

Final

**Site Investigation Report
Range 31: Weapons Demonstration Range, Parcel 89Q-X and
Former Defendum Field Firing Range No. 2, Parcel 215Q**

**Fort McClellan
Calhoun County, Alabama**

Prepared for:

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

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Revision 0

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1 ***Executive Summary***

2
3 In accordance with Contract Number DACA21-96-D-0018, Task Order CK10, Shaw
4 Environmental, Inc. (Shaw) completed a site investigation (SI) at Range 31: Weapons
5 Demonstration Range, Parcel 89Q-X and Former Defendum Field Firing Range No. 2, Parcel
6 215Q, at Fort McClellan in Calhoun County, Alabama. The SI was conducted to determine
7 whether chemical constituents are present at the site as a result of historical mission-related
8 Army activities. The SI consisted of the collection and analysis of 42 surface soil samples, 5
9 depositional soil samples, 42 subsurface soil samples, and 4 groundwater samples. In addition,
10 five permanent monitoring wells were installed in the saturated zone to facilitate groundwater
11 sample collection and to provide site-specific geological and hydrogeological characterization
12 information. However, one of the wells did not produce sufficient groundwater for sampling.

13
14 Chemical analysis of samples collected at the site indicates that metals, volatile organic
15 compounds, one semivolatile organic compound, pesticides, herbicides, explosives, and
16 perchlorate were detected in site media. To evaluate whether the detected constituents pose an
17 unacceptable risk to human health or the environment, the analytical results were compared to
18 human health site-specific screening levels (SSSL), ecological screening values (ESV), and
19 background screening values for Fort McClellan. Site metals data were further evaluated using
20 statistical and geochemical methods to select site-related metals.

21
22 Constituents detected at concentrations exceeding SSSLs and background (where available) were
23 selected as chemicals of potential concern (COPC) in site media. COPCs were aluminum in
24 surface soil, five metals (aluminum, chromium, iron, thallium, and vanadium) in subsurface soil,
25 and four pesticides in groundwater. The statistical and geochemical evaluation determined that
26 the metals identified as COPCs were present at naturally occurring levels.

27
28 In groundwater, four pesticides (4,4'-DDE, endrin aldehyde, heptachlor, and heptachlor epoxide)
29 were detected at concentrations exceeding their respective SSSLs in the one groundwater sample
30 analyzed for pesticides. All of the pesticide results, however, were low estimated concentrations
31 below method reporting limits. It should be noted that the heptachlor and heptachlor epoxide
32 results were below their respective U.S. Environmental Protection Agency (EPA) maximum
33 contaminant levels (MCL) for drinking water. Although no MCLs exist for 4,4'-DDE and endrin
34 aldehyde, the detected levels of these pesticides were low and were within the same order of
35 magnitude as their SSSLs. Given the uncertainty associated with the analytical results, the

1 relative magnitude of the exceedances, and taking into account comparisons to available MCLs,
2 it is concluded that the pesticides in groundwater do not pose an unacceptable threat to human
3 health.

4
5 Constituents detected at concentrations exceeding ESVs and background (where available) were
6 selected as constituents of potential ecological concern (COPEC) in surface soil. COPECs were
7 five metals (aluminum, copper, lead, mercury, and selenium), one herbicide (MCP), two
8 pesticides (4,4'-DDE and gamma-BHC), and one explosive compound (2,4,6-trinitrotoluene).
9 The pesticide and herbicide COPECs were detected at low estimated levels in only one of five
10 samples each and do not appear to be widely distributed. Similarly, 2,4,6-trinitrotoluene was
11 detected in only one of 47 samples. Furthermore, the ESVs are highly conservative values, based
12 on either no-observed-adverse-effects levels or the most health-protective values available, and
13 are intended to be protective of the most sensitive individual ecological receptor. Based on the
14 conservatism inherent in the ESVs, the relative magnitude of the exceedances, and their
15 infrequent detection in surface soil, it is concluded that these constituents do not pose an
16 unacceptable risk to ecological receptors at this site.

17
18 The statistical and geochemical evaluation determined that the metals identified as COPECs were
19 present at naturally occurring levels except for copper and lead in several samples and mercury in
20 one sample. Although mercury was identified as anomalously high in one sample, the result
21 (0.15 milligrams per kilogram [mg/kg]) only slightly exceeded the ESV (0.1 mg/kg). All other
22 mercury results in soil were determined to be naturally occurring and were below the ESV.
23 Additionally, all detected mercury concentrations were below alternative ESVs presented in U.S.
24 Environmental Protection Agency guidance. Given the relatively small amount by which it
25 exceeded the ESV, its infrequent detection at levels above the ESV, and the fact that all mercury
26 results were below the alternative ESVs, mercury is excluded as a COPEC. Lead and copper,
27 both of which are known constituents of ammunition, are retained as site-related COPECs.

28
29 Analysis of the spatial distribution of anomalously high copper and lead concentrations above
30 ESVs indicates that these metals are almost exclusively found in the western portion of the area
31 of investigation. The elevated copper and lead concentrations are located in areas where targets
32 and target-related features are present and bullet fragments are visible on the ground, particularly
33 in the central downrange area approximately 750 feet west of the dirt road that bisects the area of
34 investigation. The single exception is the lead result (97.5 mg/kg) at sample location HR-89Q-

1 GP27 that exceeded its ESV (50 mg/kg) and background (40 mg/kg) in the eastern portion of the
2 site.

3
4 The results of the SI indicate that historical Army activities at Parcels 89Q-X and 215Q have
5 impacted the environment. In addition, bullet fragments are present on the ground surface in
6 some areas in the western portion of the area of investigation. Copper and lead were identified as
7 site-related COPECs in surface soil but were almost exclusively found in the western portion of
8 the site in areas where targets and bullet fragments are present. The area of investigation is
9 projected for reuse by the Anniston-Calhoun County Fort McClellan Development Joint Powers
10 Authority (JPA) and the U.S. Fish and Wildlife Service (USFWS). In addition, a future Anniston
11 Water Works and Sewer Board (AWWSB) municipal water tank site is located at the far western
12 end of the area of investigation. Based on the future land use and spatial distribution of
13 contamination, the following recommendations are made:

- 14
15 • For the JPA portion of the property, the available analytical data indicate that
16 historical Army activities have impacted the environment. Specifically, surface
17 soils are contaminated with certain metals (i.e., copper and lead) that are
18 constituents of small-arms ammunition. In addition, bullet fragments are present
19 on the ground surface in some areas. The levels of copper and lead do not pose a
20 threat to human health but may pose a risk to ecological receptors. Therefore,
21 Shaw recommends disposition of the property in accordance with the requirements
22 of Environmental Services Cooperative Agreement No. DASW01-03-2-0001
23 between the Army and JPA, and in accordance with Cleanup Agreement No. AL4
24 210 020 562 between the Alabama Department of Environmental Management and
25 JPA.
- 26
27 • For the USFWS portion of the property, the available analytical data indicate that
28 historical Army activities have not adversely impacted the environment. The
29 metals and chemical constituents detected in site media do not pose an
30 unacceptable risk to human health or the environment. Therefore, Shaw
31 recommends “No Further Action” and unrestricted land reuse with regard to
32 hazardous substances regulated under the Comprehensive Environmental
33 Response, Compensation, and Liability Act (CERCLA).
- 34
35 • For the AWWSB tank site, Shaw recommends “No Further Action” and
36 unrestricted land reuse with regard to CERCLA-regulated hazardous substances.

1 **1.0 Introduction**

2
3 The U.S. Army has selected Fort McClellan (FTMC), located in Calhoun County, Alabama, for
4 closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526
5 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which
6 U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC
7 Environmental Restoration Program requires investigation and cleanup of federal properties prior
8 to transfer to the public domain. The U.S. Army is conducting environmental studies of the
9 impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army
10 Corps of Engineers (USACE)-Mobile District. The USACE contracted Shaw Environmental,
11 Inc. (Shaw), formerly IT Corporation (IT), to perform the site investigation (SI) at Range 31:
12 Weapons Demonstration Range, Parcel 89Q-X and Former Defendum Field Firing Range No. 2,
13 Parcel 215Q, under Contract Number DACA21-96-D-0018, Task Order CK10.

14
15 This report presents specific information and results compiled from the SI, including field
16 sampling and analysis, and monitoring well installation activities conducted at Parcels 89Q-X
17 and 215Q.

18 19 **1.1 Project Description**

20 Parcels 89Q-X and 215Q were identified as areas to be investigated prior to property transfer.
21 The sites were classified as Category 1 Qualified parcels in the *Final Environmental Baseline*
22 *Survey, Fort McClellan, Alabama* (EBS) (Environmental Science and Engineering, Inc. [ESE],
23 1998). Category 1 Qualified parcels are areas that have no evidence of Comprehensive
24 Environmental Response, Compensation, and Liability Act (CERCLA)-related hazardous
25 substance or petroleum product storage, release, or disposal but that do have other environmental
26 or safety concerns. Parcels 89Q-X and 215Q were qualified because chemicals of potential
27 concern and unexploded ordnance (UXO) may be present as a result of historical range activities.

28
29 A site-specific work plan, comprised of a field sampling plan (SFSP), a safety and health plan,
30 and a UXO safety plan, was finalized in April 2002 (IT, 2002a). The work plan was prepared to
31 provide technical guidance for SI field activities at Parcels 89Q-X and 215Q. The site-specific
32 work plan was used as an attachment to the installation-wide work plan (IT, 1998) and the
33 installation-wide sampling and analysis plan (SAP) (IT, 2000a; IT, 2002b). The SAP includes
34 the installation-wide safety and health plan and quality assurance plan.

1 The SI included fieldwork to collect 42 surface soil samples, 42 subsurface soil samples, 5
2 depositional soil samples, and 4 groundwater samples to determine whether potential site-
3 specific chemicals are present at the site.
4

