODE SPACING

VERTICAL SCALE: AS SHOWN

FIGURE A3-1
COMPOSITE BORING LOGS
BORING 1, BORING 2 AND BORING 3
LANDFILL NO. 3
PARCEL 80(6)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
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brown to reddish-brown, laminated calcareous mudstone; gray to dark gray dolomite; and dark gray dolomitic limestone with shaley partings (Figure A3-2). Fossils were rare, with a few shell fragments observed in the limestone.

Fractures were observed in the core from Boring 1 extending from the top of bedrock to the bottom of the borehole, with iron staining observed on several fracture faces. Calcite and quartz infilling was also observed in some fractures. Fractures were generally near vertical to 10 degrees from horizontal. Bedrock was generally weathered to severely weathered, and small vugs were observed in the argillaceous limestone units.

Tightly folded bedding was observed in the calcareous mudstone, and nine brecciated zones were observed between 87 and 191 feet bgs (Figure A3-3). The brecciated zones generally ranged in thickness from less than 1 foot to approximately 2 feet thick; however, a 5-foot brecciated zone was observed in the core from approximately 152 to 157 feet bgs.

There was no core recovery from approximately 99 to 106 feet bgs, and from approximately 160 to 173 feet bgs. These intervals may represent highly fractured and weathered zones that may have been filled with mud or clay.

At approximately 213 feet bgs, bedrock graded from dolomitic limestone to black, massive, calcareous mudstone with shaly partings (Figure A3-4). The mudstone extended to the bottom of the boring.

A3.2.2 Geophysical Data Discussion

Figure A3-1 includes the caliper log response for Boring 1. The caliper log from Boring 1 indicates that the hole retained a consistent diameter during coring activity except in intervals from approximately 105 to 110 feet bgs, 157 to 159 feet bgs, and 162 to 170 feet bgs. The intervals from 157 to 159 feet bgs and 162 to 170 feet bgs correspond to the approximate intervals of no core recovery in Boring 1. The interval from 105 to 110 feet bgs corresponds to an interval of argillaceous limestone in the core from Boring 1; however, the interval of 99 to 107 feet bgs was lost during bedrock coring. The discrepancy may be the result of a lost section of rock core below 99 feet bgs being recovered in the core run from 107 to 112 feet bgs.

Figure A3-2. Highly weathered, light gray limestone between 75 feet and 78 feet bgs in the core from Boring 1. Conasauga Formation. Up is to the top.

Figure A3-3. Breccia zone in limestone between 88.2 feet and 89.4 feet bgs in the core from Boring 1. Conasauga Formation. Up is to the top.

Figure A3-4. Fissile, calcareous mudstone between 222 feet and 223 feet bgs developed at base of the core from Boring 1. Athens Shale (?) or Conasauga Formation. Up is to the top.

Figure A3-5. Reddish-brown mudstone between 135 feet and 136 feet bgs in the core from Boring 2 with calcite filled fractures. Rome Formation. Up is to top.

Figure A3-1 includes the natural gamma ray log response for Boring 1 compared to the associated generalized lithologic log. The response indicates that residuum (ground surface to approximately 75 feet bgs) at Boring 1 generally has higher natural gamma radiation than the bedrock units.

Upon comparison of the natural gamma radiation response to the detailed lithologic logs shown in Attachment A2, the relatively high natural gamma radiation response from approximately 213 to 228 feet bgs corresponds to the black, fissile mudstone interval in the core from Boring 1.

Resistivity logging was performed in Boring 1 between 100 and 218 feet bgs (Figure A3-1). An interval of significant resistivity curve response in Boring 1 was observed between approximately 186 and 214 feet bgs. The core from Boring 1 contained dolomitic limestone and limestone beds at this interval. This suggests that the resistivity curve responses resulted from the suspected low porosity of the carbonate units in this interval.

ATV data were recorded between 100 and 212 feet bgs in Boring 1 (Attachment A3). Abrupt changes in dip, as indicated by rose diagrams, occurred between approximately 120 and 125 feet bgs (southeast dip changes to north dip) and between approximately 200 and 205 feet bgs (northwest dip changes to northeast dip). The 120- to 125-foot bgs interval corresponds to breccia zone in the core from Boring 1, and the 200- to 205-foot interval corresponds to tightly folded bedding noted in the core from Boring 1. Fractures were not observed in the core description from Boring 1 in the interval between 200 and 205 feet, and features on the ATV amplitude and acoustic displays were probably bed dips. A zone of abrupt dip change also occurred from approximately 165 to 182 feet bgs, where no core was recovered.

Based on ATV data from Boring 1, the average fracture dip ranged from 20 to 40 degrees to the east, and bed dip was 35 degrees.

A3.3 Boring 2

A3.3.1 Lithology and Structure

Boring 2, drilled to a total depth of approximately 250 feet bgs, was located west of Landfill No. 3 in an area mapped as the Cambrian Rome formation. A 6-inch rotosonic core barrel

was advanced from the ground surface to 40 feet bgs. Six-inch temporary casing was installed from ground surface to 40 feet bgs, and coring continued from 40 to 91 feet bgs using a 4-inch rotosonic core barrel. A 5-foot long, 4-inch diameter, longitudinally split, dual tube, diamond tipped, PQ3 wireline core barrel was used to collect core from 91 to 250 feet bgs. Approximately 126 feet of bedrock core was recovered from Boring 2.

The lithologic log for Boring 2 (Figure A3-1 and Attachment A2) indicates that residuum was encountered from ground surface to approximately 92 feet bgs. Residuum consisted of layers of silty clay, clay, and silt. Chert fragments were observed in residuum from ground surface to approximately 70 feet bgs, and minor shale fragments were observed below 30 feet. Relic, near-horizontal bedding was observed below 30 feet bgs, and tightly folded bedding was observed from approximately 50 to 70 feet bgs. First groundwater was observed during drilling activities at approximately 73 feet bgs.

Competent bedrock in Boring 2 was encountered at approximately 92 feet bgs and was characterized by predominantly reddish-brown to dark reddish-brown, sandy mudstone with sandy laminae. Minor units of reddish brown shaley claystone, siltstone, and clay were also observed from approximately 99 to 108 feet bgs. Calcite-filled fractures were present below 134 feet bgs (Figure A3-5). The mudstone graded gray at approximately 182 feet bgs. At approximately 185 feet bgs, the gray mudstone graded to a carbonate unit consisting of interbedded, dark to medium gray, dolomitic limestone, limestone, and sandy dolomite (Figure A3-6). This carbonate unit extended to approximately 197 feet bgs. Beneath the carbonate unit, calcareous, yellow-brown, sandy siltstone extended to approximately 212 feet bgs. The siltstone overlies reddish brown mudstone with yellowish-brown sandy laminae, from 212 feet bgs to the bottom of the borehole.

Fractures were observed throughout the core, and bedrock was generally weathered to severely weathered. Fractures dipped from approximately 10 degrees from horizontal, to nearly vertical and were occasionally iron stained and filled with calcite, quartz, or clay.

Bedding was observed ranging from horizontal to dipping approximately 50 degrees. Tightly folded bedding was observed in bedrock at approximately 110 feet bgs, 180 feet bgs, and 251 feet bgs. Three thin brecciated zones were observed at approximately 157 to 172 feet bgs.

Figure A3-6. Light brown, sandy mudstone grades into light gray limestone containing sand laminations. Dark gray dolomite is located in the basal portion of the core. The core from Boring 2 is between 184.5 feet and 185.7 feet bgs. Rome Formation. Up is to the top.

Figure A3-7. Reddish brown mudstone between 251 feet and 252 feet bgs in the core from Boring 3 showing tightly folded bedding with alternating layers of sand and silt. Rome Formation. Up is to the top.

A3.3.2 Boring 2 Borehole Geophysical Interpretation

The caliper log from Boring 2 indicates that the diameter was fairly uniform between 80 and 92 feet bgs (Figure A3-1). However, numerous small washouts, as indicated by borehole enlargement, occurred from approximately 92 to 141 feet bgs. Based on the core from Boring 2, the zones were probably poorly consolidated, thin clay zones within the mudstone, or fracture zones with clay infilling. A significant washout occurred between approximately 141 and 143 feet bgs, which corresponds to an interval of 139 to 142 feet bgs where there was no recovery of core from Boring 2. Borehole enlargements were also observed between approximately 144 and 155 feet bgs and correspond to mudstone intervals where fractures and horizontal, clay-filled bed partings were observed in the core. Between approximately 182 and 250 feet bgs, the only significant borehole enlargements occurred at depths ranging from approximately 199 to 204 feet, 216 feet, and from 237 to 245 feet bgs. The first interval correlates to a siltstone layer in the core from Boring 2 which contained vertical, clay-filled fractures. The enlargement at 216 feet corresponds to a broken mudstone interval. The 237- to 245-foot bgs interval corresponds to an interval where there was no core recovery, from 237 to 241 feet bgs, in the core from Boring 2.

Figure A3-1 includes the natural gamma ray log response for Boring 2 compared to the associated generalized lithologic log. The response indicates that residuum (ground surface to approximately 92 feet bgs) at Boring 2 generally has lower natural gamma radiation than the bedrock units. As shown on Figure A3-1, intervals of relatively high natural gamma radiation within bedrock were observed at the following depths: 93 to 111 feet bgs, 122 to 128 feet bgs, 129 to 131 feet bgs, 157 to 161 feet bgs, 165 to 168 feet bgs, 169 to 185 feet bgs, 196 to 199 feet bgs, 215 to 229 feet bgs, and 244 to 248 feet bgs.

Upon comparison of the natural gamma radiation response to the detailed lithologic logs shown in Attachment A2, the responses observed in Boring 2 appear to be due to the presence of thin clay-filled fractures or shaley partings, or laminae.

Figure A3-1 shows that the interval of the most significant resistivity response in Boring 2 occurred between approximately 183 and 199 feet bgs. This corresponds to dolomitic limestone and limestone units observed in the core. These high readings suggest an increased density in the carbonates and a reduction in primary porosity.

ATV data were recorded in Boring 2 from approximately 89 to 247 feet bgs (Attachment A3). Abrupt dip changes, as indicated by rose diagrams, occurred from approximately 104 to 110 feet bgs (north dip changes to southwest dip); and from 125 to 134 feet bgs (west dip changes to east dip). Fracture data from the ATV were confirmed by the observation of fractures in the two intervals in the core from Boring 2.

Based on ATV data from Boring 2, analysis of fracture dip data indicates that the fractures dip to the east and strike north-south, nearly parallel to the strike of the beds. The average fracture dip was approximately 23 degrees.

A3.4 Boring 3

A3.4.1 Lithology and Structure

Boring 3 was drilled west of Landfill No. 3 to a total depth of 282 feet bgs in an area mapped as the Cambrian Rome Formation. A 6-inch rotosonic core barrel was advanced from ground surface to 85 feet bgs. A 6.5-inch temporary casing was installed in the borehole from ground surface to 85 feet bgs, and coring continued from 85 to 155 feet bgs using a 4-inch rotosonic core barrel. A 5-foot long, 4-inch diameter, longitudinally split, dual tube, diamond tipped, PQ3 wireline core barrel was used to collect bedrock core from 155 to 282 feet bgs. Approximately 116 feet of bedrock core from Boring 3 was recovered.

The lithologic log for Boring 3 (Figure A3-1 and Attachment A2) indicates that an alternating sequence of predominantly clay, minor silt layers and weathered claystone was present from ground surface to approximately 155 feet bgs. First groundwater was encountered during drilling at approximately 62 feet bgs.

At 155 feet bgs, competent bedrock was encountered consisting of dark reddish-brown mudstone with yellowish-brown sandy laminae. Occasional thin clay and silt beds were also observed. The mudstone extended to approximately 253 feet bgs, where it graded to a carbonate sequence consisting of light gray, microcrystalline, hard limestone and dark gray, massive dolomite (Figure A3-7). The carbonate sequence graded to reddish-brown, sandy mudstone at 273 feet bgs, and the mudstone extended to the bottom of the borehole at 282 feet bgs.

Fractures were observed throughout the carbonate sequence and underlying mudstone, with calcite infilling (Figure A3-8). Tightly folded bedding was observed in claystone and mudstone in several intervals (Figure A3-9). Four brecciated zones were observed in mudstone from approximately 224 to 237 feet bgs. The brecciated zones were generally 2 feet or less thick.

A3.4.2 Boring 3 Geophysical Data Discussion

Caliper logging was conducted from approximately 90 to 282 feet bgs (Figure A3-1). From approximately 102 to 125 feet bgs, variations in the borehole diameter were likely due to small washouts associated with highly weathered clay intervals. From approximately 125 to 155 feet bgs, the caliper curve indicated a consistent borehole diameter. However, from approximately 160 to 166 feet (washouts in a clay zones), 179 to 182 feet (washout in a clay zone), and 197 to 199 feet bgs (washout of clay layer), the caliper log indicates borehole irregularities. From approximately 203 to 282 feet bgs, a consistent borehole diameter was observed in Boring 3.

Figure A3-1 includes the natural gamma ray log response for Boring 3 compared to the associated generalized lithologic log. The gamma ray response from ground surface to approximately 100 feet bgs is comparatively lower than the response from approximately 100 feet bgs to the bottom of the borehole. This response is due to the presence of temporary casing from ground surface to 100 feet bgs during the logging event. As shown on Figure A3-1, intervals of relatively high natural gamma radiation below 100 feet bgs were observed at the following depths: 100 to 116 feet bgs, 120 to 160 feet bgs, 182 to 196 feet bgs, 201 to 220 feet bgs, and 243 to 257 feet bgs.

Upon comparison of the natural gamma radiation response to the detailed lithologic logs shown in Attachment A2, the responses observed in Boring 3 appear to be due to the presence of thin, clay-filled fractures or from laminae within the calcareous mudstone units. The low natural gamma radiation response at approximately 162 and 197 feet bgs corresponds to the caliper log response indicating an increased borehole diameter at these depths.

Resistivity logging was performed in Boring 3 from approximately 90 to 280 feet bgs (Figure A3-1). The three resistivity curves indicate relatively uniform resistivity readings throughout Boring 3, with the exception of an interval between approximately 255 and 272 feet bgs.

Figure A3-8. Thinly bedded mudstone grades into light gray limestone containing clay and yellow silty sand laminations. Vertical, quartz filled fractures developed in mudstone and upper part of limestone. The core from Boring 3 is between 254 feet and 255 feet bgs. Rome Formation. Up is to the top.

Figure A3-9. Massive, dense dolomite with calcite filled fractures. The core from Boring 3 is between 251 feet and 252 feet bgs. Rome Formation. Up is to the top.

This interval corresponds to the alternating beds of limestone and dolomite observed in the bedrock core from Boring 3.

ATV data were recorded between 124 and 280 feet bgs in Boring 3 (Attachment A3). As indicated by the rose diagrams, abrupt dip changes occurred from approximately 142 to 148 feet bgs (southeast dip changes to northeast dip), 196 to 200 feet bgs (southeast dip changes to northeast dip), and 230 and 236 feet bgs (northeast dip changes to northwest dip). The ATV time and amplitude display for the 142- to 148-foot interval were interpreted as fractures. However, fracture development in this interval was not observed in the core from Boring 3. The ATV fracture response probably occurred because very thin, broken claystone beds interbedded with clay in this interval produced a response in the ATV log resembling fracture development. For the interval from 230 to 236 feet bgs, the ATV time and amplitude reading indicated fractures. A breccia zone observed between approximately 236 and 237 feet bgs corresponds to the abrupt dip change recorded by the ATV between approximately 230 and 236 feet bgs. The core from Boring 3 contained fractures in this interval and confirmed the ATV interpretation.

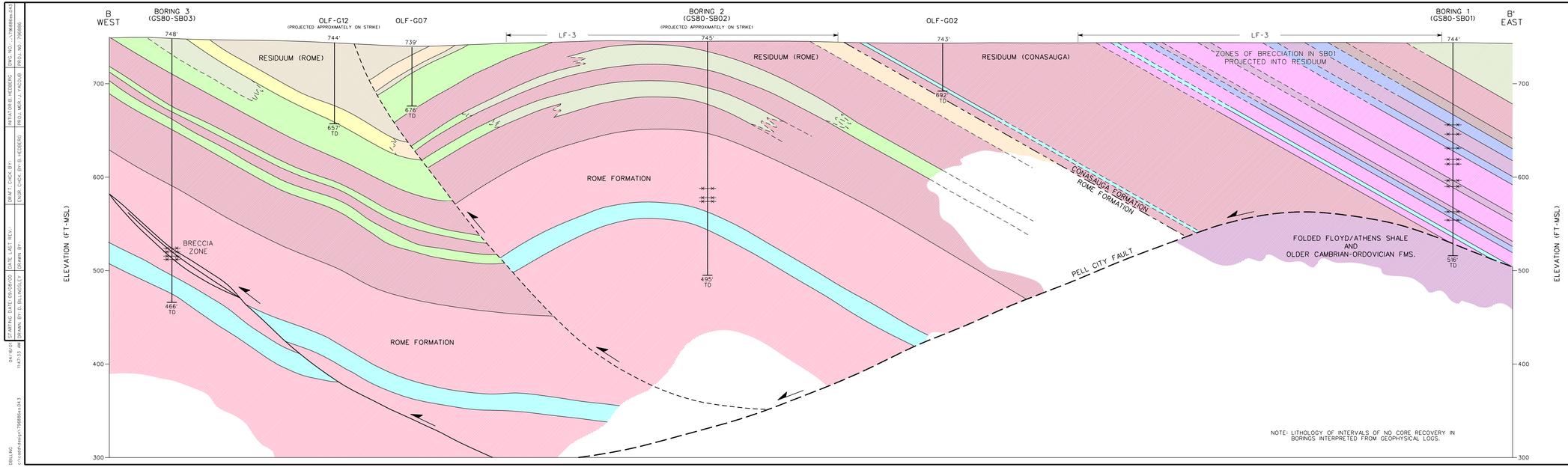
ATV data from Boring 3 indicated that there was a strong northeast-southwest component of bed dip; bedding strike is predominately to the northwest southeast. The majority of the fractures strike to the northeast, nearly parallel to the strike of the beds. The average fracture dip was 34 degrees to the northwest or southeast; whereas, the average bed dip is approximately 28 degrees.

A4.0 Site-Specific Structural Interpretation

Lithologic and structural data obtained from Boring 1, Boring 2, and Boring 3, and lithologic data from three shallow monitoring wells (OLF-G12, OLF-G07, and OLF-G02) were used to construct a geologic cross-section, Figure A4-1. The location of the cross-section is shown on the insert in Figure A4-1. The cross section was constructed to illustrate a west-to-east view of the subsurface geology and structure, perpendicular to the strike of the bedding and fracturing observed in the borings. Bedding dips obtained from the borehole geophysical data were used to project dips of the bedrock in constructing the cross section. Data from Boring 2 and monitoring well OLF-G12 were projected southward approximately on strike and incorporated into the cross section. The location map also shows the approximate surface trace of an inferred thrust.

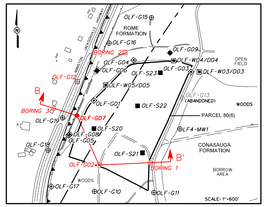
The cross-section shows the correlation between Boring 3 and Boring 2, with a thrust fault separating the two borings and a fault or breccia zone present in the lower part of Boring 3. The lithology in both borings is interpreted as belonging to the Rome Formation. Although direct evidence of major fault displacement was not observed in the cores, the presence of a northeast-southwest trending thrust fault separating the two borings and dipping to the east-southeast is consistent with available data. The fault bears evidence of small displacements that are likely associated with the overall deformation of the Pell City thrust sheet. In addition to the known tectonic setting of the area, the inference is based on the apparent vertical separation of marker beds observed in Boring 2 and Boring 3, numerous breccia zones and other indications of intense deformation observed in the borings, and lithologic data from boring logs of existing monitoring wells.

The cross-section shows that bedrock located to the east of the inferred fault (illustrated in boring data from OLF-G07 and Boring 2) has been thrust to the west over bedrock represented in boring OLF-G12 and Boring 3 by a small thrust fault. The inferred movement accounts for the presence of the carbonate unit observed in Boring 2 at approximately 562 feet, appearing approximately 70 feet higher in elevation than the carbonate unit observed in Boring 3. Furthermore, the inferred fault accounts for the sand, silt, and claystone units observed in the boring of OLF-G07 (interpreted to correspond to the sand, clay, and claystone sequence observed in Boring 3 and OLF-G12), to be situated at a higher elevation than those units in OLF-G12 and Boring 3. The sand observed in the screened portion of OLF-G12 and a sand and silt interval in OLF-G07 likely represent the upper quartzite sand



LEGEND:

- SAND
- SAND AND SILT
- SILT
- SILTY CLAY
- BRECCIA ZONE
- RELATIVE MOVEMENT OF THRUST FAULT (DASHED WHERE INFERRED)
- SANDY CLAY
- CLAY
- CLAYSTONE
- MUDSTONE
- BORING PROJECTED ON CROSS SECTION B-B'
- DEEP WELL PROJECTED ON CROSS SECTION B-B'
- CALCAREOUS MUDSTONE
- LIMESTONE
- ARGILLACEOUS LIMESTONE
- DOLOMITE
- INFERRED GEOLOGIC CONTACT BETWEEN CONASAUGA & ROME FORMATION
- THRUST FAULT (BARBS ON OVERRIDING SIDE)



LOCATION OF DETAILED CROSS SECTION
AND GENERALIZED GEOLOGIC MAP

FIGURE A4-1
GEOLOGIC CROSS SECTION B-B'
LANDFILL NO. 3, PARCEL 80(6)

VERTICAL
0 50 100 FEET

HORIZONTAL
0 50 100 FEET

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
A Member of The IT Group

DRILLING
C:\cadd4\dwgs\79696ea43
04/16/01
14:21:13 AM
STARTING DATE: 09/28/00
DRAWN BY: D. BILLINGSLEY
DATE LAST REV:
DRAWN BY:
DRAFT. CHCK. BY:
DWGR. CHCK. BY: B. HEDBERG
INITIATOR: B. HEDBERG
PROJ. MGR: J. FAUGUS
DWG NO.: 79696ea43
PROJ. NO.: 796696

described by Osborne and Szabo (1984) and Raymond et al. (1988) as characteristic of the upper part of the Rome Formation.

Four distinct breccia zones observed in Boring 3 from approximately 224 to 237 feet bgs are interpreted to represent a zone of thrust faulting with laterally small displacements. Thin breccia zones observed in Boring 2 are believed to represent faulting with a laterally small displacement; however, based on the elevation of the breccia zones and associated dip data from the geophysical interpretations in Boring 2, no correlation with breccia zones in Boring 3 is interpreted. Although a thrust fault is interpreted as separating Boring 3 and Boring 2, the presence of a fold between the two borings cannot be precluded as an alternate interpretation.

Correlation of lithologic units and structure between Boring 2 and Boring 1 is not evident. Bedrock represented in Boring 2 is interpreted as the Rome Formation and, based on core data, dips to the east-southeast. The interbedded limestone/dolomite and mudstone bedrock sequence encountered to the east in Boring 1 is interpreted as the Conasauga Formation to approximately 213 feet bgs. Black massive mudstone with shaly partings, encountered below 213 feet bgs in Boring 1, is not characteristic of the Conasauga Formation but is visually similar in appearance to Athens Shale. Because of the visual similarity to the Athens Shale and the presence of the Pell City Fault trace approximately 2,000 feet south of Landfill No. 3, which serves to delineate the contact between the Conasauga Formation and the Athens Shale, this dark gray to black mudstone with shaly partings may represent Athens Shale that has undergone physical alteration due its proximity to the fault. This interpretation requires the Pell City Fault to be at approximately 213 feet bgs. However, there is no distinct zone (such as brecciation or slickensides) at 213 feet bgs that would indicate a fault is present.

Although slickensides, gouge, and breccia are found along many faults, they are not necessarily present. Faults may lack such features due to the presence of extreme confining pressures during the faulting process (Billings, 1972). A conformable contact between the Rome Formation and the Conassauga Formation is mapped towards the middle of Landfill No. 3 and is shown on Figure A3-1. Part of the definition of this contact is monitoring well OLF-G02, which, based on a limestone or chert interval, is interpreted as being installed in the Conasauga Formation.

In general, the bedrock encountered in Boring 1 was more intensely deformed than that observed in Borings 2 and 3. The intensity of deformation was determined by the observation of the number breccia zones and tight folding observed in the cores. These zones are interpreted to have developed as a result of footwall deformation associated with the Jacksonville Thrust Fault and hanging wall deformation associated with Pell City thrust. The breccia zones are most likely small thrust faults with minor lateral displacements.

