

**Draft**

**Site-Specific Work Plan  
Remedial Investigation, Addendum IV  
Ranges Near Training Area T-24 Alpha, Parcels 88(7),  
108(7), 112Q, 113Q-X, 123Q, 187(7), 213Q, and 214Q**

**Fort McClellan  
Calhoun County, Alabama**

**Prepared for:**

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

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**Revision 0**

## 1 **1.0 Introduction**

2 This draft work plan documents additional remedial investigation (RI) activities to further define  
3 the extent of benzene, carbon tetrachloride, and other volatile organic compounds (VOC) in  
4 groundwater at the Ranges Near Training Area T-24 Alpha, Parcels 88(7), 108(7), 112Q, 113Q-  
5 X, 123Q, 187(7), 213Q, and 214Q. The purpose of this work plan is to summarize previous  
6 investigations and to document proposed activities to define the extent of contamination in  
7 groundwater. This draft plan serves as Addendum IV to previous investigations (IT, 2000; IT,  
8 2002a).

9  
10 The Ranges Near Training Area T-24A are located on the southeast portion of the Main Post and  
11 consist of a 1.5-acre fenced chemical munitions disposal area and four overlapping ranges. The  
12 following seven parcels make up the Ranges Near Training Area T-24A: Former Fog Oil Drum  
13 Storage Area, Parcel 88(7); Multipurpose Range, Parcel 108(7); Former Chemicals Munitions  
14 Disposal Area, Parcel 187(7); Former Machine Gun Range, Parcel 112Q; Former Demolition  
15 Area, Parcel 113Q-X; Former Bandholtz Machine Gun Qualification Range, Parcel 213Q; and  
16 Bandholtz Field Firing Range, Parcel 214Q.

## 17 18 19 **2.0 Previous Work**

20 To date, Shaw has completed a site investigation (SI) and two phases of remedial investigation  
21 (RI) at Range 24A (IT, 2000; IT, 2002a). Table 1 summarizes the sampling performed during  
22 the SI and the first two phases of the RI.

23  
24 **Summary of Analytical Groundwater Results.** A total of 116 groundwater samples were  
25 collected from 58 monitoring wells during the SI/RI at Ranges Near Training Area T-24A.  
26 Figure 1 depicts VOC concentrations detected above site-specific screening levels (SSSL) from  
27 all three phases of the investigation. A total of 25 VOCs were detected at 35 sample locations.  
28 Of the VOCs detected in groundwater, the concentrations of five VOCs exceeded their respective  
29 SSSLs at seven well locations:

- 30  
31 • Benzene (0.0023 to 1.9 milligrams per liter [mg/L]) exceeded its SSSL (0.0014  
32 mg/L) at four well locations (FTA-T24-GP01, R24A-187-MW12, R24A-187-  
33 MW22, and R24A-187-MW48).

- Carbon tetrachloride (0.054 to 0.89 mg/L) exceeded its SSSL (0.0004 mg/L) at three well locations (R24A-187-MW21, R24A-187-MW22, and R24A-187-MW45).
- Chloroform (0.0019 to 0.17 mg/L) exceeded its SSSL (0.00115 mg/L) at four well locations (R24A-187-MW12, R24A-187-MW21, R24A-187-MW22, and R24A-187-MW48).
- 1,2-Dichloroethane (0.037 mg/L) exceeded its SSSL (0.00045 mg/L) at one well location (R24A-187-MW22).
- 1,2,4-Trimethylbenzene (0.0072 mg/L) exceeded its SSSL (0.006 mg/L) at one well location (FTA-88-GP01).

In April, May, and June of 2003, the 58 monitoring wells were resampled and analyzed for VOCs (Table 2). A total of 18 VOCs were detected at 20 sample locations. Of these, the concentrations of four VOCs exceeded their respective SSSLs at six well locations (Table 2).

- Benzene (0.0023 to 1.9 mg/L) exceeded its SSSL (0.0014 mg/L) at four well locations (FTA-T24-GP01, R24A-187-MW12, R24A-187-MW22, and R24A-187-MW48).
- Carbon tetrachloride (0.054 to 0.89 mg/L) exceeded its SSSL (0.0004 mg/L) at three well locations (R24A-187-MW21, R24A-187-MW22, and R24A-187-MW45).
- Chloroform (0.0081 to 0.13 mg/L) exceeded its SSSL (0.00115 mg/L) at three well locations (R24A-187-MW21, R24A-187-MW22, and R24A-187-MW45).
- 1,2-Dichloroethane (0.019) exceeded its SSSL (0.00045 mg/L) at one well location (R24A-187-MW22).

The well locations with VOC concentrations above SSSLs are shown in Table 3. Also shown are the total VOC concentrations in the wells. Bedrock monitoring well R24-187-MW22 has the highest concentration of total VOCs (2.64 mg/L).

### **3.0 Site Characterization**

Previous subsurface investigations conducted in the vicinity of Training Area T-24A provided soil, bedrock, and groundwater data. These data were used to characterize the various media including the geology and hydrogeology of the site.

1 The geology in the vicinity of Training Area T-24A is very complex. A north-south-trending  
2 fault trace is mapped to the west of Parcel 187(7) (Osborne, 1999). A geologic cross section and  
3 fault location map is provided as Figure 2. This fault is mapped within the Chilhowee Group,  
4 undifferentiated, as a major splay of the Jacksonville Fault. Upon completion of the RI drilling  
5 and sampling activities in 2000, a geologic and structural conceptual model of the area around  
6 Training Area T-24A was presented to the FTMC Base Realignment and Closure (BRAC)  
7 Groundwater Subcommittee in January 2003.

8  
9 The conceptual site model is based on geologic interpretation and on the previous SI/RI results  
10 (described in previous RI work plans). Data obtained from previous drilling operations provided  
11 additional definition of Osborne's interpretation. A thick sequence of gray shales encountered in  
12 wells east of the major splay fault mapped by Osborne was interpreted to represent the Nichols  
13 Formation of the Chilhowee Group thrust over quartzites and sandstones of the Weisner and  
14 Wilson Formations. Two other small splays were interpreted in the overriding thrust slice to  
15 account for lithologic variations found in some of the wells. The presence of these minor splay  
16 faults is consistent with the degree of intense fracturing and alteration observed in cores from the  
17 wells.

18  
19 Groundwater elevations within the vicinity of Training Area T-24A were calculated by  
20 measuring the depth to groundwater relative to the surveyed top-of-casing elevations in the  
21 monitoring wells installed at the site. Groundwater elevations were measured in June 2003.  
22 Groundwater elevation maps for both residuum and bedrock aquifers are shown on Figures 3 and  
23 4, respectively. Table 4 provides groundwater elevation data from June 18, 2003 in the  
24 residuum. Table 5 provides groundwater elevation data from June 18, 2003 in the bedrock.  
25 Both tables summarize well construction information. Based on the groundwater elevation data  
26 presented on Figure 3, groundwater flow within the residuum conforms in general to surface  
27 topography and flows northwest, towards South Branch of Cane Creek.

28  
29 Groundwater flow direction in the bedrock shows a general overall north-northwest direction  
30 (Figure 4). It is likely that the flow within the bedrock is influenced by the major north-south  
31 splay fault mapped by Osborne. Because of more intense fracturing of the Weisner and Wilson  
32 Ridge lithologies, it is probable that increased permeability occurs along the fault zone.  
33 Therefore, it is interpreted that groundwater flow would be deflected to the north and flow along  
34 the strike of the fault. Several splay faults of smaller displacement and fracturing observed in  
35 bedrock cores undoubtedly further affect and complicate the general flow regime in bedrock.

1  
2 North-south geologic cross section A-A' and east-west geologic cross section B-B' are shown on  
3 Figures 5 and 6, respectively (the locations of the two transects are shown on Figure 2). Fault A  
4 is the major north-south splay fault mapped by Osborne; the two minor splay faults are mapped  
5 as Fault B and Fault C. Regionally, the Chilhowee Group is mapped as dipping to the east-  
6 southeast. On the cross sections, units comprising the Chilhowee Group and faults are shown  
7 dipping eastwards; detailed correlation of both fine and coarse-grained clastics between wells is  
8 difficult and is, in part, generalized. Cross section B-B' is presented as viewed from the  
9 northwest looking towards the southeast; because of this construction, dip of the two minor splay  
10 faults on cross section B-B' appears towards the north.

11  
12 Two isoconcentration maps of benzene and carbon tetrachloride from the April-June 2003  
13 sampling event are presented on Figures 7 and 8, respectively. The distribution of benzene  
14 reflects a side gradient flow in bedrock from an area in the general vicinity of monitoring well  
15 R24A-187-MW48 (Figure 7). This flow direction is suggested to result from contaminant flow  
16 along fractures in the bedrock. However, the distribution of carbon tetrachloride more closely  
17 approximates the direction of groundwater flow in the bedrock (Figure 8). Carbon tetrachloride  
18 detected in monitoring well R24A-187-MW22 indicates a potential source area located outside  
19 the fenced area, to the southeast. An isoconcentration map of carbon tetrachloride, including  
20 chloroform and chloromethane degradation products, is presented on Figure 9. The plume  
21 configuration coincides in general with the northwesterly flow of groundwater in bedrock. It  
22 should be noted that both isoconcentration maps shown indicate carbon tetrachloride  
23 contamination does not extend beyond the major north-south striking fault mapped by Osborne.  
24

25 Figures 10 through 13 are geologic cross sections that graphically demonstrate the vertical and  
26 horizontal transport and migration of benzene and carbon tetrachloride at the site. Figures 10  
27 and 11 show the distribution of benzene on geologic cross sections A-A' and B-B', respectively.  
28 Figures 12 and 13 show the distribution of carbon tetrachloride. Contaminant flow of both  
29 benzene and carbon tetrachloride extend across the two minor fault splays. However, the major  
30 splay fault is interpreted as providing a barrier to westward contaminant flow and deflecting  
31 groundwater to the north along a more permeable zone parallel to the fault strike.  
32

#### 33 **4.0 Proposed Field Activities**

34 Shaw proposes to install three additional bedrock monitoring wells to define the horizontal and  
35 vertical extent of benzene and carbon tetrachloride contamination in the groundwater at the

1 Ranges Near Training Area T-24A. The proposed well locations are shown on Figure 14. Table  
2 6 presents the sample rationale and discussion for the proposed wells. Following well  
3 installation and development, groundwater samples will be collected from each of the newly  
4 installed wells and from 12 existing wells. The groundwater samples will be analyzed for VOCs  
5 only (Table 7).

6  
7 Because unexploded ordnance (UXO) may be encountered at Ranges Near Training Area T-24A,  
8 Shaw will conduct UXO avoidance activities prior to initiating intrusive field activities as  
9 outlined in the SAP and as discussed in the enclosed site-specific UXO safety plan attachment.

10  
11 **Monitoring Well Installation.** The three bedrock monitoring wells (R24A-187-MW49,  
12 R24A-187-MW50, and R24A-187-MW51) will be installed using a combination of hollow-stem  
13 auger and air-rotary drilling techniques. Prior to installing 8-inch outer isolation casings into  
14 bedrock, a pilot hole will be advanced with nominal 4¼-inch diameter auger flights. Soil  
15 samples will be collected continuously for the first 12 feet and at 5-foot intervals thereafter until  
16 either split-spoon refusal is encountered or bedrock is reached. Soil samples will be collected  
17 using a 24-inch long, 2-inch diameter split-spoon sampler. Lithologic samples will be collected  
18 during drilling of the wells to provide a detailed lithologic log. All soil samples will be logged in  
19 accordance with ASTM Method D 2488 using the Unified Soil Classification System (USCS).  
20 All soil samples will be screened in the field using either a photoionization detector (PID) or a  
21 flame ionization detector (FID).

22  
23 After split-spoon soil samples are collected for lithologic descriptions, augers and drill rods will  
24 be removed from the borehole. A 12¼-inch percussion bit, rotary bit, or equivalent will be used  
25 to ream the pilot hole from land surface to a minimum of 5 feet into competent bedrock. Eight-  
26 inch inside diameter (ID) carbon steel International Pipe Standard (IPS) outer isolation casing  
27 will be installed into the borehole from ground surface to approximately 5 feet into competent  
28 bedrock. The 8-inch casing will be grouted in-place using a tremie pipe suspended in the  
29 annulus between the casing and the borehole wall. A grout plug will be placed at the bottom of  
30 the 8-inch casing to ensure that grout does not migrate inside the casing. Bentonite-cement grout  
31 will be mixed using approximately 6.5 to 7 gallons of water and 5 pounds of bentonite per 94-  
32 pound bag of Type I or Type II Portland cement.

33  
34 After the grout has cured a minimum of 48 hours, a 7.875-inch air rotary or percussion bit will be  
35 used to advance the borehole to target depth. The compressor on the drill rig will be equipped

1 with an air filter between the compressor and the drill bit. Only clean filtered air, potable water,  
2 and bentonite drilling fluids may be used as drilling fluids. The drilling contractor will operate  
3 the drill rig at such speeds and with such drill pressures and air pressures as will ensure the  
4 stability of the borehole. Based on previous air-rotary drilling operations at Training Area T-24  
5 Alpha, alternating zones of hard quartzite and softer siltstone, sandstone, and/or shale will likely  
6 be encountered.

7  
8 If borehole collapse, broken rock formations, washout zones, or lost circulation prohibits the  
9 advancement of the borehole with air, eccentric rotary bit drilling (ODEX<sup>®</sup> or equivalent) may  
10 be used to advance the borehole and install 6-inch casing. A 5.875-inch air rotary bit or  
11 percussion bit will be used to complete the borehole. Discrete groundwater samples will be  
12 collected at 20-foot intervals to the target depths. Air rotary/percussion drilling shall be  
13 conducted with a diverter or similar system to direct drill cuttings/fluids from the borehole into a  
14 roll-off container within 50 feet of the borehole. During air rotary or eccentric rotary drilling, the  
15 driller's observations are very important and shall be noted, such as amount of water used,  
16 amount of water lost, drilling rates, voids, and fractures encountered. This information shall be  
17 provided to the on-site Shaw Geologist and Site Manager daily. The drilling contractor will  
18 provide rock cuttings to the Shaw Geologist as drilling progresses.

19  
20 During drilling activities at monitoring wells R24A-187-MW49, R24A-187-MW50, and R24A-  
21 187-MW51, an estimated 30 discrete groundwater samples will be collected from the bottom of  
22 the outer casing to the target depth of the borehole. These samples will be collected with a  
23 single-packer system that allows 20-foot intervals to be isolated for sampling. Groundwater  
24 sample collection will begin below the outer casing and continue at 20-foot intervals thereafter  
25 (e.g., 100 to 120 feet bgs, 120 to 140 feet bgs). The samples will be collected using a  
26 decontaminated submersible pump made of stainless steel and Teflon (e.g.,  
27 Grundfos Redi-Flo 2<sup>TM</sup> or equivalent), affixed with a Teflon-coated polyethylene discharge line,  
28 and an inflatable packer located above the pump (to effectively seal off upper intervals). Prior to  
29 collecting a discrete groundwater sample, five volumes of water from the isolated sampling zone  
30 will be removed. In poor recharge zones or tight formations that yield little groundwater, the  
31 isolated sampling zone will be allowed to recharge for a maximum period of one hour. If there is  
32 an insufficient volume of water to sample after one hour, the borehole will be advanced 20 feet  
33 and the discrete sampling procedure will be repeated. However, the one-hour recharge period  
34 may be extended at the discretion of the Shaw site manager. Groundwater samples collected  
35 from the sampling zone will be screened for field parameters (pH, temperature, specific

1 conductivity, dissolved oxygen, and oxidation-reduction potential), and a representative sample  
2 will be sent to an off-site laboratory for 24-hour turn-around for VOC analysis. Discrete  
3 groundwater sampling at 20-foot intervals will provide information on groundwater quality and  
4 will aid in determining the well screen placement. The discrete groundwater sampling data will  
5 be used for screening purposes only and will not be considered definitive data. Therefore, the  
6 screening data will neither be reported with data packages nor validated. Instead, only laboratory  
7 certificate of analysis deliverables will be required. Discrete groundwater sampling  
8 methodology (outlined in Attachment 5, Procedure No. FTMC-GW-002 of the SAP) will be  
9 followed when collecting groundwater samples in bedrock.

10  
11 After the completion of air-rotary drilling and discrete groundwater sample collection, borehole  
12 geophysical logging will be performed at each monitoring well location. The logging will  
13 include dip meter, acoustic televiewer, natural gamma, temperature, resistivity, and caliper  
14 logging. The purpose of the geophysical logging is to provide additional information regarding  
15 fractures and lithologic changes noted during drilling. With the exception of natural gamma  
16 logging, the borehole geophysical logging will be performed only in the open portion of the  
17 borehole. Natural gamma logging will be completed in the entire borehole (i.e., open and cased  
18 portions).

19  
20 Wells at Training Area T-24 Alpha will be installed at depths of 300 feet or potentially deeper.  
21 Therefore, the well casing will consist of new 2½-inch ID, Schedule 80, threaded, flush-joint,  
22 PVC pipe. New threaded, flush-joint, 0.010-inch continuous wrap PVC well screen,  
23 approximately 10-20 feet long, will be attached to the bottom of the well casing. After the  
24 casing and screen materials are lowered into the boring, the filter materials will be tremied into  
25 the annulus. The filter pack will consist of 20/40-silica sand. The filter pack will be tremied in  
26 place from the bottom of the borehole to approximately 5 feet above the top of the well screen.  
27 Extra fine sand seal (30/70 silica sand), approximately 5 feet thick, will be tremied in place  
28 above the filter pack.

29  
30 Should bedrock fracturing be prevalent, bentonite chips will be placed into the borehole and  
31 extended a minimum of 5 feet into the bottom of the 8-inch outer casing (or 6-inch ODEX®  
32 casing if used) to inhibit the potential of cement bleeding into the formation. At the discretion of  
33 the Shaw Site Manager, a “bentonite slurry” mix may be used to minimize potential bridging.  
34 Once the bentonite seal is installed, it will be allowed to hydrate a minimum of eight hours prior  
35 to completion of the well. Prior to grouting, the bentonite seal will be measured using a

1 weighted tape (or equivalent) to ensure that the “seal” has not dropped in the borehole or within  
2 the casing. Should this occur, additional bentonite chips or bentonite slurry will be added and  
3 allowed to hydrate prior to commencing grouting of the annular space. The annular space above  
4 the bentonite seal or slurry (if used) will be filled with bentonite-cement grout. The grout will be  
5 mixed with 6.5 to 7 gallons of water per 94-lb bag of Type I Portland cement and 5 to 10 percent  
6 (by weight) powdered bentonite. Type II Portland cement may be substituted at the discretion of  
7 the Shaw Site Manager. The grout will be tremied in place from the top of the bentonite seal to  
8 ground surface. A watertight well cap will be placed atop the well casing. All filter pack  
9 materials, grout, and installation techniques will conform to requirements presented in the  
10 USACE Engineering Manual *Monitoring Well Installation and Documentation at Hazardous*  
11 *and/or Toxic Waste Sites* (USACE, 1998).

12  
13 **Well Development.** The newly installed monitoring wells will be developed as specified in  
14 Section 5.1 and Appendix C of the SAP (IT, 2002b). After well development, the monitoring  
15 wells will be allowed to equilibrate 14 days prior to sample collection.

16  
17 **Groundwater Sampling.** Following well installation and development activities,  
18 groundwater samples will be collected from the three new wells and from 12 existing wells. The  
19 groundwater samples will be analyzed for VOCs only and the analytical data will be considered  
20 definitive. The groundwater sample designations are provided in Table 7. The required quality  
21 assurance/quality control (QA/QC) samples are listed in Table 8. Groundwater samples will be  
22 collected in accordance with procedures outlined in the Supplemental RI work plan (IT, 2000)  
23 and the SAP (IT, 2002b). Low-flow groundwater sampling (as outlined in Attachment 5,  
24 Procedure No. FTMC-GW-001 of the SAP) may be used as deemed necessary by the Shaw Site  
25 Manager. The groundwater samples will be analyzed using EPA SW-846 methods, including  
26 Update III Methods where applicable, as shown in Table 8. Equipment decontamination  
27 procedures will follow the methodology presented in the SAP.

28  
29 **Surveying.** The newly installed well locations will be surveyed following the methodology  
30 outlined in the Supplemental RI work plan (IT, 2000) and the SAP (IT, 2002b).

31  
32 **Investigation-Derived Waste.** IDW generated during well installation, well development,  
33 and groundwater sampling will be managed, characterized, and disposed in accordance with the  
34 procedures outlined in the SAP. Drill cuttings and water generated during well installation will

1 be diverted directly into a lined, watertight, roll-off box per methodology previously established  
2 during drilling activities at FTMC.

3  
4 All work conducted during this additional investigation at the Ranges Near Training Area T-24  
5 Alpha will be conducted in accordance with this Draft SFSP, the revised UXO Safety Plan  
6 Addendum (presented with this SFSP) and the revised Site-Specific Safety and Health Plan  
7 (presented with this SFSP).

## 10 **5.0 Schedule**

11 Shaw is prepared to initiate field activities at Ranges Near Training Area T-24A, Parcels 88(7),  
12 108(7), 187(7), 112Q, 113Q-X, 213Q, and 214Q during November 2003.

## 15 **6.0 References**

16 IT Corporation (IT), 2002a, *Draft Site-Specific Field Sampling Plan Addendum II for the*  
17 *Remedial Investigation (Source Area) at Ranges Near Training Area T-24A, Parcels 187(7),*  
18 *112Q, 113Q-X, 213Q, and 214Q, Fort McClellan, Calhoun County, Alabama*, August.

19  
20 IT Corporation (IT), 2002b, *Draft Revision 3, Installation-Wide Sampling and Analysis Plan,*  
21 *Fort McClellan, Calhoun County, Alabama*, February.

22  
23 IT Corporation (IT), 2000, *Final Supplemental Remedial Investigation, Ranges Near Training*  
24 *Area T-24A, Parcels 187(7), 112Q, 113Q-X, 213Q, and 214Q, Fort McClellan, Calhoun*  
25 *County, Alabama*, September.

26  
27 U.S. Army Corps of Engineers (USACE), South Atlantic Division, 1998, *Monitoring Well*  
28 *Design, Installation, and Documentation at Hazardous, Toxic, and Radioactive Waste Sites,*  
29 *November*, Division Manual, DM1110-1-4000, November.

30  
31 Osborne, W.E., Daniel G. Irving, Williard E. Ward II, compilers, 1999, *Geologic Map of*  
32 *Anniston*, 7.5 minute Quadrangle, Calhoun County, Alabama, Scale 1: 24,000.

## **TABLES**

**Table 1**

**Summary of Previous Work  
Remedial Investigation, Addendum IV  
Ranges Near Training Area Area T-24A  
Fort McClellan, Calhoun County, Alabama**

<b>Sampling Media</b>	<b>Site Investigation/ Remedial Investigation Samples</b>	<b>Remedial Investigation, Addendum II Samples</b>	<b>Remedial Investigation, Addendum III Samples</b>	<b>Total Samples</b>
Surface Soil	14	37	51	102
Depositional Surface Soil	5	1	0	6
Subsurface Soil	14	8	42	64
Groundwater	18	40	58	116
Surface Water	5	6	0	11
Sediment	5	6	0	11
<b>Total</b>	<b>61</b>	<b>98</b>	<b>151</b>	<b>310</b>

**Notes:**

A total of 58 groundwater monitoring wells have been installed.

Table 2

VOCs in Groundwater  
 Remedial Investigation, Addendum IV  
 Ranges Near Training Area T-24A  
 Fort McClellan, Calhoun County, Alabama

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Sample Location Parcel		FTA-108 FTA-108-BK-G06 SK3044 15-Apr-03				FTA-108 FTA-108-GP01 SK3045 15-Apr-03				FTA-108 FTA-108-GP02 SK3046 16-Apr-03				FTA-108 FTA-108-GP03 SK3047 17-Apr-03				FTA-108 FTA-108-GP04 SK3048 16-Apr-03					
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL												
<b>VOLATILE ORGANIC COMPOUNDS</b>																							
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND															
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND				ND															
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND															
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND															
2-Butanone	mg/L	NA	7.14E-01	ND				ND															
2-Hexanone	mg/L	NA	4.94E-03	ND				ND															
Acetone	mg/L	NA	1.56E-01	ND				ND															
Benzene	mg/L	NA	1.41E-03	ND				ND															
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND															
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				ND															
Chloroform	mg/L	NA	1.15E-03	ND				2.40E-04															
Chloromethane	mg/L	NA	3.93E-03	ND				ND															
Cumene	mg/L	NA	1.27E-01	ND				ND															
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND															
Methylene chloride	mg/L	NA	7.85E-03	ND				ND															
N-Butylbenzene	mg/L	NA	9.57E-03	ND				ND															
N-Propylbenzene	mg/L	NA	1.30E-02	ND				ND															
Naphthalene	mg/L	NA	3.01E-03	ND				ND															
Tetrachloroethene	mg/L	NA	1.26E-03	ND				ND															
Toluene	mg/L	NA	2.59E-01	ND				ND															
Trichloroethene	mg/L	NA	4.51E-03	ND				ND															
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND															
p-Cymene	mg/L	NA	2.26E-01	ND				ND															
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND															
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND															

Table 2

VOCs in Groundwater  
 Remedial Investigation, Addendum IV  
 Ranges Near Training Area T-24A  
 Fort McClellan, Calhoun County, Alabama

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Sample Location Parcel Sample Number Sample Date				FTA-108 FTA-108-GP05 SK3049 16-Apr-03				FTA-108 FTA-108-GP06 SK3051 28-May-03				FTA-108 FTA-108-GP07 SK3052 28-May-03				FTA-108 FTA-108-GP08 SK3053 28-May-03				FTA-108 FTA-108-GP09 SK3054 29-May-03				
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL																	
<b>VOLATILE ORGANIC COMPOUNDS</b>																								
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND																				
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND																				
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND																				
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND																				
2-Butanone	mg/L	NA	7.14E-01	ND																				
2-Hexanone	mg/L	NA	4.94E-03	ND																				
Acetone	mg/L	NA	1.56E-01	ND																				
Benzene	mg/L	NA	1.41E-03	ND																				
Carbon disulfide	mg/L	NA	1.51E-01	ND																				
Carbon tetrachloride	mg/L	NA	4.08E-04	ND																				
Chloroform	mg/L	NA	1.15E-03	ND																				
Chloromethane	mg/L	NA	3.93E-03	ND																				
Cumene	mg/L	NA	1.27E-01	ND																				
Ethylbenzene	mg/L	NA	1.40E-01	ND																				
Methylene chloride	mg/L	NA	7.85E-03	ND																				
N-Butylbenzene	mg/L	NA	9.57E-03	ND																				
N-Propylbenzene	mg/L	NA	1.30E-02	ND				4.90E-04	J			ND				ND				ND				
Naphthalene	mg/L	NA	3.01E-03	ND																				
Tetrachloroethene	mg/L	NA	1.26E-03	ND																				
Toluene	mg/L	NA	2.59E-01	ND																				
Trichloroethene	mg/L	NA	4.51E-03	ND																				
m,p-Xylenes	mg/L	NA	2.80E+00	ND																				
p-Cymene	mg/L	NA	2.26E-01	ND																				
sec-Butylbenzene	mg/L	NA	1.06E-02	ND																				
tert-Butylbenzene	mg/L	NA	1.14E-02	ND																				

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VOCs in Groundwater  
 Remedial Investigation, Addendum IV  
 Ranges Near Training Area T-24A  
 Fort McClellan, Calhoun County, Alabama

