

**Groundwater Investigation Report
Burial Mound at Rideout Field, Parcel 202Q-RD**

**Fort McClellan
Calhoun County, Alabama**

Prepared for:

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**Task Order CK10
Contract No. DACA21-96-D-0018
IT Project No. 796887**

October 2002

Revision 0

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1 **1.0 Introduction**

2
3 This report summarizes the results of the groundwater investigation conducted by IT Corporation
4 (IT) at the Burial Mound at Rideout Field, Parcel 202Q-RD, at Fort McClellan in Calhoun
5 County, Alabama. The groundwater investigation was conducted for the U.S. Army from May
6 through August 2002 at the request of the U.S. Nuclear Regulatory Commission (NRC). The
7 NRC requested that an evaluation be conducted to determine the presence or absence of cesium-
8 137 (Cs-137), cobalt-60 (Co-60), and strontium-90 (Sr-90) in groundwater at the site.
9

10 **2.0 Site Description and History**

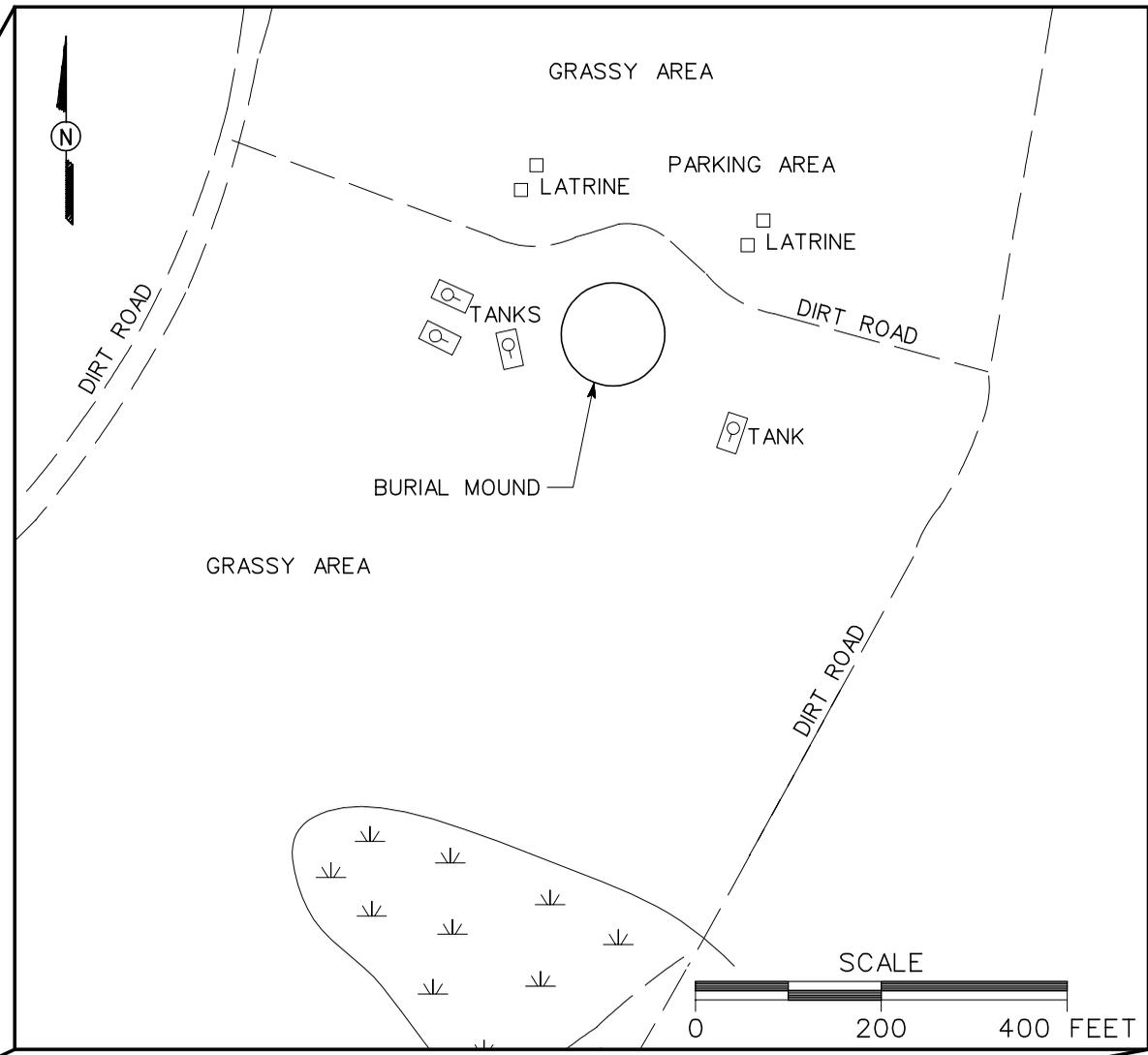
11
12 The Burial Mound site (Parcel 202Q-RD) is located at the north end of Rideout Field in the
13 western portion of Pelham Range (Figure 1). Rideout Field was used as part of the U.S. Army
14 Chemical School's Radiological Survey Training Facility from 1965 to 1972 and as a burial site
15 for radioactive material. The Rideout Field Survey Training Area was cleared, leveled, and
16 designated as a burial ground in 1957.
17

18 Radioactive waste from the waste burial ground on the Main Post (Iron Mountain site) was
19 transferred to Pelham Range and buried at the site during the same year. Burial of waste, mostly
20 laboratory waste (Cs-137, Co-60, and possibly Sr-90), continued throughout the 1960s. Other
21 items buried included leaking Co-60 sources that were placed in cut-down 55-gallon drums and
22 soils contaminated from leaking Co-60 sources (U.S. Army Center for Health Promotion and
23 Preventative Medicine [CHPPM], 1999). In 1972-73, the site was cleared and the burial mound
24 was created during the excavation of the burial site (response by John May, U.S. Army Chemical
25 School). The burial mound, which covered approximately 0.1 acre (Figure 2), was removed by
26 an Army contractor in 2001-2002. Pelham Range, including the area of the former burial
27 mound, is currently used for military training activities by the Alabama Army National Guard.
28

29 **3.0 Previous Investigations**

30
31 In 1996, CHPPM conducted an industrial radiation study to assess radiation health hazards
32 associated with potential contamination and to determine if residual radioactivity at the Burial
33 Mound site was in compliance with NRC guidance for release for unrestricted use. Results of
34 the study indicated Cs-137 and Co-60 activities above soil release criteria and subsurface
35 measurements indicative of buried radioactive sources or substantial contamination pockets in

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- ▾ MARSH / WETLANDS
- . . . SURFACE DRAINAGE / CREEK

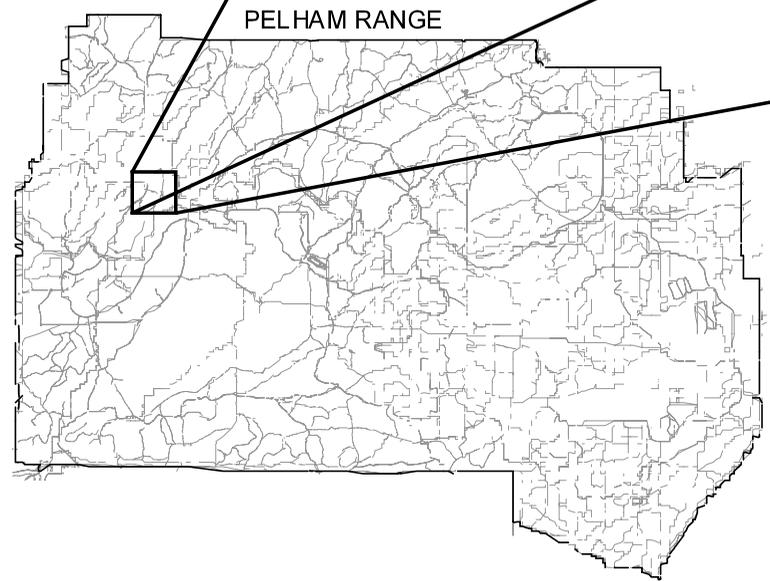
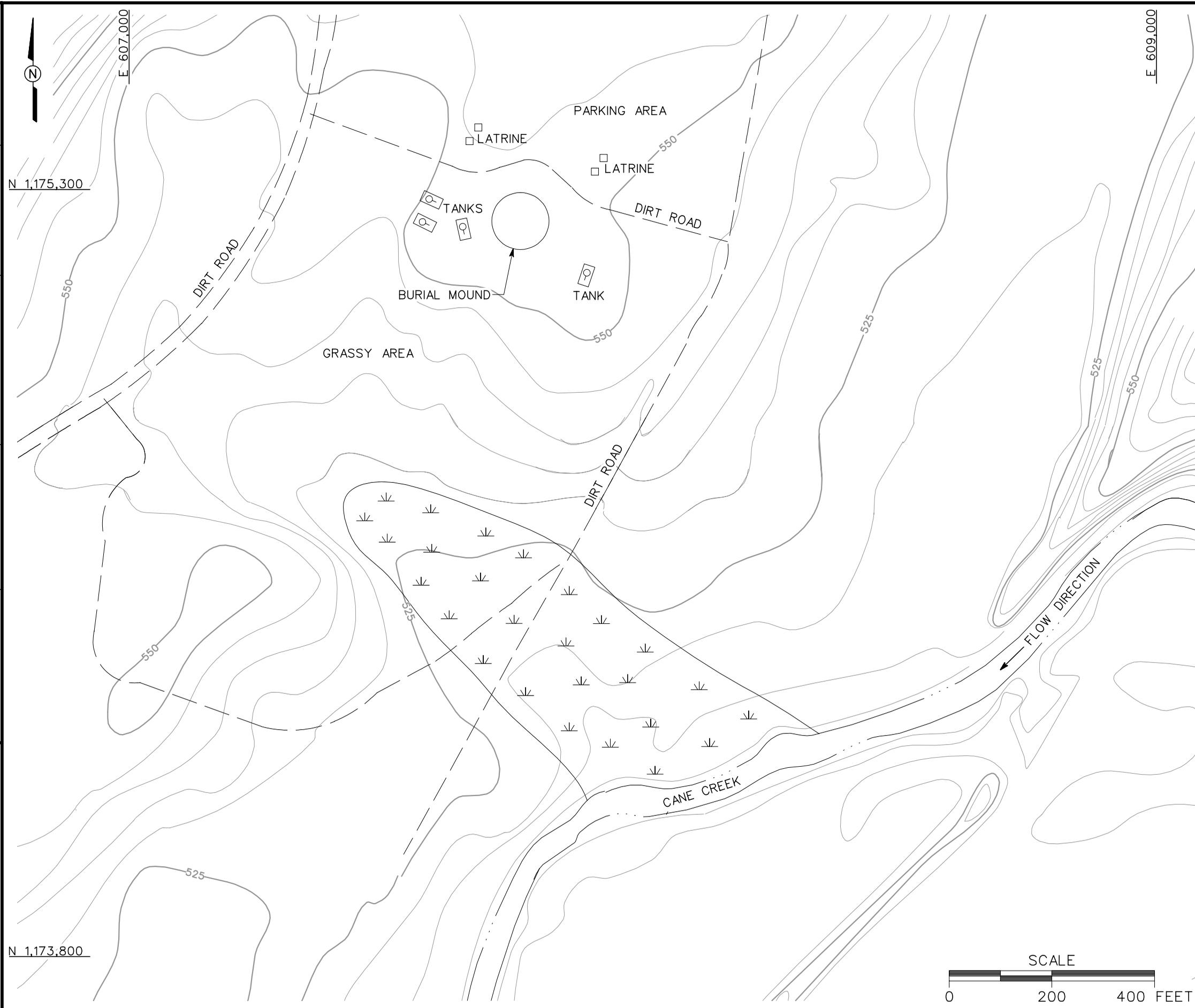


FIGURE 1
SITE LOCATION MAP
BURIAL MOUND AT RIDEOUT FIELD

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- LEGEND**
- UNIMPROVED ROADS AND PARKING
 - 550 TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
 - ↘ MARSH / WETLANDS
 - . . . SURFACE DRAINAGE / CREEK

FIGURE 2
SITE MAP
BURIAL MOUND AT RIDEOUT FIELD

U. S. ARMY CORPS OF ENGINEERS
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1 the subsurface environment. CHPPM recommended the excavation, removal, and proper
2 disposal of the surface and subsurface contamination and a final status survey of the Burial
3 Mound to support release of this area for unrestricted use.

4.0 Study Area Investigation

7 Initially, IT installed four residuum groundwater monitoring wells at the site to collect
8 groundwater samples for laboratory analysis. Three of the residuum wells were installed
9 downgradient of the Burial Mound, and one well was installed upgradient of the Burial Mound
10 (Figure 3). However, groundwater was not encountered in residuum at three of the four
11 monitoring well locations. Therefore, IT installed three additional wells in the bedrock water-
12 bearing zone. The bedrock wells were installed to depths of approximately 82 to 92 feet below
13 ground surface (bgs) at each of the dry residuum well locations. Investigation field activities are
14 summarized in the following sections.

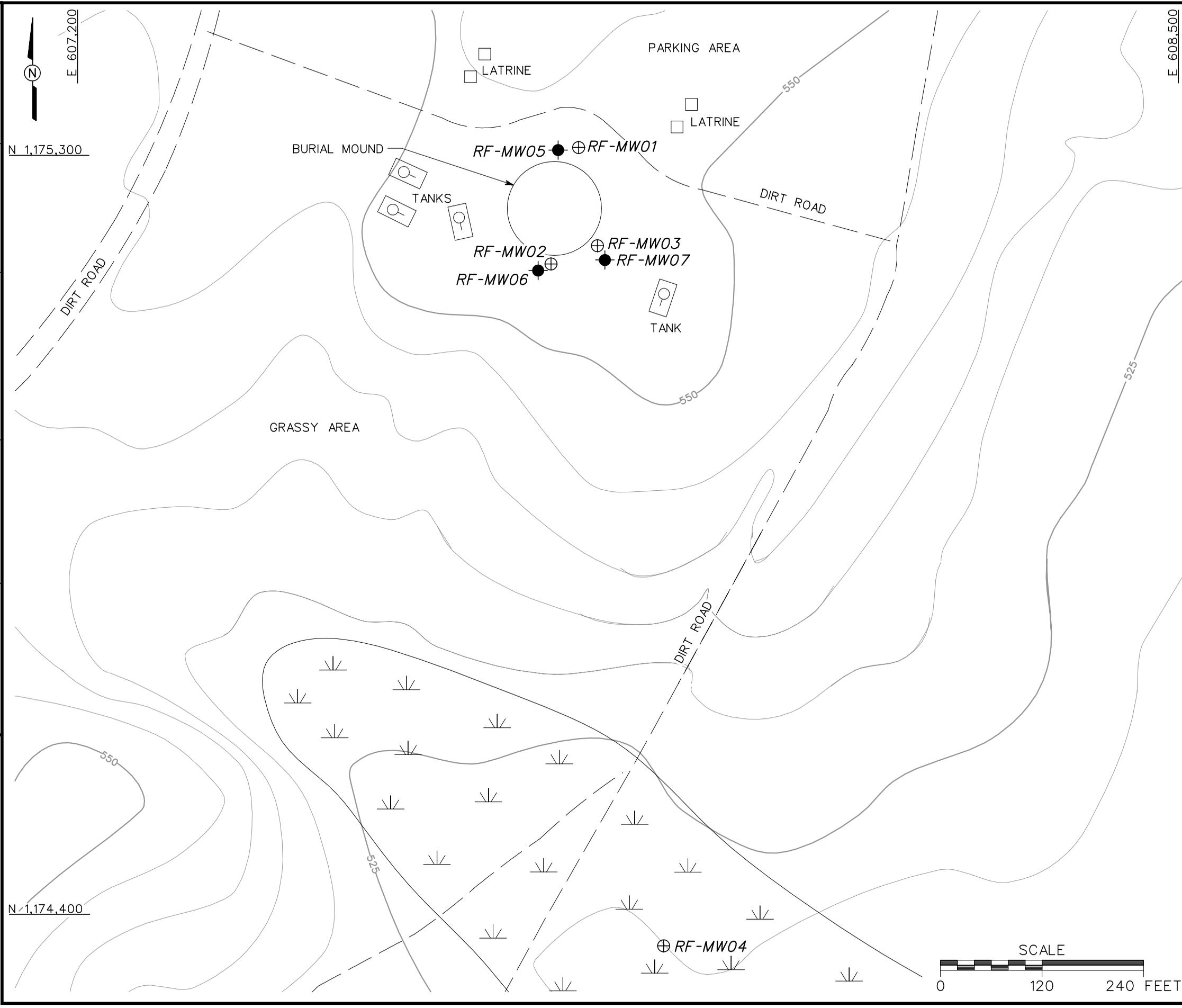
4.1 Monitoring Well Installation and Development

17 IT installed seven permanent monitoring wells at the Burial Mound at Rideout Field to provide
18 site-specific geological and hydrogeological data and to collect groundwater samples for
19 laboratory analysis. The monitoring well locations are shown on Figure 3. IT contracted Miller
20 Drilling Company to provide drilling services for installation of the wells. The field work was
21 performed in accordance with the *Site-Specific Work Plan (SSWP) for the Groundwater*
22 *Investigation at the Burial Mound at Rideout Field, Parcel 202Q-RD-Pelham Range* (IT, 2001)
23 and the site-specific safety and health plan (SSHP) attachment presented with the SSWP. The
24 SSWP was used in conjunction with the SSHP as attachments to the installation-wide work plan
25 (IT, 2002a) and the installation-wide sampling and analysis plan (SAP) (IT, 2002b).

27 **Residuum Monitoring Wells.** The residuum monitoring wells were drilled and installed using
28 the hollow-stem auger drilling methodology specified in the SAP. The monitoring well consisted
29 of new 2-inch inside diameter (ID), Schedule 40, threaded, flush-joint polyvinyl chloride (PVC)
30 riser pipe with a 10-foot section of new, threaded, flush-joint, 0.010-inch continuous wrap PVC
31 well screen. A threaded PVC end cap was attached to the bottom of the well screen. The
32 monitoring well construction details are summarized in Table 1, and the well construction logs are
33 included in Appendix A.

35 Split-spoon soil samples were collected at 5-foot intervals from ground surface to the bottom of the
36 borehole during hollow-stem auger drilling to provide a detailed lithologic log (Appendix A). The

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- LEGEND**
- UNIMPROVED ROADS AND PARKING
 - 550 TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
 - Marsh / Wetlands symbol
 - SURFACE DRAINAGE / CREEK
 - ⊕ RESIDUUM MONITORING WELL LOCATION
 - BEDROCK MONITORING WELL LOCATION

FIGURE 3
MONITORING WELL LOCATION MAP
BURIAL MOUND AT RIDEOUT FIELD

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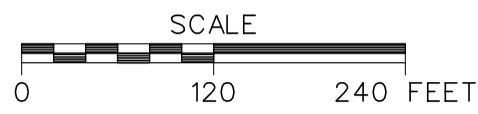


Table 1

**Monitoring Well Construction Summary
Burial Mound at Rideout Field, Parcel 202Q-RD
Fort McClellan, Calhoun County, Alabama**

| Well Location | Well Type | Northing | Easting | Ground Elevation (ft amsl) | TOC Elevation (ft amsl) | Well Depth (ft bgs) | Screen Length (ft) | Screen Interval (ft bgs) | Well Material |
|----------------------|------------------|-----------------|----------------|-----------------------------------|--------------------------------|----------------------------|---------------------------|---------------------------------|----------------------|
| RF-MW01 | Residuum | 1175307.40 | 607793.63 | 553.15 | 555.41 | 23 | 10 | 13 - 23 | 2" ID Sch. 40 PVC |
| RF-MW02 | Residuum | 1175169.35 | 607761.15 | 550.50 | 552.63 | 23.5 | 10 | 13.5 - 23.5 | 2" ID Sch. 40 PVC |
| RF-MW03 | Residuum | 1175190.89 | 607815.86 | 552.01 | 554.24 | 20 | 10 | 10 - 20 | 2" ID Sch. 40 PVC |
| RF-MW04 | Residuum | 1174360.65 | 607894.02 | 518.70 | 520.96 | 20 | 10 | 10 - 20 | 2" ID Sch. 40 PVC |
| RF-MW05 | Bedrock | 1175304.31 | 607769.39 | 552.75 | 554.85 | 91.9 | 25 | 66.5 - 91.5 | 4" ID Sch. 80 PVC |
| RF-MW06 | Bedrock | 1175161.46 | 607745.86 | 550.01 | 552.16 | 81.9 | 20 | 61.9 - 81.9 | 4" ID Sch. 80 PVC |
| RF-MW07 | Bedrock | 1175173.97 | 607824.70 | 549.79 | 551.92 | 85.5 | 25 | 60.2 - 85.2 | 4" ID Sch. 80 PVC |

Residuum wells installed using hollow-stem auger; bedrock wells installed using air rotary.

Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.

4" ID Sch. 80 PVC - 4-inch inside diameter, Schedule 80, polyvinyl chloride.

bgs - Below ground surface.

ft - Feet

amsl - Above mean sea level.

1 samples were collected using a 2-foot-long, 2-inch-diameter, carbon-steel, split-spoon sampler.
2 The soil borings were logged in accordance with American Society for Testing and Materials
3 Method (ASTM) D 2488 using the Unified Soil Classification System. During drilling activities
4 associated with monitoring well installation, two undisturbed soil samples were collected and
5 archived for potential future geotechnical analysis. The undisturbed soil samples were collected
6 with 2-foot-long, 3-inch outside diameter, thin-walled metal (Shelby) tubes following procedures
7 outlined in ASTM Method D 1587. One undisturbed soil sample was collected from RF-MW02 at
8 16 to 18 feet bgs, and the second undisturbed soil sample was collected from RF-MW03 at 12 to
9 14 feet bgs. Upon retrieval, each Shelby tube was capped with wax at both ends and transported to
10 the IT field compound for storage.

11
12 Prior to initiating drilling activities, radiological screening was conducted using a Ludlum Model
13 19 gamma radiation survey meter. Ambient background radiation levels in the area were
14 established prior to screening by selecting ten locations in nearby unaffected areas and taking
15 radiation level measurements. The drilling locations were screened and compared to the earlier
16 established background radiation levels. Furthermore, as soils were retrieved from the boreholes,
17 radiation levels were monitored and compared to background radiation levels. At no time during
18 the drilling activities did the radiation levels reach or exceed 1.5 times background radiation levels.

19
20 **Bedrock Monitoring Wells.** The bedrock monitoring wells were installed using an air-rotary
21 drill rig equipped with a 12- and/or 14-inch rotary bit and a 7-7/8-inch percussion bit. The
22 borehole at each well location was advanced from ground surface to approximately 5 feet into
23 competent bedrock. Eight-inch ID carbon steel International Pipe Standard (IPS) outer casing was
24 installed in the borehole from ground surface to the bottom of the borehole. A minimum annular
25 space of two inches was maintained between the outer casing and the borehole wall. The outer
26 casing was grouted in place using a tremie pipe suspended in the annulus outside the casing.
27 Bentonite-cement grout, consisting of approximately 6.5 to 7 gallons of water and 5 pounds of
28 bentonite per 94-pound bag of Type II Portland cement, was used to grout the casing in place.
29 After allowing the grout to cure for a minimum of 48 hours, a 7-7/8-inch air percussion bit was
30 used to drill into competent bedrock from the bottom of the outer casing to the total depth of the
31 borehole. However, prior to using the percussion bit at one location (RF-MW07), core samples
32 were collected continuously from the bottom of the outer casing to the total depth of the borehole
33 using a PQ wireline core barrel. After coring was completed, a 7-7/8-inch air percussion bit was
34 used to ream the hole from the bottom of the outer casing to the total depth of the borehole. Water
35 was the only lubricant used during drilling operations. Lithologic logs of the bedrock wells are
36 presented in Appendix A.

1 The bedrock monitoring wells were completed by placing the well screen and casing materials
2 through the outer casing according to the methodology specified in the SAP. The well consisted of
3 4-inch ID, threaded, flush-joint, Schedule 80 PVC riser pipe and 20 or 25 feet of threaded, flush-
4 joint, 0.010-inch continuous wrap PVC well screen attached to the bottom of the well casing. A
5 threaded PVC end cap was attached to the bottom of the well screen. The monitoring well
6 construction details are summarized in Table 1, and the well construction logs are included in
7 Appendix A.

8
9 **Well Development.** Monitoring wells RF-MW04, RF-MW05, RF-MW06, and RF-MW07 were
10 developed by surging and pumping with a submersible pump in accordance with methodology
11 outlined in the SAP. The remaining wells could not be developed because they did not contain
12 water. The submersible pump used for well development was moved in an up-and-down fashion
13 to encourage any residual well installation materials to enter the well. These materials were then
14 pumped out of the well in order to re-establish the natural hydraulic flow conditions. Development
15 of the residuum well (RF-MW04) continued for eight hours. Development of the bedrock wells
16 continued until the water turbidity was less than 20 nephelometric turbidity units or for a
17 maximum of 12 hours. Development of RF-MW07 was considered complete after the well had
18 been pumped/bailed dry and allowed to recharge three times. The well development logs are
19 included in Appendix C.

20 21 **4.2 Groundwater Sampling and Analysis**

22 Groundwater samples were collected from four of the seven monitoring wells (water was not
23 present in three wells) in accordance with procedures outlined in the SAP. Groundwater samples
24 were collected after purging a minimum of three well volumes and after field parameters (i.e.,
25 temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction potential, and
26 turbidity) stabilized. Purging and sampling were performed with a mechanical pump (i.e.,
27 peristaltic or bladder pump) equipped with Teflon™ tubing, except at well location RF-MW07. At
28 well location RF-MW07, purging was performed using a bladder pump and the sample was
29 collected using a bailer. Groundwater field parameters were measured using a calibrated water-
30 quality meter, as summarized in Table 2. Sample collection logs are included in Appendix B.

31
32 The groundwater samples were analyzed for gamma-emitting radionuclides (including Cs-137 and
33 Co-60) and Sr-90 using U.S. Environmental Protection Agency analytical methods (Table 3).
34 Sample documentation and chain-of-custody records were completed as specified in the SAP.
35 Completed analysis request and chain-of-custody records (Appendix B) were secured and included
36 with each shipment of sample coolers to EMAX Laboratories, Inc. in Torrance, California.

Table 2

**Groundwater Field Parameters
Burial Mound at Rideout Field, Parcel 202Q-RD
Fort McClellan, Calhoun County, Alabama**

| Sample Location | Sample Date | Specific Conductivity (mS/cm) | Dissolved Oxygen (mg/L) | ORP (mV) | Temperature (°C) | Turbidity (NTU) | pH (SU) |
|------------------------|--------------------|--------------------------------------|--------------------------------|-----------------|-------------------------|------------------------|----------------|
| RF-MW04 | 30-Jul-02 | 0.435 | 0.67 | -160 | 21.40 | 5.3 | 6.96 |
| RF-MW05 | 30-Jul-02 | 0.429 | 6.19 | 122 | 21.32 | 3.7 | 7.01 |
| RF-MW06 | 2-Aug-02 | 0.486 | 8.21 | 88 | 21.99 | 8.1 | 7.28 |
| RF-MW07 | 2-Aug-02 | 0.505 | 9.06 | 139 | 21.70 | 111 | 7.23 |

°C - Degrees Celsius.

mg/L - Milligrams per liter.

mS/cm - Millisiemens per centimeter.

mV - Millivolts.

NTU - Nephelometric turbidity units.

ORP - Oxidation-reduction potential.

SU - Standard units.

1 **4.3 Water Level Measurements**

2 The depth to groundwater was measured in monitoring wells at the site on September 16, 2002,
3 following procedures outlined in the SAP. Depth to groundwater was measured with an
4 electronic water level meter. The meter probe and cable were cleaned before use at each well,
5 following decontamination methodology presented in the SAP. The monitoring wells were left
6 uncapped for at least 48 hours prior to measurement to allow the groundwater in the wells to
7 equilibrate to atmospheric conditions. Measurements were referenced to the top of the inside
8 PVC well casing, as summarized in Table 4. A groundwater elevation map was constructed
9 using the September 2002 data, as shown on Figure 4.
10

11 **4.4 Surveying of Well Locations**

12 The monitoring well locations were surveyed using global positioning system and conventional
13 civil survey techniques described in the SAP. Horizontal coordinates were referenced to the U.S.
14 State Plane Coordinate System, Alabama East Zone, North American Datum of 1983.
15 Elevations were referenced to the North American Vertical Datum of 1988. Horizontal
16 coordinates and elevations are included in Appendix D.
17

18 **4.5 Investigation-Derived Waste Management and Disposal**

19 Investigation-derived waste (IDW) was managed and disposed as outlined in the SAP. The IDW
20 generated during the groundwater investigation at the Burial Mound at Rideout Field was
21 segregated as follows:

- 22
- 23 • Drill cuttings
- 24 • Purge water from well development, sampling activities, and decontamination fluids
- 25 • Personal protective equipment.
26

27 Solid IDW was stored on site in lined roll-off bins prior to characterization and final disposal.
28 Solid IDW was characterized using toxicity characteristic leaching procedure analyses, Sr-90
29 analysis, and full gamma scan (including Cs-137 and Co-60). Based on the results, drill cuttings
30 and personal protective equipment generated during the investigation were disposed as
31 nonregulated waste at the Three Corners Landfill in Piedmont, Alabama.
32

33 Liquid IDW was contained in a portable frac tank at the site. Liquid IDW was characterized by
34 volatile organic compound (VOC), semivolatile organic compound (SVOC), and metals analyses
35 as well as Sr-90 analysis and full gamma scan (including Cs-137 and Co-60). Based on the
36 analyses, liquid IDW was discharged as nonregulated waste to the FTMC wastewater treatment
37 plant on the Main Post.