The faults interpreted in Boring 1 and shown in Figure A4-1 are inferred to die out within the Conasauga Formation and are not connected with those observed in Boring 2 and Boring 3. Connecting the faults of Boring 1 with those in Boring 2 and Boring 3 would indicate larger displacements than the faults appear to reflect. Furthermore, such a scenario would indicate that the faults would be cutting down-section in the direction of transport, something not normally seen in thrust-faulted terrains.

An explanation of the presence of a higher degree of deformation at Boring 1 may be based on lithological differences between the Conasauga Formation and the Rome Formation. The Conasauga Formation consists primarily of competent carbonates and mudstones that are likely to deform through breakage, as observed by brecciation along distinct fault zones. On the other hand, the Rome Formation consists primarily of shale, mudstone and siltstones. Shale, in particular, may deform under low temperature and low pressure and appear to "flow," showing tight folding as a result of the deformation. There was no visual evidence observed in the core data indicating mineral alteration due to low grade metamorphism.

A5.0 Summary and Conclusions

Boring 1, Boring 2, and Boring 3 were drilled in the vicinity of Landfill No. 3 to evaluate the structural configuration of the bedrock and its stratigraphy. These borings provided lithologic information from continuous coring and were evaluated by borehole geophysical tools. It was determined that the bedrock in Boring 1 represents the Conasauga Formation and possibly Athens Shale, whereas the bedrock in Boring 2 and Boring 3 represents the Rome Formation. The bedrock in Boring 1 primarily consisted of gray dolomite and limestone beds with interbedded zones of mudstone and black, calcareous mudstone with shaly partings below 213 bgs. The bedrock in Boring 2 and Boring 3 consisted of dark red to reddish-brown mudstone, claystone, and siltstone with a few zones of interbedded limestone. The contact between the two formations is conformable and appears to strike north-northeast through the middle of the landfill. Evidence of faulting in the cores from the borings was primarily based on the occurrence of breccia zones. These breccia zones and other evidence of deformation in the cores are consistent with the degree of deformation that might be expected in this area bound by two major thrust faults (Jacksonville and Pell City). The beds have an overall northeast-southwest strike, with southeasterly dips.

Regional groundwater flow at FTMC is in a northwesterly direction across the main cantonment area of the Base. Landfill No. 3 is located within the floodplain of Cave Creek and its tributaries. The groundwater flow as mapped in the residuum across Landfill No. 3 is from east to west-northwest, nearly perpendicular to the strike of bedding and fracturing observed in the bedrock. The horizontal groundwater flow gradient is relatively flat across the landfill but becomes greater on the western perimeter of the landfill.

Based on the results of the investigations and subsequent analysis of lithologic and structural data, it appears that the geologic structure in the vicinity of Landfill No. 3 may have some influence on the groundwater flow direction. The groundwater flow direction at Landfill No. 3 is to the west-northwest, perpendicular to the strike of the inferred splay faults. If groundwater flow were influenced by faulting, flow would be expected to have a component parallel or subparallel to the strike (north-northeast) and/or dip (southeast) of the fault. A slight northwest groundwater flow component is inferred, based on groundwater elevations and the presence of groundwater contamination observed in OLF-G07 and OLF-G12. Boring OLF-G12 is essentially located along the strike of the fault mapped between Boring 3 and Boring 2. Furthermore, because the horizontal groundwater flow gradient is much

greater on the western perimeter of the landfill, it appears that groundwater elevations on the western perimeter may be influenced by the bedrock structure. Although the faulting may have small-scale localized influence of groundwater flow directions, the extent of this potential influence to groundwater flow directions to the west of Landfill No. 3 (west of the investigation area) is unknown.

A6.0 References

Billings, Marland, P., 1972, ***Structural Geology***, Third Edition, Pentice-Hall, Inc., Englewood Cliffs, New Jersey.

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ATTACHMENT A1

BORING LOGS OF EXISTING WELLS

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan,AL

DATE 18 June 1986

LOCATION Northwest side of old landfill between monitoring wells 4 and 5

DRILLERS Richard Kestner-driller USAEHA David Bayha-geologist,USAEHA, Irene Latsor and Larry Hornsby-helpers,Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow stem auger

BORE HOLE Well No.1

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
1.5		Light tan to light brown silty soil with some rock fragments and pine needles. Dry	Area was bulldozed to create road for vehicle and drill rig access. Bag sample No. 1 at 0 to 1.5 feet
5 7.5		Light gray to tan silty soil. Powdery and Dry	Easy drilling Bag sample No. 2 at 1.5 to 7.5 feet stiff drilling
10 10.5		Light brown to slightly reddish-brown silty clay with a white to light gray silty clay layer or layers. Slightly moist and starting to form ball when squeezed	Bag sample No. 3 at 7.5 to 10.5 feet.
14		Light tan to slightly reddish-brown silty clay . More moist than above. Moist, plastic.	Bag sample No. 4 at 10.5 to 14 feet. stiff drilling
15			Split-spoon sample No.5 at 14 to 17 feet

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan,AL

DATE 18 June 1986

LOCATION Northwest side of old landfill between monitoring wells 4 and 5

DRILLERS Richard Kestner-driller USAE
David Bayha-geologist,USAEHA, Irene Latso
and Larry Hornsby-helpers,Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow stem auger

BORE HOLE Well No.1

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
15		Light tan to light brown clay. Damp to wet, plastic. Some zones are light orange in color. There is a 15° (from vertical) fracture in sample. Rusty iron stains occur on both sides.	Split-spoon sample No.5 at 14 to 17 feet stiff drilling
17		Light tan to light brown silty clay (More clay than silt) Moist to wet and very plastic. Wetter than above sample.	Bag sample No. 6 at 17 to 19 feet. stiff drilling
20		same as above	- no sample collected Very little returns Soil and rock are sticking to auger.
25			
26.1		same as above	stiff drilling - no sample collected
30			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

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Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan, AL

DATE 18 June 1986

LOCATION Northwest side of old landfill between monitoring wells 4 and 5

DRILLERS Richard Kestner-driller USAE
David Bayha-geologist, USAEHA, Irene Lat
and Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow stem auger

BORE HOLE Well No. 1

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
30		same as above	- no sample collected
35			hard drilling
		Light tan to light brown silty clay. Almost vertical fractures or bedding with black and reddish-orange to rusty colored layers of limonite and/or hematite. Damp to wet, but not very plastic.	Split-spoon sample No.7 at 35 to 35.6 feet
40			hard drilling
		same as above	- no sample collected
45			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan, AL

DATE 18 June 1986

LOCATION Northwest side of old landfill between monitoring wells 4 and 5

DRILLERS Richard Kestner-driller USAEHA David Bayha-geologist, USAEHA, Irene Latson and Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow stem auger

BORE HOLE Well No. 1

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
45		same as above	- no sample collected
			very stiff drilling
50		Rusty-red clay with some silt. Wet, very plastic, almost sticky. Contains vertical layers of rusty clay reddish-brown and medium tan to dark brown clay with white gypsum or calcite crystals.	Split-spoon sample No. 8 at 49 to 50.6 feet
50.9		BOTTOM of HOLE	
		20.3-feet solid pipe 30.0-feet screen 3.0-feet solid pipe for sand trap Total depth of well is 53.3-feet below top of PVC well casing which is 2.4-feet above cement. Used 3.5 - 100 lb. bags of 20 grit sand (sand-blasting sand) Top of sand at 17-feet below ground. Used 1 - 80 lb. bucket of bentonite. Top of dry bentonite at 11-feet below ground. Used 3 - 100 lb. bags of cement and installed 6-inch diameter protective steel casing (5-feet long) around 4-inch diameter PVC well casing.	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan,AL

DATE 18 June 1986

LOCATION Southeast side of old landfill. Upgradient well

DRILLERS Richard Kestner-driller USAEHA; David Bayha-geologist,USAEHA; Irene Latso & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 2

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
		Boulders, gravel, pebbles, and sand. (Road bed material)	no sample collected hard drilling
3		Light to medium gray to rusty colored sandy, silty clay. Contains white and gray to rusty red colored chert fragments. Dry to moist, forms balls from auger hole. Slightly plastic beginning at 3 feet, but becoming wet and sticky with depth. Very plastic.	Bag sample No. 1 at 3 to 9 feet. hard drilling
5 9		Light to medium gray with rusty-colored zones, but more gray to grayish-rusty colored than above. Contains aome chert fragments. Not quite as wet as above, plastic.	Bag sample No. 2 at 9 to 18 feet
10 15			stiff drilling

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Geohydrologic Study No. 38-26-0912-87 Fort McClellan,AL

DATE 18 June 1986

LOCATION Southeast side of old landfill. Upgradient well

DRILLERS Richard Kestner-driller USAEHA David Bayha-geologist,USAEHA; Irene Latsc & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 2

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
15		Same as above	stiff drilling
18		Light tan to light reddish-brown sandy clay. Contains some white chert. Moist to wet, plastic.	Bag sample No. 3 at 18 to 23 feet. stiff drilling
20			
23		Light gray to light brown sandy and and silty clay with rusty layers, and sone chert fragments. Moist, but not as wet as above, plastic.	Bag sample No. 4 at 23 to 26.5 feet. stiff drilling
25			
26.5		Light tan to light brown	Bag sample No. 5 at 26.5 to 32 feet.
27.6		sandy and silty clay. Moist to wet More wet than above and very plastic.	stiff drilling
30			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, Jun 30, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan,AL

DATE 18 June 1986

LOCATION Southeast side of old landfill. Upgradient well

DRILLERS Richard Kestner-driller USAE; David Bayha-geologist,USAEHA; Irene Latsc & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 2

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
30		Same as above, but not quite as wet.	No sample collected
32			stiff drilling
		Same as above, but wetter	No sample collected
35			stiff drilling
		Same as above	No sample collected
40			Harder drilling but fewer returns
		Same as above	
44			Hard drilling
45		Hit limestone or chert layer	No sample collected

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 30, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan,AL

DATE 18 June 1986

LOCATION Southeast side of old land-fill. Upgradient well

DRILLERS Richard Kestner-driller USAE David Bayha-geologist,USAEHA; Irene Latsc & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 2

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
45		At about 49 feet, auger returned light tan, sandy clay. Saturated and very sticky. Plastic	Hard drilling, but easier than above. Apparently through rock layer. Few returns. Bag sample No. 6 at about 49 feet.
49			
50			
50.6		BOTTOM of HOLE	
		20-feet solid pipe 30-feet screen 2.2-feet solid pipe for sand trap Total depth of well is 52.2 feet below top of PVC well casing which is 1.6-feet above cement . Used 4.5-100 lb. bags of 20 grit sand (sand-blasting sand). Top of sand at 5-feet below ground. Used 0.5-80 lb. bucket of bentonite. Top of dry bentonite at 2.5 feet below ground. Used 2-100 lb. bags of cement and installed 6-inch diameter protective steel casing (5-feet long) around 4-inch diameter PVC well casing.	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 30, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan, AL

DATE 19 June 1986

LOCATION Northeast side of old landfill about 10 feet Northwest of asphalt road

DRILLERS Richard Kestner-driller, USAEH; David Bayha-geologist, USAEHA; Irene Latsc & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 3

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
1		Light tan to light brown soil mixed with gravel and sand.	stiff drilling
5		Light to medium gray-brown silty sandy clay. Dry to moist, somewhat plastic.	Bag sample No.1 at 1 10 6 feet.
6			stiff drilling
10		Light tan to light brown silty clay. Moist, plastic and sticky.	Bag sample No.2 at 6 to 20 feet
15			stiff drilling

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Geohydrologic Study No. 38-26-0912-87 Fort McClellan,AL

DATE 19 June 1986

LOCATION Northeast side of old landfill about 10 feet Northwest of asphalt road

DRILLERS Richard Kestner-driller,USAEH David Bayha-geologist, USAEHA; Irene Latsc & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 3

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
15		Same as above	stiff drilling
20		Light brown to light purple-gray mottled with light to dark gray, with white and rusty-colored silty clay. Material coming from augered hole looks the same as above. Dry to moist, slightly plastic. ▽	Split-spoon sample 3 at 20 to 21 feet
22.8			
25			
30			stiff drilling

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan, AL

DATE 19 June 1986

LOCATION Northeast side of old landfill about 10 feet Northwest of asphalt road

DRILLERS Richard Kestner-driller, USAEHA; David Bayha-geologist, USAEHA; Irene Lats & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 3

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
30		Near contact between material from above and light tan to brown silty clay, which is mottled with rusty colored areas. Contains layer of siltstone. Top part dry to damp, not plastic. Bottom part moist to wet.	Split-spoon sample No.4 at 30 to 33 feet
33		Tan to medium brown silty clay, with some rusty areas. Wet and sticky, very plastic.	Bag sample No.5 at 33 to 50 feet
35			
40			
45		Hit limestone or chert layer	Hard drilling. No sample

AEHA Form 130, 1 Nov 82

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DATE 19 June 1986

LOCATION Northeast side of old landfill about 10 feet Northwest of asphalt road

DRILLERS Richard Kestner-driller, USAEH; David Bayha-geologist, USAEHA; Irene Latsc & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 3

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
45		Tan to medium brown silty clay, with some rusty areas. Wet and sticky, very plastic.	
		Bottom of Hole	
50.3		23-feet of solid pipe 30-feet screen Total depth of well is 53 feet below top of PVC well casing which is 2.7 feet above cement. Used 4-100 lb bags of 20 grit sand (sand-blasting sand) Top of sand at 4.8-feet below ground. Used 0.5-80 lb bucket of bentonite. Top of dry bentonite at 1.5-feet below ground. Used 2-100 lb bags of cement and installed 6-inch diameter protective steel casing (5-feet long) around 4-inch diameter PVC well casing.	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan, AL

DATE 20 June 1986

LOCATION North end of old landfill and North side of drainage ditch

DRILLERS Richard Kestner-driller, USAEHA; David Bayha-geologist, USAEHA; Irene Latsor & Larry Hornsby-helper, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 4

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
		Dark brick-red to rusty colored silty soil. Dry.	Bag sample No.1 at 0 to 2 feet
2			stiff drilling
		Light tan to light brown clay with some silt and sand. Dry.	Bag sample No. 2 at 2 to 8 feet
5			
8			stiff drilling
		Light tan to light grayish-tan clay. Dry to slightly moist, not too plastic. Material from auger is rusty colored.	Bag sample No.3 at 8 to 12 feet
10			
12			Hard drilling
		Light purple to tan claystone. Dry to moist, not too plastic.	Bag sample No.4 at 12 to 13.5 feet
13.5			
		Light purple to light tan claystone, with rusty colored areas. Darker than above. Dry to moist.	Bag sample No.5 at 13.5 to 19 feet
15			

AEHA Form 130, 1 Nov 82

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US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan, AL

DATE 20 June 1986

LOCATION North end of old landfill and North side of drainage ditch

DRILLERS Richard Kestner-driller, USAE
David Bayha-geologist, USAEHA; Irene Latso & Larry Hornsby-helper, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 4

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
15		Same as above	Hard drilling
19		Light tan to gray and light brown silty claystone mixed with rusty colored areas. Dry to moist and not too plastic.	Bag sample No.6 at 19 to 23 feet stiff drilling
23		Light to medium brown silty, sandy clay. Moist to wet. Plastic, forms balls from auger.	Bag sample No.7 at 23 to 30 feet
25			
30			

AEHA Form 130, 1 Nov 82

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Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan,AL

DATE 20 June 1986

LOCATION North end of old landfill and North side of drainage ditch

DRILLERS Richard Kestner-driller,USAE David Bayha-geologist, USAEHA; Irene Latsc & Larry Hornsby-helper, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 4

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
30		Light gray and dark rusty colored (salt and pepper) silty and sandy clay with chert layer on top. Light tan to light brown clay with a few rusty colored layers (about 1 mm thick) on bottom. Dry to moist and not too plastic.	Split-spoon sample No.8 at 30 to 31 feet Color change about 31 feet
34			Hard drilling
35		Light to medium brown silty clay. Moist to wet, plastic.	Bag sample No.9 at 34 to 38 feet
38			Hard drilling
40		Light to medium gray claystone and light to medium brown sandy, silty clay. Dry to moist, not too plastic. Contains rusty colored layers about 1 mm thick.	Bag sample No.10 at 38 to 52 feet
45			

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DATE 20 June 1986

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DRILLERS Richard Kestner-driller,USAE
David Bayha-geologist, USAEHA; Irene Latso
& Larry Hornsby-helper, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 4

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
45		Same as above	
49.2			
50			Very hard drilling
52		Brownish-purple silty claystone. Dry to moist, not too plastic.	Bag sample No.11 at 52 to 54 feet.
54			Very soft drilling
55		Light to medium tan silty shale. Saturated and sticky.	Bag sample No.12 at 54 to 56 feet.
56			Very hard drilling
60		Unknown material	No returns

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DRILLERS Richard Kestner-driller,USAE David Bayha-geologist, USAEHA; Irene Latso & Larry Hornsby-helper, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 4

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
60.5		Bottom of Hole	
		33-feet solid pipe 30-feet screen Total depth of well is 63-feet below top of PVC well casing which is 2.5-feet above cement. Used 4-100 lb bags of 20 grit sand (sand-blasting sand). Top of sand at 14.7-feet below ground. Used 1.5-80 lb buckets of bentonite. Top of dry bentonite at 5 feet below ground. Used 2-100 lb bags of cement and installed 6-inch diameter protective steel casing (5-feet long) around 4-inch diameter PVC well casing.	

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US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Geohydrologic Study No. 38-26-0912-87 Fort McClellan, AL

DATE 21 June 1986

LOCATION Northwest corner of old landfill between drainage ditch and installation fence

DRILLERS Richard Kestner-driller, USAEH David Bayha-geologist, USAEHA; Irene Latson & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 5

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
		Light gray to light tan silty, sandy clay soil, intermixed with rusty colored areas. Dry	Bag sample No.1 at 0 to 4 feet. stiff drilling
4		Redish-brown to rusty brown silty clay. Dry to moist, somwhat plastic.	Bag sample No.2 at 4 to 10 feet stiff drilling
5			
10		Yellowish-brown silty clay. Moist, plastic.	Bag sample No.3 at 10 to 25 feet. stiff drilling
15			

AEHA Form 130, 1 Nov 82

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DRILLING LOG

(The proponent of this form is HSHB-ES)

Geohydrologic Study No. 38-26-0912-87

PROJECT Fort McClellan,AL

DATE 21 June 1986

LOCATION Northwest corner of old landfill between drainage ditch and installation fence

DRILLERS Richard Kestner-driller,USAEHA; David Bayha-geologist,USAEHA; Irene Latson & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 5

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
15		Same as above. More moist with depth. A little more rusty colored.	
20			
25			Hard drilling
		Same as above, but a little more rusty colored silty claystone.	Split-spoon sample No.4 No sample recovered as rig was raised off hydraulic jacks.
30			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 73, Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Geohydrologic Study No. 38-26-0912-87 Fort McClellan, AL

DATE 21 June 1986

LOCATION Northwest corner of old landfill between drainage ditch and installation fence

DRILLERS Richard Kestner-driller, USAEHA; David Bayha-geologist, USAEHA; Irene Latson & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 5

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
30		Vertical to near vertical beds or fractures. Grayish-brown to rusty brown silty shale and silty claystone Some fractures have black to rusty iron deposits. Dry to moist, not plastic.	Split-spoon sample No.5 at 30 to 33 feet. Hard drilling
33		Reddish-brown silty clay. Moist, plastic.	Bag sample No.6 at 33 to 35 feet. Hard drilling
35		Same as above, but dryer	No sample collected
40 ▽ 40.3		Same as above, dryer than above.	No sample collected
45			Hard drilling

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PROJECT Fort McClellan, AL

DATE 21 June 1986

LOCATION Northwest corner of old landfill between drainage ditch and installation fence

DRILLERS Richard Kestner-driller, USAEHA; David Bayha-geologist, USAEHA; Irene Latson & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 5

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
45		Same as above, dry to moist, somewhat plastic.	No sample collected
47			Softer drilling
		Same as above	No sample collected
50			Fairly easy drilling
		Reddish-brown to dark rusty brown sandy, and silty clay. Saturated.	Very little returns
55			Bag sample No.7 at 55 feet
60			

AEHA Form 130, 1 Nov 82

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DRILLING LOG

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PROJECT Geohydrologic Study No. 38-26-0912-87 Fort McClellan,AL

DATE 21 June 1986

LOCATION Northwest corner of old landfill between drainage ditch and installation fence

DRILLERS Richard Kestner-driller,USAEH; David Bayha-geologist,USAEHA; Irene Latsor & Larry Hornsby-helpers, Dynalectron

DRILL RIG Acker AD-2 with 6-inch hollow-stem auger

BORE HOLE Well No. 5

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
60.4		Bottom of Hole	
		33-feet solid pipe 30-feet screen Total depth of well is 63-feet below top of PVC well casing which is 2.6-feet above cement. Used 4-100 lb bags of 20 grit sand (sand-blasting sand). Top of sand at 15-feet below ground. Used 1-80 lb bucket of bentonite. Top of dry bentonite at 10 feet below ground. Used 3-100 lb bags of cement and installed 6-inch diameter protective steel casing (5-feet long) around 4-inch diameter PVC well casing.	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 73, Jun 80, which will be used.

U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY
GROUND-WATER MONITORING WELL SUMMARY

PROJECT Geohydrologic Study No. 38-26-0912-87 Fort McClellan,Al DATE

WELL NUMBER	OLF #1	OLF #2	OLF #3	OLF #4	OLF #5
1. Height of Monitoring Well Casing above ground level	2.4	1.6	2.7	2.5	2.6
2. Total Depth of Well below ground level	50.9	50.6	50.3	60.5	60.4
3. Depth to Top of Well Screen below ground level	17.9	18.4	20.2	30.5	30.4
4. Well Screen Length	30	30	30	30	30
5. Well Screen Slot Size (inches)	0.006	0.006	0.006	0.006	0.006
6. Well Diameter (inches)	4	4	4	4	4
7. Monitoring Well Casing Material	PVC	PVC	PVC	PVC	PVC
8. Monitoring Well Screen Material	PVC	PVC	PVC	PVC	PVC
9. Grout Thickness below ground level	11.0	2.5	1.5	5.0	10.0
10. Depth to Top of Bentonite Seal below ground level	11.0	2.5	1.5	5.0	10.0
11. Bentonite Seal Thickness	6.0	2.5	3.3	9.7	5.0
12. Depth to Top of Sand Pack	17.0	5	4.8	14.7	15.0
13. Depth to Static Water Level from top of monitoring well casing	26.4	24.4	21.5	51.7	42.9
Date Measured	28 June 86	27 June86	27 June 86	26 June86	26 June86
14. Depth to Static Water from ground level	24.0	22.8	18.8	49.2	40.2
Date Measured	28 June86	27 June 86	27 June86	26 June 86	26 June 86
15. Elevation at ground level	747.0	748.6	744.5	748.0	736.0
16. Elevation - Top of monitoring well casing	749.4	750.2	747.2	750.5	738.6
17. Ground-water elevation	723.0	725.8	725.7	698.8	695.8
Date Measured	28 June86	27 June 86	27 June 86	26 June 86	26 June 86
Comments All measurements are in feet unless otherwise indicated.					