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Sample Location Parcel Sample Number Sample Date				FTA-108 FTA-108-GP10 SK3055 28-May-03				FTA-108 FTA-108-T24A-G01 SK3056 30-May-03				FTA-108 FTA-108-T24A-G02 SK3057 29-May-03				FTA-108 FTA-108-T24A-G03 SK3058 29-May-03				FTA-88 FTA-88-GP01 SK3059 27-May-03				
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	
<b>VOLATILE ORGANIC COMPOUNDS</b>																								
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				1.10E-03				
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND				ND				ND				ND				ND				
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND				ND				ND				3.70E-04	J			
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND				
2-Butanone	mg/L	NA	7.14E-01	ND				ND				ND				ND				ND				
2-Hexanone	mg/L	NA	4.94E-03	ND				ND				ND				ND				ND				
Acetone	mg/L	NA	1.56E-01	ND				ND				ND				ND				ND				
Benzene	mg/L	NA	1.41E-03	ND				3.90E-03			YES	ND				ND				ND				
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND				ND				ND				ND				
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				ND				ND				ND				ND				
Chloroform	mg/L	NA	1.15E-03	ND				ND				ND				ND				ND				
Chloromethane	mg/L	NA	3.93E-03	ND				ND				ND				ND				ND				
Cumene	mg/L	NA	1.27E-01	ND				ND				ND				ND				ND				
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND				ND				ND				ND				
Methylene chloride	mg/L	NA	7.85E-03	ND				ND				ND				ND				ND				
N-Butylbenzene	mg/L	NA	9.57E-03	ND				ND				ND				ND				ND				
N-Propylbenzene	mg/L	NA	1.30E-02	ND				ND				ND				ND				ND				
Naphthalene	mg/L	NA	3.01E-03	ND				ND				ND				ND				ND				
Tetrachloroethene	mg/L	NA	1.26E-03	ND				ND				ND				ND				ND				
Toluene	mg/L	NA	2.59E-01	ND				ND				ND				ND				ND				
Trichloroethene	mg/L	NA	4.51E-03	ND				ND				ND				ND				ND				
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND				
p-Cymene	mg/L	NA	2.26E-01	ND				ND				ND				ND				ND				
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND				ND				ND				ND				
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND				ND				ND				ND				

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VOCs in Groundwater  
 Remedial Investigation, Addendum IV  
 Ranges Near Training Area T-24A  
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Sample Location Parcel Sample Number Sample Date				FTA-88 FTA-88-GP02 SK3060 28-May-03				FTA-88 FTA-88-GP03 SK3061 27-May-03				FTA-88 FTA-88-GP04 SK3062 28-May-03				R24A-187 R24A-187-MW01 SK3001 15-Apr-03				R24A-187 R24A-187-MW02 SK3002 16-Apr-03			
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
<b>VOLATILE ORGANIC COMPOUNDS</b>																							
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND			
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND				ND				ND				ND				ND			
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND			
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND			
2-Butanone	mg/L	NA	7.14E-01	ND				ND				1.10E-02	J			ND				3.40E-02	J		
2-Hexanone	mg/L	NA	4.94E-03	ND				ND				1.90E-03	J			ND				ND			
Acetone	mg/L	NA	1.56E-01	ND				ND				5.10E-02	J			ND				ND			
Benzene	mg/L	NA	1.41E-03	ND				ND				ND				ND				2.50E-04	J		
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND				ND				ND				ND			
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				ND				ND				ND				ND			
Chloroform	mg/L	NA	1.15E-03	ND				ND				ND				ND				ND			
Chloromethane	mg/L	NA	3.93E-03	ND				ND				ND				ND				ND			
Cumene	mg/L	NA	1.27E-01	ND				ND				ND				ND				ND			
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND				ND				ND				ND			
Methylene chloride	mg/L	NA	7.85E-03	ND				ND				ND				ND				ND			
N-Butylbenzene	mg/L	NA	9.57E-03	ND				ND				ND				ND				ND			
N-Propylbenzene	mg/L	NA	1.30E-02	ND				ND				ND				ND				ND			
Naphthalene	mg/L	NA	3.01E-03	ND				ND				ND				ND				ND			
Tetrachloroethene	mg/L	NA	1.26E-03	ND				ND				ND				ND				ND			
Toluene	mg/L	NA	2.59E-01	ND				ND				ND				ND				ND			
Trichloroethene	mg/L	NA	4.51E-03	ND				ND				ND				ND				ND			
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND			
p-Cymene	mg/L	NA	2.26E-01	ND				ND				ND				ND				ND			
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND				ND				ND				ND			
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND				ND				ND				ND			

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VOCs in Groundwater  
 Remedial Investigation, Addendum IV  
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Sample Location Parcel Sample Number Sample Date				R24A-187 R24A-187-MW03 SK3003 21-Apr-03				R24A-187 R24A-187-MW04 SK3004 21-Apr-03				R24A-187 <sup>c</sup> R24A-187-MW05 SK3005 23-Apr-03				R24A-187 R24A-187-MW06 SK3006 24-Apr-03				R24A-187 R24A-187-MW07 SK3007 23-Apr-03				
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	
<b>VOLATILE ORGANIC COMPOUNDS</b>																								
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND				
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND				ND				ND				ND				ND				
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND				
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND				
2-Butanone	mg/L	NA	7.14E-01	ND				3.70E-02 J				ND				ND				ND				
2-Hexanone	mg/L	NA	4.94E-03	ND				ND				ND				ND				ND				
Acetone	mg/L	NA	1.56E-01	ND				ND				ND				ND				ND				
Benzene	mg/L	NA	1.41E-03	ND				ND				ND				ND				ND				
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND				ND				ND				ND				
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				ND				ND				ND				ND				
Chloroform	mg/L	NA	1.15E-03	ND				ND				ND				ND				5.10E-04 J				
Chloromethane	mg/L	NA	3.93E-03	ND				ND				ND				ND				ND				
Cumene	mg/L	NA	1.27E-01	ND				ND				ND				ND				ND				
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND				ND				ND				ND				
Methylene chloride	mg/L	NA	7.85E-03	ND				ND				ND				ND				ND				
N-Butylbenzene	mg/L	NA	9.57E-03	ND				ND				ND				ND				ND				
N-Propylbenzene	mg/L	NA	1.30E-02	ND				ND				ND				ND				ND				
Naphthalene	mg/L	NA	3.01E-03	ND				ND				ND				ND				ND				
Tetrachloroethene	mg/L	NA	1.26E-03	ND				ND				ND				ND				ND				
Toluene	mg/L	NA	2.59E-01	ND				ND				ND				ND				ND				
Trichloroethene	mg/L	NA	4.51E-03	ND				ND				ND				ND				ND				
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND				
p-Cymene	mg/L	NA	2.26E-01	ND				ND				ND				ND				ND				
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND				ND				ND				ND				
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND				ND				ND				ND				

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VOCs in Groundwater  
 Remedial Investigation, Addendum IV  
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Sample Location Parcel Sample Number Sample Date				R24A-187 R24A-187-MW08 SK3008 17-Apr-03				R24A-187 R24A-187-MW09 SK3009 22-Apr-03				R24A-187 R24A-187-MW10 SK3010 15-May-03				R24A-187 R24A-187-MW11 SK3011 28-Apr-03				R24A-187 R24A-187-MW12 SK3012 22-May-03				
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL																	
<b>VOLATILE ORGANIC COMPOUNDS</b>																								
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND																				
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND																				
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND																				
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND																				
2-Butanone	mg/L	NA	7.14E-01	ND																				
2-Hexanone	mg/L	NA	4.94E-03	ND																				
Acetone	mg/L	NA	1.56E-01	ND																				
Benzene	mg/L	NA	1.41E-03	ND				2.30E-03				YES												
Carbon disulfide	mg/L	NA	1.51E-01	4.70E-04	J			ND																
Carbon tetrachloride	mg/L	NA	4.08E-04	ND																				
Chloroform	mg/L	NA	1.15E-03	4.60E-04	J			ND																
Chloromethane	mg/L	NA	3.93E-03	ND																				
Cumene	mg/L	NA	1.27E-01	ND																				
Ethylbenzene	mg/L	NA	1.40E-01	ND																				
Methylene chloride	mg/L	NA	7.85E-03	ND																				
N-Butylbenzene	mg/L	NA	9.57E-03	ND																				
N-Propylbenzene	mg/L	NA	1.30E-02	ND																				
Naphthalene	mg/L	NA	3.01E-03	ND																				
Tetrachloroethene	mg/L	NA	1.26E-03	ND																				
Toluene	mg/L	NA	2.59E-01	ND																				
Trichloroethene	mg/L	NA	4.51E-03	ND																				
m,p-Xylenes	mg/L	NA	2.80E+00	ND																				
p-Cymene	mg/L	NA	2.26E-01	ND																				
sec-Butylbenzene	mg/L	NA	1.06E-02	ND																				
tert-Butylbenzene	mg/L	NA	1.14E-02	ND																				

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VOCs in Groundwater  
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Sample Location Parcel Sample Number Sample Date				R24A-187 R24A-187-MW13 SK3014 25-Apr-03				R24A-187 R24A-187-MW14 SK3015 29-Apr-03				R24A-187 R24A-187-MW15 SK3016 30-Apr-03				R24A-187 R24A-187-MW16 SK3017 15-May-03				R24A-187 R24A-187-MW17 SK3018 2-May-03				
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL													
<b>VOLATILE ORGANIC COMPOUNDS</b>																								
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND																
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND				ND																
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND																
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND																
2-Butanone	mg/L	NA	7.14E-01	ND				ND																
2-Hexanone	mg/L	NA	4.94E-03	ND				ND																
Acetone	mg/L	NA	1.56E-01	ND				ND																
Benzene	mg/L	NA	1.41E-03	ND				ND																
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND																
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				ND																
Chloroform	mg/L	NA	1.15E-03	ND				ND																
Chloromethane	mg/L	NA	3.93E-03	ND				0.001				ND				ND				ND				
Cumene	mg/L	NA	1.27E-01	ND				ND																
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND																
Methylene chloride	mg/L	NA	7.85E-03	ND				ND																
N-Butylbenzene	mg/L	NA	9.57E-03	ND				ND																
N-Propylbenzene	mg/L	NA	1.30E-02	ND				ND																
Naphthalene	mg/L	NA	3.01E-03	ND				ND																
Tetrachloroethene	mg/L	NA	1.26E-03	ND				ND																
Toluene	mg/L	NA	2.59E-01	ND				ND																
Trichloroethene	mg/L	NA	4.51E-03	ND				ND																
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND																
p-Cymene	mg/L	NA	2.26E-01	ND				ND																
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND																
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND																

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VOCs in Groundwater  
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 Ranges Near Training Area T-24A  
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Sample Location Parcel				R24A-187 R24A-187-MW18 SK3019 14-May-03				R24A-187 R24A-187-MW19 SK3020 1-May-03				R24A-187 R24A-187-MW20 SK3021 20-May-03				R24A-187 R24A-187-MW21 SK3022 27-May-03				R24A-187 R24A-187-MW22 SK3023 22-May-03			
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
<b>VOLATILE ORGANIC COMPOUNDS</b>																							
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND			
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND				ND				ND				ND				1.90E-02			YES
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND				ND				ND				2.30E-04	J		
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND			
2-Butanone	mg/L	NA	7.14E-01	ND				ND				ND				ND				ND			
2-Hexanone	mg/L	NA	4.94E-03	ND				ND				ND				ND				ND			
Acetone	mg/L	NA	1.56E-01	ND				ND				ND				ND				ND			
Benzene	mg/L	NA	1.41E-03	ND				ND				ND				ND				1.60E+00			YES
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND				ND				ND				1.90E-03			
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				ND				ND				5.40E-02			YES	8.90E-01	J		YES
Chloroform	mg/L	NA	1.15E-03	ND				ND				ND				8.10E-03			YES	1.30E-01			YES
Chloromethane	mg/L	NA	3.93E-03	ND				ND				ND				ND				ND			
Cumene	mg/L	NA	1.27E-01	ND				ND				ND				ND				ND			
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND				ND				ND				ND			
Methylene chloride	mg/L	NA	7.85E-03	ND				ND				ND				ND				ND			
N-Butylbenzene	mg/L	NA	9.57E-03	ND				ND				ND				ND				ND			
N-Propylbenzene	mg/L	NA	1.30E-02	ND				ND				ND				ND				ND			
Naphthalene	mg/L	NA	3.01E-03	ND				ND				ND				ND				ND			
Tetrachloroethene	mg/L	NA	1.26E-03	ND				ND				ND				2.60E-04	J			9.70E-04	J		
Toluene	mg/L	NA	2.59E-01	ND				ND				ND				ND				2.10E-04	J		
Trichloroethene	mg/L	NA	4.51E-03	ND				ND				ND				ND				ND			
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND			
p-Cymene	mg/L	NA	2.26E-01	ND				ND				ND				ND				ND			
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND				ND				ND				ND			
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND				ND				ND				ND			

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VOCs in Groundwater  
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 Ranges Near Training Area T-24A  
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Sample Location Parcel Sample Number Sample Date				R24A-187 R24A-187-MW23 SK3025 7-May-03				R24A-187 R24A-187-MW24 SK3026 30-May-03				R24A-187 R24A-187-MW25 SK3027 15-May-03				R24A-187 R24A-187-MW28 SK3028 12-May-03				R24A-187 R24A-187-MW29 SK3029 16-May-03				
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	
<b>VOLATILE ORGANIC COMPOUNDS</b>																								
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND				
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND				ND				ND				ND				ND				
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND				
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND				
2-Butanone	mg/L	NA	7.14E-01	ND				ND				ND				ND				ND				
2-Hexanone	mg/L	NA	4.94E-03	ND				ND				ND				ND				ND				
Acetone	mg/L	NA	1.56E-01	ND				ND				ND				ND				ND				
Benzene	mg/L	NA	1.41E-03	ND				ND				ND				ND				ND				
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND				ND				ND				ND				
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				ND				ND				ND				ND				
Chloroform	mg/L	NA	1.15E-03	ND				ND				ND				ND				ND				
Chloromethane	mg/L	NA	3.93E-03	ND				ND				ND				ND				ND				
Cumene	mg/L	NA	1.27E-01	ND				ND				ND				ND				ND				
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND				ND				ND				ND				
Methylene chloride	mg/L	NA	7.85E-03	ND				ND				ND				ND				ND				
N-Butylbenzene	mg/L	NA	9.57E-03	ND				ND				ND				ND				ND				
N-Propylbenzene	mg/L	NA	1.30E-02	ND				ND				ND				ND				ND				
Naphthalene	mg/L	NA	3.01E-03	ND				ND				ND				ND				ND				
Tetrachloroethene	mg/L	NA	1.26E-03	ND				ND				ND				ND				ND				
Toluene	mg/L	NA	2.59E-01	ND				ND				ND				ND				ND				
Trichloroethene	mg/L	NA	4.51E-03	ND				ND				ND				ND				ND				
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND				
p-Cymene	mg/L	NA	2.26E-01	ND				ND				ND				ND				ND				
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND				ND				ND				ND				
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND				ND				ND				ND				

Table 2

**VOCs in Groundwater  
Remedial Investigation, Addendum IV  
Ranges Near Training Area T-24A  
Fort McClellan, Calhoun County, Alabama**

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Sample Location Parcel Sample Number Sample Date				R24A-187 R24A-187-MW30 SK3030 12-May-03				R24A-187 R24A-187-MW35 SK3031 8-May-03				R24A-187 R24A-187-MW36 SK3032 8-May-03				R24A-187 R24A-187-MW38 SK3033 9-May-03				R24A-187 R24A-187-MW40 SK3034 22-May-03			
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
<b>VOLATILE ORGANIC COMPOUNDS</b>																							
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				2.70E-03				ND			
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND				ND				ND				ND				ND			
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND			
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				6.80E-04	J			ND			
2-Butanone	mg/L	NA	7.14E-01	ND				ND				ND				ND				ND			
2-Hexanone	mg/L	NA	4.94E-03	ND				ND				ND				ND				ND			
Acetone	mg/L	NA	1.56E-01	ND				ND				ND				ND				ND			
Benzene	mg/L	NA	1.41E-03	ND				ND				ND				2.40E-04	J			ND			
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND				ND				ND				7.70E-04	J		
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				ND				ND				ND				ND			
Chloroform	mg/L	NA	1.15E-03	ND				ND				ND				2.40E-04	J			ND			
Chloromethane	mg/L	NA	3.93E-03	ND				ND				ND				ND				ND			
Cumene	mg/L	NA	1.27E-01	ND				ND				ND				ND				ND			
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND				ND				ND				ND			
Methylene chloride	mg/L	NA	7.85E-03	ND				ND				ND				ND				ND			
N-Butylbenzene	mg/L	NA	9.57E-03	ND				ND				ND				ND				ND			
N-Propylbenzene	mg/L	NA	1.30E-02	ND				ND				ND				ND				ND			
Naphthalene	mg/L	NA	3.01E-03	ND				ND				ND				ND				ND			
Tetrachloroethene	mg/L	NA	1.26E-03	ND				ND				ND				ND				ND			
Toluene	mg/L	NA	2.59E-01	ND				ND				ND				ND				ND			
Trichloroethene	mg/L	NA	4.51E-03	ND				ND				ND				ND				ND			
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND			
p-Cymene	mg/L	NA	2.26E-01	ND				ND				ND				2.70E-04	J			ND			
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND				ND				5.50E-04	J			ND			
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND				ND				2.30E-04	J			ND			

Table 2

VOCs in Groundwater  
 Remedial Investigation, Addendum IV  
 Ranges Near Training Area T-24A  
 Fort McClellan, Calhoun County, Alabama

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Sample Location Parcel Sample Number Sample Date				R24A-187 R24A-187-MW41 SK3035 12-May-03				R24A-187 R24A-187-MW42 SK3036 20-May-03				R24A-187 R24A-187-MW43 SK3037 21-May-03				R24A-187 R24A-187-MW44 SK3038 21-May-03				R24A-187 R24A-187-MW45 SK3039 27-May-03				
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL																	
<b>VOLATILE ORGANIC COMPOUNDS</b>																								
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND																				
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND																				
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND																				
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND																				
2-Butanone	mg/L	NA	7.14E-01	ND																				
2-Hexanone	mg/L	NA	4.94E-03	ND																				
Acetone	mg/L	NA	1.56E-01	ND				ND				ND				8.70E-03	B			ND				
Benzene	mg/L	NA	1.41E-03	ND				8.50E-04	J															
Carbon disulfide	mg/L	NA	1.51E-01	ND				2.90E-04	J			ND				3.80E-04	J			2.80E-04	J			
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				8.20E-02				YES												
Chloroform	mg/L	NA	1.15E-03	ND				2.00E-02				YES												
Chloromethane	mg/L	NA	3.93E-03	ND																				
Cumene	mg/L	NA	1.27E-01	ND																				
Ethylbenzene	mg/L	NA	1.40E-01	ND																				
Methylene chloride	mg/L	NA	7.85E-03	ND																				
N-Butylbenzene	mg/L	NA	9.57E-03	ND																				
N-Propylbenzene	mg/L	NA	1.30E-02	ND																				
Naphthalene	mg/L	NA	3.01E-03	ND																				
Tetrachloroethene	mg/L	NA	1.26E-03	ND				3.40E-04	J															
Toluene	mg/L	NA	2.59E-01	ND																				
Trichloroethene	mg/L	NA	4.51E-03	ND																				
m,p-Xylenes	mg/L	NA	2.80E+00	ND																				
p-Cymene	mg/L	NA	2.26E-01	ND																				
sec-Butylbenzene	mg/L	NA	1.06E-02	ND																				
tert-Butylbenzene	mg/L	NA	1.14E-02	ND																				

Table 2

VOCs in Groundwater  
 Remedial Investigation, Addendum IV  
 Ranges Near Training Area T-24A  
 Fort McClellan, Calhoun County, Alabama

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Sample Location Parcel Sample Number Sample Date				R24A-187 R24A-187-MW46 SK3041 4-Jun-03				R24A-187 R24A-187-MW47 SK3042 21-May-03				R24A-187 R24A-187-MW48 SK3043 2-Jun-03			
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
<b>VOLATILE ORGANIC COMPOUNDS</b>															
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND			
1,2-Dichloroethane	mg/L	NA	4.48E-04	ND				ND				ND			
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND				ND			
1,3,5-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND			
2-Butanone	mg/L	NA	7.14E-01	ND				ND				ND			
2-Hexanone	mg/L	NA	4.94E-03	ND				ND				ND			
Acetone	mg/L	NA	1.56E-01	6.80E-03 J				ND				ND			
Benzene	mg/L	NA	1.41E-03	ND				ND				1.20E-01 J			YES
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND				ND			
Carbon tetrachloride	mg/L	NA	4.08E-04	ND				ND				ND			
Chloroform	mg/L	NA	1.15E-03	ND				ND				ND			
Chloromethane	mg/L	NA	3.93E-03	ND				ND				ND			
Cumene	mg/L	NA	1.27E-01	ND				ND				ND			
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND				ND			
Methylene chloride	mg/L	NA	7.85E-03	ND				ND				ND			
N-Butylbenzene	mg/L	NA	9.57E-03	ND				ND				ND			
N-Propylbenzene	mg/L	NA	1.30E-02	ND				ND				ND			
Naphthalene	mg/L	NA	3.01E-03	ND				ND				ND			
Tetrachloroethene	mg/L	NA	1.26E-03	ND				ND				ND			
Toluene	mg/L	NA	2.59E-01	5.90E-04 J				ND				ND			
Trichloroethene	mg/L	NA	4.51E-03	ND				ND				ND			
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND			
p-Cymene	mg/L	NA	2.26E-01	ND				ND				ND			
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND				ND			
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND				ND			

**Table 2**

**VOCs in Groundwater  
Remedial Investigation, Addendum IV  
Ranges Near Training Area T-24A  
Fort McClellan, Calhoun County, Alabama**

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Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

<sup>a</sup> BKG - Background. Background concentrations are not applicable for VOCs.

<sup>b</sup> Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is an estimated concentration.

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

**Table 3**

**VOC Concentrations Above SSSLs  
Remedial Investigation, Addendum IV  
Ranges Near Training Area T-24A  
Fort McClellan, Calhoun County, Alabama**

Well Location	Sample No.	Sample Date	VOC Parameter	Result (mg/L)	Qual	SSSL (mg/L)	>SSSL	Total VOCs (mg/L)
R24A-187-MW22	SK3023	22-May-03	1,2-Dichloroethane	0.019		0.000448	YES	<b>2.64231</b>
			1,2-Dimethylbenzene	0.00023	J	2.801371		
			Benzene	1.6		0.001406	YES	
			Carbon disulfide	0.0019		0.150567		
			Carbon tetrachloride	0.89	J	0.000408	YES	
			Chloroform	0.13		0.001152	YES	
			Tetrachloroethene	0.00097	J	0.001257		
			Toluene	0.00021	J	0.259032		
R24A-187-MW48	SK3043	02-Jun-03	Benzene	0.12	J	0.001406	YES	<b>0.12</b>
R24A-187-MW45	SK3039	27-May-03	Benzene	0.00085	J	0.001406		<b>0.10347</b>
			Carbon disulfide	0.00028	J	0.150567		
			Carbon tetrachloride	0.082		0.000408	YES	
			Chloroform	0.02		0.001152	YES	
			Tetrachloroethene	0.00034	J	0.001257		
R24A-187-MW21	SK3022	27-May-03	Carbon tetrachloride	0.054		0.000408	YES	<b>0.06236</b>
			Chloroform	0.0081		0.001152	YES	
			Tetrachloroethene	0.00026	J	0.001257		
R24A-187-MW12	SK3012	22-May-03	Benzene	0.0023		0.001406	YES	<b>0.0023</b>
FTA-108-T24A-G01	SK3056	30-May-03	Benzene	0.0039		0.001406	YES	<b>0.0039</b>

mg/L - Milligrams per liter.

J - Compound was positively identified; reported value is an estimated concentration.

Qual - Data validation qualifier.

SSSL - Site-specific screening level.

VOC - Volatile organic compound.

**Table 4**

**Residuum Monitoring Well Groundwater Elevations and Construction Summary  
Remedial Investigation, Addendum IV  
Ranges Near Training Area T-24A  
Fort McClellan, Calhoun County, Alabama**

<b>Residuum Monitoring Well</b>	<b>TOC Elevation (ft amsl)</b>	<b>Depth to Water (ft BTOC)</b>	<b>Groundwater Elevation (ft amsl)</b>	<b>Well Depth (ft bgs)</b>	<b>Screen Length (ft)</b>	<b>Screen Interval (ft bgs)</b>	<b>Screen Elevation (ft amsl)</b>
FTA-108-BK-G06	1022.88	3.88	1019.00	20	10	9 - 19	1011.83 - 1001.83
FTA-108-GP01	1014.80	6.98	1007.82	24	15	9 - 24	1002.79 - 987.79
FTA-108-GP02	1012.30	6.46	1005.84	24	15	9 - 24	1000.47 - 985.47
FTA-108-GP03	1010.52	5.22	1005.30	23	15	8 - 23	999.76 - 984.76
FTA-108-GP04	991.67	10.94	980.73	29	15	14 - 29	974.82 - 959.82
FTA-108-GP05	984.88	12.48	972.40	24	15	9 - 24	972.96 - 957.96
FTA-108-GP06	1006.00	5.00	1001.00	14	10	4 - 14	999.42 - 989.42
FTA-108-GP07	1020.80	2.17	1018.63	14	10	4 - 14	1013.88 - 1003.88
FTA-108-GP08	1061.57	14.18	1047.39	42	20	22 - 42	1036.74 - 1016.74
FTA-108-GP09	1095.02	11.12	1083.90	44	20	21 - 41	1071.50 - 1051.50
FTA-108-GP10	1052.83	17.11	1035.72	35	15	20 - 35	1030.18 - 1015.18
FTA-88-GP01	1023.73	10.04	1013.69	19	15	4 - 19	1016.74 - 1001.74
FTA-88-GP02	1022.11	7.75	1014.36	19	15	4 - 19	1015.13 - 1000.13
FTA-88-GP03	1027.86	14.45	1013.41	29	15	14 - 29	1011.05 - 996.05
FTA-88-GP04	1016.52	7.30	1009.22	15	10	5 - 15	1008.68 - 998.68
R24A-187-MW01	1002.32	10.32	992.00	45	20	20 - 40	979.72 - 959.72
R24A-187-MW02	976.08	8.58	967.50	44.4	10	34.1 - 44.1	939.26 - 929.26
R24A-187-MW03	980.36	10.85	969.51	44	15	26 - 41	952.02 - 937.02
R24A-187-MW04	1014.53	18.10	996.43	62	20	39 - 59	973.29 - 953.29
R24A-187-MW05	984.07	11.78	972.29	46	20	26 - 46	955.75 - 935.75
R24A-187-MW06	1008.29	5.15	1003.14	59	20	34 - 54	971.77 - 951.77
R24A-187-MW16	957.03	7.88	949.15	23.8	10	8.8 - 18.8	945.85 - 935.85
R24A-187-MW17	958.76	5.21	953.55	38	15	18 - 33	938.27 - 923.27
R24A-187-MW19	1033.17	4.94	1028.23	29.5	10	19.5 - 29.5	1011.21 - 1001.21
R24A-187-MW25	1018.31	5.52	1012.79	30	10	20 - 30	995.79 - 985.79
R24A-187-MW28	1018.72	6.23	1012.49	30	10	20 - 30	996.29 - 986.29
R24A-187-MW29	1017.54	6.08	1011.46	30	10	20 - 30	995.03 - 985.03
R24A-187-MW30	1020.26	6.19	1014.07	30	10	20 - 30	998.26 - 988.26
R24A-187-MW35	1025.07	7.76	1017.31	30	10	20 - 30	1002.58 - 992.58
R24A-187-MW36	1025.98	7.28	1018.70	30	10	20 - 30	1003.52 - 993.52
R24A-187-MW38	1026.91	7.33	1019.58	25	10	15 - 25	1009.30 - 999.30
R24A-187-MW47	954.61	7.61	947.00	40	15	25 - 40	927.31 - 912.31

**Notes:**

Groundwater elevations recorded June 18, 2003.

ft amsl - feet above mean sea level.

ft bgs - feet below ground surface.

ft BTOC - feet below top of casing.