Table 3

**Groundwater Sample Designations and Analytical Parameters
Burial Mound at Rideout Field, Parcel 202Q-RD
Fort McClellan, Calhoun County, Alabama**

| Sample Location | Sample Designation | QA/QC Samples | | Analytical Parameters |
|-----------------|-----------------------|----------------------|--------|---|
| | | Field Duplicates | MS/MSD | |
| RF-MW04 | RF-MW04-GW-HV3005-REG | RF-MW04-GW-HV3004-FD | | Gamma Scan (including Cs-137 and Co-60) and Sr-90 |
| RF-MW05 | RF-MW05-GW-HV3006-REG | | | Gamma Scan (including Cs-137 and Co-60) and Sr-90 |
| RF-MW06 | RF-MW06-GW-HV3007-REG | | | Gamma Scan (including Cs-137 and Co-60) and Sr-90 |
| RF-MW07 | RF-MW07-GW-HV3008-REG | | | Gamma Scan (including Cs-137 and Co-60) and Sr-90 |

Co-60 - Cobalt 60.

Cs-137 - Cesium 137.

FD - Field duplicate.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample.

Sr-90 - Strontium 90.

Table 4

**Groundwater Elevations
Burial Mound at Rideout Field, Parcel 202Q-RD
Fort McClellan, Calhoun County, Alabama**

| Well Location | Date | Depth to Water (ft BTOC) | Top of Casing Elevation (ft amsl) | Ground Elevation (ft amsl) | Groundwater Elevation (ft amsl) |
|----------------------|-------------|-------------------------------------|--|---|--|
| RF-MW04 | 16-Sep-02 | 4.25 | 520.96 | 518.70 | 516.71 |
| RF-MW05 | 16-Sep-02 | 31.21 | 554.85 | 552.75 | 523.64 |
| RF-MW06 | 16-Sep-02 | 27.72 | 552.16 | 550.01 | 524.44 |
| RF-MW07 | 16-Sep-02 | 37.05 | 551.92 | 549.79 | 514.87 |

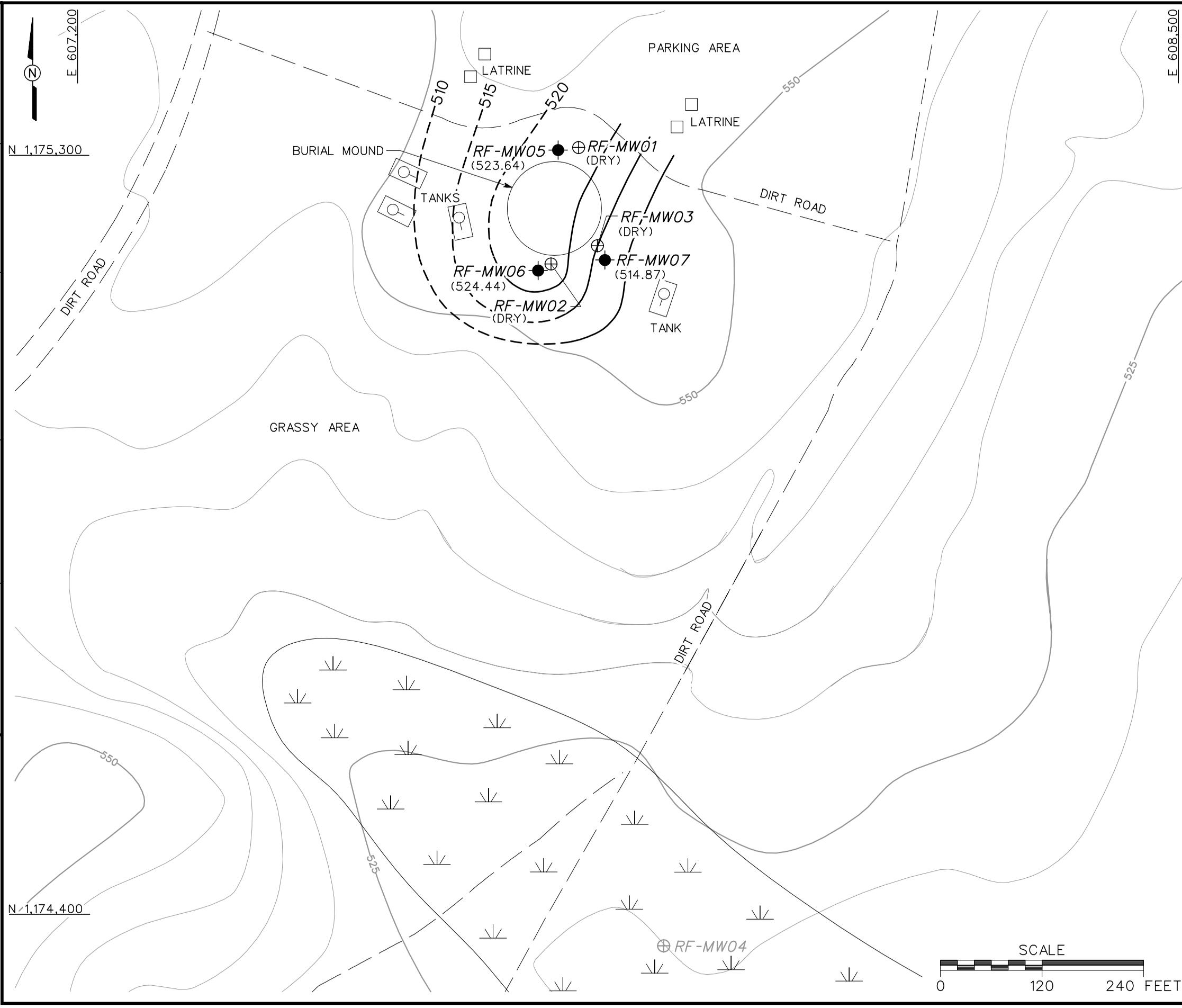
Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

BTOC - Below top of casing

ft - Feet

amsl - Above mean sea level

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- LEGEND**
- UNIMPROVED ROADS AND PARKING
 - 550 TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
 - 500 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
 - (523.64) GROUNDWATER ELEVATION (FT MSL) (SEPTEMBER 16, 2002)
 - Marsh / WETLANDS
 - SURFACE DRAINAGE / CREEK
 - ⊕ RESIDUUM MONITORING WELL LOCATION
 - BEDROCK MONITORING WELL LOCATION

FIGURE 4
GROUNDWATER ELEVATION MAP
SEPTEMBER 16, 2002
BURIAL MOUND AT RIDEOUT FIELD

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



1 **5.0 Physical Characteristics of Study Area**

3 **5.1 Meteorology**

4 FTMC is situated in a temperate, humid climate. Summers are long and hot, and winters are
5 usually short and mild to moderately cold. The climate is influenced by frontal systems moving
6 from northwest to southeast, and temperatures change rapidly from warm to cool due to the inflow
7 of northern air. The average annual temperature is 63 degrees Fahrenheit (°F). Summer
8 temperatures usually reach 90°F or higher about 70 days per year, but temperatures above 100°F
9 are rare. Freezing temperatures are common in winter but are usually of short duration. The first
10 frost may arrive by late October. Snowfall averages 0.5 to 1 inch. On rare occasions, several
11 inches of snow accumulate from a single storm. At Anniston, the average date of the first 32°F
12 temperature is November 6, and the last is March 30. This provides a growing season of 221 days
13 (ESE, 1998).

14
15 The average annual rainfall is approximately 53 inches and is well distributed throughout the year
16 (National Climatic Data Center, 2001). The more intense rains usually occur during the warmer
17 months, and some flooding occurs nearly every year. Drought conditions are rare, though the
18 entire southeastern United States has been experiencing drought conditions for the three years
19 previous to this writing. Approximately 80 percent of the flood-producing storms are of the frontal
20 type and occur in the winter and spring, lasting from 2 to 4 days each. Summer storms are usually
21 thunderstorms with intense precipitation over small areas, and these sometimes result in serious
22 local floods. Occasionally, several wet years or dry years occur in series. Annual rainfall records
23 indicate no characteristic order or pattern.

24
25 Winds in the FTMC area are seldom strong and frequently blow down the valley from the
26 northeast. However, there is no truly persistent wind direction. Normally, only light breezes or
27 calm prevails, except during passages of cyclic disturbances, when destructive local wind storms
28 develop, some into tornadoes, with winds of 100 miles per hour or more.

30 **5.2 Geology**

32 **5.2.1 Regional Geology**

33 Calhoun County includes parts of two physiographic provinces, the Piedmont Upland Province
34 and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme
35 eastern and southeastern portions of the county and is characterized by metamorphosed
36 sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to
37 Devonian.

1
2 The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian
3 fold-and-thrust structural belt (Valley and Ridge Province), where southeastward-dipping thrust
4 faults with associated minor folding are the predominant structural features. The fold-and-thrust
5 belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-
6 faulted, with major structures and faults striking in a northeast-southwest direction.

7
8 Northwestward transport of the Paleozoic rock sequence along the thrust faults has resulted in
9 the imbricate stacking of large slabs of rock, referred to as thrust sheets. Within an individual
10 thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of
11 rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this
12 region generally strike parallel to the faults, and repetition of lithologic units is common in
13 vertical sequences. Geologic formations within the Valley and Ridge Province portion of
14 Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984),
15 and Moser and DeJarnette (1992) and vary in age from Lower Cambrian to Pennsylvanian.

16
17 The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee
18 Group. The Chilhowee Group consists of the Cochran, Nichols, Wilson Ridge, and Weisner
19 Formations (Osborne and Szabo, 1984) but in Calhoun County is either undifferentiated or
20 divided into the Cochran and Nichols Formations and an upper, undifferentiated Wilson Ridge
21 and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and
22 conglomerate with interbeds of greenish gray siltstone and mudstone. Massive to laminated
23 greenish gray and black mudstone makes up the Nichols Formation, with thin interbeds of
24 siltstone and very fine-grained sandstone (Osborne et al., 1988). These two formations are
25 mapped only in the eastern part of the county.

26
27 The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist
28 of both coarse-grained and fine-grained clastics. The coarse-grained facies appears to dominate
29 the unit and consists primarily of coarse-grained, vitreous quartzite and friable, fine- to coarse-
30 grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained
31 facies consists of sandy and micaceous shale and silty, micaceous mudstone, which are locally
32 interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and
33 quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to
34 the Weisner Formation (Osborne and Szabo, 1984).

35
36 The Cambrian Shady Dolomite overlies the Weisner Formation northeast, east, and southwest of
37 the Main Post and consists of interlayered bluish gray or pale yellowish gray sandy dolomitic

1 limestone and siliceous dolomite with coarsely crystalline, porous chert (Osborne et al., 1989).
2 A variegated shale and clayey silt have been included within the lower part of the Shady
3 Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled
4 by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the
5 Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic
6 interval are still uncertain (Osborne, 1999).

7
8 The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and
9 southeast of the Main Post, as mapped by Warman and Causey (1962) and Osborne and Szabo
10 (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome
11 Formation consists of variegated, thinly interbedded grayish red-purple mudstone, shale,
12 siltstone, and greenish red and light gray sandstone, with locally occurring limestone and
13 dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal
14 axes in the northeastern portion of Pelham Range (Warman and Causey, 1962; Osborne and
15 Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga
16 Formation is composed of dark gray, finely to coarsely crystalline, medium- to thick-bedded
17 dolomite with minor shale and chert (Osborne et al., 1989).

18
19 Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge
20 and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in
21 Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded
22 to laminated, siliceous dolomite and dolomitic limestone that weather to a chert residuum
23 (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range
24 area.

25
26 The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala
27 Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite.
28 The Little Oak Limestone consists of dark gray, medium- to thick-bedded, fossiliferous,
29 argillaceous to silty limestone with chert nodules. These limestone units are mapped as
30 undifferentiated at FTMC and in other parts of Calhoun County. The Athens Shale overlies the
31 Ordovician limestone units. The Athens Shale consists of dark gray to black shale and
32 graptolitic shale with localized interbedded dark gray limestone (Osborne et al., 1989). These
33 units occur within an eroded "window" in the uppermost structural thrust sheet at FTMC and
34 underlie much of the developed area of the Main Post.

35
36 Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport
37 Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of

1 various siltstones, sandstones, shales, dolomites, and limestones and are mapped as one,
2 undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary
3 formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of
4 interbedded red sandstone, siltstone, and shale with greenish gray to red silty and sandy
5 limestone.

6
7 The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with
8 shale interbeds, dolomudstone, and glauconitic limestone (Osborne et al., 1988). This unit
9 occurs locally in the western portion of Pelham Range.

10
11 The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain
12 Sandstone and are composed of dark to light gray limestone with abundant chert nodules and
13 greenish gray to grayish red phosphatic shale, with increasing amounts of calcareous chert
14 toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the
15 northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also
16 of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin
17 intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned
18 the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC,
19 to the Ordovician Athens Shale based on fossil data.

20
21 The Pennsylvanian Parkwood Formation overlies the Floyd Shale and consists of a medium to
22 dark gray, silty, clay shale and mudstone with interbedded light to medium gray, very fine to fine
23 grained argillaceous, micaceous sandstone. Locally the Parkwood Formation also contains beds
24 of medium to dark gray argillaceous, bioclastic to cherty limestone and beds of clayey coal up to
25 a few inches thick (Raymond et al., 1988). The Parkwood Formation in Calhoun County is
26 generally found within a structurally complex area known as the Coosa deformed belt. In the
27 deformed belt, the Parkwood Formation and Floyd Shale are mapped as undifferentiated because
28 their lithologic similarity and significant deformation make it impractical to map the contact
29 (Thomas and Drahovzal, 1974; Osborne et al., 1988). The undifferentiated Parkwood Formation
30 and Floyd Shale are found throughout the western quarter of Pelham Range.

31
32 The Jacksonville thrust fault is the most significant structural geologic feature in the vicinity of
33 the Main Post of FTMC, both for its role in determining the stratigraphic relationships in the area
34 and for its contribution to regional water supplies. The trace of the fault extends northeastward
35 for approximately 39 miles between Bynum, Alabama, and Piedmont, Alabama. The fault is
36 interpreted as a major splay of the Pell City fault (Osborne and Szabo, 1984). The Ordovician
37 sequence that makes up the Eden thrust sheet is exposed at FTMC through an eroded window, or

1 fenster, in the overlying thrust sheet. Rocks within the window display complex folding, with
2 the folds being overturned and tight to isoclinal. The carbonates and shales locally exhibit well-
3 developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest
4 by the Rome Formation; north by the Conasauga Formation; northeast, east, and southwest by
5 the Shady Dolomite; and southeast and southwest by the Chilhowee Group (Osborne et al.,
6 1997). Two small klippen of the Shady Dolomite, bounded by the Jacksonville fault, have been
7 recognized adjacent to the Pell City fault at the FTMC window (Osborne et al., 1997).

8
9 The Pell City fault serves as a fault contact between the bedrock within the FTMC window and the
10 Rome and Conasauga Formations. The trace of the Pell City fault is also exposed approximately
11 nine miles west of the FTMC window on Pelham Range, where it traverses northeast to southwest
12 across the western quarter of Pelham Range. Here, the trace of the Pell City fault marks the
13 boundary between the Pell City thrust sheet and the Coosa deformed belt.

14
15 The eastern three-quarters of Pelham Range is located within the Pell City thrust sheet, while the
16 remaining western quarter of Pelham is located within the Coosa deformed belt. The Pell City
17 thrust sheet, a large-scale thrust sheet containing Cambrian and Ordovician rock, is relatively less
18 structurally complex than the Coosa deformed belt (Thomas and Neathery, 1982). The Pell City
19 thrust sheet is exposed between the traces of the Jacksonville and Pell City faults along the western
20 boundary of the FTMC window and along the trace of the Pell City fault on Pelham Range
21 (Thomas and Neathery, 1982; Osborne et al., 1988). The Coosa deformed belt is a narrow
22 (approximately 5 to 20 miles wide and approximately 90 miles in length) zone of complex
23 structure consisting mainly of thin, imbricate thrust slices. The structure within these imbricate
24 thrust slices is often internally complicated by small-scale folding and additional thrust faults
25 (Thomas and Drahovzal, 1974).

26 27 **5.2.2 Site-Specific Geology**

28 Soils at Rideout Field consist of Anniston and Allen gravelly loams, six to ten percent slopes,
29 eroded (AcC2) (U.S. Department of Agriculture [USDA], 1961). Some severely eroded areas may
30 be common on the surface for this soil type, as well as a few shallow gullies. The depth to bedrock
31 ranges from 2 feet to greater than 10 feet. The typical soil description is 2 to 10 feet of well-
32 drained stony loam to clay loam over stratified local alluvium, limestone, or shale bedrock. The
33 depth to the water table is likely greater than 20 feet (USDA, 1961).

34
35 Site-specific soils were assessed using lithologic logs prepared by IT during installation of the
36 monitoring wells at the site. In general, the residuum at the Burial Mound at Rideout Field, Parcel
37 202Q-RD, is reddish brown to brownish orange, medium stiff to hard, clayey sand to clay with

1 minor amounts of silt and gravel from land surface to approximately 23 feet bgs. At monitoring
2 well RF-MW04, located approximately 840 feet south-southeast of the Burial Mound, the
3 residuum is light brown to olive gray, stiff to hard clay with minor amounts of silt from ground
4 surface to 8 feet bgs. Hard, dark gray to black clay was encountered from approximately 8 to 13
5 feet bgs.

6
7 Bedrock beneath the Burial Mound at Rideout Field is mapped as Ordovician Athens Shale and
8 Ordovician Newala Limestone (Osborne et al., 1989). The Athens Shale consists of dark gray to
9 black shale and graptolitic shale with localized interbedded dark gray limestone. The Newala
10 Limestone consists of light gray to dark gray, micritic, thick-bedded limestone with minor
11 dolomite.

12
13 Based on lithologic logs prepared by IT (Appendix A) during the groundwater investigation,
14 moderately hard, slightly weathered to unweathered, lightly to highly fractured, light gray to light
15 bluish gray, microcrystalline limestone with some shale and clay-filled fractures was encountered
16 underlying the residuum. This rock type is typical of the Newala Limestone. At monitoring well
17 RF-MW04, which is located approximately 840 feet south-southeast of the Burial Mound,
18 weathered black shale, typical of the Athens Shale, was encountered during drilling.

19
20 No faults have been mapped within the area of investigation; however, two faults (trending
21 northeast to southwest) have been mapped near the site (Osborne et al., 1989). One fault is
22 mapped approximately 400 feet west of the site and the other is mapped approximately 1,000 feet
23 east of the site.

24 25 **5.3 Hydrology**

26 27 **5.3.1 Surface Hydrology**

28 The Cane/Cave Creek watershed is among six major watersheds in Calhoun County. Cane
29 Creek and its tributaries originate on FTMC. These creek systems originate in the Choccolocco
30 Mountains on the eastern boundary of the installation and flow west through Main Post. They
31 are fed by springs originating in underlying limestone strata. Cane Creek also passes through the
32 entire length of Pelham Range, but its size and volume are greatly increased by the time it
33 reaches this area. Cane Creek eventually discharges into the Coosa River, approximately 10
34 miles east of Pelham Range (SAIC, 2000).

35
36 Cane Creek, which flows westward across the center of Pelham Range, and its tributaries drain
37 almost all of Pelham Range. Drainage entering the range from the south originates in the Anniston

1 Army Depot, which joins Pelham Range to the south. One drainage located in the southwestern
2 corner traverses this low approximately 800 yards to the north; and all water collected in the low
3 eventually drains into Cane Creek. Drainage from the Cane/Cave Creek watershed on FTMC and
4 Pelham Range ultimately empties into the Coosa River. Floodplains up to 2,500 feet wide traverse
5 this sector and slope toward the center of the range. The wide floodplains are absent in the
6 southern portion of the range (SAIC, 2000).

7
8 A study completed by the U.S. Geologic Survey (USGS) reported a 7-day, 2-year low flow of 1.9
9 cubic feet per second as characteristic of Cane Creek near Anniston (USGS, 1994). The station
10 location for this reading was a bridge on a county road located 0.5 miles northwest of State
11 Highway 11 and 5 miles north of Anniston. Cane Creek, which is located approximately 1,100
12 feet south of the former Burial Mound, is perennial at the location downgradient from Rideout
13 Field. Surface water runoff from the former Burial Mound site follows site topography and flows
14 generally to the south towards Cane Creek (Figure 2).

15 16 **5.3.2 Groundwater Flow and Hydrogeology**

17 Groundwater was encountered in limestone at depths ranging from approximately 60 to 90 feet bgs
18 during well installation activities at the Burial Mound at Rideout Field. Groundwater was not
19 encountered in residuum in the immediate vicinity of the Burial Mound (i.e., in monitoring wells
20 RF-MW01, RF-MW02, and RF-MW03).

21
22 The groundwater elevation data collected on September 16, 2002, are presented on Figure 4.
23 Based on the September 2002 data, groundwater elevations range from approximately 524 feet
24 above mean sea level in RF-MW05 to approximately 515 feet above mean sea level in RF-MW07.
25 Groundwater elevation measurements in September were collected after allowing the monitoring
26 wells to vent for approximately 48 hours prior to measurement to allow for atmospheric
27 equilibration. Based on the groundwater elevation data, groundwater flow direction in bedrock
28 appears to conform to surface topography and is toward Cane Creek. As shown on Figure 4, there
29 is a component of groundwater flow to the east toward Cane Creek. The figure also shows inferred
30 groundwater flow directions to the south and southwest toward Cane Creek, mimicking
31 topography.

32
33 The thickness of the unsaturated zone at monitoring wells RF-MW05, RF-MW06, and RF-MW07
34 ranges from approximately 60 feet (at RF-MW05) to 90 feet (at RF-MW07).

6.0 Summary of Groundwater Analytical Results

The four groundwater samples collected at the Burial Mound at Rideout Field were analyzed for gamma-emitting radionuclides (including Cs-137 and Co-60) and Sr-90. None of the three radionuclides of concern (Cs-137, Co-60, and Sr-90) was detected in any of the samples. Only two naturally occurring radionuclides were detected in the groundwater samples collected. Bismuth-214 (Bi-214) and lead-214 (Pb-214) were detected at 21 and 21.6 picocuries per liter (pCi/L), respectively, in one well (RF-MW06). Because no federal drinking water standards exist for these radionuclides, the analytical results were compared to U.S. Department of Energy (DOE) groundwater screening levels to determine whether the activities of these radionuclides pose a potential threat to human health. The DOE groundwater screening levels are derived for a dose equivalent of 4 millirem per year by multiplying the DOE derived concentration guide (DCG) by 4 percent. DCGs are published in DOE Order 5400.5, *Radiation Protection of the Public and the Environment* (DOE, 1993) and are concentrations of radionuclides in air or water that, under conditions of continuous exposure for one year by one exposure mode (e.g., inhalation, ingestion) would result in a dose of 100 millirem to the public.

As shown in Table 5, the detected radionuclide activities were well below DOE screening levels of 24,000 pCi/L for Bi-214 and 8,000 pCi/L for Pb-214. Complete analytical results are provided in Appendix E.

7.0 Conclusions

Groundwater is not present in residuum groundwater monitoring wells in the vicinity of the former burial mound. The analytical results of the groundwater samples collected from residuum monitoring well RF-MW04 (located approximately 800 feet south-southeast of the former burial mound) and bedrock monitoring wells RF-MW05, RF-MW06, and RF-MW07 indicate that the radionuclides of concern (Cs-137, Co-60, and Sr-90) were not present in groundwater at the site. Two naturally occurring radionuclides (Bi-214 and Pb-214) were detected in one well (RF-MW06) at the site; however, the activities of these radionuclides were well below DOE groundwater screening levels.

Table 5

**Groundwater Analytical Results
Burial Mound at Rideout Field
Fort McClellan, Calhoun County, Alabama**

| Sample Location Sample Number Sample Date | | | RF-MW04 HV3005 30-Jul-02 | | RF-MW05 HV3006 30-Jul-02 | | RF-MW06 HV3007 2-Aug-02 | | RF-MW07 HV3008 2-Aug-02 | |
|---|-------|--|--------------------------------|----------------------------|--------------------------------|----------------------------|-------------------------------|----------------------------|-------------------------------|----------------------------|
| Parameter | Units | DOE Screening Level ^a | Result | >DOE Screening Level | Result | >DOE Screening Level | Result | >DOE Screening Level | Result | >DOE Screening Level |
| GAMMA SCAN | | | | | | | | | | |
| Bi-214 | pCi/L | 24,000 | ND | No | ND | No | 21 | No | ND | No |
| Pb-214 | pCi/L | 8,000 | ND | No | ND | No | 21.6 | No | ND | No |

^a U.S. Department of Energy (DOE) groundwater screening level. Derived for a dose equivalent of 4 millirem per year (mrem/yr) by multiplying the DOE Derived Concentration Guide (DCG) by 4 percent. DCGs are published in DOE Order 5400.5, *Radiation Protection of the Public and the Environment*.

Bi - Bismuth.

Pb - Lead.

pCi/L - Picocuries per liter.

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ATTACHMENT 1
LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

| | | | | | |
|----------|---|-------------------------|---|-----------------|---|
| 2-ADNT | 2-amino-4,6-dinitrotoluene | AT | averaging time | CCV | continuing calibration verification |
| 4-ADNT | 4-amino-2,6-dinitrotoluene | atm-m ³ /mol | atmospheres per cubic meter per mole | CD | compact disc |
| 2,4-D | 2,4-dichlorophenoxyacetic acid | ATSDR | Agency for Toxic Substances and Disease Registry | CDTF | Chemical Defense Training Facility |
| 2,4,5-T | 2,4,5-trichlorophenoxyacetic acid | ATV | all-terrain vehicle | CEHNC | U.S. Army Engineering and Support Center, Huntsville |
| 2,4,5-TP | 2,4,5-trichlorophenoxypropionic acid | AUF | area use factor | CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| 3D | 3D International Environmental Group | AWARE | Associated Water and Air Resources Engineers, Inc. | CERFA | Community Environmental Response Facilitation Act |
| AB | ambient blank | AWQC | ambient water quality criteria | CESAS | Corps of Engineers South Atlantic Savannah |
| AbB3 | Anniston gravelly clay loam, 2 to 6 percent slopes, severely eroded | AWWSB | Anniston Water Works and Sewer Board | CF | conversion factor |
| AbC3 | Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded | 'B' | Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero) | CFC | chlorofluorocarbon |
| AbD3 | Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded | BAF | bioaccumulation factor | CFDP | Center for Domestic Preparedness |
| ABLM | adult blood lead model | BBGR | Baby Bains Gap Road | CFR | Code of Federal Regulations |
| Abs | skin absorption | BCF | blank correction factor; bioconcentration factor | CG | phosgene (carbonyl chloride) |
| ABS | dermal absorption factor | BCT | BRAC Cleanup Team | CGI | combustible gas indicator |
| AC | hydrogen cyanide | BERA | baseline ecological risk assessment | ch | inorganic clays of high plasticity |
| ACAD | AutoCadd | BEHP | bis(2-ethylhexyl)phthalate | CHPPM | U.S. Army Center for Health Promotion and Preventive Medicine |
| AcB2 | Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded | BFB | bromofluorobenzene | CIH | Certified Industrial Hygienist |
| AcC2 | Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded | BFE | base flood elevation | CK | cyanogen chloride |
| AcD2 | Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded | BG | Bacillus globigii | cl | inorganic clays of low to medium plasticity |
| AcE2 | Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded | BGR | Bains Gap Road | Cl | chlorinated |
| ACGIH | American Conference of Governmental Industrial Hygienists | bgs | below ground surface | CLP | Contract Laboratory Program |
| AdE | Anniston and Allen stony loam, 10 to 25 percent slope | BHC | hexachlorocyclohexane | cm | centimeter |
| ADEM | Alabama Department of Environmental Management | BHHRA | baseline human health risk assessment | CN | chloroacetophenone |
| ADPH | Alabama Department of Public Health | BIRTC | Branch Immaterial Replacement Training Center | CNB | chloroacetophenone, benzene, and carbon tetrachloride |
| AEC | U.S. Army Environmental Center | bkg | background | CNS | chloroacetophenone, chloropicrin, and chloroform |
| AEDA | ammunition, explosives, and other dangerous articles | bls | below land surface | CO | carbon monoxide |
| AEL | airborne exposure limit | BOD | biological oxygen demand | CO ₂ | carbon dioxide |
| AET | adverse effect threshold | Bp | soil-to-plant biotransfer factors | Co-60 | cobalt-60 |
| AF | soil-to-skin adherence factor | BRAC | Base Realignment and Closure | CoA | Code of Alabama |
| AHA | ammunition holding area | Braun | Braun Intertec Corporation | COC | chain of custody; chemical of concern |
| AL | Alabama | BSAF | biota-to-sediment accumulation factors | COE | Corps of Engineers |
| ALARNG | Alabama Army National Guard | BSC | background screening criterion | Con | skin or eye contact |
| ALAD | δ-aminolevulinic acid dehydratase | BTAG | Biological Technical Assistance Group | COPC | chemical of potential concern |
| ALDOT | Alabama Department of Transportation | BTEX | benzene, toluene, ethyl benzene, and xylenes | COPEC | constituent of potential ecological concern |
| amb. | amber | BTOC | below top of casing | CPOM | coarse particulate organic matter |
| amsl | above mean sea level | BTV | background threshold value | CPSS | chemicals present in site samples |
| ANAD | Anniston Army Depot | BW | biological warfare; body weight | CQCSM | Contract Quality Control System Manager |
| AOC | area of concern | BZ | breathing zone; 3-quinuclidinyl benzilate | CRDL | contract-required detection limit |
| AP | armor piercing | C | ceiling limit value | CRL | certified reporting limit |
| APEC | areas of potential ecological concern | Ca | carcinogen | CRQL | contract-required quantitation limit |
| APT | armor-piercing tracer | CaCO ₃ | calcium carbonate | CRZ | contamination reduction zone |
| AR | analysis request | CAA | Clean Air Act | Cs-137 | cesium-137 |
| ARAR | applicable or relevant and appropriate requirement | CAB | chemical warfare agent breakdown products | CS | ortho-chlorobenzylidene-malononitrile |
| AREE | area requiring environmental evaluation | CACM | Chemical Agent Contaminated Media | CSEM | conceptual site exposure model |
| AS/SVE | air sparging/soil vapor extraction | CAMU | corrective action management unit | CSM | conceptual site model |
| ASP | Ammunition Supply Point | CBR | chemical, biological, and radiological | CT | central tendency |
| ASR | Archives Search Report | CCAL | continuing calibration | ctr. | container |
| AST | aboveground storage tank | CCB | continuing calibration blank | CWA | chemical warfare agent; Clean Water Act |
| ASTM | American Society for Testing and Materials | | | CWM | chemical warfare material; clear, wide mouth |

