

Draft Final

**Supplemental Remedial Investigation Addendum
Site-Specific Field Sampling Plan,
Site-Specific Safety and Health Plan, and Site-Specific
Unexploded Ordnance Safety Plan Attachments
Old Water Hole – Pelham Range, Parcel 205(7)**

**Fort McClellan
Calhoun County, Alabama**

**Task Order CK05
Contract No. DACA21-96-D-0018
IT Project No. 774645**

July 2002

Revision 0

Draft Final

**Supplemental Remedial Investigation Addendum
Site-Specific Field Sampling Plan Attachment
Old Water Hole – Pelham Range,
Parcel 205(7)**

**Fort McClellan
Calhoun County, Alabama**

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**Task Order CK05
Contract No. DACA21-96-D-0018
IT Project No. 774645**

July 2002

Revision 0

Table of Contents

	Page
List of Tables	iii
List of Figures	iii
List of Acronyms	iv
Executive Summary	ES-1
1.0 Project Description.....	1-1
1.1 Introduction	1-1
1.2 Site Description	1-1
1.3 Scope of Work.....	1-2
2.0 Summary of Existing Environmental Studies.....	2-1
3.0 Site-Specific Data Quality Objectives	3-1
3.1 Overview	3-1
3.2 Data Users and Available Data.....	3-1
3.3 Data Types and Quality	3-1
3.4 Precision, Accuracy, and Completeness.....	3-2
4.0 Field Activities.....	4-1
4.1 UXO Survey Requirements and Utility Clearances	4-1
4.1.1 Surface UXO Survey	4-1
4.1.2 Downhole UXO Survey	4-1
4.1.3 Utility Clearances	4-1
4.2 Environmental Sampling.....	4-2
4.2.1 Surface Soil Sampling.....	4-2
4.2.1.1 Sample Locations and Rationale	4-2
4.2.1.2 Sample Collection	4-2
4.2.2 Subsurface Soil Sampling	4-2
4.2.2.1 Sample Locations and Rationale	4-3
4.2.2.2 Sample Collection	4-3
4.2.3 Monitoring Well Installation	4-4
4.2.4 Groundwater Sampling.....	4-5
4.2.4.1 Sample Locations and Rationale	4-5
4.2.4.2 Sample Collection	4-5

Table of Contents (Continued)

	Page
4.3 Decontamination Requirements	4-6
4.4 Surveying of Sample Locations	4-6
4.5 Analytical Program.....	4-6
4.6 Sample Preservation, Packaging, and Shipping	4-7
4.7 Investigation-Derived Waste Management	4-7
4.8 Site-Specific Safety and Health.....	4-7
5.0 Project Schedule.....	5-1
6.0 References	6-1
Attachment 1 – List of Abbreviations and Acronyms	
Appendix A – SAIC Soil Boring/Well Logs	
Appendix B – Memorandum: Release of Property for Pelham Range HTRW Investigations	

List of Tables

Table	Title	Follows Page
2-1	RI Soil Analytical Results, Old Water Hole, Parcel 205(7)	2-2
2-2	RI Groundwater Analytical Results, Old Water Hole, Parcel 205(7)	2-3
2-3	Summary of Groundwater Elevation Data, Old Water Hole, Parcel 205(7)	2-3
3-1	Summary of Data Quality Objectives, Old Water Hole, Parcel 205(7)	3-1
4-1	Sampling Locations and Rationale, Old Water Hole, Parcel 205(7)	4-2
4-2	Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities, Old Water Hole, Parcel 205(7)	4-2
4-3	Groundwater Sample Designations and QA/QC Sample Quantities, Old Water Hole, Parcel 205(7)	4-5
4-4	Analytical Samples, Old Water Hole, Parcel 205(7)	4-6

List of Figures

Figure	Title	Follows Page
1-1	Site Location Map, Old Water Hole, Parcel 205(7)	1-1
1-2	Site Map, Old Water Hole, Parcel 205(7)	1-2
2-1	RI Sample Location Map	2-2
2-2	Geophysical Survey Results	2-3
2-3	Groundwater Elevation Map, January 2002, Old Water Hole, Parcel 205(7)	2-3
4-1	Proposed Sample Locations, Old Water Hole, Parcel 205(7)	4-2

List of Acronyms

See Attachment 1 for the list of abbreviations and acronyms.

1 **Executive Summary**

2
3 In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation
4 (IT) will conduct supplemental remedial investigation activities at the Old Water Hole, Parcel
5 205(7), at Fort McClellan, Calhoun County, Alabama, to fill data gaps in the remedial
6 investigation data collected by Science Applications International Corporation (SAIC). The
7 purpose of this site-specific field sampling plan (SFSP) is to provide technical guidance for
8 sampling activities at the Old Water Hole, Parcel 205(7).
9

10 The Old Water Hole, Parcel 205(7), is located between New Mt. Sellers Cemetery and the
11 Prisoner of War Camp in the northeast quadrant of Pelham Range. The site has been described
12 as possibly a sinkhole or a shallow excavated depression and was reportedly used for the disposal
13 of a variety of munitions, including chemical ordnance. Field expedient decontamination
14 activities were reportedly conducted in the vicinity of the site where 50-gallon drums of
15 supertropical bleach were used. Drums containing residual supertropical bleach, as well as old
16 smoke pots and fog oil drums, were reportedly disposed of in the Old Water Hole. A qualitative
17 metal detection sweep of the site conducted by the U.S. Army Technical Escort Unit in 1992
18 suggested the potential for buried metallic objects at the site. This information is supported by a
19 geophysical survey performed by SAIC in 1995 which indicated that subsurface anomalies are
20 present; however, the report states that the geophysical surveys do not indicate massive burial of
21 metallic objects. According to the SAIC July 2000 *Final Remedial Investigation/Baseline Risk*
22 *Assessment*, the precise duration of time that the Old Water Hole was actively used is unknown.
23

24 The Old Water Hole is an irregularly shaped, shallow topographic depression approximately 50
25 by 140 feet (0.2 acre). The depression occasionally fills with water during periods of rain and
26 does not readily drain. According to the SAIC July 2000 *Final Remedial Investigation/Baseline*
27 *Risk Assessment*, a second depression was noted approximately 150 feet north of the reported
28 location of the Old Water Hole. The location of the second depression has not been confirmed.
29

30 IT will collect six surface and six subsurface soil samples in conjunction with the installation of
31 three temporary soil borings, four permanent monitoring wells. Nine groundwater samples will
32 be collected from the four newly installed monitoring wells and the five pre-existing monitoring
33 wells. Potential chemicals at the site could include a wide array of compounds because reports
34 have indicated that a variety of materials may have been disposed of in this depression. All
35 samples collected during the supplemental remedial investigation will be analyzed for volatile

1 organic compounds, semivolatile organic compounds, metals, nitroaromatics, and chemical
2 weapons breakdown products.

3
4 Analytical results from these samples will be compared with site-specific screening levels,
5 ecological screening values, and background values to determine if potential site-specific
6 chemicals are present at the site at concentrations that pose an unacceptable risk to human health
7 or the environment.

8
9 The Old Water Hole, Parcel 205(7), falls within the "Possible Explosive Ordnance Impact Areas"
10 shown on Plate 10 of the U.S. Army Corps of Engineers September 2001 *Archives Search*
11 *Report, Maps, Fort McClellan, Anniston, Alabama*; therefore, unexploded ordnance (UXO)
12 surface sweeps and downhole surveys of soil borings will be required to support field activities at
13 the Old Water Hole, Parcel 205(7). The surface sweeps and downhole surveys will be conducted
14 to identify anomalies for the purpose of UXO avoidance.

15
16 This SFSP attachment to the installation-wide sampling and analysis plan (SAP) for Fort
17 McClellan has been prepared to provide technical guidance for sample collection and analysis at
18 the Old Water Hole, Parcel 205(7). This SFSP will be used in conjunction with the site-specific
19 safety and health plan, the site-specific UXO safety plan, the installation-wide work plan, and the
20 SAP. The SAP includes the installation-wide safety and health plan, monitoring well installation
21 and maintenance plan, investigation-derived waste management plan, ordnance and explosives
22 management plan, and quality assurance plan. Site-specific hazard analyses are included in the
23 site-specific safety and health plan.

1 **1.0 Project Description**

3 **1.1 Introduction**

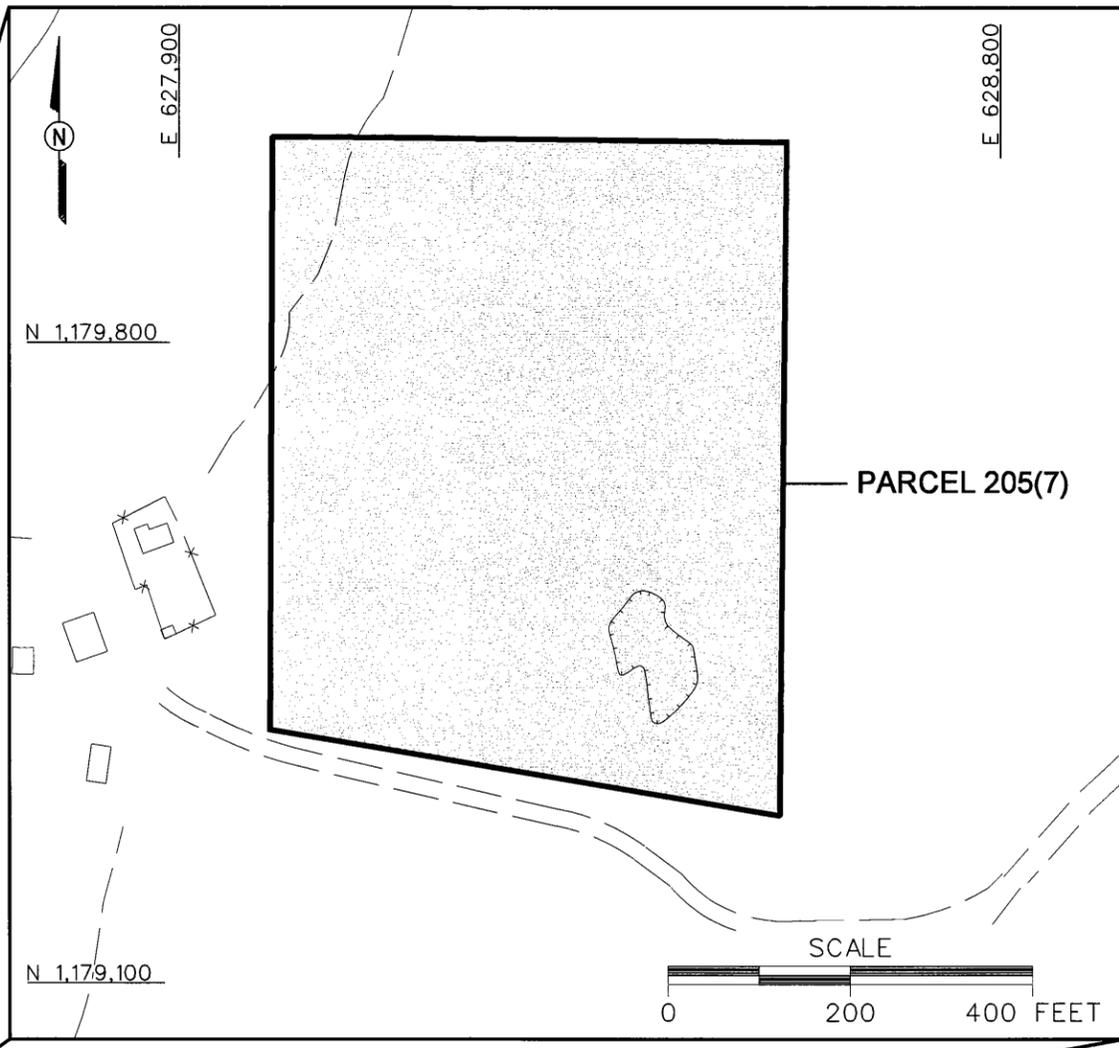
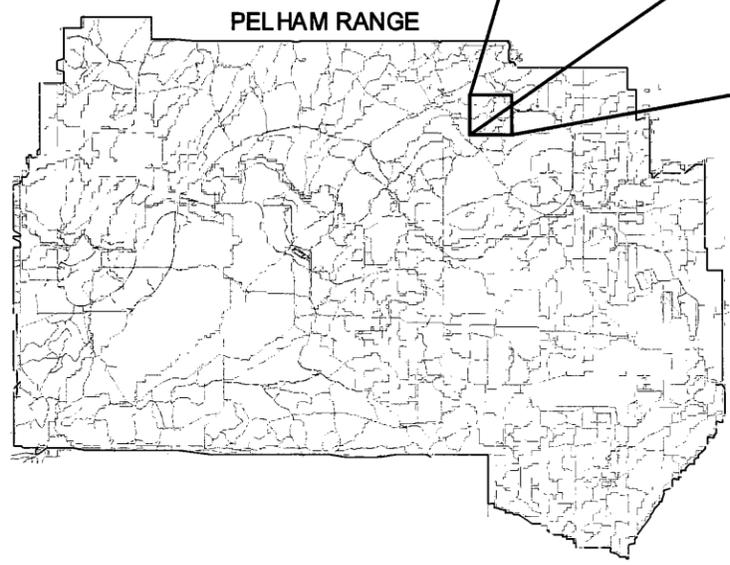
4 The U.S. Army is conducting studies of the environmental impact of suspected contaminants at
5 Fort McClellan (FTMC) in Calhoun County, Alabama, under the management of the U.S. Army
6 Corps of Engineers (USACE)-Mobile District. The USACE has contracted IT Corporation (IT)
7 to provide environmental services for the supplemental remedial investigation (RI) of the Old
8 Water Hole, Parcel 205(7), under Task Order CK05, Contract Number DACA21-96-D-0018.

9
10 This site-specific field sampling plan (SFSP) attachment to the installation-wide sampling and
11 analysis plan (SAP) (IT, 2002a) for FTMC has been prepared to provide technical guidance for
12 sample collection and analysis at the Old Water Hole, Parcel 205(7). This SFSP will be used in
13 conjunction with the site-specific safety and health plan (SSHP) and the site-specific unexploded
14 ordnance (UXO) safety plan developed for the Old Water Hole, Parcel 205(7), and the
15 installation-wide work plan (IT, 2002b) and SAP. The SAP includes the installation-wide safety
16 and health plan, well installation and maintenance plan, investigation-derived waste (IDW)
17 management plan, ordnance and explosives management plan, and quality assurance plan (QAP).
18 Site-specific hazard analyses are included in the SSHP and the site-specific UXO safety plan.

20 **1.2 Site Description**

21 The Old Water Hole is located in the northeast quadrant of Pelham Range (Figure 1-1). The site,
22 possibly a sinkhole or shallow excavation, was reportedly used for the disposal of a wide variety
23 of waste, including chemical ordnance. Waste reportedly disposed in the area includes
24 supertropical bleach drums from field expedient decontamination training, in which the drums
25 were crushed and thrown in the hole. The drums may have contained residual supertropical
26 bleach. Fog oil drums and 'smoke pots' were also reported to have been disposed of in the
27 depression (U.S. Army Center for Health Promotion and Preventive Maintenance [CHPPM],
28 1999). Several expanded small arms casings, flares, and smoke rounds were found at the site in
29 1992. A qualitative metal detection sweep conducted by U.S. Army Technical Escort Unit in
30 1992 suggests the potential for buried metallic objects at the site. Geophysical surveys
31 performed in the 1995 Science Applications International Corporation (SAIC) RI (SAIC, 2000)
32 also indicated that subsurface anomalies are present; however, the report states that the
33 geophysical surveys do not indicate massive burial of metallic objects. The precise duration of
34 time that the Old Water Hole was actively used is unknown.

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 INITIATOR: C. RHODES PROJ. MGR.: J. YACOUB
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- LEGEND**
- UNIMPROVED ROADS
 - BUILDING
 - PARCEL BOUNDARY
 - FENCE
 - DEPRESSION

FIGURE 1-1
SITE LOCATION MAP
OLD WATER HOLE
PARCEL 205(7)

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



1 The irregularly shaped topographic depression identified as the Old Water Hole is approximately
2 50 by 140 feet (0.2 acre) and was located by FTMC personnel in 1992 (Figure 1-2). An
3 additional circular depression has been reported approximately 150 feet north of the main
4 depression in this area (SAIC, 2000), though this has not been confirmed by IT personnel. The
5 main depression periodically fills with water from precipitation and does not readily drain.

6
7 The land surface at Parcel 205(7) slopes from northwest to southeast, with a range in elevation
8 from 730 to 645 feet above mean sea level. The steepest relief is in the northwest portion of the
9 parcel and becomes less steep to the southeast. The Old Water Hole, a depression approximately
10 5 feet deep, is located in the southeastern portion of the parcel.

11
12 The soils mapped within Parcel 205(7) consist of the Clarksville Fullerton stony loam and the
13 Fullerton cherty, silt, clay loam. The Fullerton cherty, silt, clay loam underlies a large majority
14 of the parcel, with only the westernmost portion of the parcel underlain by the Clarksville-
15 Fullerton stony loams. The Fullerton cherty, silt, clay loam is a strongly acid, well drained soil
16 developed from the residuum of cherty limestone. The color of this soil is usually a strong
17 brown to yellowish red. The subsoil ranges in color from red to yellowish red and consists of
18 cherty, silty, clay loam to silty clay. Pieces of chert up to three inches in diameter are found
19 throughout this soil. The runoff and infiltration of this soil are medium permeability and
20 capacity for available moisture are moderate (U.S. Department of Agriculture [USDA], 1961).

21
22 The Clarksville-Fullerton stony loams have developed on the uplands in the residuum of cherty
23 limestone. The color of this soil ranges from grayish brown to yellowish brown. The subsoil is
24 yellowish brown to light yellowish brown, faintly mottled, cherty, silty clay or pale brown to
25 light yellowish brown, stony, light silt clay loam. Pieces of chert and limestone from three to
26 more than eight inches in diameter can be found throughout this soil. The runoff and infiltration
27 of this soil are medium, permeability is rapid, and the capacity for available moisture is moderate
28 (USDA, 1961).