SOIL BORING/WELL LOG

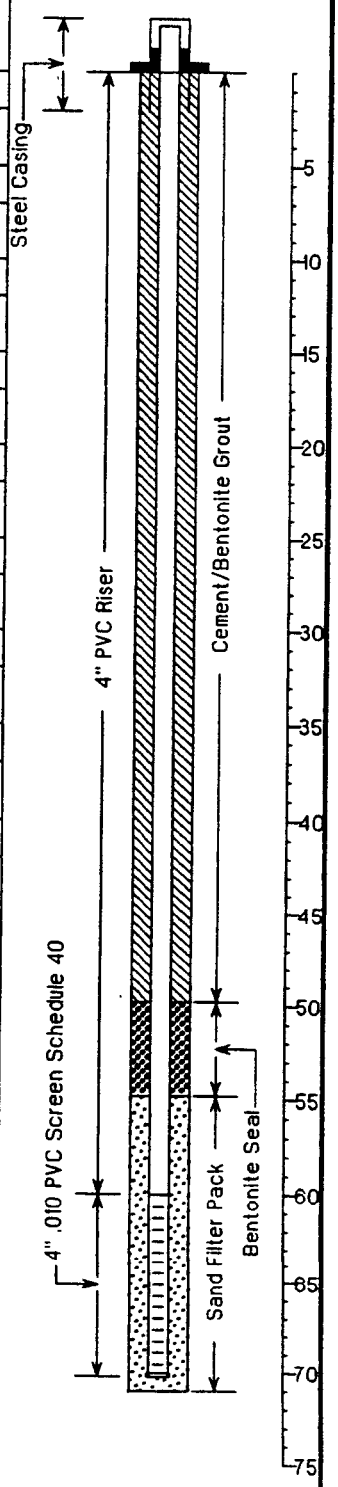
Project Name: Fort McClellan Site Investigation
SAIC Project No.: 01-0827-03-0424
Geologist: W.P. Stoner
Drilling Co.: Environmental Exploration, Inc.
Driller: S. Turner
Drill Rig: Mobile Drill B57

Site Location: Landfill #3 (OLF)
Northing (ft): 1180592.99
Easting (ft): 512566.25
Groundwater Elev. (ft): 683.48 on 6/4/92
Drilling Method: Hollow Stem Auger/Coring
Sampling Method: Split Spoon/Core Barrel

Monitoring Well No.: OLF6
Start/Finish Date: 04-22-92/04-24-92
Well Completion Depth (ft): 71.0
Drilled Depth (ft): 71.0
Surface Pad Elevation (ft): 747.73
Top of Casing Elevation (ft): 749.93

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
	ML		SILT, 20-30% clay; 5YR 4/6 yellowish red; firm; very low plasticity; moist to dry.	0/0	2-2-3-3	1	SS	1.5
5	CL		CLAY, 40% silt; 2.5YR 3/4 dark reddish brown; very stiff; low plasticity; dry to very slightly moist.	0/0	5-9-16-20	2	SS	1.3
10	SM		SAND, very fine to fine sand, 30-40% silt, 5-10% clay; 5YR 5/3 reddish brown; medium dense; non-plastic; dry.	1/0	5-7-7-9	3	SS	1.3
15			SILTY SAND, some clay, 52% sand, 24% silt, 24% clay; 2.5YR 3/4 dark reddish brown; medium dense; low plasticity; dry to very slightly moist.	0.6/DNR	5-15-14-19	4	SS	2.0
20	ML		SILT, 20-30% very fine sand, >5% clay; 7.5YR 7/6 reddish yellow; very stiff; non-plastic; dry.	0/0	5-10-13-15	5	SS	1.5
25			SILT, 10-30% very fine sand, >10% clay; 2.5YR 4/4 reddish brown, mottled with 10YR 6/8 brownish yellow; stiff; non-plastic; dry. Silt/Claystone present in sample.	0.6/0	7-9-11-15	6	SS	1.6
			SILT, 20-30% very fine sand, >5% clay; 7.5YR 5/4 brown; hard; non- plastic; dry. Silt/Claystone present.	0/<1	8-18-24-35	7	SS	1.8
35			CLAYEY SILT, some sand, 60% silt, 22% sand, 14% clay, 4% gravel; 7.5 YR 6/6 reddish yellow; hard; non-plastic; dry.	0/0	23-25-36-50/5.5"	8	SS	1.7
40	CL		CLAY, 40% silt; 2.5YR 5/3 reddish brown; hard; non-plastic; dry.	0/0	50/5"	9	SS	0.5
45				0/0	50-50/2"	10	SS	0.5
50	N/A		CLAYSTONE, laminated; 10R 5/3 weak red, horizontal bedding, iron staining; hard; well cemented; fine grained; highly weathered and very fractured; porous to very porous.	DNR	50/2"	11	SS	NR
55				DNR	DP @ 100 PSI	12	CB	3.5
60								
65			CLAYSTONE, laminated; 10R 5/3 weak red, horizontal bedding, iron staining; hard; well cemented; fine grained; very highly weathered and very fractured; porous to very porous.			13	CB	2.5
70			*Bottom of Boring at 71.0 feet*					
75								

Well Const. As-Built



SOIL BORING/WELL LOG

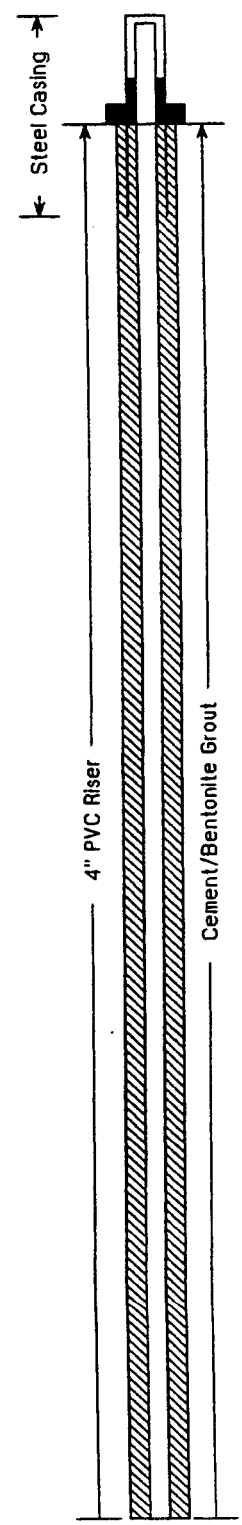
Project Name: Fort McClellan Site Investigation
SAIC Project No.: 01-0827-03-0424
Geologist: W.P. Stoner
Drilling Co.: Environmental Exploration, Inc.
Driller: S. Turner
Drill Rig: Mobile Drill B57

Site Location: Landfill #3 (OLF)
Northing (ft): 1180113.99
Easting (ft): 512352.32
Groundwater Elev. (ft): 697.88 on 6/4/92
Drilling Method: H S Auger/Coring/Mud Rotary
Sampling Method: Split Spoon/Core Barrel

Monitoring Well No.: OLF7
Start/Finish Date: 04-14-92/04-21-92
Well Completion Depth (ft): 62.5
Drilled Depth (ft): 62.5
Surface Pad Elevation (ft): 739.01
Top of Casing Elevation (ft): 741.42

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
	ML		SILT, 20% very fine to fine sand, 10% medium sand; 10YR 4/2 dark grayish brown; firm; very slightly plastic; moist.	0/DNR	2-3-3-5	1	SS	2.0
			SILT, 10% very fine sand, 10-20% clay; 10YR 5/8 yellowish brown; stiff; low plasticity; moist.	0/0	3-4-6-7	2	SS	1.8
5			SILT, 10-20% clay, 20% very fine to fine sand; 10YR 5/8 yellowish brown; hard; non to very low plasticity; moist to dry.	0.2/0	5-14-34-41	3	SS	1.8
			SILT, 20% clay, 20% very fine to fine sand; 7.5YR 7/0 light gray; very stiff; low plasticity; moist to dry. (Piece of quartz in the spoon)	0/0	8-9-15-21	4	SS	2.0
	SM							
	ML		SAND, very fine to fine sand, 20-30% silt, <5% clay; 7.5YR 4/6 strong brown; medium dense; non-plastic; dry.	0/0	8-14-21-29	5	SS	2.0
10	SM		SILT, 10-20% very fine sand, 5% clay; 7.5YR 6/8 reddish yellow and 7.5YR 4/4 dark brown; hard; non-plastic; dry.	0/0	9-13-23-30	6	SS	1.7
			SAND, very fine to fine, 20% silt; 5YR 5/2 reddish gray; dense; non-plastic; dry.					
15	CL			0/0	6-10-12-15	7	SS	1.5
	SM		SILTY CLAY, 20-30% silt; 10YR 5/8 yellowish brown and 10YR 7/2 light gray; very stiff; low plasticity; dry. (Silty partings)					
	ML		SAND, very fine to fine, 20% silt; 5YR 5/2 reddish gray; medium dense; non-plastic; dry.	0/0	9-13-21-27	8	SS	1.5
20	SM		SILT, 30% clay; 10R 4/2 weak red; hard; non-plastic; dry.	0/0	10-13-20-36	9	SS	1.07
			SAND, very fine to fine, 30% silt; 5YR 5/2 reddish gray; dense to very dense; non-plastic; dry.	0/0	10-23-33-42	10	SS	1.35
25	ML		CLAYEY SILT, trace sand, 61% silt, 30% clay, 7% sand, 2% gravel; 5YR 5/2 reddish gray; hard; non-plastic; dry.	0/0	8-15-19-31	11	SS	1.4
			SILT, 30% very fine sand; 5YR 5/2 reddish gray; hard; non-plastic; dry. (Claystone present in sample)	1/0	14-50/5"	12	SS	0.9
30	N/A		CLAYSTONE, laminated; 10R 4/2 weak red; soft; poorly cemented; fine grained; highly weathered.	DNR	25-34-50/5"	13	SS	1.1
35								

Well Const. As-Built

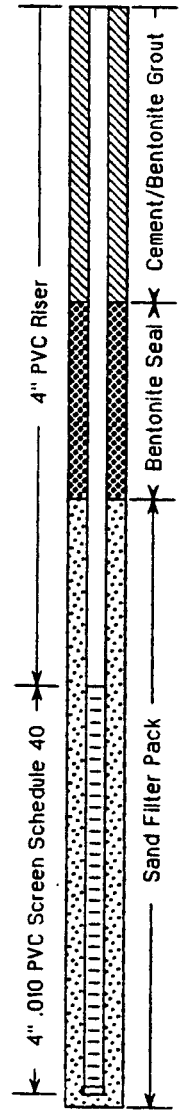


SOIL BORING/WELL LOG

Project Name: Fort McClellan Site Investigation
Site Location: Landfill #3 (OLF)
Monitoring Well No.: OLF7
SAIC Project No.: 01-0827-03-0424
Northing (ft): 1180113.99
Start/Finish Date: 04-14-92/04-21-92
Geologist: W.P. Stoner
Easting (ft): 512352.32
Well Completion Depth (ft): 62.5
Drilling Co.: Environmental Exploration, Inc.
Groundwater Elev. (ft): 697.88 on 6/4/92
Drilled Depth (ft): 62.5
Driller: S. Turner
Drilling Method: H S Auger/Coring/Mud Rotary
Surface Pad Elevation (ft): 739.01
Drill Rig: Mobile Drill B57
Sampling Method: Split Spoon/Core Barrel
Top of Casing Elevation (ft): 741.42

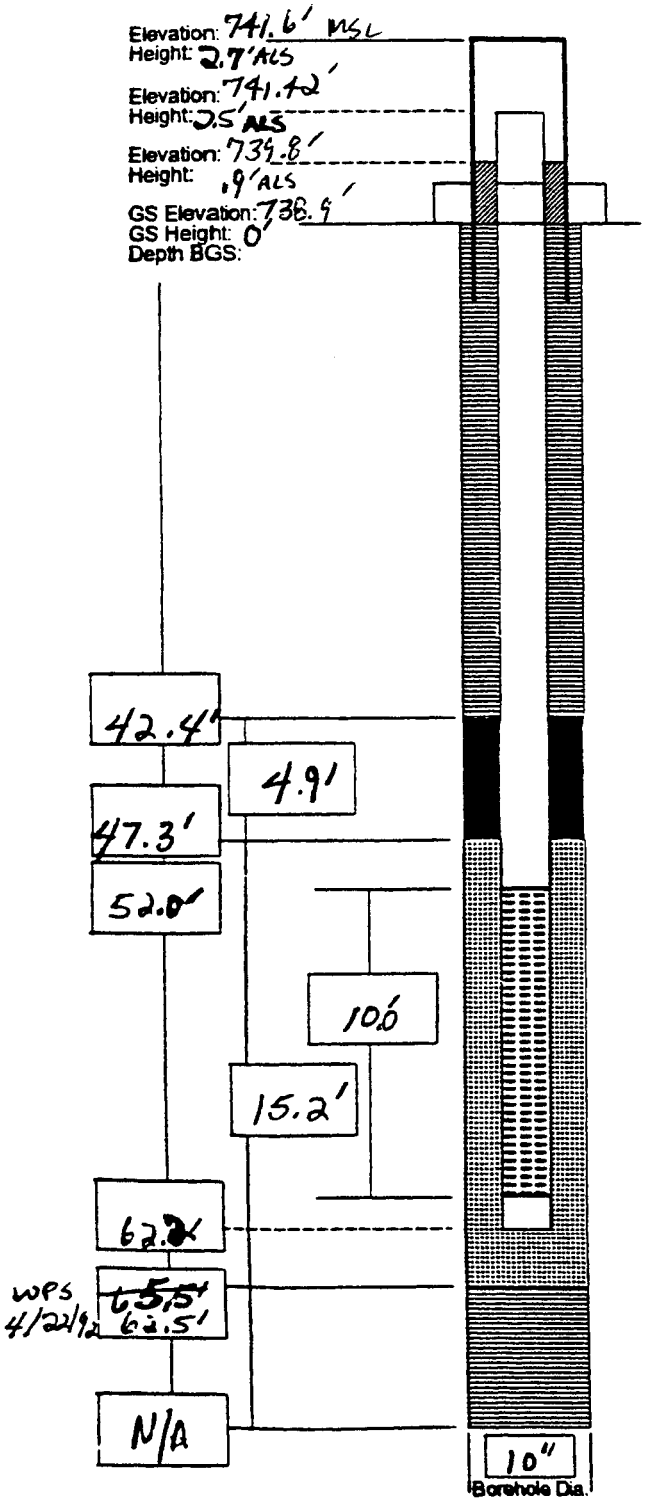
Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
				DNR	50/5.5"	14	SS	0.5
40	N/A		CLAYSTONE, laminated; 10R 5/3 weak red, horizontal bedding; hard; well cemented; fine grained; highly weathered; porous to very porous; very fractured. (Note: The 36.5 to 40.5 foot interval yielded about 1.5 feet of recovery. Because of fracturing and weathering, the looser material was washed out. It is very difficult to determine an interval or intervals of lost coring.)	DNR	DP @ 300 PSI	15	CB	1.13
45						16	CB	1.47
50					DP @ 150-300 PSI	17	CB	1.47
55					DP @ 400 PSI	18	CB	3.4
60								
65			*Bottom of Boring at 62.5 feet*					
70								

Well Const. As-Built



SAIC

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 7	Installation: FT. McCLELLAN ARMY BASE	Site: OLF/LANDFILL #3
Project No.: 01-0827-03-0424-XX	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/14/92	Comp. End: 4/21/92	
Built By: SAIC / WAYNE STONER	Well Coord.: N 1180113.99 E 512352.32	



PROTECTIVE CGS
Material Type: STEEL — Length: 5.0'
Diameter: 8" x 8" BOX — Water Tight Seal( )
Depth BGS: 2.3' — Drainage Hole (X) — Height: 0.9' ALS — Size: 1/4"

GUARD POSTS( ) No.: 4
Configuration: SQUARE — Type: STEEL

SURFACE PAD
Composition & Size: CONCRETE (3000 PSI) 4' x 4' x 6"

RISER PIPE
Type: PVC SCHEDULE 40
Diameter: 4" I.D.

GROUT Composition: CEMENT ; BENTONITE ; WATER
Proportions: 94 lbs ; 5 lbs ; 8 GALS
Interval: 0 - 42.4' BLS Tremied(X)

CENTRALIZERS( ) Type:
Depth(s): N/A

SEAL
Type: BENTONITE PELLETS
Source: WYO-BEN, INC / BILLINGS, MONTANA
Setup / Hydration time: 1 HR Vol. Fluid Added: NONE, H2O IN THE BOREHOLE
Tremied( ) POURED

FILTER PACK
Type: SAND - WASHED & SIEVED
Amount Used: 9 BAGS Tremied(X)
Source: MORIE CO. GEORGIA
Gr. Size Dist: #1 WELL GRAVEL

SCREEN Type: 4" PVC
Manufacturer: BUFFALO WELL PRODUCTS
Diameter ID: 4" ~~DBC~~ WPS 4/22/92
Slot Size: 10 SLOT
Schedule / Thickness: SCHEDULE 40
Interval BGS: 52.0' - 62.0' BLS

SUMP( ) Bottom Cap(X)
Interval BGS: N/A

BACKFILL PLUG
Material: N/A
Setup / Hydration time: N/A Tremied( ) N/A

WATER ADDED( )
Interval: ~ 27' — Amount: 20 GALS
Interval: ~ 31' — Amount: 175 GALS

MONITORING WELL CONSTRUCTION LOG - Standard | Rev: 4/92

Well No.: OLF 7	Installation: FT McCLELLAND ARMY BASE	Site: LANDFILL #3
Project No.: 03-0424	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/14/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

DRILLING EQUIPMENT

Rig Manufacturer: MOBILE DRILL

Rig Model: B57

DRILLING METHOD: (X) Auger (X) Mud Rotary w/o Bentonite ( ) Air Rotary ( ) Cable Tool (X) Other (Specify) CORING

Auger Type & Size: HSA 6 5/8" ID

Casing Size: N/A

Bit Type and Size: HSA - NO BIT ROTARY - TRI-CONE - 6" OD & 10" OD / CORE BARREL 3" OD

Hammer Weight and Percussion Method: 140 lb; 30 INCH DROP; CATHEAD

Rod Size: AW ML

Mud Mixture (Mud Rotary)
Air Filter Method (Air Rotary): BENTONITE WAS NOT USED. FOR MUD, JUST H_2O.

SAMPLING METHOD & NUMBER COLLECTED — TOTAL

(X) Split Spoon No.: 13
( ) Grab Sample No.: ( )
( ) Misc. No.: ( )
( ) Shelby Tube No.: ( )
(X) Core Barrel No.: (3) (2) 5' RUNS (1) 10' RUN

MATERIALS USED (TOTALS)

Sand: 9 BAGS

Bentonite Pellets: 2 BUCKETS (5 GAL BUCKETS)

GROUT
Bentonite: 13 BAGS ~ 65 lbs

Cement: 12 BAGS

SURFACE PAD MATERIALS

Screen (ft): 10'

Riser (ft): 55'

Misc: 1 STEEL PROTECTIVE CASING

MISC: SCREEN LENGTH 10 ft
RISER LENGTH: 55.18 ft = 10.05 ft + 10.05 + 10.05 + 10.00 + 10.00 + 5.03
BOTTOM PLUG SIZE - 0.15 ft
RISER ALS = 2.55 ALS
RISER PIECE CUTOFF = .8'
TOTAL LENGTH OF WELL = 65.33
CUTOFF AND RISER ALS - 3.35
WELL BOTTOM — 61.98 = 62.0' BLS
4/23/92 GROUT MEASURMENT 2.7' BLS.

H_2O LOST WAS ~ 130 GALS.

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 7	Installation: FT McCLELLAN WPS 4/14/92	Site: OLF/LANDFILL #3
Project No.: 03-0424-XX	Client / Project: USATHAMA / ST	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/14/92	Comp. End:	
Built By: SAIC / WAYNE STONER (WPS)	Well Coord.:	

Remarks: 4/14/92

1000 DRILLERS SETTING UP ON OLF 7.

1009 DRIVING 1ST SPLIT SPOON. SEE FIELD BORING LOG. STARTED DRILLING.

1141 DRILLER'S HAVING DIFFICULTIES DRILLING. DENSE MATERIAL.

1216 DRILLER'S BREAKING FOR LUNCH.

1316 DRILLERS HAVE NOT ARRIVED BACK FROM LUNCH.

1338 DRILLERS ARRIVED BACK ON SITE. WPS WENT TO BUILDING 3228 TO GET THE WATER LEVEL INDICATOR.

1408 WPS ARRIVES BACK ON SITE W/ WATER LEVEL INDICATOR.

1508 AUGER DRILLING IS DIFFICULT DUE TO DENSITY OF SOIL AND SIZE OF AUGERS. IT APPEARS THAT THE FORMATION IS SEMI CONSOLIDATED DUE TO REMNANTS OF WHAT APPEARS TO BE A SANDSTONE/SILTSTONE AND CLAYSTONE.

1515 ADDED ABOUT 20 GALS OF H_2O TO BOREHOLE TO EASE DRILLING.

1520 SAMPLE WAS DIFFICULT TO COLLECT. LOW RECOVERY (SEE BORING LOG). STARTED DRILLING AGAIN. HITTING REFUSAL AS DEFINED BY LETTER SHELDON TURNER (ST) HAD. THIS LETTER WAS TO BE SENT TO CHRIS MANIKAS AND STATED THE FOLLOWING:

AUGER REFUSAL ROLLER CONE BIT REFUSAL IS DEFINED AS ADVANCEMENT OF 1' OR LESS IN A MAXIMUM PERIOD OF 15 MINUTES W/ MAXIMUM ~~TORQUE~~ ROTATIONAL TORQUE AND DOWN THRUST.

1540 IT WAS DECIDED THAT THE HOLE SHOULD BE CORED AND THEN REAMED. ST CAN NOT CORE UNTIL HIS COMPANY REPRESENTATIVE AUTHORIZES IT.

1600 WPS CALLED CHRIS MANIKAS (CM) TO ADVISE HIM OF CURRENT STATUS. DRILLERS PREPARING TO CORE AND REAM, SO WE CAN START IN THE MORNING UPON AUTHORIZATION.

1630 DRILLERS LEAVE SITE TO GET NEEDED EQUIPMENT. WPS CLEANING UP AREA.

1700 DRILLERS ARRIVE BACK ON-SITE. GATE IS LOCKED TO THEIR STORAGE AREA. FINISHED FOR THE DAY.

1710 WPS WENT TO BLDG 3228 TO CHARGE EQUIPMENT AND PREP FOR TOMORROW'S ACTIVITES.

1745 WPS AND HAN DEPART SITE (BASE).

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 7	Installation: FT McCLELLAN	Site: OLF/LANDFILL #3
Project No.: 03-0424-XX	Client / Project: USATHAMA / ST	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/14/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

Remarks: 4/15/92 WEATHER: CLOUDY; COOL ~50°F AND CALM.
SAIC FIELD CREW:
WAYNE P. STONER - WPS
HEATHER A. HOWLEY - WPS

0630 WPS AND HAH ARRIVE AT BLDG 322B. WPS CALIB HNU AND LEL. SEE FIELD NOTEBOOK # 1.

0730 WPS MET DRILLERS AT GMO AREA. WPS TRIED TO GET A KEY BECAUSE THE DRILLERS COULDN'T GET TO THEIR SUPPLIES LAST NITE. SHELDON TURNER (ST) SAID IT WOULD TAKE AN HOUR OR SO TO GET READY FOR CORING.

0830 ~~DRILLERS STA~~ WPS 4/15/92 WPS ARRIVES ON-SITE (LANDFILL #3) AND DRILLERS GETTING READY TO START SETTING UP FOR CORING AND REAMING.

0838 AUGERED DOWN TO 30' BLS. PLACING A BENTONITE PLUG TO SEAL OFF THE AUGERS ~~ADDED ~~ THIS IS THE SEAL BETWEEN THE AUGERS AND THE MUD TUB.

0857 PUTTING RODS TOGETHER FOR USING THE ROTOR CONE BIT. THE DRILLER WILL ROTOR TO 30' AND EVALUATE SITUATION. THE FORMATION MAY BE TO SOFT TO CORE. USING A 6" O.D. TRI CONE BIT.

0930 ST IS USING A TRI-CONE BIT SEE PG 2 FOR SPECS. DRILLED ABOUT .5' AND HE SAID THE ROCK IS PRETTY HARD. HE IS GOING TO ROTORY DOWN TO GET A BETTER OF CORING POSSIBILITIES

0939 ST IS GOING TO TRY A SPLIT SPOON AGAIN. IF THERE IS NO RECOVERY THEN HE'LL TRY TO CORE.

0950 COLLECTED SPLIT SPOON SAMPLE. ST CALLED LAB (2) 7oz. JARS ARE ENOUGH FOR GRAIN SIZE AND ATTERBERG ANALYSES. GOING TO USE THE ROLLER BIT UNTIL WE NEED TO CORE AS LONG AS WE GET ENOUGH SAMPLE.

1026 STOPPED DRILLING BECAUSE MORE H_2O IS NEEDED. A LEAK IN THE TUB SEAL HAS LOST ~50 GALS OF H_2O. WPS PUT UP A SOIL BERM TO CONTAIN THE H_2O. WE WILL PUMP THIS H_2O INTO A DRUM.

1030 DRILLER BLEW A MUFFLER ON HIS RIG. HE IS TRYING TO FIX IT.

1035 DRILLER ADDED ~175 GALS OF H_2O TO THE TUB.

1044 STARTING TO DRILL AGAIN W/ THE ROLLER BIT. GETTING H_2S READINGS. CAN'T CONFIRM IF THEY ARE LEGITIMATE OR NOT BECAUSE THE H_2S WAS NOT CALIBRATED. WILL CONTINUE TO MONITOR.

1110 WPS CALLED PAIGE DILLION TO GET H_2S CALIBRATION GAS FOR TOMORROW. WPS TALKED TO (ST) AND AGREED THAT IF 5 PPM IS REGISTERED FOR A MINUTE IN THE BREATHING ZONE, WE WILL UPGRADE TO LEVEL C.