5 **1.2 Purpose and Objectives**

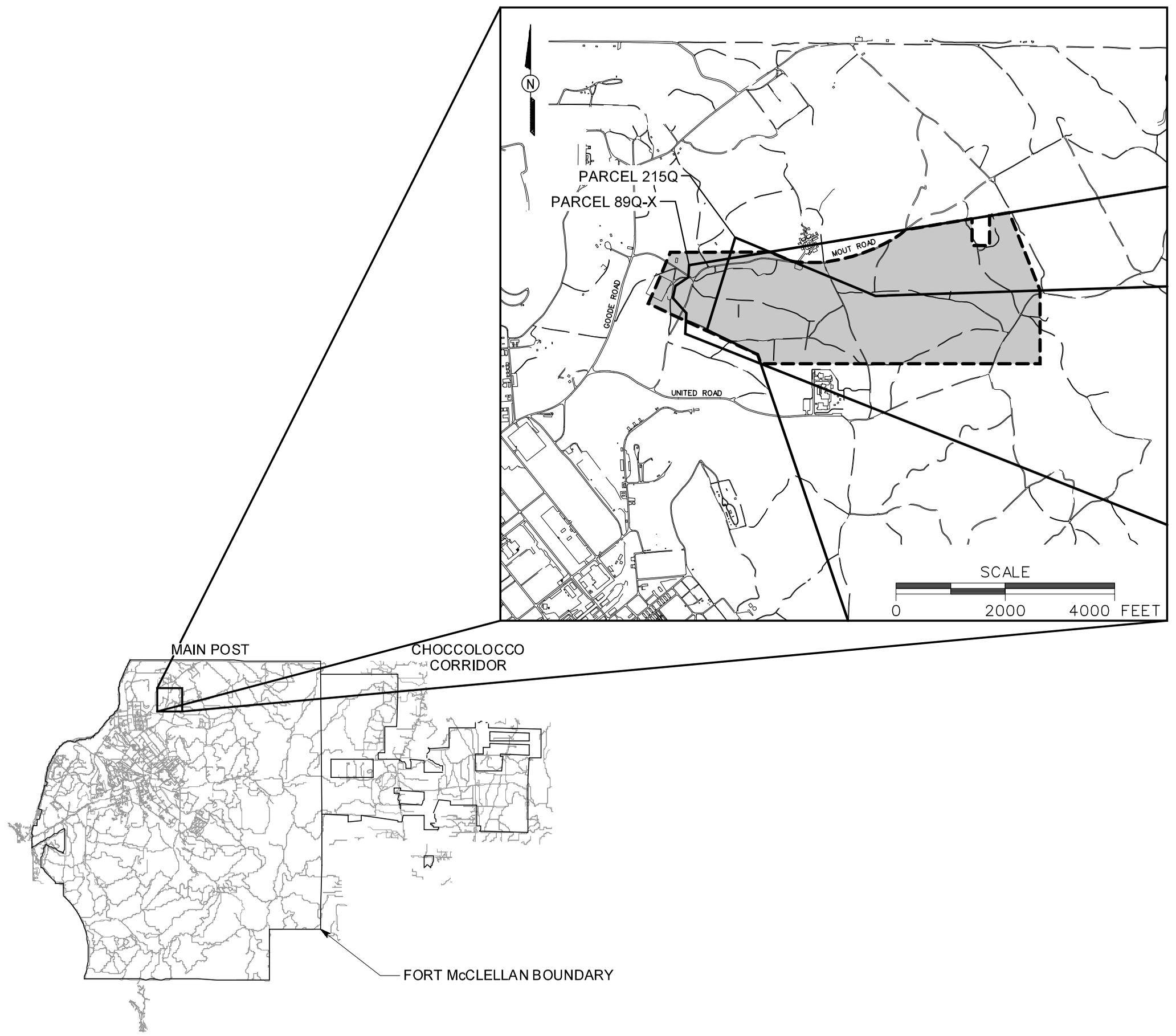
6 The SI program was designed to collect data from site media and provide a level of defensible
7 data and information in sufficient detail to determine whether chemical constituents are present
8 at Parcels 89Q-X and 215Q at concentrations that pose an unacceptable risk to human health or
9 the environment. The conclusions of the SI in Chapter 6.0 are based on the comparison of the
10 analytical results to human health site-specific screening levels (SSSL), ecological screening
11 values (ESV), and background screening values for FTMC. The SSSLs and ESVs were
12 developed for human health and ecological risk evaluations as part of investigations performed
13 under the BRAC Environmental Restoration Program at FTMC. The SSSLs and ESVs are
14 presented in the *Final Human Health and Ecological Screening Values and PAH Background*
15 *Summary Report* (IT, 2000b). Background metals screening values are presented in the *Final*
16 *Background Metals Survey Report, Fort McClellan, Alabama* (Science Applications
17 International Corporation [SAIC], 1998).
18

19 Based on the conclusions presented in this SI report, the BRAC Cleanup Team (BCT) will decide
20 either to propose “No Further Action” or to conduct additional work at the site.
21

22 **1.3 Site Description and History**

23 Range 31: Weapons Demonstration Range, Parcel 89Q-X, and Former Defendum Field Firing
24 Range No. 2, Parcel 215Q, are located in the north-central area of the Main Post at FTMC
25 (Figure 1-1). The parcel boundary for Range 31 encompasses a large, overlapping area of
26 Former Defendum Field Firing Range No. 2. The area of investigation covers approximately 322
27 acres (Figure 1-2). The property within the area of investigation is projected for dual land reuse.
28 The western portion (approximately 130 acres) will be transferred to the Anniston-Calhoun
29 County Fort McClellan Development Joint Powers Authority (JPA) and the eastern portion
30 (approximately 192 acres) will be transferred to the U.S. Fish and Wildlife Service (USFWS).
31 At the far western end of the area of investigation, the Anniston Water Works and Sewer Board
32 (AWWSB) has identified an approximately 3-acre area as the location for a future municipal
33 water tank. Figure 1-3 shows the future property use within the area of investigation.
34

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 PROJ. NO.: 796887
 INITIATOR: T. WINTON
 PROJ. MGR.: J. YACOUB
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 STARTING DATE: 06/08/04
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LEGEND

- UNIMPROVED ROAD
- PAVED ROAD AND PARKING
- ▭ PARCEL BOUNDARY
- ▭ AREA OF INVESTIGATION

FIGURE 1-1
SITE LOCATION MAP
RANGE 31 WEAPONS DEMONSTRATION
RANGE, PARCEL 89Q-X
FORMER DEFENDUM FIELD FIRING
RANGE NO. 2, PARCEL 215Q

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

DWG. NO.: 796887es.824
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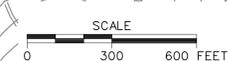


- LEGEND:**
- UNIMPROVED ROAD
 - PAVED ROAD AND PARKING
 - BUILDING
 - TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL - 25 FOOT)
 - TREES / TREELINE
 - PARCEL BOUNDARY
 - AREA OF INVESTIGATION
 - AWWSB WATER TANK SITE
 - SURFACE DRAINAGE / CREEK
 - MANMADE SURFACE DRAINAGE FEATURE
 - TRENCH
 - BERM
 - FENCE
 - RAILROAD
 - UTILITY POLE

- APPROXIMATE LOCATION OF OBSERVED FEATURES**
- ① UTILITY JUNCTION BOX
 - ② CINDER BLOCK BUILDING USED TO ASSIST MOVING TARGET. A 55-GALLON DRUM IS LOCATED SOUTHEAST OF THE BUILDING
 - ③ JEEP(S)
 - ④ ARMORED PERSONNEL CARRIER(S)
 - ⑤ TANK(S)
 - ⑥ TARGET DEPRESSION WITH FUEL TANK
 - ⑦ 55-GALLON DRUM
 - ⑧ METAL CONTAINERS AND AMMO CANS
 - ⑨ PIT WITH STONE AROUND TOP, BRICK FOUNDATION
 - ⑩ STONE WALLS AND WWI ERA METAL SHRAPNEL
 - ⑪ 35-GALLON DRUM
 - ⑫ CINDER BLOCK BUILDING
 - ⑬ RUBBLE
 - ⑭ DUMP TRUCK BED, TWO 5-GALLON DRUMS
 - ⑮ DRUM(S)
 - ⑯ AIR CANNISTER
 - ⑰ DEPRESSION(S)
 - ⑱ MOUND(S)
 - ⑲ POP-UP TARGET(S)
 - ⑳ AMMUNITION FRAGMENTS

FIGURE 1-2
SITE MAP
RANGE 31 WEAPONS DEMONSTRATION
RANGE, PARCEL 89Q-X
FORMER DEFENDUM FIELD FIRING
RANGE NO. 2, PARCEL 215Q

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



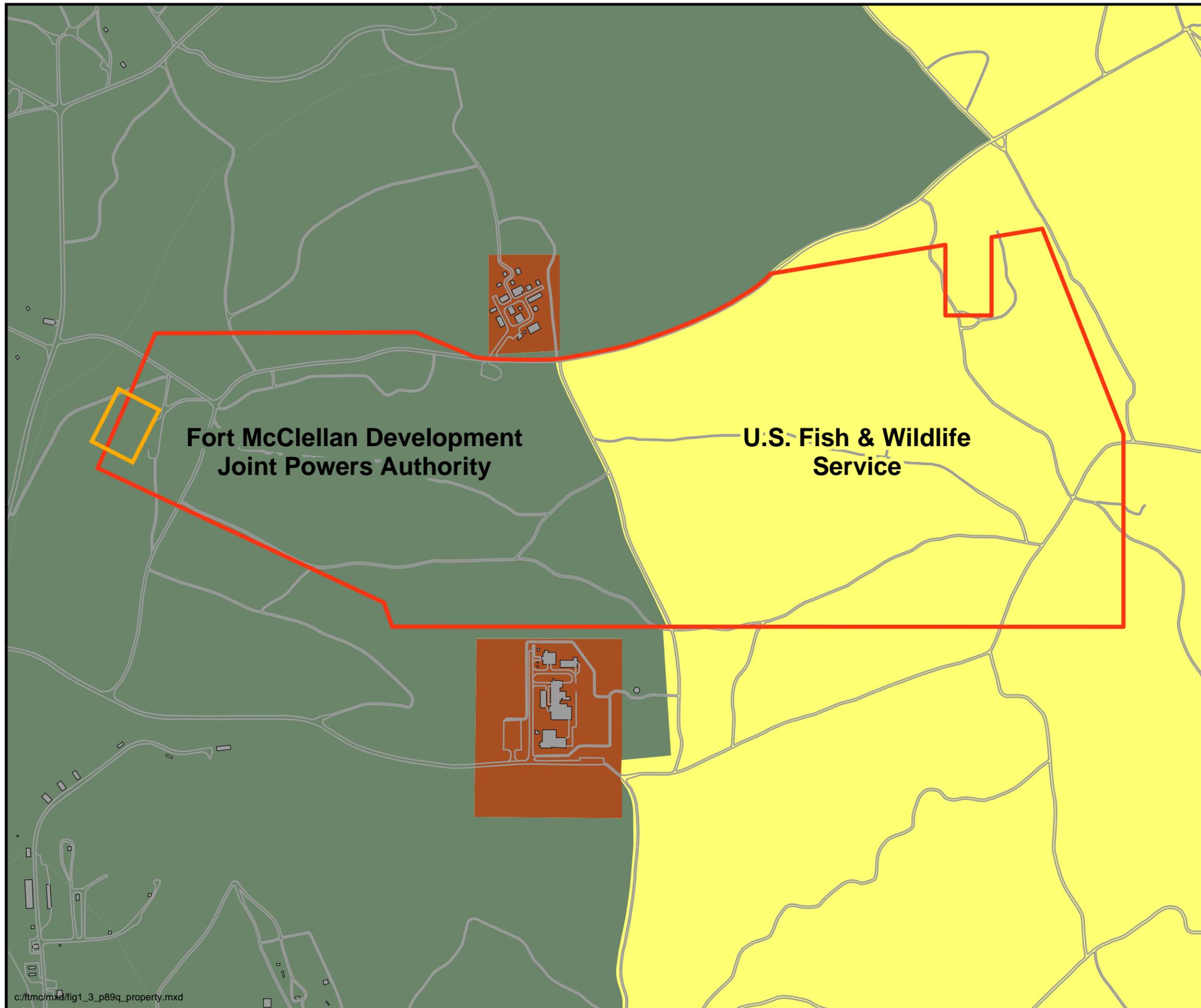


Figure 1-3

Property Map

Parcels 89Q-X and 215Q
Fort McClellan, Alabama

Legend

-  Roads
-  Area of Investigation
-  AWWSB Water Tank Site
-  Buildings
-  U.S. Fish & Wildlife Service
-  Department of Justice
-  FTMC Development JPA



NAD83 State Plane Coordinates



Contract No. DACA21-96-D-0018

1 Range 31 was used from 1951 through 1984 or 1985. Operations at Range 31 ceased when the
2 Military Operations in Urban Terrain (MOUT) site and the Chemical Defense Training Facility
3 were constructed because these facilities were within the surface danger zone for Range 31.
4

5 Weapons most recently used at Range 31 included .45-caliber (cal) and .38-cal pistol, M-16 rifle,
6 M-60 machine gun, M-72 light anti-tank weapon (LAW), and M-203 40 millimeter (mm)
7 grenade launcher. Other weapons fired at this range included 66mm incendiary rockets
8 containing triethylaluminum (a powdered metallic incendiary material), flash rounds (mixture of
9 jellied fuel and powdered magnesium and aluminum), 90mm recoilless rifles (armor piercing
10 [AP] and high explosive [HE]), and .50-cal machine guns. Other rounds fired included .30-cal
11 rounds fired from the M-72 and M-203 weapons systems; these rounds were inert demonstration
12 rounds. A large quantity of .30-cal lead projectiles was observed within this range during the
13 EBS site visit. Range 31 reportedly contained a target on tracks used for antitank weapons
14 practice (ESE, 1998).
15

16 FTMC personnel reported that Range 31 was used as a firepower demonstration range and that
17 many weapons systems were fired at this location, including flash rounds, live warheads on AP
18 rounds, and 66mm incendiary rockets filled with triethylaluminum. Targets exhibiting AP and
19 HE impact marks, numerous 40mm smoke grenades, slap flares, one 90mm AP recoilless rifle
20 projectile, and numerous unfired blank rounds have been noted at Range 31. Members of the
21 142nd Explosive Ordnance Disposal interpreted the condition of the hard targets as an indication
22 that .50-cal machine gun training was conducted at the range (ESE, 1998).
23

24 Defendum Field Firing Range No. 2 (Parcel 215Q) was first identified on a map entitled
25 "Ranges, 1948." The firing line for this range is located in the western portion of Range 31, with
26 the direction of fire to the southeast. Ordnance fired at this location was assumed to have been
27 restricted to small arms ammunition. No other information is available regarding the dates of use
28 or operation of this range (ESE, 1998).
29

30 During SI site walks conducted in late 2001 and early 2002, several features were noted (Figure
31 1-2). At the western end of the Range 31 parcel boundary is a line of buried cement practice
32 bombs, suspected to be a firing line for small arms, approximately 25 feet east of this area is a
33 200-foot-long berm, beyond which is possibly a line of pop-up targets. Also in the immediate
34 area is a small S-shaped depression containing numerous small-gauge wires. To the east of these
35 features are a series of shallow depressions, each with a pole and possible blasting wire,

1 suggestive of demolition/explosive simulation blasting holes. Similar depressions were noted
2 throughout the range. Other small depressions, most likely used for pop-up targets, were also
3 prevalent throughout the range.