TOC - Top of casing.

Table 5

**Bedrock Monitoring Well Groundwater Elevations and Construction Summary**  
**Remedial Investigation, Addendum IV**  
**Ranges Near Training Area T-24A**  
**Fort McClellan, Calhoun County, Alabama**

Bedrock Monitoring Well	TOC Elevation (ft amsl)	Depth to Water (ft BTOC)	Groundwater Elevation (ft amsl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Screen Elevation (ft amsl)
FTA-108-T24A-G01	1007.11	30.05	977.06	100	10	87 - 97	918.24 - 908.24
FTA-108-T24A-G02	1007.85	13.89	993.96	30	10	17 - 27	988.93 - 978.93
FTA-108-T24A-G03	1033.02	11.58	1021.44	40	10	26 - 36	1004.73 - 994.73
R24A-187-MW07	1003.31	17.08	986.23	90	10	76.8 - 86.8	924.02 - 914.02
R24A-187-MW08	976.16	8.74	967.42	75	10	61.2 - 71.2	912.54 - 902.54
R24A-187-MW09	980.53	11.44	969.09	75	10	61.8 - 71.8	916.42 - 906.42
R24A-187-MW10	1012.94	48.00	964.94	110.2	9.5	97.5 - 107	913.19 - 903.69
R24A-187-MW11	984.22	19.99	964.23	70	10	58.8 - 68.8	923.32 - 913.32
R24A-187-MW12	1007.93	33.62	974.31	147	10	135.8 - 145.8	869.92 - 859.92
R24A-187-MW13	984.64	15.67	968.97	75	10	64 - 74	918.48 - 908.48
R24A-187-MW14	1007.47	15.82	991.65	100.2	15	82.6 - 97.6	922.70 - 907.70
R24A-187-MW15	1034.37	13.33	1021.04	103	15	87.5 - 102.5	944.85 - 929.85
R24A-187-MW18	1052.30	22.13	1030.17	111	10	97 - 107	952.99 - 942.99
R24A-187-MW20	1004.83	42.25	962.58	151.7	10	138.3 - 148.3	864.45 - 854.45
R24A-187-MW21	984.30	21.74	962.56	132.2	10	118.8 - 128.8	864.26 - 854.26
R24A-187-MW22	1006.63	34.38	972.25	245.3	10	232 - 242	772.73 - 762.73
R24A-187-MW23	1034.82	16.33	1018.49	169.9	10	159.5 - 169.5	873.06 - 863.06
R24A-187-MW24	1017.64	24.31	993.33	300.3	20	280 - 300	735.10 - 715.10
R24A-187-MW40	1033.54	27.49	1006.05	275	20	255 - 275	776.16 - 756.16
R24A-187-MW41	1005.09	0.00	1005.09	231.9	10	223 - 233	779.65 - 769.65
R24A-187-MW42	1006.97	7.58	999.39	242.5	20	222 - 242	782.59 - 762.59
R24A-187-MW43	982.27	13.80	968.47	220	20	200 - 220	779.86 - 759.86
R24A-187-MW44	984.73	18.45	966.28	224	20	204 - 224	778.43 - 758.43
R24A-187-MW45	1006.06	44.07	961.99	183	20	163 - 183	840.74 - 820.74
R24A-187-MW46	1008.51	39.78	968.73	350	20	330 - 350	676.05 - 656.05
R24A-187-MW48	1057.77	83.69	974.08	290	20	270 - 290	786.50 - 766.50

**Notes:**

Groundwater elevations recorded June 18, 2003.

ft amsl - feet above mean sea level.

ft bgs - feet below ground surface.

ft BTOC - feet below top of casing.

TOC - Top of casing.

**Table 6**

**Sample Rationale  
Remedial Investigation, Addendum IV  
Ranges Near Training Area T-24 Alpha,  
Fort McClellan, Calhoun County, Alabama**

Location	Sample Rationale
R24A-187-MW49	Permanent bedrock well to be placed approximately 160 feet southeast of well cluster FTA-108-T24A-G01, R24A-187-MW12, R24A-187-MW22, and R24A-187-MW46 and along the northeast boundary of the fenced area at T-24A. The location is along a suspected northwest-southeast trending fault interpreted to parallel the fenced area and is upgradient to benzene and carbon tetrachloride contamination at well cluster at R24A-187-MW46 . Groundwater sample data will further delineate the vertical and horizontal extent of benzene and carbon tetrachloride contamination. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology, and provide information on groundwater quality in the bedrock. R24A-187-49 will be sampled by split spoon sampler and hollow stem auger drill rig to the top of bedrock and then air drilled to a target depth of 300 feet bgs, after installing 8 inch outer casing at approximately 75 feet. This target depth may be modified depending on field conditions. An estimated 10 discrete groundwater samples will be collected at 20 foot intervals. Geophysical logging comprised of dipmeter, acoustic, televiwer, temperature, resistivity and caliper logging will be carried out from the bottom of the casing to the total anticipated depth. Natural gamma ray logging will be completed from ground surface to the total anticipated depth. The well construction will consist of 2.5 inch ID schedule 80 PVC with 15 feet of screen.
R24A-187-MW50	Permanent bedrock well to be placed approximately 160 feet north-northwest of R24A-187-MW48. The location is upgradient/side gradient to benzene contamination detected in groundwater at R24A-187-MW48 and is approximately 400 feet upgradient of R24A-187-MW45 where carbon tetrachloride contamination is present in groundwater. Groundwater sample data will further delineate the vertical and horizontal extent of benzene and carbon tetrachloride contamination. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology, and provide information on groundwater quality in the bedrock. R24A-187-MW50 will be sampled by split spoon sampler and hollow stem auger drill rig to the top of bedrock and then air drilled to a target depth of 300 feet bgs, after installing 8 inch outer casing at approximately 75 feet. An estimated 10 discrete groundwater samples will be collected at 20 foot intervals. This target depth may be modified depending on field conditions. Geophysical logging comprised of dipmeter, acoustic, televiwer, temperature, resistivity and caliper logging will be carried out from the bottom of the casing to the total anticipated depth. Natural gamma ray logging will be completed from ground surface to the total anticipated depth. The well construction will consist of 2.5 inch ID schedule 80 PVC with 15 feet of screen.
R24A-187-MW51	Permanent bedrock well to be placed approximately 280 feet west of well cluster FTA-108-T24A-G01, R24A-187-MW12, R24A-187-MW22, and R24A-187-MW46, where benzene and carbon tetrachloride are present in the groundwater and approximately 160 feet south of well R24A-187-MW21, where carbon tetrachloride is detected in groundwater. The location is upgradient to these areas and along a major north-south trending thrust fault mapped in the area. Groundwater sample data will further delineate the vertical and horizontal extent of benzene and carbon tetrachloride contamination. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology, and provide information on groundwater quality in the bedrock. R24A-187-MW51 will be sampled by split spoon sampler and hollow stem auger drill rig to the top of bedrock and then air drilled to a target depth of 300 feet bgs, after installing 8 inch outer casing at approximately 75 feet. An estimated 10 discrete groundwater samples will be collected at 20 foot intervals. This target depth may be modified depending on field conditions. Geophysical logging comprised of dipmeter, acoustic, televiwer, temperature, resistivity and caliper logging will be carried out from the bottom of the casing to the total anticipated depth. Natural gamma ray logging will be completed from ground surface to the total anticipated depth. The well construction will consist of 2.5 inch ID schedule 80 PVC with 15 feet of screen.
FTA-108-T24A-G01	Resample existing monitoring wells.
R24A-187-MW12	
R24A-187-MW14	
R24A-187-MW21	
R24A-187-MW22	
R24A-187-MW24	
R24A-187-MW40	
R24A-187-MW42	
R24A-187-MW44	
R24A-187-MW45	
R24A-187-MW46	
R24A-187-MW48	

**Table 7**

**Groundwater Samples and Analytical Parameters  
Remedial Investigation, Addendum IV  
Ranges Near Training Area T-24 Alpha  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	QA/QC Samples		Analytical Parameters
		Field Duplicates	MS/MSD	
FTA-108-T24A-G01	FTA-108-T24A-G01-GW-SN3001-REG			TCL VOCs
R24A-187-MW12	R24A-187-MW12-GW-SN3002-REG			TCL VOCs
R24A-187-MW14	R24A-187-MW14-GW-SN3003-REG			TCL VOCs
R24A-187-MW21	R24A-187-MW21-GW-SN3004-REG	R24A-187-MW21-GW-SN3005-FD		TCL VOCs
R24A-187-MW22	R24A-187-MW22-GW-SN3006-REG	R24A-187-MW22-GW-SN3007-FD		TCL VOCs
R24A-187-MW24	R24A-187-MW24-GW-SN3008-REG			TCL VOCs
R24A-187-MW40	R24A-187-MW40-GW-SN3009-REG		R24A-187-MW40-GW-SN3009-MS/MSD	TCL VOCs
R24A-187-MW42	R24A-187-MW42-GW-SN3010-REG			TCL VOCs
R24A-187-MW44	R24A-187-MW44-GW-SN3011-REG			TCL VOCs
R24A-187-MW45	R24A-187-MW45-GW-SN3012-REG			TCL VOCs
R24A-187-MW46	R24A-187-MW46-GW-SN3013-REG			TCL VOCs
R24A-187-MW48	R24A-187-MW48-GW-SN3014-REG			TCL VOCs
R24A-187-MW49 <sup>a</sup>	R24A-187-MW49-GW-SN3015-REG			TCL VOCs
R24A-187-MW50 <sup>a</sup>	R24A-187-MW50-GW-SN3016-REG			TCL VOCs
R24A-187-MW51 <sup>a</sup>	R24A-187-MW51-GW-SN3017-REG			TCL VOCs

<sup>a</sup> Sample location is a new monitoring well location. Discrete samples will be collected at 10' intervals at these wells during installation and analyzed for TCL VC

QA/QC - Quality assurance/quality control.

FD - Field duplicate.

MS/MSD - Matrix spike/matrix spike duplicate.

REG - Field sample.

TCL VOCs- Target compound list volatile organic compounds.

**Table 8**

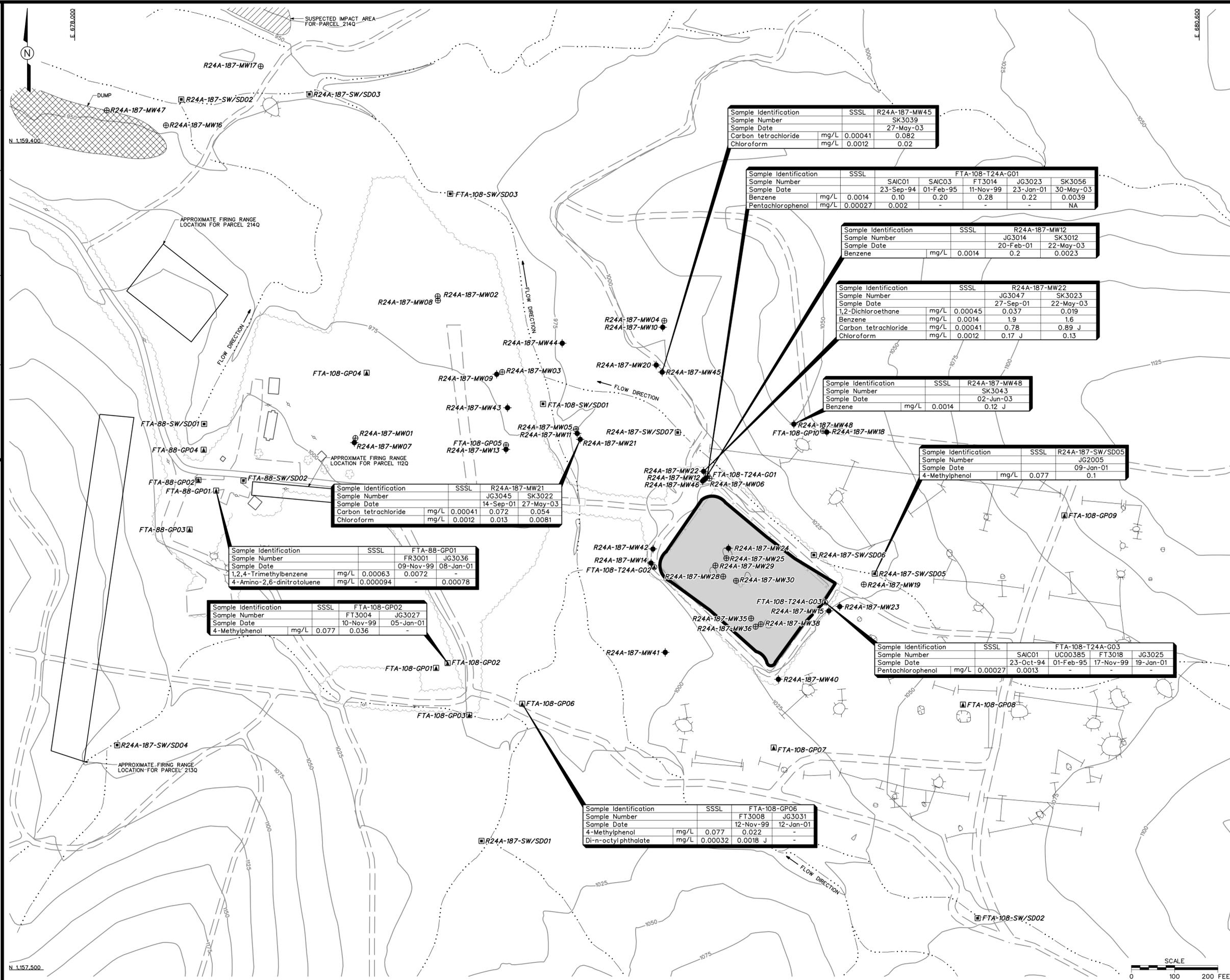
**Analytical Samples  
Remedial Investigation, Addendum IV  
Ranges Near Training Area T-24 Alpha,  
Fort McClellan, Calhoun County, Alabama**

Parameters	Analytical Method	Sample Matrix	TAT Needed	Field Samples			QA/QC Samples <sup>a</sup>				EMAX	
				No. of Sample Points	No. of Events	No. of Field Samples	Field Dups (10%)	MS/MSD (5%)	Trip Blank (1/ship)	Eq. Rinse (1/wk/matrix)	Total No. Analysis	
<b>Training Area T-24 Alpha: 15 groundwater samples</b>												
All samples will be analyzed for the following parameters:												
TCL VOCs	8260B	water	normal	15	1	15	2	1	3	1	23	
<b>Training Area T-24 Alpha Supplemental Subtotal:</b>				15			2	1	3	1	23	
<b>Training Area T-24 Alpha: 30 water matrix discrete samples</b>												
All samples will be analyzed for the following parameters:												
TCL VOCs	8260B	<b>24-hr</b>	normal	30	1	30					30	
<b>Training Area T-24 Alpha Subtotal:</b>				30			0	0	0	0	30	
<p><sup>a</sup>Field duplicate, and MS/MSD samples were calculated as a percentage of the field samples collected per site and were rounded to the nearest whole number.</p> <p>One trip blank sample will be collected each week with water matrix samples for VOC analysis only. Assumed 5 field samples per week to estimate trip blanks. Equipment blanks will be collected once per event whenever sampling equipment is field decontaminated and re-used. They will be repeated weekly for sampling events that last more than 1 week. Assumed 5 field samples will be collected per week to estimate number of equipment blanks.</p> <p>TAT - Turn-around time.</p> <p>QA/QC - Quality assurance/quality control.</p> <p>MS/MSD - Matrix spike/matrix spike duplicate.</p> <p>TCL VOCs - target compound list volatile organic compounds.</p>												
								Ship samples to:	EMAX Laboratories, Inc. 1835 205th Street Torrance, CA 90501 Attn: Elizabeth McIntyre Tel: 310-618-8889 Fax: 310-618-0818			

## FIGURES

INITIATOR: B. HEDBERG  
 DWG. NO.: 796887.es.805  
 PROJ. MGR.: J. YACOUB  
 PROJ. NO.: 796887  
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 ENGR. CHCK. BY: S. MORAN  
 STARTING DATE: 09/02/03  
 DATE LAST REV.:  
 DRAWN BY: D. BOMAR

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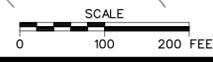
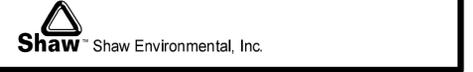


- LEGEND:**
- UNIMPROVED ROADS AND PARKING
  - PAVED ROADS AND PARKING
  - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
  - TREES / TREELINE
  - PARCEL BOUNDARY
  - BRIDGE
  - SURFACE DRAINAGE / CREEK
  - FENCE
  - UTILITY POLE
  - TRENCHES
  - MOUNDS
  - DEPRESSIONS
  - BEDROCK MONITORING WELL LOCATION
  - RESIDUUM MONITORING WELL LOCATION
  - GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
  - SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
  - SURFACE SOIL SAMPLE LOCATION
  - GROUNDWATER SAMPLE LOCATION
  - RESULT IS GREATER THAN STATED METHOD DETECTION LIMIT BUT LESS THAN OR EQUAL TO SPECIFIED REPORTING LIMIT
  - NA NOT ANALYZED
  - NOT DETECTED
  - SSSLs SITE SPECIFIC SCREENING LEVELS
  - mg/L MILLIGRAMS PER LITER

**NOTE:**  
 1. COMMON LAB CONTAMINANTS ACETONE, METHYLENE CHLORIDE, BIS(2-ETHYLHEXYL) PHTHALATE NOT INCLUDED.

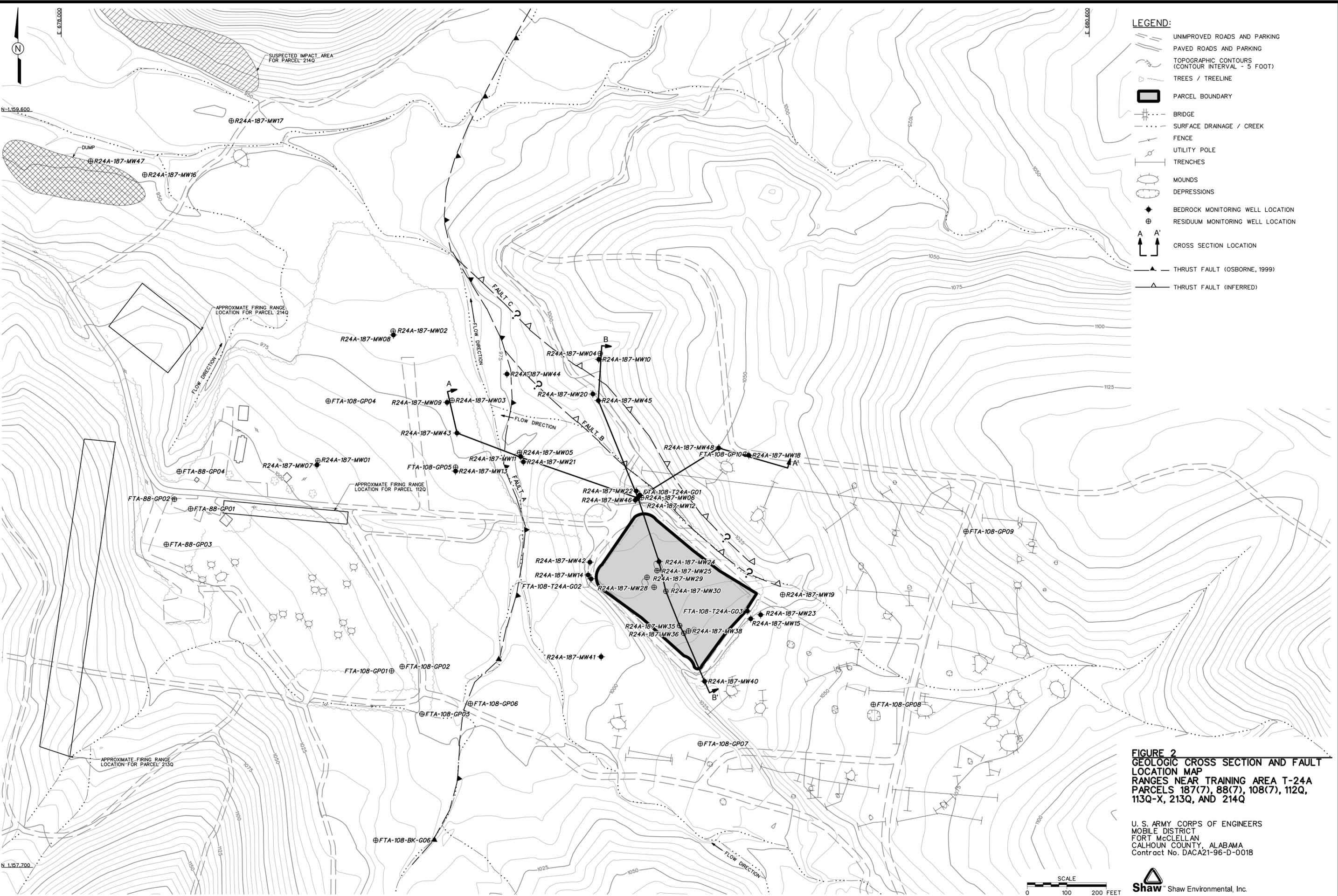
**FIGURE 1**  
 GROUNDWATER AND SURFACE WATER SAMPLES ORGANIC DETECTIONS EXCEEDING HUMAN HEALTH SSSLs RANGES NEAR TRAINING AREA T-24A PARCELS 187(7), 88(7), 108(7), 112Q, 113Q-X, 213Q, AND 214Q

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 CALHOUN COUNTY, ALABAMA  
 Contract No. DACA21-96-D-0018



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 PROJ. MGR.: J. YACOUB  
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 ENGR. CHK. BY: S. MORAN  
 STARTING DATE: 07/03/03  
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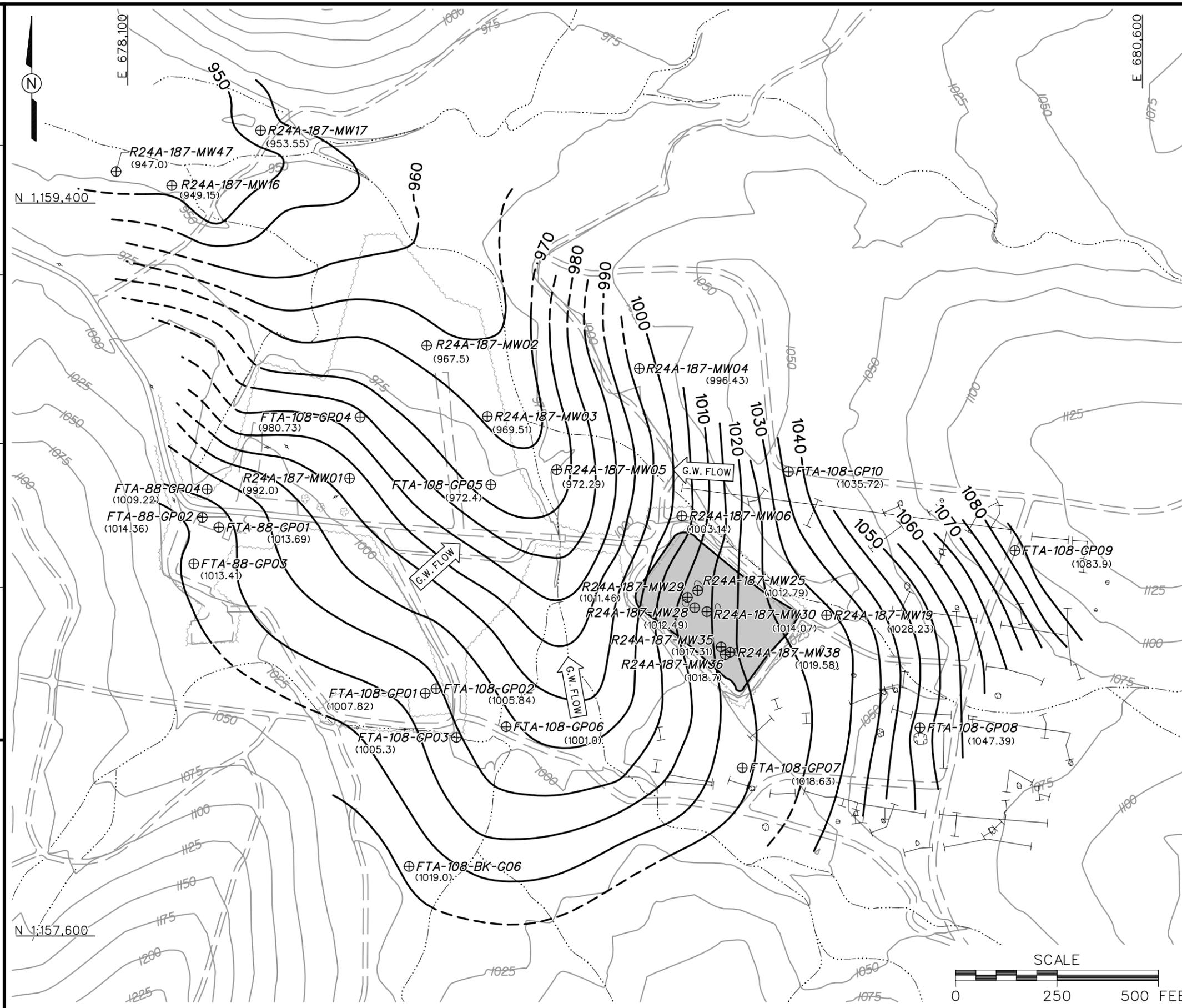


**FIGURE 2**  
**GEOLOGIC CROSS SECTION AND FAULT**  
**LOCATION MAP**  
**RANGES NEAR TRAINING AREA T-24A**  
**PARCELS 187(7), 88(7), 108(7), 112Q,**  
**113Q-X, 213Q, AND 214Q**

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 CALHOUN COUNTY, ALABAMA  
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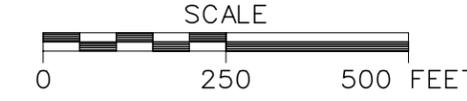
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- LEGEND**
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  - PAVED ROADS AND PARKING
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  - GROUNDWATER ELEVATION CONTOURS (DASHED WHERE INFERRED)
  - (1019.00) GROUNDWATER ELEVATION (FT MSL) (JUNE 2003)
  - G.W. FLOW
  - TREES / TREELINE
  - PARCEL BOUNDARY
  - BRIDGE
  - SURFACE DRAINAGE / CREEK
  - FENCE
  - UTILITY POLE
  - TRENCHES
  - MOUNDS
  - DEPRESSIONS
  - RESIDUUM MONITORING WELL LOCATION