1123 ST PREPARING TO CORE.

1130 TUB SEAL IS STILL LEAKING

1155 READY TO CORE BREAKING FOR LUNCH

1300 WPS ARRIVES BACK ON SITE (LANDFILL #3). ST IS TRYING TO FIX

MONITORING WELL CONSTRUCTION LOG - Standard | Rev: 4/92

Well No.: OLF 7	Installation: FT McCLELLAN	Site: OLF LANDFILL #3
Project No.: 03-0424-XX	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/14/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

Remarks: 4/15/92 TUB SEAL.

1537 STARTING TO CORE FROM 36' BLS. CORING ABOUT 1' PER 4 MIN AT DOWN PRESSURE OF ABOUT 300 PSI.

1401 STOPPED CORING, ~~TO A~~ AT A DEPTH OF 45' BLS. GOING TO PULL THE CORE BARREL. WPS 4/15/92

1413 CORE BARREL PULLED. DRILLERS HAVING PROBLEMS GETTING IT APART. RECOVERY ON CORE BARREL IS ABOUT 1.8'.

1430 STOPPED TO FIX MUD TUB AGAIN.

1441 STARTED CORING AGAIN. DEPTH FROM 40.5'. CORING ABOUT 1' PER 4 MIN AT A DOWN PRESSURE OF 300 PSI WPS 4/15/92

1500 STOPPED CORING AT 45.5' BLS. PULLING CORE BARREL.

1515 PULLING CORE BARREL OUT OF THE HOLE AND LAYING IT DOWN BECAUSE ITS GETTING DIFFICULT TO BREAK IT APART.

1525 PULLING OUT CORED MATERIAL. DECIDED TO PUMP THE HOLE TO SEE IF H_2O IS COMING IN. DRILLERS WENT TO GET NEEDED EQUIPMENT.

1600 DRILLERS ARRIVE BACK ON-SITE. STARTED PUMPING BORE HOLE.

1630 CONTINUING TO PUMP WATER OUT OF BOREHOLE.

1700 WPS DECIDED TO CORE DOWN TO 50.5' AND PUMP DRY.

1710 STARTED CORING AGAIN. WPS 4/15/92

1727 STOPPED CORING AT A DEPTH OF 50.5' BLS. DOWN PRESSURE WAS BETWEEN 150-300 PSI. AT ABOUT 1' PER 4 MIN WPS 4/15/92

1740 STARTED PUMPING BOREHOLE AGAIN.

1800 STILL PUMPING BOREHOLE.

1830 STOPPED PUMPING. BREAKING DOWN FOR THE DAY. H_2O LEVEL 27.5' BTOC.

1900 WPS AND DRILLERS DEPART SITE.

4/16/92

0700 WPS CALIBRATED HNU AND LEL. SEE NOTEBOOK #1.
WEATHER: SUNNY, COOL ~50°F AND CALM.

0730 WPS MET DRILLERS AT LANDFILL #3.

0800 WPS TOOK A H_2O LEVEL MEASUREMENT. 28.7' BTOC. LAST NIGHT'S MEASUREMENT WAS 27.5' BTOC. STARTING TO BAIL THE WELL W/ 2" TEFLON BAILER

0830 H_2O LEVEL MEASUREMENT IS 31.1' BTOC. TD ~ 44' BLS WPS 4/16/92

0905 H_2O LEVEL IS 34.5' BTOC

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 7	Installation: FT McCLELLAN	Site: OLF / LANDFILL
Project No.: 63-0424-x	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/14/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

Remarks: 4/16/92 (CONT')

0927 H_2O LEVEL 42.4' BTOC. STOPPED BAILING HOLE

0943 H_2O LEVEL 42.0' BTOC.

1000 H_2O LEVEL 41.8' BTOC. DECIDED TO CORE TO 60.5' BLS BECAUSE OF LACK OF H_2O. GETTING READY TO CORE.

1026 STARTED TO CORE. H_2O TUB LEAKING. LOSING H_2O FROM THE SOIL UNDER THE H_2O TUB NOT THE H_2O TUB'S SEAL ITSELF.

1040 STARTED CORING AGAIN, LOSING H_2O SO THEY STOPPED.

1049 STARTED CORING AGAIN.

1115 STOPPED CORING AT A DEPTH OF 60.5'. AVG DOWN PRESSURE OF 400 PSI. CORING ABOUT 1' PER 2.5 MIN.

1130 STARTED TAKING OUT CORING. ROCK IS VERY FRACTURED AND POROUS. GOING TO PUMP IT DOWN AND TAKE H_2O LEVEL READINGS. STARTED PUMPING BOREHOLE. WILL PUMP IT DOWN AND START BAILING AGAIN.

1234 STILL BAILING THE HOLE. WPS CALLING OFFICE TO GET INFORMATION ON a submersible pump.

1312 H_2O LEVEL MEASUREMENT 43.4' BTOC.

1316 DRILLERS WENT TO LUNCH WILL LET IT RECHARGE AND CHECK H_2O LEVELS.

1330 CHRIS MANIKAS CALLED AND SAID DRILLING COMPANY WAS SUPPOSED TO SUPPLY SAIC W/ EQUIPMENT TO COMPLETE THE JOB. DOWN TIME.

1340 H_2O LEVEL 42.6' BTOC.

1400 H_2O LEVEL 42.4' BTOC.

1414 DRILLERS ARRIVE BACK FROM LUNCH.

1420 DRILLERS START REAMING BOREHOLE TO 62.0 USING 6" OD TRI-CONE BIT. WPS CALLED GARY BRAY IN REGARDS TO GET SOMETHING TO PUMP THE BOREHOLE, HE SAID BEN KEELER WILL CALL CHRIS MANIKAS.

1555 STOPPED REAMING JERALD ~~BROUGHTON~~ BROUGHTON AND DR BUCHI ARRIVED ON SITE. JERALD BROUGHTON SAID IF WE CAN INSTALL THE WELL IN THE 6" BOREHOLE TO DO IT.

1600 GETTING READY TO CLEAN THE HOLE OUT, SO WE CAN INSTALL THE WELL TOMORROW.

1615 STARTED TO FLUSH THE HOLE.

1630 STOPPED FLUSHING HOLE. STARTED TO CLEAN UP AROUND SITE.

1700 WPS AND DRILLERS DEPART SITE.

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 7	Installation: FT McCLELLAN	Site: OLF / LANDFILL #3
Project No.: 03-0424-xx	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/14/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

Remarks: 4/17/92

0645 WPS 4/17/92 WPS AND HAH ARRIVED ON BASE AT BLDG 3228.

0700 WPS MET DRILLERS AT LANDFILL #3. DRILLERS NEED TO GET H2O & WELL MATERIALS.

0745 ARRIVE BACK ON SITE. DRILLERS SETTING UP TO DECON WELL MATERIALS

0755 STARTED DECONNING WELL MATERIALS. 25 MIN DECON.

0820 FINISHED DECONNING AND STARTED LOADING.

0830 FILLING H2O TANK OF RIG SO WE CAN FLUSH THE HOLE.

0855 FLUSHED BOREHOLE.

0859 TD IS 63.4' BTOC, MEASURED WELL RISER AND SCREEN AND BOTTOM PLUG SEE MISC BOX ON WELL CONSTRUCTION FORM.

0900 PLACING WELL SCREEN AND CASING IN THE HOLE.

0914. CAN'T GET THE TREMIE PIPE DOWN IN THE HOLE. ST IS GOING TO GET 1/2" TREMIE PIPE. DOWN TIME STARTS.

1015 ST ARRIVES BACK ON SITE W/ 1/2" TREMIE PIPE. TRYING TO GET IT TOGETHER BECAUSE IT DOES NOT HAVE THREADS. USING STAINLESS STEEL SCREWS TO PUT IT TOGETHER.

1030 STARTING TO TAKE THE WELL CASING AND SCREEN BACK OUT OF THE HOLE IT WILL NEED TO BE REAMED.

1050 STARTING TO PULL AUGERS.

1115 FINISHED PULLING AUGERS.

1130 DRILLERS WENT TO GET THE BIT TO REAM THE HOLE.

1154 DRILLERS ARRIVE W/ 10" TRI CONE BIT. TO BIG FOR H2O TUB PIPE. PUTTING BIT AND RODS INTO BOREHOLE AND THEN PLACE THE H2O TUB OVER THE HOLE.

1200 STARTED TO REAM. HAD PROBLEMS W/ H2O TUB STARTED TO REAM AGAIN AT 1215.

1330 REAMED TO 40'. ADDING ANOTHER ROD.

1410 HAVING TROUBLE REAMING AT ABOUT 46' BLS DUE TO A HIGHLY FRACTURED ZONE. DOWN PRESSURE ABOUT 150 PSI.

1505 DOWN TO 50'. ADDING ANOTHER ROD.

1510 STARTED REAMING AGAIN. RAN OUT OF GAS.

1515 STARTING REAMING AGAIN TO 60'.

1600 STOPPED REAMING FINISHED FOR THE DAY. DEPTH IS ~~60'~~ 58' WPS 4/17/92

1615 WPS & ST DID PAPERWORK AND DEPARTED SITE.

1645 WPS & HAH DEPART BASE FOR AIRPORT.

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF7	Installation: FT McCLELLAN	Site: OLF/LANDFILL #3
Project No.: 03-0424-xx	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/14/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

Remarks: 4/20/92

1000 WPS AND PAD ARRIVE ON SITE AT LANDFILL #3. DRILLERS ALREADY ON SITE AND REAMING HOLE. H_2O LEVEL MEASUREMENT ~22.7' BTOC. ~ 8814 GALS LOST WPS 4/20/92

1040 DRILLERS FINISHED REAMING HOLE TO A TD OF ~62.5' BLS. GETTING READY TO DECON SCREEN AGAIN. DRILLERS WERE REAMING 1 HOUR

1100 DRILLERS DECONNING SCREEN, WELL CASING AND TREMIE PIPE AGAIN 30 MIN DECON.

1130 FINISHED DECONNING, LOADING WELL MATERIALS.

1144 BACK AT MONITORING WELL LOCATION OLF 7.

1150 FLUSHING BOREHOLE.

1200 FINISHED FLUSHING BORE HOLE. STARTED PULLING RODS.

1215. HAVING PROBLEMS BREAKING THE RODS. CHANGING TEETH ON THE PIPE WRENCH THAT IS HOOKED TO A WINCH AND USED TO BREAK THE RODS.

1230 WRENCH IS FIXED STARTED BREAKING RODS AGAIN.

1245 STARTED ADDING WELL SCREEN AND CASING TO BOREHOLE

1305 SETTING UP TO TREMIE SAND

1307 STARTED TO TREMIE SAND. WPS COLLECT (2) 7oz JARS OF THE SAND PACK USED

1335 ~~TREMIED~~ WPS 4/20/92 TREMIED SAND TO ~47.3' BLS. STARTING TO ADD BENTONITE PELLETS FOR THE SEAL.

1356 FINISH ADDING BENTONITE SEAL. USED 2 BUCKETS. TOP OF SEAL 42.4' BLS.

1400 DRILLERS GETTING CEMENT AND LUNCH WHILE SEAL SETS-UP.

1500 DRILLERS RETURN FROM LUNCH AND START SETTING-UP TO GROUT.

WPS 4/20/92 ~~1500~~ 1515 OFF IN THE DISTANCE THERE IS LIGHTNING AND IT IS STARTING TO RAIN.

1530 IT IS POURING AND STILL THUNDERING AND LIGHTNING.

1700 WPS 4/20/92 ~~1700~~ DEPARTING SITE BECAUSE OF WEATHER CONDITIONS. IT IS NOT SAFE TO WORK.

4/21/92

0830 WPS AND PAD MET DRILLERS ONSITE, LANDFILL #3. RAINY WEATHER AND THUNDER DELAYED WORK. DRILLERS CONTINUING TO SET UP TO GROUT.

0845 DRILLERS GOTO BLDG 1298 TO GET H_2O TRUCK FILLED.

0900 DRILLERS ARRIVE BACK ON-SITE BECAUSE BLDG 1298 IS LOCKED. WPS CALLED LEMAR SMITH TO GET THE BLDG UNLOCK - THEY ARE SENDING SOMEONE OVER.

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 7	Installation: FT McCLELLAN	Site: OLD LANDFILLS
Project No.: 03-0434-xx	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENT EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/21/92	Comp. End:	
Built By: SAIC / WAYNE STOKER	Well Coord.:	

Remarks: 4/21/92 (CONT')

0915 PERSON FROM DEH ARRIVES AND UNLOCKS BLDG.

0945 DRILLERS ARRIVE BACK ONSITE AND H_2O TRUCK GETS STUCK ABOUT 200 TO 300 FEET FROM THE WELL. DRILLERS SET UP A SYSTEM TO FILL DRUMS AS FAR AWAY FROM THE H_2O TRUCK ~~AS PAR~~ AS POSSIBLE AND PUMP THE DRUMS USING THE RIG HOOK-UP.

1030 STARTING TO GROUT OLF 7 INCLUDING MIXING THE GROUT.

1100 MIXING LAST BATCH OF GROUT.

1115 GROUT PUMP HAVING PROBLEMS.

1130 FINISHED GROUTING OLF 7. CLEANING UP.

1150 TRYING TO MOVE RIG. RIG IS GETTING STUCK.

1220 WPS CALLED LEMAR SMITH TO GET EQUIPMENT TO PULL OUT THE RIG AND SUPPORT TRUCK. LEMAR WAS OUT TO LUNCH.

1225 DRILLERS WENT TO LUNCH. WPS AND PAD WENT TO DEH TO FIND LEMAR SMITH.

1245 WPS TALKED TO LEMAR AND HE IS GOING TO SEND SOMEONE OUT TO PULL OUT THE VEHICLES. WPS AND PAD WENT TO BLDG 3220 TO SEE IF ANY FEDEX PACKAGES ARRIVED.

1325 WPS AND PAD ARRIVE AT LANDFILL #3. WAITING FOR HELP.

1330 DRILLERS ARRIVE ON SITE. THEY ARE GOING BACK TO CLEAN-UP AND LOAD RIG UNTIL PERSON FROM DEH COMES.

1400 PERSON FROM DEH ARRIVES. STARTS TO PULL OUT RIG.

1430 ~~PULLS~~ WPS 4/21/92 DEH PERSON PULLED OUT RIG AND SUPPORT TRUCK W/ A D9 DOZER. HE IS GOING TO PUT SOME DRY SOIL AROUND THE DECON PAD TO ~~LIMIT~~ ENHANCE VEHICLE TRACTION. WPS 4/21/92

1445 DRILLERS STARTED DECONNING.

1500 LEMAR SMITH ARRIVED ON SITE TO ASSESS ACCESS INTO MONITORING LOCATION OLF 8. WPS WILL CONTACT HIM LATER IN THE WEEK TO MAKE ARRANGEMENTS. WPS 4/21/92

1600 LT MIKE McMULLEN ARRIVED ON SITE, OPENED BLDG 1298 SO DRILLERS CAN GET H_2O.

1645 DRILLERS FINISHED DECONNING.

1700 SHELDON TURNER (ST) WENT TO GMO TO GET MORE DRUMS. STEVE DESHERIA WENT TO GET A LOAD OF H_2O.

1745 ST AND WPS DOING PAPERWORK.

1800 SAIC PERSONNEL AND DRILLERS DEPART SITE. SAIC PERSONNEL GOING TO BLDG 3228.

1820 SAIC PERSONNEL DEPART BASE.

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Field Boring Log

Site File No.: BR-0424-XX County CALHOUN Boring No. ~~OLF 7~~ WPS 4/14/92 Monitor Well No. OLF7

Site File Name FT. McCLELLAN / (SITE OLF/LANDFILL #3) Surface Elev. _____ Completion Depth 62.5'

Fed. ID. No. _____ Auger Depth 30.0' Rotary Depth 62.5'

Quadrangle _____ Sec. ____ T. ____ R ____ Date: Start 4/14/92 Finish SOIL SAMPLING & CORING ~~4/18/92~~ 4/18/92 WPS 4/27/92

Boring Location LOCATED ON NORTWESTERN SIDE OF SITE. IT IS APPROXIMATELY 150-200 YDS NORTH OF OLF 5.

Drilling Equipment MOBILE DRILL BS7; HSA 6 5/8" ID; 140 lb HAMMER

Personnel: G - WAYNE P. STONER; D - SHELDON TURNER; H - STEVE P. DESHERLIA; H - JIMMY M. WRIGHT

TIME ~~Elev.~~	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Valves (Blows)	OVA or HNU readings	REMARKS
1009	(0-2.0') 0-.45' [ML] SILT, V.FINE TO FINE SAND 20%, 10% MED SAND. 10YR 4/2 DK. GRAYISH BROWN, LOW DENSE, V.SL. PLASTIC; MOIST. .45-2.0' - [ML] SILT, V.FINE SAND 10%, CLAY 10-20%. 10YR 5/8 YELLOWISH BROWN; LOW DENSE TO MED DENSE; LOW PLASTIC; MOIST.		1	SS	2.0'		2-3-3-5	ND	SS - SPLIT SPOON; DNR - DATA NO; ND - NO DETECTED
1026	(2.5-4.5') [ML] SILT, CLAY 10-20%, V.FINE TO FINE ~~SAL~~ SAND 20%. 10YR 5/8 YELLOWISH BROWN, ~~MED~~ LOW DENSE; NON TO V.LOW PLASTIC; MOIST TO DRY.	2.5	2	SS	2.0'		3-4-6-7	ND	BKGD - BACKGROUND .8 PPm; LEL: 0
1040	(5-7.0') SAME AS 2.5-4.5' INTERVAL EXCEPT MED DENSE TO DENSE, 7.5YR N7/0 LIGHT GRAY CLAY - 20%; LOW PLASTICITY; MOIST TO DRY. A PIECE OF ~~MILK~~ QUARTZ WAS IN THE SPOON WPS 4/14/92	5.0	3	SS	1.0'		5-14-~~37~~-41	.2	LEL: 0
1110	(7.5-9.5') (7.5-8.5) SAME AS 5-7' INTERVAL. 8.5-9.2' [SM] SAND, V.FINE TO FINE, SILT 20-30% CLAY <5%. 7.5YR 4/6 STRONG BROWN, MED DENSE; NON-PLASTIC; DRY. 9.2-9.5' [ML] SILT, V.FINE SAND 10-20%, CLAY 5%, 7.5YR 6/8 REDDISH YELLOW AND 7.5YR 4/4 DK BROWN; MED DENSE; NON PLASTIC; DRY. *	7.5	4	SS	2.0		8-9-15-21	ND	LEL: 0
1122	(10.0-12.0') (SM) SAND, V.FINE TO FINE, SILT 20%. 5YR 5/2 REDDISH GRAY; LOW DENSE, NON-PLASTIC; DRY	10.0	5	SS	2.0		8-14-21-29	ND	LEL: 0
1145	(12.5-14.5') SAME AS 10.0-12.0' INTERVAL	12.5	6	SS	1.5		9-13-23-30	ND	LEL: 0
NR	(15.5-~~15.5~~ 16.0) SILTY CLAY, 20-30% SILT. 10YR 5/8 YELLOWISH BROWN AND 10YR 7/2 LIGHT GRAY; MED DENSE; LOW PLASTICITY; DRY. ~~PARTINGS~~ WPS 4/14/92 SILTY PARTINGS (~~15.5~~ 16.0-17) SAME AS 10-12' INTERVAL.	15.0	7	SS	1.5		6-10-12-15	ND	LEL: 0
1150	(17.5-19.5) [ML] SILT, CLAY 30%, 10R 4/2 WEAK RED; LOOSE TO DENSE; NON-PLASTIC; DRY.	17.5	8	SS	1.5		9-13-21-27	ND	LEL: 0

Field Boring Log Page 2 of 1

Science Applications International Corporation

Site File No.: 03-0424-XX County CALHOUN Boring No. OLF 7 Monitor Well No. OLF

Site File Name FT. MCCLELLAN / OLF (LANDFILL #3) Surface Elev. _____ Completion Depth 62.5

Fed. ID. No. _____ Auger Depth 30.0' Rotary Depth 6.

Quadrangle _____ Sec. _____ T. _____ R _____ Date: Start 4/14/92 SOIL SAMPLING & CORING Finish 4/16/92

Boring Location NORTHWESTERN SIDE OF SITE, APPROXIMATELY 150-200 YDS NORTH OF OLF 5.

Drilling Equipment HSA 6 5/8" ID; B57; 140 lb HAMMER

Personnel: G - WAYNE STONE; D - SHELDON TURNER; H - STEVE DESNERL; H - JIMMY WRIGHT

TIME	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Valves (Blows)	OVA or HNU readings	REMARKS
									SS-SPLIT SPOON CB-CORE BARREL
1200	(20-22') SAME AS 10-12' INTERVAL BUT 30% SILT & LOW TO MED DENSE.	21.5	9	SS	X	1.0	10-13-20-36 WPS 4/14/92 9-13-21-27	ND	LEL: 0
1426	(22.5-24.5) SAME AS 20-22' INTERVAL.	24.2	10	SS	X	1.35	10-23-33-42	ND	LEL: 0
1445	(25-27') [ML] SILT, V. FINE SAND 30%. 5YR 5/2 REDDISH GRAY; ~~LOW TO ML~~ WPS 4/14/92 DENSE; NON-PLASTIC; DRY. CLAYSTONE PRESENT IN SAMPLE.	26.5	11	SS	X	1.4	8-15-19-31	ND	LEL: 0
1520	(27.5-28.4') CLAYSTONE, 10R 4/2 ~~WEAK RED~~ WPS 4/14/92; LAMINATED; ~~HARD~~ SOFT; ~~WELL~~ POORLY CEMENTED; FINE GRAINED; BADLY WEATHERED.	29.0	12	SS	X	.7	14-50/5"		LEL: 0
	5/16/92								ROTARY AT 30' BLS. WILL START CORING AT 36' IF SPLIT SPOON ~~SAMPLE~~ WP RECOVERY IS VERY LOW
0940	(31-32.1') SAME AS 27.5-28.4' INTERVAL.	31.5	13	SS	X	2.1	25-34-50/5"		
		34							
	(36.0-36.5') ~~CLAYSTONE;~~ WPS 5/15/92	36.5	14	SS	X	3	50/5"		ABOUT 30% RECOVERY
	(36.5-40.5') CLAYSTONE; LAMINATED; 10R 5/3 WEAK RED; HARD; WELL CEMENTED; FINE GRAINED; HORIZONTAL BEDDING; BADLY WEATHERED; ~~SOFT~~ POROUS; V. FRACTURED		15	CB	X				

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Field Boring Log

Site File No.: 03-0424-XX County CALHOUN Boring No. — Monitor Well No OLF 7

Site File Name FT McCLELLAN / (OLF/LANDFILL#3) Surface Elev. ____ Completion Depth 62.5'

Fed. ID. No ____ Auger Depth 30.0' Rotary Depth 62.5'

Quadrangle ____ Sec. ____ T. ____ R ____ Date: Start 4/14/92 Finish 4/20/92

Boring Location NORTHWESTERN SIDE OF SITE. APPROXIMATELY 150 - 200 YDS NORTH OF OLF 5.

Drilling Equipment MOBILE DRILL B57; 3" OD COREBARREL.

Personnel: G - WAYNE STONER; D - SHELDON TURNER; H - JIMMY WRIGHT; H - STEVE DESHERLIA

Elev.	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA or (HNU) readings	REMARKS
	NOTE: THE 36.5' TO 40.5' INTERVAL YIELDED ABOUT 1.5' OF RECOVERY. BECAUSE OF FRACTURING AND WEATHERING THE LOOSER MATERIAL WAS WASHED OUT. IT IS V. DIFFICULT TO DETERMINE AN INTERVAL OR INTERVALS OF LOST CORING.						N/A		CB - CORE BARREL
		40.5			X				RECOVERY - ~30% ~1.5'
	(40.5' - 45.5) SAME AS 36.5-40.5' INTERVAL								
		43.0	16	CB					
		45.5			X				RECOVERY - ~30% ~1.5'
	(45.5' - 50.5) SAME AS 36.5-40.5' INTERVAL								
		48.0	17	CB					
		50.5			X				RECOVERY - ~25% ~2.5'
	(50.5' - 60.5') SAME AS 36.5-40.5' INTERVAL AND V. POROUS.								
		53.0	18	CB					
		55.5							

Science Applications International Corporation

Field Boring Log

Site File No.: 03-0424-XX County CALHOUN

Boring No. — Monitor Well No OLF 7

Site File Name FT. McCLELLAN / (OLF/LANDFILL #3)

Surface Elev. ____ Completion Depth 62.5'

Fed. ID. No.