29 30 **1.3 Scope of Work**

31 The scope of work for activities associated with the supplemental RI at the Old Water Hole,
32 Parcel 205(7), as specified by the statement of work (USACE, 1999), includes the following
33 tasks:

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- LEGEND**
- UNIMPROVED ROADS
 - BUILDING
 - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
 - TREES / TREELINE
 - PARCEL BOUNDARY
 - FENCE
 - DEPRESSION

PARCEL 205(7)

FIGURE 1-2
SITE MAP
OLD WATER HOLE
PARCEL 205(7)

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



- 1 • Develop the SFSP attachment.
- 2
- 3 • Develop the SSHP attachment.
- 4
- 5 • Conduct a surface and near-surface UXO survey over areas to be included in the
- 6 supplemental sampling effort to determine the presence of buried hazards.
- 7
- 8 • Provide downhole UXO support for all intrusive drilling to determine buried
- 9 downhole hazards.
- 10
- 11 • Install four deep residuum/bedrock groundwater monitoring wells.
- 12
- 13 • Collect six surface soil samples, six subsurface soil samples, and nine groundwater
- 14 samples to fill data gaps in the RI data collected by SAIC and to provide data
- 15 useful for supporting any future planned corrective measures and closure activities.
- 16
- 17 • Analyze samples for the parameters listed in Section 4.5.
- 18

19 The Old Water Hole, Parcel 205(7), falls within the “Possible Explosive Ordnance Impact Areas”
20 shown on Plate 10 of the *Archives Search Report, Maps, Fort McClellan, Anniston, Alabama*
21 (USACE, 2001); therefore, UXO surface sweeps and downhole surveys of soil borings will be
22 required to support field activities at this site. The surface sweeps and downhole surveys will be
23 conducted to identify anomalies for the purpose of UXO avoidance. The site-specific UXO
24 safety plan will be used to support hazardous, toxic, and radiological waste investigation and
25 construction activities at the Old Water Hole, Parcel 205(7), if incidental ordnance, explosives,
26 or UXO are encountered and require avoidance.

27
28 At the completion of the field activities and sample analyses, draft and final supplemental RI
29 reports will be prepared to summarize the results of the activities, to evaluate the absence or
30 presence of potential site-specific chemicals (PSSC) at this site, and to recommend further
31 actions, if appropriate. RI sampling reports will be prepared in accordance with current
32 guidelines of U.S. Environmental Protection Agency (EPA), Region IV, and the Alabama
33 Department of Environmental Management (ADEM).

2.0 Summary of Existing Environmental Studies

An environmental baseline survey (EBS) was conducted by Environmental Science and Engineering, Inc. to document current environmental conditions of all FTMC property (Environmental Science and Engineering, Inc., 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with U.S. Department of Defense guidance for fast-track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by the following seven criteria:

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas).
2. Areas where only release or disposal of petroleum products has occurred.
3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response.
4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken.
5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken.
6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented.
7. Areas that are not evaluated or require further evaluation.

The EBS was conducted in accordance with protocols of the Community Environmental Response Facilitation Act (CERFA) (CERFA – Public Law 102-426) and U.S. Department of Defense policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, EPA Region IV, and Calhoun County, as well as a database search of Comprehensive Environmental Response, Compensation, and Liability Act-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historical maps and aerial photographs were reviewed to document historical land uses. Personal and telephone interviews

1 of past and present FTMC employees and military personnel were conducted. In addition, visual
2 site inspections were conducted to verify conditions of specific property parcels.

3
4 The Old Water Hole, Parcel 205(7), was identified as a Category 7 CERFA site. CERFA sites
5 are parcels where site-specific chemicals were stored and possibly released onto the site or to the
6 environment and/or were disposed of on site property. Category 7 CERFA sites are areas that
7 either have not been evaluated or lack adequate documentation and therefore require additional
8 evaluation to determine the environmental condition of the parcel.

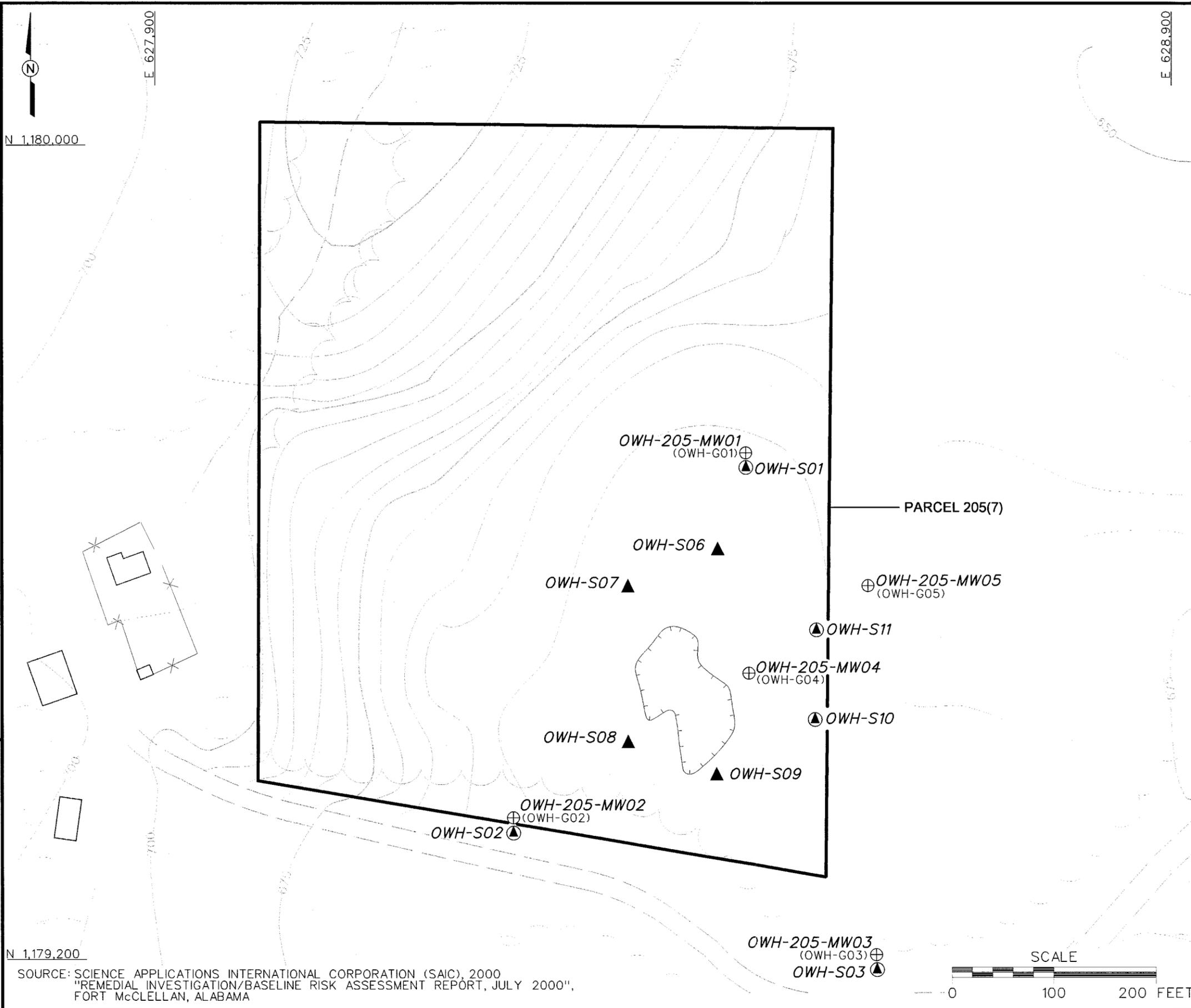
9
10 RI activities conducted by SAIC at the site in 1995 consisted of geophysical surveys, field
11 screening of chemical warfare agents using miniature continuous air monitoring systems
12 (MINICAMS), surface and subsurface soil sampling, monitoring well installation, and
13 subsequent sampling of the groundwater monitoring wells. A baseline risk assessment was also
14 conducted as part of this RI effort.

15
16 MINICAMS screening for distilled mustard (HD), sarin (GB), and nerve agents (VX) was
17 conducted by the U.S. Army Technical Escort Unit during the RI on 45 soil samples collected
18 from boreholes (OWH-S01 to OWH-S03, and OWH-S06 through OWH-S11) and a few surface
19 sample locations. Chemical warfare agents were not detected above the 0.8 time-weighted
20 average (instrumental baseline) in any of the screened samples. The boring locations are
21 illustrated on Figure 2-1.

22
23 Seven soil samples collected from five borings drilled for monitor well installation were
24 collected and analyzed for volatile organic compounds (VOC), semivolatile organic compounds
25 (SVOC), pesticides, explosives-related compounds, metals, and HD, GB, and VX degradation
26 products. Isolated concentrations of VOCs and SVOCs consisting of benzyl alcohol (0.05 to
27 0.06 micrograms per gram [$\mu\text{g/g}$]), phenol (1 to 3.5 $\mu\text{g/g}$), and 42 unidentified nontarget SVOCs
28 were detected in the samples. A single detection of 1,1,1-trichloroethane was reported in the soil
29 from OWH-S03 at 0.28 $\mu\text{g/g}$. Agent degradation products and explosive compounds were not
30 detected in the soil samples collected at the site. A summary of detected constituents in surface
31 and subsurface soil samples from the RI is presented in Table 2-1. Figure 2-1 shows the sample
32 locations.

33
34 Five monitoring wells were installed in the residuum groundwater-bearing zone around the
35 periphery of the Old Water Hole. Boring depths ranged from 95.5 to 108 feet bgs, while the total

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- LEGEND**
- UNIMPROVED ROADS
 - BUILDING
 - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
 - TREES / TREELINE
 - PARCEL BOUNDARY
 - FENCE
 - DEPRESSION
 - EXISTING MONITORING WELL LOCATION (FORMER SAIC DESIGNATION IN PARENTHESES)
 - MINICAM SAMPLE LOCATION
 - SOIL AND MINICAM SAMPLE LOCATION

NOTE:

1. SOIL AND MINICAM SAMPLES OWH-S01, OWH-S02, AND OWH-S03 WERE COLLECTED FROM MONITORING WELL LOCATIONS OWH-G01, OWH-G02, AND OWH-G03, RESPECTIVELY.

FIGURE 2-1
 RI SAMPLE LOCATION MAP
 OLD WATER HOLE
 PARCEL 205(7)

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



SOURCE: SCIENCE APPLICATIONS INTERNATIONAL CORPORATION (SAIC), 2000
 "REMEDIAL INVESTIGATION/BASELINE RISK ASSESSMENT REPORT, JULY 2000",
 FORT McCLELLAN, ALABAMA

Table 2-1

RI Soil Analytical Results
The Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama

Parcel	OWH-205	OWH-205							
Sample Location	OWH-S01	OWH-S02	OWH-S03	OWH-S03	OWH-S03	OWH-S03	OWH-S03	OWH-S10	OWH-S11
Sample Number	UB04281	UB04281	UB04222	UB04223	UB04224	UB04280	UB04447	UB04448	
Sample Date	22-Jun-94	22-Jun-94	21-Jun-94	21-Jun-94	21-Jun-94	22-Jun-94	28-Jun-94	28-Jun-94	
Sample Depth (Feet)	0- 2	0- 2	1-3	1-3	35 - 37	87 - 89	20 - 22	20 - 22	
Parameter	Units	Result	Result						
PESTICIDES									
Endosulfan II	mg/kg	ND	9.96E-04	ND	ND	ND	ND	ND	ND
METALS									
Aluminum	mg/kg	7.89E+03	4.55E+03	1.44E+04	1.50E+04	1.65E+04	1.91E+04	2.49E+04	8.38E+03
Arsenic	mg/kg	4.50E+00	1.50E+01	2.08E+01	1.31E+01	3.03E+01	5.60E+01	3.65E+00	ND
Barium	mg/kg	5.09E+01	1.71E+01	1.22E+01	1.06E+01	1.53E+01	8.38E+01	2.42E+01	9.92E+00
Beryllium	mg/kg	ND	ND	ND	ND	ND	3.38E+00	ND	ND
Calcium	mg/kg	8.52E+02	8.68E+01	6.99E+01	ND	9.90E+01	1.43E+03	1.96E+02	1.23E+02
Chromium	mg/kg	1.48E+01	1.19E+01	3.66E+01	5.41E+00	3.23E+01	2.22E+01	3.71E+01	1.26E+01
Cobalt	mg/kg	ND	ND	ND	ND	ND	4.24E+01	ND	ND
Copper	mg/kg	ND	7.43E+00	4.48E+00	6.24E+00	8.20E+00	5.92E+01	1.82E+01	6.65E+00
Iron	mg/kg	1.92E+04	1.59E+04	3.72E+04	7.20E+04	2.36E+04	4.28E+04	2.05E+04	1.38E+04
Lead	mg/kg	2.17E+01	1.29E+01	8.49E+00	6.87E+00	1.77E+01	4.00E+01	1.00E+01	4.37E+00
Magnesium	mg/kg	3.38E+02	1.65E+02	4.43E+02	3.53E+02	5.84E+02	7.75E+03	5.97E+02	1.85E+02
Manganese	mg/kg	4.01E+02	1.52E+02	2.23E+02	6.05E+01	3.90E+01	2.20E+03	2.58E+01	2.76E+01
Nickel	mg/kg	3.81E+00	ND	4.11E+00	ND	8.38E+00	5.42E+01	7.85E+00	ND
Potassium	mg/kg	1.89E+02	1.89E+02	3.09E+02	2.20E+02	4.54E+02	9.73E+02	5.74E+02	2.21E+02
Vanadium	mg/kg	3.88E+01	2.71E+01	6.04E+01	9.84E+01	3.82E+01	5.58E+01	9.21E+01	2.44E+01
Zinc	mg/kg	2.43E+01	2.26E+01	1.34E+01	1.19E+01	2.22E+01	1.57E+02	2.36E+01	9.73E+00
SEMIVOLATILE ORGANIC COMPOUNDS									
Benzyl Alcohol	mg/kg	6.00E-02	ND	5.00E-02	5.50E-02	ND	6.30E-02	ND	ND
Phenol	mg/kg	1.70E+00	1.00E+00	3.50E+00	2.90E+00	1.30E+00	1.70E+00	ND	ND
VOLATILE ORGANIC COMPOUNDS									
1,1,1-Trichloroethane	mg/kg	ND	ND	ND	ND	2.80E-01	ND	ND	ND

Data results are a summary of detected compounds from the SAIC 1995 RI Report and the SAIC 2000 RI/BRA Report.

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

J - Result is greater than method detection limit but less than or equal to reporting limit.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

RI - Remedial Investigation

SAIC - Science Applications International Corporation

Qual - Data validation qualifier.

1 depth of the monitoring wells ranged from 75.0 to 107.4 feet bgs. The soil and residuum
2 encountered during drilling activities for the RI were consistent with the mapped Fullerton,
3 cherty, silt, clay loam and Clarksville Fullerton, stoney loam as described in Section 1.2 of this
4 work plan. Bedrock was not encountered during the installation of the monitoring wells. The
5 soil boring logs can be found in Appendix A.

6
7 Two rounds of groundwater samples were collected from these wells and analyzed for VOCs,
8 SVOCs, organochlorine pesticides, PCBs, explosives, metals, and HD, GB, and VX degradation
9 products. The analytical results indicated that concentrations of metals were detected; organic
10 compounds detected were primarily polynuclear aromatic hydrocarbons (PAH) (consisting of
11 chrysene, benzo(a)anthracene, and pyrene) and pesticides (SAIC, 2000). A single detection of
12 thiodiglycol, aldrin, and PCB-1248 was found in the upgradient well OWH-G02, although the
13 thiodiglycol was determined to be the result of laboratory contamination (SAIC, 2000).
14 Groundwater analytical results from the SAIC groundwater sampling effort are presented in
15 Table 2-2. Figure 2-1 shows the sample locations.

16
17 A geophysical survey was conducted at the Old Water Hole, Parcel 205(7), as a part of the RI.
18 The survey included frequency domain electromagnetic (EM-31), time domain EM (TDEM), and
19 magnetic gradiometer data measurements. Figure 2-2 shows a contour map of the total field
20 magnetic vertical mode EM-31 conductivity data. EM-31 anomalies were detected, though the
21 precision of the data was questionable (SAIC, 2000). The EM-31 conductivity data did not
22 indicate the presence of a deep burial pit or buried materials. Magnetometer data suggested that
23 ferromagnetic material may be present at three anomalous areas. The results of the TDEM data
24 indicated an anomalous region in the northeast corner that corresponds to low or subsided areas
25 located approximately 150 feet north of the identified Old Water Hole site (SAIC, 2000).
26 Although the results of the geophysical survey indicated the presence of subsurface anomalies,
27 there was no indication of massive amounts of buried metallic objects (SAIC, 2000).