**FIGURE 3**  
 RESIDUUM POTENTIOMETRIC MAP  
 RANGES NEAR TRAINING AREA T-24A  
 PARCELS 187(7), 88(7), 108(7), 112Q,  
 113Q-X, 213Q, AND 214Q

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 CALHOUN COUNTY, ALABAMA  
 Contract No. DACA21-96-D-0018

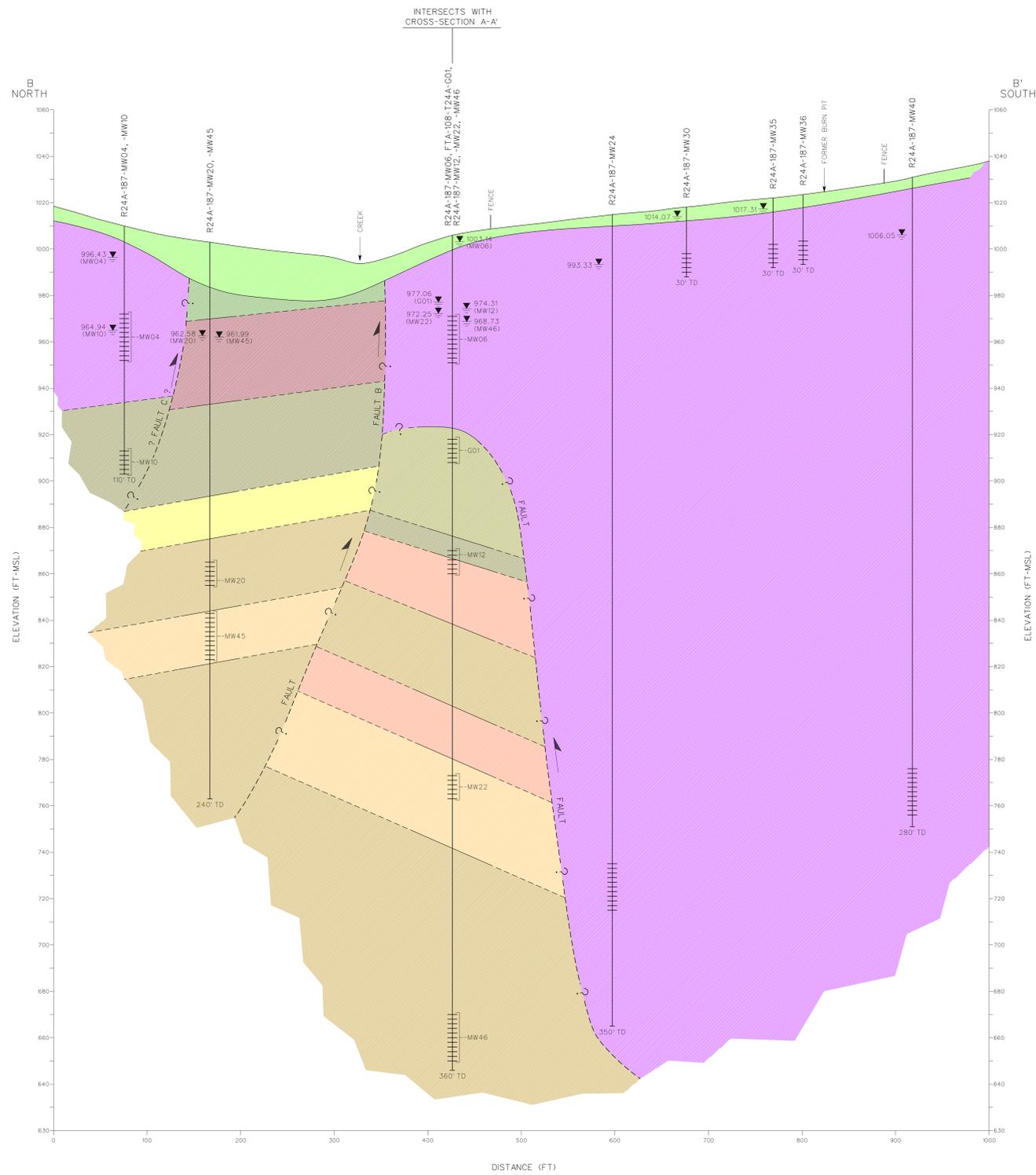






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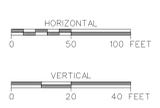
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- LEGEND:**
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  - GROUNDWATER ELEVATION (FT MSL) (JANUARY 2002)
  - CONTACT DASHED WHERE INFERRED
  - RELATIVE MOVEMENT OF THRUST FAULT
  - SHALE
  - SILTSTONE
  - SHALE AND SILTSTONE, INTERBEDDED
  - MUDSTONE
  - SANDSTONE AND SILTSTONE, INTERBEDDED, CONGLOMERATIC IN PART
  - QUARTZITE
  - SANDSTONE AND QUARTZITE, INTERBEDDED
  - SILT AND CLAY UNDIFFERENTIATED
  - GRAVELLY SILT
  - QUARTZITE AND SHALE
  - SANDSTONE
  - SANDSTONE AND SHALE, INTERBEDDED

**NOTE:**  
 1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

**FIGURE 6**  
 GEOLOGIC CROSS-SECTION B-B'  
 RANGES NEAR TRAINING AREA T-24A  
 PARCELS 187(7), 88(7), 108(7), 112Q,  
 113Q-X, 213Q, AND 214Q



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 CALHOUN COUNTY, ALABAMA  
 Contract No. DACA21-96-D-0018  
 Shaw Environmental, Inc.

DWG. NO.: ...796887es.808  
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 PROJ. MGR.: J. YACOUB  
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 ENGR. CHCK. BY: S. MORAN  
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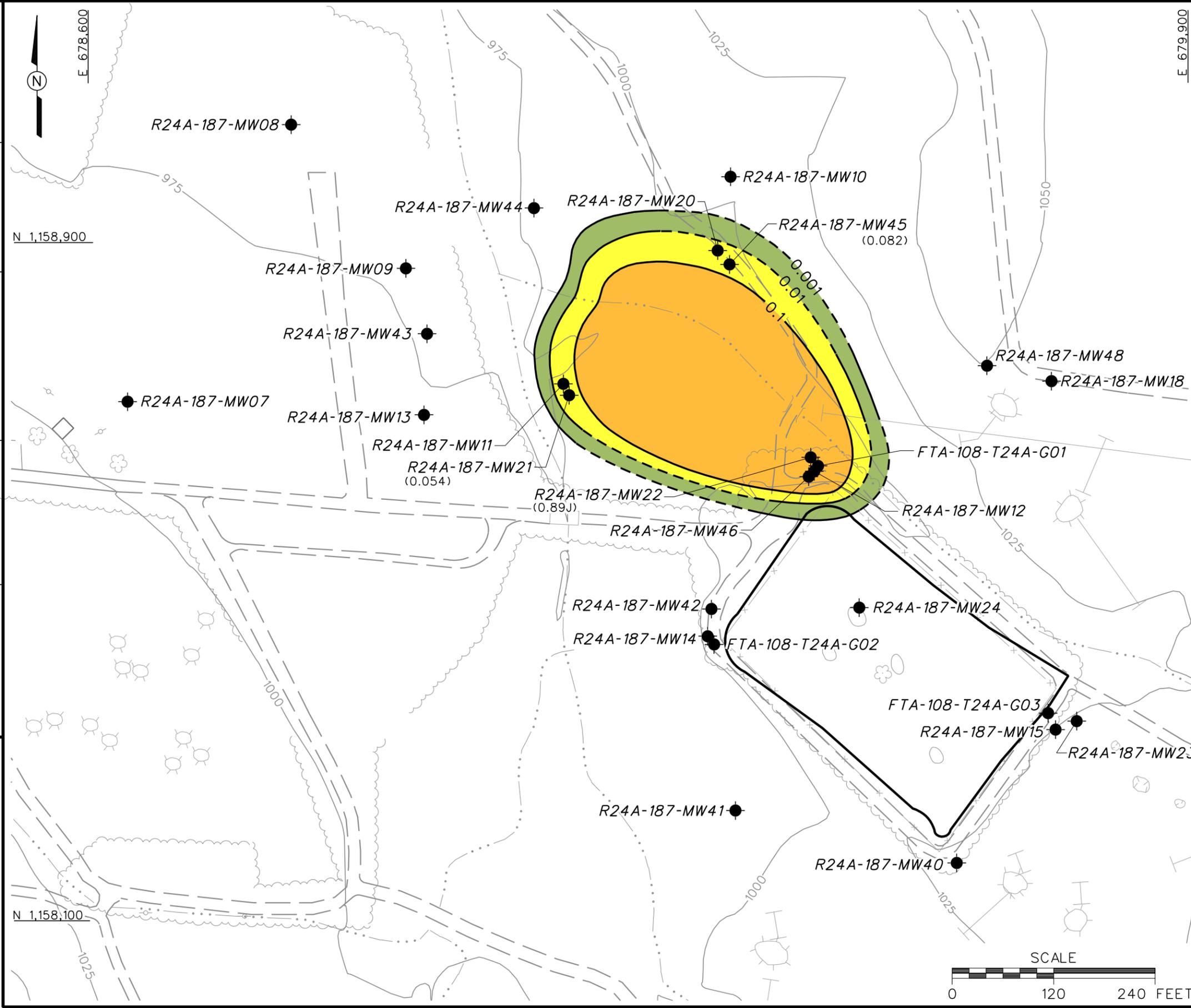
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- TREES / TREELINE
- PARCEL BOUNDARY
- BRIDGE
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- TRENCHES
- MOUNDS
- DEPRESSIONS
- BEDROCK MONITORING WELL LOCATION
- BENZENE CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- COMPOUND WAS POSITIVELY IDENTIFIED; REPORTED VALUE IS AN ESTIMATED CONCENTRATION

**FIGURE 7**  
 BENZENE DETECTIONS IN  
 BEDROCK WELLS  
 APRIL-JUNE 2003 SAMPLING EVENT  
 RANGES NEAR TRAINING AREA T-24A  
 PARCELS 187(7), 88(7), 108(7), 112Q,  
 113Q-X, 213Q, AND 214Q

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



DWG. NO.: ...796887es.809  
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 PROJ. MGR.: J. YACOUB  
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**LEGEND**

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- BRIDGE
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- TRENCHES
- MOUNDS
- DEPRESSIONS
- BEDROCK MONITORING WELL LOCATION
- CARBON TETRACHLORIDE CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- COMPOUND WAS POSITIVELY IDENTIFIED; REPORTED VALUE IS AN ESTIMATED CONCENTRATION

**FIGURE 8**  
 CARBON TETRACHLORIDE  
 DETECTIONS IN BEDROCK WELLS  
 APRIL-JUNE 2003 SAMPLING EVENT  
 RANGES NEAR TRAINING AREA T-24A  
 PARCELS 187(7), 88(7), 108(7), 112Q,  
 113Q-X, 213Q, AND 214Q

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



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 PROJ. MGR.: J. YACOUB  
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 ENGR. CHCK. BY: S. MORAN  
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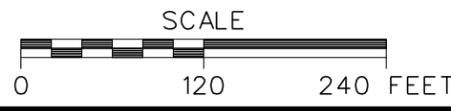


**LEGEND**

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- BRIDGE
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- TRENCHES
- MOUNDS
- DEPRESSIONS
- BEDROCK MONITORING WELL LOCATION
- TOTAL CARBON TETRACHLORIDE, CHLOROFORM, CHLOROMETHANE CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- COMPOUND WAS POSITIVELY IDENTIFIED; REPORTED VALUE IS AN ESTIMATED CONCENTRATION

**FIGURE 9**  
 TOTAL CARBON TETRACHLORIDE AND DEGRADATION PRODUCTS CHLOROFORM AND CHLOROMETHANE DETECTIONS IN BEDROCK WELLS APRIL-JUNE 2003 SAMPLING EVENT RANGES NEAR TRAINING AREA T-24A PARCELS 187(7), 88(7), 108(7), 112Q, 113Q-X, 213Q, AND 214Q

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



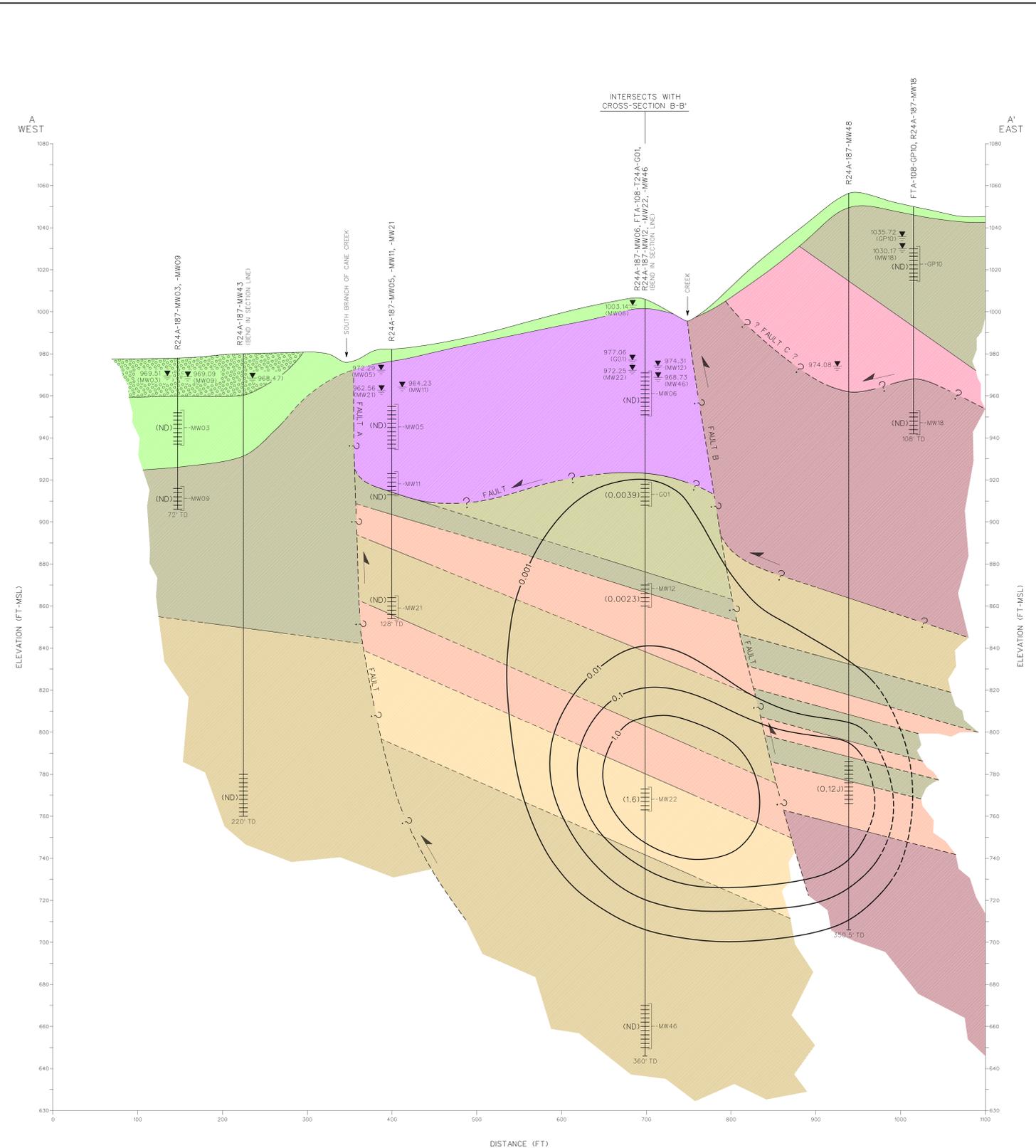
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INITIALS: J. JENKINS  
 PROJ. MGR.: J. YACOB



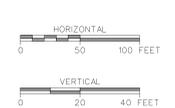
**LEGEND:**

- SCREEN INTERVAL
- WATER TABLE
- 577.34 GROUNDWATER ELEVATION (FT MSL) (JUNE 2003)
- CONTACT DASHED WHERE INFERRED
- RELATIVE MOVEMENT OF THRUST FAULT
- BENZENE CONCENTRATION IN BEDROCK (mg/L)
- (1.6) CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- (ND) NOT DETECTED
- J COMPOUND WAS POSITIVELY IDENTIFIED; REPORTED VALUE IS AN ESTIMATED CONCENTRATION

- SHALE
- SILTSTONE
- SHALE AND SILTSTONE, INTERBEDDED
- MUDSTONE
- SANDSTONE AND SILTSTONE, INTERBEDDED, CONGLOMERATIC IN PART
- QUARTZITE
- SANDSTONE AND QUARTZITE, INTERBEDDED
- SILT AND CLAY UNDIFFERENTIATED
- GRAVELLY SILT
- QUARTZITE AND SHALE
- SANDSTONE
- SANDSTONE AND SHALE, INTERBEDDED

**NOTE:**  
 1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

**FIGURE 10**  
 BENZENE CROSS-SECTION A-A'  
 APRIL-JUNE 2003 SAMPLING EVENT  
 RANGES NEAR TRAINING AREA T-24A  
 PARCELS 187(7), 88(7), 108(7), 112Q,  
 113Q-X, 213Q, AND 214Q

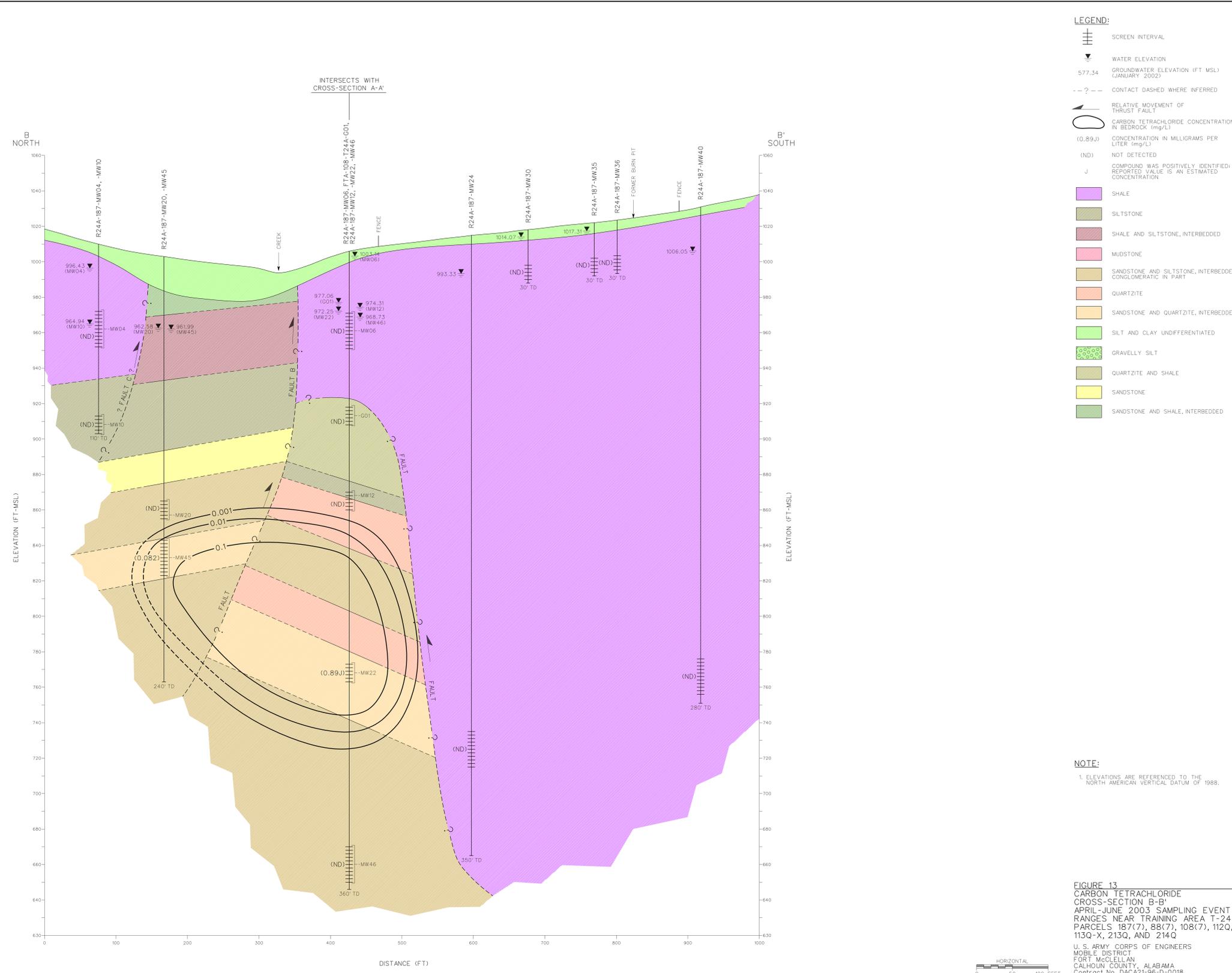


U. S. ARMY CORPS OF ENGINEERS  
 MOBILE DISTRICT  
 FORT McLELLAN  
 CALHOUN COUNTY, ALABAMA  
 Contract No. DAC21-96-D-0018

Shaw Environmental, Inc.







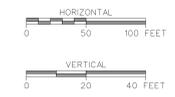
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- WATER ELEVATION
- GROUNDWATER ELEVATION (FT MSL) (JANUARY 2002)
- CONTACT DASHED WHERE INFERRED
- RELATIVE MOVEMENT OF THRUST FAULT
- CARBON TETRACHLORIDE CONCENTRATION IN BEDROCK (mg/L)
- CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- NOT DETECTED
- COMPOUND WAS POSITIVELY IDENTIFIED; REPORTED VALUE IS AN ESTIMATED CONCENTRATION

- SHALE
- SILTSTONE
- SHALE AND SILTSTONE, INTERBEDDED
- MUDSTONE
- SANDSTONE AND SILTSTONE, INTERBEDDED, CONGLOMERATIC IN PART
- QUARTZITE
- SANDSTONE AND QUARTZITE, INTERBEDDED
- SILT AND CLAY UNDIFFERENTIATED
- GRAVELLY SILT
- QUARTZITE AND SHALE
- SANDSTONE
- SANDSTONE AND SHALE, INTERBEDDED

**NOTE:**  
 1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

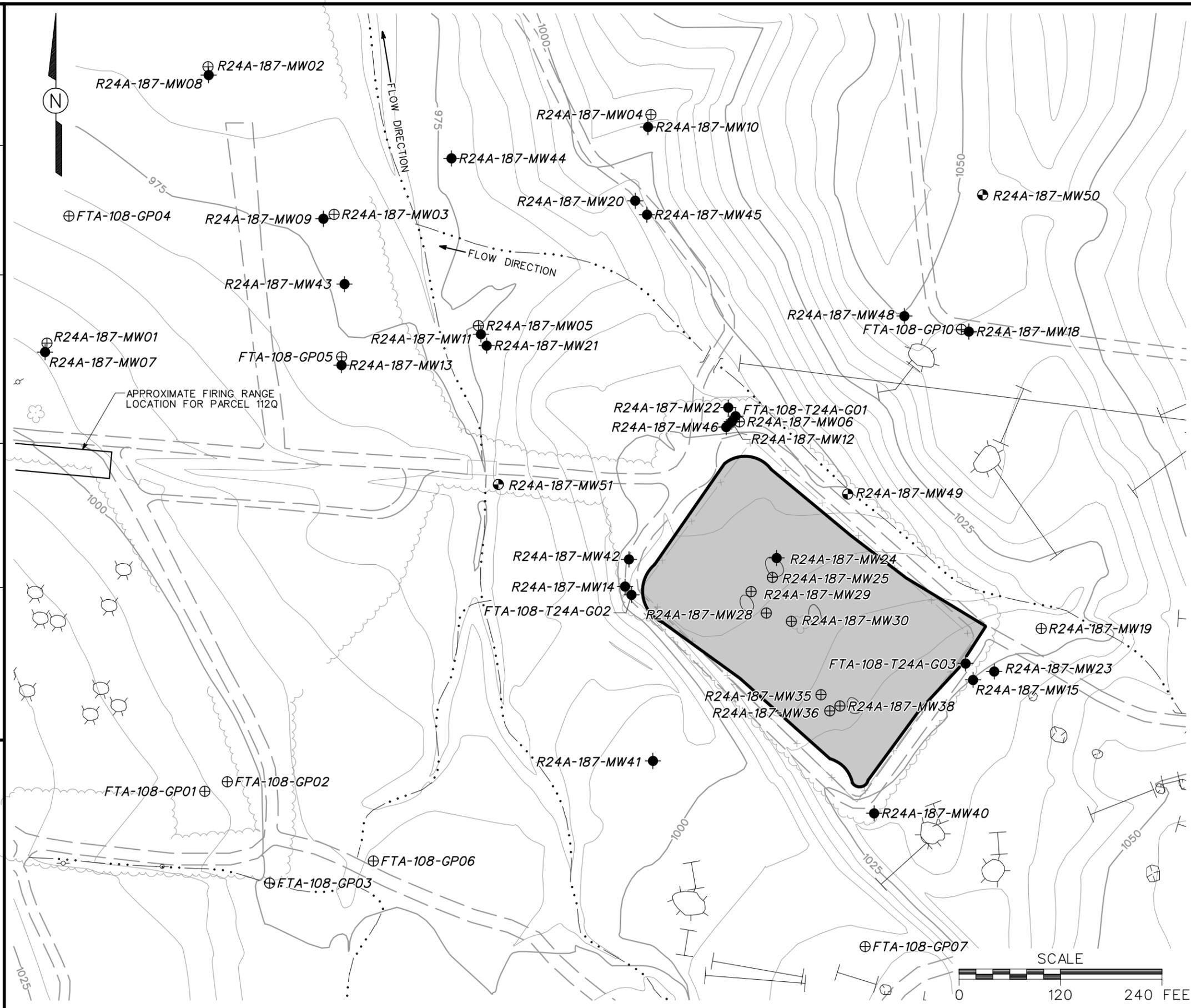
**FIGURE 13**  
 CARBON TETRACHLORIDE  
 CROSS-SECTION B-B'  
 APRIL-JUNE 2003 SAMPLING EVENT  
 RANGES NEAR TRAINING AREA T-24A  
 PARCELS 187(7), 88(7), 108(7), 112Q,  
 113Q-X, 213Q, AND 214Q



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



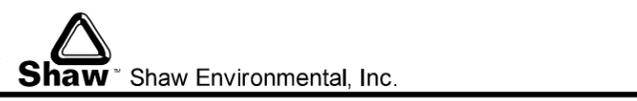
DWG. NO.: ...796887es.814  
 PROJ. NO.: 796887  
 INITIATOR: B. HEDBERG  
 PROJ. MGR.: J. YACOUB  
 DRAFT. CHK. BY:  
 ENGR. CHK. BY: S. MORAN  
 STARTING DATE: 10/01/03  
 DATE LAST REV.:  
 DRAWN BY:  
 10/14/2003  
 09:52:38 AM  
 DRAWN BY: D. BOMAR  
 dbomar  
 c:\cadd\design\796887es.814



- LEGEND:**
- UNIMPROVED ROADS AND PARKING
  - PAVED ROADS AND PARKING
  - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
  - TREES / TREELINE
  - PARCEL BOUNDARY
  - BRIDGE
  - SURFACE DRAINAGE / CREEK
  - FENCE
  - UTILITY POLE
  - TRENCHES
  - MOUNDS
  - DEPRESSIONS
  - BEDROCK MONITORING WELL LOCATION
  - RESIDUUM MONITORING WELL LOCATION
  - PROPOSED BEDROCK MONITORING WELL LOCATION

**FIGURE 14**  
**PROPOSED WELL LOCATION MAP**  
**RANGES NEAR TRAINING AREA T-24A**  
**PARCELS 187(7), 88(7), 108(7), 112Q,**  
**113Q-X, 213Q, AND 214Q**

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



**Final  
Site-Specific Safety and Health Plan Attachment  
Remedial Investigation (Horizontal and Vertical Extent –  
Groundwater) at the Ranges Near Training Area T-24A,  
Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q,  
and 214Q Training Area T-24A**

**Fort McClellan  
Calhoun County, Alabama  
EPA ID No. AL7 210 020 562**

**Prepared for:**

**U.S. Army Corps of Engineers, Mobile District  
109 St. Joseph Street  
Mobile, Alabama 36602**

**Prepared by:**

**Shaw Environmental, Inc.  
312 Directors Drive  
Knoxville, Tennessee 37923**

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

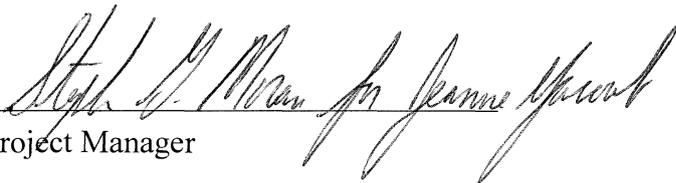
**October 2003**

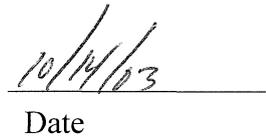
This site-specific safety and health plan (SSHP) must be used in conjunction with the installation-wide safety and health plan, Fort McClellan, Alabama. The following SSHP has been designed for the methods presently contemplated by the company for execution of the proposed work. Therefore, the SSHP may not be appropriate if the work is not performed by or using the methods presently contemplated by the company. In addition, as the work is performed, conditions different from those anticipated may be encountered and the SSHP may have to be modified. Therefore, the company only makes representations or warranties as to the adequacy of this SSHP for currently anticipated activities and conditions.