Auger Depth 30.0' Rotary Depth 62.5'

Quadrangle ____ Sec. ____ T. ____ R. ____

Date: Start 4/14/92 Finish 4/18/92

Boring Location NORTHWESTERN SIDE OF SITE. APPROXIMATELY 150-200 YDS NORTH OF OLF 5.

Drilling Equipment MOBILE DRILL B57; 6 5/8" HSA; 10" OD TRI-CONE BIT; 140 lb HAMMER

Personnel: G - WAYNE STONER; D - SHELDON TURNER; H - JIMMY WRIGHT; H - STEVE DESHERLIA

Elev.	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA or HNU reading	REMARKS
			1B						
		59.5							
	REAMED TO 62.5 W/ 10" OD. TRICONE BIT. NO SAMPLE COLLECTED BETWEEN 60' AND 62.5' BLS.	62.0							

Page __ of __

MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 4/92
Well No.: OLF 7	Installation: FT McCLELLAND		Site: LANDFILL #3/OLF
Project No.: 03-0484-XX	Client / Project: USATHAMA / SI		
Drilling Contractor: ENVIRONMENTAL EXPLORATION INC		Driller: SHELDON TURNER	
Comp. Start: 4/15/92		Comp. End:	
Built By: SAIC / WAYNE STONER		Well Coord.:	

Remarks: ABBREVIATIONS:

WPS - WAYNE P. STONER
BLDG - BUILDING
w/ - WITH
H_2O - WATER
ST - SHELDON TURNER
HAH - HEATHER A. HOWLEY
GMO - GAME MANAGEMENT OFFICE
~ - ABOUT OR APPROXIMATELY
BLS - BELOW LAND SURFACE
ALS - ABOVE LAND SURFACE
BTOC - BELOW TOP OF CASING
TD - TOTAL DEPTH
OLF - OLD LANDFILL & LANDFILL#3
DEH - DIRECTORATE OF ENGINEERING AND HOUSING (JOHNSON CONTROLS)
PAD - PAIGE A. DILLON
FEDEX - FEDERAL EXPRESS
CALIB - CALIBRATE
LF2 - LANDFILL #2
HR - HOUR (s)
' - FEET
@ - ABOUT
GAL - GALLON
V. - VERY
SL. - SLIGHTLY
REC - RECOVERY
LT - LIGHT
HSA - HOLLOW STEM AUGER
ID - INSIDE DIAMETER
OD - OUTSIDE DIAMETER
TD - TOTAL

OLF8

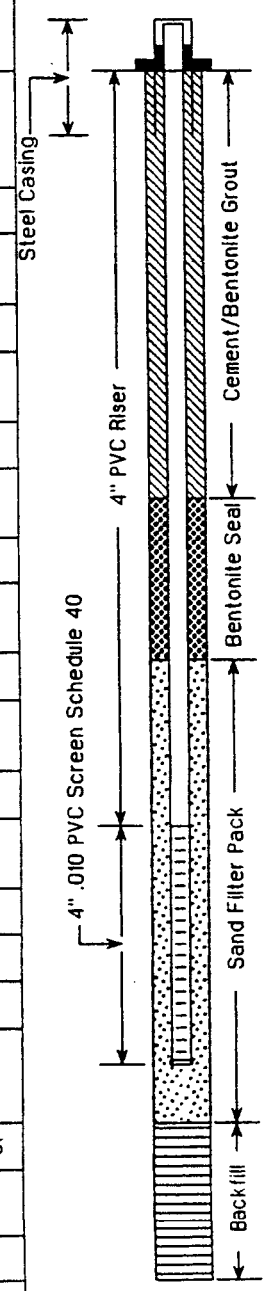
SOIL BORING/WELL LOG

Project Name: Fort McClellan Site Investigation
Site Location: Landfill #3 (OLF)
Monitoring Well No.: OLF8
SAIC Project No.: 01-0827-03-0424
Northing (ft): 1179911.24
Start/Finish Date: 04-27-92/04-28-92
Geologist: W.P. Stoner
Easting (ft): 512279.72
Well Completion Depth (ft): 45.0
Drilling Co.: Environmental Exploration, Inc.
Groundwater Elev. (ft): 708.26 on 6/4/92
Drilled Depth (ft): 52.0
Driller: S. Turner
Drilling Method: Hollow Stem Auger/Mud Rotary
Surface Pad Elevation (ft): 737.64
Drill Rig: Mobile Drill B57
Sampling Method: Split Spoon/Shelby Tube
Top of Casing Elevation (ft): 739.34

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
5	ML		SILT, 20-30% clay, 20% very fine sand; 10YR 6/3 pale gray; firm; slightly plastic to plastic; moist.	0.2/0	2-3-2-3	1	SS	1.8
10	CH		SILTY CLAY, some sand, 61% clay, 21% silt, 18% sand; 10YR 6/8 brownish yellow mottled with 10YR 6/1 gray, iron staining; stiff; plastic; moist.	DNR/0	DP @ 750 PSI	2	ST	2.0
15	ML		CLAYEY SILT, some sand, 33% silt, 33% clay, 29% sand, 5% gravel; 10YR 6/8 brownish yellow; hard; very slightly plastic; dry.	0/0	7-27-34-27	3	SS	1.3
20	N/A		CLAYSTONE; 10YR 7/4 very pale brown; no visible bedding; hard; well cemented; very fine grained; moderately weathered. (No geo-technical sample was collected due to low recovery from claystone layer.)	DNR/0	50/3"	4	SS	0.25
25	ML		SILT, 10-15% clay, 10% very fine sand; 10YR 6/8 brownish yellow; hard; slightly plastic; moist. (Claystone present same as previous sample)	0/0	30-50/3"	5	SS	0.8
30	GM GC			DNR	35-50/5"	6	SS	1.3
35	N/A SM		SANDY GRAVEL, some silt and clay, 37% gravel, 37% sand, 18% silt, 8% clay; 10YR 3/3 dark brown; hard; very slightly plastic; very moist to wet.	DNR	50/5"	7	SS	0.5
40	ML		SILTSTONE; 10YR 6/6 brownish yellow stained with 2.5Y 3/0 very dark gray; thinly bedded; hard; well cemented; fine grained; moderately weathered; solid; horizontal fractures.	DNR/0	50/5"	8	SS	0.5
45			SAND, v. fine to very coarse sand, 20-30% silt, 20% clay; 10YR 6/6 brownish yellow mottled with 2.5Y 3/0 very dark gray; dense; very slightly plastic; moist to wet. (Siltstone present same as previous sample)	DNR/0	50/3"	9	SS	0.25
50			SILT, 20-30% very fine sand; 10YR 4/2 weak red; hard; non to very slightly plastic; moist to wet.	DNR/0	11-36-62/5"	10	SS	0.5
55			SILT, 20-30% very fine sand; 10YR 4/2 weak red mottled with 7.5YR 4/6 strong brown; hard; non to very slightly plastic; moist to wet.					
60			SILT, 10-15% very fine sand; 10YR 4/2 weak red; hard; slightly plastic to non-plastic; dry to moist.					

Bottom of Boring at 52.0 feet

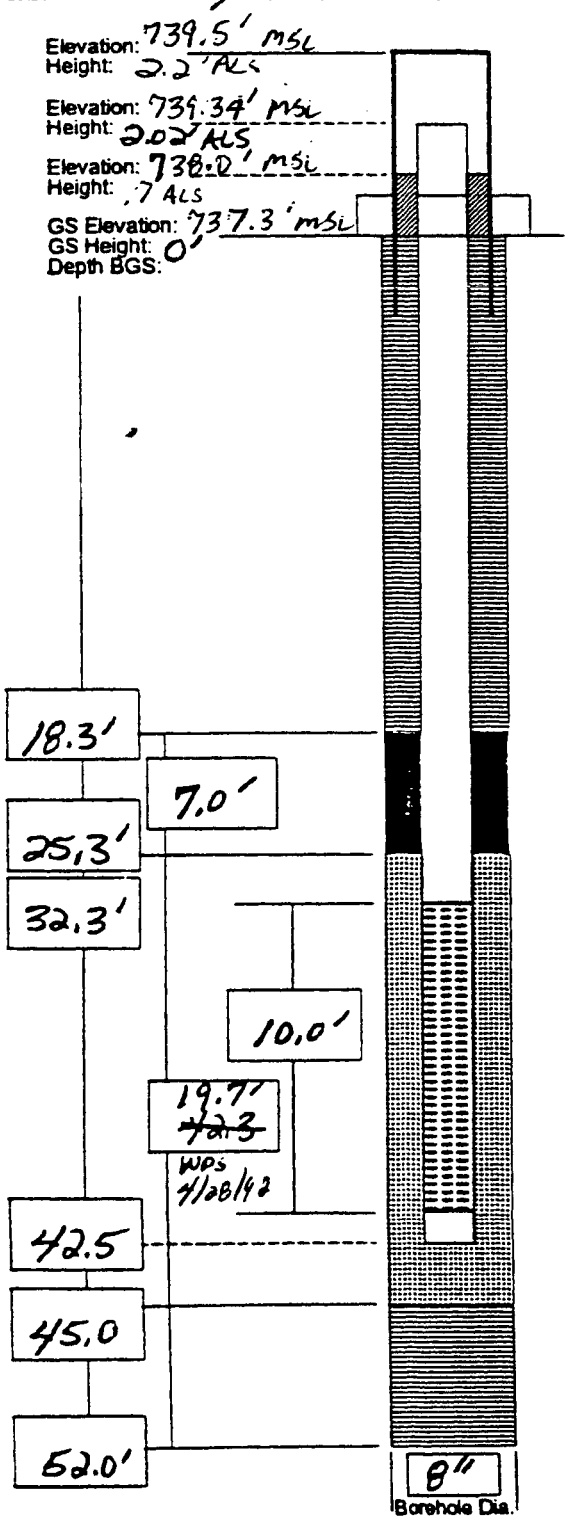
Well Const. As-Built



SAIC

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 8	Installation: FT McCLELLAN	Site: OLF/LANDFILL #5
Project No.: 03-0424-XX	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/27/92	Comp. End: 4/28/92	
Built By: SAIC / WAYNE STONER	Well Coord.: N 1179911.24 E 512279.72	

Elevation: 739.5' MSL
Height: 2.2' ALS
Elevation: 739.34' MSL
Height: 2.02' ALS
Elevation: 738.0' MSL
Height: .7 ALS
GS Elevation: 737.3' MSL
GS Height: 0'
Depth BGS:



PROTECTIVE CGS Material Type STEEL	Length: 5.0'
Diameter 8"x8" BOX	Water Tight Seal( )
Depth BGS 2.8'	Drainage Hole (X) Height: .8' ALS Size: 1/4"
GUARD POSTS(X) No.: 4 Configuration: SQUARE	Type STEEL
SURFACE PAD Composition & Size CONCRETE (3000 PSI) 4'x4'x6"	
RISER PIPE Type PVC	
Diameter 4" ID	
GROUT Composition: CEMENT; BENTONITE; H_2O Proportions: 94 lbs; 5 lbs; 8 GALS	
Interval 0' - 18.3' BLS	Tremied(X)
CENTRALIZERS( ) Type: Depth(s) N/A	
SEAL Type BENTONITE SLURRY	
Source WYO-BEN, INC BILLINGS, MT	
Setup / Hydration time 1.2 HRS	Vol. Fluid Added
Tremied(X)	
FILTER PACK Type SAND	
Amount Used 7 BAGS	Tremied(X)
Source MORIE CO. GEORGIA	
Gr. Size Dist #1 WELL MATERIAL	
SCREEN	Type: PVC Manufacturer: BUFFALO WELL PRODUCTS
Diameter ID: 4"	OD:
Slot Size: 10 SLOT Schedule / Thickness 40	
Interval BGS ~~42.3~~ WDS 4/28/92 32.3' - 42.3' BLS	
SUMP( ) Interval BGS 42.3' - 42.5' BLS	Bottom Cap(X)
BACKFILL PLUG Material N/A	
Setup / Hydration time N/A	Tremied( ) N/A
WATER ADDED( ) Interval INITIAL H_2O FOR REAMING	Amount ~200 GALS
Interval 25 - 45' BLS	Amount ~20 GALS FOR SAND TREMI

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 8	Installation: FT McCLELLAN	Site: OLF/LANDFILL #3
Project No.: 03-0424-xx	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/27/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

DRILLING EQUIPMENT

Rig Manufacturer: MOBILE DRILL

Rig Model: B57

DRILLING METHOD: (X) Auger ( ) Air Rotary ( ) Other (Specify) ____
(X) Mud Rotary NO BENTONITE) Cable Tool

Auger Type & Size: 2 1/4" ID HSA

Casing Size: N/A

Bit Type and Size: 8" O.D. TRI-CONE BIT

Hammer Weight and Percussion Method: 140lb HAMMER; CATHEAD AND 30" DROP

Rod Size: AWML

Mud Mixture (Mud Rotary) NO BENTONITE WAS USED, JUST H_2O
Air Filter Method (Air Rotary)

SAMPLING METHOD & NUMBER COLLECTED

(X) Split Spoon No.: (4) (X) Shelby Tube No.: (1)
( ) Grab Sample No.: ( ) ( ) Core Barrel No.: ( )
( ) Misc. No.: ( )

MATERIALS USED (TOTALS)

Sand: 7 BAGS Bentonite Pellets: SLURRY MIX: 25lbs TO 16 GALS

GROUT
Bentonite: ~15-20 lbs Cement: 3 BAGS

SURFACE PAD MATERIALS

Screen (ft): 10.0'

Riser (ft): 34.5

Misc: WPS 7/28/92 ~~END~~ BOTTOM CAP = .15' ~ .2'

MISC:

MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 4/92
Well No.: OLF 8	Installation: FT MCCLELLAN		Site: OLF / LANDFILL #3
Project No.: 03-0424-xx	Client / Project: USATHAMA / SI		
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC		Driller: SHELDON TURNER	
Comp. Start: 4/27/92		Comp. End:	
Built By: SAIC / WAYNE STONER (WPS)		Well Coord.:	

Remarks: 4/27/92

0700 WPS ARRIVES AT BLDG TO CALIBRATE LEL AND HNU. SEE NOTEBOOK #1. WEATHER: CLOUDY, COLD ~40-50°F AND BREEZY. JOHN PENDLETON (JP) ARRIVED LAST NITE AND WILL BE HELPING TEV AND DERRAL VANWINKLE (DVW)

0800 WPS ARRIVES ON SITE (LANDFILL #3) AND DRILLERS ARE DECONNING THE RIG. THEY ARRIVED ABOUT 0730.

0900 DRILLERS FINISHED DECONNING RIG. WAITING ON SHELDON TURNER (ST) TO RETURN.

0915 WPS CHECKED OLF 9 FOR H_2O LEVEL WHICH WAS 14.78' BLS

0930 ST ARRIVES AND WE ARE TAKING THE RIG BACK TO OLF 8. LEMAR SMITH CAME OUT ~0930 TO LOOK AT ACCESS PROBLEM. ~~ONE~~ TWO OF HIS PEOPLE WERE OUT EARLIER TO TRY AND SMOOTH A SPOT ON THE ROAD BACK. THEY WERE HERE ABOUT 0900. 4/27/92

1000 HAD TO PULL THE RIG ON THE HOLE W/ A BULL DOZER. THEY (JOHNSON CONTRC) ARE GOING TO PUT A COUPLE OF LOADS OF CHERT IN THE BAD SPOT SO THEY RIG MIGHT NOT GET STUCK WHEN PULLING OFF THE HOLE.

1015 DRILLERS WORKING ON RIG TRYING TO PUT A MUFFLER ON.

1120 STARTED DRILLING. WILL NOT TAKE A 0-2' BECAUSE OF THE ESCAVATION BY THE BULL DOZER. WE WILL INSTEAD START AT 5' BLS. SEE FIELD BORING LOGS FOR LITHOLOGY DESCRIPTIONS.

1230 BROKE FOR LUNCH. WPS FILLING OUT PAPERWORK.

1330 DRILLERS RETURN FROM LUNCH.

1400 START DRILLING AGAIN. HIT A FRACTURED ROCK ZONE BETWEEN 30 AND 31'. WAITING FOR H_2O TO COME UP.

1415 NO WATER IN THE HOLE.

1445 ~~H_2O~~ INSIDE OF SPOON IS WET BUT IT IS THE FALLIN THAT IS WET. WE WILL WAIT FOR H_2O TO RISE. WPS 4/27/92 WPS 4/27/92

~~WPS 4/27/92 1445 DRILLING TO 35'~~

1508 H_2O LEVEL IS 34.6' BLS

1518 H_2O LEVEL IS 33.9' BLS

1524 DRILLING TO NEXT INTERVAL. SEE FIELD LOGS

1630 LAST SAMPLE AT 50-52' WAS DRY. WE WILL SET THE SAND PACK STARTING AT 50' AND WELL BOTTOM AT ~47' BLS. THE SAND PACK WILL EXTEND TO ~~A~~BOUT 29' BLS.

1640 DRILLERS PULLING AUGERS

1651 FINISHED PULLING AUGERS. DRILLERS ARE GOING TO DECON THE MUD TUB AND SET IT UP ON OLF 8 FOR REAMING. THEY WILL USE AN 8" O.D. TRI-CONE BIT.

1730 DRILLERS LEAVE SITE, FINISHED FOR THE DAY. WPS WENT TO BLDG 3228 TO PREP FOR TOMORROW.

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 8	Installation: FT McCLELLAN	Site: OLF/LANDFILL #3
Project No.: 03-044-XX	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: ~~4/28/92~~ 4/27/92 WPS 4/28/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

Remarks: 4/28/92

WEATHER: SUNNY, COLD ~ 40°F AND BREEZY.

WPS 4/28/92 ~~0715 DRILLERS~~

0700 WPS ARRIVES ON SITE AND WAITED FOR DRILLERS. CALIB HNU AND LEL. SEE NOTEBOOK #1

0710 WPS WENT TO BLDG 3228 TO PICK UP SOME EQUIPMENT.

0730 WPS MET DRILLERS AT OLF (LANDFILL #3). THEY HAD ARRIVED ~ 0715. THEY NEEDED H_2O AND BLDG 1298 WAS LOCKED. WPS MET STEVE DESMERLIA (SD) AT BLDG 1298 WHILE ST WENT TO GET DRUMS. WPS CALLED CHRIS MANIKAS (CM) AND GAVE HIM CURRENT STATUS. SURVEYORS HAVE NOT CLEARED LANDFILL #1. HE SAID THEY SHOULD HAVE IT CLEARED BY TODAY IF NOT CALL CM BACK. WPS 4/28/92

0800 WPS MET DRILLERS AT OLF 8. H_2O LEVEL READING IS ~28.5' BLS.

0815 STARTED TO REAM W/ 8" OD TRICONE BIT. WPS 4/28/92

1045 FINISHED REAMING, WPS CALLED LEMAR TO PULL OUT H_2O TRUCK BECAUSE IT WAS STUCK. DRILLERS BREAKING DOWN.

1100 DRILLERS WAITING TO MOVE.

1130 DEH PERSON ARRIVED W/ LEMAR SMITH & PULLED H_2O TRUCK OUT.

DRILLERS ARE DECONNING WELL MATERIAL.

1216 DRILLERS GO TO LUNCH.

1300 ~~ARE~~ WPS 4/28/92 DRILLERS COME BACK FROM LUNCH. CONTINUEING TO DECON WELL MATERIALS.

1330 MOVING TO OLF 8 LOCATION.

1335 PUT WELL SCREEN AND RISER IN THE BOREHOLE. STARTING TO TREMIE SAND.

1415 FINISHED TREMIEING SAND. 7 BAGS. MIXING BENTONITE SLURRY FOR SEAL. USED 25 lbs OF BENTONITE & ABOUT 16 GALS OF H_2O

1420 ADDING SLURRY. WILL LET IT SET UP ~45 MINS TO AN HOUR.

1530 MIXING GROUT. STARTED GROUTING

1535 FINISHED GROUTING, STARTED BREAKING DOWN AND CLEANING UP.

1545 DRILLERS DECONNING RIG. WHEN FINISHED DECONNING, DRILLERS ARE GOING TO PREPARE TO SET SURFACE PADS ON THE INSTALLED WELLS AND BREAK DOWN DECON PAD.

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Field Boring Log

Site File No.: 03-0424-XX County CALHOUN Boring No. — Monitor Well No OLF2

Site File Name FT McCLELLAN / (OLF/LANDFILL #3) Surface Elev. _____ Completion Depth 52.0

Fed. ID. No _____ Auger Depth 50' Rotary Depth 45

Quadrangle _____ Sec. ____ T. ____ R ____ Date: Start 4/27/92 Finish 4/27/92

Boring Location ABOUT 15' FROM OLF 5

Drilling Equipment MOBILEDRILL B57; 2¼" ID HSA ; 140 lb HAMMER

Personnel: G - WAYNE P. STOPLI; D - SHELDON TURNER; H - JIMMY WRIGHT; H - STEVE DESHERL

Elev.	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA or GEM readings	REMARKS
									SPLIT SPOON - SS SHELBY TUBE - ST DOWN PRESSURE - DP. DATA NOT RECORDED - DNR NON-DETECT - ND SPLIT SPOON - SS ~~SHEL~~ WPS 4/27/92
		2.5							
		5.0'							
	① [ML] SILT; 20-30% CLAY; 20% V. FINE SAND 10YR 6/3 PALE GRAY; SOFT; SL. PLASTIC TO PLASTIC MOIST ~~TO WET.~~ WPS 4/27/92 REC: 1.8'		①	SS	1.8		2-3-2-3	.3	LEL: 0
		7.5'							
		10.0'							
	② [CL] CLAY: 10-20% SILT, 10YR 6/8 BROWNISH YELLOW MOTTLED W/ 10YR 6/1 GRAY; IRON STAINING; STIFF; PLASTIC, MOIST. TOP OF SHELBY		②	ST	2.0		75 DP PSI	DNR	LEL: 0
		12.5							
		15.0							
	③ [ML] SILT; 30% CLAY, 10YR 6/8 BROWNISH YELLOW; DENSE; SL. V. SL PLASTIC; DRY.		③	SS	1.3		7-27-34-37	ND	LEL: 0
		17.5							

SAIC Science Applications International Corporation

Field Boring Log

Site File No.: 03-0424-XY County: CALHOUN Boring No.: — Monitor Well No: OLF8

Site File Name: FT McCLELLAN / (OLF/LANFILL #3) Surface Elev.: _____ Completion Depth: 52.0

Fed. ID. No.: _____ Auger Depth: 50' Rotary Depth: 45'

Quadrangle: _____ Sec. ____ T. ____ R. ____ Date: Start 4/27/92 Finish SAMPLING 4/29/92

Boring Location: APPROXIMATELY 15' FROM OLF 5

Drilling Equipment: MOBILE DRILL B57; 2 1/4" ID HSA; 140 lb HAMMER

Personnel: G - WAYNE STONER; D - SHELDON TURNER; H - JIMMY WRIGHT; H - STEVE DESHERLA

Elev.	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA or HNU readings	REMARKS
	(4) GEO-TECH SAMPLE NOT COLLECTED DUE TO LOW RECOVERY FROM ~~STOT~~/CLAYSTONE LAYER. ~~STOT~~/CLAYSTONE; NO VISIBLE BEDDING (4/27/92 LOGS); 10YR 7/4 V. PALE BROWN; HARD; WELL CEMENTED; V. FINE GRAINED; SEMI-WEATHERED; SOLID.	21.5	(4)	SS	X		50/3"	DNR	DNR - DATA NOT RECORDED; ND - NON DETECT; LEL: 0
	(5) [ML] SILT; 10-15% CLAY; 10% V. FINE SAND. 10YR 6/8 ~~V. PALE BROWN~~ ~~STRONG~~ BROWNISH YELLOW; DENSE; SL PLASTIC; MOIST. CLAYSTONE PRESENT SAME AS SAMPLE #4.	24.0 / 26.5	(5)	SS	X		30-50/3"	ND	LEL: 0
	(6) [SM] V. FINE SAND; 20-30% SILT; 20% CLAY. 10YR 3/3 DK BROWN; DENSE; V. SL PLASTIC; V. MOIST TO WET. SILTSTONE; 10YR 6/6 BROWNISH YELLOW STAINED W/ 2.5Y 3/0 V. DK GRAY; THINLY BEDDED; MOD HARD; WELL CEMENTED; FINE GRAINED; MOD WEATHERED; SOLID; HORIZONTAL FRACTURES.	29.0 / 31.5	(6)	SS	X		35-50/5"	DNR	H_2O TABLE, VERY FRACTURED AREA. HNU BATTERY IS DEAD.
	(7) [SM] V. FINE TO V. CSE SAND; 20-30% SILT; 20% CLAY 10YR 6/6 BROWNISH YELLOW MOTTLED W/ 2.5Y 3/0 V. DK GRAY; DENSE; V. SL. PLASTIC; MOIST TO WET. SILTSTONE SAME AS SAMPLE #6.	34.0 / 36.5	(7)	SS	X		50/5"	DNR	

Page 1 of 1

Site File No.: 03-0434-XY County CALHOUN Boring No. — Monitor Well No OLF 8

Site File Name FT McCLELLAN / (OLF/LANDFILL #3) Surface Elev. _____ Completion Depth 50.0

Fed. ID. No. _____ Auger Depth 50.0 Rotary Depth 45.