4
5 A concrete building used for a moving target system was also observed near the center of the
6 range. In the vicinity of this building is a berm, a drum, and scattered metal debris. Several
7 LAWs and 40mm practice rounds were also found near the concrete building.

8
9 Numerous items used for training were observed approximately 1,000 feet downrange. This
10 included: large areas of pop-up targets and numerous vehicles used as targets, including jeeps,
11 tanks, and armored personnel carriers. Shrapnel and metal debris were scattered throughout the
12 area.

13
14 In the eastern portion of the area of investigation is a depression with stone lined around the
15 opening. The stone is stacked in this area in a variety of small walls. Scattered metal, lead
16 fragments, and World War I-era 75mm and 155mm fragments are also located in this area.
17 Approximately 900 feet to the north is an excavated area containing stressed vegetation, mounds,
18 depressions, and ammunition blanks. It is not clear whether items in the northern portion of the
19 Range 31 range fan are related to activities at Range 31 or the Defendum Field Firing Range
20 No. 2.

21 22 **1.3.1 Archives Search Report Ranges**

23 In addition to the EBS, the *Archives Search Report (ASR), Maps, Fort McClellan, Anniston,*
24 *Alabama* (USACE, 2001a) was reviewed for Range 31: Weapons Demonstration Range, Parcel
25 89Q-X, and Former Defendum Field Firing Range No. 2, Parcel 215Q. Also, any ranges that
26 appear to overlap the area of investigation are presented on Figures 1-4 through 1-6. The
27 following ASR plates show additional ranges within the area of investigation:

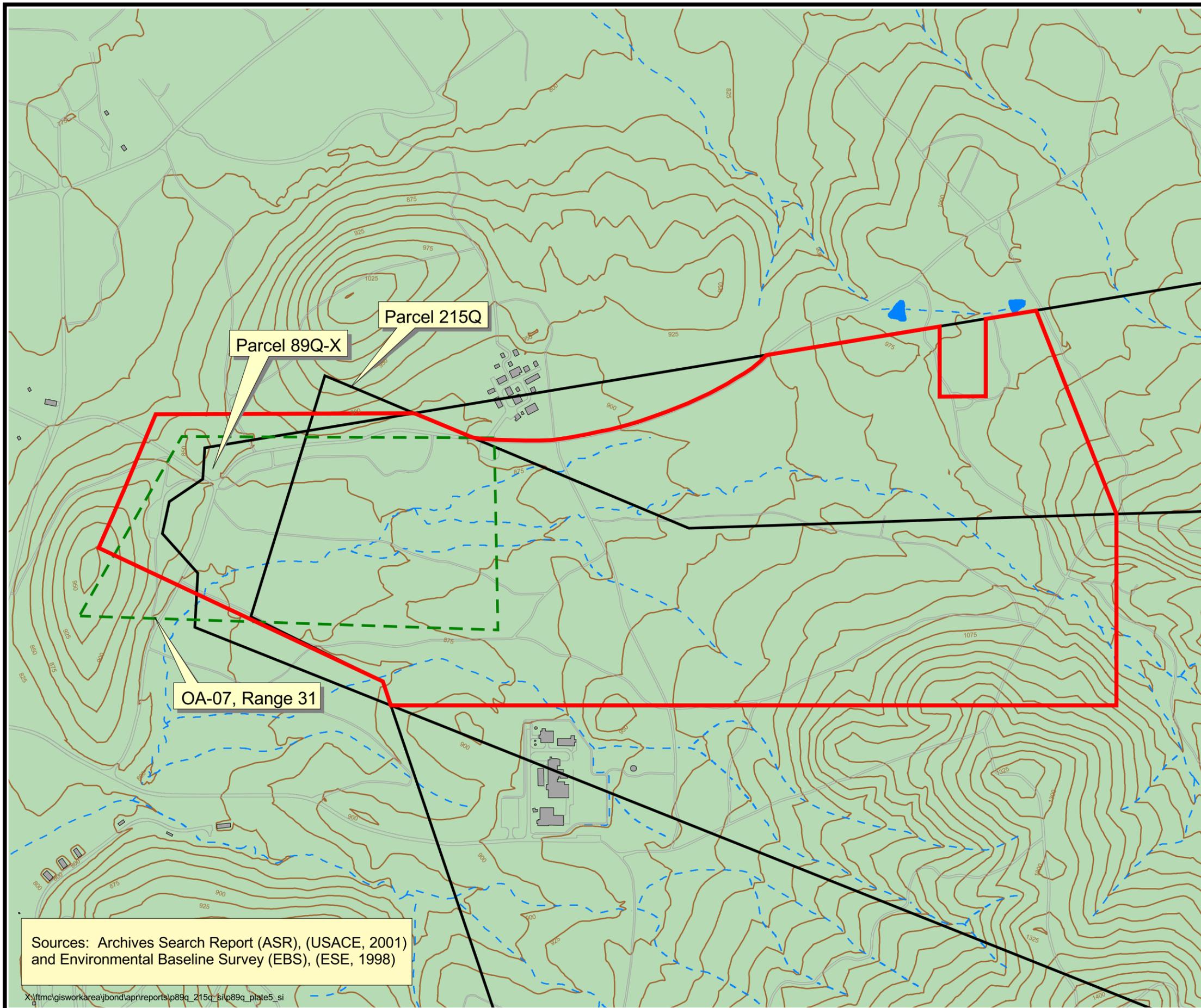
- 28
29
- Plate 4 – Inter-War Range Use (World War I to World War II)
 - Plate 5 – World War II to 1950 Range Use
 - Plate 6 – 1950 to 1973 Range Use
 - Plate 7 – 1974 to 1996
 - Plate 8 – Chemical School Range and Training Areas.
- 30
31
32
33
34

35 The following paragraphs provide brief descriptions of the ASR plates.

Figure 1-4

Range Location Map, ASR Plate 5

Parcels 89Q-X and 215Q
Fort McClellan, Alabama

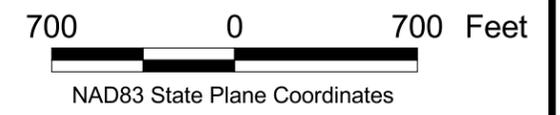


Sources: Archives Search Report (ASR), (USACE, 2001)
and Environmental Baseline Survey (EBS), (ESE, 1998)

X:\fmc\gisworkarea\jbond\aprr\reports\p89q_215q_si\p89q_plate5_si

Legend

- Area of Investigation
- - - ASR Range
- EBS Parcel
- Roads
- - - Streams (dashed where intermittent)
- Topographic Contours 25-foot Interval
- Buildings
- Surface Water Feature (may be ephemeral)



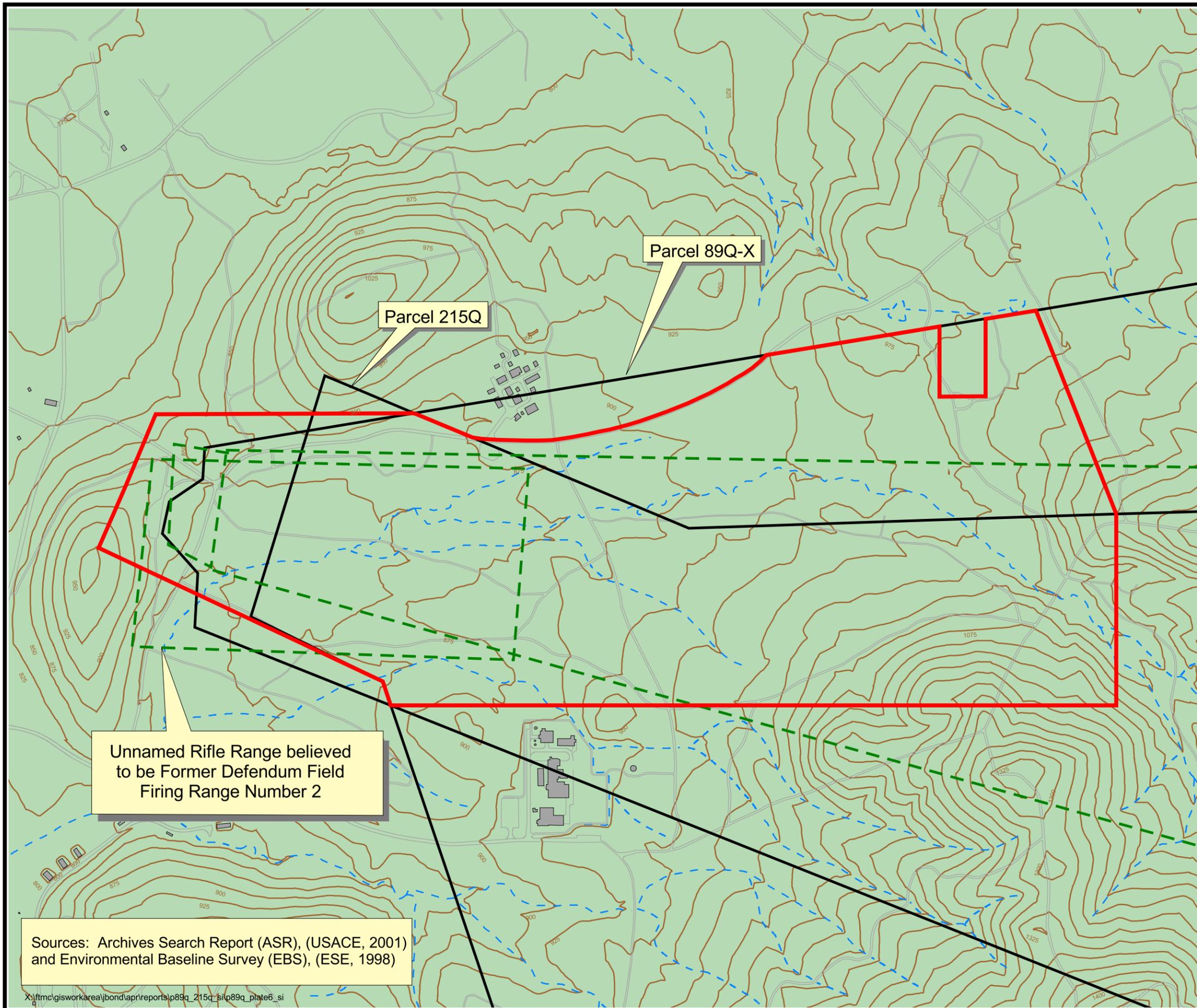
U.S. Army Corps
of Engineers
Mobile District

Contract No. DACA21-96-D-0018

Figure 1-5

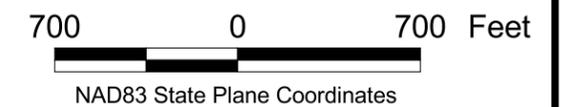
Range Location Map, ASR Plate 6

Parcels 89Q-X and 215Q
Fort McClellan, Alabama



Legend

- Area of Investigation
- ASR Range
- EBS Parcel
- Roads
- Streams (dashed where intermittent)
- Topographic Contours 25-foot Interval
- Buildings
- Surface Water Feature (may be ephemeral)