## Acknowledgments

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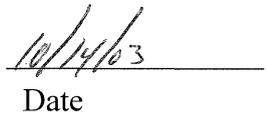
The final approved version of this site-specific safety and health plan (SSHP) attachment for the Remedial Investigation (Horizontal and Vertical Extent – Groundwater) at the Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q, and 214Q, at Fort McClellan, Alabama, has been provided to the site coordinator. I acknowledge my responsibility to provide the site coordinator with the equipment, materials, and qualified personnel to implement fully all safety requirements in this SSHP attachment. I will formally review this plan with the health and safety staff every six months until project completion.

  
Project Manager

  
Date

I acknowledge receipt of this SSHP attachment from the project manager, and that it is my responsibility to explain its contents to all site personnel and cause these requirements to be fully implemented. Any change in conditions, scope of work, or other change that might affect worker safety requires me to notify the project manager and the health and safety manager.

  
Site Manager

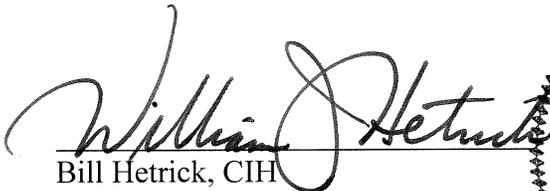
  
Date

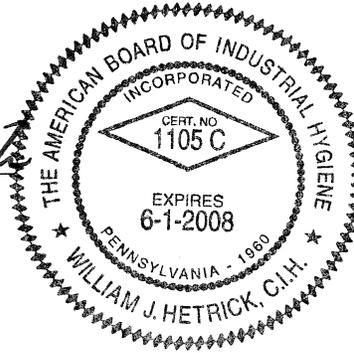
**Site-Specific Safety and Health Plan Attachment Approval  
Fort McClellan, Calhoun County, Alabama**

I have read and approve this site-specific safety and health plan attachment for the Remedial Investigation (Horizontal and Vertical Extent – Groundwater) at the Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q, and 214Q, at Fort McClellan, Alabama, with respect to project hazards, regulatory requirements, and Shaw procedures.

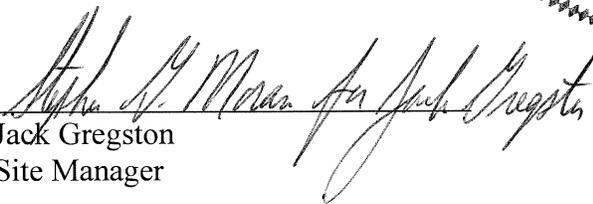
  
\_\_\_\_\_  
Jeanné Yacoub, PE  
Project Manager

10/14/03  
Date

  
\_\_\_\_\_  
Bill Hetrick, CIH  
Health & Safety Manager



10/14/03  
Date

  
\_\_\_\_\_  
Jack Gregston  
Site Manager

10/14/03  
Date



## Fort McClellan Gate Hours

Baltzell Gate	Baltzell Road. Open 24 hours daily, 7 days a week.
---------------	---

## Fort McClellan Project Emergency Contacts

Range Control Office (Main Post).....	(256) 848-6772
Fire Department (on post).....	911
Fire Department (off post).....	256 (237-3541)
Ambulance (off post).....	911
Regional Medical Center.....	(256) 235-5121
Military Police.....	(256) 848-5680, 848-4824
DOD Guard Force (Mr. Bolton).....	(256) 848-5680, 848-4732
Anniston Police Department.....	(256) 238-1800
Chemical Agent Emergencies.....	(256) 895-1598
UXO Emergencies.....	(256) 895-1598
UXO Nonemergencies/Reporting Only (Ronald Levy).....	(256) 848-3758
Baltzell Gate Guard Shack.....	(256) 848-5693, 848-3821
National Response Center & Terrorist Hotline.....	(800) 424-8802
Poison Control Center.....	(800) 462-0800
EPA Region IV.....	(404) 562-8725
Ronald Levy, BRAC Environmental Coordinator, FTMC Transition Force.....	(256) 848-3758
Lisa Holstein, FTMC Transition Force.....	(256) 848-7455
Lee Coker, U.S. Army Corps of Engineers, Mobile District.....	(251) 690-3077
Phillip Stroud, Alabama Department of Environmental Management.....	(334) 270-5646
Doyle Brittain, EPA Region IV.....	(404) 562-8549
Ross McCollum, U.S. Army Corps of Engineers, Mobile District.....	(251) 690-3113
Darryl Stabile, U.S. Army Corps of Engineers.....	(251) 690-2784
Jeanne Yacoub, Shaw Project Manager.....	(770) 663-1429
Jack Gregston, Shaw Site Manager.....	(256) 848-3482, -3499
Bill Hetrick, Shaw H&S Manager.....	Direct dial (865) 692-3571
Dr. Jerry H. Berke, Health Resources Occupational Physician.....	(800) 350-4511

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## **List of Attachments**

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Attachment 1 – Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities

## **List of Acronyms**

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See Attachment 1 of the Site-Specific Field Sampling Plan for the list of Abbreviations and Acronyms.

## 1.0 Site Work Plan Summary

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**Project Objective.** The objective of this remedial investigation (RI) at Fort McClellan (FTMC), Calhoun County, Alabama, is to collect and analyze samples at the Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q, and 214Q. Specifically, Shaw E&I will conduct additional investigation of the horizontal and vertical extent of groundwater contamination at the parcels noted. The sample media, locations, and analytical parameters are identified in the SFSP.

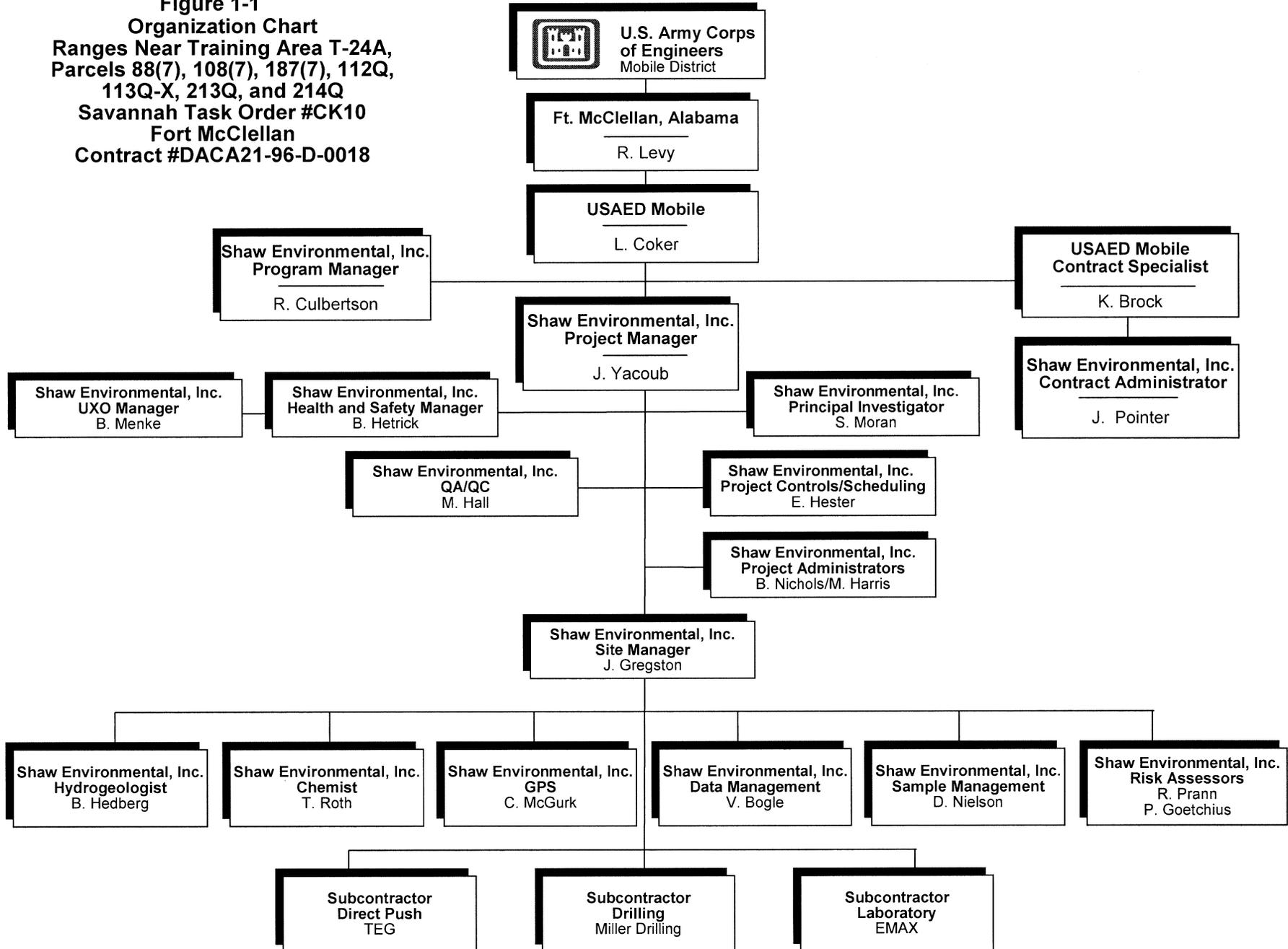
### **Project Tasks**

- Conduct a surface and near-surface unexploded ordnance (UXO) survey over all areas to be included in the sampling effort.
- Provide downhole UXO support for all intrusive drilling activity to determine the presence of potential downhole hazards.
- Install three bedrock groundwater monitoring wells.
- Collect groundwater samples.

**Personnel Requirements.** Up to 15 employees. See Figure 1-1 for an organization chart.

Note: All personnel on this site shall have received training, informational programs, and medical surveillance as outlined in the installation-wide safety and health plan (SHP) for site investigations at FTMC and shall be familiar with the requirements of this site-specific safety and health plan (SSHP). This SSHP must be used in conjunction with the SHP for FTMC, Alabama.

**Figure 1-1  
 Organization Chart  
 Ranges Near Training Area T-24A,  
 Parcels 88(7), 108(7), 187(7), 112Q,  
 113Q-X, 213Q, and 214Q  
 Savannah Task Order #CK10  
 Fort McClellan  
 Contract #DACA21-96-D-0018**



## **2.0 Site Characterization and Analysis**

---

### **2.1 Anticipated Hazards**

The activity hazard analysis in Chapter 5.0 contains project-specific practices utilized to reduce or eliminate anticipated site hazards. The activity hazard analysis indicates specific chemical and physical hazards that may be present and encountered during each task from on-site operations. Below each task is a list of hazards and specific actions that will be taken to control the respective hazards. These control measures may include work practice controls, engineering controls, and/or use of appropriate personal protective equipment (PPE).

Previous investigations conducted in the vicinity included a geophysical survey, soil sampling, groundwater sampling, surface water sampling, sediment sampling, and trenching operations. The geophysical survey was conducted in 2001 inside the Former Chemical Munitions Disposal Area, Parcel 187(7), (the fenced area at Training Area T-24A) by Parsons Engineering Science, Inc. as part of a chemical warfare material (CWM) engineering evaluation cost analysis. Numerous geophysical anomalies were observed and evaluated. Twenty-one CWM items were encountered during investigative trenching of the anomalies; but these items did not contain chemical warfare agents, nor were they explosively configured. Eight soil samples were collected during the trenching and analyzed for chemical warfare agents (GB, HD, 1,4-thioxane, or 1,4-dithiane). No concentrations of GB, HD, 1,4-thioxane, or 1,4-dithiane were detected above the reporting limits. Groundwater sample results from previous investigations conducted by Shaw and Science Applications International Corporation indicate the presence of benzene in three bedrock monitoring wells and carbon tetrachloride in two bedrock monitoring wells located downgradient of the fenced area at Training Area T-24A. The investigation will help define the horizontal and vertical extent of benzene and carbon tetrachloride contamination inside groundwater at Ranges Near Training Area T-24A. The three groundwater monitoring wells to be installed are described in the accompanying field sampling plan and Figure 14 of the FSP shows their location.

Table 2-1 contains the toxicological and physiological properties of chemicals anticipated or to be used at the Former Chemical Munitions Disposal Area, Parcel 187(7), at Training Area T-24A. Contaminants of concern at the area include arsenic, benzene, ethyl benzene, carbon tetrachloride, lead, pentachlorophenol, phenol, toluene, and xylene.

As referenced in the correspondence from Mr. Ellis Pope (COR) and Dr. John Potter (Huntsville, CX), the sites addressed in this SSHP have had a CWM engineering evaluation/cost analysis

**Table 2-1**

**Toxicological and Physical Properties of Chemicals  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 5)

Substance [CAS]	IP <sup>a</sup> (eV)	Odor Threshold (ppm)	Route <sup>b</sup>	Symptoms of Exposure	Treatment	TWA <sup>c</sup>	STEL <sup>d</sup>	Source <sup>e</sup>	IDLH (NIOSH) <sup>f</sup>
Acetone [67-64-1]	9.7	13-100	Inh Ing Con	Irritated eyes, nose, and throat; headache, dizziness; dermatitis.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	1,000 ppm 500 ppm 250 ppm	-- 750 ppm --	PEL TLV REL	2,500 ppm [10% LEL]
Arsenic [7440-38-2]	NA	NA	Inh Ing Con Abs	Ulceration of nasal septum, dermatitis, GI disturbances, respiratory irritation, hyperpigmentation of skin.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	0.01 mg/m <sup>3</sup> 0.01 mg/m <sup>3</sup> --	-- -- C 0.002 mg/m <sup>3</sup>	PEL TLV REL	Ca (5 mg/m <sup>3</sup> )
Benzene [71-43-2]	9.24	34-119	Inh Ing Con Abs	Irritated eyes, skin, nose, respiratory system, giddiness, headache, nausea, dermatitis, bone marrow depression.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	1 ppm 0.5 ppm 0.1 ppm	5 ppm 2.5 ppm 1 ppm	PEL TLV REL	Ca (500 ppm)
Ethyl benzene [100-41-4]	8.76	?	Inh Ing Con	Irritated eyes, skin, mucous membranes, headache, dermatitis, narcosis, coma.	Eye: Irrigate immediately Skin: Water flush promptly Breath: Fresh air Swallow: Immediate medical attention	100 ppm 100 ppm 100 ppm	-- 125 ppm 125 ppm	PEL TLV REL	800 ppm [10% LEL]
Fuel oil (diesel oil, medium) [68476-30-2]	?	?	Ing Inh Con	Ingestion causes nausea, vomiting, and cramps; depressed central nervous system, headache, coma, death; pulmonary irritation; kidney and liver damage; aspiration causes severe lung irritation, coughing, gagging, dyspnea, substernal stress, pulmonary edema; broncho- pneumonia; excited, then depressed, central nervous system.	Eye: Irrigate promptly Skin: Soap wash Breath: Respiratory support Swallow: Immediate medical attention Aspiration: Immediate medical attention	-- 100 mg/m <sup>3</sup> --	-- -- --	PEL TLV REL	--

Table 2-1

**Toxicological and Physical Properties of Chemicals  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 5)

Substance [CAS]	IP <sup>a</sup> (eV)	Odor Threshold (ppm)	Route <sup>b</sup>	Symptoms of Exposure	Treatment	TWA <sup>c</sup>	STEL <sup>d</sup>	Source <sup>e</sup>	IDLH (NIOSH) <sup>f</sup>
Carbon tetrachloride [56-23-5]	11.47	?	Inh Abs Ing Con	Irritated eyes, skin; CNS depressant, nausea, vomiting, liver and kidney damage, dizziness incoordination.	Eye: Irrigate promptly Skin: Soap wash Breath: Respiratory support Swallow: Immediate medical attention Aspiration: Immediate medical attention	10 ppm 5 ppm --	C 25 ppm 10 ppm 2 (60 min)	PEL TLV REL	Ca (200 ppm)
Gasoline [8006-61-9]	?	?	Inh Ing Con	Intoxication, headaches, blurred vision, dizziness, nausea; eye, nose throat irritation; potential kidney and other cancers. Carcinogenic.	Eye: Irrigate immediately (15 min) Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	-- 300 ppm Ca, lowest feasible conc. (LOQ 15 ppm)	-- 500 ppm --	PEL TLV REL	Ca 1,400 ppm [10% LEL]
n-Hexane [110-54-3]	10.18	?	Inh Ing Con	Lightheadedness; nausea, headache; numbness of the extremities, muscular weakness; irritation of the eyes and nose; dermatitis; chemical pneumonia; giddiness.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	500 ppm 50 ppm 50 ppm	-- -- --	PEL TLV REL	1,100 ppm [10% LEL]
Isopropyl alcohol (isopropanol) [67-63-0]	10.10	?	Inh Ing Con	Mild irritation of the eyes, nose, and throat; drowsiness, dizziness, headache; dry, cracked skin.	Eye: Irrigate immediately Skin: Water flush Breath: Respiratory support Swallow: Immediate medical attention	400 ppm 400 ppm 400 ppm	-- 500 ppm 500 ppm	PEL TLV REL	2,000 ppm [10% LEL]
Lead [7439-92-1]	NA	NA	Inh Ing Con	Weak, insomnia, facial pallor, constipated, abdominal pain, colic, anemia, irritated eyes, paralysis of wrists and ankles, encephalopathy.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	0.05 mg/m 0.05 mg/m <0.1 mg/m	-- -- --	PEL TLV REL	100 mg/m
Methyl ethyl ketone [78-93-9]	9.54	2-85	Inh Ing Con	Irritated eyes and nose; headache, dizziness; vomiting.	Eye: Irrigate immediately Skin: Water flush promptly Breath: Fresh air Swallow: Immediate medical attention	200 ppm 200 ppm 200 ppm	-- 300 ppm 300 ppm	PEL TLV REL	3,000 ppm

**Table 2-1**

**Toxicological and Physical Properties of Chemicals  
 Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
 Fort McClellan, Calhoun County, Alabama**

(Page 3 of 5)

Substance [CAS]	IP <sup>a</sup> (eV)	Odor Threshold (ppm)	Route <sup>b</sup>	Symptoms of Exposure	Treatment	TWA <sup>c</sup>	STEL <sup>d</sup>	Source <sup>e</sup>	IDLH (NIOSH) <sup>f</sup>
Motor Oil [NA]	?	?	Inh Ing	Irritated eyes, skin, respiratory system; usually only a problem if misted or ingested.	Eye: Irrigate immediately (15 min) Skin: Soap wash immediately Swallow: Immediate medical attention	-- -- --	500 ppm 500 ppm 500 ppm	PEL TLV REL	None
Nitric acid [7697-37-2]	11.95	0.3-1	Inh Ing Con	Irritated eyes, mucous membranes, and skin; delayed pulmonary edema, pneumonitis, bronchitis; dental erosion.	Eye: Irrigate immediately Skin: Water flush promptly Breath: Respiratory support Swallow: Immediate medical attention	2 ppm 2 ppm 2 ppm	-- 4 ppm 4 ppm	PEL TLV REL	25 ppm
Pentachlorophenol [87-86-5]	NA	?	Inh Ing Con Abs	Irritated eyes, nose, throat, sneezing, coughing, weakness, vomiting, headache, dizziness, dermatitis, chest pain, high fever, dyspnea.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	0.5 mg/m <sup>3</sup> (skin) 0.5 mg/m <sup>3</sup> (skin) 0.5 mg/m <sup>3</sup> (skin)	-- -- --	TLV PELREL	2.5 mg/m <sup>3</sup>
Phenol [108-95-2]	8.50	.06	Inh Ing Abs Con	Irritated eyes, nose, throat, anorexic, weakness, pain, dark urine, skin burns, dermatitis, tremors.	Eye: Irrigate immediately (15 min) Skin: Soap wash immediately Swallow: Immediate medical attention	5 ppm (skin) 5 ppm (skin) 5 ppm (skin)	-- -- C 15.6 ppm	TLV PELREL	250 ppm
Portland cement	NA	NA	Inh	Fine gray powder that can be irritating if inhaled or in eyes.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	10 mg/m <sup>3</sup> 10 mg/m <sup>3</sup> /total dust 5 mg/m <sup>3</sup> respirable fraction	-- -- --	TLV REL  PEL	5,000 mg/m <sup>3</sup>
Sodium hydroxide [1310-73-2]	NA	NA	Inh Ing Con	Irritated nose; pneumonitis; burns eyes, and skin; temporary loss of hair.	Eye: Irrigate immediately Skin: Water flush immediately Breath: Respiratory support Swallow: Immediate medical attention	2 mg/m <sup>3</sup> -- --	-- C 2 mg/m <sup>3</sup> C 2 mg/m <sup>3</sup>	PEL TLV REL	10 mg/m <sup>3</sup>

**Table 2-1**

**Toxicological and Physical Properties of Chemicals  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

(Page 4 of 5)

Substance [CAS]	IP <sup>a</sup> (eV)	Odor Threshold (ppm)	Route <sup>b</sup>	Symptoms of Exposure	Treatment	TWA <sup>c</sup>	STEL <sup>d</sup>	Source <sup>e</sup>	IDLH (NIOSH) <sup>f</sup>
Sulfuric acid [7664-93-9]	?	0.15	Inh Ing Con	Irritated eyes, nose, and throat; pulmonary edema, bronchitis; em- physema; conjunctivitis; stomatitis; dental erosion; tracheobronchitis; skin and eye burns; dermatitis.	Eye: Irrigate immediately Skin: Water flush immediately Breath: Respiratory support Swallow: Immediate medical attention	1 mg/m <sup>3</sup> 1 mg/m <sup>3</sup> 1 mg/m <sup>3</sup>	3 mg/m <sup>3</sup>	PEL TLV REL	15 mg/m <sup>3</sup>
Toluene [108-88-3]	8.82	.02-69	Inh Ing Con Abs	Irritated eyes, nose, fainting, weakness, confusion, dizziness, headache, dilated pupils, dermatitis.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	200 ppm 50 ppm (skin) 100 ppm	C 300mg/m <sup>3</sup> -- 150 ppm	PEL TLV REL	500 ppm
Xylene (o-,m-,p- isomers) [95-47-6] [108-38-3] [106-42-3]	8.56	.08-40	Inh Ing Con Abs	Irritated eyes, skin, nose, throat, dizziness, excitement, drowsiness, incoherence, staggering, nausea, vomiting, dermatitis.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	100 ppm 100 ppm 100 ppm	150 ppm -- 150 ppm	TLV PEL REL	900 ppm

<sup>a</sup>IP = Ionization potential (electron volts).

<sup>b</sup>Route = Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; Con, Skin and/or eye contact.

<sup>c</sup>TWA = Time-weighted average. The TWA concentration for a normal work day (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.

<sup>d</sup>STEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.

<sup>e</sup>PEL = Occupational Safety and Health Administration (OSHA) permissible exposure limit (29 CFR 1910.1000, Table Z).

AEL = Airborne Exposure Limit.

TLV = American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit value-TWA.

REL = National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.

<sup>f</sup>IDLH (NIOSH) = Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

NE = No evidence could be found for the existence of an IDLH (NIOSH Pocket Guide to Chemical Hazards, Pub. 1998).

C = Ceiling limit value which should not be exceeded at any time.

Ca = Carcinogen.

NA = Not applicable.

? = Unknown.

LEL = Lower explosive limits.

LC<sub>50</sub> = Lethal concentration for 50 percent of population tested.

LD<sub>50</sub> = Lethal dose for 50 percent of population tested.

NIC = Notice of intended change (ACGIH).

## Table 2-1

### Toxicological and Physical Properties of Chemicals Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q Fort McClellan, Calhoun County, Alabama

(Page 5 of 5)

#### References:

- American Conference of Governmental Industrial Hygienists Guide to Occupational Exposure Values, 1998, compiled by the American Conference of Governmental Industrial Hygienists.
- Amoore, J. E. Hautala, "Odor as an Aid to Chemical Safety," Journal of Applied Toxicology, 1983.
- Clayton, George D., Clayton, F. E., Patty's Industrial Hygiene and Toxicology, 3rd ed., John Wiley & Sons, New York.
- Documentation of TLVs and BEIs, American Conference of Governmental Industrial Hygienists, 6th ed., 1998.
- Fazzuluri, F. A., Compilation of Odor and Taste Threshold Values Data, American Society for Testing and Materials, 1978.
- Gemet, L. J. Van, Compilation of Odor Threshold Values in Air and Water, CIVO, Netherlands, 1977.
- Gemet, L. J. Van, Compilation of Odor Threshold Values in Air and Water, Supplement IV, CIVO, Netherlands, 1977.
- Lewis, Richard J., Sr., 1992, Sax's Dangerous Properties of Industrial Materials, 8th ed., Van Nostrand Reinhold, New York.
- Micromedex Tomes Plus (R) System, 1992, Micromedex, Inc.
- National Institute for Occupational Safety and Health Pocket Guide to Chemicals, Pub. 1998, National Institute for Occupational Safety and Health.
- Odor Threshold for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association, 1989.
- Respirator Selection Guide, 3M Occupational Health and Safety Division, 1993.
- Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand and Reinhold, 1977.
- Warning Properties of Industrial Chemicals—Occupational Health Resource Center, Oregon Lung Association.
- Workplace Environmental Exposure Levels, American Industrial Hygiene Association, 1992.

completed and all soil samples taken were clean of CWM and CWM by-products. Based on this information (see Attachment 1), no CWM monitoring will be required during site operations.

The possibility of UXO exists on the parcels near Training Area T-24A; therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance.

Attachment 1, Evaluating Ordnance and Explosives (OE)/UXO/CWM Hazards in Support of HTRW Activities, has been prepared to identify additional OE site information.