List of Abbreviations and Acronyms (Continued)

| | | | | | |
|------------------|---|------------------|---|------------------|---|
| CX | dichloroformoxime | EE/CA | engineering evaluation and cost analysis | FOMRA | Former Ordnance Motor Repair Area |
| 'D' | duplicate; dilution | Eh | oxidation-reduction potential | FOST | Finding of Suitability to Transfer |
| D&I | detection and identification | Elev. | elevation | Foster Wheeler | Foster Wheeler Environmental Corporation |
| DAAMS | depot area agent monitoring station | EM | electromagnetic | FR | Federal Register |
| DAF | dilution-attenuation factor | EMI | Environmental Management Inc. | Frtn | fraction |
| DANC | decontamination agent, non-corrosive | EM31 | Geonics Limited EM31 Terrain Conductivity Meter | FS | field split; feasibility study |
| °C | degrees Celsius | EM61 | Geonics Limited EM61 High-Resolution Metal Detector | FSP | field sampling plan |
| °F | degrees Fahrenheit | EOD | explosive ordnance disposal | ft | feet |
| DCA | dichloroethane | EODT | explosive ordnance disposal team | ft/day | feet per day |
| DCE | dichloroethene | EPA | U.S. Environmental Protection Agency | ft/ft | feet per foot |
| DDD | dichlorodiphenyldichloroethane | EPC | exposure point concentration | ft/yr | feet per year |
| DDE | dichlorodiphenyldichloroethene | EPIC | Environmental Photographic Interpretation Center | FTA | Fire Training Area |
| DDT | dichlorodiphenyltrichloroethane | EPRI | Electrical Power Research Institute | FTMC | Fort McClellan |
| DEH | Directorate of Engineering and Housing | EPT | Ephemeroptera, Plecoptera, Trichoptera | FTRRA | FTMC Reuse & Redevelopment Authority |
| DEHP | di(2-ethylhexyl)phthalate | ER | equipment rinsate | g | gram |
| DEP | depositional soil | ERA | ecological risk assessment | g/m ³ | gram per cubic meter |
| DFTPP | decafluorotriphenylphosphine | ER-L | effects range-low | G-856 | Geometrics, Inc. G-856 magnetometer |
| DI | deionized | ER-M | effects range-medium | G-858G | Geometrics, Inc. G-858G magnetic gradiometer |
| DID | data item description | ESE | Environmental Science and Engineering, Inc. | GAF | gastrointestinal absorption factor |
| DIMP | di-isopropylmethylphosphonate | ESL | ecological screening level | gal | gallon |
| DM | dry matter; adamsite | ESMP | Endangered Species Management Plan | gal/min | gallons per minute |
| DMBA | dimethylbenz(a)anthracene | ESN | Environmental Services Network, Inc. | GB | sarin (isopropyl methylphosphonofluoridate) |
| DMMP | dimethylmethylphosphonate | ESV | ecological screening value | gc | clay gravels; gravel-sand-clay mixtures |
| DNAPL | dense nonaqueous-phase liquid | ET | exposure time | GC | gas chromatograph |
| DNT | dinitrotoluene | EU | exposure unit | GCL | geosynthetic clay liner |
| DO | dissolved oxygen | Exp. | Explosives | GC/MS | gas chromatograph/mass spectrometer |
| DOD | U.S. Department of Defense | EXTOXNET | Extension Toxicology Network | GCR | geosynthetic clay liner |
| DOJ | U.S. Department of Justice | E-W | east to west | GFAA | graphite furnace atomic absorption |
| DOT | U.S. Department of Transportation | EZ | exclusion zone | GIS | Geographic Information System |
| DP | direct-push | FAR | Federal Acquisition Regulations | gm | silty gravels; gravel-sand-silt mixtures |
| DPDO | Defense Property Disposal Office | FB | field blank | gp | poorly graded gravels; gravel-sand mixtures |
| DPT | direct-push technology | FBI | Family Biotic Index | gpm | gallons per minute |
| DQO | data quality objective | FD | field duplicate | GPR | ground-penetrating radar |
| DRMO | Defense Reutilization and Marketing Office | FDC | Former Decontamination Complex | GPS | global positioning system |
| DRO | diesel range organics | FDA | U.S. Food and Drug Administration | GRA | general response action |
| DS | deep (subsurface) soil | Fe ⁺³ | ferric iron | GS | ground scar |
| DS2 | Decontamination Solution Number 2 | Fe ⁺² | ferrous iron | GSA | General Services Administration; Geologic Survey of Alabama |
| DSERTS | Defense Site Environmental Restoration Tracking System | FedEx | Federal Express, Inc. | GSBP | Ground Scar Boiler Plant |
| DWEL | drinking water equivalent level | FEMA | Federal Emergency Management Agency | GSSI | Geophysical Survey Systems, Inc. |
| E&E | Ecology and Environment, Inc. | FFCA | Federal Facilities Compliance Act | GST | ground stain |
| EB | equipment blank | FFE | field flame expedient | GW | groundwater |
| EBS | environmental baseline survey | FFS | focused feasibility study | gw | well-graded gravels; gravel-sand mixtures |
| EC ₂₀ | effects concentration for 20 percent of a test population | FI | fraction of exposure | H&S | health and safety |
| EC ₅₀ | effects concentration for 50 percent of a test population | Fil | filtered | HA | hand auger |
| ECBC | Edgewood Chemical Biological Center | Flt | filtered | HC | mixture of hexachloroethane, aluminum powder, and zinc oxide (smoke producer) |
| ED | exposure duration | FMDC | Fort McClellan Development Commission | HCl | hydrochloric acid |
| EDD | electronic data deliverable | FML | flexible membrane liner | HD | distilled mustard (bis-[dichloroethyl]sulfide) |
| EF | exposure frequency | f _{oc} | fraction organic carbon | | |
| EDQL | ecological data quality level | | | | |

List of Abbreviations and Acronyms (Continued)

| | | | | | |
|-------------------------------|---|-------------------|--|-------------------------------|--|
| HDPE | high-density polyethylene | JeB2 | Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded | µg/g | micrograms per gram |
| HE | high explosive | JeC2 | Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded | µg/kg | micrograms per kilogram |
| HEAST | Health Effects Assessment Summary Tables | JfB | Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes | µg/L | micrograms per liter |
| Herb. | herbicides | JPA | Joint Powers Authority | µmhos/cm | micromhos per centimeter |
| HHRA | human health risk assessment | K | conductivity | MeV | mega electron volt |
| HI | hazard index | K _d | soil-water distribution coefficient | min | minimum |
| H ₂ O ₂ | hydrogen peroxide | kg | kilogram | MINICAMS | miniature continuous air monitoring system |
| HPLC | high-performance liquid chromatography | KeV | kilo electron volt | ml | inorganic silts and very fine sands |
| HNO ₃ | nitric acid | K _{oc} | organic carbon partitioning coefficient | mL | milliliter |
| HQ | hazard quotient | K _{ow} | octonal-water partition coefficient | mm | millimeter |
| HQ _{screen} | screening-level hazard quotient | KMnO ₄ | potassium permanganate | MM | mounded material |
| hr | hour | L | liter; Lewisite (dichloro-[2-chloroethyl]sulfide) | MMBtu/hr | million Btu per hour |
| HRC | hydrogen releasing compound | L/kg/day | liters per kilogram per day | MNA | monitored natural attenuation |
| HSA | hollow-stem auger | l | liter | MnO ₄ ⁻ | permanganate ion |
| HSDB | Hazardous Substance Data Bank | LAW | light anti-tank weapon | MOA | Memorandum of Agreement |
| HTRW | hazardous, toxic, and radioactive waste | lb | pound | MOGAS | motor vehicle gasoline |
| 'I' | out of control, data rejected due to low recovery | LBP | lead-based paint | MOUT | Military Operations in Urban Terrain |
| IASPOW | Impact Area South of POW Training Facility | LC | liquid chromatography | MP | Military Police |
| IATA | International Air Transport Authority | LCS | laboratory control sample | MPA | methyl phosphonic acid |
| ICAL | initial calibration | LC ₅₀ | lethal concentration for 50 percent population tested | MPC | maximum permissible concentration |
| ICB | initial calibration blank | LD ₅₀ | lethal dose for 50 percent population tested | MPM | most probable munition |
| ICP | inductively-coupled plasma | LEL | lower explosive limit | MQL | method quantitation limit |
| ICRP | International Commission on Radiological Protection | LOAEL | lowest-observed-advserse-effects-level | MR | molasses residue |
| ICS | interference check sample | LOEC | lowest-observable-effect-concentration | MRL | method reporting limit |
| ID | inside diameter | LRA | land redevelopment authority | MS | matrix spike |
| IDL | instrument detection limit | LT | less than the certified reporting limit | mS/cm | millisiemens per centimeter |
| IDLH | immediately dangerous to life or health | LUC | land-use control | mS/m | millisiemens per meter |
| IDM | investigative-derived media | LUCAP | land-use control assurance plan | MSD | matrix spike duplicate |
| IDW | investigation-derived waste | LUCIP | land-use control implementation plan | MTBE | methyl tertiary butyl ether |
| IEUBK | Integrated Exposure Uptake Biokinetic | max | maximum | msl | mean sea level |
| IF | ingestion factor; inhalation factor | MB | method blank | MtD3 | Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded |
| ILCR | incremental lifetime cancer risk | MCL | maximum contaminant level | mV | millivolts |
| IMPA | isopropylmethyl phosphonic acid | MCLG | maximum contaminant level goal | MW | monitoring well |
| IMR | Iron Mountain Road | MCPA | 4-chloro-2-methylphenoxyacetic acid | MW1&MP | Monitoring Well Installation and Management Plan |
| in. | inch | MCPP | 2-(2-methyl-4-chlorophenoxy)propionic acid | Na | sodium |
| Ing | ingestion | MCS | media cleanup standard | NA | not applicable; not available |
| Inh | inhalation | MD | matrix duplicate | NAD | North American Datum |
| IP | ionization potential | MDC | maximum detected concentration | NAD83 | North American Datum of 1983 |
| IPS | International Pipe Standard | MDCC | maximum detected constituent concentration | NaMnO ₄ | sodium permanganate |
| IR | ingestion rate | MDL | method detection limit | NAVD88 | North American Vertical Datum of 1988 |
| IRDMIS | Installation Restoration Data Management Information System | mg | milligrams | NAS | National Academy of Sciences |
| IRIS | Integrated Risk Information Service | mg/kg | milligrams per kilogram | NCEA | National Center for Environmental Assessment |
| IRP | Installation Restoration Program | mg/kg/day | milligram per kilogram per day | NCP | National Contingency Plan |
| IS | internal standard | mg/kgbw/day | milligrams per kilogram of body weight per day | NCRP | National Council on Radiation Protection and Measurements |
| ISCP | Installation Spill Contingency Plan | mg/L | milligrams per liter | ND | not detected |
| IT | IT Corporation | mg/m ³ | milligrams per cubic meter | NE | no evidence; northeast |
| ITEMS | IT Environmental Management System™ | mh | inorganic silts, micaceous or diatomaceous fine, sandy or silt soils | ne | not evaluated |
| 'J' | estimated concentration | MHz | megahertz | NEW | net explosive weight |

List of Abbreviations and Acronyms (Continued)

| | | | | | |
|------------------------------|--|---------|---|-------|--|
| NFA | No Further Action | PA | preliminary assessment | QAP | installation-wide quality assurance plan |
| NG | National Guard | PAH | polynuclear aromatic hydrocarbon | QC | quality control |
| NGP | National Guardsperson | PARCCS | precision, accuracy, representativeness, comparability, completeness, and sensitivity | QST | QST Environmental, Inc. |
| ng/L | nanograms per liter | Parsons | Parsons Engineering Science, Inc. | qty | quantity |
| NGVD | National Geodetic Vertical Datum | Pb | lead | Qual | qualifier |
| Ni | nickel | PBMS | performance-based measurement system | R | rejected data; resample; retardation factor |
| NIC | notice of intended change | PC | permeability coefficient | R&A | relevant and appropriate |
| NIOSH | National Institute for Occupational Safety and Health | PCB | polychlorinated biphenyl | RA | remedial action |
| NIST | National Institute of Standards and Technology | PCDD | polychlorinated dibenzo-p-dioxins | RAO | remedial action objective |
| NLM | National Library of Medicine | PCDF | polychlorinated dibenzofurans | RBC | risk-based concentration; red blood cell |
| NO ₃ ⁻ | nitrate | PCE | perchloroethene | RBRG | risk-based remedial goal |
| NOEC | no-observable-effect-concentration | PCP | pentachlorophenol | RCRA | Resource Conservation and Recovery Act |
| NPDES | National Pollutant Discharge Elimination System | PDS | Personnel Decontamination Station | RCWM | Recovered Chemical Warfare Material |
| NPW | net present worth | PEF | particulate emission factor | RD | remedial design |
| No. | number | PEL | permissible exposure limit | RDX | cyclotrimethylenetrinitramine |
| NOAA | National Oceanic and Atmospheric Administration | PERA | preliminary ecological risk assessment | ReB3 | Rarden silty clay loams |
| NOAEL | no-observed-adverse-effects-level | PERC | perchloroethene | REG | regular field sample |
| NR | not requested; not recorded; no risk | PES | potential explosive site | REL | recommended exposure limit |
| NRC | National Research Council | Pest. | pesticides | RFA | request for analysis |
| NRCC | National Research Council of Canada | PETN | pentaerythritoltetranitrate | RfC | reference concentration |
| NRHP | National Register of Historic Places | PFT | portable flamethrower | RfD | reference dose |
| NRT | near real time | PG | professional geologist | RGO | remedial goal option |
| ns | nanosecond | PID | photoionization detector | RI | remedial investigation |
| N-S | north to south | PkA | Philo and Stendal soils local alluvium, 0 to 2 percent slopes | RL | reporting limit |
| NS | not surveyed | PM | project manager | RME | reasonable maximum exposure |
| NSA | New South Associates, Inc. | POC | point of contact | ROD | Record of Decision |
| nT | nanotesla | POL | petroleum, oils, and lubricants | RPD | relative percent difference |
| nT/m | nanoteslas per meter | POTW | publicly owned treatment works | RR | range residue |
| NTU | nephelometric turbidity unit | POW | prisoner of war | RRF | relative response factor |
| nv | not validated | PP | peristaltic pump; Proposed Plan | RRSE | Relative Risk Site Evaluation |
| O ₂ | oxygen | ppb | parts per billion | RSD | relative standard deviation |
| O ₃ | ozone | ppbv | parts per billion by volume | RTC | Recruiting Training Center |
| O&G | oil and grease | PPE | personal protective equipment | RTECS | Registry of Toxic Effects of Chemical Substances |
| O&M | operation and maintenance | ppm | parts per million | RTK | real-time kinematic |
| OB/OD | open burning/open detonation | PPMP | Print Plant Motor Pool | RWIMR | Ranges West of Iron Mountain Road |
| OD | outside diameter | ppt | parts per thousand | SA | exposed skin surface area |
| OE | ordnance and explosives | PR | potential risk | SAD | South Atlantic Division |
| oh | organic clays of medium to high plasticity | PRA | preliminary risk assessment | SAE | Society of Automotive Engineers |
| OH• | hydroxyl radical | PRG | preliminary remediation goal | SAIC | Science Applications International Corporation |
| ol | organic silts and organic silty clays of low plasticity | PS | chloropicrin | SAP | installation-wide sampling and analysis plan |
| OP | organophosphorus | PSSC | potential site-specific chemical | SARA | Superfund Amendments and Reauthorization Act |
| ORC | Oxygen Releasing Compound | pt | peat or other highly organic silts | sc | clayey sands; sand-clay mixtures |
| ORP | oxidation-reduction potential | PVC | polyvinyl chloride | Sch. | schedule |
| OSHA | Occupational Safety and Health Administration | QA | quality assurance | SCM | site conceptual model |
| OSWER | Office of Solid Waste and Emergency Response | QA/QC | quality assurance/quality control | SD | sediment |
| OVM-PID/FID | organic vapor meter-photoionization detector/flame ionization detector | QAM | quality assurance manual | SDG | sample delivery group |
| OWS | oil/water separator | QAO | quality assurance officer | SDWA | Safe Drinking Water Act |
| oz | ounce | | | SDZ | safe distance zone; surface danger zone |

List of Abbreviations and Acronyms (Continued)

| | | | | | |
|-------------------------------|--|----------|---|-----------------|---|
| SEMS | Southern Environmental Management & Specialties, Inc. | SWMU | solid waste management unit | USATEU | U.S. Army Technical Escort Unit |
| SF | cancer slope factor | SWPP | storm water pollution prevention plan | USATHAMA | U.S. Army Toxic and Hazardous Material Agency |
| SFSP | site-specific field sampling plan | SZ | support zone | USC | United States Code |
| SGF | standard grade fuels | TAL | target analyte list | USCS | Unified Soil Classification System |
| Shaw | Shaw Environmental, Inc. | TAT | turn around time | USDA | U.S. Department of Agriculture |
| SHP | installation-wide safety and health plan | TB | trip blank | USEPA | U.S. Environmental Protection Agency |
| SI | site investigation | TBC | to be considered | USFWS | U.S. Fish and Wildlife Service |
| SINA | Special Interest Natural Area | TCA | trichloroethane | USGS | U.S. Geological Survey |
| SL | standing liquid | TCDD | 2,3,7,8-tetrachlorodibenzo-p-dioxin | UST | underground storage tank |
| SLERA | screening-level ecological risk assessment | TCDF | tetrachlorodibenzofurans | UTL | upper tolerance level; upper tolerance limit |
| sm | silty sands; sand-silt mixtures | TCE | trichloroethene | UXO | unexploded ordnance |
| SM | Serratia marcescens | TCL | target compound list | UXOQCS | UXO Quality Control Supervisor |
| SMDP | Scientific Management Decision Point | TCLP | toxicity characteristic leaching procedure | UXOSO | UXO safety officer |
| s/n | signal-to-noise ratio | TDEC | Tennessee Department of Environment and Conservation | V | vanadium |
| SO ₄ ⁻² | sulfate | TDGCL | thiodiglycol | VC | vinyl chloride |
| SOD | soil oxidant demand | TDGCLA | thiodiglycol chloroacetic acid | VOA | volatile organic analyte |
| SOP | standard operating procedure | TEA | triethylaluminum | VOC | volatile organic compound |
| SOPQAM | U.S. EPA's <i>Standard Operating Procedure/Quality Assurance Manual</i> | Tetryl | trinitrophenylmethyl nitramine | VOH | volatile organic hydrocarbon |
| sp | poorly graded sands; gravelly sands | TERC | Total Environmental Restoration Contract | VQlfr | validation qualifier |
| SP | submersible pump | THI | target hazard index | VQual | validation qualifier |
| SPCC | system performance calibration compound | TIC | tentatively identified compound | VX | nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate) |
| SPCS | State Plane Coordinate System | TLV | threshold limit value | WAC | Women's Army Corps |
| SPM | sample planning module | TN | Tennessee | Weston | Roy F. Weston, Inc. |
| SQRT | screening quick reference tables | TNB | trinitrobenzene | WP | installation-wide work plan |
| Sr-90 | strontium-90 | TNT | trinitrotoluene | WRS | Wilcoxon rank sum |
| SRA | streamlined human health risk assessment | TOC | top of casing; total organic carbon | WS | watershed |
| SRI | supplemental remedial investigation | TPH | total petroleum hydrocarbons | WSA | Watershed Screening Assessment |
| SRM | standard reference material | TR | target cancer risk | WWI | World War I |
| Ss | stony rough land, sandstone series | TRADOC | U.S. Army Training and Doctrine Command | WWII | World War II |
| SS | surface soil | TRPH | total recoverable petroleum hydrocarbons | XRF | x-ray fluorescence |
| SSC | site-specific chemical | TRV | toxicity reference value | yd ³ | cubic yards |
| SSHO | site safety and health officer | TSCA | Toxic Substances Control Act | | |
| SSHP | site-specific safety and health plan | TSDF | treatment, storage, and disposal facility | | |
| SSL | soil screening level | TSS | total suspended solids | | |
| SSSL | site-specific screening level | TWA | time-weighted average | | |
| SSSSL | site-specific soil screening level | UCL | upper confidence limit | | |
| STB | supertropical bleach | UCR | upper certified range | | |
| STC | source-term concentration | 'U' | not detected above reporting limit | | |
| STD | standard deviation | UIC | underground injection control | | |
| STEL | short-term exposure limit | UF | uncertainty factor | | |
| STL | Severn-Trent Laboratories | URF | unit risk factor | | |
| STOLS | Surface Towed Ordnance Locator System® | USACE | U.S. Army Corps of Engineers | | |
| Std. units | standard units | USACHPPM | U.S. Army Center for Health Promotion and Preventive Medicine | | |
| SU | standard unit | USAEC | U.S. Army Environmental Center | | |
| SUXOS | senior UXO supervisor | USAEHA | U.S. Army Environmental Hygiene Agency | | |
| SVOC | semivolatile organic compound | USACMLS | U.S. Army Chemical School | | |
| SW | surface water | USAMPS | U.S. Army Military Police School | | |
| SW-846 | U.S. EPA's <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i> | USATCES | U.S. Army Technical Center for Explosive Safety | | |

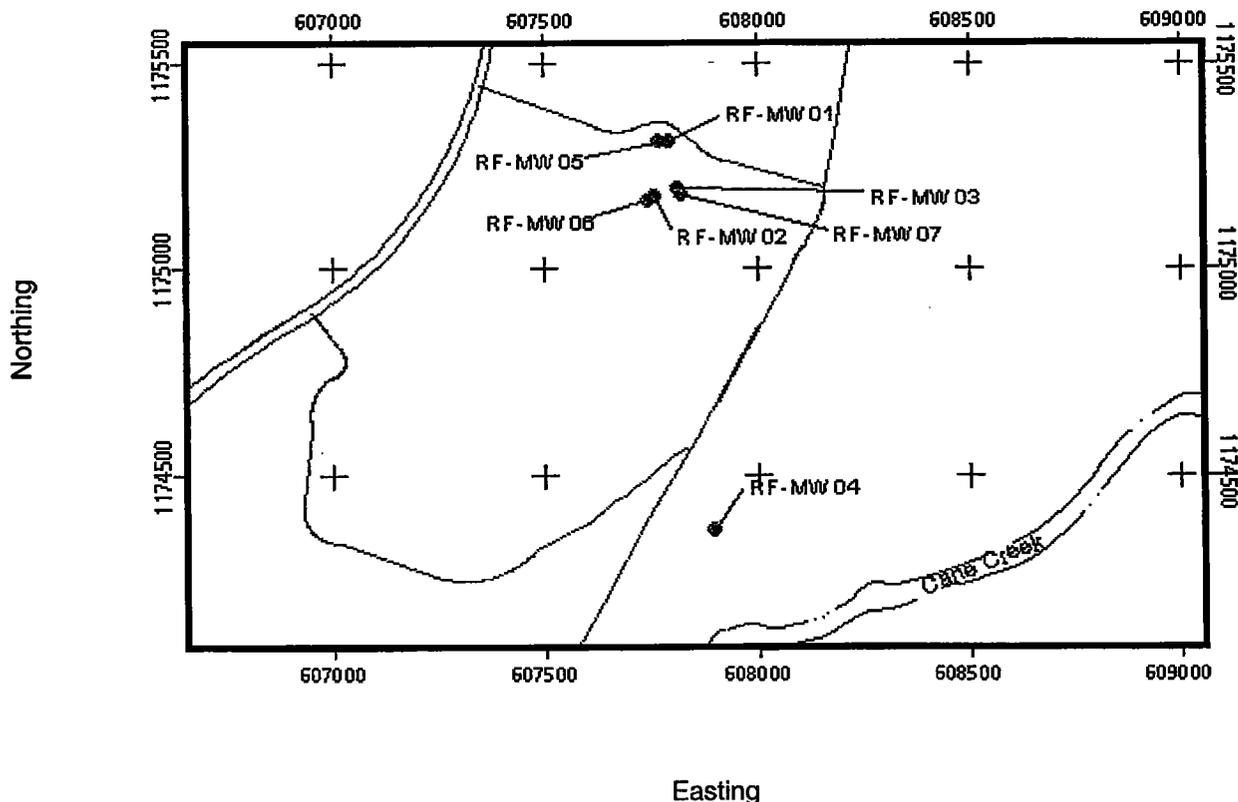
APPENDIX A

BORING LOGS AND WELL CONSTRUCTION LOGS

BORING LOGS

| | | | | | |
|---|-------------------|--|------------------------|---|--|
| HTRW DRILLING LOG | | District: Mobile USACE | | HOLE NUMBER RF-MW01 | |
| 1. Company name: IT Corporation | | 2. Drill Subcontractor: Miller Drilling Company | | Sheet 1 of 4 sheets | |
| 3. Project: Fort McClellan | | 4. Location: Calhoun County, Alabama | | | |
| 5. Name of driller: Paul Gibson | | 6. Mfr. designation of drill: Mobile B-59 HSA | | | |
| 7. Sizes and types of drilling and sampling equipment: Hollow Stem Auger HSA - 5'x8.25" OD Augers, 2'x2" Steel Split Spoons | | 8. Hole location: Rideout Field, Pelham Range | | | |
| | | 9. Surface elevation (feet above mean sea level): 553.15 | | | |
| | | 10. Date started: 05/28/02 | | 11. Date completed: 06/03/02 | |
| 12. Overburden thickness (feet bgs): 23 | | 15. Depth groundwater encountered (feet bgs): NA | | | |
| 13. Depth drilled into rock (feet bgs): .1 | | 16. Depth to water and elapsed time after drilling completed (feet bgs): Dry after 24 hours | | | |
| 14. Total depth of hole (feet bgs): 23.1 | | 17. Other water level measurements (specify): NA | | | |
| 18. Geotechnical samples: | Collected: | Disturbed: | Undisturbed: | 19. Total no. of core boxes: N/A | |
| | | | | | |
| 20. Samples for chemical analysis: | VOC | Metals | Other (specify) | Other (specify) | Other (specify) |
| | | | | | 21. Total core recovery: N/A |
| 22. Disposition of hole: | Backfilled | Monitoring well | Other (specify) | Geologist: Cindy Levaas | |
| | | 2" Permanent | | | |

LOCATION SKETCH/COMMENTS:



Project: Fort McClellan

bgs= below ground surface
NA = Not applicable

Hole no.: RF-MW01

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW01

Project: Fort McClellan

Geologist: Cindy Levaas

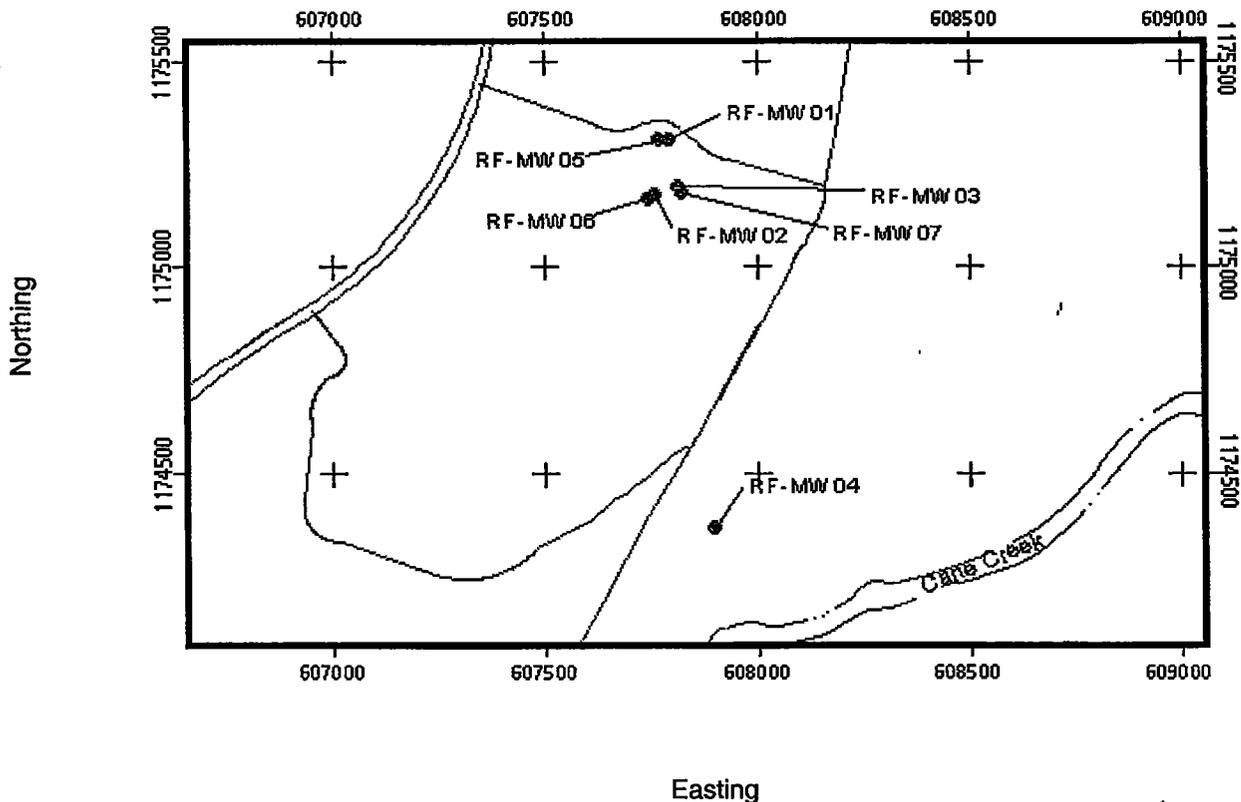
Sheet 3 of 4 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|---|----|---|----------------------|--|--|----------------|----------------------------|
| 540 | 11 | cl: Reddish brown, moist, stiff CLAY, some fine to medium Sand, little Silt. | cl |  | Organic Vapor = 0ppm | | | 13 18 16 14 | Rec 1.5'/2.0' (10-12' bgs) |
| | 12 | NA: No recovery. | NA | | | | | | |
| | 13 | NA: No sample collected for lithologic description. | NA | | | | | | |
| | 14 | | NA | | | | | | |
| | 15 | cl: Orangeish brown to olive gray, moist, medium stiff to stiff CLAY, some Silt, noted manganese nodules. | cl |  | Organic Vapor = 0ppm | | | 1 3 4 6 | Rec 1.9'/2.0' (15-17' bgs) |
| | 16 | | cl | | | | | | |
| | 17 | NA: No recovery. | NA | | | | | | |
| | 18 | NA: No sample collected for lithologic description. | NA | | | | | | |
| 535 | 19 | | NA | | | | | | |
| | 20 | sc: Light brown to dark brown, very moist, fine | |  | Organic | | | 3 3 4 6 | Rec 2.0'/2.0' (20-22' bgs) |

| | | | | | |
|---|------------|--|-----------------|---|--|
| HTRW DRILLING LOG | | District: Mobile USACE | | HOLE NUMBER RF-MW02 | |
| 1. Company name: IT Corporation | | 2. Drill Subcontractor: Miller Drilling Company | | Sheet 1 of 4 sheets | |
| 3. Project: Fort McClellan | | 4. Location: Calhoun County, Alabama | | | |
| 5. Name of driller: Paul Gibson | | 6. Mfr. designation of drill: Mobile B-59 HSA | | | |
| 7. Sizes and types of drilling and sampling equipment: Hollow Stem Auger HSA - 5'x8.25" OD Augers, 2'x2" Steel Split Spoons | | 8. Hole location: Rideout Field, Pelham Range | | | |
| | | 9. Surface elevation (feet above mean sea level): 550.5 | | | |
| | | 10. Date started: 05/30/02 | | 11. Date completed: 06/03/02 | |
| 12. Overburden thickness (feet bgs): 23.5 | | 15. Depth groundwater encountered (feet bgs): N/A | | | |
| 13. Depth drilled into rock (feet bgs): 0 | | 16. Depth to water and elapsed time after drilling completed (feet bgs): Dry after 24 hours | | | |
| 14. Total depth of hole (feet bgs): 23.5 | | 17. Other water level measurements (specify): N/A | | | |
| 18. Geotechnical samples: | Collected: | Disturbed: | Undisturbed: | 19. Total no. of core boxes: N/A | |
| | | | | | |
| 20. Samples for chemical analysis: | VOC | Metals | Other (specify) | Other (specify) | Other (specify) |
| | | | | | 21. Total core recovery: N/A |
| 22. Disposition of hole: | Backfilled | Monitoring well | Other (specify) | Geologist: Cindy Levaas | |
| | | 2" Permanent | | | |

LOCATION SKETCH/COMMENTS:



Project: Fort McClellan

bgs= below ground surface
NA = Not applicable

Hole no.: RF-MW02

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW02

Project: Fort McClellan

Geologist: Cindy Levaas

Sheet 2 of 4 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|---|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|---------------------------|
| 550 | 0 | sc: Reddish orange, dry to slightly moist, medium stiff CLAY and SAND, little subrounded, sandstone Gravel. | sc | | Organic Vapor = 0ppm | | | 3 2 4 5 | Rec 1.8'/2.0' (0-2' bgs) |
| | 1 | | sc | | | | | | |
| | 2 | NA: No recovery. | NA | | | | | 6 4 11 9 | Rec 1.0'/2.0' (2-4' bgs) |
| | 3 | sc: Reddish brown, dry to moist, medium stiff to stiff CLAY and SAND. | sc | | Organic Vapor = 0ppm | | | | |
| | 4 | NA: No recovery. | NA | | | | | | |
| | 5 | sc: Reddish brown, moist, medium stiff CLAY and SAND, trace Silt. | sc | | Organic Vapor = 0ppm | | | 6 11 12 14 | Rec 1.7'/2.0' (4-6' bgs) |
| 545 | 6 | NA: No recovery. | NA | | | | | | |
| | 7 | cl: Orangeish brown, moist, stiff to very stiff CLAY, little fine to medium Sand. | cl | | Organic Vapor = 0ppm | | | 14 15 19 20 | Rec 1.4'/2.0' (6-8' bgs) |
| | 8 | NA: No recovery. | NA | | | | | | |
| | 9 | cl: Orangeish brown, moist, stiff to very stiff CLAY, little fine to medium Sand. | cl | | Organic Vapor = 0ppm | | | 11 17 20 29 | Rec 1.2'/2.0' (8-10' bgs) |
| | 10 | NA: No recovery. | NA | | | | | | |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW02

Project: Fort McClellan

Geologist: Cindy Levaas

Sheet 3 of 4 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|---|----|--|----------------------|--|--|---------|------------------------------|
| 540 | 11 | NA: Shelby tube sample collected. | NA | | | | | | |
| | 12 | NA: No sample collected for lithologic description. | NA | | | | | | |
| | 13 | | NA | | | | | | |
| | 14 | cl: Orangeish brown to light brown, moist to very moist, medium stiff to stiff, partially laminated CLAY, some fine to coarse Sand, little Silt, noted manganese nodules. | cl | | Organic Vapor = 0ppm | | | 3 5 5 8 | Rec 2.0'/2.0' (14-16' bgs) |
| 535 | 15 | | | | | | | | |
| | 16 | NA: Shelby tube sample collected. | NA | | | | | | |
| | 17 | | NA | | | | | | |
| | 18 | NA: No sample collected for lithologic description. | NA | | | | | | |
| | 19 | | NA | | | | | | |
| | 20 | sc: Medium brown, wet, soft to medium stiff | | | Organic | | | | Rec 0.8'/0.8' (20-20.8' bgs) |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW02

Project: Fort McClellan

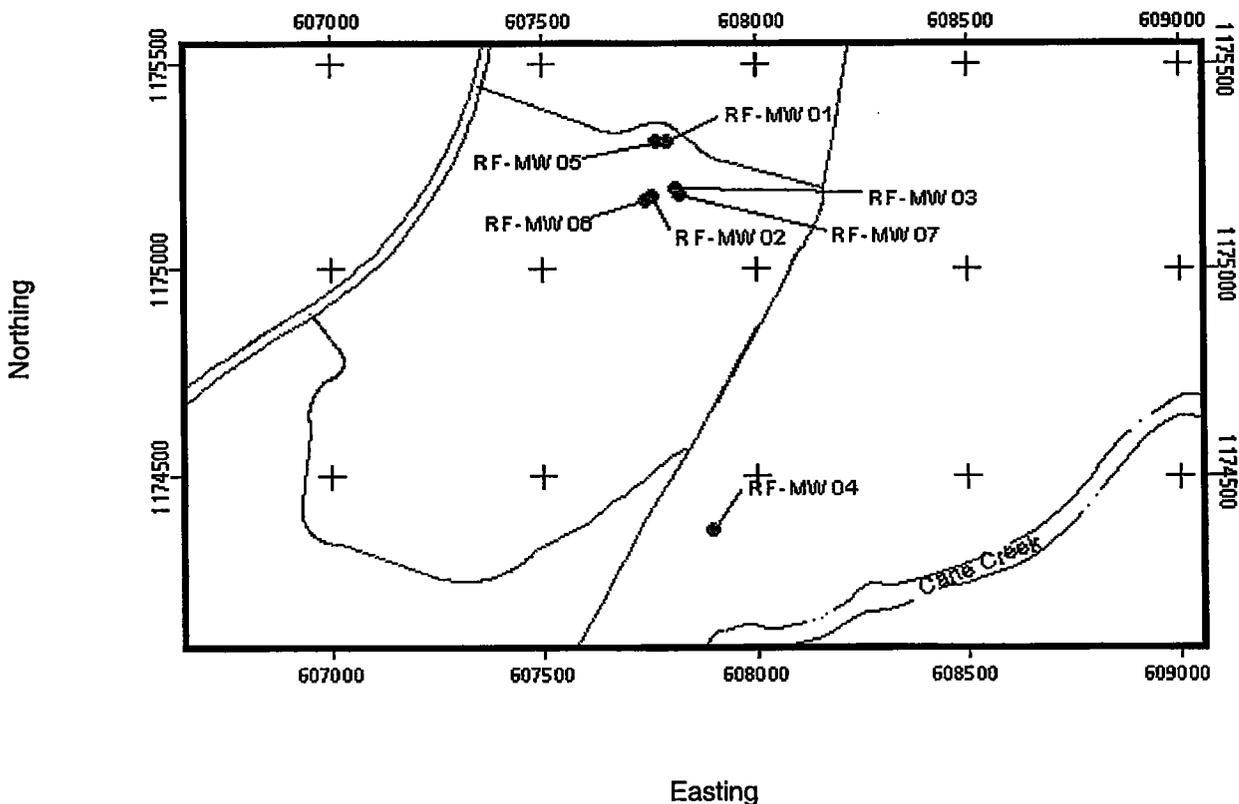
Geologist: Cindy Levaas

Sheet 4 of 4 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|---|------------------|---|-----------------------------|------------------------------------|---------------------------|-----------------|----------------------------|
| 530 | 21 | SAND and CLAY. | sc |  | Vapor = 0ppm | | | | |
| | 21 | NA: No sample collected for lithologic description. | | | | | | | |
| | 22 | | NA | | | | | | |
| | 23 | | | | | | | | Auger refusal at 23.5' bgs |

| | | | | | |
|---|-------------------|--|------------------------|---|--|
| HTRW DRILLING LOG | | District: Mobile USACE | | HOLE NUMBER RF-MW03 | |
| 1. Company name: IT Corporation | | 2. Drill Subcontractor: Miller Drilling Company | | Sheet 1 of 4 sheets | |
| 3. Project: Fort McClellan | | 4. Location: Calhoun County, Alabama | | | |
| 5. Name of driller: Paul Gibson | | 6. Mfr. designation of drill: Mobile B-59 HSA | | | |
| 7. Sizes and types of drilling and sampling equipment: Hollow Stem Auger HSA - 5'x8.25" OD Augers, 2'x2" Steel Split Spoons | | 8. Hole location: Rideout Field, Pelham Range | | | |
| | | 9. Surface elevation (feet above mean sea level): 552.01 | | | |
| | | 10. Date started: 05/29/02 | | 11. Date completed: 06/03/02 | |
| 12. Overburden thickness (feet bgs): 20 | | 15. Depth groundwater encountered (feet bgs): N/A | | | |
| 13. Depth drilled into rock (feet bgs): .1 | | 16. Depth to water and elapsed time after drilling completed (feet bgs): Dry after 24 hours | | | |
| 14. Total depth of hole (feet bgs): 20.1 | | 17. Other water level measurements (specify): N/A | | | |
| 18. Geotechnical samples: | Collected: | Disturbed: | Undisturbed: | 19. Total no. of core boxes: N/A | |
| | | | | | |
| 20. Samples for chemical analysis: | VOC | Metals | Other (specify) | Other (specify) | Other (specify) |
| | | | | | 21. Total core recovery: N/A |
| 22. Disposition of hole: | Backfilled | Monitoring well | Other (specify) | Geologist: Cindy Levaas | |
| | | 2" Permanent | | | |

LOCATION SKETCH/COMMENTS:



Project: **Fort McClellan**

bgs= below ground surface
NA = Not applicable

Hole no.: **RF-MW03**

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW03

Project: Fort McClellan

Geologist: Cindy Levaas

Sheet 3 of 4 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|---|----|---|----------------------|--|--|---------|--|
| | 11 | cl: Reddish brown, moist, medium stiff CLAY, some fine to medium Sand. | cl |  | Organic Vapor = 0ppm | | | 2 5 4 3 | Rec 1.2'/2.0' (10-12' bgs) |
| | 12 | NA: No recovery. | NA | | | | | | |
| 540 | 12 | NA: Shelby tube sample collected. | NA | | | | | | |
| | 13 | | NA | | | | | | |
| | 14 | NA: No sample collected for lithologic description. | NA | | | | | | |
| | 15 | cl: Reddish brown, moist, medium stiff to very stiff CLAY, trace fine to medium Sand, noted manganese nodules, some Silt. | cl |  | Organic Vapor = 0ppm | | | 6 7 9 7 | Rec 2.0'/2.0' (15-17' bgs) |
| | 16 | | cl | | | | | | |
| 535 | 17 | NA: No sample collected for lithologic description. | NA | | | | | | |
| | 18 | | NA | | | | | | |
| | 19 | | NA | | | | | | |
| | 20 | ls: Light gray to medium gray, subangular, fine | | | | | | 48/0.1' | Rec 0.1'/0.1' (20-20.1' bgs) Auger and split spoon refusal at 20.1' bgs Bottom of borehole at 20.1' 20 |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW03

Project: Fort McClellan

Geologist: Cindy Levaas

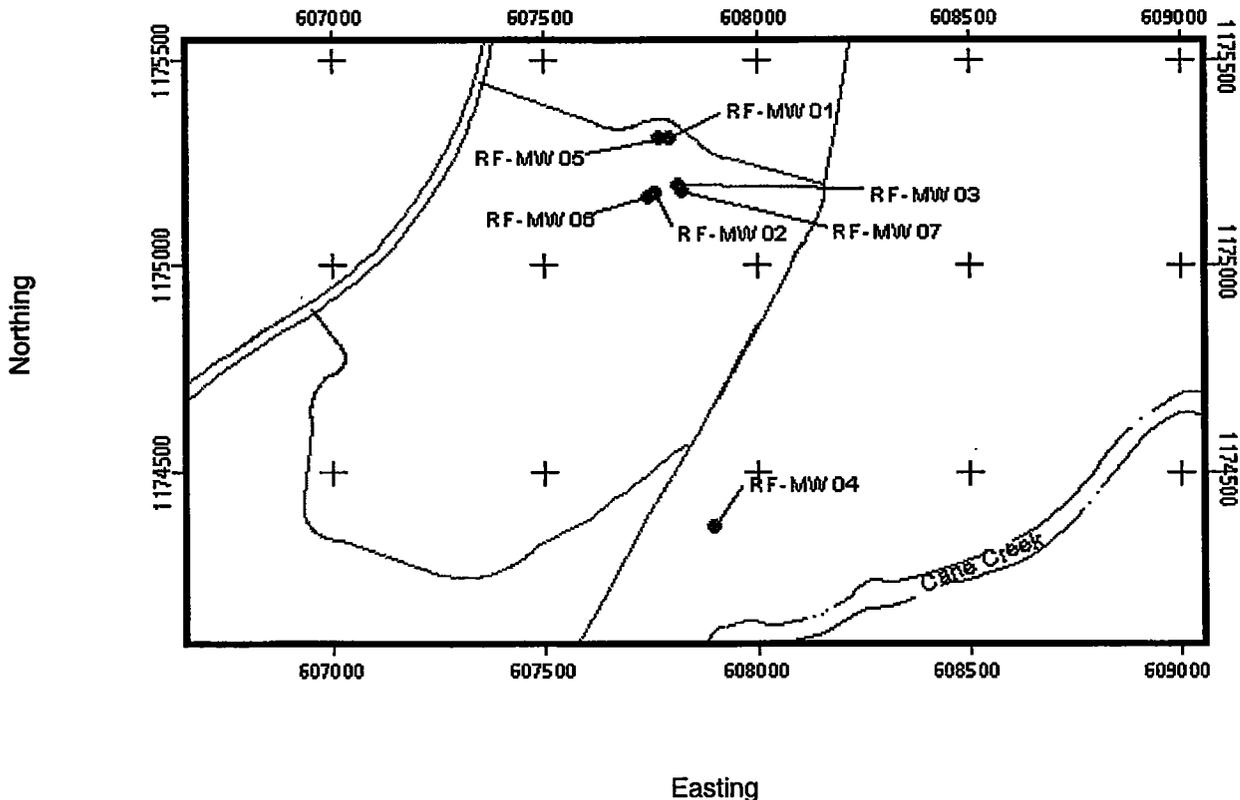
Sheet 4 of 4 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

grained LIMESTONE.

| | | | | | |
|---|--|--|--|-------------------------------------|---|
| HTRW DRILLING LOG | | District: Mobile USACE | | HOLE NUMBER RF-MW04 | |
| 1. Company name: IT Corporation | | 2. Drill Subcontractor: Miller Drilling Company | | Sheet 1 of 3 sheets | |
| 3. Project: Fort McClellan | | | 4. Location: Calhoun County, Alabama | | |
| 5. Name of driller: Paul Gibson | | | 6. Mfr. designation of drill: Mobile B-59, Pelham Range | | |
| 7. Sizes and types of drilling and sampling equipment: Hollow Stem Auger HSA - 5'x8.25" OD Augers, 2'x2" Steel Split Spoons | | | 8. Hole location: Rideout Field, Pelham Range | | |
| | | | 9. Surface elevation (feet above mean sea level): 518.7 | | |
| | | | 10. Date started: 05/30/02 | 11. Date completed: 06/03/02 | |
| 12. Overburden thickness (feet bgs): 20 | | | 15. Depth groundwater encountered (feet bgs): Dry | | |
| 13. Depth drilled into rock (feet bgs): 0 | | | 16. Depth to water and elapsed time after drilling completed (feet bgs): 10.25' bgs ~72 hrs | | |
| 14. Total depth of hole (feet bgs): 20 | | | 17. Other water level measurements (specify): N/A | | |
| 18. Geotechnical samples: | | Collected: | Disturbed: | Undisturbed: | 19. Total no. of core boxes: N/A |
| | | | | | |
| 20. Samples for chemical analysis: | | VOC | Metals | Other (specify) | Other (specify) Other (specify) 21. Total core recovery: N/A |
| | | | | | |
| 22. Disposition of hole: | | Backfilled | Monitoring well | Other (specify) | Geologist: Cindy Levaas |
| | | | 2" Permanent | | |

LOCATION SKETCH/COMMENTS:



HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW04

Project: Fort McClellan

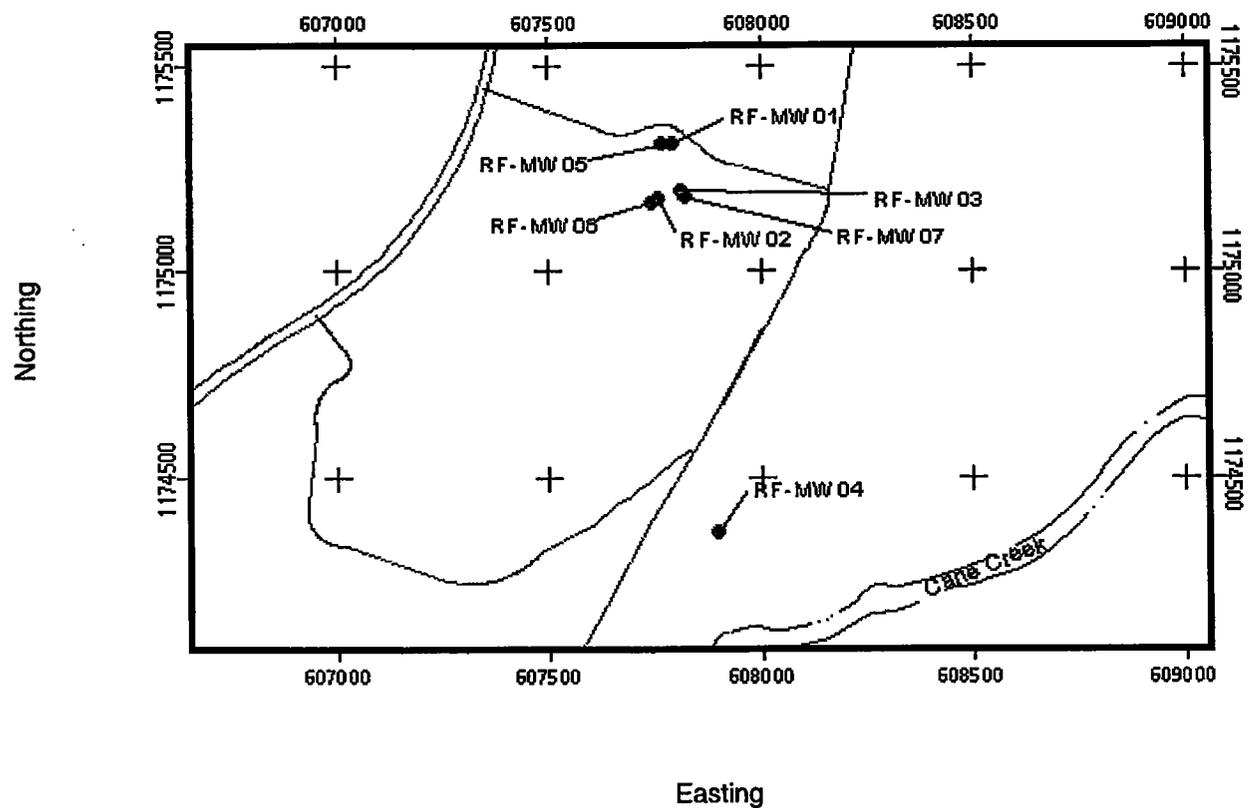
Geologist: Cindy Levaas

Sheet 3 of 3 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|--|------------------|---|-----------------------------|------------------------------------|---------------------------|-----------------|---|
| | 11 | NA: No sample collected for lithologic description. | NA | | Organic Vapor = 3.1ppm | | | | |
| | 12 | | | | | | | | |
| | 13 | sh: Dark gray to black, carbonaceous SHALE, little black, medium stiff Clay. | sh |  | Organic Vapor = 0.3ppm | | | 50/0.4' | Rec 0.4'/0.4' (13-13.4' bgs) |
| 505 | 14 | NA: No sample collected for lithologic description. | | | | | | | |
| | 15 | | | | | | | | |
| | 16 | | NA | | | | | | |
| | 17 | | | | | | | | |
| | 18 | sh: Dark gray to black, carbonaceous SHALE, little black, medium stiff Clay. | sh |  | Organic Vapor = 0ppm | | | 50/0.3' | Rec 0.3'/0.3' (18-18.3' bgs) |
| 500 | 19 | NA: No recovery. | | | | | | | |
| | 20 | | NA | | | | | | Auger refusal at 20' bgs Bottom of borehole at 20' bgs |

| | | | | | |
|---|-------------------|--|------------------------|---|--|
| HTRW DRILLING LOG | | District: Mobile USACE | | HOLE NUMBER RF-MW05 | |
| 1. Company name: IT Corporation | | 2. Drill Subcontractor: Miller Drilling Company | | Sheet 1 of 11 sheets | |
| 3. Project: Fort McClellan | | 4. Location: Calhoun County, Alabama | | | |
| 5. Name of driller: Al Davis | | 6. Mfr. designation of drill: Schramm T450W Air Rotary | | | |
| 7. Sizes and types of drilling and sampling equipment: Air Rotary 12" Roller bit 8" Hammer bit | | 8. Hole location: Rideout Field, Pelham Range | | | |
| | | 9. Surface elevation (feet above mean sea level): 552.75 | | | |
| 12. Overburden thickness (feet bgs): 22.5 | | 10. Date started: 06/28/02 | | | |
| | | 11. Date completed: 07/11/02 | | | |
| 13. Depth drilled into rock (feet bgs): 69.4 | | 15. Depth groundwater encountered (feet bgs): 90 Ft | | | |
| 14. Total depth of hole (feet bgs): 91.9 | | 16. Depth to water and elapsed time after drilling completed (feet bgs): 28.0' after 24 hours | | | |
| | | 17. Other water level measurements (specify): N/A | | | |
| 18. Geotechnical samples: | Collected: | Disturbed: | Undisturbed: | 19. Total no. of core boxes: N/A | |
| | | | | | |
| 20. Samples for chemical analysis: | VOC | Metals | Other (specify) | Other (specify) | Other (specify) |
| | | | | | 21. Total core recovery: N/A |
| 22. Disposition of hole: | Backfilled | Monitoring well | Other (specify) | Geologist: Adam Day | |
| | | 4" Permanent | | | |

LOCATION SKETCH/COMMENTS:



HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW05

Project: Fort McClellan

Geologist: Adam Day

Sheet 2 of 11 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|--|----|--|--|--|--|--|---|
| | 0 | sc: Reddish brown, slightly moist, medium stiff to stiff CLAY and SAND, trace roots, trace subrounded, sandstone Gravel. | | | | | | | Lithologic description from RF-MW01 (0-22.5' bgs) |
| | 1 | | sc | | | | | | |
| | 2 | NA: No recovery. | NA | | | | | | |
| | 2 | sc: Reddish brown, slightly moist, medium stiff to stiff CLAY and SAND, trace roots, trace subrounded, sandstone Gravel. | | | | | | | |
| 550 | 3 | | sc | | | | | | |
| | 4 | NA: No recovery. | NA | | | | | | |
| | 4 | sc: Reddish brown, slightly moist, medium stiff to stiff CLAY and SAND, trace roots, trace subrounded, sandstone Gravel. | | | | | | | |
| | 5 | | sc | | | | | | |
| | 6 | NA: No recovery. | NA | | | | | | |
| | 6 | sc: Reddish brown to light brown, moist, very stiff CLAY and fine to medium SAND, little Silt, little subrounded, sandstone Gravel. | | | | | | | |
| | 7 | | sc | | | | | | |
| 545 | 8 | | | | | | | | |
| | 8 | cl: Reddish brown to light gray, moist, stiff CLAY, some fine to medium Sand, little Silt, little subangular, siltstone Gravel (in layer). | | | | | | | |
| | 9 | | cl | | | | | | |
| | 10 | | | | | | | | |

HTRW DRILLING LOG (Continuation Sheet)

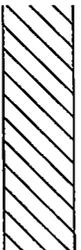
HOLE NUMBER: RF-MW05

Project: Fort McClellan

Geologist: Adam Day

Sheet 3 of 11 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|--|---|----|---|--|--|--|--|--|
| | | cl: Reddish brown, moist, stiff CLAY, some fine to medium Sand, little Silt. | cl |  | | | | | |
| | | NA: No recovery. | NA | | | | | | |
| | | NA: No sample collected for lithologic description. | | | | | | | |
| 540 | | | NA | | | | | | |
| | | cl: Orangeish brown to olive gray, moist, medium stiff to stiff CLAY, some Silt, noted manganese nodules. | cl |  | | | | | |
| | | NA: No recovery. | NA | | | | | | |
| | | NA: No sample collected for lithologic description. | | | | | | | |
| 535 | | | NA | | | | | | |
| | | | | | | | | | |
| | | sc: Light brown to dark brown, very moist, fine | |  | | | | | |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW05

Project: Fort McClellan

Geologist: Adam Day

Sheet 4 of 11 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|---|----|--|----------------------|--|--|--|---|
| | | to medium SAND, some Clay, little Silt. | | | | | | | |
| | 21 | | sc | | | | | | |
| | 22 | | | | | | | | |
| 530 | 23 | ls: LIMESTONE, hard, unweathered, undetermined fracturing, undetermined bedding, microcrystalline, medium Gray, reacts with HCl. | | | | | | | Description from Air Rotary drill cuttings (22.5-91.9' bgs) |
| | 24 | | | | Organic Vapor = 0ppm | | | | |
| | 25 | | | | | | | | |
| | 26 | | ls | | | | | | |
| | 27 | | | | | | | | |
| 525 | 28 | | | | | | | | |
| | 29 | ls: Dolomitic LIMESTONE, hard, unweathered, undetermined fracturing, undetermined bedding, microcrystalline, medium Gray, slightly reacts with HCl. | | | | | | | |
| | 30 | | | | Organic Vapor = 0ppm | | | | |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW05

Project: Fort McClellan

Geologist: Adam Day

Sheet 6 of 11 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|--|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
| | 41 | | | | | | | | |
| | 42 | Is: Dolomitic LIMESTONE, hard, fine grained, undetermined fracturing, undetermined bedding, light gray, reacts slightly with HCl, (unweathered). | | | | | | | |
| 510 | 43 | | | | | | | | |
| | 44 | | | | | | | | |
| | 45 | | | | | | | | |
| | 46 | | | | | | | | |
| | 47 | | | | | | | | |
| 505 | 48 | | | | | | | | |
| | 49 | | | | | | | | |
| | 50 | | | | | | | | |

Organic Vapor = 0ppm

Organic Vapor = 0ppm

Organic Vapor = 0ppm

HTRW DRILLING LOG (Continuation Sheet)