U.S. Army Corps
of Engineers
Mobile District

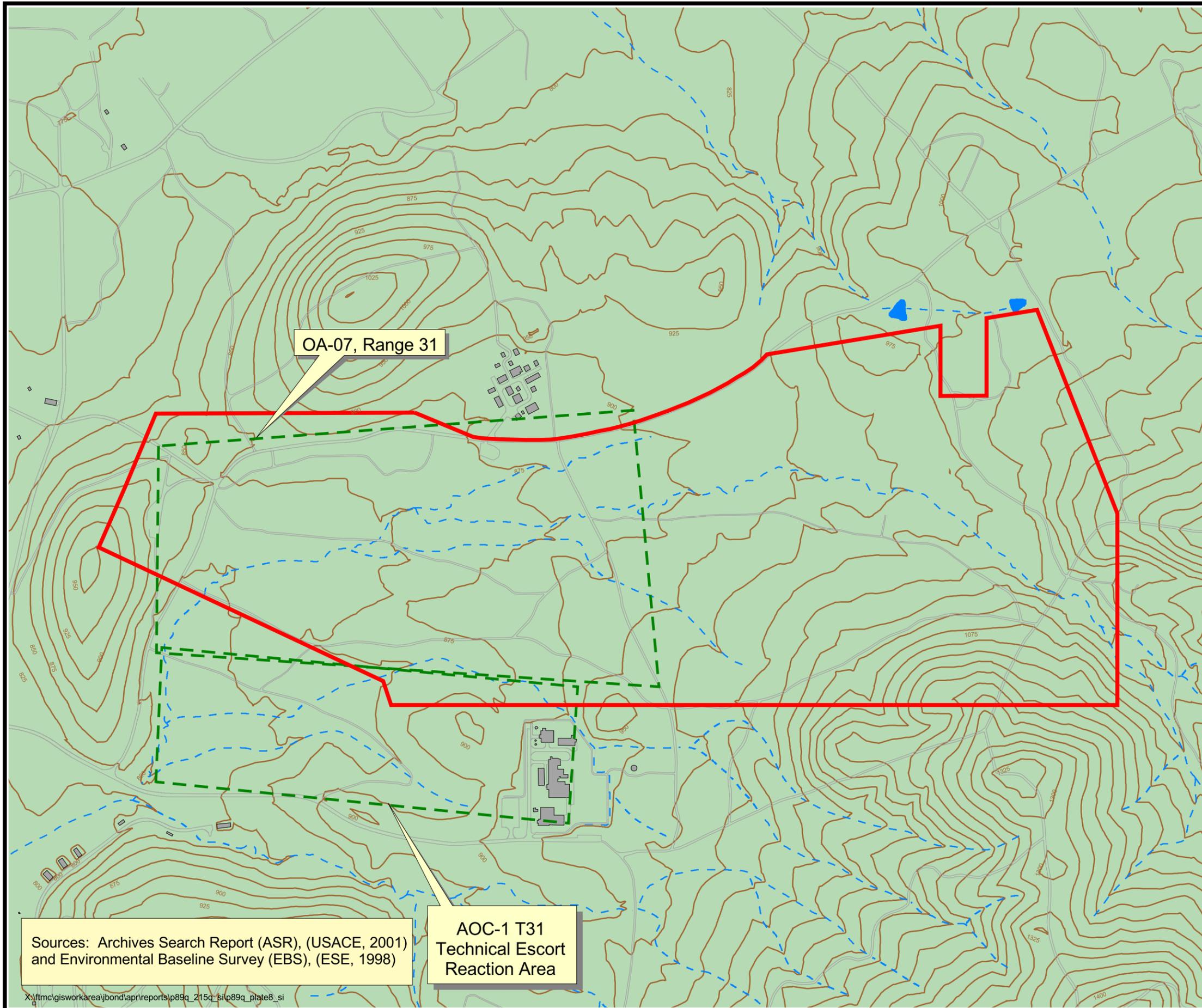
Sources: Archives Search Report (ASR), (USACE, 2001)
and Environmental Baseline Survey (EBS), (ESE, 1998)

Contract No. DACA21-96-D-0018

Figure 1-6

Range Location Map, ASR Plate 8

Parcels 89Q-X and 215Q
Fort McClellan, Alabama



Legend

- Area of Investigation
- ASR Range
- Roads
- Streams (dashed where intermittent)
- Topographic Contours 25-foot Interval
- Buildings
- Surface Water Feature (may be ephemeral)

700 0 700 Feet



NAD83 State Plane Coordinates



U.S. Army Corps
of Engineers
Mobile District



Sources: Archives Search Report (ASR), (USACE, 2001)
and Environmental Baseline Survey (EBS), (ESE, 1998)

AOC-1 T31
Technical Escort
Reaction Area

1 **Plate 4 (Inter-War Use).** Plate 4 identifies two ranges located north of Range 31 and Former
2 Defendum Field Firing Range No. 2: World War I Machine Gun Range (OA-05) and Tank
3 Combat Range (OA-11) (USACE, 2001a). These range boundaries overlap the area of this
4 investigation.

5
6 **Plate 5 (World War II to 1950).** A small arms/rifle and pistol range is identifiable in the
7 approximate location of the area of investigation (Figure 1-4). The range is referred to as “Rifle
8 Range” (OA-07) on Plate 5, and is named Range 31 in the ASR. The ASR indicates that Range
9 31 was first used during World War II, although its initial purpose was unknown. However, the
10 EBS states that Range 31 was established in 1951.

11
12 **Plate 6 (1950-1973).** Two ranges are shown in the area of investigation (Figure 1-5). One
13 range is labeled OA-07, Range 31; the other is listed as an Unnamed Rifle Range. Range 31 has
14 a different shape on Plate 6 than that presented on Plate 5. Range 31 is now shown as an impact
15 area with a range fan extending an estimated 11,000 feet to the east.

16
17 The Unnamed Rifle Range has a similar shape as Range 31 as shown on Plate 5. This range is
18 believed to be Former Defendum Field Firing Range No. 2.

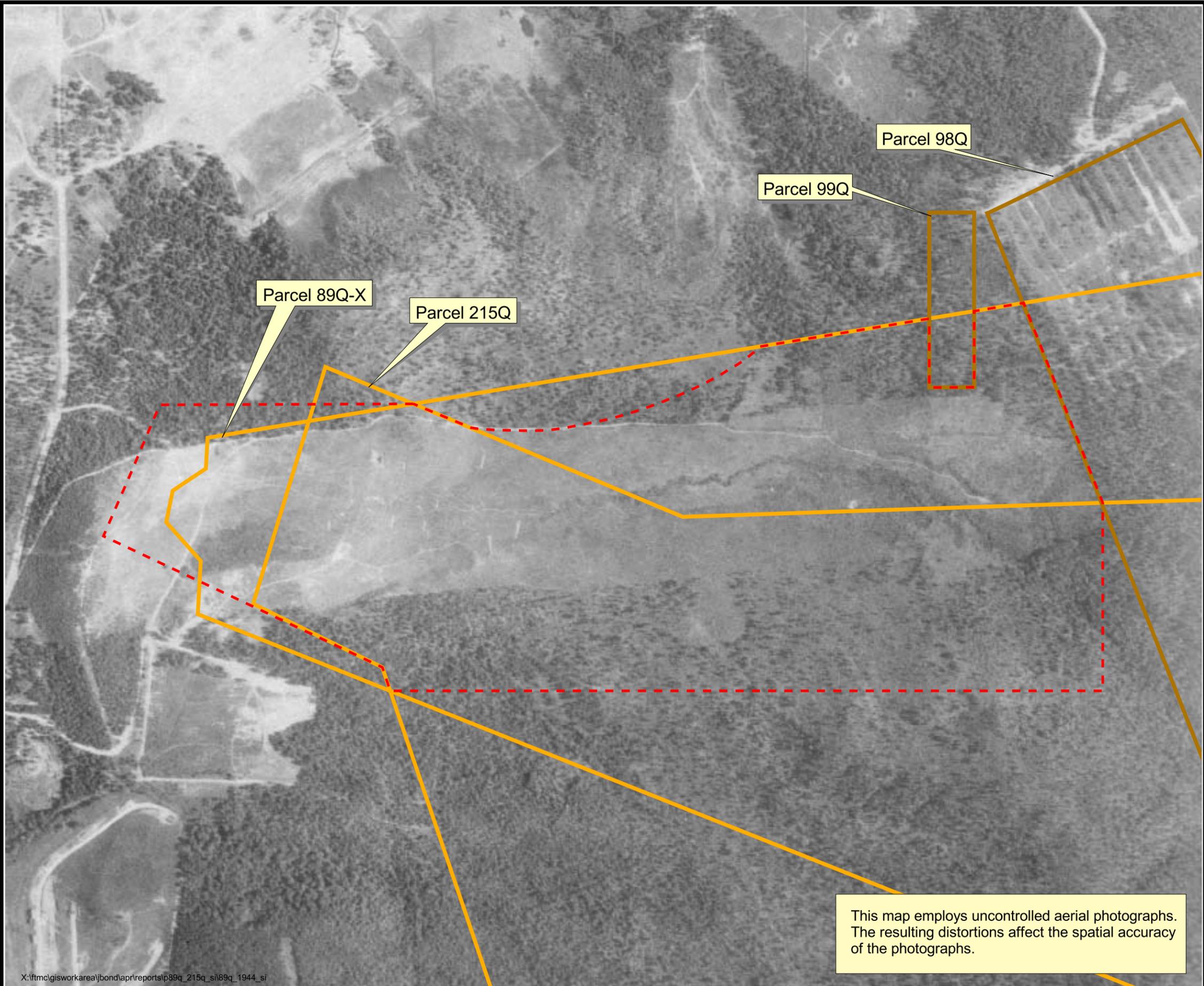
19
20 **Plate 7 (1973 to 1996).** Range 31 remains the same shape and size as previously illustrated
21 on Plate 6 with an added fan for the rifle and/or pistol range (believed to be Former Defendum
22 Field Firing Range No. 2). Additionally, a bivouac area labeled OA-63 is identified in the
23 northwest corner of the study area. Although no discussion of OA-63 is presented in the ASR,
24 other bivouac areas are described as containing training debris in the form of expended rifle
25 blanks and pyrotechnic devices such as smoke grenades. The only other range fan shown on
26 Plate 7 that intersects the area of investigation is Bandholtz Rifle Range.

27
28 **Plate 8 (Chemical School Ranges and Training Areas).** Technical Escort Reaction
29 Training Area T-31 (AOC-1) is a chemical training area that appears adjacent to Range 31 (OA-
30 07) on ASR Plate 8 (Figure 1-6).

31 32 **1.3.2 Aerial Photographs**

33 Available aerial photographs were reviewed for land-use activity in the area of investigation, as
34 discussed in the following paragraphs.

1 **1937 and 1940.** The study area is completely wooded; the only notable features are
2 unimproved roads.
3
4 **1944.** The 1944 aerial photograph (Figure 1-7) shows that OA-07, Range 31 has been cleared.
5 Features observed include unimproved roads and numerous target areas.
6
7 **1954.** The eastern portion of the parcel has been largely reclaimed by vegetation.
8
9 **1969.** The 1969 aerial photograph (Figure 1-8) reveals frequent activity at Range 31 and more
10 distinct target areas. Tree growth has become denser to the east and the area appears largely
11 unused. Clearing has occurred in the northeastern corner of the area of investigation at the
12 Former Rifle/Machine Gun Range, Parcel 99Q.
13
14 **1982.** The 1982 aerial photograph (Figure 1-9) shows a decline in activity at Range 31 and an
15 increase in vegetative growth. However, additional clearing has occurred at Parcel 99Q.
16
17 **1994 and 1998.** Activity at the ranges has ceased; much of the area of investigation has been
18 reclaimed by vegetation.