28
29 Three rounds of groundwater level measurements were collected between March and June 1995.
30 IT collected groundwater level measurements in December 2000 and January 2002. The
31 groundwater elevation data collected are presented on Table 2-3. The groundwater elevation data
32 collected in January 2002 revealed groundwater flow was west to east across the site, with a
33 horizontal hydraulic gradient ranging between 0.01 to 0.02 feet per foot (Figure 2-3). Slug tests
34 were performed on monitoring wells OWH-205-MW04 and OWH-205-MW05. The measured

Table 2-2

RI Groundwater Analytical Results
The Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama

(Page 1 of 3)

Parcel Sample Location Sample Number Sample Date		OWH-205 OWH-G01 UC01008 28-Apr-95	OWH-205 OWH-G01 UC01940 27-Jun-95	OWH-205 OWH-G02 UC00484 8-Feb-95	OWH-205 OWH-G02 UC01044 30-Apr-95	OWH-205 OWH-G02 OWH-G02-971001 1-Oct-97
Parameter	Units	Result	Result	Result	Result	Result
PESTICIDES						
4,4'-DDE	mg/L	ND	ND	ND	4.30E-06	NR
4,4'-DDT	mg/L	ND	ND	ND	3.70E-06	NR
Aldrin	mg/L	ND	1.81E-05	ND	3.17E-05	NR
Aroclor 1248	mg/L	ND	ND	ND	4.99E-04	NR
Endosulfan I	mg/L	ND	ND	ND	2.40E-05	NR
Endosulfan sulfate	mg/L	ND	ND	ND	NR	NR
Heptachlor	mg/L	ND	ND	ND	ND	NR
alpha-BHC	mg/L	ND	1.13E-05	ND	ND	NR
gamma-BHC (Lindane)	mg/L	ND	4.40E-06	6.60E-06	ND	NR
CWM BREAKDOWN						
Thiodiglycol	mg/L	ND	ND	2.42E-01	ND	NR
EXPLOSIVES						
Nitroglycerine	mg/L	NR	ND	2.39E-03	NR	NR
RDX	mg/L	5.78E-04	ND	ND	ND	NR
METALS						
Aluminum	mg/L	4.91E-01	2.27E-01	4.18E-01	9.60E+00	1.56E-01
Arsenic	mg/L	ND	ND	ND	4.16E-03	2.60E-03
Barium	mg/L	3.02E-02	2.49E-02	1.46E-02	5.44E-02	1.28E-01
Beryllium	mg/L	ND	ND	ND	1.17E-03	ND
Calcium	mg/L	3.32E+01	2.68E+01	5.85E+00	1.77E+01	2.22E+01
Cobalt	mg/L	ND	ND	ND	ND	ND
Iron	mg/L	8.56E-01	5.53E-01	8.14E-01	7.62E+00	1.28E-01
Lead	mg/L	6.20E-03	NR	ND	1.24E-02	ND
Magnesium	mg/L	1.76E+01	1.22E+01	2.69E+00	6.23E+00	4.12E+00
Manganese	mg/L	1.47E-01	4.05E-02	2.25E-01	4.64E-01	7.73E-02
Mercury	mg/L	ND	NR	ND	ND	ND
Potassium	mg/L	1.94E+01	2.15E+01	5.93E+00	4.87E+00	4.26E+00
Sodium	mg/L	1.63E+01	3.10E+01	2.96E+01	4.37E+01	1.44E+01
Sulfate	mg/L	NR	NR	3.68E+00	NR	3.68E+00
Thallium	mg/L	ND	ND	2.51E-03	ND	ND
Zinc	mg/L	7.04E-02	ND	2.77E-02	5.63E-02	ND
NOT CLASSIFIED						
Isodrin	mg/L	1.20E-05	1.37E-05	ND	1.25E-05	ND
SEMIVOLATILE ORGANIC COMPOUNDS						
Benzo(a)anthracene	mg/L	4.28E-05	5.81E-05	ND	ND	NR
Chrysene	mg/L	ND	ND	ND	4.42E-05	NR
Dibenz(a,h)anthracene	mg/L	ND	5.04E-05	ND	1.04E-04	NR
Indeno(1,2,3-cd)pyrene	mg/L	6.62E-05	1.33E-04	ND	ND	NR
bis(2-Ethylhexyl)phthalate	mg/L	1.20E-02	ND	ND	ND	NR
WET CHEMISTRY						
Hexavalent Chromium	mg/L	NR	NR	ND	NR	2.00E-02

Table 2-2

**RI Groundwater Analytical Results
The Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 3)

Parcel Sample Location Sample Number Sample Date		OWH-205 OWH-G03 UC01006 28-Apr-95	OWH-205 OWH-G03 UC01976 27-Jun-95	OWH-205 OWH-G04 UC01002 28-Apr-95	OWH-205 OWH-G04 UC01939 27-Jun-95	OWH-205 OWH-G05 UC01007 28-Apr-95	OWH-205 OWH-G05 UC01944 27-Jun-95
Parameter	Units	Result	Result	Result	Result	Result	Result
PESTICIDES							
4,4'-DDE	mg/L	ND	ND	ND	ND	ND	ND
4,4'-DDT	mg/L	ND	ND	ND	ND	ND	ND
Aldrin	mg/L	ND	ND	ND	ND	1.49E-05	ND
Aroclor 1248	mg/L	ND	ND	ND	ND	4.47E-04	ND
Endosulfan I	mg/L	ND	ND	ND	ND	1.58E-05	8.30E-06
Endosulfan sulfate	mg/L	ND	ND	ND	3.80E-06	ND	ND
Heptachlor	mg/L	ND	ND	ND	ND	4.01E-05	7.30E-06
alpha-BHC	mg/L	ND	ND	ND	1.70E-05	ND	4.10E-06
gamma-BHC (Lindane)	mg/L	ND	ND	ND	ND	ND	ND
CWM BREAKDOWN							
Thiodiglycol	mg/L	ND	ND	ND	ND	ND	ND
EXPLOSIVES							
Nitroglycerine	mg/L	NF	ND		ND		ND
RDX	mg/L	ND	ND	ND	ND	ND	1.08E-03
METALS							
Aluminum	mg/L	1.72E-01	1.48E-01	2.85E+00	4.18E-01	1.14E+00	1.20E+00
Arsenic	mg/L	ND	NR	ND	ND	ND	ND
Barium	mg/L	2.49E-02	1.73E-02	2.52E-01	8.36E-02	1.42E-02	1.77E-02
Beryllium	mg/L	ND	ND	ND	ND	ND	ND
Calcium	mg/L	3.83E+00	3.06E+00	4.36E+01	3.05E+01	2.17E+01	2.24E+01
Cobalt	mg/L	ND	ND	4.84E-02	ND	ND	ND
Iron	mg/L	2.38E-01	6.88E-01	7.00E+00	5.89E-01	2.93E+00	3.37E+00
Lead	mg/L	ND	NR	1.14E-02	NR	ND	NR
Magnesium	mg/L	7.25E-01	4.31E-01	2.26E+01	1.03E+01	1.17E+01	1.06E+01
Manganese	mg/L	5.32E-01	2.87E-01	2.11E+00	1.70E-01	2.05E-01	1.98E-01
Mercury	mg/L	1.17E-04	NR	1.78E-04	NR	1.07E-04	NR
Potassium	mg/L	2.06E+01	2.07E+01	1.28E+01	5.64E+01	3.78E+00	4.05E+00
Sodium	mg/L	1.48E+01	1.34E+01	3.99E+00	1.82E+01	1.76E+00	2.13E+00
Sulfate	mg/L	NR	NR	NR	NR	NR	NR
Thallium	mg/L	ND	ND	ND	ND	ND	ND
Zinc	mg/L	6.06E-02	8.42E-02	3.26E-02	ND	ND	2.20E-02
NOT CLASSIFIED							
Isodrin	mg/L	1.31E-05	ND	1.18E-05	8.70E-06	2.41E-05	5.98E-05
SEMIVOLATILE ORGANIC COMPOUNDS							
Benzo(a)anthracene	mg/L	2.12E-05	ND	ND	ND	ND	ND
Chrysene	mg/L	3.99E-05	2.10E-05	2.95E-05	ND	5.72E-05	ND
Dibenz(a,h)anthracene	mg/L	ND	9.63E-05	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	mg/L	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	mg/L	ND	ND	2.10E-02	1.40E-02	1.90E-02	ND
WET CHEMISTRY							
Hexavalent Chromium	mg/L	NR	NR	NR	NR	NR	NR

Table 2-2

**RI Groundwater Analytical Results
The Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama**

Page 3 of 3

Data results are a summary of detected compounds from the SAIC 1995 RI Report and the SAIC 2000 RI/BRA Report.

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

I - The low-spike recovery is high.

J - Result is greater than the method detection limit but less than or equal to the reporting limit.

mg/L - Milligrams per liter.

M - The high-spike recovery is high.

N - The high-spike recovery is low.

NA - Not available.

ND - Not detected.

NF - Analytical results not reported.

NR - Analysis not requested.

O - Low spike recoveries excessively different.

Qual - Data validation qualifier.

RI - Remedial Investigation.

RI/BRA - Remedial Investigation/Baseline Risk Assessment.

SAIC - Science Applications International Corporation.

bvander

05/01/02

STARTING DATE: 11/14/01

DATE LAST REV.: 05/01/02

DRAFT. CHCK. BY:

INITIATOR: J. BOND

DWG. NO.: \774645.es.836

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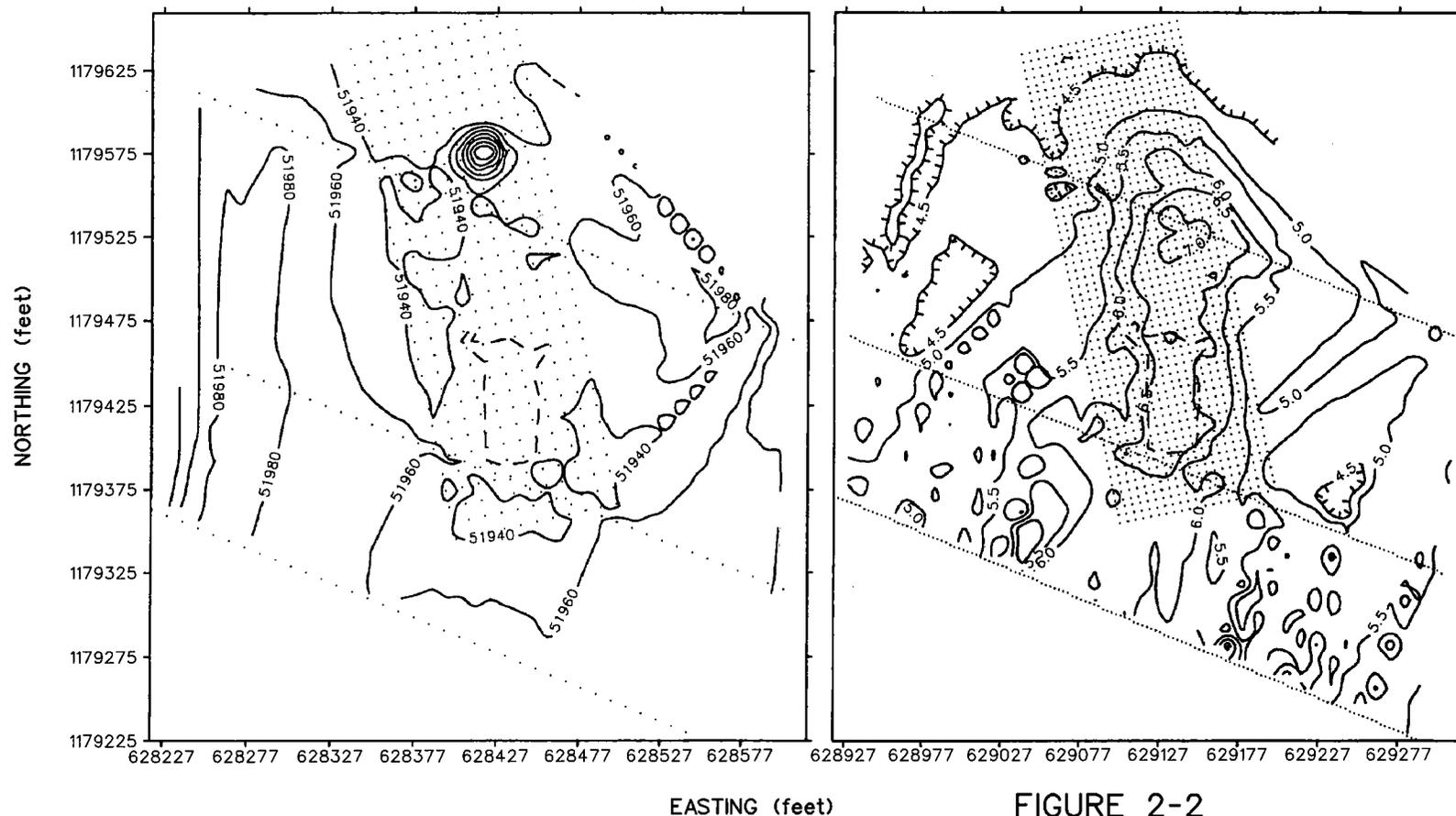
ENGR. CHCK. BY: J. JENKINS

PROJ. MGR.: J. YACOB

PROJ. NO.: 774645

TOTAL FIELD MAGNETOMETER DATA

VERTICAL MODE EM-31 CONDUCTIVITY (mS/m)



NOTES:

CONTOURS ON THE TOTAL FIELD MAGNETOMETER DATA MAP ARE 20 NANOTESLA.

CONTOURS ON THE EM-31 CONDUCTIVITY MAP ARE 0.5 MILLISIEMENS PER METER.

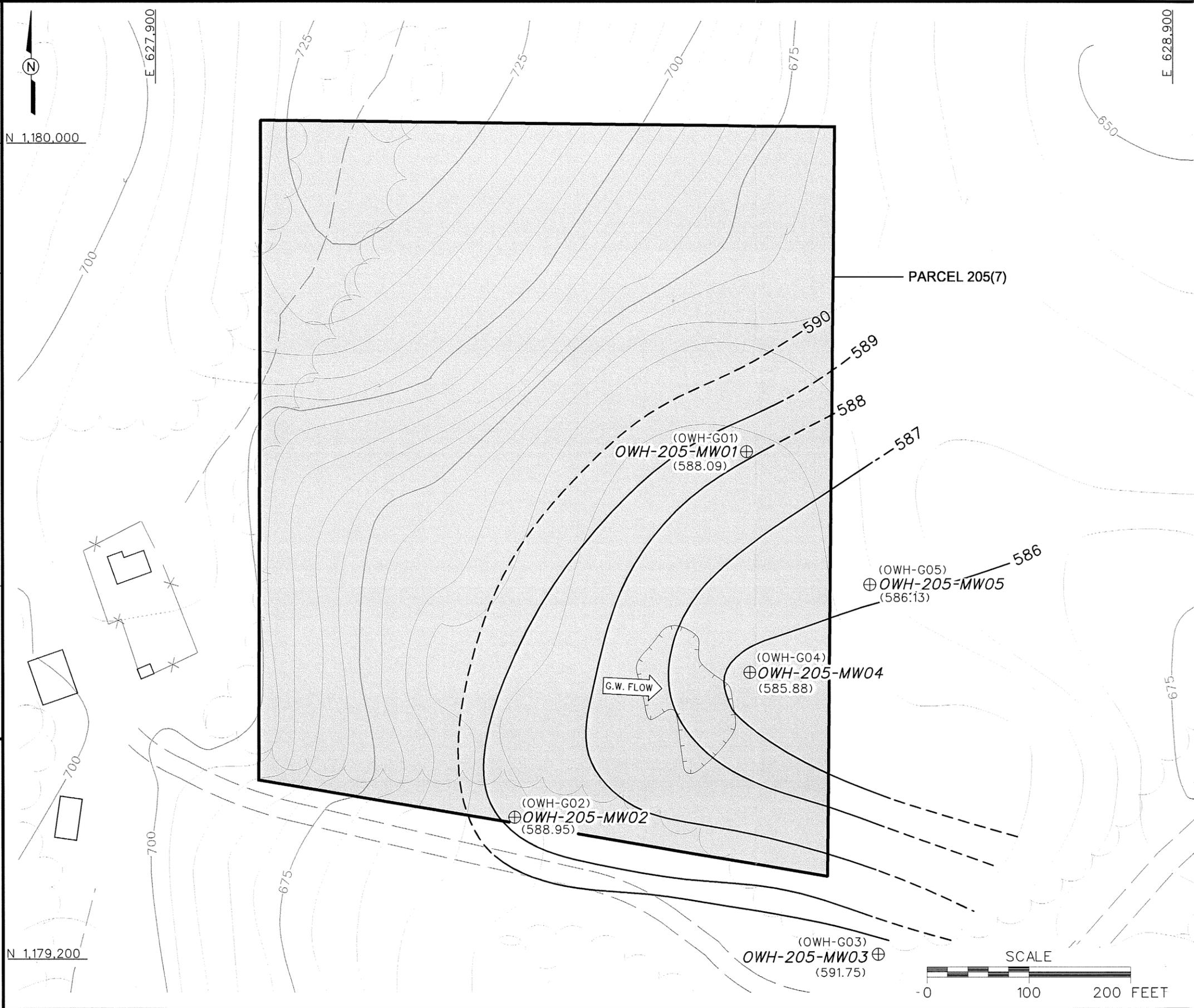
FIGURE 2-2
GEOPHYSICAL SURVEY RESULTS
OLD WATER HOLE
PARCEL 205(7)

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

SOURCE: GRID AND TRANSECT DATA COORDINATES SURVEYED BY F. HOLLIS AND ASSOCIATES (1994).



DWG. NO.: ... \774645es.702
 PROJ. NO.: 774645
 INITIATOR: C. RHODES
 PROJ. MGR.: J. YACOUB
 DRAFT. CHK. BY:
 ENGR. CHK. BY: S. MORAN
 STARTING DATE: 12/29/00
 DATE LAST REV.:
 DRAWN BY: D. BILLINGSLEY
 06/24/02
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- LEGEND**
- UNIMPROVED ROADS
 - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
 - GROUNDWATER ELEVATION CONTOURS (DASHED WHERE INFERRED)
 - (585.88) GROUNDWATER ELEVATION (FT MSL) (JANUARY 2002)
 - TREES / TREELINE
 - PARCEL BOUNDARY
 - FENCE
 - DEPRESSION
 - EXISTING MONITORING WELL LOCATION (FORMER SAIC DESIGNATION IN PARENTHESES)
 - G.W. FLOW GROUNDWATER FLOW DIRECTION

FIGURE 2-3
GROUNDWATER ELEVATION MAP
OLD WATER HOLE
PARCEL 205(7)

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

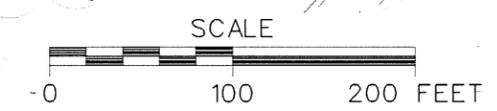


Table 2-3

Summary of Groundwater Elevation Data
 Old Water Hole, Parcel 205(7)
 FortMcClellan, Calhoun County, Alabama

IT Location Designation	OWH-205-MW01	OWH-205-MW02	OWH-205-MW03	OWH-205-MW04	OWH-205-MW05
Former Location Designation	OWH-G01 feet above msl	OWH-G02 feet above msl	OWH-G03 feet above msl	OWH-G04 feet above msl	OWH-G05 feet above msl
Date					
Mar-95	623.07	626.15	624.38	NA	NA
Apr-95	611.80	612.70	611.70	609.36	611.30
Jun-95	595.50	599.12	596.05	596.06	595.68
Dec-00	578.43	580.76	Dry	578.57	578.38
Jan-02	588.09	588.95	591.75	585.88	586.13

msl - Mean sea level.