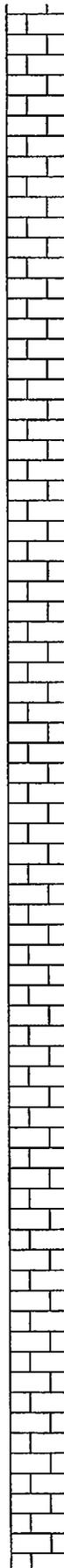
HOLE NUMBER: RF-MW05

Project: Fort McClellan

Geologist: Adam Day

Sheet 7 of 11 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|--|--|----|--|--|--|--|--|----------------------|
| 51 | | | | | | | | | |
| 52 | | | ls |  | | | | | |
| 500 | | | | | | | | | |
| 53 | | | | | | | | | |
| 54 | | | | | | | | | |
| 55 | | | | | | | | | |
| 56 | | | | | | | | | |
| 57 | | | | | | | | | |
| 495 | | | | | | | | | |
| 58 | | | | | | | | | |
| 59 | | | | | | | | | |
| 60 | | | | | | | | | Organic Vapor = 0ppm |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW05

Project: Fort McClellan

Geologist: Adam Day

Sheet 8 of 11 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|--|---|--|--|--|--|--|--|--|
| 61 | | | | | | | | | |
| 62 | | Is: LIMESTONE, hard, fine grained, undetermined fracturing, undetermined bedding, unweathered, light gray, reacts with HCl. | | | | | | | |
| 499 | | | | | | | | | |
| 63 | | | | | | | | | |
| 64 | | | | | | | | | |
| 65 | | | | | | | | | |
| 66 | | | | | | | | | |
| 67 | | | | | | | | | |
| 485 | | | | | | | | | |
| 68 | | | | | | | | | |
| 69 | | | | | | | | | |
| 70 | | | | | | | | | |

Organic Vapor = 0ppm

Organic Vapor = 0ppm

Organic Vapor = 0ppm

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW01

Project: Fort McClellan

Geologist: Cindy Levaas

Sheet 4 of 4 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|--|----|---|----|---|--------------|--|--|--------------|--|
| | 21 | to medium SAND, some Clay, little Silt. | sc |  | Vapor = 0ppm | | | | |
| | 22 | NA: No sample collected for lithologic description. | NA |  | | | | | |
| | 23 | ls: Light gray, weathered LIMESTONE. | |  | | | | 30/0.1' (23- | Auger and split spoon refusal at 23.1' bgs Bottom of borehole at 23.1' 23 |

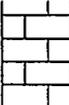
HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW05

Project: Fort McClellan

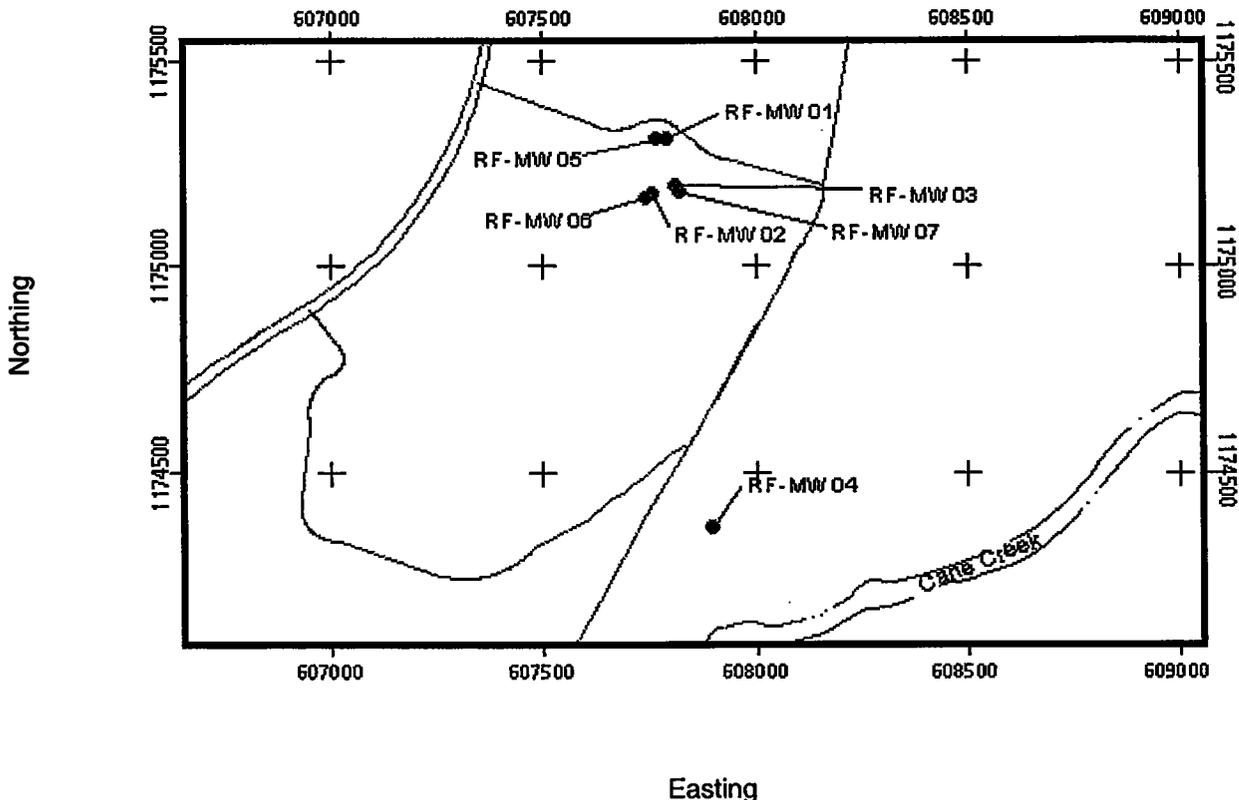
Geologist: Adam Day

Sheet 11 of 11 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|--------------|--------------|------------------------------|---------------------|---|-----------------------------------|---|---------------------------------|--------------------|---------------------------------|
| | | | |  | = 0ppm | | | | Bottom of borehole at 91.9' bgs |

| | | | | | |
|--|--|--|--|-------------------------------------|---|
| HTRW DRILLING LOG | | District: Mobile USACE | | HOLE NUMBER RF-MW06 | |
| 1. Company name: IT Corporation | | 2. Drill Subcontractor: Miller Drilling Company | | Sheet 1 of 10 sheets | |
| 3. Project: Fort McClellan | | | 4. Location: Calhoun County, Alabama | | |
| 5. Name of driller: Al Davis | | | 6. Mfr. designation of drill: Schramm T450 Rotadrill | | |
| 7. Sizes and types of drilling and sampling equipment: Air Rotary 14", 10", 8" Roller bit 8" Hammer bit | | | 8. Hole location: Rideout Field | | |
| | | | 9. Surface elevation (feet above mean sea level): 550.01 | | |
| | | | 10. Date started: 06/26/02 | 11. Date completed: 07/02/02 | |
| 12. Overburden thickness (feet bgs): 19.5 | | | 15. Depth groundwater encountered (feet bgs): 61 Ft | | |
| 13. Depth drilled into rock (feet bgs): 62.4 | | | 16. Depth to water and elapsed time after drilling completed (feet bgs): 25.25 after 24 hours | | |
| 14. Total depth of hole (feet bgs): 81.9 | | | 17. Other water level measurements (specify): N/A | | |
| 18. Geotechnical samples: | | Collected: | Disturbed: | Undisturbed: | 19. Total no. of core boxes: N/A |
| 20. Samples for chemical analysis: | | VOC | Metals | Other (specify) | Other (specify) Other (specify) 21. Total core recovery: N/A |
| 22. Disposition of hole: | | Backfilled | Monitoring well | Other (specify) | Geologist: Adam Day |
| | | | 4" Permanent | | |

LOCATION SKETCH/COMMENTS:



HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW06

Project: Fort McClellan

Geologist: Adam Day

Sheet 2 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|---|----|--|----------------------|--|--|--|---|
| 550 | 0 | sc: Reddish orange, dry to slightly moist, medium stiff CLAY and SAND, little subrounded, sandstone Gravel. | | | Organic Vapor = 0ppm | | | | Lithologic description from RF-MW02 (0-19.5' bgs) |
| | 1 | | sc | | | | | | |
| | 2 | NA: No recovery. | NA | | | | | | |
| | 2 | sc: Reddish brown, dry to moist, medium stiff to stiff CLAY and SAND. | sc | | | | | | |
| | 3 | NA: No recovery. | NA | | | | | | |
| | 4 | sc: Reddish brown, moist, medium stiff CLAY and SAND, trace Silt. | sc | | | | | | |
| 545 | 5 | | sc | | | | | | |
| | 6 | NA: No recovery. | NA | | | | | | |
| | 6 | cl: Orangeish brown, moist, stiff to very stiff CLAY, little fine to medium Sand. | cl | | | | | | |
| | 7 | | cl | | | | | | |
| | 8 | NA: No recovery. | NA | | | | | | |
| | 8 | cl: Orangeish brown, moist, stiff to very stiff CLAY, little fine to medium Sand. | cl | | | | | | |
| | 9 | | cl | | | | | | |
| | 9 | NA: No recovery. | NA | | | | | | |
| 540 | 10 | | NA | | | | | | |

HTRW DRILLING LOG (Continuation Sheet)

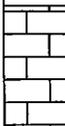
HOLE NUMBER: RF-MW06

Project: Fort McClellan

Geologist: Adam Day

Sheet 3 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|---|----|---|--|--|--|--|--|
| | 11 | NA: Shelby tube sample collected. | NA | | | | | | |
| | 12 | NA: No sample collected for lithologic description. | NA | | | | | | |
| | 13 | | NA | | | | | | |
| | 14 | cl: Orangeish brown to light brown, moist to very moist, medium stiff to stiff, partially laminated CLAY, some fine to coarse Sand, little Silt, noted manganese nodules. | |  | | | | | |
| 535 | 15 | | cl | | | | | | |
| | 16 | NA: Shelby tube sample collected. | NA | | | | | | |
| | 17 | | NA | | | | | | |
| | 18 | NA: No sample collected for lithologic description. | NA | | | | | | |
| | 19 | | NA | | | | | | |
| 530 | 20 | ls: LIMESTONE, hard, unweathered, undetermined fracturing, undetermined bedding, fine grained to microcrystalline, medium gray, reacts with HCl. | |  | | | | | |

Organic Vapor = 0ppm

Organic

Description from Air Rotary drill cuttings (19.5-81.9' bgs)

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW06

Project: Fort McClellan

Geologist: Adam Day

Sheet 4 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|--|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
| | | | | | Vapor = 0ppm | | | | |
| | 21 | | | | | | | | |
| | 22 | | Is | | Organic Vapor = 0ppm | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| 525 | 25 | Is: LIMESTONE, hard, undetermined fracturing, undetermined bedding, microcrystalline, dark gray to medium gray, contorted calcite veins throughout, reacts with HCl. | | | | | | | |
| | 26 | | | | | | | | |
| | 27 | | | | Organic Vapor = 0ppm | | | | |
| | 28 | | | | | | | | |
| | 29 | | | | | | | | |
| 520 | 30 | | | | Organic Vapor | | | | |

HTRW DRILLING LOG (Continuation Sheet)

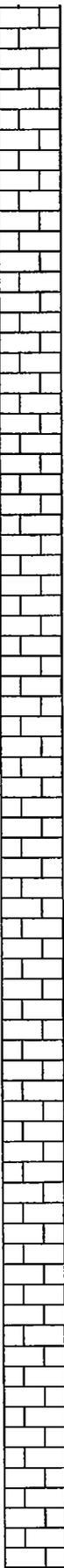
HOLE NUMBER: RF-MW06

Project: Fort McClellan

Geologist: Adam Day

Sheet 5 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|--|----|--|----------------------|--|--|--|--|
| | | | | | | | | | |
| | 31 | | | | | | | | |
| | 32 | | | | | | | | |
| | 33 | | | | | | | | |
| | 34 | | | | | | | | |
| 515 | 35 | | ls |  | = 0ppm | | | | |
| | 36 | | | | | | | | |
| | 37 | | | | | | | | |
| | 38 | | | | | | | | |
| | 39 | | | | | | | | |
| 510 | 40 | | | | Organic Vapor = 0ppm | | | | |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW06

Project: Fort McClellan

Geologist: Adam Day

Sheet 6 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|--------|--|--|--|--|----------------------|--|--|--|--|
| 41 | | ls: LIMESTONE, hard, unweathered, undetermined fracturing, undetermined bedding, microcrystalline, medium gray, reacts with HCl. | | | | | | | |
| 42 | | | | | Organic Vapor = 0ppm | | | | |
| 43 | | | | | | | | | |
| 44 | | | | | | | | | |
| 505 45 | | | | | | | | | |
| 46 | | | | | | | | | |
| 47 | | | | | | | | | |
| 48 | | | | | | | | | |
| 49 | | | | | | | | | |
| 500 50 | | | | | Organic Vapor = 0ppm | | | | |

HTRW DRILLING LOG (Continuation Sheet)

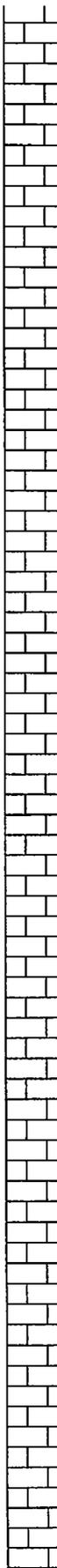
HOLE NUMBER: RF-MW06

Project: Fort McClellan

Geologist: Adam Day

Sheet 7 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|--------|--|--|----|--|--|--|--|--|-----------------------------|
| 51 | | | ls |  | | | | | <p>Organic Vapor = 0ppm</p> |
| 52 | | | | | | | | | |
| 53 | | | | | | | | | |
| 54 | | | | | | | | | |
| 495 55 | | | | | | | | | |
| 56 | | | | | | | | | |
| 57 | | | | | | | | | |
| 58 | | | | | | | | | |
| 59 | | | | | | | | | |
| 490 60 | | | | | | | | | |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW06

Project: Fort McClellan

Geologist: Adam Day

Sheet 8 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|---|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|------------------------------------|
| | 61 | Is: LIMESTONE, hard, unweathered, undetermined fracturing, undetermined bedding, microcrystalline, dark gray to medium gray, contorted calcite veins throughout, reacts with HCl. | | | Organic Vapor = 0ppm | | | | Groundwater encountered at 61' bgs |
| | 62 | | | | | | | | |
| | 63 | | | | | | | | |
| | 64 | | | | | | | | |
| 485 | 65 | | | | | | | | |
| | 66 | | | | | | | | |
| | 67 | | | | | | | | |
| | 68 | | | | | | | | |
| | 69 | | | | | | | | |
| 480 | 70 | | | | | Organic Vapor = 0ppm | | | |

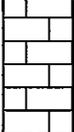
HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW06

Project: Fort McClellan

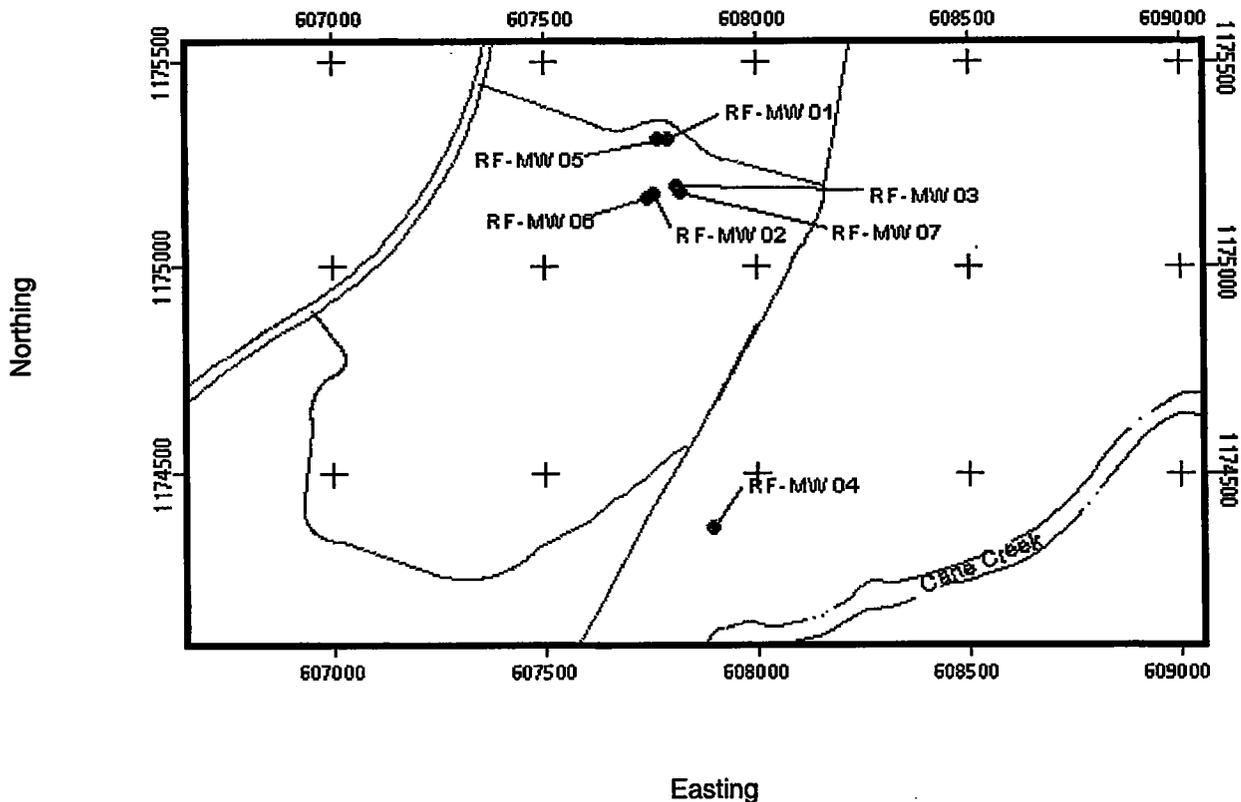
Geologist: Adam Day

Sheet 10 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|--------------|--------------|------------------------------|---------------------|---|-----------------------------------|---|---------------------------------|--------------------|-----------------------------|
| | | | |  | | | | | Bottom of borehole at 81.9' |

| | | | | | |
|--|--|--|---|------------------------|--|
| HTRW DRILLING LOG | | District: Mobile USACE | | HOLE NUMBER RF-MW07 | |
| 1. Company name: IT Corporation | | 2. Drill Subcontractor: Miller Drilling Company | | Sheet 1 of 10 sheets | |
| 3. Project: Fort McClellan | | | 4. Location: Calhoun County, Alabama | | |
| 5. Name of driller: Al Davis/Glen Bilbrey | | | 6. Mfr. designation of drill: CME 850/CME 250/Schramm T450 Rotadrill | | |
| 7. Sizes and types of drilling and sampling equipment: CME 850, Triple PQ Core Barrel 14", 10", 8" Roller Bit 8" Hammer bit | | | 8. Hole location: Rideout Field, Pelham Range | | |
| | | | 9. Surface elevation (feet above mean sea level): 549.79 | | |
| 12. Overburden thickness (feet bgs): 23 | | | 15. Depth groundwater encountered (feet bgs): unknown | | |
| 13. Depth drilled into rock (feet bgs): 62.5 | | | 16. Depth to water and elapsed time after drilling completed (feet bgs): 40.93 after 2 hours | | |
| 14. Total depth of hole (feet bgs): 85.5 | | | 17. Other water level measurements (specify): N/A | | |
| 18. Geotechnical samples: | | Collected: | Disturbed: | Undisturbed: | 19. Total no. of core boxes: 7 |
| 20. Samples for chemical analysis: | | VOC | Metals | Other (specify) | Other (specify) Other (specify) 21. Total core recovery: ~ 58.5 |
| 22. Disposition of hole: | | Backfilled | Monitoring well | Other (specify) | Geologist: Adam Day/Kyle Wilson |
| | | | 4" Permanent | | |

LOCATION SKETCH/COMMENTS:



HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW07

Project: Fort McClellan

Geologist: Adam Day/Kyle Wilson

Sheet 2 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|---|----|--|----------------------|--|--|--|---|
| 0 | | sc: Reddish orange, dry to slightly moist, medium stiff CLAY and SAND, trace subrounded, sandstone Gravel. | sc | | Organic Vapor = 0ppm | | | | Lithologic description from RF-MW03 (0-23' bgs) |
| 1 | | NA: No recovery. | NA | | | | | | |
| 2 | | sc: Reddish orange, dry to slightly moist, medium stiff CLAY and SAND, trace subrounded, sandstone Gravel. | sc | | | | | | |
| 3 | | NA: No recovery. | NA | | | | | | |
| 4 | | cl: Reddish brown, moist, medium stiff CLAY, little fine to medium Sand, little subangular, siltstone Gravel. | cl | | | | | | |
| 545 | 5 | NA: No recovery. | NA | | | | | | |
| 6 | | cl: Reddish brown, moist, medium stiff CLAY, some fine to medium Sand. | cl | | | | | | |
| 7 | | NA: No recovery. | NA | | | | | | |
| 8 | | cl: Reddish brown, moist, medium stiff CLAY, some fine to medium Sand. | cl | | | | | | |
| 9 | | NA: No recovery. | NA | | | | | | |
| 540 | 10 | | | | | | | | |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW07

Project: Fort McClellan

Geologist: Adam Day/Kyle Wilson

Sheet 3 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|----|---|----|---|----------------------|--|--|--|--|
| | | cl: Reddish brown, moist, medium stiff CLAY, some fine to medium Sand. | cl |  | Organic Vapor = 0ppm | | | | |
| 11 | | NA: No recovery. | NA | | | | | | |
| 12 | | NA: No sample collected for lithologic description. | NA | | | | | | |
| 13 | | | NA | | | | | | |
| 14 | | NA: No sample collected for lithologic description. | NA | | | | | | |
| 535 | 15 | cl: Reddish brown, moist, medium stiff to very stiff CLAY, trace fine to medium Sand, noted manganese nodules, some Silt. | cl |  | | | | | |
| 16 | | | cl | | | | | | |
| 17 | | NA: No sample collected for lithologic description. | NA | | | | | | |
| 18 | | | NA | | | | | | |
| 19 | | | NA | | | | | | |
| 530 | 20 | ls: Light gray to medium gray, subangular, fine | |  | | | | | |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW07

Project: Fort McClellan

Geologist: Adam Day/Kyle Wilson

Sheet 5 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|
|-----------|-----------|------------------------------|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|-------------|

| | | | | | | | | | |
|-----|--|---|----|--|--|--|--|----------|--|
| 31 | | Is: LIMESTONE, moderately hard, slightly weathered to unweathered, microcrystalline, massive bedding, highly fractured (fractures embedded with Shale at 30.5', 32.3', 33.8', 34' and 35'), contorted calcite veins throughout, color light bluish gray to light gray. Shale is medium gray, contorted veins of Shale and Clay throughout, color medium bluish gray. | | | | | | CD 30.25 | Run 2 (30.3-35.3' bgs) Ran 5.0', Rec 4.88' Loss .12' UL .01' Water used 450 gallons, req ₃ 95%, light gray to tan to white HP 500 psi WP 50 psi Time 18 min RQD 30% |
| 32 | | | | | | | | | |
| 33 | | | Is | | | | | | |
| 34 | | | | | | | | | |
| 515 | | | | | | | | | |
| 35 | | | | | | | | | |
| 36 | | Is: LIMESTONE, moderately hard, unweathered, microcrystalline, massive bedding, moderately jointed at 35.14-35.67', 36.06', 37.85' and 38.03'. Joints are filled with gray Shale and Clay along edges at 35.14-35.67'. Contorted calcite veins throughout, some veins are filled with Clay, color is light bluish gray to light gray, Clay and Shale is medium to medium bluish gray. | | | | | | CD 35.14 | Run 3 (35.3-40.3' bgs) Ran 5.0', Rec 4.93' Loss .07' UL 0.0 Water used 450 gallons, req ₃ 98%, gray to white HP 500 psi WP 50 psi Time 20 mins RQD 91.8% |
| 37 | | | | | | | | | |
| 38 | | | Is | | | | | | |
| 39 | | | | | | | | | |
| 510 | | | | | | | | | |
| 40 | | Is: LIMESTONE, moderately hard, unweathered, microcrystalline, massive bedding, moderately jointed at 41.5', 41.8', | | | | | | CD 40.07 | Run 4 (40.3-45.3' bgs) |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW07

Project: Fort McClellan

Geologist: Adam Day/Kyle Wilson

Sheet 6 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|---|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|---|
| | 41 | 42.7', 43.7', 43.95', broken zone from 44.65' to 44.81'. Embedded Shale at 41.5', 41.8', 42.7'. Contorted calcite veins throughout, some veins are filled with Shale and Clay, color is light bluish gray to light gray, Clay and Shale is medium to medium bluish gray. | | | | | | | Ran 5.0', Rec 5.18' Gain 0.18 UL 0.0 Water used 300 gallons, req 95% HP 500 psi WP 50 psi Time 15 mins RQD 86% |
| | 42 | | | | | | | | |
| | 43 | | Is | | | | | | |
| | 44 | | | | | Box 2 of 7 (40.3 to 45.3' bgs) | | | |
| 505 | 45 | | | | | | | | |
| | 46 | Is: LIMESTONE, moderately hard, unweathered, microcrystalline, massive bedding, moderately jointed at 46.5', 47.5', 48.45' and 48.82'. Joints are filled with Shale, contorted veins throughout, some veins are filled with calcite, some filled with Clay, color is light bluish gray to light gray, Clay and Shale is medium to medium bluish gray. | | | Organic Vapor = 0ppm | | | CD 45.25 | Run 5 (45.3-50.3' bgs) Ran 5.0', Rec 4.45' Loss 0.55' UL 0.0' Water used 410 gallons, req 95%, gray to white HP 500 psi WP 50 psi Time 20 mins |
| | 47 | | | | | | | | |
| | 48 | | Is | | | | | | |
| | 49 | | | | | Box 3 of 7 (45.3 to 55.3' bgs) | | | |
| 500 | 50 | Is: LIMESTONE, moderately hard, unweathered, microcrystalline, massive bedding, lightly jointed at 52.85' (90 degrees). Joints are not filled with Shale and Clay. Contorted calcite veins throughout, color is light bluish gray to medium light gray. | | | Organic Vapor = 0ppm | | | CD 49.7 | Run 6 (50.3-55.3' bgs) Ran 5.0', Rec 4.35' |

HTRW DRILLING LOG (Continuation Sheet)

HOLE NUMBER: RF-MW07

Project: Fort McClellan

Geologist: Adam Day/Kyle Wilson

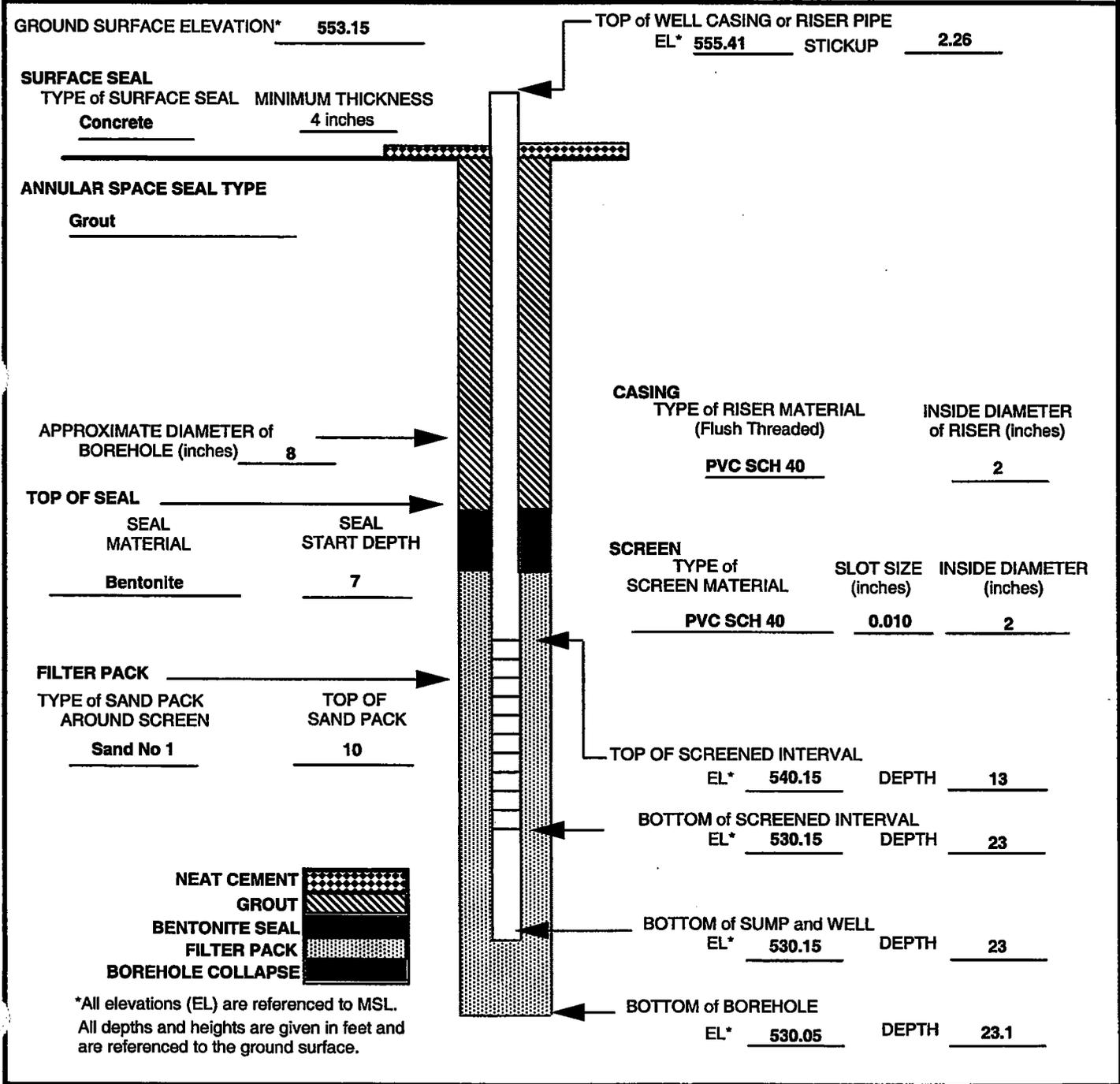
Sheet 10 of 10 sheets

| Elev. (a) | Depth (b) | Description of Materials (c) | USCS / Lithology | Graphic | Field screening results (d) | Geotech sample or core box no. (e) | Analytical sample no. (f) | Blow counts (g) | Remarks (h) |
|-----------|-----------|--|------------------|---------|-----------------------------|------------------------------------|---------------------------|-----------------|--|
| | | gray. | | | | | | | 95%, gray to white HP 500 psi WP 50 psi Time 34 mins RQD 100% |
| | 82 | | | | | | | | |
| | 83 | | ls | | | Box 7 of 7 (80.3 to 85.5' bgs) | | | |
| | 84 | | | | | | | | |
| 465 | 85 | ls: LIMESTONE, moderately hard to hard, unweathered, microcrystalline, medium light gray to light bluish gray. | | | Organic Vapor = 0ppm | | | | Description from Air Rotary drill cuttings (85.3-85.5' bgs) Bottom of borehole at 85.5' |