X:\ftmcl\gisworkarea\jbond\aprt\reports\p89q_215q_sl\89q_1944_si

Figure 1-7

1944 Aerial Photograph

Parcels 89Q-X and 215Q
Fort McClellan, Alabama

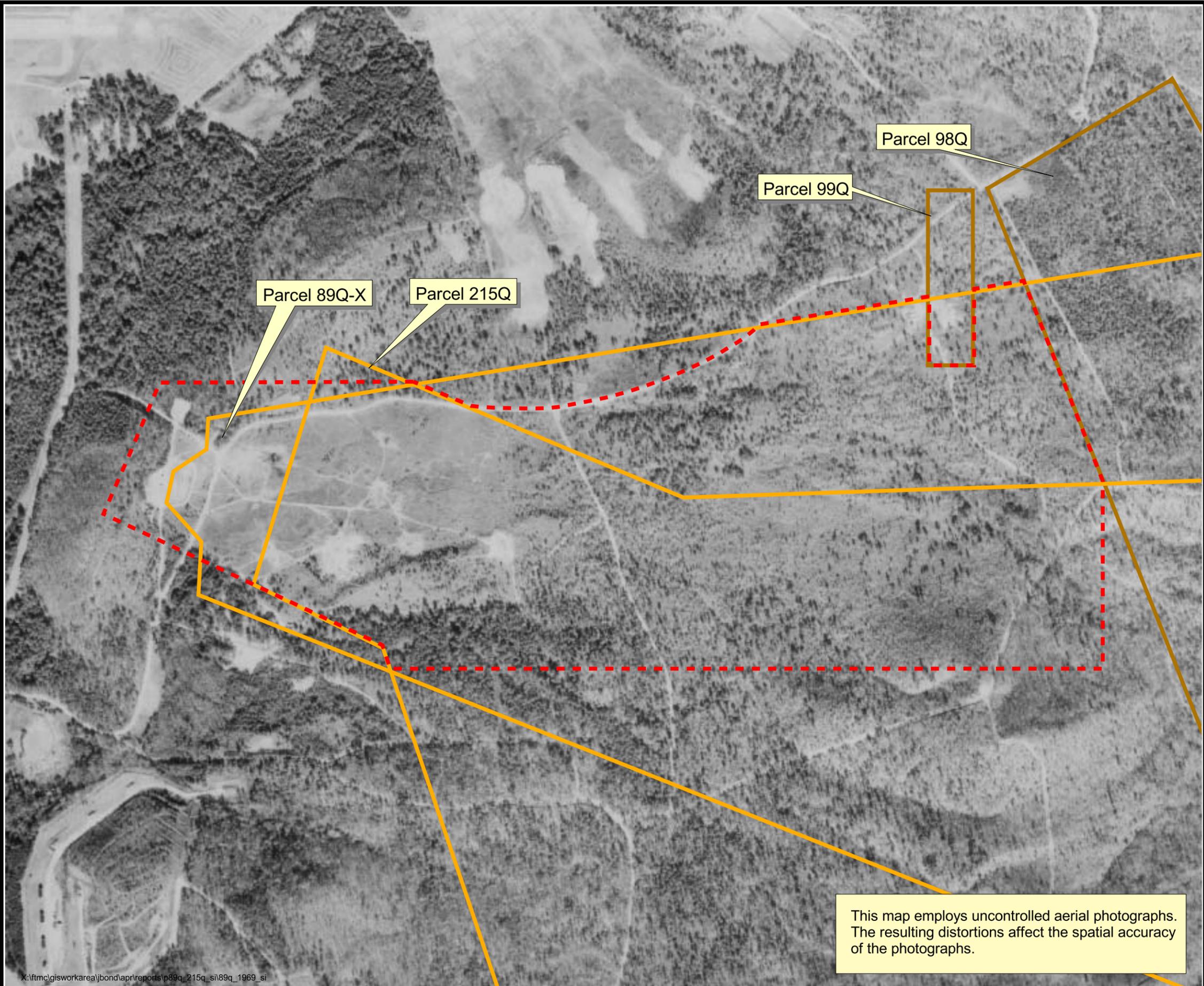
Legend

- - - Area of Investigation
- Parcel Boundary/
Range Safety Fan
- Parcel Boundary/
Range Safety Fan



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X:\ftmc\gisworkarea\jbond\apri\reports\p89q_215q_sl\89q_1969_si

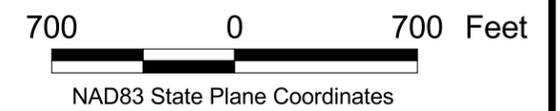
Figure 1-8

1969 Aerial Photograph

Parcels 89Q-X and 215Q
Fort McClellan, Alabama

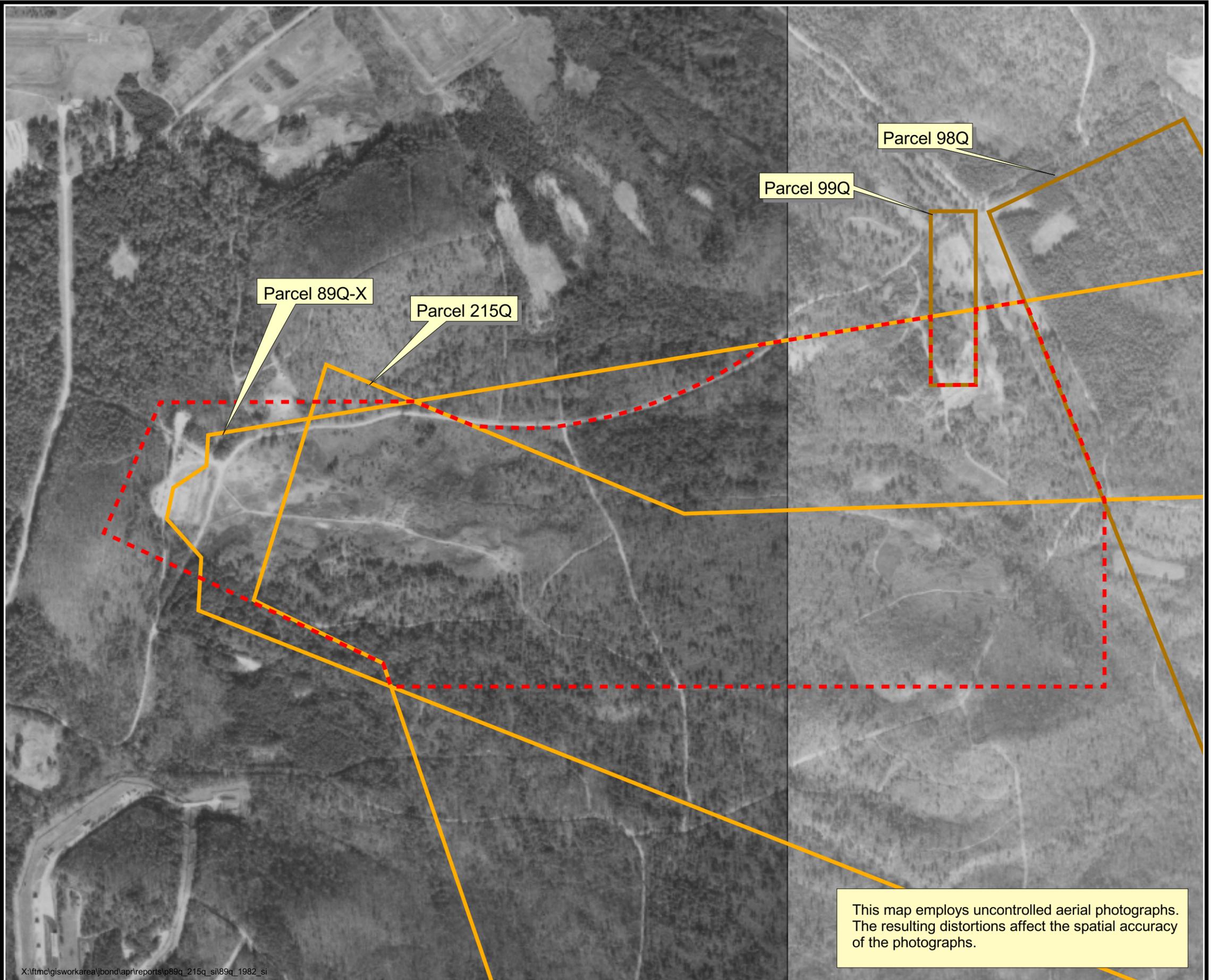
Legend

- - - Area of Investigation
- Parcel Boundary/
Range Safety Fan
- Parcel Boundary/
Range Safety Fan



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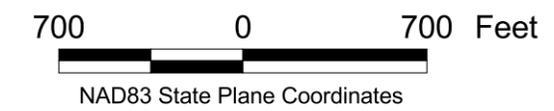
Figure 1-9

1982 Aerial Photograph

Parcels 89Q-X and 215Q
Fort McClellan, Alabama

Legend

-  Area of Investigation
-  Parcel Boundary/
Range Safety Fan
-  Parcel Boundary/
Range Safety Fan



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Contract No. DACA21-96-D-0018

2.0 Previous Investigations

An EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). The purpose of the study was to identify sites that, based on available information, have no history of contamination and comply with DOD 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 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 have occurred, but required actions have not yet been implemented.
7. Areas that are not evaluated or require additional evaluation.

For non-CERCLA environmental or safety issues, the parcel label includes the following components: a unique non-CERCLA issue number; the letter "Q" designating the parcel as a Community Environmental Response Facilitation Act (CERFA) Category 1 Qualified parcel; and the code of the specific non-CERCLA issue(s) present (ESE, 1998). The non-CERCLA issue codes used are:

- A = Asbestos (in buildings)
- L = Lead-based paint (in buildings)
- P = Polychlorinated biphenyls
- R = Radon (in buildings)
- RD = Radionuclides/radiological issues

- X = UXO
- CWM = Chemical warfare material.

The EBS was conducted in accordance with CERFA protocols (Public Law 102-426) and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, the Alabama Department of Environmental Management (ADEM), the U.S. Environmental Protection Agency (EPA) Region 4, and Calhoun County, as well as a database search of CERCLA-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 of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

Parcels 89Q-X and 215Q are areas where no known or recorded storage, release, or disposal (including migration) of hazardous substances or petroleum products has occurred on site property. The parcels, however, were qualified because chemicals of potential concern and/or UXO may be present as a result of historical range activities. Therefore, these parcels required additional evaluation to determine their environmental condition.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted at Range 31: Weapons Demonstration Range, Parcel 89Q-X and Former Defendum Field Firing Range No. 2, Parcel 215Q, including UXO avoidance activities, environmental sampling and analysis, and groundwater monitoring well installation activities.

3.1 UXO Avoidance

UXO avoidance was performed at Parcels 89Q-X and 215Q following methodology outlined in the SAP. Shaw UXO personnel used a low-sensitivity magnetometer to perform a surface sweep of the area of investigation prior to site access. After the site was cleared for access, sample locations were monitored by UXO personnel following procedures outlined in the SAP.

3.2 Environmental Sampling

Environmental sampling performed during the SI at Parcels 89Q-X and 215Q included the collection of surface and depositional soil samples, subsurface soil samples, and groundwater samples for chemical analysis. Sample locations were determined by observing site physical characteristics during a site walk and by reviewing historical documents and aerial photographs pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analysis of site-related parameters listed in Section 3.4.

3.2.1 Surface and Depositional Soil Sampling

Surface soil samples were collected from 42 locations and depositional soil samples were collected from 5 locations at Parcels 89Q-X and 215Q, as shown on Figure 3-1. Soil sampling locations and rationale are presented in Table 3-1. Sample designations and analytical parameters are listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, and site topography.