NA - Not available.

1 hydraulic conductivity in these wells was 1.305×10^{-4} and 1.851×10^{-4} centimeters per second,
2 respectively (SAIC, 2000).

3
4 The baseline risk assessment conducted as part of the RI concluded that there were no
5 contaminants of concern at the site; however, SAIC recommended that additional surface and
6 subsurface soil sampling be conducted to complete the evaluation of the Old Water Hole study
7 area (SAIC, 2000). CHPPM also recommended that additional work be conducted to further
8 characterize the hydrology of the site and to ascertain the source of the analytes detected in the
9 upgradient well (OWH-205-MW02) (CHPPM, 1999).

10
11 Parsons Engineering Science, Inc., (Parsons) conducted a SI for chemical warfare material
12 (CWM) at three sites on Pelham Range including the Old Water Hole Parcel 205(7). The
13 purpose of the SI was only to determine the presence or absence of CWM that may have resulted
14 from training activities conducted at the three sites.

15
16 Parsons began the investigation at the Old Water Hole, Parcel 205(7) by relocating two large
17 anomalies identified in the SAIC geophysical data. These anomalies, located at the north end of
18 the depression, were selected for reacquisition and subsequent intrusive investigation. The
19 anomaly reacquisition was performed using the EM 61 TDMD and a Schonstedt magnetic
20 locator (Parsons, 2002).

21
22 The intrusive investigation was conducted using a backhoe and hand tools. No CWM related
23 items were recovered during the investigation. Items recovered during the investigation
24 consisted of car or trailer parts, plow parts, and an axe head. It was estimated that approximately
25 225 pounds of scrap metal were removed from the excavations (Parsons, 2002).

26
27 Six soil samples were collected during the investigation conducted at the Old Water Hole. Soil
28 samples collected from the Old Water Hole were submitted for the headspace screening for
29 chemical warfare agent and laboratory analysis of 1,4-Dithiane, 1,4-Thioxane, GB, HD, and L.
30 Headspace analysis was performed by heating the sample and analyzing the sample headspace
31 with MINICAMS (Parsons, 2002).

32
33 As a result of this CWM investigation by Parsons, USACE-Huntsville Center issued a release of
34 Pelham Range for hazardous, toxic and radiological waste investigation (Appendix B).

3.0 Site-Specific Data Quality Objectives

3.1 Overview

The data quality objective (DQO) process is followed to establish data requirements. This process ensures that the proper quantity and quality of data are generated to support the decision-making process associated with the action selection for the Old Water Hole, Parcel 205(7). This section incorporates the components of the DQO process described in the EPA publication 600/R-96/005, *Guidance for Data Quality Objectives Process for Superfund* (EPA, 2000). The DQO process as applied to the Old Water Hole, Parcel 205(7), is described in more detail in Section 4.3 of the installation-wide work plan (IT, 2002b). Table 3-1 provides a summary of the factors used to determine the appropriate quantity of samples and the procedures necessary to meet the objectives of the RI and to establish a basis for future action at this site.

The samples will be analyzed using EPA SW-846 methods, including Update III methods where applicable, as presented in Chapter 4.0 of this SFSP and Chapter 5.0 of the QAP. Data will be reported in accordance with definitive data requirements of Chapter 2.0, *Chemistry Data Reporting Requirements and Data Package Deliverables*, USACE Engineering Manual 200-1-6, *Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste Projects* (USACE, 1997) and evaluated by the stipulated requirements for the generation of definitive data (Section 7.2.2 of the QAP). Chemical data will be reported via hard-copy data packages by the laboratory using Contract Laboratory Program-like forms. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

3.2 Data Users and Available Data

Data from sample collection and analysis activities are intended for use by the EPA, USACE, ADEM, FTMC, and supporting contractors. This SFSP, along with the necessary companion documents, has been designed to provide the regulatory agencies with sufficient detail to reach a determination as to the adequacy of the scope of work. The program has also been designed to provide the level of defensible data and information required to confirm or rule out the existence of residual chemical contamination in site media.

3.3 Data Types and Quality

Surface soil, subsurface soil, and groundwater will be sampled and analyzed in order to confirm or rule out the existence of residual PSSCs in the site media. Quality assurance/quality control

Table 3-1

**Summary of Data Quality Objectives
Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama**

Users	Available Data	Media of Concern	Data Uses and Objectives	Data Types	Analytical Level	Data Quantity
EPA, ADEM, USACE, DOD, FTMC, IT Corporation, Other contractors, and possible future land users	SAIC 2000 RI/BRA	<u>Surface soil</u>	SI to confirm the presence or absence of contamination in the site media Definitive quality data for future decision-making	<u>Surface soil</u> TCL VOCs, TCL SVOCs, TAL Metals, Nitroexplosives, and CWM breakdown products	Definitive data in data packages (as defined in USACE EM200-1-6)	6 direct-push soil samples +QC
		<u>Subsurface soil</u>		<u>Subsurface soil</u> TCL VOCs, TCL SVOCs, TAL Metals, Nitroexplosives, and CWM breakdown products	Definitive data in data packages (as defined in USACE EM200-1-6)	6 direct-push soil samples +QC
		<u>Groundwater</u>		<u>Groundwater</u> TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives, and CWM breakdown products	Definitive data in data packages (as defined in USACE EM200-1-6)	9 groundwater +QC (from 4 proposed, 5 existing monitoring wells)

ADEM – Alabama Department of Environmental Management.
 CWM – Chemical Warfare Material.
 DOD – U.S. Department of Defense.
 EM200-1-6 – USACE Engineering Manual, Chemical Quality Assurance for HTRW projects, October 10, 1987.
 EPA – U.S. Environmental Protection Agency.
 FTMC – Fort McClellan.
 QC – Quality control.

RI/BRA – Remedial Investigation/Baseline Risk Assessment.
 SAIC – Science Applications International Corporation.
 SI – Site investigation.
 SVOC – Semivolatile organic compound.
 TAL – Target analyte list.
 TCL – Target compound list.
 USACE – U.S. Army Corps of Engineers.
 VOC – Volatile organic compound.

1 (QA/QC) samples will be collected for all sample types as described in Chapter 4.0 of this SFSP.
2 Samples will be analyzed by EPA-approved SW-846 methods Update III, where available;
3 comply with EPA definitive data requirements; and be reported using hard-copy data packages.
4 In addition to meeting the quality needs of this supplemental RI, data analyzed at this level of
5 quality are appropriate for all phases of site characterization, RI, and risk assessment.

6

7 **3.4. Precision, Accuracy, and Completeness**

8 Laboratory requirements of precision, accuracy, and completeness for this supplemental RI are
9 defined in Section 3.3 and presented in Chapter 5.0 of the QAP (IT, 2002a).

10

4.0 Field Activities

4.1 UXO Survey Requirements and Utility Clearances

The Old Water Hole, Parcel 205(7), falls within the “Possible Explosive Ordnance Impact Area” shown on Plate 10 of the *Archives Search Report, Maps, Fort McClellan, Anniston, Alabama* (USACE, 1999b). Therefore, IT will conduct UXO avoidance activities, including surface sweeps and downhole surveys of soil borings. The site-specific UXO safety plan provides technical guidance for ordnance and explosives avoidance for sample collection activities at Old Water Hole, Parcel 205(7). The site-specific UXO safety plan attachment has been written in conjunction with Appendix E of the SAP (IT, 2002a).

4.1.1 Surface UXO Survey

A UXO sweep will be conducted over areas that will be included in the sampling and surveying activities to identify UXO on or near the surface that may present a hazard to on-site workers during field activities. Low-sensitivity magnetometers will be used to locate surface and shallow-buried metal objects. UXO located on the surface will be identified and conspicuously marked for easy avoidance. Subsurface metallic anomalies will not be disturbed but will also be marked for easy avoidance. UXO personnel requirements, procedures, and detailed descriptions of the geophysical equipment to be used are provided in Chapter 4.0 and Appendix E of the SAP (IT, 2002a).

4.1.2 Downhole UXO Survey

During the soil boring and downhole sampling, downhole UXO surveys will be performed to determine if buried metallic objects are present. UXO monitoring, as described in Appendix E of the SAP (IT, 2002a), will continue until undisturbed soils are encountered or the borehole has been advanced to 12 feet bgs, whichever is reached first.

4.1.3 Utility Clearances

After the UXO surface survey has cleared the area to be sampled, but prior to performing any intrusive sampling, a utility clearance will be performed using the procedure outlined in Section 4.2 of the SAP (IT, 2002a). The site manager will mark the proposed locations with stakes, coordinate with the local utility companies to clear the proposed locations for utilities, and obtain digging permits. Once the locations are approved (for both UXO and utility avoidance) for intrusive sampling, the stakes will be labeled as cleared.

1 **4.2 Environmental Sampling**

2 Environmental sampling at the Old Water Hole, Parcel 205(7), includes the collection of surface
3 and subsurface soil and groundwater samples. Samples will be collected and analyzed to
4 determine if further action should be conducted at the site.

5
6 **4.2.1 Surface Soil Sampling**

7 Surface soil samples will be collected from six boring locations at the Old Water Hole, Parcel
8 205(7). Three boring locations will be completed as groundwater monitoring wells, and three
9 will be completed as temporary borings. The temporary borings will be properly abandoned
10 after sample collection.

11
12 **4.2.1.1 Sample Locations and Rationale**

13 The surface soil sampling rationale is listed in Table 4-1, and proposed sampling locations are
14 shown in Figure 4-1. Surface soil sample designations and QA/QC sample requirements are
15 summarized in Table 4-2. The final soil boring sampling locations will be determined in the
16 field by the on-site geologist, based on actual field conditions.

17
18 **4.2.1.2 Sample Collection**

19 Surface soil samples will be collected from the upper 1 foot of soil by direct-push methodology
20 specified in Section 5.1.1.1 and Section 6.1.1.1 of the SAP (IT, 2002a). In areas where site
21 access does not permit the use of a direct-push rig, the samples will be collected using a
22 stainless-steel auger as specified in Section 5.1.1.2 and Section 6.1.1.1 of the SAP (IT, 2002a).
23 Collected soil samples will be screened using a photoionization detector (PID) in accordance
24 with Section 4.15 of the SAP. Surface soil samples will be screened for information purposes
25 only, not to aid in the selection of samples for analysis. Sample containers, sample volumes,
26 preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter
27 4.0 and listed in Table 4-1 of the QAP. Sample documentation and chain-of-custody (COC) will
28 be recorded as specified in Chapter 6.0 of the SAP. The samples will be analyzed for the
29 parameters listed in Section 4.5 of this SFSP.

30
31 **4.2.2 Subsurface Soil Sampling**

32 Subsurface soil samples will be collected from six boring locations at the Old Water Hole, Parcel
33 205(7). Three of the locations are temporary soil borings to be completed to a depth of 12 feet
34 bgs. The three remaining locations will be completed as residuum monitoring wells. Figure 4-1
35 is a sample location map showing the proposed locations.

Table 4-1

**Sampling Locations and Rationale
Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

Sample Location	Sample Media	Sample Location Rationale
OWH-205-MW01	Groundwater	Samples will be collected from the existing monitoring well (formerly designated OWH-G01) to confirm the historical sampling results obtained during the remedial investigation.
OWH-205-MW02	Groundwater	Samples will be collected from the existing monitoring well (formerly designated OWH-G02) to confirm the historical sampling results obtained during the remedial investigation.
OWH-205-MW03	Groundwater	Samples will be collected from the existing monitoring well (formerly designated OWH-G03) to confirm the historical sampling results obtained during the remedial investigation.
OWH-205-MW04	Groundwater	Samples will be collected from the existing monitoring well (formerly designated OWH-G04) to confirm the historical sampling results obtained during the remedial investigation.
OWH-205-MW05	Groundwater	Samples will be collected from the existing monitoring well (formerly designated OWH-G05) to confirm the historical sampling results obtained during the remedial investigation.
OWH-205-MW06	Groundwater	Monitoring well placement is chosen to be immediately adjacent to existing upgradient residuum well OWH-205-MW01 and will be installed to a target depth of 150 feet bgs for the purpose of determining the presence or absence of contaminants below the screened interval of the existing residuum monitoring well at this location. Groundwater elevation data will be used for vertical hydraulic gradient data.
OWH-205-MW07	Groundwater	Monitoring well placement is chosen to be immediately adjacent to existing upgradient residuum well OWH-205-MW05 and will be installed to a target depth of 150 feet bgs for the purpose of determining the presence or absence of contaminants below the screened interval of the existing residuum monitoring well at this location. Groundwater elevation data will be used for vertical hydraulic gradient data.
OWH-205-MW08	Groundwater	Monitoring well placement is chosen to be immediately adjacent to existing upgradient residuum well OWH-205-MW02 and will be installed to a target depth of 150 feet bgs for the purpose of determining the presence or absence of contaminants below the screened interval of the existing residuum monitoring well at this location. Groundwater elevation data will be used for vertical hydraulic gradient data.
OWH-205-MW09	Groundwater	Monitoring well placement is downgradient of the depression and will be installed to a target depth of 150 feet bgs for the purpose of determining the presence or absence of contaminants at this location.

Table 4-1
Sampling Locations and Rationale
Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama

(Page 2 of 2)

Sample Location	Sample Media	Sample Location Rationale
OWH-205-GP01	Surface soil and subsurface soil	Sample location placement is based on potential site source location and existing geophysical survey data (SAIC, 2000). Sample data will indicate if contaminant releases have occurred in this area and if contaminated soil exists at this site. Estimated boring depth is 12 feet bgs.
OWH-205-GP02	Surface soil and subsurface soil	Sample location placement is based on potential site source location and existing geophysical survey data (SAIC, 2000). Sample data will indicate if contaminant releases have occurred in this area and if contaminated soil exists at this site. Estimated boring depth is 12 feet bgs.
OWH-205-GP03	Surface soil and subsurface soil	Sample location is based on isolated detections of contaminants in upgradient well OWH-205-MW02. Boring is located to investigate potential sources in this area, to determine if contaminant releases in this area have occurred, and to determine if contaminated soil exists at this site. Estimated boring depth is 12 feet bgs.
OWH-205-GP04	Surface soil and subsurface soil	Soil boring for surface and subsurface soil samples to be placed north and east of the surface depression. Sample data will indicate if contaminant releases into the environment have occurred from use of this area and if contaminated soil exists at this site. Estimated boring depth is 12 feet bgs.
OWH-205-GP05	Surface soil and subsurface soil	Soil boring for surface and subsurface soil samples to be placed east of the depression area. Sample data will indicate if contaminant releases into the environment have occurred from use of this area and if contaminated soil exists at this site. Estimated boring depth is 12 feet bgs.
OWH-205-GP06	Surface soil and subsurface soil	Soil boring for surface and subsurface soil samples to be placed to the south and west of the depression. Sample data will indicate if contaminant releases into the environment have occurred from use of this area and if contaminated soil exists at this site. Estimated boring depth is 12 feet bgs.

Table 4-2

**Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities
Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
OWH-205-GP01	OWH-205-GP01-SS-MK0008-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatics/nitramines, and CWM Breakdown products
	OWH-205-GP01-DS-MK0009-REG	a				
OWH-205-GP02	OWH-205-GP02-SS-MK0010-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatics/nitramines, and CWM Breakdown products
	OWH-205-GP02-DS-MK0011-REG	a				
OWH-205-GP03	OWH-205-GP03-SS-MK0012-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatics/nitramines, and CWM Breakdown products
	OWH-205-GP03-DS-MK0013-REG	a				
OWH-205-GP04	OWH-205-GP04-SS-MK0001-REG	0-1			OWH-205-MW06-SS-MK0001-MS/MSD	TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatics/nitramines, and CWM Breakdown products
	OWH-205-GP04-DS-MK0002-REG	a				
OWH-205-GP05	OWH-205-GP05-SS-MK0003-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatics/nitramines, and CWM Breakdown products
	OWH-205-GP05-DS-MK0004-REG	a				
OWH-205-GP06	OWH-205-GP06-SS-MK0005-REG	0-1	OWH-205-GP06-SS-MK0006-FD			TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatics/nitramines, and CWM Breakdown products
	OWH-205-GP06-DS-MK0007-REG	a				

^a Actual sample depth selected for analysis will be at the discretion of the site geologist and will be based on field observation.

CWM - Chemical Warfare Materials.

FD - Field duplicate.

ft - feet.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample.

SVOC - Semivolatile organic compound.

TAL - Target analyte list.

TCL - Target compound list.

VOC - Volatile organic compound.

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4.2.2.1 Sample Locations and Rationale

Subsurface soil samples will be collected from six soil borings shown on Figure 4-1. The subsurface soil sampling rationale is listed in Table 4-1, and subsurface soil sample quantities and assigned field numbers are listed in Table 4-2. The final soil boring sampling locations will be determined in the field by the on-site geologist based on actual field observations, UXO clearance results, and utility clearance results.

4.2.2.2 Sample Collection

Subsurface soil samples will be collected from soil borings at a depth greater than 1 foot bgs in the unsaturated zone. The soil borings will be advanced and soil samples collected using the direct-push sampling procedures specified in Section 5.1.1.1 and Section 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a hand auger as specified in Section 5.1.1.2 and Section 6.1.1.1 of the SAP (IT, 2002a).

Soil samples will be collected continuously for the first twelve feet or until either groundwater or refusal is reached. A detailed lithologic log will be recorded by the on-site geologist for each borehole. At least one subsurface sample from each borehole will be selected for analysis. The collected subsurface soil samples will be field-screened using a PID in accordance with Section 6.8.3 of the SAP to measure samples exhibiting elevated readings exceeding background (readings in ambient air). Typically, the subsurface soil sample showing the highest reading (above background) will be selected and sent to the laboratory for analysis. If none of the samples indicate readings exceeding background using the PID, the deepest interval from the soil boring will be sampled and submitted to the laboratory for analysis. Subsurface soil samples may be selected for analysis from any depth interval if the on-site geologist suspects PSSCs at the interval. Site conditions such as lithology may also determine the actual sample depth interval submitted for analysis. More than one subsurface soil sample will be collected if field measurements and observations indicate a possible layer of PSSCs and/or additional sample data would provide insight to the existence of any PSSCs.

Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Chapter 4.0, Table 4-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

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4.2.3 Monitoring Well Installation

Four permanent monitoring wells will be installed at the Old Water Hole, Parcel 205(7). The proposed monitoring well locations are shown on Figure 4-1, and the rationales for the well locations are presented in Table 4-1. The four monitoring wells will be installed using hollow stem auger drilling methods or a combination of hollow stem auger and air rotary drilling methods. Three of the four proposed monitoring wells will be paired with an existing residuum monitoring well to form a shallow residuum and deep residuum or residuum and bedrock well pair. The fourth monitoring well will be installed as a deep residuum or bedrock well down gradient of the Old Water Hole.

The borehole will be advanced with 6.25-inch ID hollow stem augers in order to allow collection of lithological samples. Lithologic samples will be collected at 5-foot intervals to the target depth of the borehole (approximately 150 feet bgs). The samples will be collected using a 24-inch-long, 2-inch-or-larger-diameter, split-spoon sampler. The lithologic samples will be logged in accordance with American Standard for Testing and Materials Methods D-2488 using the Unified Soil Classification system. The samples will be screened in the field for the presence of VOC contamination using a PID. If hollow-stem auger refusal is encountered before reaching the target depth, the borehole will be advanced using a 7 7/8-inch air percussion or air rotary bit. Drill cuttings from air rotary drilling will be logged to determine lithologic changes and the approximate depth groundwater encountered during drilling. This information will provide site-specific geological and hydrogeologic information.

A 4-inch monitoring well will be installed at each proposed well location. The well casing will consist of new, 4-inch ID, Schedule 80, threaded, flush-joint polyvinyl chloride (PVC) pipe. Attached to the bottom of the well casing will be a section of new threaded, flush joint, 0.010-inch continuous wrap PVC well screen, 10 to 20 feet long. At the discretion of the IT site manager, a sump (composed of new, 4-inch ID, Schedule 80, threaded flush-joint PVC) may be attached to the bottom of the well. After the casing and screen material are lowered into the boring, a filter pack will be installed around the well screen. The filter pack, consisting of 20/40 silica sand, will be tremied into place from the bottom of the well to approximately 3 feet above the top of the screen. A fine sand seal (30/70 silica sand) approximately 3 feet thick may be placed over the filter pack. A bentonite seal approximately 5 feet thick will be placed above the filter pack (or fine sand if used). The remaining annular space will be grouted with a bentonite-cement mixture (as described above) tremied into place from the top of the bentonite seal to

1 ground surface. The monitoring well will be completed with a stick-up or flush-mount
2 construction as determined by the site geologist based on site conditions.

3
4 The monitoring wells will be developed as specified in Section 5.1 and Appendix C of the SAP
5 (2002a). Groundwater samples will not be collected from the monitoring wells for a period of at
6 least 14 days after well development. IDW will be containerized and staged in accordance with
7 Section 5.7 of the SAP.

8 9 **4.2.4 Groundwater Sampling**

10 Nine groundwater samples will be collected from the four newly installed monitoring wells and
11 the five pre-existing monitoring wells at the Old Water Hole, Parcel 205(7).

12 13 **4.2.4.1 Sample Locations and Rationale**

14 A total of nine groundwater samples will be collected at the Old Water Hole, Parcel 205(7).
15 Groundwater samples will be collected from the monitoring well locations shown on Figure 4-1.
16 The groundwater sampling rationales are listed in Table 4-1. The groundwater sample
17 designations and required QA/QC sample quantities are listed in Table 4-3.

18 19 **4.2.4.2 Sample Collection**

20 Prior to sampling monitoring wells, static water level will be measured at each of the four newly
21 installed monitoring wells and the five pre-existing wells. Water level measurements will be
22 performed as outlined in Section 5.5 of the SAP (IT, 2002a). Groundwater samples will be
23 collected in accordance with the procedures outlined in Section 6.1.1.5 and Attachment 5 of the
24 SAP. Low-flow groundwater sampling methodology, outlined in Attachment 5, Procedure No.
25 FTMC-GW-001 of the SAP (IT, 2002a), may be used as deemed necessary by the IT site
26 manager.

27
28 Sample documentation and COC will be recorded as specified in Section 6.0 of the SAP.
29 Sample containers, sample volumes, preservatives, and holding times for the analyses required in
30 this SFSP are discussed in Section 4.0 and listed in Table 4-1 of the QAP. The samples will be
31 analyzed for the parameters listed in Section 4.5 of this SFSP.

Table 4-3

**Groundwater Sample Designations and QA/QC Sample Quantities
Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite
				Field Duplicates	Field Splits	MS/MSD	
OWH-205-MW01	OWH-G01-GW-MK3001-REG	Groundwater	a				TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives/nitramines, and CWM Breakdown products
OWH-205-MW02	OWH-G02-GW-MK3002-REG	Groundwater	a				TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives/nitramines, and CWM Breakdown products
OWH-205-MW03	OWH-G03-GW-MK3003-REG	Groundwater	a				TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives/nitramines, and CWM Breakdown products
OWH-205-MW04	OWH-G04-GW-MK3004-REG	Groundwater	a				TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives/nitramines, and CWM Breakdown products
OWH-205-MW05	OWH-G05-GW-MK3005-REG	Groundwater	a				TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives/nitramines, and CWM Breakdown products
OWH-205-MW06	OWH-205-MW06-GW-MK3006-REG	Groundwater	a			OWH-205-MW06-GW-MK3006-MS/MSD	TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives/nitramines, and CWM Breakdown products
OWH-205-MW07	OWH-205-MW07-GW-MK3007-REG	Groundwater	a	OWH-205-MW07-GW-MK3008-FD			TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives/nitramines, and CWM Breakdown products
OWH-205-MW08	OWH-205-MW08-GW-MK3009-REG	Groundwater	a				TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives/nitramines, and CWM Breakdown products
OWH-205-MW09	OWH-205-MW09-GW-MK3010-REG	Groundwater	a				TCL VOCs, TCL SVOCs, Total TAL Metals, Nitroexplosives/nitramines, and CWM Breakdown products

a - Groundwater samples will be collected from the approximate top 5 to 10 feet of the water column per Attachment 5 of the installation-wide sampling and analysis plan (IT, 2002a).

FD - Field duplicate.
CWM - Chemical Warfare Material.
ft - feet.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.

REG - Field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
VOC - Volatile organic compound.

1 **4.3 Decontamination Requirements**

2 Decontamination will be performed on sampling and nonsampling equipment to prevent cross
3 contamination between sampling locations. Decontamination of sampling equipment will be
4 performed in accordance with requirements presented in Section 6.5.1.1 of the SAP (IT, 2002a).
5 Decontamination of nonsampling equipment will be performed in accordance with requirements
6 presented in Section 6.5.1.2 of the SAP.
7

8 **4.4 Surveying of Sample Locations**

9 Sampling locations will be marked with pin flags, stakes, and/or flagging and will be surveyed
10 using either global positioning system (GPS) or conventional civil survey techniques, as
11 necessary to obtain the required level of accuracy. Horizontal coordinates will be referenced to
12 the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum, 1983.
13 Elevations will be referenced to the National Geodetic Vertical Datum of 1929 or the North
14 American Vertical Datum of 1988 (soon to be established on site).
15

16 Horizontal coordinates for soil boring locations not associated with a monitoring well will be
17 recorded using a GPS to provide accuracy within 1 meter. Because of the need to use permanent
18 monitoring wells to determine water levels, a higher level of accuracy is required. The four
19 newly installed monitoring wells and the five pre-existing wells will be surveyed to an accuracy
20 of 0.1 foot for horizontal coordinates and 0.01 foot for elevations, using survey-grade GPS
21 techniques and/or conventional civil survey techniques, as required. Procedures to be used for
22 GPS surveying are described in Section 4.4.1.1 of the SAP. Conventional land survey require-
23 ments are presented in Section 4.4.1.2 of the SAP.
24

25 **4.5 Analytical Program**

26 Samples collected at locations specified in this chapter of this SFSP will be analyzed for specific
27 suites of chemicals and elements based on the history of site usage, as well as EPA, ADEM,
28 FTMC, and USACE requirements. Target analyses for samples collected from the Old Water
29 Hole, Parcel 205(7), consist of the following list of analytical suites:
30

- 31 • Target compound list (TCL) VOCs – Method 5035/8260B
- 32 • TCL SVOCs – Method 8270C
- 33 • Target analyte list metals – Method 6010B/7000
- 34 • Nitroaromatic/nitramine (nitroexplosives) – Method 8330
- 35 • Chemical warfare material breakdown products – Method 8270M/8321.
- 36

Table 4-4

**Analytical Samples
Old Water Hole, Parcel 205(7)
Fort McClellan, Calhoun County, Alabama**

Parameters	Analysis Method	Sample Matrix	TAT Needed	Field Samples			QA/QC Samples ^a					EMAX Total No. Analysis	QA Lab Total No. Analysis
				No. of Sample Points	No. of Events	No. of Field Samples	Field Dups (10%)	Splits w/ QA Lab (0%)	MS/MSD (5%)	Trip Blank (1/ship)	Eq. Rinse (1/wk/matrix)		
The Old Water Hole, Parcel 205: 9 water matrix samples (9 groundwater samples); 12 soil matrix samples (6 surface soil samples and 6 subsurface soil samples)													
TCL VOCs	8260B	water	normal	9	1	9	1	0	1	4	1	17	0
TCL SVOCs	8270C	water	normal	9	1	9	1	0	1		1	13	0
Total TAL Metals	6010B/7000	water	normal	9	1	9	1	0	1		1	13	0
Nitroaromatic/Nitramine	8330	water	normal	9	1	9	1	0	1		1	13	0
CWM BD Products	8321/8270M	water	normal	9	1	9	1	0	1		1	13	0
TCL VOCs	5035/8260B	soil	normal	12	1	12	1	0	1		1	16	0
TCL SVOCs	8270C	soil	normal	12	1	12	1	0	1		1	16	0
TAL Metals	6010B/7000	soil	normal	12	1	12	1	0	1		1	16	0
Nitroaromatic/Nitramine	8330	soil	normal	12	1	12	1	0	1		1	16	0
CWM BD Products	8321/8270M	soil	normal	12	1	12	1	0	1		1	16	0
The Old Water Hole Subtotal:				105	10	0	10	4	10		10	149	0

^aField 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. Trip blank samples will be collected in association with water matrix samples for VOC analysis only. Assumed four field samples per day 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 are anticipated to last more than 1 week. Assumed 20 field samples will be collected per week to estimate number of equipment blanks.

Ship samples to: EMAX Laboratories, Inc
630 Maple Ave.
Torrance, CA 90503
Attn: Elizabeth McIntyre
Tel: 310-618-8889
Fax: 310-618-0818

ASTM- American Society for Testing and Materials.
BD - Breakdown.
CWM - Chemical warfare material.
Dups - Duplicates.
Eq. Rinse - Equipment rinsate blank.
MS/MSD - Matrix spike/matrix spike duplicate.
No. - Number.

QA/QC - Quality assurance/quality control.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TAT - Turn-around-time.
TCL - Target compound list.
TOC - Total organic carbon.
VOC - Volatile organic compound.

1 The samples will be analyzed using EPA SW-846 methods, including Update III Methods where
2 applicable, as presented in Table 4-4 in this SFSP and Section 5.0 the QAP. Data will be
3 reported and evaluated in accordance with definitive data requirements of Chapter 2 of the
4 USACE Engineer Manual 200-1-6, *Chemical Quality Assurance for Hazardous, Toxic, and*
5 *Radioactive Waste (HTRW) Projects* (USACE, 1997). Chemical data will be reported via hard-
6 copy data packages by the laboratory using Contract Laboratory Program-like forms and
7 electronic copies. These packages will be validated in accordance with EPA National Functional
8 Guidelines by Level III criteria.

10 **4.6 Sample Preservation, Packaging, and Shipping**

11 Sample preservation, packaging, and shipping will follow the procedures specified in Sections
12 6.1.3 through 6.1.7 of the SAP (IT, 2002a). Completed analysis request/COC records will be
13 secured and included with each shipment of coolers to:

14
15 EMAX
16 Attention: Sample Receiving/Elizabeth McIntyre
17 EMAX Laboratories, Inc.
18 1835 205th Street
19 Torrance, California 90501
20 Telephone: (310) 618-8889.
21

22 **4.7 Investigation-Derived Waste Management**

23 Management and disposal of the IDW will follow procedures and requirements described in
24 Appendix D of the SAP (IT, 2002a). The IDW generated at the Old Water Hole, Parcel 205(7),
25 is expected to include drilling fluids, drill cuttings, decontamination fluids, purge water, and
26 disposable personal protective equipment. Sampling of IDW to obtain analytical results for
27 characterizing the waste for disposal will follow the procedures specified in Section 6.1.1.8 of
28 the SAP (IT, 2002a)

30 **4.8 Site-Specific Safety and Health**

31 Safety and health requirements for this supplemental RI are provided in the SSHP attachment for
32 the Old Water Hole, Parcel 205(7). The SSHP attachment will be used in conjunction with the
33 installation-wide safety and health plan, Appendix A of the SAP (IT, 2002a).

1 **5.0 Project Schedule**

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3 The project schedule for the supplemental RI activities will be provided by the IT project
4 manager to the Base Realignment and Closure Cleanup Team.

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ATTACHMENT 1
LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid	BCT	BRAC Cleanup Team	CI	chlorinated
2,4,5-T	2,4,5-trichlorophenoxyacetic acid	BERA	baseline ecological risk assessment	CLP	Contract Laboratory Program
2,4,5-TP	silvex	BEHP	bis(2-ethylhexyl)phthalate	cm	centimeter
3D	3D International Environmental Group	BFB	bromofluorobenzene	CN	chloroacetophenone
AB	ambient blank	BFE	base flood elevation	CNB	chloroacetophenone, benzene, and carbon tetrachloride
AbB3	Anniston gravelly clay loam, 2 to 6 percent slopes, severely eroded	BG	Bacillus globigii	CNS	chloroacetophenone, chloropicrin, and chloroform
AbC3	Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded	bgs	below ground surface	CO	carbon monoxide
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded	BHC	betahexachlorocyclohexane	Co-60	cobalt-60
Abs	skin absorption	BHHRA	baseline human health risk assessment	CoA	Code of Alabama
ABS	dermal absorption factor	BIRTC	Branch Immaterial Replacement Training Center	COC	chain of custody; contaminant of concern
AC	hydrogen cyanide	bkg	background	COE	Corps of Engineers
ACAD	AutoCadd	bls	below land surface	Con	skin or eye contact
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded	BOD	biological oxygen demand	COPC	chemical(s) of potential concern
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded	Bp	soil-to-plant biotransfer factors	COPEC	chemical(s) of potential ecological concern
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded	BRAC	Base Realignment and Closure	CPSS	chemicals present in site samples
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded	Braun	Braun Intertec Corporation	CQCSM	Contract Quality Control System Manager
ACGIH	American Conference of Governmental Industrial Hygienists	BSAF	biota-to-sediment accumulation factors	CRDL	contract-required detection limit
AdE	Anniston and Allen stony loam, 10 to 25 percent slope	BSC	background screening criterion	CRL	certified reporting limit
ADEM	Alabama Department of Environmental Management	BTAG	Biological Technical Assistance Group	CRQL	contract-required quantitation limit
ADPH	Alabama Department of Public Health	BTEX	benzene, toluene, ethyl benzene, and xylenes	CRZ	contamination reduction zone
AEC	U.S. Army Environmental Center	BTOC	below top of casing	Cs-137	cesium-137
AEL	airborne exposure limit	BTV	background threshold value	CS	ortho-chlorobenzylidene-malononitrile
AET	adverse effect threshold	BW	biological warfare; body weight	CSEM	conceptual site exposure model
AF	soil-to-skin adherence factor	BZ	breathing zone; 3-quinuclidinyl benzilate	CSM	conceptual site model
AHA	ammunition holding area	C	ceiling limit value	CT	central tendency
AL	Alabama	Ca	carcinogen	ctr.	container
ALAD	δ -aminolevulinic acid dehydratase	CAB	chemical warfare agent breakdown products	CWA	chemical warfare agent
amb.	Amber	CAMU	corrective action management unit	CWM	chemical warfare material; clear, wide mouth
amsl	above mean sea level	CBR	chemical, biological and radiological	CX	dichloroformoxime
ANAD	Anniston Army Depot	CCAL	continuing calibration	'D'	duplicate; dilution
AOC	area of concern	CCB	continuing calibration blank	D&I	detection and identification
APEC	areas of potential ecological concern	CCV	continuing calibration verification	DAAMS	depot area air monitoring system
APT	armor-piercing tracer	CD	compact disc	DAF	dilution-attenuation factor
AR	analysis request	CDTF	Chemical Defense Training Facility	DANC	decontamination agent, non-corrosive
ARAR	applicable or relevant and appropriate requirement	CEHNC	U.S. Army Engineering and Support Center, Huntsville	°C	degrees Celsius
AREE	area requiring environmental evaluation	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	°F	degrees Fahrenheit
ASP	Ammunition Supply Point	CERFA	Community Environmental Response Facilitation Act	DCA	dichloroethane
ASR	Archives Search Report	CESAS	Corps of Engineers South Atlantic Savannah	DCE	dichloroethene
AST	aboveground storage tank	CF	conversion factor	DDD	dichlorodiphenyldichloroethane
ASTM	American Society for Testing and Materials	CFC	chlorofluorocarbon	DDE	dichlorodiphenyldichloroethene
AT	averaging time	CFDP	Center for Domestic Preparedness	DDT	dichlorodiphenyltrichloroethane
ATSDR	Agency for Toxic Substances and Disease Registry	CFR	Code of Federal Regulations	DEH	Directorate of Engineering and Housing
ATV	all-terrain vehicle	CG	carbonyl chloride (phosgene)	DEP	depositional soil
AWARE	Associated Water and Air Resources Engineers, Inc.	CGI	combustible gas indicator	DFTPP	decafluorotriphenylphosphine
AWWSB	Anniston Water Works and Sewer Board	ch	inorganic clays of high plasticity	DI	deionized
'B'	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)	CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine	DID	data item description
BCF	blank correction factor; bioconcentration factor	CK	cyanogen chloride	DIMP	di-isopropylmethylphosphonate
		cl	inorganic clays of low to medium plasticity	DM	dry matter