WELL CONSTRUCTION LOGS

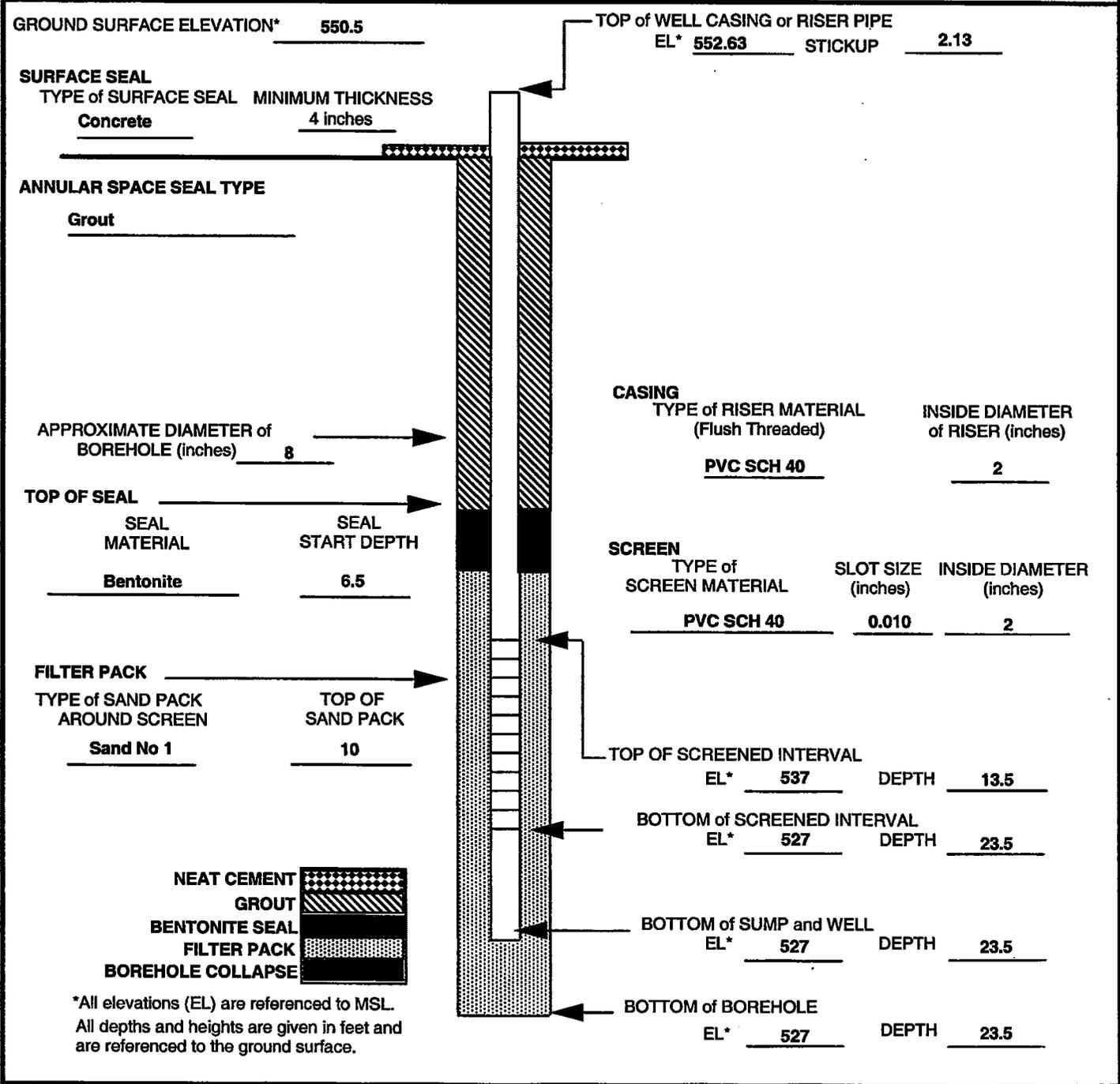
MONITORING WELL INSTALLATION DETAIL

| | |
|--|--|
| PROJECT: <u>Fort McClellan</u> LOCATION: <u>Anniston, AL</u> CLIENT: <u>USACE Mobile District</u> CONTRACTOR: <u>Miller Drilling Company</u> DRILLER: <u>Paul Gibson</u> IT FIELD REPRESENTATIVE: <u>Cindy Levaas</u> | WELL NO: <u>RF-MW01</u> DRILLING METHOD: <u>Hollow Stem Auger</u> INSTALLATION DATE: <u>03-JUN-02</u> NORTHING: <u>1175307.4</u> EASTING: <u>607793.63</u> HORIZONTAL SURVEY DATUM: <u>NAD83</u> VERTICAL SURVEY DATUM: <u>NAVD88</u> JOB NO: <u>796887</u> |
|--|--|



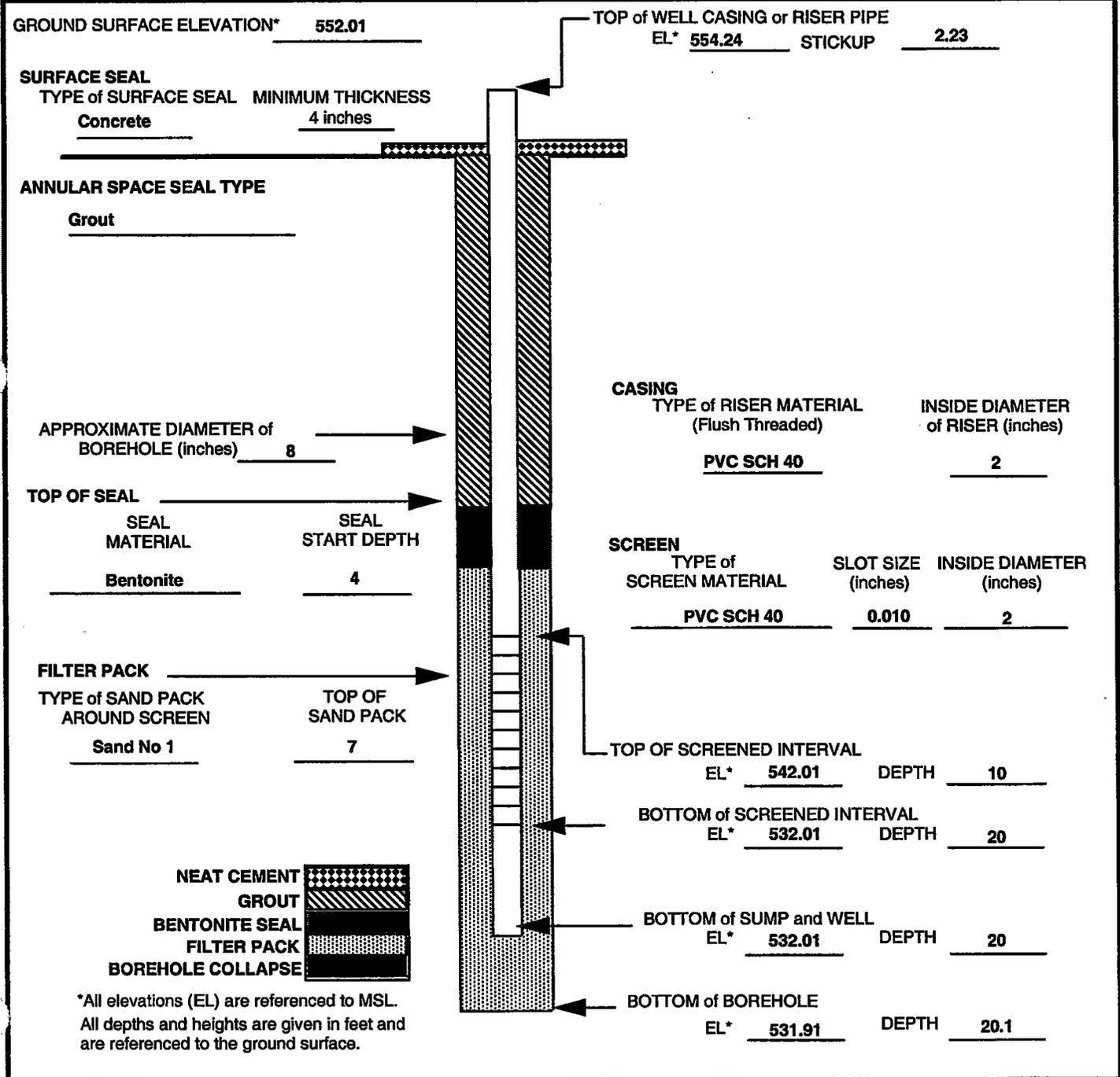
MONITORING WELL INSTALLATION DETAIL

| | |
|--|---|
| PROJECT: <u>Fort McClellan</u> LOCATION: <u>Anniston, AL</u> CLIENT: <u>USACE Mobile District</u> CONTRACTOR: <u>Miller Drilling Company</u> DRILLER: <u>Paul Gibson</u> IT FIELD REPRESENTATIVE: <u>Cindy Levaas</u> | WELL NO: <u>RF-MW02</u> DRILLING METHOD: <u>Hollow Stem Auger</u> INSTALLATION DATE: <u>03-JUN-02</u> NORTHING: <u>1175169.35</u> EASTING: <u>607761.15</u> HORIZONTAL SURVEY DATUM: <u>NAD83</u> VERTICAL SURVEY DATUM: <u>NAVD88</u> JOB NO: <u>796887</u> |
|--|---|



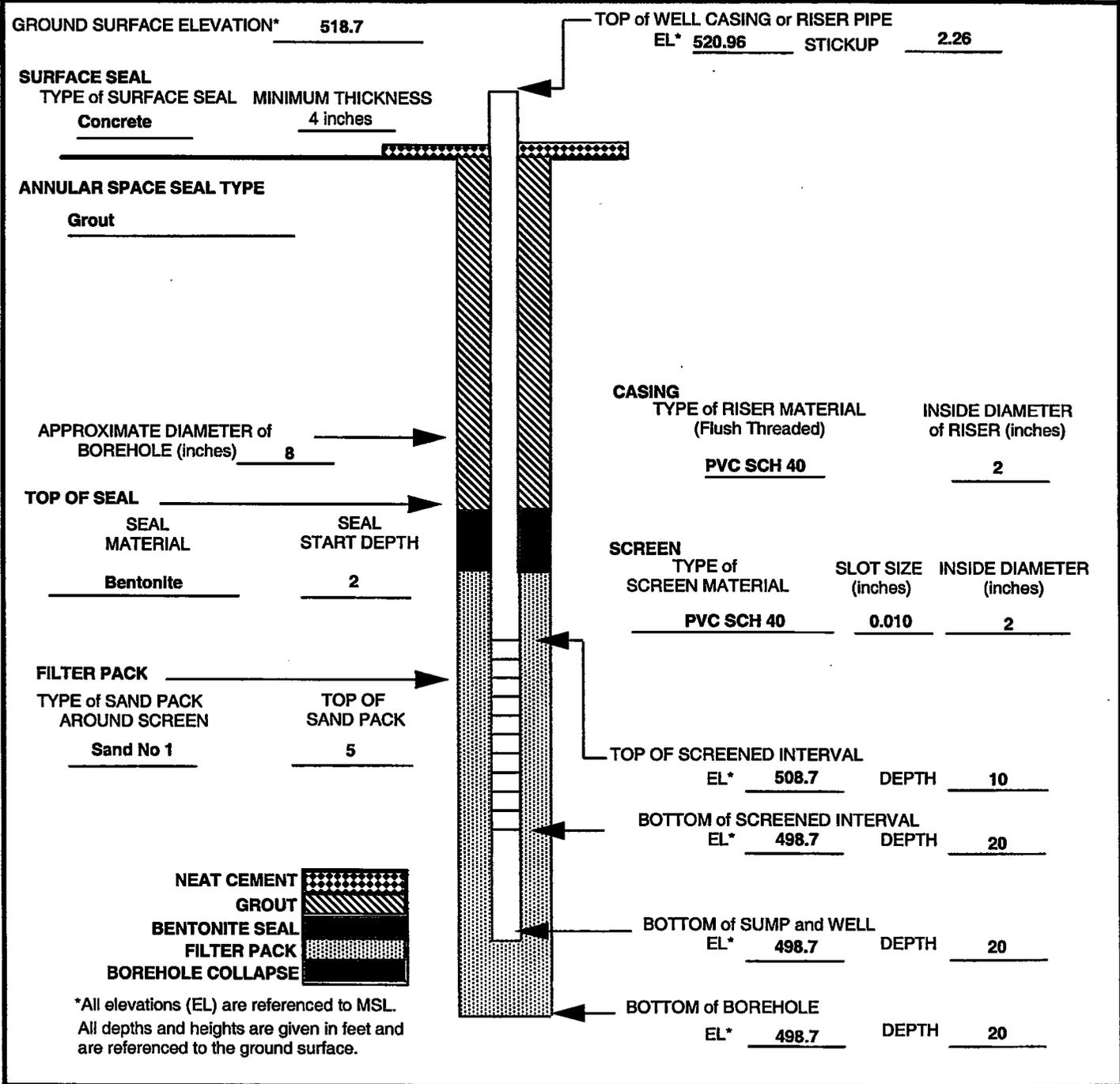
MONITORING WELL INSTALLATION DETAIL

| | |
|--|---|
| PROJECT: <u>Fort McClellan</u> LOCATION: <u>Anniston, AL</u> CLIENT: <u>USACE Mobile District</u> CONTRACTOR: <u>Miller Drilling Company</u> DRILLER: <u>Paul Gibson</u> IT FIELD REPRESENTATIVE: <u>Cindy Levaas</u> | WELL NO: <u>RF-MW03</u> DRILLING METHOD: <u>Hollow Stem Auger</u> INSTALLATION DATE: <u>03-JUN-02</u> NORTHING: <u>1175190.89</u> EASTING: <u>607815.86</u> HORIZONTAL SURVEY DATUM: <u>NAD83</u> VERTICAL SURVEY DATUM: <u>NAVD88</u> JOB NO: <u>796887</u> |
|--|---|



MONITORING WELL INSTALLATION DETAIL

| | |
|--|---|
| PROJECT: <u>Fort McClellan</u> LOCATION: <u>Anniston, AL</u> CLIENT: <u>USACE Mobile District</u> CONTRACTOR: <u>Miller Drilling Company</u> DRILLER: <u>Paul Gibson</u> IT FIELD REPRESENTATIVE: <u>Cindy Levaas</u> | WELL NO: <u>RF-MW04</u> DRILLING METHOD: <u>Hollow Stem Auger</u> INSTALLATION DATE: <u>03-JUN-02</u> NORTHING: <u>1174360.65</u> EASTING: <u>607894.02</u> HORIZONTAL SURVEY DATUM: <u>NAD83</u> VERTICAL SURVEY DATUM: <u>NAVD88</u> JOB NO: <u>796887</u> |
|--|---|



MONITORING WELL INSTALLATION DETAIL

PROJECT: Fort McClellan
LOCATION: Anniston, AL
CLIENT: USACE Mobile District
CONTRACTOR: Miller Drilling Company
DRILLER: Al Davis
IT FIELD REPRESENTATIVE: Adam Day

WELL NO: RF-MW05
DRILLING METHOD: Air Rotary
INSTALLATION DATE: 11-JUL-02
NORTHING: 1175304.31
EASTING: 607769.39
HORIZONTAL SURVEY DATUM: NAD83
VERTICAL SURVEY DATUM: NAVD88
JOB NO: 796887

GROUND SURFACE ELEVATION* 552.75

TOP of WELL CASING or RISER PIPE
EL* 554.85 STICKUP 2.1

SURFACE SEAL
 TYPE of SURFACE SEAL MINIMUM THICKNESS
 Concrete 4 inches

APPROXIMATE DIAMETER of BOREHOLE (inches) 12

ANNULAR SPACE SEAL TYPE

Grout
Grout

SURFACE CASING
 BOTTOM of SURFACE CASING
 MATERIAL INSIDE DIAMETER EL* DEPTH
 Steel 8 523.75 29

APPROXIMATE DIAMETER of BOREHOLE (inches) 8

CASING
 TYPE of RISER MATERIAL INSIDE DIAMETER of RISER (inches)
 (Flush Threaded)
 PVC SCH 80 4

TOP OF SEAL
 SEAL MATERIAL SEAL START DEPTH
 Bentonite 19
 Sand No 0 59

SCREEN
 TYPE of SCREEN MATERIAL SLOT SIZE (inches) INSIDE DIAMETER (inches)
 PVC SCH 80 0.010 4

FILTER PACK
 TYPE of SAND PACK AROUND SCREEN TOP OF SAND PACK
 Sand No 1 64

TOP OF SCREENED INTERVAL
EL* 486.2 DEPTH 66.55

BOTTOM of SCREENED INTERVAL
EL* 461.2 DEPTH 91.55

BOTTOM of SUMP and WELL
EL* 460.85 DEPTH 91.9

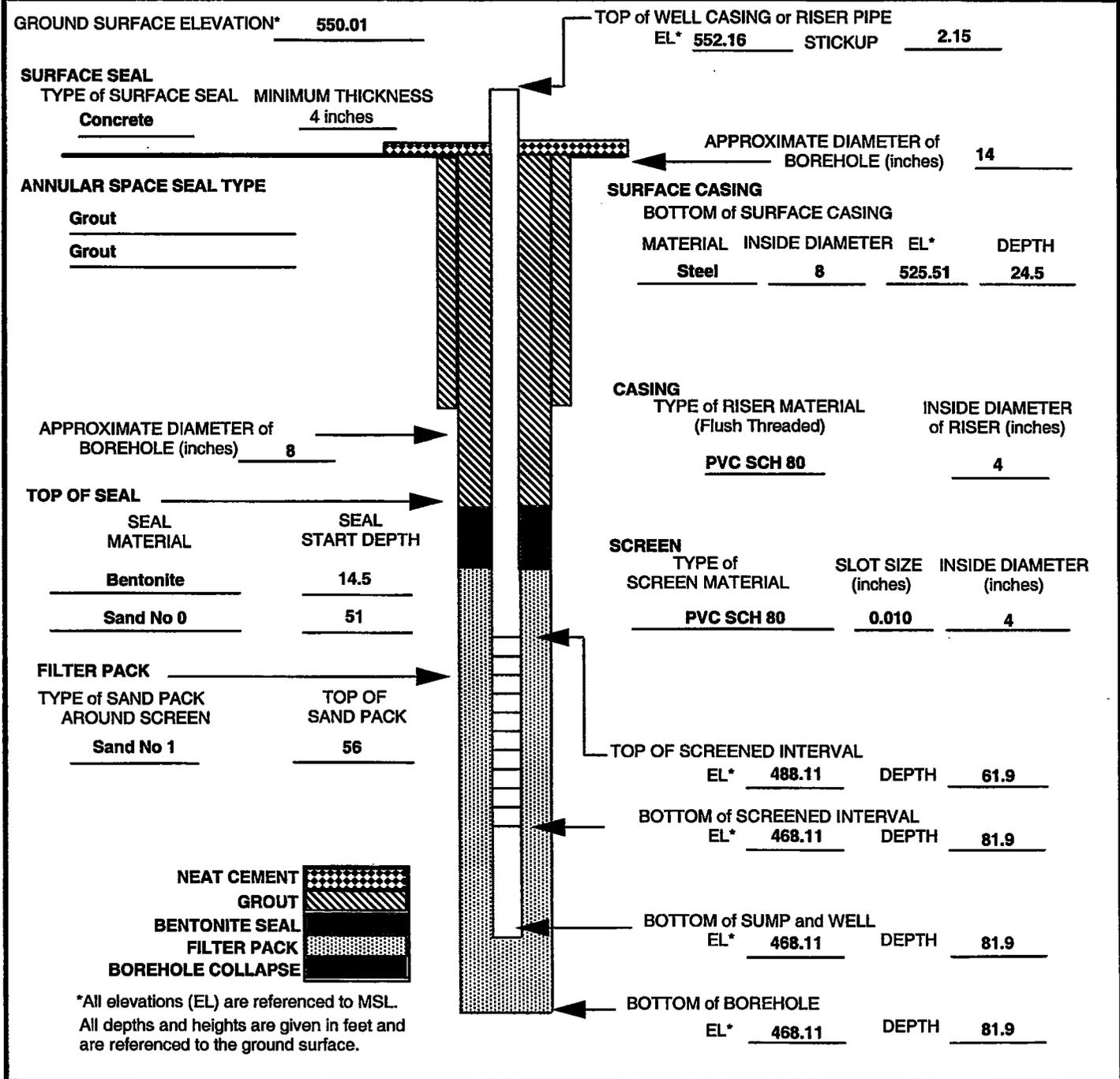


*All elevations (EL) are referenced to MSL.
 All depths and heights are given in feet and are referenced to the ground surface.

BOTTOM of BOREHOLE
EL* 460.85 DEPTH 91.9

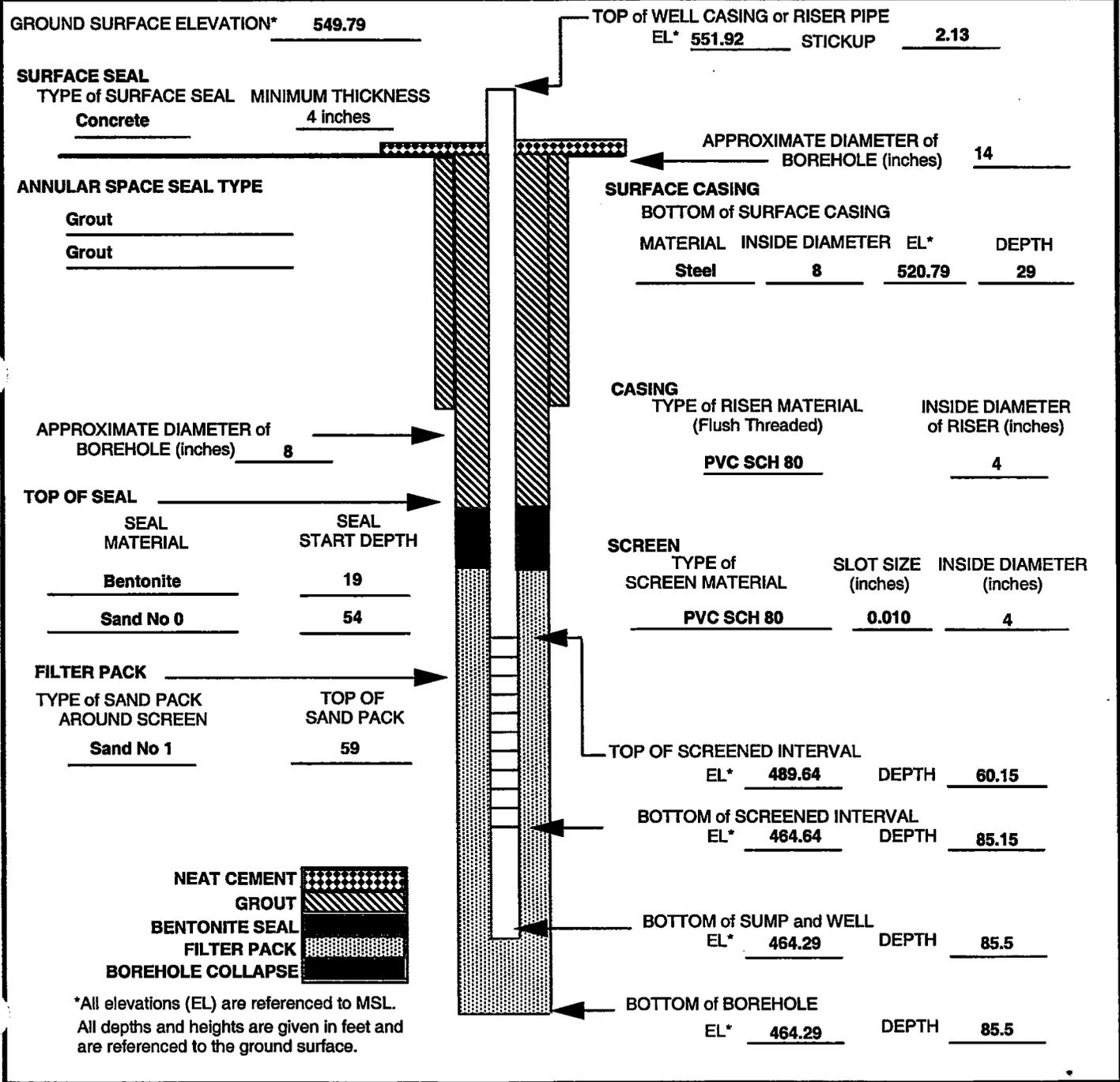
MONITORING WELL INSTALLATION DETAIL

| | |
|---|--|
| PROJECT: <u>Fort McClellan</u> LOCATION: <u>Anniston, AL</u> CLIENT: <u>USACE Mobile District</u> CONTRACTOR: <u>Miller Drilling Company</u> DRILLER: <u>Al Davis</u> IT FIELD REPRESENTATIVE: <u>Adam Day</u> | WELL NO: <u>RF-MW06</u> DRILLING METHOD: <u>Air Rotary</u> INSTALLATION DATE: <u>02-JUL-02</u> NORTHING: <u>1175161.46</u> EASTING: <u>607745.86</u> HORIZONTAL SURVEY DATUM: <u>NAD83</u> VERTICAL SURVEY DATUM: <u>NAVD88</u> JOB NO: <u>796887</u> |
|---|--|



MONITORING WELL INSTALLATION DETAIL

| | |
|---|---|
| PROJECT: <u>Fort McClellan</u> LOCATION: <u>Anniston, AL</u> CLIENT: <u>USACE Mobile District</u> CONTRACTOR: <u>Miller Drilling Company</u> DRILLER: <u>Al Davis</u> IT FIELD REPRESENTATIVE: <u>Adam Day</u> | WELL NO: <u>RF-MW07</u> DRILLING METHOD: <u>Air Rotary</u> INSTALLATION DATE: <u>02-JUL-02</u> NORTHING: <u>1175173.97</u> EASTING: <u>607824.7</u> HORIZONTAL SURVEY DATUM: <u>NAD83</u> VERTICAL SURVEY DATUM: <u>NAVD88</u> JOB NO: <u>796887</u> |
|---|---|



APPENDIX B

**SAMPLE COLLECTION LOGS AND
ANALYSIS REQUEST/CHAIN OF CUSTODY FORMS**

SAMPLE COLLECTION LOGS

Sample Collection Log

Project: 796887 Fort McClellan
Manager: Jeanne Yacoub

RFA / COC Number: RF-073102-EMAX

Location Code: RF-MW04

Collection Date: 07/30/02

Sample Number: HV3005

Collection Time: 1050

Sample Name: RF-MW04-GW-HV3005-REG

Start Depth: 10'

Sampling Method: SP *PP*

End Depth: 20'

Sample Type: GW

Sample Purpose: REG

Sample Matrix: WATER

Sample Team: JA-JC

QC Partners:

(TB) NA (ER) 000202-ER (FB) NA

ERPIMS Values:

Sacode: _____

Lot Control#: _____

Containers

Analytical Suite Flt Frtn Qty Size Units Type

| | | | | | | |
|--------------|---|---|---|---|---|------|
| GAMMA SCAN | N | A | I | I | L | HDPE |
| STRONTIUM-90 | N | A | I | I | L | HDPE |

Comments: FD has been moved from RF-MW03 to RF-MW04

Sketch Location:

07/30/02

Logged BY / Date: *[Signature]*

Reviewed BY / Date: *[Signature]*

7/30/02



Sample Collection Log

Project: 796887 Fort McClellan
Manager: Jeanne Yacoub

Location Code: RF-MW04

Sample Number: HV3005

.1g/

PURGE RECORD:

| Initial | Time(24hr) | DepthtoWater (ft) | Eh (mV) | pH (SU) | Conductivity (mS/cm) | Turbidity (NTU) | DissOxygen (ppm) | Temperature (C) | Purge Volume (gal) |
|------------|------------|----------------------|------------|------------|-------------------------|--------------------|--------------------------------|--------------------|-----------------------|
| <i>SHC</i> | 0915 | 3.94 | -65 | 6.44 | .433 | 78.3 | 3.20 | 21.35 | 1.5 |
| | 0945 | 6.19 | -150 | 7.00 | .431 | 14.4 | 0.47 | 21.23 | 3 |
| | 1015 | 6.40 | -160 | 7.04 | .434 | 6.2 | 0.39 | 21.21 | 6 |
| | 1035 | 6.44 | -159 | 6.96 | .433 | 5.5 | 0.85 | 21.32 | 8 |
| | 1040 | 6.42 | -160 | 6.96 | .433 | 5.1 | 0.73 | 21.26 | 8.5 |
| | 1045 | 6.41 | -160 | 6.95 | .435 | 5.0 | 0.69 | 21.31 | 9 |
| Sample: | 1050 | 6.42 | -160 | 6.96 | .435 | 5.3 | 0.67 | 21.40 | 9.5 |

TD 22.28
DTW - 3.94

$18.34 \times .163 = 2.99$

$2.99 \times 3 = 9$
 $2.99 \times 5 = 15$

Saman - Strontium - 90 PH < 2
P.D - 0.0 Well head 3.1

07/30/02

Logged BY / Date:

Jeanne Yacoub

Reviewed BY / Date:

Jeanne Yacoub 7/30/02

Sample Collection Log

Project: 796887 Fort McClellan
Manager: Jeanne Yacoub

RFA / COC Number: RF-073102-EMAX

Location Code: ~~RF-MW03~~ MW04

Collection Date: 07/30/02

Sample Number: HV3004⁰⁴

Collection Time: 1050

Sample Name: ~~RF-MW03~~-GW-HV3004-FD

Start Depth: 10'

Sampling Method: ~~SP~~ PP

End Depth: 20'

Sample Type: GW

Sample Purpose: FD

Sample Matrix: WATER

Sample Team: JA - JC

QC Partners:

(TB) NA (ER) 090202-ER2 (FB) NA

ERPIMS Values:

Sacode: _____

Lot Control#: _____

| Analytical Suite | Containers | | | Flt | Frtn | Qty | Size | Units | Type |
|------------------|------------|---|---|-----|------|-----|------|-------|------|
| GAMMA SCAN | N | A | I | I | L | | | | HDPE |
| STRONTIUM-90 | N | A | I | I | L | | | | HDPE |

Comments: FD. Has been moved from RF-MW03 to RF-MW04

Sketch Location:

Logged BY / Date: [Signature]

Reviewed BY / Date: [Signature] 7/30/02



Sample Collection Log

Project: 796887 Fort McClellan
Manager: Jeanne Yacoub

RFA / COC Number: ^{RF} ~~202-073102-EMAX~~ ^{K.A. 7/30/02} ^{K.A. 7/30/02} ^{7/30/02}

Location Code: RF-MW05

Collection Date: 07/30/02

Sample Number: HV3006

Collection Time: 1255

Sample Name: RF-MW05-GW-HV3006-REG

Start Depth: ~~60.15~~ 66.55'

Sampling Method: ~~SP~~ BP

End Depth: ~~85.45~~ 91.55'

Sample Type: GW

Sample Purpose: REG

Sample Matrix: WATER

Sample Team: J.A. - J.C.