Sample Collection. Surface soil samples were collected from the uppermost foot of soil using a stainless-steel hand auger, following the methodology specified in the SAP. Depositional soil samples were collected from the upper six inches of soil with a stainless-steel hand auger. Surface and depositional soil samples were collected by first removing surface debris (e.g., rocks and vegetation) from the immediate sample area. In addition, any visible bullet fragments were

Table 3-1

**Sampling Locations and Rationale
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 3)

Sample Location	Sample Media	Sample Location Rationale
HR-89Q-GP01	Surface soil and subsurface soil	Surface and subsurface soil samples were collected just west of the area of investigation, in an area of activity observed on aerial photographs, to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP02	Surface soil and subsurface soil	Surface and subsurface soil samples were collected downslope of depressions and above hillside terraces located near the southwest portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP03	Surface soil and subsurface soil	Surface and subsurface soil samples were collected immediately downslope and adjacent to the small posts at the west end of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP04	Surface soil and subsurface soil	Surface and subsurface soil samples were collected downslope of several depressions in the western portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP05	Surface soil and subsurface soil	Surface and subsurface soil samples were collected near a mound located in the western portion of the area of investigation to determine if potential site-specific chemicals have impacted site media to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP06	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in an area with pieces of 40 mm practice rounds scattered on the ground to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP07	Surface soil and subsurface soil	Surface and subsurface soil samples were collected from a berm located in the southwestern portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP08	Surface soil and subsurface soil	Surface and subsurface soil samples were collected within an area of pop-up target pits and a trench located in the south-central portion of the range to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP09	Surface soil and subsurface soil	Surface and subsurface soil samples were collected within an area of jeeps used as targets in the central portion of the range to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP10	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the central portion of the area of investigation, near three tanks used as targets, to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP11	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in a trench located south of the MOUT site to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP12	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in a trench in the west-central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP13	Surface soil and subsurface soil	Surface and subsurface soil samples were collected immediately adjacent to the largest of several depressions located in the west-central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP14	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the north-central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP15	Surface soil and subsurface soil	Surface and subsurface soil samples were collected near a 55-gallon drum in the north-central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP16	Surface soil and subsurface soil	Surface and subsurface soil samples were collected adjacent to a pit in the northeastern portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.

Table 3-1

**Sampling Locations and Rationale
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 3)

Sample Location	Sample Media	Sample Location Rationale
HR-89Q-GP17	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the vicinity of a 55-gallon drum in the eastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP18	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the south-central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP19	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southeastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP20	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the eastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP21	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southeastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP22	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the northeastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP23	Surface soil and subsurface soil	Surface and subsurface soil samples were collected within a trench in the eastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP24	Surface soil and subsurface soil	Surface and subsurface soil samples were collected from a berm in the south-central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP25	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the north-central (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP26	Surface soil and subsurface soil	Surface and subsurface soil samples were collected near an excavation area in the eastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP27	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the central portion area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP28	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the south-central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP29	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southeastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP30	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the eastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP31	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the eastern (downrange) portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP32	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at the far west end of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP33	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at the west end of the area of investigation in the lower of two hillside terraces to determine if potential site-specific chemicals have impacted site media.

Table 3-1

**Sampling Locations and Rationale
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama**

(Page 3 of 3)

Sample Location	Sample Media	Sample Location Rationale
HR-89Q-GP34	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in depressions located in the western portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP35	Surface soil and subsurface soil	Surface and subsurface soil samples were collected between a depression and a mound in the western portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP36	Surface soil and subsurface soil	Surface and subsurface soil samples were collected from one of three berms located in the western portion of the site to determine if potential site-specific chemicals have impacted site media.
HR-89Q-GP37	Surface soil and subsurface soil	Surface and subsurface soil samples were collected on a mound in the west-central portion of the area of investigation, southwest of the MOUT site, to determine if potential site-specific chemicals have impacted site media.
HR-89Q-MW01	Surface soil and subsurface soil	Surface and subsurface soil samples were collected downslope from a series of depressions located in the western portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-MW02	Surface soil subsurface soil and groundwater	Surface soil, subsurface soil, and groundwater samples were collected just east of armored personnel carriers, in an area with pieces of light anti-tank weapons, to determine if potential site-specific chemicals have impacted site media.
HR-89Q-MW03	Surface soil subsurface soil and groundwater	Surface soil, subsurface soil, and groundwater samples were collected adjacent to armored personnel carriers in the west-central portion of the range, in an area with lead shrapnel, to determine if potential site-specific chemicals have impacted site media.
HR-89Q-MW04	Surface soil subsurface soil and groundwater	Surface soil, subsurface soil, and groundwater samples were collected in the west-central portion of the site, adjacent to jeeps used as targets, to determine if potential site-specific chemicals have impacted site media.
HR-89Q-MW05	Surface soil subsurface soil and groundwater	Surface soil, subsurface soil, and groundwater samples were collected in the central portion of the area of investigation, in an area with lead shrapnel, to determine if potential site-specific chemicals have impacted site media.
HR-89Q-DEP01	Depositional Soil	A depositional soil sample was collected adjacent to a 55-gallon drum located approximately 20 feet east of a building formerly used for controlling targets to determine if potential site-specific chemicals have impacted site media.
HR-89Q-DEP02	Depositional Soil	A depositional soil sample was collected from a dry streambed in the western portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-DEP03	Depositional Soil	A depositional soil sample was collected from a dry streambed in the west-central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-DEP04	Depositional Soil	A depositional soil sample was collected from a dry streambed in the west-central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-89Q-DEP05	Depositional soil	A depositional soil sample was collected from a dry streambed in the eastern portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.

Table 3-2

Soil Sample Designations and Analytical Parameters
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Alabama

(Page 1 of 3)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-89Q-GP01	HR-89Q-GP01-SS-QU0001-REG HR-89Q-GP01-DS-QU0002-REG	0-1 2-4		HR-89Q-GP01-SS-QU0001-MS/MSD	Metals, Explosives, and Perchlorate
HR-89Q-GP02	HR-89Q-GP02-SS-QU0003-REG HR-89Q-GP02-DS-QU0005-REG	0-1 2-4	HR-89Q-GP02-SS-QU0004-FD		Metals, Explosives, and Perchlorate
HR-89Q-GP03	HR-89Q-GP03-SS-QU0006-REG HR-89Q-GP03-DS-QU0007-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP04	HR-89Q-GP04-SS-QU0008-REG HR-89Q-GP04-DS-QU0009-REG	0-1 2-4			Metals, VOCs, SVOCs, Pesticides, Herbicides, Explosives, and Perchlorate
HR-89Q-GP05	HR-89Q-GP05-SS-QU0010-REG HR-89Q-GP05-DS-QU0011-REG	0-1 2-4		HR-89Q-GP05-SS-QU0010-MS/MSD	Metals, Explosives, and Perchlorate
HR-89Q-GP06	HR-89Q-GP06-SS-QU0012-REG HR-89Q-GP06-DS-QU0014-REG	0-1 2-4	HR-89Q-GP06-SS-QU0013-FD		Metals, Explosives, and Perchlorate
HR-89Q-GP07	HR-89Q-GP07-SS-QU0015-REG HR-89Q-GP07-DS-QU0016-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP08	HR-89Q-GP08-SS-QU0017-REG HR-89Q-GP08-DS-QU0018-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP09	HR-89Q-GP09-SS-QU0019-REG HR-89Q-GP09-DS-QU0021-REG	0-1 2-4	HR-89Q-GP09-SS-QU0020-FD		Metals, VOCs, SVOCs, Pesticides, Herbicides, Explosives, and Perchlorate
HR-89Q-GP10	HR-89Q-GP10-SS-QU0022-REG HR-89Q-GP10-DS-QU0023-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP11	HR-89Q-GP11-SS-QU0024-REG HR-89Q-GP11-DS-QU0025-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP12	HR-89Q-GP12-SS-QU0026-REG HR-89Q-GP12-DS-QU0028-REG	0-1 2-4	HR-89Q-GP12-SS-QU0027-FD		Metals, Explosives, and Perchlorate
HR-89Q-GP13	HR-89Q-GP13-SS-QU0029-REG HR-89Q-GP13-DS-QU0030-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP14	HR-89Q-GP14-SS-QU0031-REG HR-89Q-GP14-DS-QU0032-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP15	HR-89Q-GP15-SS-QU0033-REG HR-89Q-GP15-DS-QU0034-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP16	HR-89Q-GP16-SS-QU0035-REG HR-89Q-GP16-DS-QU0036-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP17	HR-89Q-GP17-SS-QU0037-REG HR-89Q-GP17-DS-QU0038-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP18	HR-89Q-GP18-SS-QU0039-REG HR-89Q-GP18-DS-QU0041-REG	0-1 2-4	HR-89Q-GP18-SS-QU0040-FD		Metals, Explosives, and Perchlorate

Table 3-2

Soil Sample Designations and Analytical Parameters
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Alabama

(Page 2 of 3)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-89Q-GP19	HR-89Q-GP19-SS-QU0042-REG HR-89Q-GP19-DS-QU0043-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP20	HR-89Q-GP20-SS-QU0044-REG HR-89Q-GP20-DS-QU0045-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP21	HR-89Q-GP21-SS-QU0046-REG HR-89Q-GP21-DS-QU0047-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP22	HR-89Q-GP22-SS-QU0048-REG HR-89Q-GP22-DS-QU0049-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP23	HR-89Q-GP23-SS-QU0050-REG HR-89Q-GP23-DS-QU0051-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP24	HR-89Q-GP24-SS-QU0052-REG HR-89Q-GP24-DS-QU0053-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP25	HR-89Q-GP25-SS-QU0054-REG HR-89Q-GP25-DS-QU0055-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP26	HR-89Q-GP26-SS-QU0056-REG HR-89Q-GP26-DS-QU0057-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP27	HR-89Q-GP27-SS-QU0058-REG HR-89Q-GP27-DS-QU0059-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP28	HR-89Q-GP28-SS-QU0060-REG HR-89Q-GP28-DS-QU0061-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP29	HR-89Q-GP29-SS-QU0062-REG HR-89Q-GP29-DS-QU0063-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP30	HR-89Q-GP30-SS-QU0064-REG HR-89Q-GP30-DS-QU0065-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP31	HR-89Q-GP31-SS-QU0066-REG HR-89Q-GP31-DS-QU0067-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP32	HR-89Q-GP32-SS-QU0068-REG HR-89Q-GP32-DS-QU0069-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP33	HR-89Q-GP33-SS-QU0070-REG HR-89Q-GP33-DS-QU0071-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP34	HR-89Q-GP34-SS-QU0072-REG HR-89Q-GP34-DS-QU0073-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-GP35	HR-89Q-GP35-SS-QU0074-REG HR-89Q-GP35-DS-QU0075-REG	0-1 2-4	HR-89Q-GP35-DS-QU0076-FD	HR-89Q-GP35-SS-QU0074-MS/MSD	Metals, VOCs, SVOCs, Pesticides, Herbicides, Explosives, and Perchlorate
HR-89Q-GP36	HR-89Q-GP36-SS-QU0077-REG HR-89Q-GP36-DS-QU0078-REG	0-1 2-4			Metals, Explosives, and Perchlorate

Table 3-2

Soil Sample Designations and Analytical Parameters
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Alabama

(Page 3 of 3)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-89Q-GP37	HR-89Q-GP37-SS-QU0079-REG HR-89Q-GP37-DS-QU0080-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-MW01	HR-89Q-MW01-SS-QU0081-REG HR-89Q-MW01-DS-QU0083-REG	0-1 2-4	HR-89Q-MW01-SS-QU0082-FD		Metals, Explosives, and Perchlorate
HR-89Q-MW02	HR-89Q-MW02-SS-QU0084-REG HR-89Q-MW02-DS-QU0085-REG	0-1 2-4		HR-89Q-MW02-SS-QU0084-MS/MSD	Metals, Explosives, and Perchlorate
HR-89Q-MW03	HR-89Q-MW03-SS-QU0086-REG HR-89Q-MW03-DS-QU0087-REG	0-1 2-4			Metals, VOCs, SVOCs, Pesticides, Herbicides, Explosives, and Perchlorate
HR-89Q-MW04	HR-89Q-MW04-SS-QU0088-REG HR-89Q-MW04-DS-QU0089-REG	0-1 2-4			Metals, Explosives, and Perchlorate
HR-89Q-MW05	HR-89Q-MW05-SS-QU0090-REG HR-89Q-MW05-DS-QU0092-REG	0-1 2-4	HR-89Q-MW05-SS-QU0091-FD		Metals, Explosives, and Perchlorate
HR-89Q-DEP01	HR-89Q-DEP01-DEP-QU0093-REG	0-0.5			Metals, Explosives, and Perchlorate
HR-89Q-DEP02	HR-89Q-DEP02-DEP-QU0094-REG	0-0.5	HR-89Q-DEP02-DEP-QU0095-FD		Metals, Explosives, and Perchlorate
HR-89Q-DEP03	HR-89Q-DEP03-DEP-QU0096-REG	0-0.5			Metals, VOCs, SVOCs, Pesticides, Herbicides, Explosives, and Perchlorate
HR-89Q-DEP04	HR-89Q-DEP04-DEP-QU0097-REG	0-0.5			Metals, VOCs, SVOCs, Pesticides, Herbicides, Explosives, and Perchlorate
HR-89Q-DEP05	HR-89Q-DEP05-DEP-QU0098-REG	0-0.5			Metals, Explosives, and Perchlorate