List of Abbreviations and Acronyms (Continued)

DMBA	dimethylbenz(a)anthracene	FAR	Federal Acquisition Regulations	GSSI	Geophysical Survey Systems, Inc.
DMMP	dimethylmethylphosphonate	FB	field blank	GST	ground stain
DOD	U.S. Department of Defense	FD	field duplicate	GW	groundwater
DOJ	U.S. Department of Justice	FDA	U.S. Food and Drug Administration	gw	well-graded gravels; gravel-sand mixtures
DOT	U.S. Department of Transportation	FedEx	Federal Express, Inc.	HA	hand auger
DP	direct-push	FEMA	Federal Emergency Management Agency	HCl	hydrochloric acid
DPDO	Defense Property Disposal Office	FFCA	Federal Facilities Compliance Act	HD	distilled mustard
DPT	direct-push technology	FFE	field flame expedient	HDPE	high-density polyethylene
DQO	data quality objective	FFS	focused feasibility study	HEAST	Health Effects Assessment Summary Tables
DRMO	Defense Reutilization and Marketing Office	FI	fraction of exposure	Herb.	herbicides
DRO	diesel range organics	Fil	filtered	HHRA	human health risk assessment
DS	deep (subsurface) soil	Flt	filtered	HI	hazard index
DS2	Decontamination Solution Number 2	FMDC	Fort McClellan Development Commission	HPLC	high performance liquid chromatography
DWEL	drinking water equivalent level	FML	flexible membrane liner	HNO ₃	nitric acid
E&E	Ecology and Environment, Inc.	FMP 1300	Former Motor Pool 1300	HQ	hazard quotient
EB	equipment blank	FOMRA	Former Ordnance Motor Repair Area	HQ _{screen}	screening-level hazard quotient
EBS	environmental baseline survey	Foster Wheeler	Foster Wheeler Environmental Corporation	hr	hour
EC ₅₀	effects concentration for 50 percent of a population	Frtn	fraction	H&S	health and safety
ECBC	Edgewood Chemical/Biological Command	FS	field split; feasibility study	HSA	hollow-stem auger
ED	exposure duration-	FSP	field sampling plan	HTRW	hazardous, toxic, and radioactive waste
EDD	electronic data deliverable	ft	feet	'I'	out of control, data rejected due to low recovery
EF	exposure frequency	ft/ft	feet per foot	IATA	International Air Transport Authority
EDQL	ecological data quality level	FTA	Fire Training Area	ICAL	initial calibration
EE/CA	engineering evaluation and cost analysis	FTMC	Fort McClellan	ICB	initial calibration blank
Elev.	elevation	FTRRA	FTMC Reuse & Redevelopment Authority	ICP	inductively-coupled plasma
EM	electromagnetic	g	gram	ICRP	International Commission on Radiological Protection
EMI	Environmental Management Inc.	g/m ³	gram per cubic meter	ICS	interference check sample
EM31	Geonics Limited EM31 Terrain Conductivity Meter	G-856	Geometrics, Inc. G-856 magnetometer	ID	inside diameter
EM61	Geonics Limited EM61 High-Resolution Metal Detector	G-858G	Geometrics, Inc. G-858G magnetic gradiometer	IDL	instrument detection limit
EOD	explosive ordnance disposal	GAF	gastrointestinal absorption factor	IDLH	immediately dangerous to life or health
EODT	explosive ordnance disposal team	gal	gallon	IDM	investigative-derived media
EPA	U.S. Environmental Protection Agency	gal/min	gallons per minute	IDW	investigation-derived waste
EPC	exposure point concentration	GB	sarin	IEUBK	Integrated Exposure Uptake Biokinetic
EPIC	Environmental Photographic Interpretation Center	gc	clay gravels; gravel-sand-clay mixtures	IF	ingestion factor; inhalation factor
EPRI	Electrical Power Research Institute	GC	gas chromatograph	ILCR	incremental lifetime cancer risk
ER	equipment rinsate	GCL	geosynthetic clay liner	IMPA	isopropylmethyl phosphonic acid
ERA	ecological risk assessment	GC/MS	gas chromatograph/mass spectrometer	IMR	Iron Mountain Road
ER-L	effects range-low	GCR	geosynthetic clay liner	in.	inch
ER-M	effects range-medium	GFAA	graphite furnace atomic absorption	Ing	ingestion
ESE	Environmental Science and Engineering, Inc.	GIS	Geographic Information System	Inh	inhalation
ESMP	Endangered Species Management Plan	gm	silty gravels; gravel-sand-silt mixtures	IP	ionization potential
ESN	Environmental Services Network, Inc.	gp	poorly graded gravels; gravel-sand mixtures	IPS	International Pipe Standard
ESV	ecological screening value	gpm	gallons per minute	IR	ingestion rate
ET	exposure time	GPR	ground-penetrating radar	IRDMIS	Installation Restoration Data Management Information System
EU	exposure unit	GPS	global positioning system	IRIS	Integrated Risk Information Service
Exp.	explosives	GS	ground scar	IRP	Installation Restoration Program
E-W	east to west	GSA	General Services Administration; Geologic Survey of Alabama	IS	internal standard
EZ	exclusion zone	GSBP	Ground Scar Boiler Plant	ISCP	Installation Spill Contingency Plan

List of Abbreviations and Acronyms (Continued)

IT	IT Corporation	mm	millimeter	NR	not requested; not recorded; no risk
ITEMS	IT Environmental Management System™	MM	mounded material	NRC	National Research Council
'J'	estimated concentration	MMBtu/hr	million Btu per hour	NRCC	National Research Council of Canada
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded	MOGAS	motor vehicle gasoline	NRHP	National Register of Historic Places
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded	MP	Military Police	ns	nanosecond
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes	MPA	methyl phosphonic acid	N-S	north to south
JPA	Joint Powers Authority	MPM	most probable munition	NS	not surveyed
K	conductivity	MQL	method quantitation limit	NSA	New South Associates, Inc.
K _{ow}	octonal-water partition coefficient	MR	molasses residue	nT	nanotesla
L	lewisite; liter	MRL	method reporting limit	nT/m	nanoteslas per meter
l	liter	MS	matrix spike	NTU	nephelometric turbidity unit
LBP	lead-based paint	mS/cm	millisiemens per centimeter	nv	not validated
LC	liquid chromatography	mS/m	millisiemens per meter	O ₂	oxygen
LCS	laboratory control sample	MSD	matrix spike duplicate	O&G	oil and grease
LC ₅₀	lethal concentration for 50 percent population tested	MTBE	methyl tertiary butyl ether	O&M	operation and maintenance
LD ₅₀	lethal dose for 50 percent population tested	msl	mean sea level	OB/OD	open burning/open detonation
LEL	lower explosive limit	MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes, severely eroded	OD	outside diameter
LOAEL	lowest-observed-adverse-effects-level	mV	millivolts	OE	ordnance and explosives
LT	less than the certified reporting limit	MW	monitoring well	oh	organic clays of medium to high plasticity
LUC	land-use control	MWI&P	Monitoring Well Installation and Management Plan	ol	organic silts and organic silty clays of low plasticity
LUCAP	land-use control assurance plan	Na	sodium	OP	organophosphorus
LUCIP	land-use control implementation plan	NA	not applicable; not available	ORP	oxidation-reduction potential
max	maximum	NAD	North American Datum	OSHA	Occupational Safety and Health Administration
MB	method blank	NAD83	North American Datum of 1983	OSWER	Office of Solid Waste and Emergency Response
MCL	maximum contaminant level	NAVD88	North American Vertical Datum of 1988	OVM-PID/FID	organic vapor meter-photoionization detector/flame ionization detector
MCLG	maximum contaminant level goal	NAS	National Academy of Sciences	OVS	oil/water separator
MCPA	4-chloro-2-methylphenoxyacetic acid	NCEA	National Center for Environmental Assessment	oz	ounce
MCS	media cleanup standard	NCP	National Contingency Plan	PA	preliminary assessment
MD	matrix duplicate	NCRP	National Council on Radiation Protection and Measurements	PAH	polynuclear aromatic hydrocarbon
MDC	maximum detected concentration	ND	not detected	PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
MDCC	maximum detected constituent concentration	NE	no evidence; northeast	Parsons	Parsons Engineering Science, Inc.
MDL	method detection limit	ne	not evaluated	Pb	lead
mg	milligrams	NEW	net explosive weight	PBMS	performance-based measurement system
mg/kg	milligrams per kilogram	NFA	No Further Action	PC	permeability coefficient
mg/kg/day	milligram per kilogram per day	NG	National Guard	PCB	polychlorinated biphenyl
mg/kgbw/day	milligrams per kilogram of body weight per day	NGP	National Guardsperson	PCDD	polychlorinated dibenzo-p-dioxins
mg/L	milligrams per liter	ng/L	nanograms per liter	PCDF	polychlorinated dibenzofurans
mg/m ³	milligrams per cubic meter	NGVD	National Geodetic Vertical Datum	PCE	perchloroethene
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils	Ni	nickel	PCP	pentachlorophenol
MHz	megahertz	NIC	notice of intended change	PDS	Personnel Decontamination Station
µg/g	micrograms per gram	NIOSH	National Institute for Occupational Safety and Health	PEF	particulate emission factor
µg/kg	micrograms per kilogram	NIST	National Institute of Standards and Technology	PEL	permissible exposure limit
µg/L	micrograms per liter	NLM	National Library of Medicine	PES	potential explosive site
µmhos/cm	micromhos per centimeter	NPDES	National Pollutant Discharge Elimination System	Pest.	pesticides
min	minimum	NPW	net present worth	PETN	pentarey thritol tetranitrate
MINICAMS	miniature continuous air monitoring system	No.	number	PFT	portable flamethrower
ml	inorganic silts and very fine sands	NOAA	National Oceanic and Atmospheric Administration	PG	professional geologist
mL	milliliter	NOAEL	no-observed-adverse-effects-level		

List of Abbreviations and Acronyms (Continued)

PID	photoionization detector	RSD	relative standard deviation	STC	source-term concentration
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes	RTC	Recruiting Training Center	STD	standard deviation
PM	project manager	RTECS	Registry of Toxic Effects of Chemical Substances	STEL	short-term exposure limit
POC	point of contact	RTK	real-time kinematic	STL	Severn-Trent Laboratories
POL	petroleum, oils, and lubricants	SA	exposed skin surface area	STOLS	Surface Towed Ordnance Locator System®
POW	prisoner of war	SAD	South Atlantic Division	Std. units	standard units
PP	peristaltic pump; Proposed Plan	SAE	Society of Automotive Engineers	SU	standard unit
ppb	parts per billion	SAIC	Science Applications International Corporation	SUXOS	senior UXO supervisor
PPE	personal protective equipment	SAP	installation-wide sampling and analysis plan	SVOC	semivolatile organic compound
ppm	parts per million	sc	clayey sands; sand-clay mixtures	SW	surface water
PPMP	Print Plant Motor Pool	Sch.	Schedule	SW-846	U.S. EPA's <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i>
ppt	parts per thousand	SCM	site conceptual model	SWMU	solid waste management unit
PR	potential risk	SD	sediment	SWPP	storm water pollution prevention plan
PRA	preliminary risk assessment	SDG	sample delivery group	SZ	support zone
PRG	preliminary remediation goal	SDZ	safe distance zone; surface danger zone	TAL	target analyte list
PSSC	potential site-specific chemical	SEMS	Southern Environmental Management & Specialties, Inc.	TAT	turn around time
pt	peat or other highly organic silts	SF	cancer slope factor	TB	trip blank
PVC	polyvinyl chloride	SFSP	site-specific field sampling plan	TBC	to be considered
QA	quality assurance	SGF	standard grade fuels	TCA	trichloroethane
QA/QC	quality assurance/quality control	SHP	installation-wide safety and health plan	TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
QAM	quality assurance manual	SI	site investigation	TCDF	tetrachlorodibenzofurans
QAO	quality assurance officer	SINA	Special Interest Natural Area	TCE	trichloroethene
QAP	installation-wide quality assurance plan	SL	standing liquid	TCL	target compound list
QC	quality control	SLERA	screening-level ecological risk assessment	TCLP	toxicity characteristic leaching procedure
QST	QST Environmental, Inc.	sm	silty sands; sand-silt mixtures	TDEC	Tennessee Department of Environment and Conservation
qty	quantity	SM	Serratia marcescens	TDGCL	thiodiglycol
Qual	qualifier	SMDP	Scientific Management Decision Point	TDGCLA	thiodiglycol chloroacetic acid
'R'	rejected data; resample	s/n	signal-to-noise ratio	TERC	Total Environmental Restoration Contract
R&A	relevant and appropriate	SOP	standard operating procedure	THI	target hazard index
RA	remedial action	SOPQAM	U.S. EPA's <i>Standard Operating Procedure/Quality Assurance Manual</i>	TIC	tentatively identified compound
RAO	removal action objective	sp	poorly graded sands; gravelly sands	TLV	threshold limit value
RBC	risk-based concentration	SP	submersible pump	TN	Tennessee
RCRA	Resource Conservation and Recovery Act	SPCC	system performance calibration compound	TNT	trinitrotoluene
RD	remedial design	SPCS	State Plane Coordinate System	TOC	top of casing; total organic carbon
RDX	cyclonite	SPM	sample planning module	TPH	total petroleum hydrocarbons
ReB3	Rarden silty clay loams	SQRT	screening quick reference tables	TR	target cancer risk
REG	regular field sample	Sr-90	strontium-90	TRADOC	U.S. Army Training and Doctrine Command
REL	recommended exposure limit	SRA	streamlined human health risk assessment	TRPH	total recoverable petroleum hydrocarbons
RFA	request for analysis	SRM	standard reference material	TSCA	Toxic Substances Control Act
RfC	reference concentration	Ss	stony rough land, sandstone series	TSDF	treatment, storage, and disposal facility
RfD	reference dose	SS	surface soil	TWA	time-weighted average
RGO	remedial goal option	SSC	site-specific chemical	UCL	upper confidence limit
RI	remedial investigation	SSHO	site safety and health officer	UCR	upper certified range
RL	reporting limit	SSHHP	site-specific safety and health plan	'U'	not detected above reporting limit
RME	reasonable maximum exposure	SSL	soil screening level	UF	uncertainty factor
ROD	Record of Decision	SSSL	site-specific screening level	USACE	U.S. Army Corps of Engineers
RPD	relative percent difference	SSSSL	site-specific soil screening level	USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
RRF	relative response factor	STB	supertropical bleach	USAEC	U.S. Army Environmental Center

List of Abbreviations and Acronyms (Continued)

USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATCES	U.S. Army Technical Center for Explosive Safety
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level; upper tolerance limit
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
WAC	Women's Army Corps
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WRS	Wilcoxon rank sum
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd ³	cubic yards

Q – Sample interference obscured peak of interest
R – Non-target compound analyzed for but not detected (GC/MS methods)
S – Non-target compound analyzed for and detected (GC/MS methods)
T – Non-target compound analyzed for but not detected (non GC/MS methods)
U – Analysis in unconfirmed
Z – Non-target compound analyzed for and detected (non-GC/MS methods)

Qualifiers

J – The low-spike recovery is low
N – The high-spike recovery is low
R – Data is rejected

SAIC – Data Qualifiers, Codes and Footnotes, 1995 Remedial Investigation

N/A – Not analyzed

ND – Not detected

Boolean Codes

LT – Less than the certified reporting limit

Flagging Codes

9 – Non-demonstrated/validated method performed for USAEC

B – Analyte found in the method blank or QC blank

C – Analysis was confirmed

D – Duplicate analysis

I – Interfaces in sample make quantitation and/or identification to be suspicious

J – Value is estimated

K – Reported results are affected by interfaces or high background

N – Tentatively identified compound (match greater than 70%)

APPENDIX A
SAIC SOIL BORING/WELL LOGS

SOIL BORING/WELL LOG

Project Name: <u>Fort McClellan RI/FS</u>	Site Location: <u>Old Water Hole</u>	Monitoring Well No.: <u>OWH-G01</u>
SAIC Project No.: <u>01-0827-03-6520</u>	Northing (ft): <u>1179621.43</u>	Start/Finish Date: <u>02-22-85/04-04-85</u>
Geologist: <u>Brad Baker</u>	Easting (ft): <u>472304.96</u>	Well Completion Depth (ft): <u>107.4</u>
Drilling Co.: <u>Christensen Boyles Brothers Inc.</u>	Groundwater Elev. (ft): <u>617.46</u>	Drilled Depth (ft): <u>108</u>
Driller: <u>Kenneth Kesty</u>	Drilling Method: <u>Hollow Stem Auger</u>	Surface Pad Elevation (ft): <u>662.48</u>
Drill Rig: <u>Mobil B-61</u>	Sampling Method: <u>Split Spoon</u>	Top of Casing Elevation (ft): <u>684.41</u>