Quadrangle _____ Sec. ____ T. ____ R ____ Date: Start 4/26/92 Finish 4/27/92

Boring Location ABOUT 15' FROM OLF 5

Drilling Equipment MOBILE DRILL B57 ; 2¼" IDHSA ; 140 lb HAMMER

Personnel: G - WAYNE P. STOND; D - SHELDON TURNER; H - JIMMY WRIGHT; H - STEVE DESHEFFLE

Elev.	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA or (HNU) readings	REMARKS
									DNR - DATA NOT RECORDED
	(8) [ML] SILT ~30% U. FINE SAND. 10YR 4/2 WEAK RED; DENSE; ~~NONPLASTIC~~ PLASTIC NON TO V. SL. PLASTIC, MOIST TO WET. REC: ~.5'	40.5	8	SS			50/6"	DNR	LEL: 0
		42.0							
	(9) SAME AS SAMPLE # 8 AND IS MOTTLED W/ 7.5YR 4/6 STRONG BROWN. REC: .25'	45.5	9	SS			50/3"	DNR	LEL: 0
		48.0							
	(10) SAME AS SAMPLE # 8 AND ALSO IS 10-15%; SL. PLASTIC TO NON PLASTIC AND DRY TO MOIST. GOOD REC: ~ .5'	50.5	10	SS			11-36-62/5"	DNR	LEL: 0
		52.0							
		55.5							

Page __ of __

MONITORING WELL CONSTRUCTION LOG - Standard (SUPPLEMENT)			Rev: 4/92
Well No.: OLF 9	Installation: FT. McCLELLAN	Site: OLF/LANDFILL	
Project No.: 03-0424-XX	Client / Project: USATHAMA / SI		
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC		Driller: SHELDON TURNER	
Comp. Start: 4/25/92		Comp. End: 6/12/92	
Built By: SAIC / WAYNE STONER		Well Coord.:	

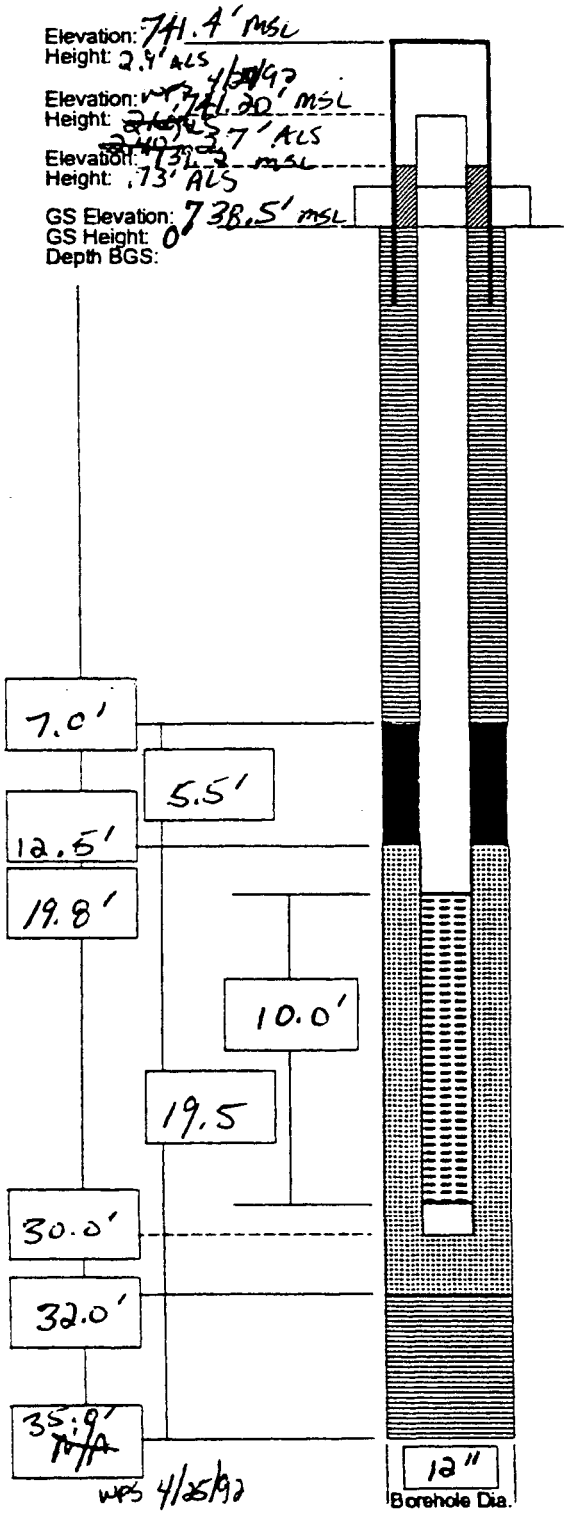
Remarks: 6/22/92

IN REFERENCE TO A CONVERSATION TAKING PLACE ON JUNE 19, 1992, RISER STICK-UP MEASUREMENTS ARE SUPPOSE TO BE OBTAINED FROM ORIGINAL WELL CONSTRUCTION MEASUREMENTS. WELL OLF 9 HAD ~~AN INSTALLATION~~ WPS 6/22/92 STICKUP OF 2.5' AGS ~~AT~~ WHEN IT WAS BEING INSTALLED. THIS MEASUREMENT WAS MEASURED FROM THE LAND SURFACE TO THE BOTTOM OF THE THREADS AT THE TOP OF THE RISER. THE THREADS WERE SUPPOSED TO BE CUT OFF BUT THEY WERE NOT ~~BECAUSE~~ THE WELL CAP FIT BETTER. THE LENGTH OF THE THREADS WERE 2/10THS. ADDING THESE 2/10THS TO THE ORIGINAL STICK-UP MEASUREMENT OF 2.5' MAKES THE NEW STICKUP 2.7' AGS. THE TOTAL LENGTH OF RISER & SCREEN WOULD BE 32.7'.

OLF10

MONITORING WELL CONSTRUCTION LOG - Standard | Rev: 4/92

Well No.: OLF 9	Installation: FT McCLELLAN	Site: OLF/LANDFILL #3
Project No.: 03-0424-xx	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/25/92	Comp. End: 4/25/92	
Built By: SAIC / WAYNE P. STONER	Well Coord.: N 1180782.95 E 513343.85	



WPS 4/25/92

PROTECTIVE CGS
Material Type: STEEL | Length: 5.0'
Diameter: 8"x8" Box | Water Tight Seal( )
Depth BGS: 2.1' | Drainage Hole (X) | Height: .79' ALS | Size: 4"
GUARD POSTS(X) No.: 4
Configuration: SQUARE | Type: STEEL
SURFACE PAD
Composition & Size: CONCRETE (3000 PSI) 4'x4'x6"
RISER PIPE
Type: PVC
Diameter: 4" ID
GROUT Composition: CEMENT; BENTONITE; H_2O
Proportions: 94 lbs; 5 lbs; 8 GALS
Interval: 0 - 7.0' BLS | Tremied(X)
CENTRALIZERS( ) Type:
Depth(s): N/A
SEAL
Type: PELLETS
Source: NYO-BEN, INC / BILLINGS, MONTANA
Setup / Hydration time: .75 HR | Vol. Fluid Added: ABOUT 15 GALS
Tremied( ) POURED BETWEEN AUGER AND WELL ANNULUS
FILTER PACK
Type: SAND - WASHED & SIEVED
Amount Used: 17 BAGS | Tremied(X) TREMIED THROUGH AUGERS
Source: MARIE CO. GEORGIA
Gr. Size Dist: #1 WELL GRAVEL
SCREEN Type: PVC
Manufacturer: BUFFALO WELLPRODUCTS
Diameter ID: 4" | OD: —
Slot Size: 10 SLOT
Schedule / Thickness: 40
Interval BGS: 19.8 - 29.8' BLS
SUMP( ) Bottom Cap(X)
Interval BGS: 29.8 - 30.0'
BACKFILL PLUG
Material: N/A
Setup / Hydration time: N/A | Tremied( ) ~~POURED~~ WPS 4/25/92 N/A
WATER ADDED( )
Interval: N/A | Amount: N/A
Interval: N/A | Amount: N/A

MONITORING WELL CONSTRUCTION LOG - Standard | Rev: 4/92

Well No.: OLF 9	Installation: FT McCLELLAN	Site: OLF/LANDFILL #3
Project No.: 03-0324-XX	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/25/92	Comp. End:	
Built By: SAIC / WAYNE P. STONER	Well Coord.:	

DRILLING EQUIPMENT

Rig Manufacturer: MOBILE DRILL

Rig Model: B57

DRILLING METHOD: (X) Auger ( ) Mud Rotary ( ) Air Rotary ( ) Cable Tool ( ) Other (Specify) _____

Auger Type & Size: 2 1/4" ID AND 6 5/8" I.D. HSA

Casing Size: N/A

Bit Type and Size: N/A

Hammer Weight and Percussion Method: 140 lbs AND CATHEAD

Rod Size: AWML

Mud Mixture (Mud Rotary)
Air Filter Method (Air Rotary): N/A

SAMPLING METHOD & NUMBER COLLECTED

(X) Split Spoon No.: (8) ( ) Shelby Tube No.: ( )
( ) Grab Sample No.: ( ) ( ) Core Barrel No.: ( )
( ) Misc. No.: ( )

MATERIALS USED (TOTALS)

Sand: 17 BAGS Bentonite Pellets: (4) 5GAL BUCKETS

GROUT
Bentonite: ~15 lbs Cement: 3 BAGS

SURFACE PAD MATERIALS

Screen (ft): 10.0'

Riser (ft): 22.3'

Misc: END PLUG - .15' ~.2'

MISC: SCREEN LENGTH - 10.0'
RISER LENGTH - 22.3'
END PLUG - .15'
TOTAL LENGTH - 32.45 = 32.5'

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 9	Installation: FT McCLELLAN	Site: OLF/LANDFILL #3
Project No.: 03-0424-XX	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/25/92	Comp. End:	
Built By: SAIC / WAYNE P. STONER	Well Coord.:	

Remarks: 4/25/92

0730 WPS ARRIVES ON-SITE (LANDFILL #3). WAITING ON DRILLERS. HNU AND LEL WERE CALIB. SEE NOTEBOOK #1.

0815 DRILLERS ARRIVE ON SITE

0830 DRIVING 1ST SPOON. SEE FIELD BORING LOGS FOR LITHOLOGY DESCRIPTIONS.

0945 HIT H_2O BETWEEN 20' AND 25' BLS. TAKING H_2O LEVEL READINGS.

1000 H_2O LEVEL 19.7' BLS.

1030 H_2O LEVEL 12.5' BLS. CONTINUEING TO DRILL.

1100 DOWN TO 35' BLS. DRY BUT, A THIN WET ZONE WAS PRESENT. WE WILL USE INITIAL CONTACT OF H_2O. WE WILL REAM DOWN TO WPS 4/25/92 ABOUT 32' AND SET THE SCREEN BETWEEN 20' AND 30' BLS. PULLING 2¼" ID AUGERS

1130 ~~THE~~ STARTING TO REAM W/ 6⅝" ID AUGERS. 12" BOREHOLE.

1140 WPS 4/25/92 ~~THE~~ RIG CARBURETOR IS CAUSING PROBLEMS. ABOUT 7' OF AUGER IN THE HOLE. DRILLERS WILL BREAK EARLY FOR LUNCH AND TRY TO GET A NEW CARBURETOR

1200 DRILLERS BREAKING FOR LUNCH.

1330 DRILLERS RETURN FROM LUNCH

1345 CONTINUED TO REAM THE HOLE

1500 REAMED DOWN TO ABOUT 32' BLS. KNOCKING OUT BOTTOM PLUG.

1515 ADDING WELL SCREEN AND RISER. USING A WOODED BOTTOM PLUG.

1530 STARTING TO TREMIE SAND.

1605 FINISHED TREMIEING SAND. WPS 4/25/92 ~~TOPP~~ TOP OF SAND 12.5' BLS. ADDING PELLETS THROUGH AUGERS. 17 BAGS OF SAND USED

1630 FINISHED ADDING PELLETS. HAD TO GET ANOTHER BUCKET OF PELLETS AND THAT IS WHY IT TOOK LONGER THAN USUAL. ADDING H_2O. ADDED ABOUT 15 GALS. ~~PULLED~~ WPS 4/25/92 TOP OF SEAL BEFORE HYDRATION 7.0' BLS. PULLED AUGERS OUT. WE WILL LET THE SEAL SET UP 45 MINS TO AN HOUR AND THEN GROUT TO SURFACE.

1710 GROUTING THE HOLE TO LAND SURFACE.

1715 DRILLERS PULLING THE RIG OFF THE HOLE. GETTING READY TO DECON H_2O LEVEL IS 15.2' BLS.

1730 STARTED DECONNING

1830 FINISHED DECONNING AND DEPARTED SITE.

4/27/92

0915 CHECKED H_2O LEVEL 17.18' BTOC. NEW STICK-UP IS 2.40' ALS, USED NATURAL LAND SURFACE TO MEASURE IT. H_2O LEVEL IS 15.68 BLS.

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Field Boring Log

Site File No.: B3-0424-XX County: CALHOUN

Boring No.: — Monitor Well No: OLF 9

Site File Name: FT McCLELLAN / (OLF / LANDFILL #3)

Surface Elev.: — Completion Depth: 32.6

Fed. ID. No.:

Auger Depth: 35' Rotary Depth: —

Quadrangle: Sec.: T.: R:

Date: Start 4/25/92 Sampling Finish 4/25/92

Boring Location: SOUTH OF DIRT ROAD INTO SITE AND ABOUT 150 YDS FROM HARD ROAD.

Drilling Equipment: MOBILE DRILL B57; 2¼ & 6⅝ ID HSA; 140 lb HAMMER

Personnel: G - WAYNE STONER; D - SHELDON TURNER; H - JIMMY WRIGHT; H - STEVE DESHERLIA

Elev.	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA or BHU readings	REMARKS
	(1) [CL] CLAY; 30% SILT, >5% CSE TO V. CSE SAND. 7.5 YR 5/8 STRONG BROWN; STIFF; LOW PLASTICITY; DRY TO V. SL. MOIST. REC 1.4		1	SS	1.4		4-5-8-8	DNR	SS - SPLIT SPOON; BKGD HNU: .6 PPM; LEL: 0; DNR - DATA NOT RECORDED; ND - NON-DETECT.
		2.5							
	(2) SAME AS SAMPLE NO. 1 BUT ALSO HAD INTERBEDDED WHITE 10YR 8/1 CLAY; PLASTIC; SL MOIST; SOFT. REC: 1.8'	5.0	2	SS	1.8		8-10-13-14	1.2 PPM	HNU BKGD: .6 PPM; LEL: 0
		7.5							
	(3) SAME AS SAMPLE NO. 2, ALSO HAD ABOUT 10% V. FINE SAND. REC: 2.0'	10.0	3	SS	2.0		3-3-5-6	ND	LEL: 0
		12.5							
	(4) SAME AS SAMPLE NO. 2, ALSO HAS INTERBEDDED REDDISH BROWN 5YR 5/4 CLAY. REC: 2.0'	15.0	4	SS	2.0		3-4-4-7	ND	LEL: 0
		17.5							

Site File No.: A3-0424-XX County: CALHOUN Boring No.: — Monitor Well No: OLF 9

Site File Name: FT. McCLELLAN / (OLF/LANDFILL #3) Surface Elev.: ____ Completion Depth: 32.0'

Fed. ID. No.: ____ Auger Depth: 35' Rotary Depth: N/A

Quadrangle: ____ Sec. ____ T. ____ R ____ Date: Start 4/25/92 Finish 4/25/92

Boring Location: SOUTH OF DIRT ROAD INTO SITE AND ABOUT 150 YDS FROM HARD ROAD

Drilling Equipment: MOBILE DRILL B59 ; 2 1/4" ID HSA ; 140 lb HAMMER

Personnel: G - WAYNE STONER; D - SHELDON TURNER; H - JIMMY WRIGHT; H - STEVE DESHORLIA

Elev.	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA & HNU readings	REMARKS
	(5) [CL] CLAY; 20% SILT; >10% V. FINE TO MED SAND. 2.5 YR 4/6 RED; SOFT; PLASTIC; MOIST TO WET. REC: 1.7'	24.5	(5)	SS	X		3-2-2-5	ND	SPOON VERY WET ON THE INSIDE. LEL: 0
		24.2							H_2O COMING IN BETWEEN 20' AND 25' BLS.
	(6) [ML] SILT; 20-30% CLAY; >10% V. FINE SAND. 2.5 YR 5/3 REDDISH BROWN; DENSE TO V. DENSE; NON PLASTIC; V. DRY, IRON STAINING. REC: 1.5'	26.5	(6)	SS	X		13-18-20-30	ND	LEL: 0
	(7) [CL] CLAY; 30% SILT; 10% V. FINE TO V. CSE SAND. 10YR 5/6 YELLOWISH BROWN; FIRM; NON TO SL PLASTIC; DRY. REC 1.4'	29.0							
		31.5	(7)	SS	X		13-28-30-50/5"	NP	LEL: 0
		34.0							
	(8) SAME AS SAMPLE NO. 7. ALSO HAD AT ~35' A PIECE OF SILT/CLAY STONE. THINLY BEDDED; 2.5 4/2 WEAK RED; MODERATELY HARD; WELL CEMENTED; FINE GRAINED; HORIZONTAL BEDDING; SL. WEATHERED; SOLID; IRON STAINED. REC: 1.0'	36.5	(8)	SS	X		36-50/5"	NP	ROCK IN SPOON AT ABOUT 35.3' INTERVAL LEL: 0

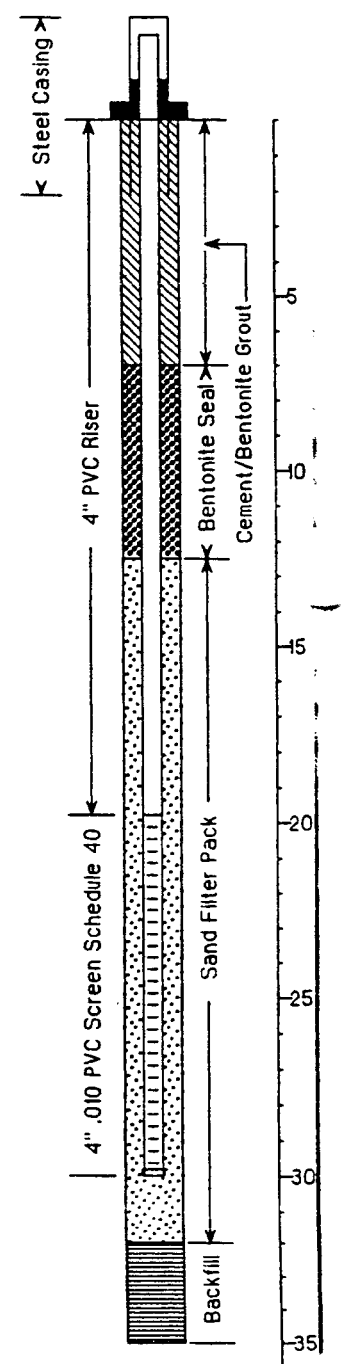
SOIL BORING/WELL LOG

Project Name: Fort McClellan Site Investigation
Site Location: Landfill #3 (OLF)
Monitoring Well No.: OLF9
SAIC Project No.: 01-0827-03-0424
Northing (ft): 1180782.95
Start/Finish Date: 04-25-92/04-25-92
Geologist: W.P. Stoner
Easting (ft): 513343.85
Well Completion Depth (ft): 32.0
Drilling Co.: Environmental Exploration, Inc.
Groundwater Elev. (ft): 718.48 on 6/4/92
Drilled Depth (ft): 35.0
Driller: S. Turner
Drilling Method: Hollow Stem Auger
Surface Pad Elevation (ft): 738.96
Drill Rig: Mobile Drill B57
Sampling Method: Split Spoon
Top of Casing Elevation (ft): 741.20

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
			CLAY, 30% silt, >5% coarse to very coarse sand; 7.5YR 5/8 strong brown; stiff; low plasticity; dry to very slightly moist.	DNR/0	4-5-8-8	1	SS	1.4
5	CL		CLAY, 30% silt, >5% coarse to very coarse sand; 7.5YR 5/8 strong brown; very stiff; low plasticity; dry to very slightly moist; interbedded CLAY; 10YR 8/1 white; soft; plastic; slightly moist.	1.2/0	8-10-13-14	2	SS	1.8
10			CLAY, 30% silt, 10% very fine sand, >5% coarse to very coarse sand; 7.5YR 5/8 strong brown; firm to stiff; low plasticity; dry to slightly moist; interbedded CLAY; 10YR 8/1 white; soft; plastic; slightly moist.	0/0	3-3-5-6	3	SS	2.0
15	ML		SANDY SILT, trace to some clay, 56% silt, 21% sand, 20% clay, 3% gravel; 7.5YR 5/8 strong brown; firm to stiff; low plasticity; dry to very slightly moist; interbedded CLAY; 10YR 8/1 white and 5YR 5/4 reddish brown; soft; plastic; slightly moist.	0/0	3-4-4-7	4	SS	2.0
20	CL		CLAY, 20% silt; >10% very fine to medium sand; 2.5YR 4/6 red; firm; plastic; moist to wet.	0/0	3-2-3-5	5	SS	1.7
25	ML		SILT, 20-30% clay, >10% very fine sand; 2.5YR 5/3 reddish brown, iron staining; hard; non-plastic; very dry.	0/0	13-18-28-30	6	SS	1.5
30	CL		CLAY, 30% silt, 10% very fine to very coarse sand; 10YR 5/6 yellowish brown; hard; non to slightly plastic; dry.	DNR/0	13-28-30-50/5"	7	SS	1.4
35	N/A		SILT/CLAYSTONE (piece at 35.3 feet) 2.5YR 4/2 weak red, iron stained; thinly bedded; moderately hard; well cemented; fine grained; slightly weathered; solid; horizontal bedding.	DNR/0	36-50/5"	8	SS	1.0
40			CLAY, 30% silt, 10% very fine to very coarse sand; 10YR 5/6 yellowish brown; firm; non to slightly plastic; dry.					