FD - Field duplicate.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

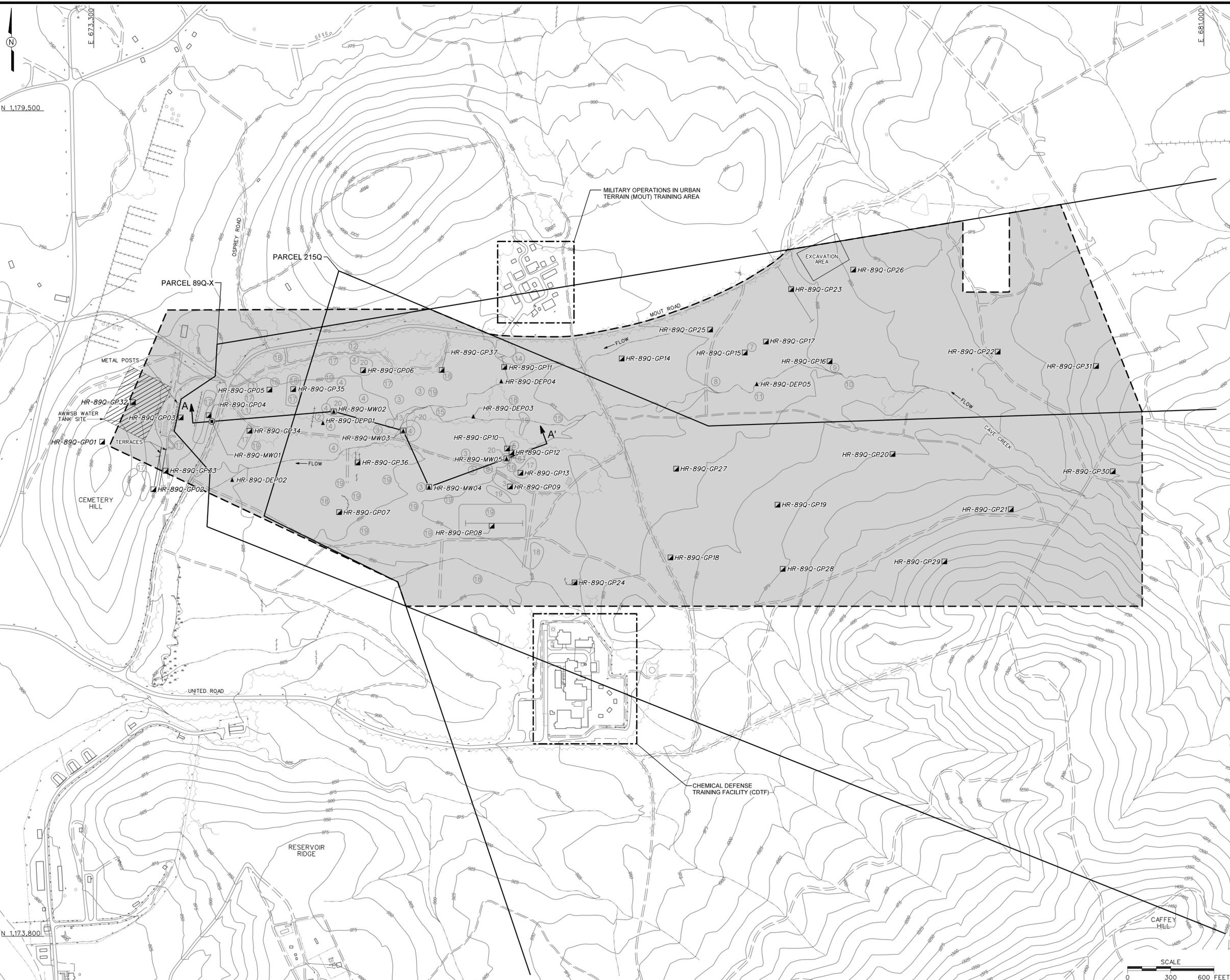
REG - Field sample.

SVOC - Semivolatile organic compound.

VOC - Volatile organic compound.

DWG. NO.: 796887es.825
 PROJ. NO.: 796887
 INITIATOR: T. WINTON
 PROJ. MGR.: J. YACOUB
 DRAFT. CHK. BY: S. MORAN
 ENGR. CHK. BY: S. MORAN
 DATE LAST REV.:
 DRAWN BY: D. BOMAR
 STARTING DATE: 06/08/04
 DATE: 8/30/2004

8/30/2004
 9:54:24 AM
 c:\ecad\design\796887es.825
 dbomar



- LEGEND:**
- UNIMPROVED ROAD
 - PAVED ROAD AND PARKING
 - BUILDING
 - TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL - 25 FOOT)
 - TREES / TREELINE
 - PARCEL BOUNDARY
 - AREA OF INVESTIGATION
 - AWWSB WATER TANK SITE
 - SURFACE DRAINAGE / CREEK
 - MANMADE SURFACE DRAINAGE FEATURE
 - TRENCH
 - BERM
 - FENCE
 - RAILROAD
 - UTILITY POLE
 - MONITORING WELL / SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
 - SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
 - GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
 - DEPOSITIONAL SOIL SAMPLE LOCATION
 - CROSS SECTION LOCATION

- APPROXIMATE LOCATION OF OBSERVED FEATURES**
- 1 UTILITY JUNCTION BOX
 - 2 CINDER BLOCK BUILDING USED TO ASSIST MOVING TARGET. A 55-GALLON DRUM IS LOCATED SOUTHEAST OF THE BUILDING
 - 3 JEEP(S)
 - 4 ARMORED PERSONNEL CARRIER(S)
 - 5 TANK(S)
 - 6 TARGET DEPRESSION WITH FUEL TANK
 - 7 55-GALLON DRUM
 - 8 METAL CONTAINERS AND AMMO CANS
 - 9 PIT WITH STONE AROUND TOP, BRICK FOUNDATION
 - 10 STONE WALLS AND WWI ERA METAL SHRAPNEL
 - 11 35-GALLON DRUM
 - 12 CINDER BLOCK BUILDING
 - 13 RUBBLE
 - 14 DUMP TRUCK BED, TWO 5-GALLON DRUMS
 - 15 DRUM(S)
 - 16 AIR CANNISTER
 - 17 DEPRESSION(S)
 - 18 MOUND(S)
 - 19 POP-UP TARGET(S)
 - 20 AMMUNITION FRAGMENTS

FIGURE 3-1
SAMPLE LOCATION MAP
RANGE 31 WEAPONS DEMONSTRATION
RANGE, PARCEL 89Q-X
FORMER DEFENDUM FIELD FIRING
RANGE NO. 2, PARCEL 215Q

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

1 removed prior to sample collection. The soil sample was then collected with the sampling device
2 and was screened with a photoionization detector (PID) in accordance with procedures outlined
3 in the SAP. As necessary, the soil fraction for volatile organic compound (VOC) analysis was
4 collected directly from the sample device using three EnCore[®] samplers. The remaining soil was
5 then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate
6 sample containers. Sample collection logs are included in Appendix A. The samples were
7 analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

8 9 **3.2.2 Subsurface Soil Sampling**

10 Subsurface soil samples were collected from 42 soil borings at Parcels 89Q-X and 215Q, as
11 shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table
12 3-1. Sample designations, depths, and analytical parameters are listed in Table 3-2. Soil boring
13 locations were determined in the field by the on-site geologist based on UXO avoidance
14 activities, sampling rationale, presence of surface structures, and site topography.

15
16 **Sample Collection.** Subsurface soil samples were collected from soil borings at depths
17 greater than one foot below ground surface (bgs) in the unsaturated zone. The soil borings were
18 advanced and soil samples collected using a stainless-steel hand auger, following procedures
19 specified in the SAP. Sample collection logs are included in Appendix A. The samples were
20 analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

21
22 Subsurface soil samples were collected continuously to 4 feet bgs or until hand-auger refusal was
23 encountered. Samples were field screened using a PID to measure volatile organic vapors. The
24 sample displaying the highest reading was selected and sent to the laboratory for analysis;
25 however, at those locations where PID readings were below background, the deepest sample
26 interval was submitted for analysis. As necessary, the soil fraction for VOC analysis was
27 collected directly from the sample device using three EnCore samplers. The remaining soil was
28 then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate
29 sample containers. The on-site geologist constructed a detailed boring log for each soil boring.
30 The boring logs are included in Appendix B.

31 32 **3.2.3 Monitoring Well Installation**

33 Five permanent monitoring wells were installed within the area of investigation at Parcels 89Q-X
34 and 215Q to collect groundwater samples for laboratory analysis. The well locations are shown

1 on Figure 3-1. Table 3-3 summarizes construction details of the monitoring wells installed at the
2 site. The well construction logs are included in Appendix B.

3
4 Shaw contracted Miller Drilling Company to install the permanent wells using a hollow-stem
5 auger rig at five of the hand-auger soil boring locations (HR-89Q-MW01 through HR-89Q-
6 MW05). The wells were installed following procedures outlined in the SAP. The borehole at
7 each well location was advanced with a 4¼-inch inside diameter (ID) hollow-stem auger from
8 ground surface to the first groundwater-bearing zone in residuum at the well location. Beginning
9 at the completion depth of the hand-auger boring, a 2-foot-long, 2-inch ID carbon steel split-
10 spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing
11 lithology. The samples were logged to determine lithologic changes and the approximate depth
12 of groundwater encountered during drilling. This information was used to determine the optimal
13 placement of the monitoring well screen interval and to provide site-specific geological and
14 hydrogeological information. Soil characteristics were described using the “Burmeister
15 Identification System” described in Hunt (1986) and the Unified Soil Classification System as
16 outlined in American Society for Testing and Materials (ASTM) Method D 2488 (ASTM, 2000).
17 The boring logs are included in Appendix B.

18
19 Upon reaching the target depth in each borehole, a 10- to 30-foot length of 2-inch ID, 0.010-inch
20 continuous slot, Schedule 40 polyvinyl chloride (PVC) screen with a PVC end cap was placed
21 through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch
22 ID, flush-threaded Schedule 40 PVC riser. A filter pack consisting of Number 1 filter sand
23 (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to
24 approximately 5 feet above the top of the well screen as the augers were removed. At two well
25 locations (HR-89Q-MW03 and HR-89Q-MW05), the filter pack also included a 5-foot layer of
26 extra fine filter sand (sieve size 30 to 70). A bentonite seal, consisting of approximately 5 feet of
27 bentonite pellets, was placed immediately on top of the filter pack and hydrated with potable
28 water. The bentonite seal placement and hydration followed procedures in the SAP. Bentonite-
29 cement grout was tremied into the remaining annular space of the well from the top of the
30 bentonite seal to ground surface. A well cap was placed on the PVC well riser. A locking
31 protective steel casing was placed over the PVC well riser and a concrete pad was constructed
32 around the wellhead. Four protective steel posts were installed around the well pad.

33
34 The monitoring wells that produced water were developed by surging and pumping with a
35 submersible pump in accordance with methodology outlined in the SAP. The submersible pump

Table 3-3

**Monitoring Well Construction Summary
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama**

Well Location	Northing	Easting	Ground Elevation (ft amsl)	TOC Elevation (ft amsl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
HR-89Q-MW01	1177349.21	674124.59	851.09	853.09	43.5	10	33.2 - 43.2	2" ID Sch. 40 PVC
HR-89Q-MW02	1177418.13	674970.17	846.91	848.96	40	15	24.7 - 39.7	2" ID Sch. 40 PVC
HR-89Q-MW03	1177285.49	675452.58	853.32	855.41	60	20	39.7 - 59.7	2" ID Sch. 40 PVC
HR-89Q-MW04	1176896.96	675631.10	858.70	861.04	60	20	39.7 - 59.7	2" ID Sch. 40 PVC
HR-89Q-MW05	1177092.97	676168.55	874.98	877.14	80	30	49.7 - 79.7	2" ID Sch. 40 PVC

Permanent wells installed using hollow-stem auger.