## **2.2 General Site Information**

**Duration of Planned Employee Activity.** Employee activity duration is anticipated to be one month.

**Pathways for Hazardous Substance Dispersion.** Possible pathways for hazardous substances in the area are groundwater and soils. The primary exposure routes include inhalation, absorption, and ingestion.

**Site Topography.** The elevation of the ranges near Training Area T-24A ranges from approximately 985 feet to 1,145 feet above mean sea level, with the ground surface sloping from the southeast to the northwest across the site. A small creek that bisects the site flows north along a small valley to the South Branch of Cane Creek.

### 3.0 Personal Protective Equipment

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The work activities will begin in the following levels of protection. Also, a complete description of Level D, Modified Level D, and Level C PPE is provided.

Task	Initial Level of PPE
Staging equipment	Level D
Collecting samples	Modified Level D*
Installing monitoring wells	Modified Level D*

\* Initial level will be raised to Level C or higher if air monitoring results for volatile organic hydrocarbons in the worker's breathing zone (BZ) are greater than action levels.

**Level D.** The minimal level of protection that will be required of personnel at the site will be Level D. The following equipment will be used for Level D protection:

- Coveralls or work clothing
- Leather work gloves (when necessary)
- Steel-toed safety boots
- Safety glasses
- Hard hat
- Hearing protection (when working near/adjacent to operating equipment).

**Modified Level D.** The following equipment will be used for Level D-Modified protection:

- Permeable Tyvek, Kleenguard, or its equivalent (polycoated Tyvek for pressure washing)
- Latex boot covers
- Nitrile, heavy work, or latex gloves
- Steel-toed safety boots
- Safety glasses
- Hard hat
- Hearing protection (when working near/adjacent to operating equipment)
- Supplied air emergency escape/egress packs (required for suspect chemical agent sites).

Note: In addition to modified Level D PPE, the operator of high-pressure water jetting equipment shall wear metatarsal guards for the legs and feet and a face shield.

**Level C.** Level C protection will not be used unless air-monitoring data indicate the need for upgrade; however, the equipment shall be readily available on site. The following equipment will be used for Level C protection:

- National Institute of Occupational Safety and Health-approved full-face, air-purifying respirator equipped with organic vapor/acid gas/P100 cartridge
- Hooded, Saran-coated Tyvek, taped at gloves, boots, and respirator
- Nitrile gloves (outer)
- Latex or lightweight nitrile gloves (inner)
- Neoprene steel-toed boots or polyvinyl chloride overbooties/steel-toed safety boots
- Hard hat
- Hearing protection (when working near/adjacent to operating equipment).
- Supplied air emergency escape/egress packs (required for suspect chemical agent sites).

Note: In addition to Level C PPE, the operator of high-pressure water jetting equipment shall wear metatarsal guards for the legs and feet.

## 4.0 Site Monitoring

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The environmental contaminants of concern Training Area T-24A operations are arsenic, benzene, ethyl benzene, lead, pentachlorophenol, phenol, toluene, and xylene. Table 4-1 contains action levels for site monitoring at the sites.

**Chemical.** Monitoring will be performed by the site safety and health officer or qualified task geologist during the performance of ground-intrusive operations. A calibrated photoionization detector (i.e., HNu DL 101 or equivalent) organic vapor analyzer with a 10.2 electron volt lamp will be utilized to monitor the sampling locations and BZs to determine if any organic material may be present that would necessitate upgrading of protection level. A calibrated combustible gas/oxygen indicator will be utilized to monitor the work areas and BZs to determine if any combustible/flammable oxygen levels may be present that would necessitate evacuation of the work area. Benzene detector tubes will be utilized, as needed, to monitor benzene levels in the work areas and BZs. Table 4-2 contains the air monitoring frequency and location for site monitoring at the work sites.

**Unexploded Ordnance.** UXO safety will be achieved by employing UXO specialists to ensure that field personnel do not come into contact with UXO. In areas where UXO is suspected, the UXO specialists will perform the following UXO avoidance operations.

- **Area UXO Surveys Using Magnetometers.** During this operation, UXO on the surface will be detected and marked for avoidance during field operations. Metal objects just below the surface will also be marked to indicate the potential hazard.
- **Downhole UXO Surveys.** UXO specialists will perform downhole magnetometer surveys to detect metal objects in the path of the boring apparatus until undisturbed soils are reached. The boring location will be moved if subsurface metal objects are detected.

If UXO is encountered, personnel will contact the site manager and UXO specialist immediately. Personnel will evacuate the immediate area and secure it.

**Table 4-1**

**Action Levels  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q,  
113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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When in Level C PPE

Analyte	Action Level <sup>a</sup>	Required Action <sup>b</sup>
Volatile Organic Compounds (VOC)	≥ 10 ppm above background in breathing zone (BZ)	Stop work, evacuate work area, initiate benzene test.
Oxygen	≥ 20%, ≤23% < 20%, >23%	Normal operations. Stop work, evacuate work area.
Flammable vapors	≥ 10% LEL < 10% LEL	Stop work, evacuate work area. Continue operations, monitor for VOCs.
Benzene	≥ 5 ppm in BZ	Stop work, evacuate work area.

Note: The Health and Safety Manager must be immediately notified if action levels trigger Level B PPE upgrade.

When in Level D Modified/D PPE

Analyte	Action Level <sup>a</sup>	Required Action <sup>b</sup>
VOCs	≥ 5 ppm above background in BZ	Stop activities, suspend work activities for 15 to 30 minutes, if readings are sustained then upgrade to Level C PPE and initiate benzene test.
Oxygen	≥ 20%, ≤23% < 20%, >23%	Normal operations. Stop work, evacuate work area.
Flammable vapors	≥ 10% LEL < 10% LEL	Stop work, evacuate work area. Continue operations, monitor for VOCs.
Benzene	≥ 1 ppm in BZ	Upgrade to Level C PPE.

**Table 4-1**

**Action Levels  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q,  
113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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When in Support Zone

Analyte	Action Level <sup>a</sup>	Required Action
VOCs	$\geq 1$ ppm above background in BZ	Evacuate support zone and re-establish perimeter of exclusion zone.

<sup>a</sup> Four instantaneous peaks in any 15-minute period or a sustained reading for 5 minutes in excess of the action level will trigger a response.

<sup>b</sup> Contact with the H&S manager must be made prior to continuance of work. The H&S manager may then initiate perimeter/integrated air sampling along with additional engineering controls.

**No one is permitted to downgrade levels of PPE without authorization from the H&S manager.**

**Table 4-2**

**Air Monitoring Frequency and Location  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q,  
113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

Work Activity	Instrument	Frequency	Location
Staging equipment	OV Monitor	Initially for area	BZ of employees
Land Survey	OV Monitor	Initially for area	BZ of employees
Sampling (surface/subsurface soil)	OV Monitor LEL/O <sub>2</sub> Monitor BDT	Continuously Periodically As needed	BZ of employees and/or work area
Installing monitoring wells	OV Monitor LEL/O <sub>2</sub> Monitor BDT	Continuously Continuously As needed	BZ of employees and/or work area

BZ = Breathing zone.

OV = Organic vapor.

LEL/O<sub>2</sub> = Lower explosive level/oxygen.

BDT = Benzene detector tube.

Miniram = Respirable Dust Monitor.

## **5.0 Activity Hazard Analysis**

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The attached activity hazard analysis (Table 5-1) is provided for the following activities:

- Staging equipment
- Land survey
- Surface/subsurface soil and groundwater sampling
- Installation of monitoring wells
- Disposal of IDW
- High pressure water jetting.

All injuries and illnesses must be immediately reported to the site manager or the site safety and health officer, who will then notify off-site personnel and organizations as necessary.

If hospital care must be provided, the victim shall be treated at Northeast Regional Medical Center, 400 East 10th Street, Anniston, Alabama. The telephone number is (256) 235- 5121. Directions to the hospital are provided in Figure 5-1.

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Staging equipment	Unexploded ordnance (UXO)	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface avoidance and/or UXO downhole avoidance. See site-specific safety and health plans (SSHP) to determine if required.</li> </ul>
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> <li>• Determine best access route before transporting equipment.</li> <li>• Practice good housekeeping; keep work area picked up and clean as feasible.</li> <li>• Continually inspect the work area for slip, trip, and fall hazards.</li> <li>• Look before you step; ensure safe and secure footing.</li> </ul>
	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment.</li> </ul>
	Falling objects	<ul style="list-style-type: none"> <li>• Stay alert and clear of materials suspended overhead; wear hard hat and steel-toed boots.</li> </ul>
	Flying debris, dirt, dust, etc.	<ul style="list-style-type: none"> <li>• Wear safety glasses/goggles; ensure that eye wash is in proper working condition.</li> </ul>
	Pinch points	<ul style="list-style-type: none"> <li>• Keep hands, fingers, and feet clear of moving/suspended materials and equipment.</li> <li>• Beware of contact points.</li> <li>• Stay alert at all times!</li> </ul>
	Cuts/bruises	<ul style="list-style-type: none"> <li>• Use cotton or leather work gloves for material handling.</li> </ul>
	Bees, spiders, and snakes	<ul style="list-style-type: none"> <li>• Inspect work area carefully and avoid placing hands and feet into concealed areas.</li> </ul>
	Ticks	<ul style="list-style-type: none"> <li>• Wear light colored clothing (can see ticks better).</li> <li>• Mow vegetated and small brush areas.</li> <li>• Wear insect repellent.</li> <li>• Wear long sleeves and long pants.</li> <li>• Visually check oneself promptly and frequently after exiting the work area.</li> </ul>
	Fire	<ul style="list-style-type: none"> <li>• Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.</li> </ul>
	Contact with moving equipment/vehicles	<ul style="list-style-type: none"> <li>• Work area will be barricaded/demarcated.</li> <li>• Equipment will be laid out in an area free of traffic flow.</li> </ul>
	Hazard communication	<ul style="list-style-type: none"> <li>• Label all containers as to contents and dispose of properly.</li> <li>• Ensure Material Safety Data Sheets (MSDS) are available for hazardous chemicals used on site.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Sound levels above 85 decibels (dBA) mandates hearing protection.</li> </ul>	

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Staging equipment (continued)	Lighting	<ul style="list-style-type: none"> <li>• Adequate lighting will be provided to ensure a safe working environment.</li> </ul>
	Cold stress	<ul style="list-style-type: none"> <li>• Workers should wear insulated clothing when temperatures drop below 40 degrees Fahrenheit (°F).</li> <li>• Drink warm beverages on breaks. Refrain from drinking caffeinated beverages.</li> <li>• Remove wet clothing promptly.</li> <li>• Take breaks in warm areas.</li> <li>• Reduce work periods as necessary.</li> <li>• Layer work clothing.</li> </ul>
	Poison ivy/oak/sumac	<ul style="list-style-type: none"> <li>• Avoid plant areas if possible.</li> <li>• Wear long sleeves and long pants.</li> <li>• Promptly wash clothing that has contacted poisonous plants.</li> <li>• Wash affected areas immediately with soap and water.</li> </ul>
	Heat rash	<ul style="list-style-type: none"> <li>• Keep the skin clean and dry.</li> <li>• Change perspiration-soaked clothing, as necessary.</li> <li>• Bathe at end of work shift or day.</li> <li>• Apply powder to affected area.</li> </ul>
	Heat cramps	<ul style="list-style-type: none"> <li>• Drink plenty of cool fluids even when not thirsty.</li> <li>• Provide cool fluid for work crews.</li> <li>• Move victim to shaded, cool area.</li> </ul>
	Heat exhaustion	<ul style="list-style-type: none"> <li>• Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).</li> <li>• Set up work/rest periods.</li> <li>• Use the buddy system.</li> <li>• Allow workers time to acclimate.</li> <li>• Have ice packs available for use.</li> <li>• Take frequent breaks.</li> </ul>
	Heat stroke	<ul style="list-style-type: none"> <li>• Evaluate possibility of night work.</li> <li>• Perform physiological monitoring on workers during breaks.</li> <li>• Wear body cooling devices.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Staging equipment (continued)	Contact with moving equipment/vehicles	<ul style="list-style-type: none"> <li>• Work area will be barricaded/demarcated.</li> <li>• Equipment will be laid out in an area free of traffic flow.</li> <li>• Barricades shall be used on or around work areas when it is necessary to prevent the inadvertent intrusion of pedestrian traffic.</li> <li>• Barriers shall be used to protect workers from vehicular traffic.</li> <li>• Barriers shall be used to guard excavations adjacent to streets or roadways.</li> <li>• Flagging shall be used for the short term (less than 24 hours) to identify hazards until proper barricades or barriers are provided.</li> <li>• Heavy equipment shall have backup alarms.</li> </ul>
	Forklift operations	<ul style="list-style-type: none"> <li>• Use qualified and trained forklift operators.</li> <li>• The operator shall not exceed the load capacity rating for the forklift.</li> <li>• The load capacity shall be clearly visible on the forklift.</li> <li>• Forklift operators shall inform their supervisor of any prescribed medication that they are taking that would impair their judgement.</li> </ul>
	Portable electric tools	<ul style="list-style-type: none"> <li>• Portable electric tools that are unsafe due to faulty plugs, damaged cords, or other reasons, shall be tagged (do not use) and removed from service.</li> <li>• Portable electric tools and all cord and plug connected equipment shall be protected by a ground fault circuit interrupter (GFCI) device.</li> <li>• Electrical tools shall be inspected daily prior to use.</li> </ul>
	Extension cords	<ul style="list-style-type: none"> <li>• Extension cords that have faulty plugs, damaged insulation, or are unsafe in any way shall be removed from service.</li> <li>• Cords shall be protected from damage from sharp edges, projections, pinch points (doorways), and vehicular traffic.</li> <li>• Cords shall be suspended with a nonconductive support (rope, plastic ties, etc.).</li> <li>• Cords shall be designed for hard duty.</li> <li>• Cords shall be inspected daily.</li> </ul>
	Lightning strikes	<ul style="list-style-type: none"> <li>• Whenever possible, halt activities and take cover.</li> <li>• If outdoors, stay low to the ground.</li> <li>• Limit the body surface area that is in contact with the ground (i.e., kneeling on one knee is better than laying on the ground).</li> <li>• Seek shelter in a building if possible.</li> <li>• Stay away from windows.</li> <li>• If available, crouch under a group of trees instead of one single tree.</li> <li>• Remain 6 feet away from tree trunk if seeking shelter beneath tree(s).</li> <li>• If in a group, keep 6 feet of distance between people.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Staging equipment (continued)	Thunderstorms, tornadoes	<ul style="list-style-type: none"> <li>• Listen to radio or TV announcements for pending weather information.</li> <li>• Cease field activities during thunderstorm or tornado warnings.</li> <li>• Seek shelter. Do not try to outrun a tornado.</li> </ul>
Surveying	Slip, trip, fall	<ul style="list-style-type: none"> <li>• Site workers will be required to wear hard hat, safety glasses with side shields, work gloves, and steel-toe boots when working in the field.</li> <li>• Provide adequate lighting in all work areas.</li> <li>• Whenever possible, avoid routing cords and hoses across walking pathways.</li> <li>• Flag or cover inconspicuous holes to protect against falls.</li> <li>• Work areas will be kept clean and orderly.</li> <li>• Garbage and trash will be disposed of daily in approved refuse containers.</li> <li>• Tools and accessories will be properly maintained and stored.</li> <li>• Work areas and floors will be kept free of dirt, grease, and slippery materials.</li> </ul>
	UXO	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface avoidance.</li> </ul>
	Traffic accidents	<ul style="list-style-type: none"> <li>• Place physical barrier (i.e., barricades, fencing) around work areas regularly occupied by pedestrians.</li> <li>• If working adjacent to roadways, have workers wear fluorescent orange vests.</li> <li>• Use warning signs or lights to alert oncoming traffic.</li> <li>• Assign flag person(s) if necessary to direct local traffic.</li> <li>• Set up temporary parking locations outside the immediate work area.</li> <li>• Motor vehicle operators shall obey all posted traffic signs, signals, and speed limits.</li> <li>• Pedestrians have the right-of-way.</li> <li>• Wear seat belts when vehicles are in motion.</li> </ul>
	Wildlife hazards	<ul style="list-style-type: none"> <li>• Workers should be cautious when driving through the site in order to avoid encounters with passing animals.</li> </ul>
	Biological hazards	<ul style="list-style-type: none"> <li>• Walking through overgrown grass areas, watch for snakes (rattlesnakes, moccasins, copperheads).</li> </ul>
	Ticks	<ul style="list-style-type: none"> <li>• Wear light colored clothing (can see ticks better).</li> <li>• Mow vegetated and small brush areas.</li> <li>• Wear insect repellent.</li> <li>• Wear long sleeves and long pants.</li> <li>• Visually check oneself promptly and frequently after exiting the work area.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Surveying (continued)	Poison ivy/oak/sumac	<ul style="list-style-type: none"> <li>• Avoid plant areas if possible.</li> <li>• Wear long sleeves and long pants.</li> <li>• Promptly wash clothing that has contacted poisonous plants.</li> <li>• Wash affected areas immediately with soap and water.</li> </ul>
Surface/subsurface soil and groundwater sampling	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.</li> <li>• Avoid skin contact with water.</li> <li>• Handle samples with care.</li> <li>• Only essential personnel will be in the work area.</li> <li>• Real-time air monitoring will take place before and during sampling activities.</li> <li>• All personnel will follow good hygiene practices.</li> <li>• Proper decontamination procedures will be followed.</li> <li>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.</li> </ul>
	UXO	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface avoidance and/or UXO downhole avoidance.</li> </ul>
	Cut hazards	<ul style="list-style-type: none"> <li>• Use care when handling glassware.</li> <li>• Wear adequate hand protection.</li> </ul>
	Hazard communication	<ul style="list-style-type: none"> <li>• MSDSs shall be obtained for chemicals brought on site.</li> <li>• Label all containers as to contents.</li> </ul>
	Strains/sprains	<ul style="list-style-type: none"> <li>• Use the proper tool for the job being performed.</li> <li>• Get assistance if needed.</li> <li>• Avoid twisting/turning while pulling on tools, moving equipment, etc.</li> </ul>
	Unattended worker	<ul style="list-style-type: none"> <li>• Use "buddy system" - visual contact will be maintained with the sampling technician during sampling activities.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Soil boring and surface/subsurface sampling	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.</li> <li>• Avoid skin contact with soils.</li> <li>• Handle samples with care.</li> <li>• Only essential personnel will be in the work area.</li> <li>• All personnel will follow good hygiene practices..</li> <li>• Proper decontamination procedures will be followed.</li> <li>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.</li> </ul>
	Cut hazards	<ul style="list-style-type: none"> <li>• Use care when handling glassware.</li> <li>• Wear adequate hand protection.</li> </ul>
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> <li>• Practice good housekeeping; keep work area picked up and clean as feasible.</li> <li>• Continually inspect the work area for slip, trip, and fall hazards.</li> </ul>
	UXO	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface avoidance and/or UXO downhole avoidance.</li> </ul>
	Bees, spiders, and snakes	<ul style="list-style-type: none"> <li>• Workers shall inspect the work area carefully and avoid placing hands and feet into concealed areas.</li> <li>• Evaluate need for sensitive workers to have prescribed antibiotic or medicine to combat onset of symptoms.</li> </ul>
	Poison ivy/oak/sumac	<ul style="list-style-type: none"> <li>• Avoid plant areas if possible.</li> <li>• Wear long sleeves and long pants.</li> <li>• Promptly wash clothing that has contacted poisonous plants.</li> <li>• Wash affected areas immediately with soap and water.</li> </ul>
	Contingency angle boring	<ul style="list-style-type: none"> <li>• Drill crew shall be familiar with angle boring operations</li> <li>• Auger guards shall be in place to prevent contact with rotating augers.</li> <li>• Drill equipment shall be approved by the specific rig manufacturer.</li> <li>• Boom/mast on drill rig shall have a positive locking means to achieve drill angle.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Soil boring and surface/subsurface sampling (continued)	Cold stress	<ul style="list-style-type: none"> <li>• Workers should wear insulated clothing when temperatures drop below 40 degrees Fahrenheit (°F).</li> <li>• Drink warm beverages on breaks. Refrain from drinking caffeinated beverages.</li> <li>• Remove wet clothing promptly.</li> <li>• Take breaks in warm areas.</li> <li>• Reduce work periods as necessary.</li> <li>• Layer work clothing.</li> </ul>
	Access/egress hazards	<ul style="list-style-type: none"> <li>• Use qualified and trained bushhog operator.</li> <li>• Keep employees out of the bushhog work area.</li> <li>• Utilize good housekeeping practices.</li> <li>• Keep aisleways, pathways, and work areas free of obstruction.</li> <li>• Clean ice or snow off of walkways or work stations.</li> <li>• Use appropriate footwear for the task assigned.</li> </ul>
	Heat rash	<ul style="list-style-type: none"> <li>• Keep the skin clean and dry.</li> <li>• Change perspiration-soaked clothing, as necessary.</li> <li>• Bathe at end of work shift or day.</li> <li>• Apply powder to affected area.</li> </ul>
	Heat cramps	<ul style="list-style-type: none"> <li>• Drink plenty of cool fluids even when not thirsty.</li> <li>• Provide cool fluid for work crews.</li> <li>• Move victim to shaded, cool area.</li> </ul>
	Heat exhaustion	<ul style="list-style-type: none"> <li>• Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).</li> <li>• Set up work/rest periods.</li> <li>• Use the buddy system.</li> <li>• Allow workers time to acclimate.</li> <li>• Have ice packs available for use.</li> <li>• Take frequent breaks.</li> </ul>
	Heat stroke	<ul style="list-style-type: none"> <li>• Evaluate possibility of night work.</li> <li>• Perform physiological monitoring on workers during breaks.</li> <li>• Wear body cooling devices.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Soil boring and surface/subsurface sampling (continued)	Lightning strikes	<ul style="list-style-type: none"> <li>• Whenever possible, halt activities and take cover.</li> <li>• If outdoors, stay low to the ground.</li> <li>• Limit the body surface area that is in contact with the ground (i.e., kneeling on one knee is better than laying on the ground).</li> <li>• Seek shelter in a building if possible.</li> <li>• Stay away from windows.</li> <li>• If available, crouch under a group of trees instead of one single tree.</li> <li>• If in a group, keep 6 feet of distance between people.</li> </ul>
	Thunderstorms, tornadoes	<ul style="list-style-type: none"> <li>• Listen to radio or TV announcements for pending weather information.</li> <li>• Cease field activities during thunderstorms or tornado warnings.</li> <li>• Seek shelter. Do not try to outrun a tornado.</li> </ul>
	UXO	<ul style="list-style-type: none"> <li>• UXO specialist will perform UXO surface avoidance and/or UXO downhole avoidance.</li> </ul>
Installation of Monitoring Wells	Overhead hazards	<ul style="list-style-type: none"> <li>• Make sure no obstacles are within radius of boom. Always stay a safe distance from power lines.</li> </ul>
	Faulty or damaged equipment being utilized to perform work	<ul style="list-style-type: none"> <li>• All machinery or mechanized equipment will be inspected by a competent mechanic and be certified to be in safe operating condition.</li> <li>• Equipment will be inspected before being put to use and at the beginning of each shift.</li> <li>• Faulty/unsafe equipment will be tagged and if possible locked out.</li> <li>• Drill rigs and geoprobes shall be equipped with reverse signal alarm, backup warning lights, or the vehicle is backed up only when an observer signals it is safe to do so.</li> </ul>
	Heat rash	<ul style="list-style-type: none"> <li>• Keep the skin clean and dry.</li> <li>• Change perspiration-soaked clothing, as necessary.</li> <li>• Comply with IT Procedure HS 400 (May 13, 1999).</li> <li>• Bathe at end of work shift or day.</li> <li>• Apply powder to affected area.</li> </ul>
	Heat cramps	<ul style="list-style-type: none"> <li>• Drink plenty of cool fluids even when not thirsty.</li> <li>• Provide cool fluid for work crews.</li> <li>• Comply with IT Procedure HS 400 (May 13, 1999).</li> <li>• Move victim to shaded, cool area.</li> </ul>
	Heat exhaustion	<ul style="list-style-type: none"> <li>• Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).</li> <li>• Set up work/rest periods.</li> <li>• Use the "buddy system."</li> <li>• Comply with IT Procedure HS 400 (May 13, 1999).</li> <li>• Allow workers time to acclimate.</li> <li>• Have ice packs available for use.</li> <li>• Take frequent breaks.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

(Page 9 of 12)

Activity	Potential Hazards	Recommended Controls
Installation of Monitoring Wells (continued)	Heat stroke	<ul style="list-style-type: none"> <li>• Evaluate possibility of night work.</li> <li>• Perform physiological monitoring on workers during breaks.</li> <li>• Wear body cooling devices.</li> <li>• Comply with IT Procedure HS 400 (May 13, 1999).</li> </ul>
	Uneven terrain, poor ground support, inadequate clearances, contact with utilities	<ul style="list-style-type: none"> <li>• Inspections or determinations of road conditions and structures shall be made in advance to ensure that clearances and load capacities are safe for the passage or placing of any machinery or equipment.</li> <li>• All mobile equipment and areas in which they are operated shall be adequately illuminated.</li> <li>• Aboveground and belowground utilities will be located prior to staging equipment.</li> <li>• Whenever the equipment is parked, the parking brake shall be set.</li> <li>• Equipment parked on inclines will have the wheels chocked.</li> <li>• Inspect brakes and tire pressure on drill rig before staging for work.</li> </ul>
	Inexperienced operator	<ul style="list-style-type: none"> <li>• Machinery and mechanized equipment shall be operated only by designated personnel.</li> <li>• Operators shall inform their supervisor(s) of any prescribed medication that they are taking that would impair their judgment.</li> </ul>
	Jacks/outriggers	<ul style="list-style-type: none"> <li>• Ensure proper footing and cribbing.</li> </ul>
	Falling objects	<ul style="list-style-type: none"> <li>• Remove unsecured tools and materials before raising or lowering the derrick.</li> <li>• Stay alert and clear of materials suspended overhead.</li> </ul>
	Pinch points	<ul style="list-style-type: none"> <li>• Keep feet and hands clear of moving/suspended materials and equipment.</li> <li>• Stay alert at all times!</li> </ul>
	Fire	<ul style="list-style-type: none"> <li>• Mechanized equipment shall be shut down prior to and during fueling operations.</li> <li>• Have fire extinguishers inspected and readily available.</li> <li>• Obtain a Hot Work Permit, per IT Procedure HS 314 (May 19, 1999) for any operation which could act as an ignition source.</li> </ul>
	Fall hazards	<ul style="list-style-type: none"> <li>• Personnel are not allowed to work off of machinery or use them as ladders.</li> <li>• Use fall protection when working above 6 feet.</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• Hearing protection is mandatory above 85 dBA.</li> </ul>
	Contact with rotating or reciprocating machine parts	<ul style="list-style-type: none"> <li>• Use machine guards; use long-handled shovels to remove auger cuttings.</li> <li>• Safe lockout procedures for maintenance work.</li> </ul>
	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift.</li> </ul>
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> <li>• Practice good housekeeping, keep work area picked up and clean as feasible.</li> <li>• Continually inspect the work area for slip, trip, and fall hazards.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

(Page 10 of 12)