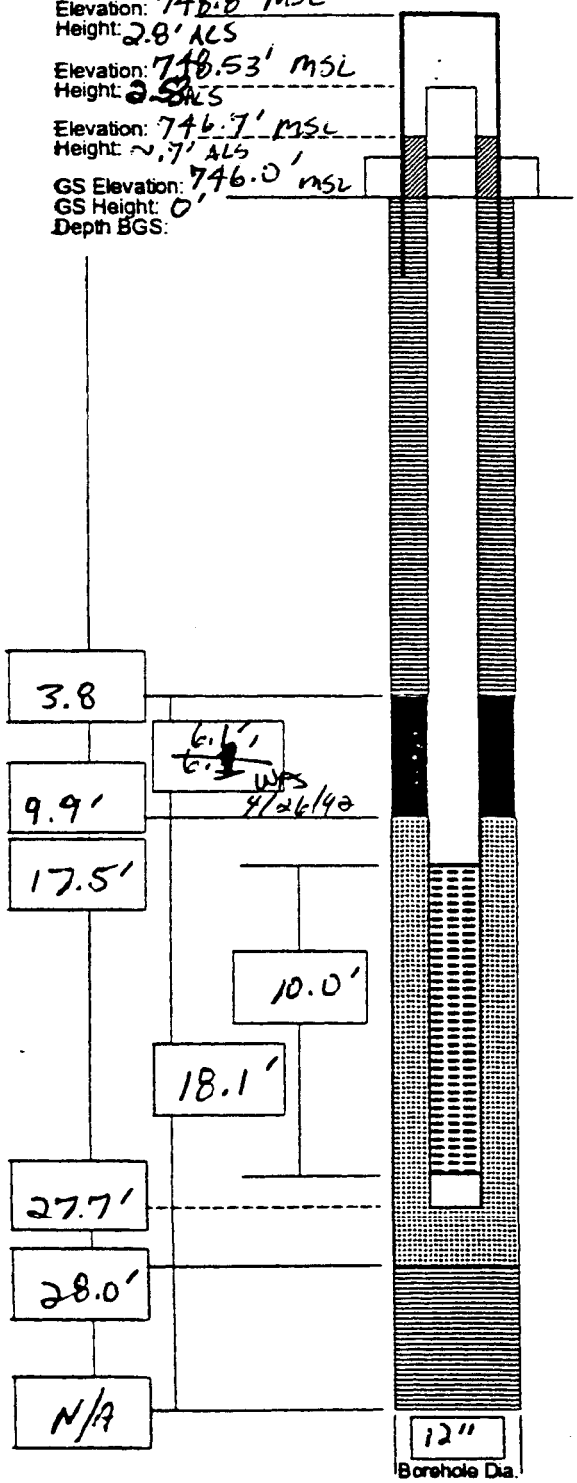
Bottom of Boring at 35.0 feet

Well Const. As-Built



MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF 1C	Installation: FT. McCLELLAN	Site: OLF/LANDFILL
Project No.: 03-0424-AX	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION INC	Driller: SHELDON TURNER	
Comp. Start: 4/26/92	Comp. End: 4/26/92	
Built By: SAIC / WAYNE P. STONER	Well Coord.: N 1179303.451 E 512538.82	

Elevation: 748.8' MSL
Height: 2.8' ALS
Elevation: 748.53' MSL
Height: 2.5' ALS
Elevation: 746.7' MSL
Height: ~.7' ALS
GS Elevation: 746.0' MSL
GS Height: 0'
Depth BGS:



PROTECTIVE CGS Material Type STEEL	Length: 5.0'
Diameter 8"x8" BOX	Water Tight Seal( )
Depth BGS 2.2' BLS	Drainage Hole (X) Height: ~.7' ALS Size: 1/4"
GUARD POSTS(X) No.: 4 Configuration: SQUARE	Type STEEL
SURFACE PAD Composition & Size CONCRETE (3000 PSI) / 4'x4'x6"	
RISER PIPE Type PVC	
Diameter 4" I.D.	
GROUT Composition: CEMENT : BENTONITE ; H_2O Proportions : 94 lbs : 5 lbs ; 8 GALS	
Interval 0'-3.8' BLS	Tremied( ) POURED INTO BORE HOLE
CENTRALIZERS( ) Type: Depth(s) N/A	
SEAL Type BENTONITE SLURRY	
Source WYO-BEN, INC. BILLINGS, MT	
Setup / Hydration time 50 MIN	Vol. Fluid Added ~25 GALS OF H_2O
Tremied(X)	
FILTER PACK Type SAND	
Amount Used 17.5 BAGS	Tremied(X)
Source MORIE CO. GEORGIA	
Gr. Size Dist #1 WELL MATERIAL	
SCREEN	Type: PVC Manufacturer: BUFFALO WELL PRODUCTS
Diameter ID: 4" I.D.	OD: —
Slot Size: 10 SLOT Schedule / Thickness 40	
Interval BGS 17.5'-27.5' BLS	
SUMP( ) Interval BGS 27.5'-27.7'	Bottom Cap(X)
BACKFILL PLUG Material N/A	
Setup / Hydration time N/A	Tremied( ) N/A
WATER ADDED( ) Interval N/A	Amount N/A
Interval N/A	Amount N/A

MONITORING WELL CONSTRUCTION LOG - Standard | Rev: 4/92

Well No.: OLF 10	Installation: FT McCLELLAN	Site: OLF/LANDFILL #3
Project No.: 03-0424-XX	Client / Project: USATHAMA / SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/26/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

DRILLING EQUIPMENT

Rig Manufacturer: MOBILE DRILL

Rig Model: B57

DRILLING METHOD: (X) Auger ( ) Mud Rotary ( ) Air Rotary ( ) Cable Tool ( ) Other (Specify) _____

Auger Type & Size: 2 1/4" AND 6 5/8" ID. HSA

Casing Size: N/A

Bit Type and Size: N/A

Hammer Weight and Percussion Method: 140 lb; 30 INCH DROP USING A CATHEAD

Rod Size: AWML

Mud Mixture (Mud Rotary)
Air Filter Method (Air Rotary): N/A

SAMPLING METHOD & NUMBER COLLECTED

(X) Split Spoon No.: (6) (X) Shelby Tube No.: (2)
( ) Grab Sample No.: ( ) ( ) Core Barrel No.: ( )
( ) Misc. No.: ( )

MATERIALS USED (TOTALS)

Sand: 17.5 BAGS Bentonite ~~Pellets~~: SLURRY: 35 lbs BENTONITE; 25 GALS OF H2O
WPS 4/26/92

GROUT
Bentonite: 10-12 lbs Cement: 2 BAGS

SURFACE PAD MATERIALS

Screen (ft): 10.0'

Riser (ft): 20.0'

Misc: END PLUG - .2

MISC: SCREEN LENGTH - 10.0'
RISER LENGTH - 20.0'
BOTTOM PLUG - .2'
TOTAL LENGTH - 30.2'
STICK UP 2.53 ~ 2.5' AGS
WELL BOTTOM 27.7 BGS

MONITORING WELL CONSTRUCTION LOG - Standard		Rev: 4/92
Well No.: OLF10	Installation: FT McCLELLAN	Site: OLF/LANDFILL #3
Project No.: 03-0424-XX	Client / Project: USATHAMA/SI	
Drilling Contractor: ENVIRONMENTAL EXPLORATION, INC	Driller: SHELDON TURNER	
Comp. Start: 4/26/92	Comp. End:	
Built By: SAIC / WAYNE STONER	Well Coord.:	

Remarks: 4/26/92

0800 WPS ARRIVES ON SITE (LANDFILL #3). HNU AND LEL CALIB (SEE NOTEBOOK #1). DRILLERS ARRIVE AND PREP TO MOVE.

0830 MOVED TO WELL LOCATION OLF 10. SETTING UP TO DRILL.

0850 DRIVING 1ST SPOON. SEE FIELD BORING LOGS FOR LITHOLOGY DESCRIPTIONS

~1030 DVM ARRIVES ON SITE AND GETS KEYS FROM WPS FOR BLDG 3228

1100 DVM ARRIVES BACK ON-SITE. TAKING 15 MINS TO CHECK H_2O LEVEL OF OLF 10.

1110 STARTED TAKING SPLIT SPOON SAMPLE AT 25'. WHEN THE SPOON WAS PULLED UP, THE END PIECE HAD COME OFF. NO RECOVERY IN THE SPOON. SHELDON TURNER (ST) DRILLED THROUGH THE 25-27' INTERVAL TO RETRIEVE THE END PIECE. IT WAS RECOVERED.

1115 PULLED AUGERS. CHECKING H_2O LEVEL

1122 H_2O LEVEL 25.2' BLS. DRILLERS DEPART FOR LUNCH.

1132 H_2O LEVEL 24.8'

1232 DRILLERS AND WPS ARRIVE BACK ~~FROM~~ ON-SITE, CHECKED H_2O LEVEL — 22.0' BLS. RECHARGE OF ~3.2'/HR. WPS 4/26/92

1245 ~~STILL RECHARG~~ H_2O LEVEL IS STILL INCREASING. 21.5' BLS. H_2O IS BELIEVED TO BECOMING IN ~~AT~~ BETWEEN ABOUT 17' AND 19' BLS. INTERVAL WHERE THE SHELBY TUBE WAS TAKEN. THE DRILLER SAID THE TOP OF THE TUBE WAS MOST. DRILLERS WENT TO DECON WELL SCREEN AND RISER. WPS WILL CONTINUE TO MONITOR THE H_2O LEVEL. WPS 4/26/92

1315 WPS AND STEVE DESHERLIA ~~WENT~~ (SD) WENT TO BLDG 1298 TO GET H_2O.

1324 WPS ARRIVES AT MONITORING WELL OLF 10 AND TAKES H_2O READING. 20.0' BLS.

1345 DRILLERS ARRIVE W/ DECONNED WELL MATERIALS. LAST H_2O LEVEL BEFORE WELL INSTALLATION. 19.4' BLS.

1400 STARTED REAMING DOWN W/ 6 5/8" ID HSA W/ BOTTOM PLUG. DEPTH WILL BE ABOUT 28' BLS.

1430 DENSE SOIL AND THE RIG IS NOT RUNNING RIGHT.

1500 STARTED REAMING AGAIN

1550 DOWN TO 28.0'. KNOCKING OUT BOTTOM PLUG.

1600 ADDING SAND. POURING BETWEEN AUGER AND WELL CASING ANNULUS. KEEPING SAND IN AUGERS AND RAISING AUGERS 1-2' AT A TIME.

1639 FINISHED ADDING SAND, TOP OF SAND 9.9' BLS. USED ABOUT 17.5 BAGS

1645 ADDED BENTONITE SLURRY BECAUSE THE DRILLERS ARE OUT OF PELLETS. TOP OF SEAL 3.75' BLS ~3.8'. WILL LET THE SLURRY SET UP BETWEEN 45 MINS AND AN HOUR. USED ~35 lbs OF BENTONITE & ~25 GALS OF H_2O.

1635 ADDED GROUT.

1700 BREAKING DOWN AND SETTING UP TO DECON TOMORROW.

1800 DRILLERS DEPART SITE.

1830 WPS DEPARTS BASE

SAIC Science Applications International Corporation

Field Boring Log

Site File No.: 03-0424-XX County: CALHOUN

Boring No.: — Monitor Well No: OLF10

Site File Name: FT McCLELLAN / OLF / LANDFILL #3

Surface Elev.: ____ Completion Depth: 28.0'

Fed. ID. No: ____

Auger Depth: 28.0' Rotary Depth: N/A

Quadrangle: ____ Sec. ____ T. ____ R. ____

Date: Start 4/26/92 Sampling Finished 4/26/92

Boring Location: EASTERN SIDE OF SITE. APPROXIMATELY 100 YDS SOUTH OF OLF 2

Drilling Equipment: MOBILE DRILL B57; 2¼" & 6⅝" ID HSA; KOLB HAMMER

Personnel: G - WAYNE P. STONE; D - SHELDON TURNER; H - JIMMY WRIGHT; H - STEVE DESHERON

Elev.	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA or BHC readings	REMARKS
	(1) (ML) SILT; 20-30% CLAY. 7YR 4/6 STRONG BROWN; ~~[illegible]~~ LOW DENSE; LOW PLASTICITY; SL. MOIST. WPS 4/26/92		(1)	SS			2-3-5-4	ND	SS-SPLIT SPOON; ST-SHELBY TUBE; ND-NON-DETECT; LEL: >1; ~~NR-NOT RECORDED~~ DNR-DATA NOT RECORDED.
		2.5							
	(2) (ML) SILT; 20% CLAY. 5Y 6/2 LIGHT OLIVE GRAY; DENSE; NON TO SL. PLASTIC; DRY.	5.0	(2)	SS			5-10-7-17	DNR	LEL: >1 <1 WPS 4/26/92
		7.5							
	(3) NO DESCRIPTIVE SAMPLE COLLECTED. PUSHED TUBE 2.5'	10.0	(3)	ST			SOUND PRESSURE (DP) 900 PSI	ND	LEL: >1 <1 WPS 4/26/92
		12.5							
	(4) (ML) SILT; 20-30% CLAY. 10YR 6/8 BROWNISH YELLOW; LOOSE DENSE; SL. TO LOW PLASTIC; DRY TO MOIST.	15.0	(4)	SS			5-15-11-11	ND	LEL: >1 <1 WP 4/26/92
	(5) DESCRIPTIVE SAMPLE WAS NOT COLLECTED. PUSHED TUBE 2'.	17.5	(5)	ST			DP 750 PSI		

Science Applications International Corporation

Field Boring Log Page 5 of 5

Site File No. 03*04/24-XX County CALHOUN Boring No. — Monitor Well No OLF 10

Site File Name FT McCLELLAN, (OLF/LANDFILL #3) Surface Elev. _____ Completion Depth 28.0

Fed. ID. No. _____ Auger Depth 28.0' Rotary Depth N/A

Quadrangle _____ Sec. ____ T. ____ R ____ Date: Start 4/26/92 Finish 4/26/92

Boring Location EASTERN SIDE OF SITE, APPROXIMATELY 100 YDS SOUTH OF OLF 2.

Drilling Equipment MOBILE DRILL B57; 2¼" & 6⅝" ID HSA; 140 lb HAMMER

Personnel: G - WAYNE STONER; D - SHELDON TURNER; H - JIMMY WRIGHT; H - STEVE DESHERLIA

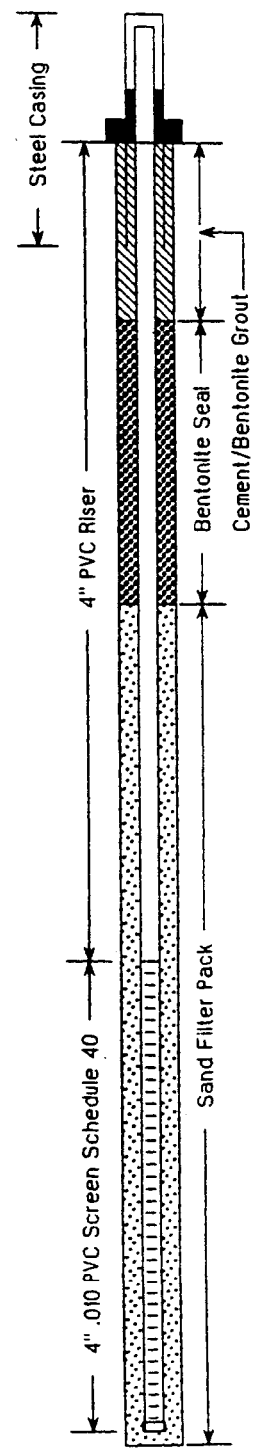
Elev.	DESCRIPTION	Depth in feet	Sample No.	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA (PPM) reading	REMARKS
									SS - SPLIT SPOON NR - NO RECOVERY.
	(6) [ML] SILT; 20-30% CLAY, 2.5 YR 4/8 RED MOTTLED W/ 10YR 5/6 YELLOWISH BROWN AND 2.5Y 6/4 LT YELLOWISH BROWN; V. DENSE; NON TO SL. PLASTIC; DRY.		(6)	SS			17-50-50/5"		LEL: 0
	WPS 4/26/92 SILT/CLAYSTONE ~~[illegible]~~, MODERATELY CEMENTED; MOD HARD; BADLY WEATHERED; 10YR 5/6 YELLOWISH BROWN AND 2.5Y 6/4 LT. YELLOWISH BROWN.	21.5							
		24.0							
	(7) [CL] CLAY; 40% SILT; 75% V. FINE SAND. 7.5YR 5/4 BROWN; ~~[illegible]~~ STIFF; NON-PLASTIC; DRY. WPS 4/26/92		(7)	SS	NR	50/3"		LEL: 0
	SILT/CLAYSTONE SAME AS SAMPLE NO. 6 BUT THE COLOR IS 5Y 6/2 OLIVE GRAY.	26.5							
		29.0							
		31.5							
		34.0							
		36.5							

SOIL BORING/WELL LOG

Project Name: Fort McClellan Site Investigation
Site Location: Landfill #3 (OLF)
Monitoring Well No.: OLF10
SAIC Project No.: 01-0827-03-0424
Northing (ft): 1179303.45
Start/Finish Date: 04-26-92/04-26-92
Geologist: W.P. Stoner
Easting (ft): 512538.83
Well Completion Depth (ft): 28.0
Drilling Co.: Environmental Exploration, Inc.
Groundwater Elev. (ft): 729.95 on 6/4/92
Drilled Depth (ft): 28.0
Driller: S. Turner
Drilling Method: Hollow Stem Auger
Surface Pad Elevation (ft): 746.62
Drill Rig: Mobile Drill B57
Sampling Method: Split Spoon/Shelby Tube
Top of Casing Elevation (ft): 748.53

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
	ML		SILT, 20-30% clay; 7YR 4/6 strong brown; firm to stiff; low plasticity; slightly moist.	0/<1	2-3-5-4	1	SS	1.0
5	ML		SILT; 20% clay; 5Y 6/2 light olive gray; very stiff; non to slightly plastic; dry.	DNR/<1	5-10-7-17	2	SS	0.6
10	CH		SILTY CLAY, trace sand, 55% clay, 33% silt, 10% very fine to very coarse sand, 2% fine gravel; yellow red; very plastic; wet.	0/<1	DP @ 900 PSI	3	ST	2.5
15	ML		SILT, 20-30% clay; 10YR 6/8 brownish yellow; very stiff; slight to low plasticity; dry to moist.	0/<1	5-15-11-11	4	SS	1.8
			No descriptive sample collected. Pushed shelby tube 2.0 feet.	DNR	DP @ 750 PSI	5	ST	2.0
20	SM SC		CLAYEY SILTY SAND, 42% sand, 38% silt, 17% clay, 3% fine gravel; 2.5YR 4/8 red mottled with 10YR 5/6 yellowish brown; very dense; non to slightly plastic; dry. SILT/CLAYSTONE; 10YR 5/6 yellowish brown and 2.5Y 6/4 light yellowish brown; moderately cemented; moderately hard; highly weathered.	DNR/0	17-50-50/5"	6	SS	1.5
25	CL		CLAY, 40% silt, >5% very fine sand; 7.5YR 5/4 brown; stiff; non- plastic; dry. SILT/CLAYSTONE; 10YR 5/6 yellowish brown and 2.5Y 6/4 light yellowish brown; moderately cemented; moderately hard; highly weathered.	DNR/0	50/2"	7	SS	NR
30			*Bottom of Boring at 28.0 feet*					

Well Const. As-Built



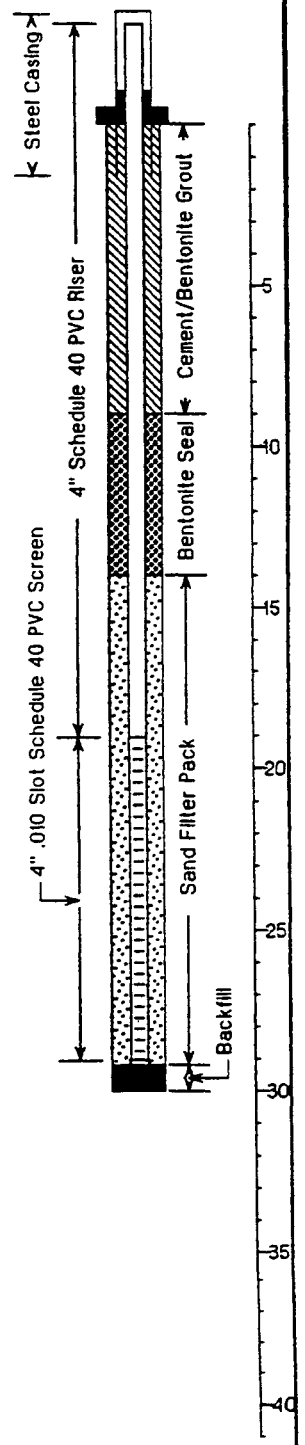
SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS	Site Location: Old Landfill #3	Monitoring Well No.: OLF-G11
SAIC Project No.: 01-0827-03-6520	Northing (ft): 1179291.44	Start/Finish Date: 04-17-94
Geologist: Chuck Houck	Easting (ft): 513171.51	Well Completion Depth (ft): 29.2
Drilling Co.: Environmental Exploration, Inc.	Groundwater Elev. (ft): 724.46	Drilled Depth (ft): 30.0
Driller: Kevin Bray	Drilling Method: Hollow Stem Auger	Surface Elevation (ft): 744.61
Drill Rig: CME Model 75	Sampling Method: Split Spoon	Top of Casing Elevation (ft): 747.11

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
	NA		Surface Grass.	0/0	2-3-5-6	1	SS	1.8
	GC		Gravel, 10-30% Clay and Silt, <10% fine Sand. loose; moderately sorted; slightly moist; well rounded					
5	ML		Silt, 30% Clay. 7.5YR5/4 brown to 7.5YR4/6 strong brown; firm; slightly moist	0/0	2-4-6-12	2	SS	2.0
	CL		Clay, 20% Silt. 10YR6/8 brownish yellow; firm; moist	0/0	2-2-6-12	3	SS	1.8
10	ML		Silt. 2.5Y6/4 light redish brown; dry; partial cementation; organics; fissle characteristics					
	CL		Silt, 40% Clay. 7.5yr4/6 strong brown; stiff; moist	NR	2-6-12-16	4	SS	2.0
15	ML		Clay, 20% Silt. 7.5yr5/6 strong brown; stiff; moist					
			Silt, <10% Clay. 2.5R5/2 grayish brown mottled; firm; dry					
	NA		Shale. 5y5/1 gray; fissle; hard; weathered	0/0	5-15-21-21	5	SS	2.0
20	ML		Silt, 10% Clay. 7.5YR6/6 reddish yellow; firm to hard; moist; partially cement					
	NA		Shale. 5Y5/1 gray; fractured; highly decomposed; weathered; dry	0/0	4-5-7-7	6	SS	2.0
	CL							
25	ML		Clay, 20% Silt. 7.5YR6/2 pinkish gray; firm; moist					
	CL							
	NA							
	ML		Silt, <10% fine Sand. 7.5YR5/4 brown; soft; slightly moist					
	CL			NR	3-3-11-21	7	SS	2.0
	GC		Clay, 20% Silt. 7.5YR5/4 brown; firm					
30	ML		Shale, weathered highly decomposed Silt matrix					
			Silt, <10% Clay. firm; dry					
			Clay, 20% Silt, <10% Gravel. 7.5YR5/4 brown; soft; moist; angular					
35			Gravel, fine to coarse Sand, with Clay. 7.5YR6/0 gray; firm; slightly moist					
			Silt, <10% Clay. 10YR6/8 brownish yellow; soft					
			Silt. partial cementation; hard; dry					
40			*Bottom of Boring at 30 feet*					

Note:NR=Not Recorded, NA=Not Applicable
SS=Split Spoon, Borehole Diameter=11.75"

Well Const. As-Built

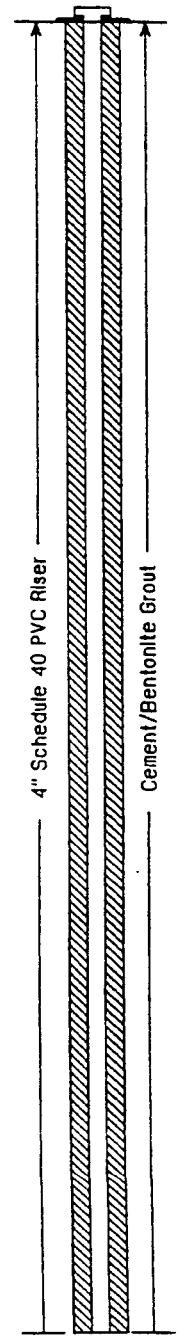


SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS
Site Location: Old Landfill #3
Monitoring Well No.: OLF-612
SAIC Project No.: 01-0827-03-6520
Northing (ft): 1180476.24
Start/Finish Date: 03-13-95/04-17-95
Geologist: Brad Baker
Easting (ft): 512356.29
Well Completion Depth (ft): 87
Drilling Co.: Christensen Boyles Brothers Inc.
Groundwater Elev. (ft): 680.04
Drilled Depth (ft): 87
Driller: Kenneth Kesty
Drilling Method: Hollow Stem Auger
Surface Elevation (ft): 743.53
Drill Rig: Model B-61
Sampling Method: Split Spoon
Top of Casing Elevation (ft): 743.88

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
5	ML		Silt, 20% very fine Sand. 10R3/6 dark red. very dense; moist; low plasticity, trace of light brownish yellow fine sand; subrounded; slightly fissile	0/0	33	1	SS	1.5
10			Silt, 20% very fine Sand. 10R3/6 dark red. very dense; moist; low plasticity; Same as above with trace of light gray very fine sand.	0/0	52	2	SS	1.6
15			Sandy Silt, 35% very fine Sand. 10R3/6 dark red; very dense; moist; low plasticity interbeds of light brownish yellow very fine sand; subrounded; fissile	0/0	75	3	SS	1.7
20			Sandy Silt, 35% very fine Sand, 10YR7/4 very pale brown; very dense; moist; low to moderate plasticity, bottom 4" of sample is wet, trace of light gray clay, subrounded	0/0	50	4	SS	1.6
25			Sandy Silt, 40% very fine sand. 10YR7/4 very pale brown; very dense; dry; low plasticity; fissile, subrounded	0/0	50/6"	5	SS	2.0
30			Sandy Silt, 25% very fine sand. 10YR3/6 dark red; very dense; moist; low plasticity, fissile with a trace of white and brownish yellow sand, subrounded	0/0	50/6"	6	SS	0.7
35			Silt, 20% very fine sand. 10YR3/6 dark red; very dense; moist; low plasticity; fissile with a trace of light brownish yellow sand, subrounded	0/0	50/4"	7	SS	0.9
40			Silt, 20% very fine Sand. 10YR3/6 dark red; very dense; moist; low plasticity; Same as above	0/0	50/3"	8	SS	0.4
45								