QC Partners:

(TB) NA (ER) 00202-EK (FB) NA

ERPIMS Values:

Sacode: _____

Lot Control#: _____

Containers

Analytical Suite Flt Frtn Qty Size Units Type

| | | | | | | |
|--------------|---|---|---|---|---|------|
| GAMMA SCAN | N | A | 1 | 1 | L | HDPE |
| STRONTIUM-90 | N | A | 1 | 1 | L | HDPE |

Comments:

Sketch Location:

07/30/02

Logged BY / Date:

Jeanne Yacoub

Reviewed BY / Date:

Kurt Hoff 7/30/02

Sample Collection Log

Project: 796887 Fort McClellan
Manager: Jeanne Yacoub

Location Code: RF-MW05

Sample Number: HV3006

| PURGE RECORD: | | | | | | | | | |
|----------------------|---------------------|---------|---------|----------------------|-----------------|-------------------|-----------------|--------------------|---------|
| Initial Time(24hr) | Depth to Water (ft) | Eh (mV) | pH (SU) | Conductivity (mS/cm) | Turbidity (NTU) | Diss Oxygen (ppm) | Temperature (C) | Purge Volume (gal) | |
| 07/29-025 | | | | | | | | | |
| 11 20 | 31.06 | 196 | 6.53 | .401 | 4.0 | 8.38 | 22.28 | — | .35 gal |
| 12 20 | 32.47 | 193 | 6.97 | .424 | 4.2 | 7.53 | 20.72 | 21 gal | .5 gal |
| 13 20 | 32.46 | 188 | 7.02 | .421 | 4.5 | 7.77 | 21.09 | 51 | |
| 14 20 | 32.55 | 192 | 7.05 | .415 | 4.3 | 7.78 | 21.0 | 81 | |
| 15 20 | 32.61 | 190 | 6.99 | .419 | 4.3 | 7.80 | 21.62 | 111 | |
| 07/30/02 | | | | | | | | | |
| 12 10 | 31.08 | 117 | 7.23 | .462 | 4.7 | 9.53 | 22.61 | 111 gal | .35 gal |
| 12 25 | 32.31 | 123 | 7.07 | .427 | 4.4 | 7.23 | 20.55 | 116.25 | |
| 12 40 | 32.42 | 121 | 7.02 | .427 | 3.8 | 6.14 | 21.13 | 121.5 | |
| 12 45 | 32.42 | 124 | 7.02 | .429 | 3.6 | 6.33 | 20.91 | 123.25 | |
| 12 50 | 32.42 | 122 | 7.02 | .429 | 4.1 | 6.24 | 21.20 | 125 | |
| Sample: | 1255 | 32.42 | 122 | 7.01 | .429 | 3.7 | 6.19 | 21.32 | 126.75 |

TD - 94.13

PID - 0.0

D_{1w} - 31.06

SAMMA - Stronair - 90 - PH 42

$$63.07 \times .653 = 41.2$$

$$41.2 \times 3 = 123.6$$

$$41.2 \times 5 = 206$$

Logged BY / Date:

Jane D. Cunningham

Reviewed BY / Date:

7/30/02
[Signature] 7/30/02



Sample Collection Log

Project: 796887 Fort McClellan
Manager: Jeanne Yacoub

RFA / COC Number: RF-080502-96NC

Location Code: RF-MW06

Collection Date: 08/02/02

Sample Number: HV3007

Collection Time: 1205

Sample Name: RF-MW06-GW-HV3007-REG

Start Depth: 61.55

Sampling Method: ~~SP~~ BP

End Depth: 81.55

Sample Type: GW

Sample Purpose: REG

Sample Matrix: WATER

Sample Team: RB-JC

QC Partners:

(TB) N/A (ER) 080202-ER (FB) N/A

ERPIMS Values:

Sacode: _____

Lot Control#: _____

| Analytical Suite | Containers | | | | Units | Type |
|------------------|------------|------|-----|------|-------|------|
| | Flt | Frtn | Qty | Size | | |
| GAMMA SCAN | N | A | 1 | 1 | L | HDPE |
| STRONTIUM-90 | N | A | 1 | 1 | L | HDPE |

Comments:

Sketch Location:

Logged BY / Date: Jeanne Yacoub

08-01-02/08-02-02
Reviewed BY / Date: [Signature] 8/2/02

Sample Collection Log

Project: 796887 Fort McClellan
Manager: Jeanne Yacoub

Location Code: RF-MW06

Sample Number: HV3007

PURGE RECORD:

| Initial Time(24hr) | Depth to Water (ft) | Eh (mV) | pH (SU) | Conductivity (mS/cm) | Turbidity (NTU) | DissOxygen (ppm) | Temperature (C) | Purge Volume (gal) |
|--------------------|---------------------|---------|---------|----------------------|-----------------|------------------|-----------------|--------------------|
| 08/01/02 | | | | | | | | |
| 1540 | 27.70 | 108 | 7.04 | 200.458 | 11.2 | 9.06 | 24.86 | 5 ml |
| 1640 | 44.21 | 110 | 7.08 | .469 | 13.9 | 8.31 | 24.19 | 30 |
| 08/02/02 | | | | | | | | |
| 0940 | 27.78 | 90 | 6.48 | .468 | 6.2 | 9.73 | 21.42 | 30g - .5g |
| 1040 | 32.25 | 86 | 7.18 | .490 | 6.3 | 7.23 | 22.56 | 60 - .6g |
| 1145 | 37.09 | 95 | 7.29 | .481 | 9.8 | 8.47 | 21.36 | 96.99 gal |
| 1150 | 37.16 | 90 | 7.27 | .485 | 7.1 | 8.21 | 21.71 | 102 |
| 1155 | 37.21 | 89 | 7.27 | .487 | 6.9 | 8.16 | 22.0 | 105 |
| 1200 | 37.36 | 90 | 7.26 | .489 | 7.5 | 8.24 | 22.13 | 108 |
| Sample: 1205 | 37.51 | 88 | 7.28 | .486 | 8.1 | 8.21 | 21.99 | 111 |

TD - 83.91

PID - 0.0

Dtw - 27.70

Lamma - Strontium 90 - pH < 2

$$56.21 \times .65^3 = 36.71$$

$$36.71 \times 3 = 110.12$$

$$36.71 \times 5 = 183.53$$

Logged BY / Date:

Reviewed BY / Date:

8/5/02



Sample Collection Log

Project: 796887 Fort McClellan
Manager: Jeanne Yacoub

RFA / COC Number: RF-080502-EMAD

Location Code: RF-MW07

Collection Date: 08-02-02

Sample Number: HV3008

Collection Time: 1230

Sample Name: RF-MW07-GW-HV3008-REG

Start Depth: 60.15

Sampling Method: SP BP purge Bailed Well

End Depth: 85.15

Sample Type: GW

Sample Purpose: REG

Sample Matrix: WATER

Sample Team: RG-JC

QC Partners:

(TB) NA (ER) 080202-ER (FB) NA

ERPIMS Values:

Sacode: _____

Lot Control#: _____

| Analytical Suite | Containers | | | | Units | Type |
|------------------|------------|------|-----|------|-------|------|
| | Flt | Frtn | Qty | Size | | |
| GAMMA SCAN | N | A | 1 | L | L | HDPE |
| STRONTIUM-90 | N | A | 1 | L | L | HDPE |

Comments: _____

Sketch Location:

Logged BY / Date: [Signature]

08-01-02 / 08-02-02
Reviewed BY / Date: [Signature] 8/5/02



Sample Collection Log

Project: 796887 Fort McClellan
Manager: Jeanne Yacoub

Location Code: RF-MW07
Sample Number: HV3008

PURGE RECORD:

| Initial Time(24hr) | Depth to Water (ft) | Eh (mV) | pH (SU) | Conductivity (mS/cm) | Turbidity (NTU) | Diss Oxygen (ppm) | Temperature (C) | Purge Volume (gal) |
|--------------------|---------------------|----------------|---------|----------------------|-----------------|-------------------|-----------------|--------------------|
| 08/01/02 1200 | 66.06 | 151 | 6.88 | .466 | 415 | 8.31 | 25.36 | — .18 gal |
| 1300 | 70.54 | 152 | 6.77 | .466 | 25.8 | 6.48 | 22.57 | 10.8 |
| 1400 | 74.82 | 150 | 6.94 | .499 | 122.0 | 8.52 | 29.62 | 21.6 |
| 1500 | 80.98 | 147 | 6.98 | .483 | 69.1 | 5.76 | 26.15 | 33.4 |
| 1530 | Well | went | Dry! | — | — | — | — | 38.8 |
| 08/02/02 1230 | 82.09 | Bailing sample | | | | | | |
| 1230 | 82.09 | 139 | 7.23 | .505 | 111 | 9.06 | 21.70 | |
| Sample: | 1230 | 82.09 | 139 | 7.23 | .505 | 111 | 9.06 | 21.70 |

TD 84.08

P10 - 0.0

DW - 66.06

$18.02 \times 1.653 = 11.8$

$11.8 \times 3 = 35.3$

$11.8 \times 5 = 59$

LAMMA - Strontium 90 - pH < 2

Logged BY / Date:

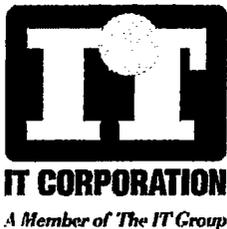
[Signature]

08-01-02 / 08/02-02

Reviewed BY / Date:

[Signature] 8/5/02

ANALYSIS REQUEST/CHAIN OF CUSTODY FORMS



ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

711 024008
Reference Document No: RF-073102-EMAX

Page 1 of 1

Project Number: 796887

Samples Shipment Date: 31 JUL 2002

Bill To: Duane Nielsen

Project Name: Fort McClellan

Lab Destination: EMAX Laboratories, Inc.

312 Directors Drive

Knoxville

TN 37923

Sample Coordinator: Oliver Allen

Lab Contact: Elizabeth McIntyre

Report To: Duane Nielsen

Turnaround Time: *Normal*

Project Contact: Tim Roth

312 Directors Drive

Knoxville

TN 37923

Carrier/Waybill No.: UPS/

| | |
|---|---|
| Special Instructions: None | |
| Possible Hazard Identification: Non-hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> | Sample Disposal: Return to Client <input type="checkbox"/> Disposal by Lab <input checked="" type="checkbox"/> Archive (mos.) |
| 1. Relinquished By (Signature/Affiliation) <i>[Signature]</i> | 1. Received By (Signature/Affiliation) <i>[Signature]</i> |
| Date: 7/31/02 Time: 1400 | Date: 8-01-02 Time: 10:00 AM |
| 2. Relinquished By (Signature/Affiliation) | 2. Received By (Signature/Affiliation) |
| Date: Time: | Date: Time: |
| 3. Relinquished By (Signature/Affiliation) | 3. Received By (Signature/Affiliation) |
| Date: Time: | Date: Time: |
| Comments: None <div style="text-align: right; font-size: 2em; font-family: cursive;">T=3.5°C</div> | |

| Sample No | Sample Name | Sample Date | Sample Time | Container | Ctr Qty | Preservative | Requested Testing Program | FII | CID | Condition On Receipt |
|-----------|-----------------------|-------------|-------------|-----------|---------|--------------|--|-----|-----|----------------------|
| HV3004 | RF-MW04-GW-HV3004-FD | 30 JUL 2002 | 10:50 | 1 L HDPE | 1 | HNO3<pH 2 | Full Gamma Scan including Co-60 and Cs-137 by EPA 901.1, Strontium-90 by EPA 905.0 | N | | |
| HV3005 | RF-MW04-GW-HV3005-REG | 30 JUL 2002 | 10:50 | 1 L HDPE | 1 | HNO3<pH 2 | Full Gamma Scan including Co-60 and Cs-137 by EPA 901.1, Strontium-90 by EPA 905.0 | N | | |
| HV3006 | RF-MW05-GW-HV3006-REG | 30 JUL 2002 | 12:55 | 1 L HDPE | 1 | HNO3<pH 2 | Full Gamma Scan including Co-60 and Cs-137 by EPA 901.1, Strontium-90 by EPA 905.0 | N | | |

2
21001



IT CORPORATION

A Member of The IT Group

0208030

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference Document No: RF-080502-PGNC

Page 1 of 1

Project Number: 796887

Samples Shipment Date: 05 AUG 2002

Bill To: Duane Nielsen

Project Name: Fort McClellan

Lab Destination: Paragon Analytics, Inc

312 Directors Drive

Knoxville

TN 37923

Sample Coordinator: Oliver Allen

Lab Contact: Debbie Fazio

Report To: Duane Nielsen

312 Directors Drive

Knoxville

TN 37923

Turnaround Time: *Normal*

Project Contact: Tim Roth

Carrier/Waybill No.: UPS/

| | |
|--|--|
| Special Instructions: None | |
| Possible Hazard Identification: Non-hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> | Sample Disposal: Return to Client <input type="checkbox"/> Disposal by Lab <input checked="" type="checkbox"/> Archive (mos.) |
| 1. Relinquished By (Signature/Affiliation) <i>[Signature]</i> IT Corp. Date: 8/5/02 Time: 1500 | 1. Received By (Signature/Affiliation) <i>[Signature]</i> (Paragon) Date: 8/6/02 Time: 0930 |
| 2. Relinquished By (Signature/Affiliation) | 2. Received By (Signature/Affiliation) |
| 3. Relinquished By (Signature/Affiliation) | 3. Received By (Signature/Affiliation) |
| Comments: None | |

| Sample No | Sample Name | Sample Date | Sample Time | Container | Ctr Qty | Preservative | Requested Testing Program | File CID | Condition On Receipt |
|-------------|-------------------------|-------------|-------------|-----------|---------|--------------|--|----------|----------------------|
| ① 080202-ER | FIELDQC-BW-080202-ER-ER | 02 AUG 2002 | 08:00 | 1 L HDPE | 1 | HNO3<pH 2 | Full Gamma Scan including Co-60 and Cs-137 by EPA 901.1, Strontium-90 by EPA 905.0 | N | |
| ② HV3007 | RF-MW06-GW-HV3007-REG | 02 AUG 2002 | 12:05 | 1 L HDPE | 1 | HNO3<pH 2 | Full Gamma Scan including Co-60 and Cs-137 by EPA 901.1, Strontium-90 by EPA 905.0 | N | |
| ③ HV3008 | RF-MW07-GW-HV3008-REG | 02 AUG 2002 | 12:30 | 1 L HDPE | 1 | HNO3<pH 2 | Full Gamma Scan including Co-60 and Cs-137 by EPA 901.1, Strontium-90 by EPA 905.0 | N | |

1002

APPENDIX C
WELL DEVELOPMENT LOGS

Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 796887
 Form Completed by: Lee FLIPPEN
 Well Developed by (person/firm): Lee FLIPPEN/The Shaw

Parcel No.: RF202
 Well No.: MW04
 Date started: 7-11-02

Monitoring Well Information

Development Method: Surge + Purge
 Development Equipment: whale pumps, Heriba U-22, Aquafast II, Heron water indicator
 Casing Diameter: 2" .163

Beginning Measurements
 Depth to Water (ft): 3.74' TOC
 Total depth of Well (ft): 21.25 TOC

7-11-02 PID Malfunction, screen 10'-20'

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) (Purge Rate, Pump Position, Misc.) |
|-----------|--------------------|------------------------|----------------|----------------------|-----------------|-------------------------|------------------|-----------------|---|
| 11:30 | 0 | 31.25 21.02 | 7.26 | .437 | 999+ | 9.97 | 22.29 | BLACK | - Surged well screen - Depth 21 ft, Purge Rate 1.0 gpm |
| 11:45 | 15.0 | 20.11 | 7.39 | .410 | 999+ | 6.69 | 22.05 | BLACK | Depth 21 ft., PR .25 gpm |
| 12:00 | 18.75 | 9.50 | 7.42 | .410 | 999+ | 4.98 | 21.70 | GRAY | Depth 21 ft., PR .25 gpm |
| 12:15 | 22.5 | 9.87 | 7.39 | .406 | 999+ | 5.32 | 21.01 | GRAY | Depth 21 ft., PR .25 gpm |
| 12:30 | 26.25 | 9.89 | 7.51 | .408 | 999+ | 5.36 | 21.29 | GRAY | Depth 21 ft., PR .25 gpm |
| 12:45 | 30.0 | 9.81 | 7.34 | .406 | 999+ | 3.78 | 21.86 | GRAY | Depth 21 ft., PR .25 gpm |
| 13:00 | 33.75 | 8.62 | 7.37 | .403 | 999+ | 5.20 | 22.31 | GRAY | Depth 21 ft., PR .25 gpm |

$$TD - DTW = WC \times \frac{2'}{4'} \text{ well} = \text{One PV} \times 5 = \text{Min PV} + \text{H}_2\text{O to install well} = \text{Minimum H}_2\text{O to remove}$$

$$21.25 - 3.74 = 17.51 \times .163 = 2.85 \times 5 = 14.25 + 10 \text{ g} = 24.25 \text{ g}$$

Parcel No.: RF 202
 Well ID: MW 04
 Date: 7-11-02

7-11-02 PID = Malfunction. ADAM DAY / Lee FLIPPEN

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) |
|--------------|--------------------------|---------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|---|
| 13:15 | 37.5 | 8.58 | 7.38 | .411 | 654 | 5.02 | 22.28 | GRAY | Depth 21', Purge Rate .25 gpm |
| 13:30 | 41.25 | 8.54 | 7.32 | .412 | 394 | 4.01 | 21.22 | GRAY | Depth 21', P.R. .25 gpm |
| 13:45 | 45.0 | 8.51 | 7.52 | .406 | 445 | 7.01 | 20.54 | GRAY | Depth 21', P.R. .25 gpm |
| 14:00 | 48.75 | 11.25 | 7.34 | .408 | 441 | 3.78 | 20.16 | GRAYISH | Depth 21' P.R. .25 gpm |
| 14:15 | 52.5 | 11.64 | 7.35 | .411 | 402 | 3.71 | 19.80 | GRAYISH | Depth 21' P.R. .25 gpm |
| 14:30 | 56.25 | 11.78 | 7.35 | .407 | 268 | 3.74 | 19.84 | GRAYISH | Depth 21', P.R. .25 gpm |
| 14:45 | 60.0 | 11.98 | 7.39 | .416 | 72.4 | 4.01 | 19.64 | CLOUDY | Depth 21', P.R. .25 gpm |
| 15:00 | 63.75 | 10.68 | 7.35 | .399 | 112 | 6.35 | 19.93 | CLOUDY | Depth 21', P.R. .25 gpm |
| 15:15 | 67.5 | 10.03 | 7.36 | .409 | 131 | 6.02 | 20.01 | CLOUDY | Depth 21', P.R. .25 gpm |
| 15:30 | 71.25 | 9.89 | 7.34 | .466 | 132 | 6.36 | 20.20 | CLOUDY | Depth 21', P.R. .25 gpm |
| 15:45 | 75.0 | 9.81 | 7.39 | .404 | 102 | 7.73 | 20.60 | CLOUDY | Depth 21', P.R. .25 gpm |
| 16:00 | 78.75 | 9.48 | 7.31 | .408 | 41.5 | 4.93 | 20.82 | CLOUDY | stopped parameters - see log 7-11-02 |
| 09:25 | 78.75 | 3.78 | 6.71 | .415 | 999 ⁺ | 4.24 | 19.47 | GRAY | 7-12-02 Depth 10'+12', P.R. .25 gpm |
| 09:40 | 82.5 | 10.38 | 7.25 | .406 | 999 ⁺ | 4.44 | 19.40 | GRAY | Depth 14'+16', P.R. .25 gpm |

Parcel No.: RF 202
 Well ID: MW04
 Date: 7-12-02

7-12-02 PID 0.0 DTW 3.78

Lee FLIPPEN

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) |
|--------------|--------------------------|---------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|---|
| 09:55 | 86.25 | 9.68 | 7.27 | .408 | 672 | 5.01 | 20.48 | grayish | Depth 18', 20' PR. 25 gpm |
| 10:10 | 90.0 | 9.93 | 7.35 | .410 | 694 | 6.95 | 20.51 | " | Depth 20', PR. 25 gpm |
| 10:25 | 93.75 | 9.78 | 7.39 | .413 | 315 | 8.89 | 20.04 | " | " " |
| 10:40 | 97.5 | 9.87 | 7.37 | .412 | 400 | 8.15 | 20.48 | " | " " |
| 10:55 | 101.25 | 9.68 | 7.37 | .414 | 201 | 8.47 | 20.67 | Cloudy | Depth 20', PR. 29 gpm |
| 11:10 | 104.25 | 9.65 | 7.37 | .407 | 129 | 8.45 | 20.52 | cloudy | " " |
| 11:25 | 107.25 | 10.38 | 7.39 | .418 | 51.8 | 4.12 | 20.75 | cloudy | " " |
| 11:40 | 110.25 | 10.27 | 7.37 | .412 | 77 | 4.38 | 20.80 | cloudy | " " |
| 11:55 | 113.25 | 9.31 | 7.39 | .417 | 43 | 5.04 | 21.29 | cloudy | " " |
| 12:10 | 116.25 | 9.48 | 7.38 | .418 | 40 | 3.12 | 20.87 | cloudy | " " |
| 12:25 | 119.25 | 9.13 | 7.50 | .415 | 28 | 5.12 | 21.53 | cloudy | " " |
| 12:40 | 122.25 | 9.91 | 7.50 | .415 | 13.5 | 5.85 | 21.74 | clear | " " |
| 12:55 | 125.25 | 8.88 | 7.40 | .410 | 7.0 | 5.17 | 21.74 | clear | Completed 8 hours of well Development Time. Took 1 L. H2O Photo Sample @ 12:55 7-12-02 |
| \ | \ | \ | \ | \ | \ | \ | \ | \ | |

5 hrs

6 hrs

2 hrs

Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 796887
 Form Completed by: Lee FLIPPEN
 Well Developed by (person/firm): Lee FLIPPEN / The Shaw E+I

Parcel No.: RF 202
 Well No.: MW05
 Date started: 7-15-02

Monitoring Well Information

Development Method: Surge + Purge
 Development Equipment: Grundfos Pump
Horiba U-22, Aqualast II, Hydron water indicator
 Casing Diameter: 4" (.653)

Beginning Measurements
 Depth to Water (ft): 31.31' TOC UNCUT
 Total depth of Well (ft): 94.5' TOC UNCUT

PID 0.0 screen 66.5' - 91.5'

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) (Purge Rate, Pump Position, Misc.) |
|--------------|--------------------------|------------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|---|
| 10:45 | 0 | 31.31 | 6.61 | .482 | 624 | 5.94 | 19.74 | Brownish | -surged well screen- Depth 94', Purge Rate 1.25 gpm |
| 11:00 | 18.75 | 41.60 | 6.99 | .423 | 36.5 | 4.97 | 18.97 | " | " " |
| 11:15 | 37.5 | 44.72 | 7.18 | .387 | 214 | 5.93 | 19.37 | " | " PR 1.0 gpm |
| 11:30 | 52.5 | 45.90 | 7.42 | .381 | 47 | 6.93 | 19.57 | cloudy | Depth 94', PR 1.0 gpm |
| 11:45 | 67.5 | 46.20 | 7.39 | .374 | 42 | 6.80 | 19.35 | cloudy | " " |
| 12:00 | 82.5 | 46.55 | 7.38 | .371 | 36 | 7.02 | 19.36 | clear | " " |
| 12:15 | 97.5 | 46.73 | 7.48 | .373 | 28 | 6.82 | 19.74 | clear | Depth 94', PR 1.1 gpm |

$$\text{TD} - \text{DTW} = \text{WC} \times 2\frac{1}{4}' \text{ well} = \text{One PV} \times 5 = \text{Min PV} + \text{H}_2\text{O to install well} = \text{Minimum H}_2\text{O to remove}$$

$$94.5 - 31.31 = 63.19 \times .653 = 41.26 \times 5 = 206.3 + 270g = 476.3g$$

OC'd
 [Signature]
 7/18/02

Parcel No.: RF202
 Well ID: MW05
 Date: 7-15-02

Lee FLIPPEN

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) |
|------------------|--------------------------|---------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|--|
| 12:30 | 113.5 | 39.48 | 7.42 | .376 | 171 | 6.50 | 20.72 | cloudy | -Generator ran out of GAS - Restarted, Depth 94', PR 1.19 gpm |
| 12:45 | 130.0 | 46.40 | 7.50 | .379 | 11.8 | 7.66 | 19.67 | clear | Depth 94', PR 1.19 gpm |
| 13:00 | 146.5 | 46.62 | 7.50 | .368 | 9.5 | 7.13 | 19.65 | clear | " " |
| 13:15 | 163.0 | 46.71 | 7.52 | .376 | 6.3 | 7.82 | 19.66 | clear | " " |
| 13:30 | 179.5 | 46.83 | 7.52 | .371 | 1.3 | 7.99 | 19.34 | clear | -stopped parameters to drain Tank Lee Flippen 7-15-02 |
| 14:55 | 179.5 | 31.53 | 7.59 | .383 | 5.3 | 7.36 | 21.60 | clear | -Restarted Parameters - Depth 94', PR 1.29 gpm |
| 15:10 | 197.5 | 42.53 | 7.58 | .378 | 8.3 | 7.27 | 19.47 | clear | " " |
| 15:25 | 215.5 | 47.08 | 7.64 | .378 | 8.5 | 7.91 | 19.90 | clear | " " |
| 15:40 | 233.5 | 47.27 | 7.55 | .369 | 6.4 | 7.03 | 19.77 | clear | " " |
| 15:55 | 251.5 | 47.25 | 7.47 | .370 | 6.2 | 6.84 | 19.48 | clear | " " |
| 16:10 | 269.5 | 47.29 | 7.53 | .378 | 11.0 | 7.37 | 19.39 | clear | -stopped parameters - Lee Flippen 7-15-02 |
| 7-16-02 09:00 | 269.5 | 31.41 | 6.67 | .460 | 116 | 7.86 | 19.30 | cloudy | 7-16-02 Depth 94', PR 1.25 gpm |
| 09:15 | 288.25 | 47.5 | 7.31 | .403 | 14.0 | 7.86 | 19.46 | clear | Depth 92', PR 1.2 gpm |
| 09:30 | 306.25 | 48.13 | 7.27 | .400 | 103 | 6.54 | 19.68 | cloudy | Depth 92', PR 1.2 gpm |

Parcel No.: RF202
 Well ID: MW05
 Date: 7-16-02

Lee FLIPPEN

Reached
Target RV.