Activity	Potential Hazards	Recommended Controls
Installation of Monitoring Wells (continued)	Contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Real time air monitoring will take place. Proper personal protective clothing and equipment will be utilized.</li> <li>• Stop immediately at any sign of obstruction.</li> <li>• Do not breathe air surrounding boring any more than necessary.</li> <li>• Upgrade to respirator if necessary.</li> <li>• Avoid skin contact with soil cuttings. Wear gloves.</li> <li>• Stay clear of moving parts of drill rig and geoprobe.</li> </ul>
	Drum handling	<ul style="list-style-type: none"> <li>• Be careful not to breathe air from around open drum any more than necessary. Monitor with photoionization detector/flame ionization detector (PID/FID) equipment and upgrade to respirator if necessary.</li> <li>• When filling a drum (with either soil or water), be careful not to make contact with the contained waste. Wear appropriate gloves. Make sure lid or bung of drum is secure.</li> <li>• If moving a drum unassisted, be sure to leverage properly, use proper lifting techniques, and wear safety glasses and steel-toed boots.</li> <li>• When using a drum dolly, make sure straps and lid catch are securely attached. Leverage properly when tilting drum. Be sure toes stay away from drum.</li> </ul>
	UXO	<ul style="list-style-type: none"> <li>• UXO specialist will perform UXO surface avoidance and/or UXO downhole avoidance.</li> </ul>
Moving and shipping collected samples	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size-up the lift.</li> </ul>
	Pinch points	<ul style="list-style-type: none"> <li>• Keep hands, fingers, and feet clear of moving/suspended materials and equipment.</li> <li>• Beware of contact points.</li> <li>• Stay alert at all times!</li> </ul>
	Cut hazards	<ul style="list-style-type: none"> <li>• Wear adequate hand protection. Use care when handling glassware.</li> </ul>
	Hazard communication	<ul style="list-style-type: none"> <li>• Label all containers as to contents and associated hazards.</li> </ul>
	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size-up the lift.</li> </ul>
Material storage	Flammable and combustible liquids	<ul style="list-style-type: none"> <li>• Store in NO SMOKING AREA.</li> <li>• Fire extinguisher readily available.</li> <li>• Transfer only when properly grounded and bonded.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

(Page 11 of 12)

Activity	Potential Hazards	Recommended Controls
Disposal of investigation-derived waste (IDW) (Forklift Operation)	Personnel injury, property damage, and/or equipment damage	<ul style="list-style-type: none"> <li>• Use qualified and trained forklift operators.</li> <li>• The operator shall not exceed the load capacity rating for the forklift.</li> <li>• The load capacity shall be clearly visible on the forklift.</li> <li>• Forklift operators shall inform their supervisor of any prescribed medication that they are taking that would impair their judgement.</li> </ul>
	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Stop immediately at any sign of obstruction.</li> <li>• Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.</li> <li>• Only essential personnel will be in the work area.</li> <li>• Real-time air monitoring will take place before and during sampling activities.</li> <li>• All personnel will follow good hygiene practices.</li> <li>• Proper decontamination procedures will be followed.</li> <li>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.</li> </ul>
	Cut hazards	<ul style="list-style-type: none"> <li>• Use care when handling glassware.</li> <li>• Wear adequate hand protection.</li> </ul>
High-pressure water jetting operations	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques.</li> <li>• Lifts greater than 60 pounds require assistance or mechanical equipment; size-up the lift.</li> </ul>
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> <li>• Good housekeeping shall be implemented.</li> <li>• The work area shall be kept clean as feasible.</li> <li>• Inspect the work area for slip, trip, and fall hazards.</li> </ul>
	Fueling	<ul style="list-style-type: none"> <li>• Only approved safety cans shall be used to store fuel.</li> <li>• Do not refuel equipment while it is operating.</li> <li>• Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.</li> </ul>
	Faulty or damaged equipment	<ul style="list-style-type: none"> <li>• Equipment shall be inspected before being placed into service and at the beginning of each shift.</li> <li>• Preventive maintenance procedures recommended by the manufacturer shall be followed.</li> <li>• A lockout/tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.</li> </ul>

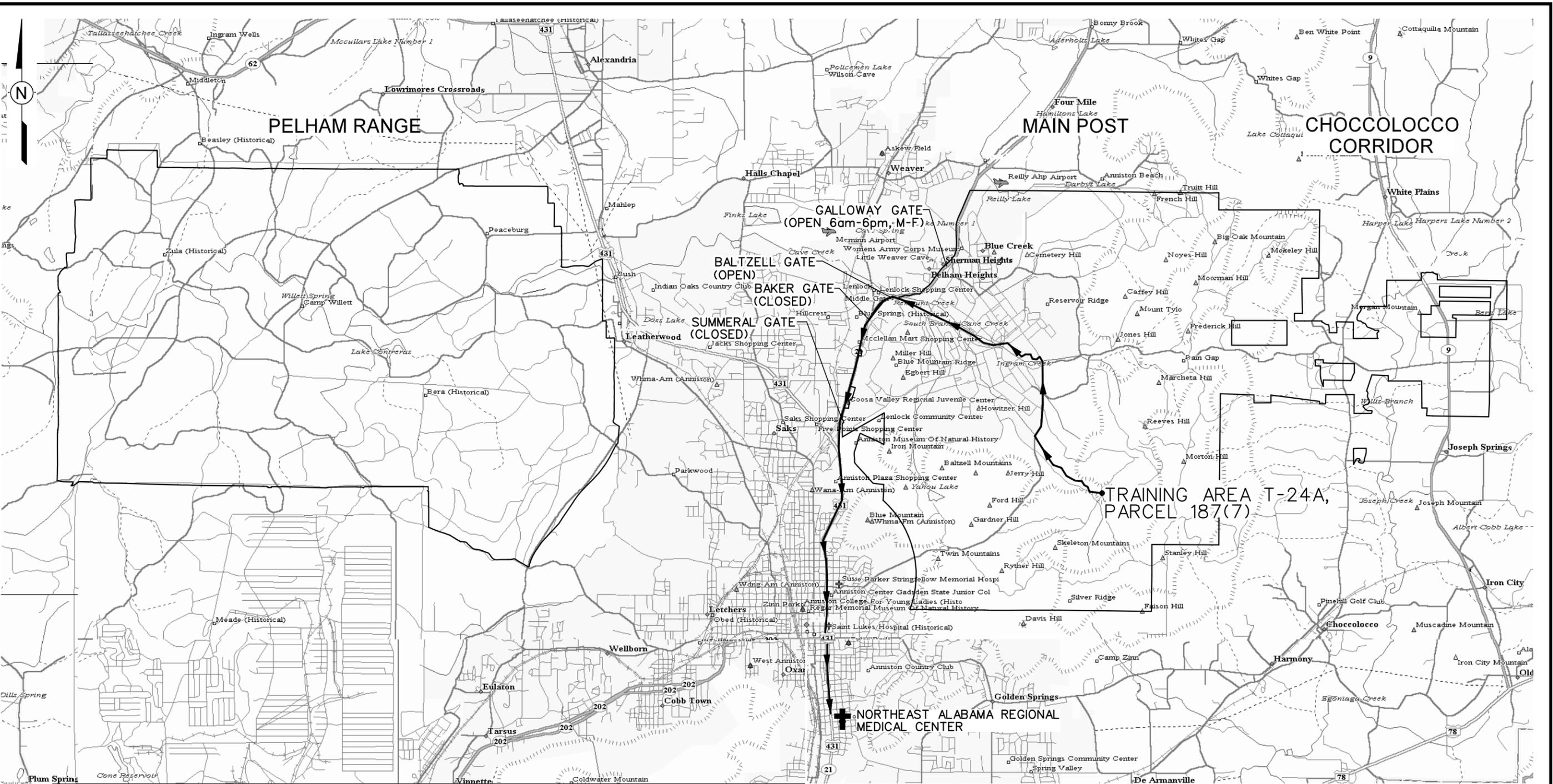
**Table 5-1**

**Activity Hazard Analysis  
Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q  
Fort McClellan, Calhoun County, Alabama**

(Page 12 of 12)

Activity	Potential Hazards	Recommended Controls
High-pressure water jetting operations (continued)	High-pressure water	<ul style="list-style-type: none"> <li>• Jetting gun operator must wear appropriate PPE including hard hat, impact-resistant safety glasses with side shields, water-resistant clothing, metatarsal guards for feet and legs, and hearing protection (if appropriate).</li> <li>• One standby person shall be available within the vicinity of the pump during jetting operation.</li> <li>• The work area shall be isolated and adequate barriers will be used to warn other site personnel.</li> </ul>
	Unqualified operators	<ul style="list-style-type: none"> <li>• Only qualified and trained personnel are permitted to operate machinery and mechanized equipment associated with water jet cutting and cleaning.</li> </ul>
	Out of control equipment	<ul style="list-style-type: none"> <li>• No machinery or equipment is permitted to run unattended.</li> <li>• Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• Sound levels above 85 dBA mandates hearing protection by nearby site personnel.</li> </ul>
	Activation during repairs	<ul style="list-style-type: none"> <li>• All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.</li> </ul>
	Pinch points	<ul style="list-style-type: none"> <li>• Keep feet and hands clear of moving/suspended materials and equipment.</li> <li>• Stay alert and clear of materials suspended</li> </ul>
	Falling objects	<ul style="list-style-type: none"> <li>• Hard hats are required by site personnel.</li> <li>• Stay alert and clear of material suspended overhead.</li> </ul>
	Flying debris	<ul style="list-style-type: none"> <li>• Impact-resistant safety glasses with side shields are required.</li> </ul>
	Contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• All site personnel will wear the appropriate PPE.</li> </ul>

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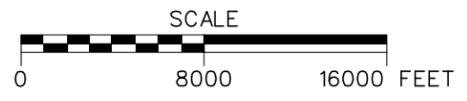


**LEGEND:**

- ROUTE TO NORTHEAST ALABAMA REGIONAL MEDICAL CENTER
- U.S. HIGHWAY
- HOSPITALS
- INVESTIGATION SITES

**DRIVING DIRECTIONS FROM BALTZELL GATE ROAD TO THE NORTHEAST ALABAMA MEDICAL CENTER**

- LEAVING FORT MCCLELLAN ON BALTZELL GATE ROAD, TURN LEFT (SOUTH) ONTO AL HWY 21
- GO ~ 2.5 MILES WHERE AL HWY 21 MERGES WITH U.S. HWY 431 AND CONTINUE SOUTH
- CONTINUE SOUTH ON AL21/US431 FOR ~ 2.7 MILES
- TURN LEFT ONTO EAST 10th STREET
- GO ~ 0.2 MILE TO MEDICAL CENTER ON RIGHT
- NORTHEAST ALABAMA REGIONAL MEDICAL CENTER, 400 EAST 10th STREET
- PHONE NUMBER : (256) 235-5121



**FIGURE 5-1  
 HOSPITAL EMERGENCY ROUTE**

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



DWG. NO.: ...796887es.100  
 PROJ. NO.: 796887

INITIATOR: J. JENKINS  
 PROJ. MGR.: J. YACOUB

DRAFT. CHK. BY:  
 ENGR. CHK. BY: J. JENKINS

STARTING DATE: 06/06/00  
 DATE LAST REV.:  
 DRAWN BY: D. BILLINGSLEY  
 DRAWN BY:

**ATTACHMENT 1**

**EVALUATING OE/UXO/CWM HAZARDS  
IN SUPPORT OF HTRW ACTIVITIES**

# Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities

Date: October 8, 2003

Name of person completing form: Jeffrey J. Tarr

Site Name: Ranges Near Training Area T-24A, Parcels 187(7), 112Q, 113Q-X, 213Q, and 214Q

Title: Technical Lead

Job Number: 796887

Signature: Jeffrey J. Tarr

**1a. Have the historical records available for this HTRW site been reviewed?** Yes No

If the answer to **1a.** is yes, proceed to **1b.**  
 If the answer to **1a.** is no, review site information prior to completing this form.

**1b. Is there recent information (site walk, worker interviews, etc.) that indicates a potential OE/CWM hazard at this site?** Yes No

Proceed to **2.**

**2. According to the records review, is this site known or suspected to have been used for:**

	Yes	No
<b>2a. Manufacturing, production, or shipping of conventional or chemical warfare materiel (CWM) OE:</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Live fire testing of any ordnance:</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Conventional or CWM OE training:</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Storage of conventional or CWM OE:</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Disposal or demilitarization of conventional or CWM OE:</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Other (specify):</b>		

	Yes	No
<b>2b. Manufacturing, production, or shipping of chemical agent:</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Research or testing of chemical agent:</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Chemical agent related training:</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Storage of chemical agent:</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Disposal or demilitarization of chemical agent:</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Other (specify):</b>		

Any **2a** question answered "YES" indicates UXO support is required for all site activities. If all **2a** questions are answered "NO", UXO support may not be required. Refer to Installation-Wide Safety and Health Plan (SHP) for additional information concerning UXO support. Proceed to question **2b.**

Any **2b** question answered "YES" requires the remainder of this form to be completed. If all **2b** questions are answered "NO", real-time monitoring for chemical agent will not be required and completing the remainder of this form is not required. Refer to SHP for additional information concerning agent monitoring.

Additional space for notes and explanations on page 4.  
**Continue to page 2 of 4 –**

Site Name: Ranges Near Training Area T-24Alpha

Job Number: 796887

Date: 8-Oct-03

3. For sites where the manufacturing, testing, storage, or disposal of CWM is suspected:	Yes	No
Is there evidence that the CWM is/was containerized in potentially unexploded ordnance:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there evidence that the CWM is/was containerized in nonexplosive containers:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there evidence that the CWM is open to the environment (i.e., in an open container or free liquid/solid in the soil/water):	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there evidence that the CWM hazard has been removed from the site or that the site has been decontaminated:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Has the site been previously monitored or sampled for chemical agent or agent breakdown products:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
For any "YES" above, was the agent or breakdown product identified?	<input type="checkbox"/>	<input type="checkbox"/>

**For any "Yes", list types of agent (mustard, lewisite, etc.) and the form (in ordnance, in drum, etc.) the CWM is expected to be found (or state "unknown"):**

The site was used as a chemical munitions disposal area including CG, BZ, GB, and HD. Decontaminants included STB, and DS2. However, the proposed work will be conducted outside the fenced area. Therefore, the risk of encountering CWM is remote (low).

**List agent breakdown products identified:**

Methylphosphonic acid was detected in 1 surface and 1 subsurface soil sample. Thiodiglycol was detected in 3 sediment samples and 1 groundwater sample. All detections were below SSSLs.

4. Defining the Potential for the Presence of CWM:	Agent Monitoring Requirements for Site Activities:
<p><b>4a.</b> High Presence Potential – Definition: CWM is known or highly suspected to be present at the site in a condition (within ordnance and/or nonexplosive container, or in an uncontainerized form in sufficient volume that weathering of the product has not rendered it harmless) that will cause potential harm to personnel if it is encountered.</p>	<p>Mandatory personal and perimeter air monitoring using the DAAMS, MINICAMS, and RTAP collection/analysis methods with off-site surety laboratory confirmation of all environmental samples. Specific monitoring criteria (equipment types and sampling station placement, percentage of personnel monitored, etc.) to be established in the Site Specific Safety and Health Plan (SSHP).</p>
<p><b>4b.</b> Moderate Presence Potential - Definition: CWM is suspected to have been present at the site, but has been previously removed and/or decontaminated, or has been open to the environment such that it is expected to have degraded and been rendered harmless.</p>	<p>The need for personal and perimeter air monitoring using the DAAMS, MINICAMS, and RTAP collection/analysis methods with off-site surety laboratory confirmation of all environmental samples will be reviewed on a site-by-site basis. Specific monitoring criteria (equipment types and sampling station placement, percentage of personnel monitored, etc.) to be established in the Site Specific Safety and Health Plan (SSHP).</p>
<p><b>4c.</b> Low Presence Potential – Definition: No indications that CWM will be present in quantity or reactivity (in munitions, projectiles, drums, etc.).</p>	<p>No specific personal or area monitoring for chemical agents required beyond what is specified in the SHP.</p>

Continue to page 3 of 4 -

Site Name: Ranges Near Training Area T-24 Alpha

Job Number: 796887

Date: 8-Oct-03

Based on the information available for this site, including information gathered during completion of this form, the potential for CWM to be present at this site, as defined above, is expected to be: **LOW**

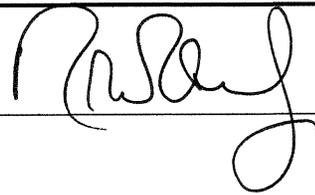
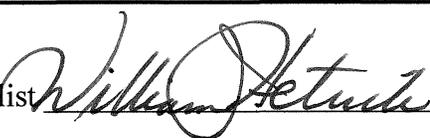
Exceptions/Explanations: See attached letters and references. (additional space for notes and explanations on page 4)

**5. Based on the information provided in questions 1 through 5, above, the following guidelines will be used for establishing PPE requirements for activities to be performed at this site; Specific details are provided in the SSHP:**

<p><b>5a.</b> High Exposure Potential - High exposure potential is determined by evaluating the potential presence of CWM in conjunction with the task(s) to be performed, as well as the specific location and duration of the task(s).</p>	<p>Subject to review by the Shaw CIH, PPE for all personnel in the exclusion zone at a site identified as having a "High Exposure Potential" will be Level B (supplied air) or Level C (full-face respirator with HEPA/Acid Gas/OV cartridges w/ emergency egress hood) and chemically resistant coveralls. Specific PPE requirements are in the SSHP for this site.</p>
<p><b>5b.</b> Moderate Exposure Potential - Moderate exposure potential is determined by evaluating the potential presence of CWM in conjunction with the task(s) to be performed, as well as the specific location and duration of the task(s).</p>	<p>Subject to review by the Shaw CIH, PPE for all personnel in the exclusion zone at a site identified as having a "Moderate Exposure Potential" will be Modified Level D (disposable coveralls and emergency egress hood) carried by all personnel. Specific PPE requirements are in the SSHP for this site.</p>
<p><b>5c.</b> Low Exposure Potential - Low exposure potential is determined by evaluating the potential presence of CWM in conjunction with the task(s) to be performed, as well as the specific location and duration of the task(s).</p>	<p>Subject to review by the Shaw CIH, no additional PPE requirements above those stated in the SSHP are needed for sites identified as having "Low Exposure Potential." Specific PPE requirements are in the SSHP for this site.</p>

Based on all available information, the exposure potential at this site is considered to be: **LOW**

Exceptions/Explanations: See attached letters and reference.

Review Signatures:  
 Shaw UXO Technical Manager  Date: 8 Oct 03 Shaw H&S Specialist  Date: 10/14/03

**Site Name: Ranges Near Training Area T-24 Alpha**

**Job Number: 796887**

**Date: 8-Oct-03**

***Additional Notes and Explanations:***

See attached letter dated September 7, 2002 from Ellis Pope, USACE, Mobile District.

See attached memorandum dated September 5, 2001 from John Potter, USACE, Huntsville Center.

Reference: Parsons, 2002. Final CWM EE/CA, Fort McClellan, Alabama, June.

These documents state that CWM or CWM breakdown products were not detected during the SI, RI, or EE/CA investigations conducted at T-24A.

In addition, the EE/CA concluded that the probability of encountering CWM during follow-on intrusive activities at T-24A is considered remote\* based on historical site uses and the results of previous investigations. Therefore, the installation commander, or designated representative, assumes the risk of conducting future site activities at T-24A as a non-CWM site.

\* Army Regulation 385-10, updated February 2000, substitutes the word "seldom" and defines it as "remotely possible; could occur at some time."

See attached Probability Assessment Report dated September 2003, approved by Ron Levy, BRAC Environmental Coordinator, FTMC, Alabama.

Because the proposed work (installation of three bedrock monitoring wells) will be conducted outside the fenced area at T-24 Alpha, the potential for CWM to be present at those drill areas is considered low. However, it should be noted that twenty-one CWM items were encountered during exploratory trenching inside the fence and analyzed for chemical warfare agent. None of the items contained chemical warfare agent nor were they explosively configured. In addition, soil samples collected during previous investigations indicated no chemical warfare agents present in the sampled media.



**DEPARTMENT OF THE ARMY**  
**MOBILE DISTRICT, CORPS OF ENGINEERS**  
P.O. BOX 2288  
MOBILE, ALABAMA 36628-0001

REPLY TO  
ATTENTION OF:

September 7, 2001

Environmental and HTRW Section  
Engineering Division

IT Corporation  
Attention: Mr. Steve Moran  
312 Directors Drive  
Knoxville, Tennessee 37923-4799

Dear Mr. Moran:

Reference is made to your Contract DACA21-96-D-0018, Task Order CK10, WADs 1, 2, 9, and 10, at Fort McClellan, Alabama.

The Corps of Engineers Huntsville Center has completed its CWM EE/CA and has received all soil sample results. All of the samples were clear of Chemical Warfare Material and Chemical Warfare Material by-products. A copy of Huntsville's letter is enclosed for your files.

You are now authorized to begin the monitoring well installations within these areas as approved in your work plans.

Should you have any questions, please contact me at (334) 690-3077.

Sincerely,

Handwritten signature of Ellis C. Pope in black ink.

Ellis C. Pope  
Authorized Representative of the  
Contracting Officer

Encl

Cf: Mr. Ron Levy  
BRAC Environmental Coordinator  
U.S. Army Garrison/Transition Force  
Environmental Office  
291 Jimmy Parks Boulevard  
Fort McClellan, AL 36205-5000



DEPARTMENT OF THE ARMY  
HUNTSVILLE CENTER, CORPS OF ENGINEERS  
P.O. BOX 1600  
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO  
ATTENTION OF

CEHNC-OE-DC (200-1c)

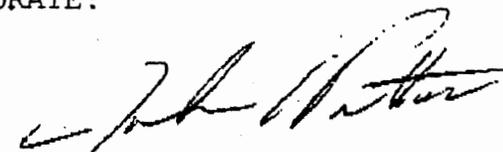
5 September 2001

MEMORANDUM FOR Commander, U.S. Army Engineer District, Mobile,  
ATTN: Ellis Pope (EN-GE), P.O. Box 2288, Mobile, AL 36628-0001

SUBJECT: Chemical Warfare Material (CWM) Engineering  
Evaluation/Cost Analysis (EE/CA) Completion and Release of  
Property for Hazardous, Toxic, and Radioactive Waste (HTRW)  
Investigations, Fort McClellan, AL

1. The CWM EE/CA for Fort McClellan has been completed and the results from all the soil samples have been received. All of the samples were clear of Chemical Warfare Material and Chemical Warfare Material by-products.
2. The HTRW investigations can be started on the Chemical Warfare Material Sites that were completed during this investigation using anomaly avoidance and withdrawal if suspect chemical weapons are found.
3. If you have any questions, please call Mr. Dan Copeland at 256-895-1567.

FOR THE DIRECTOR OF  
ORDNANCE AND EXPLOSIVES DIRECTORATE:

  
JOHN C. POTTER, Ph.D., P.E.  
Chief, Design Center  
for Ordnance and Explosives  
Directorate

**Final  
Site-Specific Unexploded Ordnance Safety Plan Attachment  
Remedial Investigation (Horizontal and Vertical Extent-  
Groundwater) at the Ranges Near Training Area T-24A,  
Parcels 88(7), 108(7), 187(7), 112(Q), 113Q-X, 213Q, and 214Q  
Fort McClellan, Calhoun County, Alabama**

**Prepared for:**

**U.S. Army Corps of Engineers, Mobile District  
109 St. Joseph Street  
Mobile, Alabama 36602**

**Prepared by:**

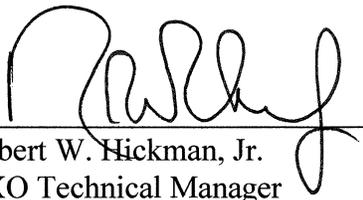
**Shaw Environmental, Inc.  
312 Directors Drive  
Knoxville, Tennessee 37923**

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

**October 2003**

**Final**  
**Site-Specific Unexploded Ordnance Safety Plan Attachment**  
**Remedial Investigation (Horizontal and Vertical Extent –**  
**Groundwater) at the Ranges Near Training Area T-24A,**  
**Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q, and 214Q.**

I have read and approve this site-specific unexploded ordnance (UXO) safety plan attachment for the Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q, and 214Q at Fort McClellan, Alabama, with respect to project hazards, regulatory requirements, and Shaw UXO procedures.



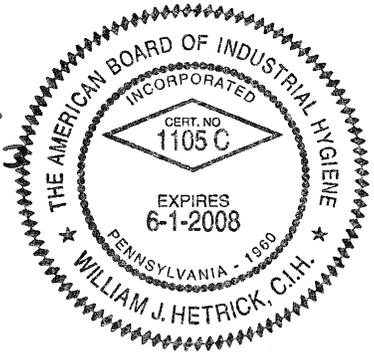
Robert W. Hickman, Jr.  
UXO Technical Manager

130d03  
Date



William J. Hetrick, CIH  
Health & Safety Manager

10/14/03  
Date



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## **List of Acronyms**

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See Attachment 1, List of Abbreviations and Acronyms, of the Site-Specific Field Sampling Plan Attachment contained in this binder.

## **1.0 Introduction**

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This document defines anomaly avoidance procedures for activities to be performed by Shaw Environmental, Inc. (Shaw) unexploded ordnance (UXO) personnel in conjunction with the remedial investigation at the Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 123(Q), 187(7), 112Q, 113Q-X, 213Q, and 214Q, at Fort McClellan (FTMC), Calhoun County, Alabama. This document is not a stand-alone document; it must be used in conjunction with Appendix E of the Draft Installation-Wide Sampling and Analysis Plan (SAP) (IT, 2002). Appendix E of the SAP is the Ordnance and Explosive Management Plan. The *Fort McClellan Unexploded Ordnance Supplementary Procedures* from Appendix E of the SAP are provided herein as Attachment 1.

Shaw UXO personnel will perform visual surveys, assisted by hand-held magnetometers and metal detectors, to support the installation of additional wells and the collection of samples for chemical analysis at the Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q and 214Q. The purpose is to avoid any ordnance and explosives (OE) during hazardous, toxic and radioactive waste (HTRW) sampling activities. Intrusive anomaly investigation is not authorized for this site work.

The Ranges Near Training Area T-24A are located on the southeast portion of the Main Post and consist of a 1.5 acre fenced chemical munitions disposal area and four overlapping ranges. The following seven parcels make up the Ranges Near Training Area T-24A: Former Fog Oil Drum Storage Area, Parcel 88(7), Multipurpose Range, Parcel 108(7), Former Chemical Munitions Disposal Area, Parcel 187(7); Former Machine Gun Range, Parcel 112Q; Former Demolition Area, Parcel 113Q-X; Former Bandholtz Machine Gun Qualification Range, Parcel 213Q, and Bandholtz Field Firing Range, Parcel 214Q.

Previous investigations conducted at the Ranges Near Training Area T-24A included a geophysical survey, soil sampling, surface water sampling, sediment sampling, groundwater sampling and trenching operations. The geophysical survey was conducted inside of the Former Chemical Munitions Disposal Area, Parcel 187(7) (the fenced area at Training Area T-24A) in 2001 by Parsons Engineering Science, Inc. as part of a chemical warfare material (CWM) Engineering Evaluation / Cost Analysis (EE/CA). Numerous geophysical anomalies were observed and evaluated. Twenty-one CWM items were encountered during investigative trenching of the anomalies but did not contain chemical warfare agents nor were they explosively

configured. Eight soil samples were collected during the trenching and analyzed for chemical warfare agents (GB, HD, 1,4-thioxane, or 1,4-dithiane). There were no concentrations of GB, HD, 1,4-thioxane, or 1,4-dithiane detected above the reporting limits. Groundwater sample results from previous investigations conducted by Shaw Environmental, Inc. (Shaw), formerly IT Corporation (IT), and Science Applications International Corporation (SAIC) indicate the presence of benzene in three bedrock monitoring wells and carbon tetrachloride in two bedrock monitoring wells located downgradient of the fenced area at Training Area T-24A. The drilling and installation of the three bedrock monitoring wells is being conducted to determine the horizontal and vertical extent of benzene and carbon tetrachloride contamination in groundwater.