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)	Well Const. As-Built
0	ML		Clayey Silt, 15% fine to med. Sand. 10YR6/4 light yellowish brown; low plasticity; poorly sorted; stiff; moist; subangular; no structure;	0.00	0.00	0.00	4	SS-1	1.8	
0	SM			0.00	0.00	0.00	21	SS-2	1.6	
5	CL		Gavelly Silty Sand, 40% Sand medium to very coarse, 30% Silt, 30% granules. 7.5YR5/6, 5/8 or 4/6 Strong brown; very dense.							
10			Interbedded Clay. 7.5YR5/8 light purple; poorly sorted; very stiff; moist; subangular to angular	0.00	0.00	0.08	16	SS-3	1.7	
15	ML		Sandy Silt, 25% medium Sand. 10YR8/3 very pale brown, variegated light reddish brown 5YR6/3 or 6/4; low plasticity; poorly sorted; dense; very stiff; moist; subangular; no structure	NS	NS	NS	8	SS-4	1.4	
20				0.00	0.00	0.05	18	SS-5	1.6	
25	CL		Silty Clay, 25% Silt, 20% medium to coarse Sand. 5YR6/8 reddish yellow variegated light brownish yellow; low plasticity; poorly sorted; very stiff; moist; subangular; no structure	NS	NS	NS	11	SS-6	2.0	
30				NS	NS	NS	30	SS-7	1.0	
35	ML		Sandy Silt, 35% fine to very coarse Sand, interbedded chert fragments. 5YR6/4 reddish yellow, variegated red; low plasticity; poorly sorted; very stiff; moist; subangular; no structure	NS	NS	NS	13	SS-8	1.4	
40				NS	NS	NS	15	SS-9	0.8	
45	ML		Clayey Silt, 20% coarse to very coarse Sand, 30% Clay. 5YR 6/4 reddish yellow, variegated red and yellowish brown; low plasticity; poorly sorted; very stiff; moist; subangular; no structure	NS	NS	NS	16	SS-10	1.8	
50				NS	NS	NS	16	SS-11	1.6	
55	CL		Silty Clay, 35% Silt, 10% fine Sand, 10% Chert fragments. 5YR6/8 reddish yellow variegated red light gray; low plasticity; poorly sorted; very stiff; moist; subangular; no structure	NS	NS	NS	16	SS-11	1.6	

SOIL BORING/WELL LOG

Project Name: <u>Fort McClellan RI/FS</u>	Site Location: <u>Old Water Hole</u>	Monitoring Well No.: <u>OWH-601</u>
SAIC Project No.: <u>01-0827-03-6520</u>	Northing (ft): <u>1179621.43</u>	Start/Finish Date: <u>02-22-95/04-04-95</u>
Geologist: <u>Brad Baker</u>	Easting (ft): <u>472304.96</u>	Well Completion Depth (ft): <u>107.4</u>
Drilling Co.: <u>Christensen Boyles Brothers Inc.</u>	Groundwater Elev. (ft): <u>617.46</u>	Drilled Depth (ft): <u>108</u>
Driller: <u>Kenneth Kesty</u>	Drilling Method: <u>Hollow Stem Auger</u>	Surface Pad Elevation (ft): <u>662.48</u>
Drill Rig: <u>Mobil B-61</u>	Sampling Method: <u>Split Spoon</u>	Top of Casing Elevation (ft): <u>664.41</u>

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)	Well Const. As-Built
60	CL	▨		NS	NS	NS	11	SS-12	1.4	
65	ML	▨	Silt, 15% fine Sand, 10% chert fragments. 5YR6/8 reddish yellow; low plasticity; poorly sorted; very stiff; moist; subangular; no structure	NS	NS	NS	14	SS-13	0.8	
68			NS	NS	NS	14	SS-14	1.6		
70	ML	▨	Sandy Silt, 35% very fine to very coarse Sand, 28% Silt, 22% Clay, 15% Chert fragments. 5YR6/8 reddish yellow; low plasticity; poorly sorted; hard; moist; subangular; no structure	NS	NS	NS	13	SS-15	0.8	
75			NS	NS	NS	15	SS-16	0.8		
80			NS	NS	NS	14	SS-17	1.4		
85	CL	▨	Sandy Clay, Sand: 10% medium; 10% coarse, 10 Chert. trace 10YR6/6 light gray and light reddish brown; moderate to high plasticity; stiff; moist; no apparent bedding; subrounded	NS	NS	NS	9	SS-18	1.0	
90										
95	SM	●	Sand, 5% Silt. light gray; low plasticity; medium grained; very dense; moist; no apparent bedding; subrounded; well sorted	NS	NS	NS	50/T	SS-19	50/T	
100			Same as above.	NS	NS	NS	8	SS-20	8	
105										
110			Bottom of Boring at 108 feet.							

Note: NR=Not Recorded, NA=Not Applicable
 SS=Split Split, NS=Not Screened OVA, LEL and H2S readings were 0 unless otherwise noted.

SOIL BORING/WELL LOG

Project Name: <u>Fort McClellan RI/FS</u>	Site Location: <u>Old Water Hole</u>	Monitoring Well No.: <u>OWH-G02</u>
SAIC Project No.: <u>01-0827-03-6520</u>	Northing (ft): <u>1179262.59</u>	Start/Finish Date: <u>12-17-94/01-07-95</u>
Geologist: <u>Brad Baker</u>	Easting (ft): <u>472076.02</u>	Well Completion Depth (ft): <u>104.0</u>
Drilling Co.: <u>Anderson Engineering Consultants Inc.</u>	Groundwater Elev. (ft): <u>619.43</u>	Drilled Depth (ft): <u>108.0</u>
Driller: <u>Dean Whitlock</u>	Drilling Method: <u>Hollow Stem Auger</u>	Surface Pad Elevation (ft): <u>665.02</u>
Drill Rig: <u>HMB-124</u>	Sampling Method: <u>Split Spoon</u>	Top of Casing Elevation (ft): <u>667.23</u>

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)	Well Const. As-Built	
										Steel Casing	Cement/Bentonite
5	ML	[Symbol]	Silt, 20% Sand. 2.5YR6/2 light brownish gray; variegated red; low plasticity; moist; no apparent bedding; subangular	0.02	0.00	0.00	11	SS-1	1.5	4" Schedule 40 PVC Riser	Cement/Bentonite
10	CL	[Symbol]	Silty Clay, 30% Silt; 10% fine Sand, 5% sandstone fragments. 10YR6/6 brownish yellow variegated moderate gray; low plasticity; hard; moist; no apparent bedding; subangular	0.00	0.00	0.00	56	SS-2	2.0		
15		[Symbol]	Clay, 20% Silt, 15% very coarse Sand, 5% Chert fragments. 10YR7/1 light gray, mottled white due to weathered feldspar, variegated brownish yellow; low plasticity; very stiff; moist; no apparent bedding; subangular	0.00	0.00	0.03	19	SS-3	2.0		
15		[Symbol]	Same as above, variegated red	0.00	0.00	0.00	22	SS-4	2.0		
20		[Symbol]	Clay, 30% Chert fragments. 10YR6/6 brownish yellow variegated red; low plasticity; hard; moist; no apparent bedding; angular	0.00	0.00	0.00	56	SS-5	0.85		
25		[Symbol]	Same as above with 40% chert fragments.	NS	NS	NS	55	SS-6	0.66		
30		[Symbol]	Same as above	NS	NS	NS	34	SS-7	0.2		
35		[Symbol]	Silty Clay, 40% Silt, 5% Chert fragments. 5YR6/6 reddish yellow; moderate plasticity; hard; moist; no apparent bedding; subangular	NS	NS	NS	31	SS-8	1.6		
40		[Symbol]	Same as above except 5YR6/8 reddish yellow	NS	NS	NS	42	SS-9	1.3		
45		[Symbol]	Silty Clay, 25% Silt, 5% granular Chert fragments. 5YR6/8 reddish yellow mottled yellow; moderate plasticity; hard; moist; no apparent bedding; subangular	NS	NS	NS	33	SS-10	2.0		
50		[Symbol]	Same as above with 15% Chert fragments; very moist	NS	NS	NS	67	SS-11	1.5		

SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS Site Location: Old Water Hole Monitoring Well No.: OWH-G02
 SAIC Project No.: 01-0827-03-6520 Northing (ft): 1179262.59 Start/Finish Date: 12-17-94/01-07-95
 Geologist: Brad Baker Easting (ft): 472076.02 Well Completion Depth (ft): 104.0
 Drilling Co.: Anderson Engineering Consultants Inc Groundwater Elev. (ft): 619.43 Drilled Depth (ft): 108.0
 Driller: Dean Whitlock Drilling Method: Hollow Stem Auger Surface Pad Elevation (ft): 665.02
 Drill Rig: HMB-124 Sampling Method: Split Spoon Top of Casing Elevation (ft): 667.23

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)	Well Const. As-Built	
										4" Schedule 40 PVC Riser	4" .10 Slot Schedule 40 PVC Screen
60	CL		Clay, 30% gravel Chert fragments. 5YR6/8 reddish yellow; moderate ; plasticity; hard; moist; no apparent bedding; angular	NS	NS	NS	52	SS-12	1.2	Cement/Bentonite	
65			Silty Clay, 30% Silt, 10% Chert fragments, 3% MnO2. 5YR6/8 reddish yellow, with wisps of yellow; moderate plasticity; hard; moist; no apparent bedding; subangular	NS	NS	NS	42	SS-13	2.0		
70			Same as above	NS	NS	NS	50/3"	SS-14	1.9		
75			Same as above with 20% coarse Sand, <5% Chert fragments	NS	NS	NS	81	SS-15	0.6		
80	ML		Clayey Silt, 35% Clay, 10% fine Sand. 5YR6/8 reddish yellow varigated yellow; low plasticity; dense; moist; no apparent bedding; subangular	NS	NS	NS	43	SS-16	1.0	Bentonite Seal	
85			Silt, 15% Clay, 5% fine Sand. 5YR6/8 reddish yellow; low plasticity; dense; moist; no apparent bedding; subangular	NS	NS	NS	28	SS-17	2.0		
90			Same as above	NS	NS	NS	36	SS-18	1.2		
95	CH		Same as above with 3% MnO2, 10YR7/4 banded very pale brown	NS	NS	NS	38	SS-19	2.0	Sand Filter Pack	
100			Silty Clay, 30% Silt. 2.5YR5/8 red; high plasticity; very stiff; wet; no apparent bedding; subrounded	NS	NS	NS	21	SS-20	2.0		
105			Same as above, stiff	NS	NS	NS	11	SS-21	2.0		
110	Bottom of Boring at 108 feet										
<p>Note: NR=Not Recorded, NA=Not Applicable SS=Split Spoon, NS=Not Screened, OVA, LEL and H2S were 0 unless otherwise noted.</p>											

SOIL BORING/WELL LOG

Project Name: <u>Fort McClellan RI/FS</u>	Site Location: <u>Old Water Hole</u>	Monitoring Well No.: <u>OWH-G03</u>
SAIC Project No.: <u>01-0827-03-6520-008</u>	Northing (ft): <u>1179128.65</u>	Start/Finish Date: <u>03-14-95/04-19-95</u>
Geologist: <u>Brad Baker</u>	Easting (ft): <u>472433.17</u>	Well Completion Depth (ft): <u>75</u>
Drilling Co.: <u>Christensen Boyles Brothers</u>	Groundwater Elev. (ft): <u>618.54</u>	Drilled Depth (ft): <u>97</u>
Driller: <u>Rickey Bilbrey</u>	Drilling Method: <u>Hollow Stem Auger</u>	Surface Pad Elevation (ft): <u>657.43</u>
Drill Rig: <u>Mobile B-61</u>	Sampling Method: <u>Split Spoon</u>	Top of Casing Elevation (ft): <u>659.46</u>

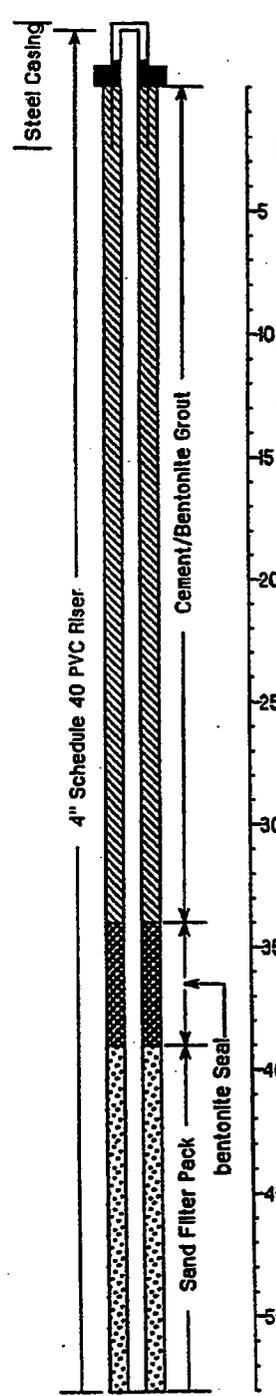
Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)	Well Const. As-Built	
										4" Schedule 40 PVC Screen	4" 10 Slot Schedule 40 PVC Riser
58	CL										
58	ML		Clayey Silt, 30% Clay, 10% light gray Chert fragments, 10% fine Sand. 5YR6/8 reddish yellow; moderate plasticity; poorly sorted; dense; moist; subangular; no structure	NS	NS	NS	7	SS-12	1.4		
63	CL		Silty Clay, 30% Silt, 20% fine to coarse Sand, 5% light gray chert fragments. 2.5YR5/8 red; moderate plasticity; very stiff; moist; subangular; no structure	NS	NS	NS	88	SS-13	0.6		
68				NS	NS	NS	12	SS-14	1.2		
73	CH		Sandy Clay, 30% fine to very coarse Sand, 3% chert fragments. 2.5YR5/8 red; low plasticity; poorly sorted; very stiff; very moist; subangular; no structure	NS	NS	NS	10	SS-15	NR		
78				NS	NS	NS	87	SS-16	2.0		
83	CL		Clay, 20% fine to very coarse Sand, 3% MnO2. 2.5 YR4/6 red; high plasticity; poorly sorted; very stiff; moist; subangular; no structure	NS	NS	NS	73	SS-17	0.6		
88				NS	NS	NS	86	SS-18	1.8		
93	SP		Sand, 90% medium to coarse Sand. 10YR4/1 dark gray; low plasticity; well sorted; moist; subangular; interbedded sand	NS	NS	NS	12	SS-20	1.2		
98	CL		Sandy Clay, 40% fine to very coarse Sand. 2.5YR4/6 red; mod. plasticity; very poorly sorted; very stiff; wet; subangular; no structure	NS	NS	NS	15	SS-21	0.8		
103	SP		Sand, 85% medium to coarse Sand. 10YR4/1 dark gray; moderately sorted; stiff; moist; subangular; interbedded Sand								
			Bottom of Boring at 97 feet								

Note: NR=Not Recorded, NA=Not Applicable
 SS=Split Spoon, NS=Not Screened OVA, LEL and H2S were 0 unless otherwise noted.

SOIL BORING/WELL LOG

Project Name: <u>Fort McClellan RI/FS</u>	Site Location: <u>Old Water Hole</u>	Monitoring Well No.: <u>OWH-603</u>
SAIC Project No.: <u>01-0827-03-6520-008</u>	Northing (ft): <u>1179128.65</u>	Start/Finish Date: <u>03-14-95/04-19-95</u>
Geologist: <u>Brad Baker</u>	Easting (ft): <u>472433.17</u>	Well Completion Depth (ft): <u>75</u>
Drilling Co.: <u>Christensen Boyles Brothers</u>	Groundwater Elev. (ft): <u>618.54</u>	Drilled Depth (ft): <u>87</u>
Driller: <u>Rickey Bilbrey</u>	Drilling Method: <u>Hollow Stem Auger</u>	Surface Pad Elevation (ft): <u>657.43</u>
Drill Rig: <u>Mobile B-61</u>	Sampling Method: <u>Split Spoon</u>	Top of Casing Elevation (ft): <u>659.46</u>

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)	Well Const. As-Built
5	ML	[Symbol]	Sandy Silt, 30% fine to medium Sand. 10YR7/6 yellow variegated pale brown; low plasticity; poorly sorted; dense; moist; subangular; no structure	0.00	0.00	0.00	16	SS-1	1.5	[Diagram Section 1-5 ft]
				0.00	0.00	0.06	51	SS-2	1.5	
10	CL	[Symbol]	Silty Clay, 25% Silt, 20% light gray Sandstone fragments, 15% fine Sand. 2.5YR5/8 red; moderate plasticity; poorly sorted; very dense; moist; subangular; no structure	0.00	0.00	0.00	20	SS-3	1.6	[Diagram Section 10-15 ft]
15	ML	[Symbol]	Sandy Silt, 25% fine-medium Sand, 10% Sandstone fragments. 2.5YR4/8 dark red variegated light brownish yellow; low plasticity; poorly sorted; medium dense; moist; subangular; no structure	0.00	0.00	0.00	15	SS-4	1.8	[Diagram Section 15-20 ft]
20				0.00	0.00	0.08	15	SS-5	0.8	
25	CL	[Symbol]	Clayey Silt, 30% Clay, 15% fine to granular Sand, 5% Sandstone fragments. 2.5YR5/8 red variegated brownish yellow; low plasticity; poorly sorted; medium dense; moist; subangular; no structure	NS	NS	NS	5	SS-6	1.2	[Diagram Section 20-25 ft]
30				NS	NS	NS	133	SS-7	0.7	
35	CL	[Symbol]	Silty Clay, 35% Silt, 20% fine to granular Sand. 5YR5/8 yellowish red variegated brownish yellow; moderate plasticity; poorly sorted; very stiff; moist; subangular; no structure	NS	NS	NS	20	SS-8	0.8	[Diagram Section 25-35 ft]
40				NS	NS	NS	11	SS-9	0.8	
45				NS	NS	NS	12	SS-10	1.6	
50	CL	[Symbol]	Silty Clay, 25% Silt, 15% fine to coarse Sand. 10 to 15% Chert fragments. 5YR5/8 yellowish red variegated brownish yellow; moderate plasticity; poorly sorted; stiff to very stiff; moist; subangular; no structure	NS	NS	NS	12	SS-11	1.4	[Diagram Section 35-50 ft]
55				NS	NS	NS	12	SS-11	1.4	