7 hrs

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) |
|--------------|--------------------------|---------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|--|
| 09:45 | 324.25 | 48.78 | 7.43 | .407 | 233 | 8.18 | 19.84 | cloudy | Depth 90', P.Rate 1.2 gpm |
| 10:00 | 342.25 | 48.81 | 7.46 | .405 | 85.1 | 7.21 | 19.38 | cloudy | Depth 88', PR 1.2 gpm |
| 10:15 | 360.25 | 48.99 | 7.41 | .401 | 25.1 | 6.81 | 19.34 | clear | Depth 86', PR 1.2 gpm |
| 10:30 | 378.25 | 49.11 | 7.52 | .401 | 21.6 | 7.48 | 19.29 | clear | Depth 84', PR 1.2 gpm |
| 10:45 | 396.25 | 49.19 | 7.47 | .407 | 22.7 | 7.91 | 19.90 | clear | Depth 82', PR 1.2 gpm |
| 11:00 | 414.25 | 49.28 | 7.46 | .417 | 29.8 | 7.28 | 19.70 | clear | Depth 80', PR 1.2 gpm |
| 11:15 | 432.25 | 49.02 | 7.63 | .398 | 23.3 | 8.72 | 22.28 | clear | * - stopped parameters to drain tank - 7-16-02 |
| 12:35 | 432.25 | 31.68 | 7.75 | .415 | 55 | 9.13 | 20.04 | cloudy | - Restarted parameters - Depth 78', PR 1.0 gpm |
| 12:50 | 447.25 | 14.22 | 7.45 | .400 | 3.3 | 7.52 | 19.63 | clear cloudy | Depth 76', 74', PR 1.0 gpm |
| 13:05 | 462.25 | 45.95 | 7.47 | .400 | 2.0 | 7.29 | 19.98 | clear | Depth 72', 70', PR 1.0 gpm |
| 13:20 | 477.25 | 46.28 | 7.43 | .398 | 2.5 | 7.02 | 19.93 | clear | - Reached Target Purge Volume Depth 68, 66', PR 1.0 gpm |
| 13:35 | 492.25 | 46.35 | 7.45 | .401 | 2.7 | 7.01 | 20.01 | clear | Depth 60', PR 1.0 gpm |
| : | : | : | : | : | : | : | : | : | - stabilization accomplished - stopped parameters and collected 1 L H ₂ O Photo Sample - well development completed - Lee Flippen 7-16-02 |

Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 796887
 Form Completed by: MARK SHOEMAKER
 Well Developed by (person/firm): MARK SHOEMAKER /
REGGIE GOINS (SNOW ETI)

Parcel No.: RF202
 Well No.: REF-MW06
 Date started: 7/16/02

7-17-02 Lee FLIPPEN

Monitoring Well Information

-Took over work on well
 From MARK S. + Reggie G.

Development Method: Surge + Purge
 Development Equipment: Grundfos pump, Control Box,
Horiba U-22, Aquafast II, Heron water indicator
 casing Diameter: 4"

Beginning Measurements

Depth to Water (ft): 27.74
 Total depth of Well (ft): 83.90

PID 0.0 Screen 61.5' - 81.5'

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) (Purge Rate, Pump Position, Misc.) |
|--------------|--------------------------|------------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|---|
| 08:05 | 0 | 27.74 | 6.75 | 0.456 | 999 | 9.51 | 21.1 | GRAY | INITIAL READINGS PUMP @ 83.0' FLOW 0.68 GPM |
| 08:20 | 10.2 | 34.60 | 7.01 | 0.396 | 134 | 9.44 | 21.4 | CLOUDY | PUMP @ 83.0' FLOW @ 0.68 GPM |
| 08:35 | 20.4 | 38.70 | 7.22 | 0.420 | 90 | 9.48 | 21.5 | SLIGHTLY CLOUDY | PUMP @ 83.0' FLOW @ 0.68 GPM |
| 08:50 | 30.8 | 44.60 | 7.49 | 0.435 | 33 | 9.52 | 21.6 | CLEAR | PUMP ADJUSTED @ 81.0' FLOW @ 0.68 GPM |
| 09:05 | 40.8 | 46.40 | 7.44 | 0.446 | 22 | 9.64 | 21.6 | CLEAR | PUMP ADJUSTED @ 79.0' FLOW @ 0.68 GPM |
| 09:20 | 51.0 | 46.74 | 7.70 | 0.450 | 19 | 9.46 | 22.3 | CLEAR | PUMP ADJUSTED @ 75.0' FLOW @ 0.68 GPM |
| 09:35 | 61.2 | 47.90 | 7.44 | 0.451 | 11 | 9.71 | 22.5 | CLEAR | PUMP ADJUSTED @ 72.1' FLOW @ 0.68 GPM |

$TD - DTW = WC \times 2' \text{ (4') well} = \text{One PV} \times 5 = \text{Min PV} + H_{20} \text{ to install well} = \text{Minimum } H_{20} \text{ to remove}$

$83.90 - 27.74 = 56.16 \times 0.653 = 36.67 \times 5 = 183.36 + 270 = 454 \text{ gal}$

202
 Lee Flippen
 7/18/02

Parcel No.: RF 202
 Well ID: MWD 6
 Date: 7-16-02

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) |
|--------------|---------------------------|---------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|---|
| 09:50 | 71.4 | 49.70 | 7.47 | 0.463 | 9 | 10.93 | 21.6 | clear | PUMP ADJUSTED TO 70' FLOW @ 0.68 gpm |
| 10:05 | 81.6 | 51.00 | 7.40 | 0.447 | 5.8 | 10.52 | 22.2 | clear | PUMP ADJUSTED TO 67' FLOW @ 0.68 gpm |
| 10:20 | 91.8 | 51.46 | 7.41 | 0.453 | 7.6 | 10.13 | 21.6 | clear | PUMP ADJUSTED TO 63' FLOW @ 0.5 gpm |
| 10:35 | 99.3 | 49.35 | 7.51 | 0.462 | 65 | 10.39 | 23.1 | clear | PUMP ADJUSTED TO 83' FLOW @ 0.5 gpm |
| 10:50 | 106.8 109.5 | 48.60 | 7.57 | 0.464 | 50 | 10.25 | 22.7 | clear | PUMP ADJUSTED TO 83' FLOW @ 0.5 gpm |
| 11:05 | 114.3 | 48.20 | 7.44 | 0.459 | 32 | 10.29 | 22.9 | clear | PUMP @ 83' FLOW @ 0.5 gpm |
| 11:20 | 121.8 | 46.70 | 7.86 | 0.461 | 28 | 6.55 | 22.3 | clear | PUMP @ 83' FLOW @ 0.5 gpm |
| 11:35 | 129.3 | 47.10 | 7.42 | 0.458 | 4.9 | 10.17 | 22.3 | clear | PUMP @ 83' FLOW @ 0.5 gpm |
| 11:50 | 139.5 136.8 | 46.80 | 7.42 | 0.459 | 6.7 | 6.42 | 21.7 | clear | PUMP @ 83' FLOW @ 0.5 gpm |
| 12:05 | 144.3 | 46.20 | 7.39 | 0.458 | 8.3 | 6.03 | 22.9 | clear | PUMP @ 83' FLOW @ 0.5 gpm |
| 12:20 | 151.8 | 46.00 | 7.50 | 0.458 | 7.9 | 6.16 | 21.7 | clear | PUMP @ 83' FLOW @ 0.5 gpm |
| 12:35 | 159.3 | 46.10 | 7.39 | 0.461 | 5.7 | 5.71 | 22.3 | clear | PUMP @ 83' FLOW @ 0.5 gpm |

Parcel No.: RF 202
 Well ID: MW 06
 Date: 7-17-02

- Lee FLIPPEN

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments. (Date if different from start date) |
|------------------|--------------------------|---------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|--|
| 12:50 | 166.8 | 46.25 | 7.42 | 0.464 | 6.8 | 6.50 | 22.1 | clear | pump @ 83' FLOW @ 0.5 gpm |
| 13:05 | 174.3 | 45.90 | 7.38 | 0.464 | 4.2 | 6.26 | 24.1 | clear | PUMP @ 83' FLOW @ 0.5 gpm |
| 13:20 | 181.9 | 45.95 | 7.43 | 0.464 | 5.1 | 6.43 | 23.0 | clear | PUMP @ 83' FLOW @ 0.5 gpm |
| 13:35 | 189.3 | 45.85 | 7.39 | 0.464 | 2.8 | 6.32 | 24.2 | clear | PUMP @ 83' FLOW @ 0.5 gpm |
| 13:50 | 199.5 | 47.77 | 7.44 | 0.462 | 3.5 | 6.31 | 22.5 | clear | PUMP @ 83' FLOW @ 0.68 gpm |
| 14:05 | 209.7 | 49.10 | 7.39 | 0.463 | 0.1 | 6.14 | 22.9 | clear | PUMP @ 83' FLOW @ 0.68 gpm |
| 14:20 | 219.9 | 49.55 | 7.49 | 0.462 | 1.1 | 6.46 | 23.0 | clear | pump @ 83' FLOW @ 0.68 gpm |
| 14:35 | 230.1 | 49.60 | 7.40 | 0.464 | 1.3 | 6.33 | 23.3 | clear | PUMP @ 83' FLOW @ 0.68 gpm |
| 14:50 | 240.3 | 49.60 | 7.49 | 0.463 | 1.0 | 6.90 | 22.8 | clear | pump @ 83' FLOW @ 1.0 gpm |
| 15:05 | 250.3 | 50.30 | 7.34 | 0.459 | 1.1 | 5.76 | 22.3 | clear | PUMP @ 83' FLOW @ 1.0 gpm |
| 15:20 | 270.3 | 56.40 | 7.47 | 0.458 | 1.3 | 6.25 | 22.8 | clear | pump @ 83' FLOW @ 1.0 gpm |
| 7-17-02 09:15 | 270.3 | 27.77 | 6.61 | .499 | 999 ⁺ | 5.52 | 21.00 | Gray | 7-17-02 Depth 83', PR 0.6 gpm |

Parcel No.: RF 202
 Well ID: MW08
 Date: 7-17-02

Screen 61.5' - 81.5'

7-17-02 PID O.O, DTW 27.77 Lee FLIPPEN

8hrs

9hrs

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) |
|--------------|--------------------------|---------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|--|
| 09:30 | 279.3 | 37.20 | 7.28 | .441 | 100 | 7.14 | 21.90 | cloudy | Depth 83', Purge Rate 1.2 gpm |
| 09:45 | 287.3 | 41.73 | 7.31 | .442 | 265 | 7.05 | 20.72 | cloudy | Depth 65', P.R 1.0 gpm |
| 10:00 | 312.3 | 47.03 | 7.39 | .442 | 29 | 7.62 | 20.94 | clear | Depth 83', PR 1.0 gpm |
| 10:15 | 327.3 | 48.44 | 7.41 | .442 | 122 | 6.78 | 21.18 | cloudy | Depth 83', PR 1.0 gpm |
| 10:30 | 342.3 | 52.78 | 7.47 | .452 | 19 | 6.87 | 21.07 | clear | Depth 83', PR 1.0 gpm |
| 10:45 | 357.3 | 58.64 | 7.46 | .448 | 15 | 7.45 | 21.13 | clear | Depth 83', PR 1.0 gpm |
| 11:00 | 372.3 | 60.98 | 7.47 | .450 | 12 | 7.09 | 21.26 | clear | Depth 83', PR .8 gpm |
| 11:15 | 384.3 | 54.18 | 7.43 | .445 | 15 | 6.68 | 21.19 | clear | Depth 83', PR .8 gpm |
| 11:30 | 396.3 | 54.20 | 7.41 | .451 | 10 | 6.87 | 21.24 | clear | Depth 83', PR .8 gpm |
| 11:45 | 408.3 | 54.27 | 7.47 | .446 | 11.5 | 6.84 | 21.28 | clear | Depth 83', PR .8 gpm |
| 12:00 | 420.3 | 54.42 | 7.47 | .455 | 7.3 | 7.43 | 22.15 | clear | Depth 83', PR .8 gpm |
| 12:15 | 432.3 | 54.36 | 7.46 | .451 | 2.8 | 7.38 | 21.43 | clear | Depth 83', PR .8 gpm |
| 12:30 | 444.3 | 54.33 | 7.47 | .454 | 3.4 | 7.22 | 21.61 | clear | Depth 83', PR .8 gpm |
| 12:45 | 456.3 | 54.37 | 7.45 | .454 | 2.3 | 7.11 | 21.62 | clear | well development completed - Reached Target Purge Volume - Collected 16 H2O Photo Sample - |

Groundwater Well Development Log

Fort McClellan, Alabama

Project Number: 796987
 Form Completed by: ADAM DAY
 Well Developed by (person/firm): ADAM DAY, SHAW G&E

Parcel No.: 202
 Well No.: RF-MW07
 Date started: 7/14/02

Monitoring Well Information

Development Method: SURGE & PURGE
 Development Equipment: LAUNDROS PUMPER #89391
CONTROLLER #13944, U-70 #004014
 Casing Diameter: 4"

Beginning Measurements
 Depth to Water (ft): 33.83' BGS
 Total depth of Well (ft): 84.08' BGS

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments (Date if different from start date) (Purge Rate, Pump Position, Misc.) |
|--------------|--------------------------|------------------------------|-------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|---|
| 11:00 | 29.0 gallons gpm | 33.83 | 6.76 | .378 | 214 | 1.42 | 7.521.7 | brownish | 2gpm, 74' BGS |
| 11:15 | 0.30 | 59.23 | 7.89 | .399 | 33 | 3.37 | 21.6 | brownish | 0.75gpm, 74' BGS |
| 11:30 | 41.25 | 64.45 | 6.72 | .404 | 26 | 1.23 | 22.2 | brownish | 0.5gpm, 74' BGS |
| 11:45 | 48.75 | 68.55 | 6.46 | .370 | 21 | 1.30 | 22.7 | brownish | 0.25gpm, 74' BGS |
| 12:00 | 52.5 | 70.00 | 7.30 | .384 | 667 | 1.32 | 24.5 | brown | 0.25gpm, 82' BGS |
| 12:15 | 56.25 | 71.33 | 7.26 | .382 | 524 | 0.55 | 25.3 | brown | 0.25gpm, 82' BGS |
| 12:30 | 60.00 | 72.50 | 7.06 | .374 | 211 | 1.14 | 26.3 | brownish | 0.25gpm, 82' BGS |

TD - DTW = WC x 2 1/4' well = One PV x 5 = Min PV + H2O to install well = Minimum H2O to remove

$84.08 - 33.83 = 50.25 \times 0.653 = 32.81325 \times 5 = 164.06625 + 850 \text{ gal} = 1014.066 \text{ gal}$

PID @ WH/BZ = 0.0 ppm

Handwritten signature

Parcel No.: 202
 Well ID: RF-MW07
 Date: 7/15/02

| Time 24hr | Purge Volume (gal) | Water Level (ft) (TOC) | pH (std units) | Conductivity (mS/cm) | Turbidity (NTU) | Dissolved oxygen (mg/L) | Temperature (°C) | Clarity (color) | Comments |
|-----------------------|---------------------------|---------------------------|------------------------------------|-------------------------|--------------------|-------------------------------|---------------------|--------------------|----------------------|
| 12:45 | 63.75 | 76.55 | 6.96 | .379 | 534 | 0.72 | 22.4 | BROWN | 0.25 gpm, 82' BGS |
| 13:00 | 67.5 | 82.11 | DRY | | | | | | WAITING 20 min |
| 13:20 | 67.5 | 79.86 | STOPPED PURGING, WAITING 24 HOURS. | | | | | | |
| ⁶ 13:42 | 67.55 76.75 | 76.75 | 7.15 | .297 | 593 | 7.21 | 21.84 | BROWN | 0.125 gpm, 82' BGS |
| 7:00 | 69.75 | 78.39 | 7.13 | .297 | 583 | 7.38 | 21.83 | BROWN | 0.125 gpm, 82' BGS |
| 7:15 | 71.625 | 78.98 | 7.22 | .293 | 422 | 6.82 | 22.31 | BROWNISH | 0.125 gpm, 82' BGS |
| 7:30 | 73.5 | 79.35 | 7.24 | .295 | 462 | 6.59 | 23.69 | BROWN | 0.125 gpm, 82' BGS |
| 7:45 | 75.375 | 80.00 | 7.26 | .304 | 477 | 5.94 | 26.80 | BROWN | 0.0666 gpm, 82' BGS |
| 8:00 | 75.44 | 80.12 | 7.29 | .312 | 549 | 5.86 | 26.42 | BROWN | 0.0666 gpm, 82' BGS |
| 8:15 | 76.43 | 80.51 | 7.32 | .318 | 821 | 4.49 | 26.55 | BROWN | 0.0666 gpm, 82' BGS. |
| 8:30 | 77.42 | DRY | | | | | | | |
| 9:00 | 79.00 | 78.92 | 7.35 | .351 | >999 | 11.83 | 22.42 | BROWN | BAILED DRY |
| : | COMPLETED | 7/17/02 6900 | PHOTO | SAMPLE | TAKEN | FINAL TURBIDITY >999 NTU | | | |

APPENDIX D
SURVEY DATA

Appendix D

Survey Data Burial Mound at Rideout Field, Parcel 202Q-RD Fort McClellan, Calhoun County, Alabama

| Sample Location | Northing | Easting | Ground Elevation (ft amsl) | Top of Casing Elevation (ft amsl) |
|-----------------|------------|-----------|----------------------------|-----------------------------------|
| RF-MW01 | 1175307.40 | 607793.63 | 553.15 | 555.41 |
| RF-MW02 | 1175169.35 | 607761.15 | 550.50 | 552.63 |
| RF-MW03 | 1175190.89 | 607815.86 | 552.01 | 554.24 |
| RF-MW04 | 1174360.65 | 607894.02 | 518.70 | 520.96 |
| RF-MW05 | 1175304.31 | 607769.39 | 552.75 | 554.85 |
| RF-MW06 | 1175161.46 | 607745.86 | 550.01 | 552.16 |
| RF-MW07 | 1175173.97 | 607824.70 | 549.79 | 551.92 |

Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

ft amsl - Feet above mean sea level

NA - Not applicable.

APPENDIX E
SUMMARY OF ANALYTICAL DATA

Summary of Groundwater Analytical Data
Burial Mound at Rideout Field, Parcel 202Q-RD
Fort McClellan, Alabama

Report Date: 10/25/02

Page: 1 of 4

| | | | |
|-------------------------|-------------|-------------|-------------|
| <i>Location Code:</i> | RF-MW04 | RF-MW04 | RF-MW05 |
| <i>Associated Site:</i> | PARCEL 202Q | PARCEL 202Q | PARCEL 202Q |
| <i>Sample No:</i> | HV3004 | HV3005 | HV3006 |
| <i>Sample Date:</i> | 30-JUL-02 | 30-JUL-02 | 30-JUL-02 |
| | | | 02-AUG-02 |

User Test Group

Lab Method

| <u>Parameter</u> | <u>Flt</u> | <u>Units</u> | <u>Result</u> | <u>Qual</u> | <u>VQual</u> |
|-------------------|------------|--------------|---------------|-------------|--------------|---------------|-------------|--------------|---------------|-------------|--------------|---------------|-------------|--------------|
| GAMMA SCAN | | | | | | | | | | | | | | |
| 713R6 | | | | | | | | | | | | | | |
| Actinium-228 | | pCi/L | -2 | U | nv | -5 | U | nv | 0 | U | nv | -6 | U | nv |
| Aluminum-26 | | pCi/L | 1.8 | U | nv | 2.2 | U | nv | -1.9 | U | nv | -0.2 | U | nv |
| Americium-241 | | pCi/L | -6 | U | nv | -5 | U | nv | 0.5 | U | nv | 1.6 | U | nv |
| Antimony-124 | | pCi/L | 0.4 | U | nv | 4.8 | U | nv | 0.7 | U | nv | -1.1 | U | nv |
| Antimony-125 | | pCi/L | -2.6 | U | nv | -1.6 | U | nv | 5 | U | nv | -7.1 | U | nv |
| Beryllium-7 | | pCi/L | -18 | U | nv | 25 | U | nv | 7 | U | nv | 1 | U | nv |
| Bismuth-212 | | pCi/L | -12 | U | nv | 42 | U | nv | 59 | U | nv | 40 | U | nv |
| Bismuth-214 | | pCi/L | 7.1 | U | nv | 7 | U | nv | 10 | U | nv | 21 | | nv |
| Cadmium-109 | | pCi/L | 7 | U | nv | -37 | U | nv | 3 | U | nv | -20 | U | nv |
| Cerium-139 | | pCi/L | 0.3 | U | nv | -2.5 | U | nv | -0.2 | U | nv | -0.6 | U | nv |
| Cerium-144 | | pCi/L | 4 | U | nv | 4 | U | nv | -7 | U | nv | 10 | U | nv |
| Cesium-134 | | pCi/L | -1.6 | U | nv | -3.7 | U | nv | -0.6 | U | nv | 1.1 | U | nv |
| Cesium-137 | | pCi/L | -3.5 | U | nv | -0.7 | U | nv | -1 | U | nv | -3.2 | U | nv |
| Chromium-51 | | pCi/L | -11 | U | nv | 17 | U | nv | 1 | U | nv | 2 | U | nv |
| Cobalt-56 | | pCi/L | -0.7 | U | nv | 5.6 | U | nv | 5.2 | U | nv | 7.7 | U | nv |
| Cobalt-57 | | pCi/L | -1.4 | U | nv | 0 | U | nv | -0.2 | U | nv | 1 | U | nv |
| Cobalt-58 | | pCi/L | -0.6 | U | nv | 1.5 | U | nv | -2.9 | U | nv | 2.8 | U | nv |
| Cobalt-60 | | pCi/L | -1.4 | U | nv | -1.1 | U | nv | -0.5 | U | nv | -1.5 | U | nv |
| Europium-152 | | pCi/L | 2 | U | nv | 0 | U | nv | 23 | U | nv | 7 | U | nv |
| Europium-154 | | pCi/L | -9 | U | nv | 16 | U | nv | -11 | U | nv | -7 | U | nv |
| Europium-155 | | pCi/L | -7.6 | U | nv | 3.8 | U | nv | 0.9 | U | nv | 3.7 | U | nv |
| Iodine-131 | | pCi/L | 4 | U | nv | -4.6 | U | nv | 1.7 | U | nv | -1.3 | U | nv |
| Iron-59 | | pCi/L | 5.6 | U | nv | 0.7 | U | nv | 6.6 | U | nv | 4.6 | U | nv |
| Lead-212 | | pCi/L | 0.7 | U | nv | 2.4 | U | nv | 5.3 | U | nv | 2.6 | U | nv |
| Lead-214 | | pCi/L | 4.1 | U | nv | 7.5 | U | nv | 5 | U | nv | 21.6 | | nv |
| Manganese-54 | | pCi/L | -0.6 | U | nv | 0.9 | U | nv | 0.9 | U | nv | 0.1 | U | nv |
| Niobium-94 | | pCi/L | -2.3 | U | nv | 0 | U | nv | -0.4 | U | nv | -0.5 | U | nv |
| Niobium-95 | | pCi/L | 0.7 | U | nv | -4 | U | nv | 2.3 | U | nv | 0.3 | U | nv |
| Potassium-40 | | pCi/L | -37 | U | nv | -5 | U | nv | -55 | U | nv | 3 | U | nv |
| Protactinium-234m | | pCi/L | 80 | U | nv | -200 | U | nv | 340 | U | nv | 530 | U | nv |
| Ruthenium-106 | | pCi/L | -20 | U | nv | 11 | U | nv | -10 | U | nv | -2 | U | nv |

Summary of Groundwater Analytical Data
 Burial Mound at Rideout Field, Parcel 202Q-RD
 Fort McClellan, Alabama

Report Date: 10/25/02

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Location Code: RF-MW07
Associated Site: PARCEL 202Q
Sample No: HV3008
Sample Date: 02-AUG-02

User Test Group
Lab Method

| <u>Parameter</u> | <u>Flt</u> | <u>Units</u> | <u>Result</u> | <u>Qual</u> | <u>VQual</u> |
|-------------------|------------|--------------|---------------|-------------|--------------|
| GAMMA SCAN | | | | | |
| 713R6 | | | | | |
| Actinium-228 | | pCi/L | 6 | U | nv |
| Aluminum-26 | | pCi/L | 0.1 | U | nv |
| Americium-241 | | pCi/L | 15 | U | nv |
| Antimony-124 | | pCi/L | -0.7 | U | nv |
| Antimony-125 | | pCi/L | 5.6 | U | nv |
| Beryllium-7 | | pCi/L | -16 | U | nv |
| Bismuth-212 | | pCi/L | 25 | U | nv |
| Bismuth-214 | | pCi/L | -3 | U | nv |
| Cadmium-109 | | pCi/L | -41 | U | nv |
| Cerium-139 | | pCi/L | -0.8 | U | nv |
| Cerium-144 | | pCi/L | 3 | U | nv |
| Cesium-134 | | pCi/L | -5.1 | U | nv |
| Cesium-137 | | pCi/L | -2.9 | U | nv |
| Chromium-51 | | pCi/L | -16 | U | nv |
| Cobalt-56 | | pCi/L | 6.7 | U | nv |
| Cobalt-57 | | pCi/L | -0.6 | U | nv |
| Cobalt-58 | | pCi/L | -4.2 | U | nv |
| Cobalt-60 | | pCi/L | -2.8 | U | nv |
| Europium-152 | | pCi/L | -13 | U | nv |
| Europium-154 | | pCi/L | 0 | U | nv |
| Europium-155 | | pCi/L | -1.7 | U | nv |
| Iodine-131 | | pCi/L | 3.3 | U | nv |
| Iron-59 | | pCi/L | 3.9 | U | nv |
| Lead-212 | | pCi/L | 1.7 | U | nv |
| Lead-214 | | pCi/L | -10 | U | nv |
| Manganese-54 | | pCi/L | -1.5 | U | nv |
| Niobium-94 | | pCi/L | 2.4 | U | nv |
| Niobium-95 | | pCi/L | 0.9 | U | nv |
| Potassium-40 | | pCi/L | 4 | U | nv |
| Protactinium-234m | | pCi/L | 100 | U | nv |
| Ruthenium-106 | | pCi/L | -18 | U | nv |

Summary of Groundwater Analytical Data
 Burial Mound at Rideout Field, Parcel 202Q-RD
 Fort McClellan, Alabama

Report Date: 10/25/02

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| | | | |
|-------------------------|-------------|-------------|-------------|
| <i>Location Code:</i> | RF-MW04 | RF-MW04 | RF-MW05 |
| <i>Associated Site:</i> | PARCEL 202Q | PARCEL 202Q | PARCEL 202Q |
| <i>Sample No:</i> | HV3004 | HV3005 | HV3006 |
| <i>Sample Date:</i> | 30-JUL-02 | 30-JUL-02 | 30-JUL-02 |
| | | | RF-MW06 |
| | | | PARCEL 202Q |
| | | | HV3007 |
| | | | 02-AUG-02 |

User Test Group
Lab Method

| <u>Parameter</u> | <u>El</u> | <u>Units</u> | <u>Result</u> | <u>Qual</u> | <u>VQual</u> |
|---------------------|-----------|--------------|---------------|-------------|--------------|---------------|-------------|--------------|---------------|-------------|--------------|---------------|-------------|--------------|
| GAMMA SCAN | | | | | | | | | | | | | | |
| 713R6 | | | | | | | | | | | | | | |
| Scandium-46 | | pCi/L | -1.5 | U | nv | -0.5 | U | nv | 0.6 | U | nv | 2.1 | U | nv |
| Silver-110m | | pCi/L | 0.5 | U | nv | 0.1 | U | nv | 0.3 | U | nv | 0.5 | U | nv |
| Sodium-22 | | pCi/L | 3.5 | U | nv | 0 | U | nv | -0.3 | U | nv | 1.7 | U | nv |
| Thallium-208 | | pCi/L | 3.1 | U | nv | 1.9 | U | nv | 0.1 | U | nv | 0.2 | U | nv |
| Thorium-227 | | pCi/L | 22 | U | nv | 9 | U | nv | 13 | U | nv | -12 | U | nv |
| Thorium-234 | | pCi/L | 5 | U | nv | 3 | U | nv | -31 | U | nv | -11 | U | nv |
| Uranium-235 | | pCi/L | -4 | U | nv | 12 | U | nv | -2 | U | nv | -21 | U | nv |
| Zinc-65 | | pCi/L | 3.7 | U | nv | -4.2 | U | nv | 3.3 | U | nv | -2.6 | U | nv |
| STRONTIUM-90 | | | | | | | | | | | | | | |
| 724R7 | | | | | | | | | | | | | | |
| Strontium-90 | | pCi/L | -0.05 | U | nv | 0 | U | nv | 0.08 | U | nv | -0.03 | U | nv |

Summary of Groundwater Analytical Data
 Burial Mound at Rideout Field, Parcel 202Q-RD
 Fort McClellan, Alabama

Report Date: 10/25/02

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Location Code: RF-MW07
Associated Site: PARCEL 202Q
Sample No.: HV3008
Sample Date: 02-AUG-02

User Test Group

Lab Method

| <u><i>Parameter</i></u> | <u><i>Flt</i></u> | <u><i>Units</i></u> | <u><i>Result</i></u> | <u><i>Qual</i></u> | <u><i>VQual</i></u> |
|-------------------------|-------------------|---------------------|----------------------|--------------------|---------------------|
| GAMMA SCAN | | | | | |
| 713R6 | | | | | |
| Scandium-46 | | pCi/L | -1.7 | U | nv |
| Silver-110m | | pCi/L | 0.1 | U | nv |
| Sodium-22 | | pCi/L | 2.8 | U | nv |
| Thallium-208 | | pCi/L | 1.8 | U | nv |
| Thorium-227 | | pCi/L | -4 | U | nv |
| Thorium-234 | | pCi/L | 42 | U | nv |
| Uranium-235 | | pCi/L | 18 | U | nv |
| Zinc-65 | | pCi/L | -1.5 | U | nv |
| STRONTIUM-90 | | | | | |
| 724R7 | | | | | |
| Strontium-90 | | pCi/L | -0.17 | U | nv |