## **2.0 UXO Team Composition**

---

UXO team and personnel requirements will be in accordance with EP 75-1-2 (USACE, 2000) and installation-wide sampling and analysis plan (SAP) (IT, 2002) for FTMC. A UXO team will be on site during all sampling or intrusive activities where OE is suspected.

## **3.0 Responsibilities**

---

The UXO Team Leader is responsible for ensuring that personnel performing UXO tasks at FTMC have the required qualifications. The UXO Team Leader supervises and coordinates UXO work activities.

The UXO team member(s) will provide UXO avoidance, explosive ordnance recognition, location, and safety functions for Shaw employees and any subcontractors during sampling activities. Sampling activities at this site may include surface and subsurface soil sampling, drilling and installing monitoring wells, sampling of monitoring wells, survey of sample points, and safe access and egress to and from the site in support of HTRW operations.

## **4.0 Authority**

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UXO personnel are authorized to perform UXO avoidance activities only. UXO personnel are not permitted to initiate OE investigative or disposal activities.

## **5.0 UXO Avoidance Procedures to Support HTRW Sampling Activities at FTMC**

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The scope of work for site investigation activities associated with the Ranges Near Training Area T-24A, Parcels 88(7), 108(7), 187(7), 112Q, 113Q-X, 213Q, and 214Q, includes the following UXO tasks:

- Provide UXO avoidance support during the installation of three bedrock monitoring wells outside the fenced area at Training Area T-24A. Sample types and locations are defined in the field activities section of the site-specific field-sampling plan contained in this binder.
- Provide downhole UXO support for all intrusive drilling to determine buried downhole hazards.
- Provide surveys for all intrusive field activities (e.g., digging, grading, drilling, excavation, etc).

Since these areas may contain OE contamination, the UXO team must conduct a surface access survey for UXO before any type of activities commence. This includes foot and vehicular traffic. UXO avoidance activities at the Ranges Near Training Area T-24A, will include:

- a) Access Corridors and Sampling Sites
  - (1) Access surveys are defined as those UXO sweeps performed to allow entry to and exit from sampling sites. In cases where hand auger sampling is required, the UXO team may consist of a UXO technician and sampling personnel. The UXO technician will sweep ahead of the non-UXO technician team member and mark a clear route. Access surveys will begin in a known clear area and proceed by the most direct route to the sampling site. The boundaries of the access route, whether for vehicle or personnel traffic, and the area of the sampling site, will be marked with white tape or white pin flags.
  - (2) If an OE item is found during the survey, the location will be conspicuously marked with a red pin flag and avoided by altering the route. Additionally, UXO personnel will complete the Shaw FTMC "Unexploded Ordnance Report Form." Subsurface anomalies will be marked with a yellow flag.

- (3) The boundaries of the access route and sampling site will be recorded in the Shaw FTMC "UXO Sketch Log" by the UXO technician. Additionally, anomaly locations will be recorded on this form.
- (4) Instrumentation used at this site will include the Schonstedt GA 72, the CST Corporation Magna-Trak 102, or the Whites Spectrum XLT Metal Detector. Additionally, the Schonstedt MG-220 or MG-230 will be set up for downhole monitoring. All equipment will be operated as specified in the appropriate operator's manual. All equipment will be function tested prior to use following the procedure in Section 3.2 of the *FTMC UXO Supplementary Procedures* and the operator's instructions. The Whites Metal Detector will be used in conjunction with hand-held magnetometers in areas of high concentrations of rocks with a magnetic signature to assist in eliminating anomalies created by "hot rocks."
- (5) The access route will be twice as wide as the widest vehicle that will use the route. Footpath lanes will be a minimum of three feet wide.
- (6) If surface OE or subsurface anomalies are encountered that cannot be avoided, the access route must be diverted to avoid contact. No personnel will be allowed outside of the surveyed areas without a UXO escort. No unescorted access is permitted inside the corridor area until a survey has been completed and boundaries established.
- (7) At the actual investigation site, the UXO team must also complete a survey of an area sufficient to support mechanical excavation equipment maneuverability, parking of support vehicles, and establishment of decontamination stations. As a minimum, the surveyed area should have a dimension in all directions equal to twice the length of the largest vehicle or piece of equipment to be brought on site. White pin flags or tape will be used to mark the boundaries of the surveyed site.
- (8) Surface soil samples are normally collected at depths of 0 to 12 inches below ground surface. The UXO team will survey the area of the soil sampling site for any indication of OE. Sampling is not permitted at any location where an anomaly has been detected.
- (9) Tracked or other vehicles whose movement would disturb the soil are authorized for use only in areas that have been surveyed and in which no anomalies have been detected.
- (10) If grading or soil movement is required to support access corridor development or a sampling location, UXO personnel will perform a survey. After an area has been surveyed and no anomalies have been detected, soil can be removed at a rate of no more than one foot per cut. If

additional grading is required, another survey will be performed after each one foot of soil has been removed.

- (11) Erosion and weathering will typically cause some OE items to leach to the surface or otherwise be uncovered. In cases where access corridors or sampling sites have not been surveyed or traversed for a period of time, additional surveys may be required. The decision regarding the performance of follow-on surveys will be made by the site superintendent with input provided by the FTMC UXO Safety Officer and FTMC UXO Team Leader. The decision will be based on such factors as: the amount of time since the last survey was performed, the weather during this period, the terrain in the area of concern, the former use of the area, and the type of quantity of OE found during initial surveys.
- (12) Incremental geophysical surveys at drill hole locations will be initially accomplished using a hand auger to install a pilot hole. An access survey of the immediate vicinity of the pilot hole location will precede the installation of the pilot hole. The UXO team will use a manual or mechanical portable auger to install the pilot hole. The augered hole will be inspected for anomalies with a geophysical instrument (configured for downhole utilization) in two-foot increments as the hole is advanced below ground surface. Hand augering of a hole will not proceed if an anomaly is detected that cannot be positively identified as inert material. If a suspect OE item is encountered, the sampling personnel must select a new drill hole location. The pilot hole will also be inspected with the geophysical instrument upon reaching the final depth of the hand augered hole, providing a total clearance depth equal to pilot hole depth plus two feet. If the proposed site is still free of magnetic anomalies, the drilling equipment may be brought on site and utilized. The UXO team will continue to inspect the drill hole for anomalies at two-foot increments as the drilling is advanced from the clearance depth of the pilot hole until a depth of 12 feet is reached.

b) Vegetation Removal

In cases where large trees or other vegetation removal is required to support access or sampling operations, the procedures in Section 4.2, *FTMC UXO Supplementary Procedures* will be followed.

c) Magnetometer/Metal Detector Checkout and Field Procedures

The procedures in Section 3.0, *FTMC UXO Supplementary Procedures* will be followed. The function test will utilize the function test ordnance that most closely approximates the 75 mm projectile. The UXO Team Leader may designate another function test item if other types of ordnance are discovered.

d) UXO Logbooks and Documentation

All UXO personnel identified in Section 5.0, *FTMC UXO Supplementary Procedures* will maintain a logbook in accordance with that procedure.

## **6.0 Safety**

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In addition to the requirements of the site-specific safety and health plan prepared for this site, the UXO personnel will ensure the following:

- a) During the access and subsurface surveys conducted with a geophysical instrument, the UXO team members will not wear safety shoes or other footwear that would cause the instrument to present a false response.
- b) The UXO team will not be required to wear protective helmets unless an overhead hazard is present.
- c) The FTMC UXO Safety Officer will monitor UXO activities to ensure compliance with applicable safety requirements.
- d) The FTMC UXO Safety Officer will certify that all FTMC UXO workers are capable of performing UXO activities at FTMC based on observation of work performance.
- e) The FTMC UXO Safety Officer is responsible for all site-specific UXO training.
- f) The UXO technician on site will advise project personnel regarding all evacuation and/or exclusion zones as appropriate. The UXO technician will monitor all sampling site activities to ensure that only the minimum numbers of personnel are present on site.

## **7.0 Quality**

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The Shaw FTMC UXO Quality Control Officer will follow quality control instructions and procedures listed in Section 9.0 of the Installation-Wide OE Management Plan, Volume IV of the SAP (IT, 2002) appropriate to this task and the FTMC UXO Supplementary Procedures provided herein as Attachment 1. The Shaw FTMC UXO Quality Control Officer will also utilize the

“UXO Avoidance Quality Control Report” to document his activities. Copies of this form will be provided to the Shaw FTMC quality assurance representative upon request.

## **8.0 References**

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Environmental Science and Engineering, Inc. (ESE), 1998, *Final Environmental Baseline Survey, Fort McClellan, Alabama*, prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland, January.

IT Corporation (IT), 2002, *Draft Installation-Wide Sampling and Analysis Plan, Revision 3, Fort McClellan, Calhoun County, Alabama*, Revision No 3, February.

U. S. Army Corps of Engineers (USACE), 2000, *Engineering Publication, EP 75-1-2, Unexploded Ordnance (UXO) Support During Hazardous, Toxic, and Radiological (HTRW) and Construction Activities*, 20 November.

U.S. Army Corps of Engineers (USACE), 1999, *Archives Search Report, Maps, Fort McClellan, Anniston, Alabama*, July.

**ATTACHMENT 1**

**FORT MCCLELLAN UNEXPLODED ORDNANCE SUPPLEMENTARY  
PROCEDURES**



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## **FTMC UXO SUPPLEMENTARY PROCEDURES**

**Subject: Ordnance and Explosives**

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### **1.0 INTRODUCTION**

Shaw Environmental, Inc. (Shaw), formerly IT Corporation, has been retained by the U.S. Army Corps of Engineers-Mobile District, under Contract Number DACA21-96-D-0018, to provide environmental services related to Base realignment and closure (BRAC) of Fort McClellan, Alabama. The Installation-Wide Ordnance and Explosives (OE) Management Plan for Fort McClellan (FTMC) was prepared by Shaw and submitted as a final document in March 2000. The Installation-Wide OE Management Plan was prepared to provide general guidance for conducting unexploded ordnance (UXO) work associated with hazardous, toxic, and radiological waste (HTRW) investigations and remedial activities currently in progress at FTMC. Shaw prepares site-specific field sampling, health and safety, and UXO safety plans for sites where fieldwork will occur that may potentially contain OE. A UXO Safety Plan is not prepared for sites that are not reported to be in areas containing OE.

#### **1.1 Purpose**

This document is intended to provide procedures to the field staff that outline UXO operations and clarify activities currently permitted under "anomaly avoidance." The document is not intended to replace any of the project documents currently approved; rather, it is intended to complement those documents with additional information that allows successful completion of the job.

### **2.0 FTMC EMPLOYEE ORIENTATION/TRAINING AND CERTIFICATION**

The Shaw FTMC orientation program is designed to:

- Indoctrinate new employees to FTMC-unique procedures
- Verify compliance with regulatory certification requirements
- Provide continuing instruction and updating in UXO fundamentals to sustain readiness to safely perform UXO tasks

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These standard policies and procedures are applicable to all members of Shaw Environmental, Inc. except where superseded or modified by the member Company.



## 2.1 Responsibilities

The Shaw OE Service Center Operations Manager will oversee the training programs and maintain a master record of UXO employee training and certification status.

The UXO person designated as the senior Shaw UXO individual at FTMC will schedule the orientation listed below.

The FTMC UXO Safety Officer will:

- Conduct all UXO-specific orientation and training at FTMC
- Certify that each new UXO employee is capable of performing UXO work activities at FTMC
- Maintain FTMC training files and records on each UXO technician on site reflecting his or her current training status.

## 2.2 UXO Employee Orientation

Every UXO employee assigned to FTMC will receive a site-specific UXO orientation in addition to training required by the Occupational Health and Safety Administration (OSHA). This orientation will include, as a minimum, the following topics:

- Local emergency response drills and procedures
- Personal protective equipment (PPE) and personnel decontamination procedures
- Ordnance recognition/UXO expected to be encountered at FTMC
- Equipment safety
- FTMC site orientation
- Chemical warfare material (CWM) awareness and procedures
- Communications procedures
- FTMC Logbook/data recording procedures
- Shaw administrative policies and procedures
- Magnetometer checkout procedures
- Accident reporting procedures.



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Upon completion of the UXO employee orientation, the FTMC UXO Safety Officer will monitor the performance of the new hire for at least three workdays while conducting typical UXO activities. The FTMC UXO Safety Officer will then certify that the individual is capable of performing UXO activities at FTMC based upon satisfactory performance of the three-day period. A copy of this certification will be maintained in the individual's site FTMC training file (see example at Attachment 1).

### **2.3 UXO Sustainment Training**

All UXO technicians have had the OSHA 40-hour hazardous waste operations and emergency response (HAZWOPER) course in order to be initially certified at FTMC. They are also required to maintain the certification with an 8-hour OSHA refresher course on an annual basis. Additionally, all Shaw FTMC UXO personnel will have 8 hours of site-specific annual UXO sustainment training. This training can be performed incrementally (2 hours every quarter) at the discretion of the site superintendent in coordination with the FTMC Shaw UXO Safety Officer. Topics will include, but are not limited to, the following subjects:

- Site-specific environmental hazards
- Site-specific UXO hazards, ordnance fuzing, functioning and precautions
- Topics which the Shaw UXO Team Leader or Shaw Safety UXO Officer determines necessary to support FTMC UXO activities

Sustainment training will be conducted for a period of no less than 8 hours. Daily safety briefings, tailgate safety meetings, and other required site-specific training are not a substitute for this training. The purpose of this training is to provide each UXO employee with site-specific UXO training over and above OSHA requirements. The site-specific UXO training will be recorded in the project file and the UXO employee's personnel file.

### **3.0 FTMC MAGNETOMETER/METAL DETECTOR FUNCTION TEST AND FIELD PROCEDURES**

This section provides FTMC magnetometer/metal detector function tests and operating procedures to be employed at all work sites that have been identified as requiring avoidance support.



### 3.1 Geophysical Test Plot

The purpose of a test plot is to provide a consistent environment where the equipment can be evaluated. This plot will be established as follows

- The test plot will be located in a clear area at the west entrance to the FTMC Transition Force Compound.
- The test plot will contain inert ordnance items at depths and attitudes characteristic of previous ordnance encounters at FTMC. Examples of test items include: a 37mm APT buried at a depth of eight inches and in a 45-degree, nose-down attitude; an aluminum alloy snap flare buried four inches in a horizontal attitude; a 60mm mortar twelve inches deep and in a 60-degree, nose-down attitude; a 2.36-inch rocket at a depth of twelve inches and in a 60-degree, nose-down attitude; and a 75mm canister projectile buried eight inches deep in a horizontal attitude. Each burial location will be marked with a wooden stake located to the east of the object. Each stake will be tagged or marked to denote the depth, type of item, and orientation of the item. The site will utilize native soils; no fill material will be brought in from another area. Sand may be used to cover the area to mitigate the effects of wet weather.
- For downhole magnetometer testing, a length of 2-inch PVC pipe will be buried to a depth of 48 inches. The location of the test item, similar in size and mass to a 2.36 inch rocket, will be marked with a wooden stake tagged to denote the depth, type of item, orientation, and reference number assigned. This item will be buried at a depth of twelve inches.

### 3.2 Magnetometer/Metal Detector Check-Out Procedures

- Prior to field use, all magnetometers and metal detectors will be set up following the guidelines in the manufacturer's operating manual for the specific instrument used. Instrumentation used at this site will include the Schonstedt GA 72, the CST Corporation Magna-Trak 102, or White's Spectrum XLT Metal Detector. Additionally, the Schonstedt MG-220 or MG-230 will be set up for downhole monitoring. All equipment will be operated in a manner consistent with instructions contained in the appropriate operator's manual. All equipment will be function-tested prior to use. The White's Metal Detector will be used in conjunction with hand-held magnetometers in areas of high concentrations of rocks with a



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magnetic signature, to assist in eliminating anomalies created by “hot rocks.” The operating manual for each of the instruments used at FTMC will be available for use with the equipment.

- Once the instrument has been determined to be working according to the manufacturer’s operating manual, the operator will perform a function test on the FTMC geophysical test plot using the detection methods described in the manual. A function test will consist of using the instrument over a minimum of three test sources. The same sources will be used during each function test to ensure consistency. The instrument detection indicator, as described in the operator’s manual, will be noted in the instrument logbook. For site checks, a 6-inch length of 1/2-inch steel reinforcing rod will be available to each operator at the work site.
- Instruments that fail to reproduce a detection indication consistent with previous tests will be checked to ensure that the power supply or batteries are sufficient. If the power supply is determined to be sufficient and the operator cannot find a fault in accordance with the operator’s manual, the instrument will be tagged and removed from service.
- Function tests will be performed each morning before the equipment is put into service.
- If an instrument is determined to be working improperly, the FTMC UXO Team Leader and the site superintendent will be immediately notified. Any activities performed using that instrument since its last positive test procedure will be considered invalid and will require reevaluation.
- Upon completion of the function test, the function test will be secured in the operator’s Daily Field Log Book.
- After an instrument has been function-tested at the beginning of each day, the instrument will be checked at least once during every hour of use or each time the instrument is turned on after having been turned off. This check will consist of dropping the 6-inch length of 1/2-inch reinforcing rod in a clear area and passing the detector over the rod in a manner consistent with the operator’s instructions. The instrument indication will be compared to the indication produced during the morning function test.

These standard policies and procedures are applicable to all members of Shaw Environmental, Inc. except where superseded or modified by the member Company.



Instruments that fail to produce a consistent indication will be checked and removed from service as required.

### **3.3 Equipment Documentation**

Each piece of equipment will be assigned a logbook noting the make, model, manufacturer, and serial number of the equipment. The following information will be recorded:

- Factory (off-site) maintenance
- On-site repair activities
- Other actions which could alter the performance of the instrument

The Shaw FTMC Quality Control (QC) Officer will perform random audits of equipment function tests and will record the fact that the test was performed in accordance with these procedures.

### **3.4 Magnetometer/Metal Detector Field Procedures**

All intrusive field activities in potential OE areas (e.g., digging, fence post driving, grading, well installation or excavation) will be preceded by a UXO sweep. Each hole made in areas where OE may potentially be found will have a check immediately over the spot of the intrusion. Magnetometer operations at FTMC will assume a detection depth of one foot when surveying an area for excavation.

All magnetometers and metal detectors will be operated in accordance with the manufacturers specifications and procedures.

When surveying a potential area for a sampling well, an area of sufficient size will be surveyed to allow for installation of required pads and bollards. After the well is installed, the location of bollards will be adjusted as required if an anomaly is detected during the bollard installation process.

The White's Metal Detector will be used to augment the magnetometers on sites where "hot rocks" are suspected. The purpose of using the metal detector in addition to the magnetometers is to eliminate the probability of "hot rocks."



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#### **4.0 FTMC ACCESS CLEARANCES, VEGETATION REMOVAL, AND ROAD MAINTENANCE**

This section is designed to provide specific procedures regarding activities associated with the building of access corridors, vegetation removal, and road maintenance in support of FTMC operations.

##### **4.1 Access Corridors**

The purpose of access corridors is to enable Shaw personnel access to well and/or other types of sampling sites within FTMC. Access corridors will be created by marking the route, both length and width, in which a UXO survey has been performed. The marking method will be defined in each site-specific UXO safety plan. No unescorted access is permitted until a corridor has been established. If an anomaly is detected during the survey or during a subsequent excavation, it must be avoided, since investigation is not authorized. The route will be altered to avoid the anomaly for FTMC activities. A magnetometer is considered to reliably detect anomalies to a depth of one foot.

The size of each area to be surveyed is dependent on the type and quantity of equipment expected to be used on that site. The UXO survey crew will follow the procedures outlined in the site-specific UXO safety plan to determine the dimensions of the area to be surveyed. Normally, the width of the access route will be at least twice as wide as the widest vehicle that will use the route; footpaths will be a minimum of 3 feet wide.

Tracked or other vehicles that disturb the soil are authorized for use only in areas that have been surveyed and no anomalies have been detected.

Erosion and weathering will typically cause some UXO items to leach to the surface or otherwise be uncovered. In cases where access corridors or sampling sites have not been surveyed or traversed for a period of time, additional UXO surveys may be required. The decision regarding the performance of additional surveys will be made by the FTMC UXO team leader and the Shaw FTMC UXO Safety Officer. The site superintendent will be notified of this decision. This decision will be based on, but not limited to, such factors as: the amount of time since the last survey was performed; the weather during this period; the terrain in the area of concern; and the type and quantity of UXO found during initial surveys.



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## 4.2 Vegetation Removal

In cases where removal of large trees or other types of vegetation is required, the following procedures will be followed:

- The UXO technician will survey around the base of the tree or vegetation, and, if no anomaly is detected, direct the bulldozer or other equipment to proceed. If an anomaly is detected, the location will be recorded and marked and another route will be selected. The size of the area to be surveyed will depend on the size of the suspected root system of the tree to be removed.
- Once the tree has been pushed over, the UXO technician will survey around the root ball and the area in and around the hole. If an anomaly is detected, the anomaly will be recorded and marked and an alternate route will be selected. If no anomaly is detected, the UXO technician will direct the equipment operator to proceed with the excavation.

## 4.3 Road Maintenance

Remote range roads and trails frequently require a certain amount of repair to remain passable. This section describes authorized actions regarding the maintenance of dirt or gravel range roads by Shaw UXO personnel.

- Bulldozers or grader-type equipment is authorized to repair roads and trails as long as a UXO survey has been performed and no anomalies have been detected.
- The UXO technician will observe the blade of the equipment as the earth is moved. If a potential UXO is uncovered, the UXO technician will signal the equipment operator to immediately stop the equipment. The UXO technician will then attempt to visually identify the object. If the object cannot be positively identified as a non-hazardous item, the equipment will be moved, the location of the object marked and recorded on the Shaw FTMC Unexploded Ordnance Report Form (Attachment 2), and the route changed to avoid the object. If no suspicious objects are detected, the equipment will continue to move earth at a rate of no more than one foot of depth at a time. If, more grading is required after the first pass is complete the UXO technician will perform another survey. If no anomalies are detected, the equipment can repeat the grading process. If an anomaly is detected, the operation will be halted and the route changed.

These standard policies and procedures are applicable to all members of Shaw Environmental, Inc. except where superseded or modified by the member Company.



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- After an area has been surveyed and no anomalies have been detected, soil can be removed at a rate of no more than one foot per lift. If additional grading is required, a survey will be performed after each one-foot increment the soil has been removed.
- Earth may not, at any time, be moved at a rate of more than one foot in each lift.

## **5.0 FTMC UXO LOG BOOKS**

All UXO team leaders or UXO technicians supporting HTRW operations will maintain a logbook. The purpose of the logbook is to record UXO actions and activities taken at each work site.

### **5.1 Responsibilities**

UXO personnel will maintain an individual daily logbook of work activities.

The logbooks will be routinely inspected weekly by the UXO QC Officer and will be made available to the FTMC site superintendent upon request. Copies will be made daily and filed in the Shaw Field Project office.

Logbooks will contain bound and numbered pages. Entries will be on successive pages as work is performed. The individual using the logbook will sign the page after the last entry for that page has been made. Logbooks are part of the project legal file and will be filed with the project files upon completion of each investigation.



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## 5.2 Data Requirements

As a minimum, individual logbooks will contain the following information:

- Date, time and location of UXO activities
- Personnel involved in the activities
- UXO activities performed, including UXO/anomalies found
- A description of areas swept
- A record of the magnetometer or other equipment used, including instrument serial number
- Weather conditions.

Shaw UXO personnel will utilize the Shaw FTMC Unexploded Ordnance Report Form (Attachment 2) to document the discovery of UXO/OE items.

The Shaw FTMC QC Officer will utilize the Shaw FTMC UXO Avoidance Quality Control Report (Attachment 3) to document checks of field activities.

Additionally, UXO personnel will complete Shaw FTMC Form UXO Sketch Log (Attachment 4) and Shaw FTMC Unexploded Ordnance Report Form. The UXO Sketch Log will contain a description of activities, including the dimensions of the area surveyed. A description of the length and width will be recorded, as well as the manner in which the survey was performed. These forms will be completed as required and presented to the site superintendent.



## ATTACHMENT 1

### FTMC Employee Certification (Example)

I certify that (name of individual) has fulfilled all UXO orientation requirements and has been observed by me for a period of 3 work days and is therefore eligible to perform UXO activities at FTMC.

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Talmadge Bohannon  
FTMC UXO Safety Officer



## ATTACHMENT 2

### Unexploded Ordnance Report Form

Report Tracking Number:													
<b>Discovery and Reporting Time</b>													
<table border="1" style="margin: auto;"> <tr><th colspan="2">Time of Discovery</th></tr> <tr><th>Date</th><th>Time</th></tr> <tr><td> </td><td> </td></tr> </table>	Time of Discovery		Date	Time			<table border="1" style="margin: auto;"> <tr><th colspan="2">Time Reported to Base Transition Force</th></tr> <tr><th>Date</th><th>Time</th></tr> <tr><td> </td><td> </td></tr> </table>	Time Reported to Base Transition Force		Date	Time		
Time of Discovery													
Date	Time												
Time Reported to Base Transition Force													
Date	Time												
Employee Name: _____	Reported to FTMC Transitional Force Personnel Name: _____												
<b>Location of Ordnance</b>													
Location, Description, and Parcel Number:													
Coordinates of Ordnance:	<table border="1" style="margin: auto;"> <tr><th colspan="2">State Plane Coordinates</th></tr> <tr><th>Northing</th><th>Easting</th></tr> <tr><td> </td><td> </td></tr> </table>	State Plane Coordinates		Northing	Easting								
State Plane Coordinates													
Northing	Easting												
<table border="1" style="margin: auto;"> <tr><th colspan="4">Picture Taken of Ordnance</th></tr> <tr><th>Yes</th><th>No</th><th>Date</th><th>Time</th></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>		Picture Taken of Ordnance				Yes	No	Date	Time				
Picture Taken of Ordnance													
Yes	No	Date	Time										
Written Description and/or Sketch of Ordnance:													
<b>Corrective Action Taken by Fort McClellan Transition Force</b>													
Date													

These standard policies and procedures are applicable to all members of Shaw Environmental, Inc. except where superseded or modified by the member Company.



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## ATTACHMENT 3

### UXO Quality Control Report

**Project Location:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Work Site Location:** \_\_\_\_\_

**Day:** \_\_\_\_\_

**1. Personnel Involved:**

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**2. Description of Work Being Performed:**

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**3. Equipment Utilized:**

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**4. Comments:**

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**Completed By**

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**Printed Name & Title**

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**Signature**

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**Date**

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## ATTACHMENT 4

### UXO Sketch Location Log

**District:** \_\_\_\_\_ **Hole Number:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Company Name:** Shaw Environmental, Inc. **Subcontractor:** \_\_\_\_\_

—

**Parcel Location:** \_\_\_\_\_ **Well Location:** \_\_\_\_\_ **Date Started:** \_\_\_\_\_ **Date Completed:** \_\_\_\_\_

<b>Type of UXO Work Being Performed:</b>

<b>Most Probable Munition:</b>	_____
<b>Down-Hole Depth Achieved for UXO Avoidance:</b>	_____
<b>Total Number of Surface UXO Marked:</b>	_____
<b>Total Number of Anomalies Marked:</b>	_____

<b>Location Sketch/Comments:</b>	<b>Not to Scale</b>
Signature of UXO Technician:	Date:

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