SOIL BORING/WELL LOG

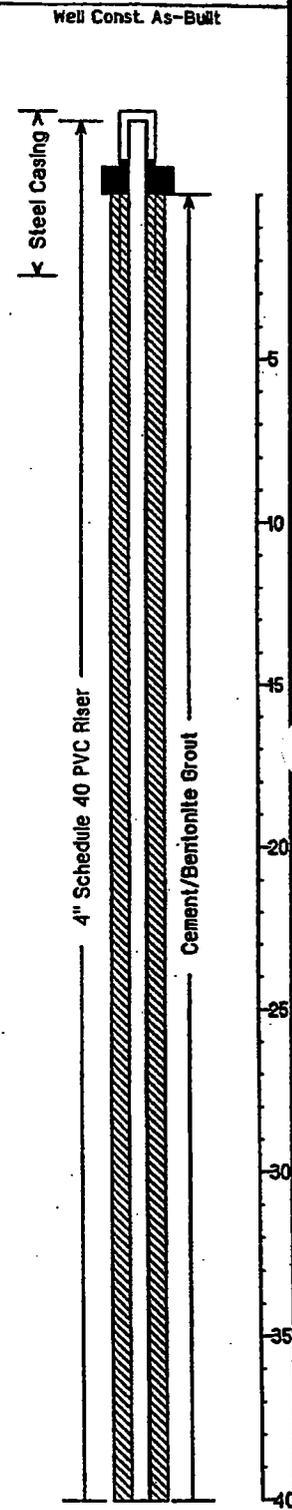
Project Name: <u>Fort McClellan RI/FS</u>	Site Location: <u>Old Water Hole</u>	Monitoring Well No.: <u>OWH-604</u>
SAIC Project No.: <u>01-0827-03-6520-008</u>	Northing (ft): <u>1179404.79</u>	Start/Finish Date: <u>03-31-95/04-06-95</u>
Geologist: <u>Brad Baker</u>	Easting (ft): <u>472307.72</u>	Well Completion Depth (ft): <u>98.5</u>
Drilling Co.: <u>Christensen Boyles Brothers</u>	Groundwater Elev. (ft): <u>609.36</u>	Drilled Depth (ft): <u>100</u>
Operator: <u>Kenneth Kesty</u>	Drilling Method: <u>Hollow Stem Auger</u>	Surface Pad Elevation (ft): <u>661.56</u>
Drill Rig: <u>Mobile B-61</u>	Sampling Method: <u>Split Spoon</u>	Top of Casing Elevation (ft): <u>659.28</u>

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)	Well Const. As-Built
45	SC	•••••	Clayey Sand, 30% fine Clay and Silt, 10% Rock fragments and Gravel. 10YR5/6 Light Orange brown with variegated light grayish greens; low plasticity; moderately moist; no bedding angular	NS	NS	NS	6	SS-8	1.5	<p style="font-size: small;">4" Schedule 40 PVC Riser</p> <p style="font-size: small;">Cement/Bentonite Grout</p> <p style="font-size: small;">Bentonite Seal</p>
45	SP	•••••	Loose wet coarse Sand.							
50	ML	— — — — —	Silt-fine, 20% Clay, 15% Rock fragments .5" diameter pebbles (noncalcareous). 5B6/7 light greenish gray with 5Y6/4 iron veining and staining, variegated olive green; low plasticity; firm; low moisture; no apparent bedding; subangular	NS	NS	NS	16	SS-9	1.6	
55		— — — — —	Silt-fine, 15% Clay 5B7/1 light bluish gray with 5Y6/4 variegated olive green; low plasticity; firm; low moisture; no apparent bedding subangular	NS	NS	NS	12	SS-10	1.6	
60		— — — — —	Same as above, except 5Y6/4 olive green with streaks of bluish gray; hard	NS	NS	NS	20	SS-11	0.5	
65	CL		Silty Clay, 25% Silt, 15% Rock fragments and saprolitic material. 5YR4/6 red/orange with 2.5Y5/3 mottled olive brown; low plasticity; very stiff; low moisture; no bedding; angular	NS	NS	NS	30	SS-12	1.7	
70			Same as above.	NS	NS	NS	30	SS-13	1.9	
75			Same as above with larger .5" diameter chert, small zone of noncalcareous fractured chert	NS	NS	NS	30	SS-14	1.9	
80			Same as above with chert, granitic looking sandstone. Silty Clay	NS	NS	NS	20	SS-15	1.8	

SOIL BORING/WELL LOG

Project Name: <u>Fort McClellan RI/FS</u>	Site Location: <u>Old Water Hole</u>	Monitoring Well No.: <u>OWH-604</u>
SAIC Project No.: <u>01-0827-03-6520-008</u>	Northing (ft): <u>1179404.79</u>	Start/Finish Date: <u>03-31-95/04-06-95</u>
Geologist: <u>Brad Baker</u>	Easting (ft): <u>472307.72</u>	Well Completion Depth (ft): <u>98.5</u>
Drilling Co.: <u>Christensen Boyles Brothers</u>	Groundwater Elev. (ft): <u>609.36</u>	Drilled Depth (ft): <u>100</u>
Driller: <u>Kenneth Kesty</u>	Drilling Method: <u>Hollow Stem Auger</u>	Surface Pad Elevation (ft): <u>661.56</u>
Drill Rig: <u>Mobile B-61</u>	Sampling Method: <u>Split Spoon</u>	Top of Casing Elevation (ft): <u>659.28</u>

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-value	Sample Type and Number	Sample Rec. (ft)
5	CL	[Hatched Pattern]	Clay, 20% fine to medium Sand. 5YR7/6 light gray variegated yellowish brown; moderate plasticity; poorly sorted; very stiff; moist; subangular; no structure	0.00	0.00	0.06	18	SS-1	2.0
10			Clay, 20% fine to coarse Sand. 5Yr7/1 light gray variegated yellowish brown; mottled white; moderate plasticity; poorly sorted; very stiff; moist; subangular; no structure	0.00	0.00	0.00	15	SS-2	2.0
15				0.00	0.00	0.00	10	SS-3	1.0
20			Sandy Clay, 35% fine to very coarse Sand. 7.5YR6/2 pinkish gray variegated yellowish brown and red; moderate plasticity; poorly sorted; stiff; moist; subangular; no structure	0.00	0.00	0.08	14	SS-4	1.6
25			Sandy Clay, 30% medium Sand, 5% Rock fragments. 5YR5/4 light orange brown with variegated 2.5YR5/4 light grays brownish yellow; high plasticity; very moist; no apparent bedding, angular rock fragments	NS	NS	NS	14	SS-5	0.7
30			Sandy Clay, 30% coarse Sand, 10% Gravel and rock fragments; 2.5YR5/6 red orange with 5YR6/1 variegated light gray and olive green; moderate plasticity; medium moist; no apparent bedding; subangular;	NS	NS	NS	6	SS-6	2.0
35			Silty Clay, 25% Silt, 5% Sand and Rock fragments. 5B6/1 light bluish gray with 5Y6/4 mottled yellow with iron red stains and veining; low plasticity; low moisture; no bedding; angular	NS	NS	NS	12	SS-7	1.8
40	SC								



SOIL BORING/WELL LOG

Project Name: Fort McClellan RI/FS	Site Location: Old Water Hole	Monitoring Well No.: OWH-604
SAIC Project No.: 01-0827-03-6520-008	Northing (ft): 1179404.79	Start/Finish Date: 03-31-95/04-06-95
Geologist: Brad Baker	Easting (ft): 472307.72	Well Completion Depth (ft): 98.5
Drilling Co.: Christensen Boyles Brothers	Groundwater Elev. (ft): 609.36	Drilled Depth (ft): 100
Driller: Kenneth Kesty	Drilling Method: Hollow Stem Auger	Surface Pad Elevation (ft): 661.56
Drill Rig: Mobile B-61	Sampling Method: Split Spoon	Top of Casing Elevation (ft): 659.28

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)	Well Const. As-Built
85	CL	[Hatched]	Same as above. Silty Clay, moderate plasticity	NS	NS	NS	24	SS-16	1.7	<p style="text-align: center;">Well Const. As-Built</p>
90	CL	[Hatched]	Clay, 15% Silt, 5% Rock fragments, 7.5YR5/6 orangy brown; low plasticity; low moisture; no bedding; angular rock fragments	NS	NS	NS	19	SS-17	1.0	
92	GP	[Dotted]	Clay, 10% Silt. 7.5YR4/6 orange brown with variegated dark gray; high plasticity; soft; moist; no bedding	NS	NS	NS	4	SS-18	1.2	
93	CL	[Hatched]		NS	NS	NS	45	ss-19	1.5	
94	ML	[Horizontal Lines]	Sand with 1 inch fractured rock. 2.5Y4/1 dark gray, wet, noncalcareous; angular rock (sandstone)	NS	NS	NS	4	SS-20	1.4	
95	GP	[Dotted]		NS	NS	NS	4	SS-20	1.4	
96	CH	[Vertical Lines]	Clay, Same as above							
98	ML	[Horizontal Lines]	Silt. white; highly weathered (saporite), low plasticity; compactable; low moisture	NS	NS	NS	15	SS-21	1.2	
100	NA	[Blank]	Wet fractured Rock with wet Sand. dark and light gray; hard; no bedding; angular fracture							
101			Clay, 1/4 inch rock fragments throughout, wet; low plasticity; soft; angular							
102			Clay, with rocks and pebbles, wet							
103			Sand, coarse grained. 2.5Y5/1 gray; well sorted; low moisture; subangular							
104			Sandstone rock fragments 1.5 inch diameter. dark/light gray; noncalcareous; massive; very hard; dense; no apparent bedding; weathered; fractured; low primary permeability							
105			Bottom of Boring at 100 feet							

Note: NR=Not Recorded, NA=Not Applicable
 SS=Split Spoon, NS=Not Screened OVA, LEL and H2S were 0 unless otherwise noted.

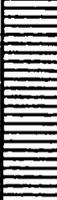
SOIL BORING/WELL LOG

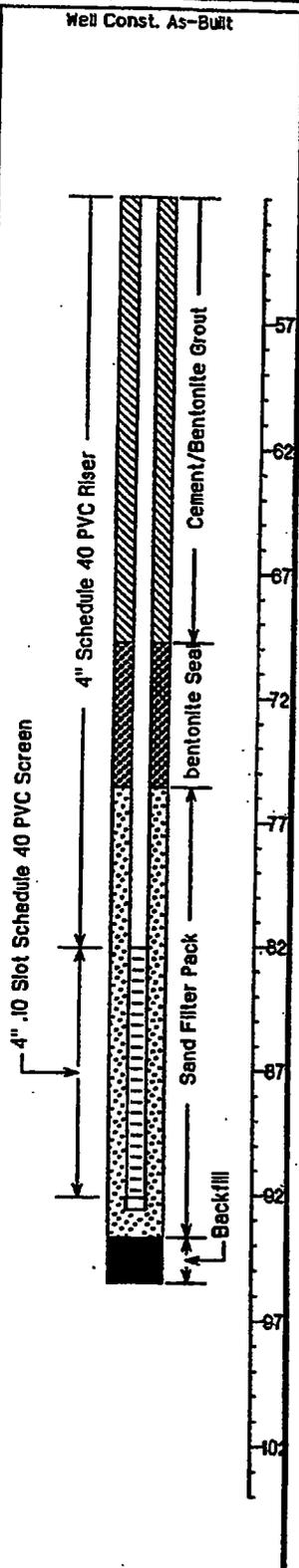
Project Name: <u>Fort McClellan RI/FS</u>	Site Location: <u>Old Water Hole</u>	Monitoring Well No.: <u>ONH-605</u>
SAIC Project No.: <u>01-0827-03-6520-008</u>	Northing (ft): <u>1179490.89</u>	Start/Finish Date: <u>03-28-95/04-02-95</u>
Geologist: <u>Brad Baker</u>	Easting (ft): <u>472425.66</u>	Well Completion Depth (ft): <u>93.7</u>
Drilling Co.: <u>Christensen Boyles Brothers</u>	Groundwater Elev. (ft): <u>611.29</u>	Drilled Depth (ft): <u>95.5</u>
Driller: <u>Kenneth Kesty</u>	Drilling Method: <u>Hollow Stem Auger</u>	Surface Pad Elevation (ft): <u>668.61</u>
Drill Rig: <u>Mobile B-61</u>	Sampling Method: <u>Split Spoon</u>	Top of Casing Elevation (ft): <u>666.57</u>

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)	Well Const. As-Built
5	CL		Sandy Clay, 25% medium Sand, 20% Rock fragments. 2.5YR4/6 reddish brown; moderate plasticity; stiff; low moist; no apparent bedding; subangular	0.00	0.00	0.06	20	SS-1	1.9	<p style="text-align: center;">Well Const. As-Built</p>
10			Sandy Clay, 35% fine Sand, 10% Rock fragments. 7.5YR7/1 mottled white with variegated orange and reddish brown; low plasticity; stiff; moist; no apparent bedding	0.00	0.00	0.00	18	SS-2	1.7	
15	SC		Sandstone, 30% Clay. 7.5 YR7/1 mottled white with 10YR6/6, 10YR5/3 variegated gold brown; low plasticity; low moisture; no apparent bedding; subangular w/ angular stone	0.00	0.00	0.00	26	SS-3	1.8	
20			Sandy Clay, 35% Sand, 10% Rock fragments. medium consistency; no bedding.	0.00	0.00	0.08	8	SS-4	1.8	
25	CL		Sandy Clay, Same as above. 30% Sand, 15% Rock fragments	NS	NS	NS	6	SS-5	2.0	
30			Sandy Clay, 35% very fine Sand, 10% Rock fragments. 2.5YR4/6 variegated orange brown with 7.5YR5/2 light grayish brown; Low plasticity; low moisture except for wet slough; no apparent bedding; subangular; weathered plagioclase	NS	NS	NS	12	SS-6	1.7	
35			Sandy Clay, 30% fine Sand, 15% Rock fragments. 2.5YR4/6 variegated orange brown with 7.5YR5/6 light gold brown; low plasticity; medium; low moisture; no bedding; subangular	NS	NS	NS	14	SS-7	2.0	
40	SC		Sandstone, 30% Clay. 2.5Y6/6 light yellow gold with 7.5YR4/6 with light orange brown; low plasticity; loose-medium consistency; low moisture; no bedding; subangular; cherty stone is angular; weathered plagioclase	NS	NS	NS	19	SS-8	1.9	
45			Sandy Clay, 25% fine Sand, 20% Chert rock fragments. 10YR5/6 variegated light gold with 10YR4/6 light orange brown; Stiff consistency; low moisture; no apparent bedding; chert stone is angular; cobbles	NS	NS	NS	21	SS-9	1.7	
50	CL		Same as above. Sandy Clay, 25% fine Sand, 25% chert and rock fragments and cobbles	NS	NS	NS	30	SS-10	1.8	

SOIL BORING/WELL LOG

Project Name: <u>Fort McClellan RI/FS</u>	Site Location: <u>Old Water Hole</u>	Monitoring Well No.: <u>OWH-G05</u>
SAIC Project No.: <u>01-0827-03-6520-008</u>	Northing (ft): <u>1179490.89</u>	Start/Finish Date: <u>03-28-95/04-02-95</u>
Geologist: <u>Brad Baker</u>	Easting (ft): <u>472425.86</u>	Well Completion Depth (ft): <u>93.7</u>
Drilling Co.: <u>Christensen Boyles Brothers</u>	Groundwater Elev. (ft): <u>611.29</u>	Drilled Depth (ft): <u>95.5</u>
Driller: <u>Kenneth Kesty</u>	Drilling Method: <u>Hollow Stem Auger</u>	Surface Pad Elevation (ft): <u>668.61</u>
Drill Rig: <u>Mobile B-81</u>	Sampling Method: <u>Split Spoon</u>	Top of Casing Elevation (ft): <u>668.57</u>

Depth (feet)	Soil Class USCS	Lithologic Symbol	Material Description	HD (TWA)	GB (TWA)	VX (TWA)	N-Value	Sample Type and Number	Sample Rec. (ft)
57	CL		Same as above, 75% Sandy Clay, 25% fine Sand, 25% chert-weathered, fractured cobbles	NS	NS	NS	24	SS-11	1.8
62			Clay, 20% fine Sand, Chert fragments and cobbles. 2.5YR4/6 light orange brown; moderate plasticity; stiff; moist; no apparent bedding; Chert is angular	NS	NS	NS	28	SS-12	2.0
67			Same as above. Clay, 25% Chert rock cobbles, 20% fine Sand, 10% Chert fragments	NS	NS	NS	25	SS-13	2.0
72			Clay, 15% fine Sand, 5% rock fragments and cobbles. 7.5YR4/4 light orange brown with mottled black MnO2 deposits; moderate plasticity; stiff; moist; no apparent bedding; angular rock fragments	NS	NS	NS	17	SS-14	2.0
77	SC		Clayey Sand, 35% Clay, 15% Chert pebbles and cobbles. 7.5YR4/4 light brown with 7.5YR5/2 variegated grayish brown; moderate plasticity; medium; moist; no apparent bedding; angular rock fragments	NS	NS	NS	24	SS-15	2.0
82			Same as above. 30% Clay, 20% Rock fragments. low plasticity; shale like fracturing of rock; non calcareous; fissile	NS	NS	NS	17	SS-16	0.30
87	CL		Sandy Clay, 40% fine silty Sand, 5% rock fragments. 5YR4/6 variegated light orange brown with 5YR4/6 yellow-gold; moderate plasticity; medium; moist; no apparent bedding; with angular rock fragments	NS	NS	NS	13	SS-17	2.0
92			Same as above.	NS	NS	NS	10	SS-18	2.0
97			Sand and pebbles, 20% Clay. some subangular black Sand; wet; loose						
102			Bottom of Boring at 95.5 feet <i>Note: NR=Not Recorded, NA=Not Applicable SS=Split Spoon, NS=Not Screened OVA, LEL and H2S were 0 unless otherwise noted.</i>						



APPENDIX B

**MEMORANDUM: RELEASE OF PROPERTY FOR PELHAM RANGE
HTRW INVESTIGATIONS**

REPLY TO
ATTENTION OF:

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

CEHNC-OE-DC

4 June 2002

MEMORANDUM FOR U. S. Army Corps of Engineers, ATTN:
Mr. Ellis Pope (EN-GE), P. O. Box 2288, Mobile, Alabama
36628-0001

SUBJECT: Release of Property for Pelham Range HTRW
Investigations

1. The CWM Site Investigation for Pelham Range 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 COMMANDER:

A handwritten signature in black ink, appearing to read "C. Douthat".

C. DAVID DOUTHAT, P.E., CSP
Director, Ordnance and
Explosives Directorate