Well Const. As-Built

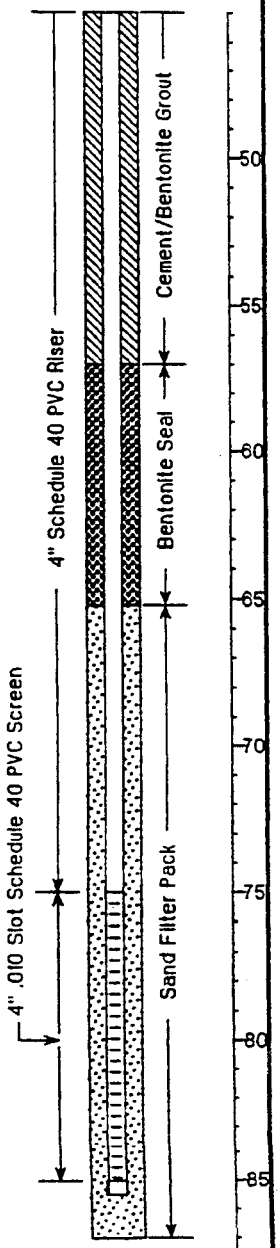


SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS
Site Location: Old Landfill #3
Monitoring Well No.: OLF-G12
SAIC Project No.: 01-0827-03-6520
Northing (ft): 1180476.24
Start/Finish Date: 03-13-95/04-17-95
Geologist: Brad Baker
Easting (ft): 512356.29
Well Completion Depth (ft): 87
Drilling Co.: Christensen Boyles Brothers Inc.
Groundwater Elev. (ft): 680.04
Drilled Depth (ft): 87
Driller: Kenneth Kesty
Drilling Method: Hollow Stem Auger
Surface Elevation (ft): 743.53
Drill Rig: Model B-61
Sampling Method: Split Spoon
Top of Casing Elevation (ft): 743.88

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
	ML		Silt, 15% very fine Sand. 10YR3/6 dark red; very dense; moist; low plasticity; trace of light brownish yellow silt, subrounded. At 47ft BGS cuttings began balling up with moisture	0/0	50/3"	9	SS	1.0
50			Silt. 15% very fine Sand. 10YR3/6 dark red; very dense; moist; low plasticity; Same as above	0/0	50/4"	10	SS	1.2
55			Sandy Silt. Sand: 30% very fine, 5% Coarse. 10YR3/6 dark red; very dense; moist; low plasticity; slightly fissile; subrounded	0/0	50/3"	11	SS	0.3
60			Top .6ft=Silt, 15% very fine Sand. 10YR3/6 dark red; very dense; moist; low plasticity; slightly fissile subrounded. Bottom 1ft=silt, 10YR7/8 Yellow, MnO2 veining/filled fractures, subrounded	0/0	42	12	SS	1.6
65	NA		Shale; 5Y6/2 light olive gray; very hard; thinly bedded, moderately cemented, texture very fine, fissile, moderately weathered, fracture.	0/0	50/2"	13	SS	0.2
70	SM		Silty Sand, very fine, 40% Silt, 2.5YR6/4 weak red; very dense; moist; low plasticity; thinly bedded light red, gray silty sand subrounded, sandstone fragments present <5%	0/0	50/3"	14	SS	1.0
75			Silty Sand, 40% Silt. 2.5YR6/4 weak red; very dense; moist; low plasticity; Same as sample #14 with gravel present approx 10%	0/0	50/2"	15	SS	0.5
85								
			Botom of boring at 87 feet					
90			Note:NR=Not Recorded, NA=Not Applicable, SS=Split Spoon, NS=Not Screened, Borehole Diameter 7 3/4"					

Well Const. As-Built

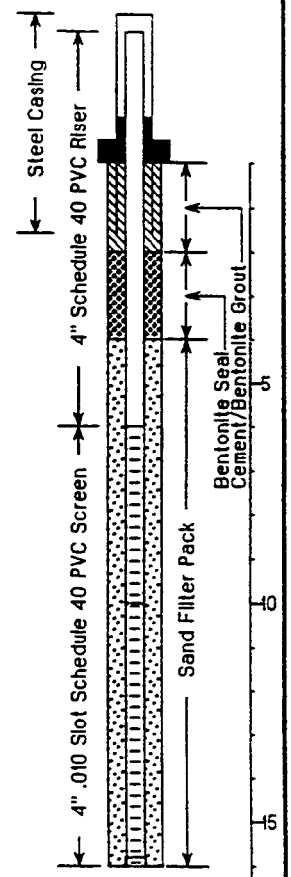


SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS	Site Location: Old Landfill #3	Monitoring Well No.: OLF-G13
SAIC Project No.: 01-0827-03-6520	Northing (ft): 1180299.12	Start/Finish Date: 04-16-94
Geologist: Chuck Houck	Easting (ft): 513477.75	Well Completion Depth (ft): 16.0
Drilling Co.: Environmental Exploration, Inc.	Groundwater Elev. (ft): 731.90	Drilled Depth (ft): 16.0
Driller: Kevin Bray	Drilling Method: Hollow Stem Auger	Surface Elevation (ft): 736.94
Drill Rig: CME Model 75	Sampling Method: Split Spoon	Top of Casing Elevation (ft): 739.49

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
	CL		Silty Clay, 20% silt. 7.5YR4/4 dark brown; soft	0/0	3-2 -4-6	1	SS	1.8
			Sandy Clay, 10-30% Gravel. 7.5YR6/0 gray; soft; moist	0/0	3-6-5-7	2	SS	1.9
5	SM		Silty Clay, 20% Silt. 7.5YR3/0 very dark gray; soft, moist					
	SC		61% Silty Sand, 37% Clay, 2% Gravel. 7.5YR6/0 gray; soft; wet					
			Clay, 10-30% fine Sand, <10% Silt. 10YR7/1 light gray; increasing sand gradient; moist	0/0	2-2-4-7	3	SS	2.0
10	SP		Clayey Sand, 10-30% fine sand, <10 Gravels, 10YR7/2 light gray; moist					
	CL		Fine Sand, <10% Clay, 5YR8/1 white					
	ML		Sandy Clay. 10YR8/1 white					
15			Silt, <10% Clay. 10YR4/2 weak red	0/0	2-2-2-2	4	SS	1.5
			Bottom of boring at 16 feet					
20			*Note: NR=Not Recorded, NA=Not Applicable, SS=Split Spoon, Borehole Diameter=11.75"*					
25								
30								

Well Const. As-Built



SOIL BORING/WELL LOG

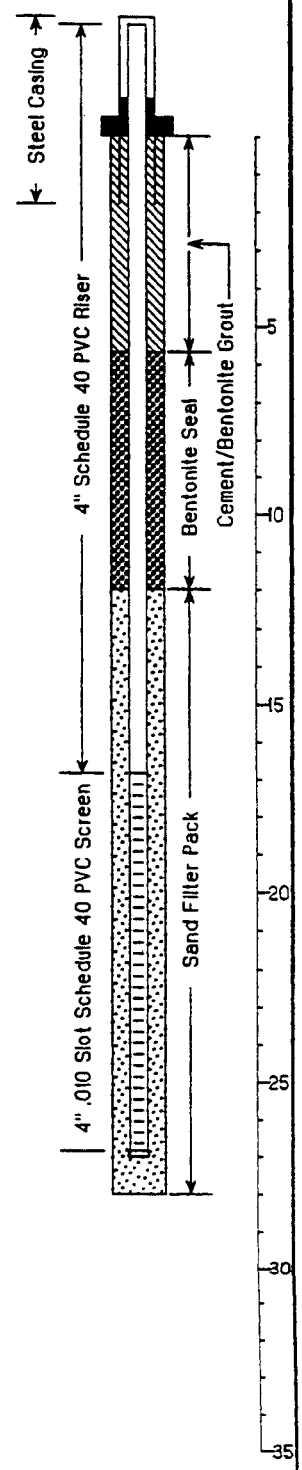
Project Name: Fort McClellan RI/FS
SAIC Project No.: 01-0827-03-6520
Geologist: Chuck Houck
Drilling Co.: Environmental Exploration, Inc.
Driller: Kevin Bray
Drill Rig: CME Model 75

Site Location: Old Landfill #3
Northing (ft): 1181158.78
Easting (ft): 513146.43
Groundwater Elev. (ft): 717.49'
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon

Monitoring Well No.: OLF-G15
Start/Finish Date: 04-20-94
Well Completion Depth (ft): 28.0
Drilled Depth (ft): 28.0
Surface Elevation (ft): 732.92
Top of Casing Elevation (ft): 735.45

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
	ML		Silt. 5YR3/4 dark reddish brown; soft; slightly moist	0/0	2-2-3-4	1	SS	1.6
	CL		Clay, 20% Silt. 5YR5/8 yellowish red; slight plasticity; soft; moist	0/0	4-6-8-11	2	SS	2.0
5			Clay, 40% Silt. 5YR5/8 yellowish red; soft; slightly moist	0/0	3-5-7-9	3	SS	2.0
			Clay, 20% Silt,<10% Gravel (10-20cm). 7.5YR5/8 strong brown; firm; slightly moist; angular	NR	2-3-4-3	4	SS	2.0
	ML		Silt, 10-30% Clay. 7.5YR6/6 redish yellow; soft; moist	NR	3-3-4-6	5	SS	2.0
10			Clay, 20% Silt. 10YR6/8 brownish yellow; firm; slight plasticity; moist	NR	3-3-5-10	6	SS	2.0
	CL		Clay, <10% Silt. 10YR7/8 yellow; firm; some plasticity; moist	NR	6-6-6-7	7	SS	2.0
15			Clay, 10-30% Silt. 5YR5/4 redish brown; firm; moist; slight cementation; interbedded laminates of organics (decomposed);	NR	3-5-5-6	8	SS	NR
	ML		Clay, 10-30% Silt. 7.5YR5/8 strong brown; no plasticity; soft; slighty moist	0/0	2-3-4-5	9	SS	2.0
	CL		Silt, 10-30% Clay and fine Sands. 7.5YR6/8 reddish yellow; soft; laminates of alternating silt and sand; soft	0/0	2-2-2-2	10	SS	2.0
20			Clay; <10% Silt. soft; plastic; laminates of partical cemented silts.	NR	1-1-1-2	11	SS	NR
	ML		Clay, 40% Gravel (20-30mm). 5YR4/6 yellowish red with 10YR6/8 brownish yellow gravel; soft; plastic; moist to wet; angular; quartzite					
25			Silt, 10-30% Clay. 10YR7/6 yellow; soft; moist; partial cementation					
	CL		Clay, 10-30 Silt. 10YR7/6 yellow; firm; slightly moist; laminates of partially cemented organic material (black) and silts	0/0	5-6-7-10	12	SS	2.0
30			*Bottom of Boring at 28 feet*					
35			*Note=NR=Not Recorded, NA=Not Applicable SS=Split Spoon, Borehole Diameter=8.75"*					

Well Const. As-Built



SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS
SAIC Project No.: 01-0827-03-6520
Geologist: Chuck Houck
Drilling Co.: Environmental Exploration, Inc.
Driller: Kevin Bray
Drill Rig: CME Model 75

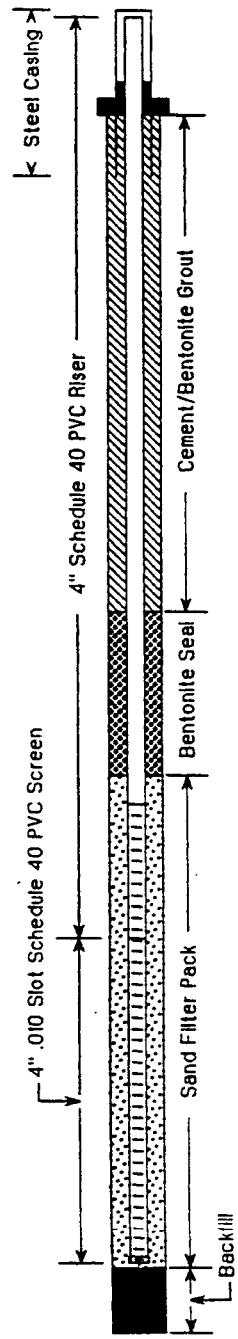
Site Location: Old Landfill #3
Northing (ft): 1180886.81
Easting (ft): 512694.55
Groundwater Elev. (ft): 701.39
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon

Monitoring Well No.: OLF-G16
Start/Finish Date: 04-18-94
Well Completion Depth (ft): 35.0
Drilled Depth (ft): 37.0
Surface Elevation (ft): 735.31
Top of Casing Elevation (ft): 737.80

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
	NA		Surface Grassy. organic loess					
	ML		Silt, 7.5YR3/2 dark brown; soft; moist; some organics; roots	0/0	2-4-7-11	1	SS	2.0
5			Silt, 40% Clay. 7.5YR5/8 strong brown; firm; slightly moist	NR	2-3-5-6	2	SS	2.0
10	CL		Clay, 40% Silt. 7.5YR4/6 strong brown; firm; moist	NR	3-5-6-7	3	SS	1.8
			Silt, <10% fine Sands. 5R4/3 reddish brown; dry; slight cementation					
15				0/0	2-3-6-8	4	SS	2.0
20	ML		Silt, <10% Clay and Gravel (<2cm.). 10YR4/3 dark brown; soft; moist	0/0	6-8-12-20	5	SS	NR
			Silt. 10R3/4 weak red ; hard; dry; slight cementation;					
25				0/0	7-16-17-22	6	SS	NR
30			Silt, <10% Clay. 2.5YR3/4 reddish brown; soft; moist	0/0	2-2-4-2	7	SS	1.0
35				0/0	1-1-1-9	8	SS	1.0
			Silt, 20% Clay. 7.5R4/2 reddish brown; firm; dry; partial cementation; fracturesw/black organics in fractures; fissle					
40			*Bottom of boring at 37 feet*					

Note:NR=Not Recorded; NA=Not Applicable
SS=Split Spoon; Borehole Diameter=11.7"

Well Const. As-Built



SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS
SAIC Project No.: 01-0827-03-6520
Geologist: Cary Gordon
Drilling Co.: Environmental Exploration, Inc.
Driller: Kevin Bray
Drill Rig: CME Model 75

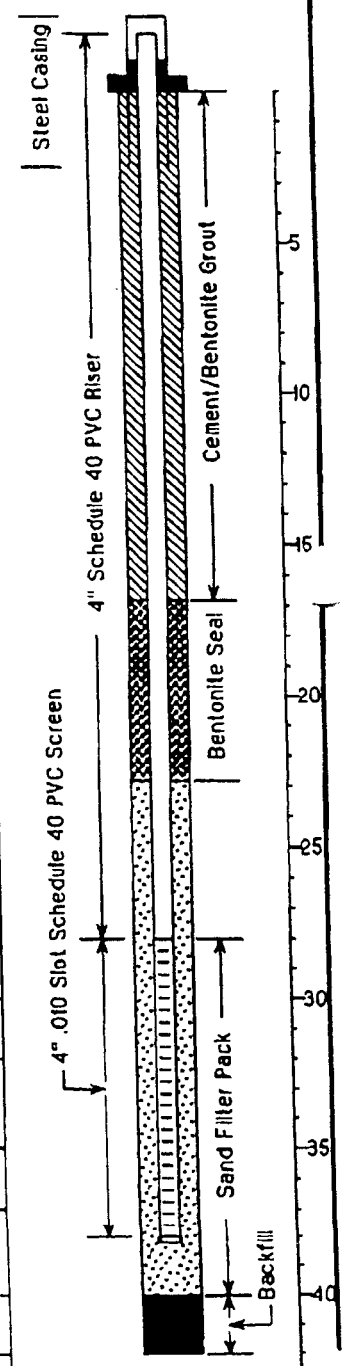
Site Location: Old Landfill #3
Northing (ft): 1178358.17
Easting (ft): 512076.47
Groundwater Elev. (ft): 713.88
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon

Monitoring Well No.: OLF-G17
Start/Finish Date: 07-05-94/07-08-94
Well Completion Depth (ft): 40.0
Drilled Depth (ft): 42.0
Surface Elevation (ft): 738.46
Top of Casing Elevation (ft): 740.11

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
	ML		Silty Sand, 45% very fine to very coarse Sand, 38% Silt, 13% Clay. 10YR7/1 gray with 10YR6/4 light brown, non-plastic; soft; slightly moist; slight organics	0/0	5-6 -6-8	1	SS	1.5
5	ML		Sandy Silt, 30% Clay. 10YR7/1 light gray, varigated brown with 10YR5/6; iron stained; slightly weathered; slightly plastic; firm; moist	0/0	4-7- 11-13	2	SS	2.0
10	ML		Sandy Silt, 31% Sand, 10% Clay, 1% Gravel. 10YR8/1 light gray with 7.5YR5/8 iron staining; semiconsolidated w/ weathering; plastic; firm; moist	0/0	4-6- 7-7	3	SS	1.6
15	NA		Siltstone/Shale. 10YR7/1 light gray with 10YR4/6 light brown; semiconsolidated weathered w/ fracturing; stiff; moist	0/0	7-10- 11-14	4	SS	1.7
20	NA		Sand, 52% very fine to very coarse Sand, 38% Silt, 16% Sandstone and Siltstone. 10YR6/2 light tan with dark iron stains; varigated; semiconsolidated; stiff; moist	0/0	7-9 9-11	5	SS	NR
				0/0	6-8 9-7	6	SS	1.5
25	NA		Sandstone 10% Clay. 10YR6/6 light yellowish brown; weathering; semiconsolidated; stiff; moist	0/0	6-11 13-21	7	SS	2.0
30	NA		Sand, 45% very fine to very coarse Sand, 23% Sandstone. 7.5YR7/2 tan with iron staining; stiff; moist	0/0	7-9 11-13	8	SS	1.3
35	NA		Sandstone, 7.5YR5/6 light brown; weathered with fracturing; hard; moist	0/0	4-7 11-14	9	SS	1.0
40	NA		Sandstone, 7.5YR3/3 reddish brown w/ 10YR6/2 varigated gray; semiconsolidated w/ weathering shale like fractures zones; hard; moist					
	NA		Sandstone and Siltstone. 2.5YR3/2 dark reddish brown w/ 7.5YR6/6 light brown; weathering; fracturing; moist; hard	0/0	10-17 18-25	10	SS	1.3
45			*Bottom of boring at 42 feet*					

Note: NR=Not Recorded, NA=Not Applicable
SS=Split Spoon, Borehole Diameter=8.75"

Well Const. As-Built

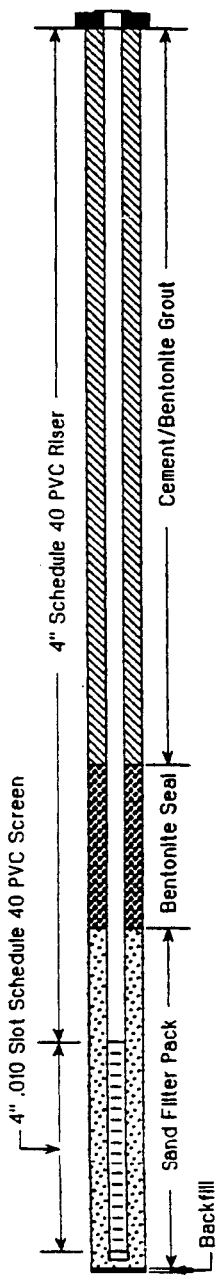


SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS
Site Location: Old Landfill #3
Monitoring Well No.: OLF-G18
SAIC Project No.: 01-0827-03-6520
Northing (ft): 1179743.99
Start/Finish Date: 02-20-95/02-21-95
Geologist: Brad Baker
Easting (ft): 512044.54
Well Completion Depth (ft): 58.3
Drilling Co.: Christensen Boyles Brothers
Groundwater Elev. (ft): 697.82
Drilled Depth (ft): 58.5
Driller: Ricky Bilbrey
Drilling Method: Hollow Stem Auger
Surface Elevation (ft): 740.83
Drill Rig: CME Model 75
Sampling Method: Split Spoon
Top of Casing Elevation (ft): 740.81

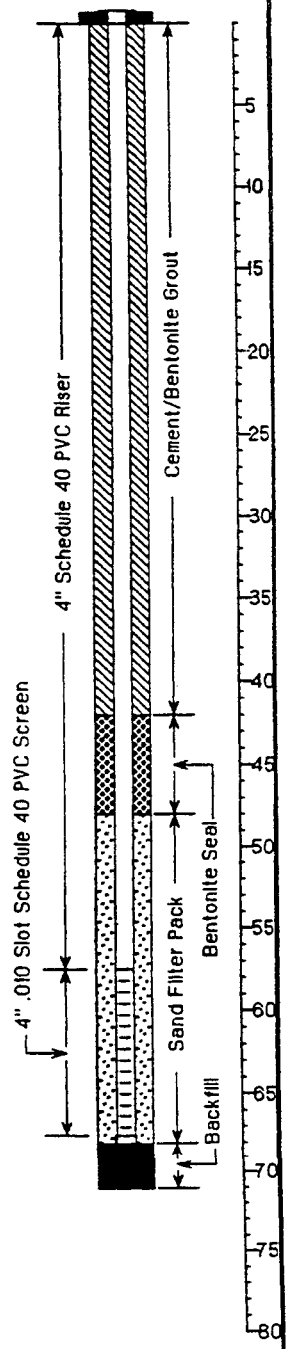
Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
5	CL		Sandy Clay, 30% Sand: 20% coarse, 10% medium, 5% roots 10YR5/8 yellowish brown; moderate plasticity; medium; moist; no apparent bedding; subangular; road gravel at bottom of spoon-2%	0/0	9-10-3-4	1	SS	0.5
10				0/0	4-4-8-7	2	SS	1.8
15	ML		Silty Clay, 30% Silt, Sand: 15% medium, 5% grannular. 10R3/6 dark red; varigated light brownish yellow and light gray; moderate plasticity; stiff; moist; no apparent bedding; subrounded	1ppm/0	6-7-12-26	3	SS	2.0
20			Silt, 20% medium Sand, 10YR3/4 Dusky Red; best fit color acutualy a a purplish red varigated orange, light gray; low plasticity; dense; Silt; moist; fissle; subrounded	0/0	12-24-38-50/5"	4	SS	2.0
25			Same as above, very dense	1ppm/0	10-21-30-36	5	SS	1.5
			Same as above with very fine grained Sand interbeds, 20% Sand, very dense					
30			Same as above. varigated white, very dense	1ppm/0	4-25-49-50/4"	6	SS	1.5
35			Same as above	0/0	9-30-50/5"	7	SS	1.2
40			Same as above. banded yellowish; very dense	0/0	4-22-45-50/5"	8	SS	1.2
45			Same as above. banded tan; very dense	0/0	15-28-50/4"	9	SS	1.2
50			Same as above; very dense	0/0	10-31-50/5"	10	SS	1.5
55			Same as above .1-58.5 *Bottom of boring at 58.5 feet*	0/0	18-50/3"	11	SS	0.8
60			*Note: NR=Not Recorded, NA=Not Applicable* *SS=Split Spoon, Borehole Diameter=11.5"*					

Well Const. As-Built



SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS	Site Location: Old Landfill #3	Monitoring Well No.: OLF-G19
SAIC Project No.: 01-0827-03-6520	Northing (ft): 1180087.97	Start/Finish Date: 03-18-95/03-21-95
Geologist: Brad Baker	Easting (ft): 512195.91	Well Completion Depth (ft): 68.0
Drilling Co.: Christensen Boyles Brothers	Groundwater Elev. (ft): 692.87	Drilled Depth (ft): 71.0
Driller: Kenneth Kesty	Drilling Method: Hollow Stem Auger	Surface Elevation (ft): 742.79
Drill Rig: CME Model 75	Sampling Method: Split Spoon	Top of Casing Elevation (ft): 742.30

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HNu (ppm)/ LEL	Blows/6 in.	Sample No.	Sample Type	Sample Rec (ft)
5			No Samples collected. Geology similar to other wells in area.					
10								
15								
20								
25								
30								
35								
40								
45								
50								
55								
60								
65								
70			*Bottom of boring at 71'*					
75			*Note: NR=Not Recorded, NA=Not Applicable SS=Split Spoon, Borehole Diameter=7.3/4"*					
80								

Well Const. As-Built