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

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

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

amsl - Above mean sea level.

bgs - Below ground surface.

ft - Feet

1 used for well development was moved in an up-and-down fashion to encourage any residual well
2 installation materials to enter the well. These materials were then pumped out of the well to re-
3 establish the natural hydraulic flow conditions. Development continued for 8 hours, until the
4 water turbidity was less than 20 nephelometric turbidity units, or until the well had been pumped
5 dry and allowed to recharge three successive times. The well development logs are included in
6 Appendix C.

7 8 **3.2.4 Water Level Measurements**

9 The depth to groundwater was measured in the permanent wells at the site on July 26, 2002,
10 following procedures outlined in the SAP. Depth to groundwater was measured with an
11 electronic water-level meter. The meter probe and cable were cleaned before use at each well
12 following decontamination methodology presented in the SAP. Measurements were referenced
13 to the top of the PVC well casing, as summarized in Table 3-4.

14 15 **3.2.5 Groundwater Sampling**

16 Groundwater samples were collected from four of the five monitoring wells installed at Parcels
17 89Q-X and 215Q. Monitoring well HR-89Q-MW01 was not sampled because the well did not
18 produce water. The well/groundwater sample locations are shown on Figure 3-1. The
19 groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample
20 designations and analytical parameters are listed in Table 3-5.

21
22 **Sample Collection.** The groundwater samples were collected using either a peristaltic pump
23 or a bladder pump equipped with Teflon™ tubing, following the procedures outlined in the SAP.
24 Only one groundwater sample (from well HR-89Q-MW03) was analyzed for VOCs. This
25 sample was collected using a bladder pump according to the procedures described in the SAP.
26 Groundwater was sampled after purging a minimum of three well volumes and after field
27 parameters (temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction
28 potential, and turbidity) stabilized. Field parameters were measured using a calibrated water-
29 quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are
30 included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using
31 methods outlined in Section 3.4.

32 33 **3.3 Surveying of Sample Locations**

34 Sample locations were surveyed using global positioning system and conventional civil survey
35 techniques described in the SAP. Horizontal coordinates were referenced to the U.S. State Plane

Table 3-4

**Groundwater Elevations
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama**

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft amsl)	Ground Elevation (ft amsl)	Groundwater Elevation (ft amsl)
HR-89Q-MW01	26-Jul-02	NA	853.09	851.09	NA
HR-89Q-MW02	26-Jul-02	16.14	848.96	846.91	832.82
HR-89Q-MW03	26-Jul-02	26.11	855.41	853.32	829.30
HR-89Q-MW04	26-Jul-02	40.67	861.04	858.70	820.37
HR-89Q-MW05	26-Jul-02	47.32	877.14	874.98	829.82

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

amsl - Above mean sea level

BTOC - Below top of casing

ft - Feet

NA - Not available; well was dry.

Table 3-5

**Groundwater Sample Designations and Analytical Parameters
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	QA/QC Samples		Analytical Parameters
		Field Duplicates	MS/MSD	
HR-89Q-MW02	HR-89Q-MW02-GW-QU3002-REG	HR-89Q-MW02-GW-QU3003-FD		Metals, Explosives, and Perchlorate
HR-89Q-MW03	HR-89Q-MW03-GW-QU3004-REG		HR-89Q-MW03-GW-QU3004-MS/MSD	Metals, VOCs, SVOCs, Pesticides, Herbicides, Explosives, and Perchlorate
HR-89Q-MW04	HR-89Q-MW04-GW-QU3005-REG			Metals, Explosives, and Perchlorate
HR-89Q-MW05	HR-89Q-MW05-GW-QU3006-REG			Metals, Explosives, and Perchlorate

FD - Field duplicate.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample.

SVOC - Semivolatile organic compound.

VOC - Volatile organic compound.

Table 3-6

Groundwater Field Parameters
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Date	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
HR-89Q-MW02	17-Jul-03	0.035	7.43	200	21.7	2.8	5.73
HR-89Q-MW03	15-Jul-03	0.026	4.05	210	31.7	0.9	5.56
HR-89Q-MW04	16-Jul-03	0.108	8.56	142	23.7	50	6.60
HR-89Q-MW05	23-Jul-03	0.054	5.80	174	30.3	90	5.66

°C - Degrees Celsius.

mg/L - Milligrams per liter.

mS/cm - Millisiemen per centimeter.

mV - Millivolt.

NTU - Nephelometric turbidity unit.

ORP - Oxidation-reduction potential.

SU - Standard unit.

1 Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations were
2 referenced to the North American Vertical Datum of 1988. Horizontal coordinates and
3 elevations are included in Appendix D.

4 5 **3.4 Analytical Program**

6 Samples collected during the SI were analyzed for various chemical parameters based on
7 potential site-specific chemicals and on EPA, ADEM, FTMC, and USACE requirements.
8 Samples collected at Parcels 89Q-X and 215Q were analyzed for the following parameters using
9 EPA SW-846 methods, including Update III methods where applicable:

- 10
- 11 • Target analyte list metals – EPA Methods 6010B/7470A/7471A
- 12 • Nitroaromatic/nitramine explosives – EPA Method 8330
- 13 • Perchlorate – EPA Method 314.
- 14

15 A minimum of ten percent of the samples were analyzed for the following additional parameters:

- 16
- 17 • Target compound list (TCL) VOCs – EPA Method 8260B
- 18 • TCL semivolatile organic compounds (SVOC) – EPA Method 8270C
- 19 • Chlorinated herbicides – EPA Method 8151A
- 20 • Chlorinated pesticides – EPA Method 8081A
- 21 • Organophosphorous pesticides – EPA Method 8141A.
- 22

23 Samples for full-suite analysis were generally placed in areas with the most observed site features
24 (i.e., those areas most likely to be contaminated).

25 26 **3.5 Sample Preservation, Packaging, and Shipping**

27 Sample preservation, packaging, and shipping followed requirements specified in the SAP.
28 Sample containers, sample volumes, preservatives, and holding times for the analyses required in
29 this SI are listed in the SAP. Sample documentation and chain-of-custody records were
30 completed as specified in the SAP.

31
32 Completed analysis request and chain-of-custody records (Appendix A) were included with each
33 shipment of sample coolers to EMAX Laboratories, Inc. in Torrance, California.

34 35 **3.6 Investigation-Derived Waste Management and Disposal**

36 Investigation-derived waste (IDW) was managed and disposed as outlined in the SAP. The IDW
37 generated during the SI at Parcels 89Q-X and 215Q was segregated as follows:

- Drill cuttings
- Purge water from well development, sampling activities, and decontamination fluids
- Spent well materials and personal protective equipment.

Solid IDW was stored in lined roll-off bins inside the fenced area surrounding Buildings 335 and 336 prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analysis. Based on the results, drill cuttings, spent well materials, and personal protective equipment generated during the SI were disposed as nonhazardous waste at the Three Corners Landfill located in Piedmont, Alabama.

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

3.7 Variances/Nonconformances

Four variances to the SFSP were recorded during completion of the SI at Parcels 89Q-X and 215Q. The variances did not alter the intent of the investigation or the sampling rationale presented in the SFSP. The variances are summarized in Table 3-7 and the variance reports are included in Appendix E.

No nonconformances to the SFSP were recorded during completion of the SI at Parcels 89Q-X and 215Q.

Proposed SI field activities for Parcels 89Q-X and 215Q were discussed by the BCT at the February 2002 project meeting. During that meeting, the BCT concurred with the approach regarding monitoring well and sampling locations and analytical parameters. Shaw issued the final work plan in April 2002 and began fieldwork in June 2002. Shaw subsequently received comments on the work plan from EPA (dated September 26, 2002) and from ADEM (dated May 29, 2003) after the fieldwork was complete. Responses to these comments are provided in a table in Appendix E.

Table 3-7

**Variations to the Site-Specific Field Sampling Plan
Range 31: Weapons Demonstration Range, Parcel 89Q-X, and
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama**

Variance to the SFSP	Justification for Variance	Impact to Site Investigation
A groundwater sample was not collected from monitoring well HR-89Q-MW01.	During hollow-stem auger drilling, competent bedrock was encountered prior to reaching groundwater. Several attempts were made to drill deeper but were unsuccessful. Therefore, a decision was made to install the well on top of bedrock. However, the well was dry during subsequent sampling attempts.	None. Data from the other four groundwater samples collected at the site provided sufficient characterization information.
Surface water and sediment samples were not collected at proposed locations HR-89Q-SW/SD01, HR-89Q-SW/SD02, HR-89Q-SW/SD03, and HR-89Q-SW/SD04. Instead, depositional soil samples were collected at these locations.	Surface water and sediment samples were not collected because surface water was not present in the intermittent streams at the time of sample collection.	None. Data from the depositional soil samples were used to characterize the site.
Sample location HR-89Q-GP15 was moved approximately 200 feet east of the location proposed in the SFSP.	This sample location was proposed adjacent to and downslope of an empty 55-gallon drum. However, the drum was actually located approximately 200 feet east of the location shown on figures in the SFSP.	None. Relocating the sample ensured that the sampling objective in the SFSP was met.
Sample location HR-89Q-GP12 was moved approximately 300 feet southwest of the location proposed in the SFSP.	This sample location was proposed within a trench located adjacent to an intermittent stream. However, the trench was actually located approximately 300 feet southwest of the location shown on figures in the SFSP.	None. Relocating the sample ensured that the sampling objective in the SFSP was met.

SFSP - Site-specific field sampling plan.

1 **3.8 Data Quality**

2 The field sample analytical data are presented in tabular form in Appendix F. The field samples
3 were collected, documented, handled, analyzed, and reported in a manner consistent with the SI
4 work plan, the FTMC SAP and quality assurance plan, and standard, accepted methods and
5 procedures. Data were reported and evaluated in accordance with Corps of Engineers South
6 Atlantic Savannah Level B criteria (USACE, 2001b) and the stipulated requirements for the
7 generation of definitive data presented in the SAP. Chemical data were reported by the
8 laboratory via hard-copy data packages using Contract Laboratory Program-like forms.
9

10 **Data Validation.** The reported analytical data were validated in accordance with EPA National
11 Functional Guidelines by Level III criteria. The data validation results are summarized in a
12 quality assurance report, which includes the data validation summary report (Appendix G).
13 Selected results were qualified based on the implementation of accepted data validation
14 procedures and practices. These qualified parameters are highlighted in the report. The
15 validation-assigned qualifiers were added to the FTMC ShawView™ database for tracking and
16 reporting. The qualified data were used in comparisons to the SSSLs and ESVs. Rejected data
17 (assigned an "R" qualifier) were not used in the comparisons to the SSSLs and ESVs. The data
18 presented in this report, except where qualified, meet the principle data quality objective for this
19 SI.

1 **4.0 Site Characterization**

2
3 Subsurface investigations performed at Range 31: Weapons Demonstration Range, Parcel 89Q-X
4 and Former Defendum Field Firing Range No. 2, Parcel 215Q, provided soil, geologic, and
5 groundwater data used to characterize the geology and hydrogeology of the site.
6

7 **4.1 Regional and Site Geology**

8 9 **4.1.1 Regional Geology**

10 Calhoun County includes parts of two physiographic provinces: the Piedmont Upland Province
11 and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme
12 eastern and southeastern portions of the county and is characterized by metamorphosed
13 sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to
14 Devonian.
15

16 The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian
17 fold-and-thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust
18 faults with associated minor folding are the predominant structural features. The fold-and-thrust
19 belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-
20 faulted, with major structures and faults striking in a northeast-southwest direction.
21

22 Northwestward transport of the Paleozoic rock sequence along the thrust faults has resulted in the
23 imbricate stacking of large slabs of rock referred to as thrust sheets. Within an individual thrust
24 sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock
25 units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this
26 region generally strike parallel to the faults, and repetition of lithologic units is common in
27 vertical sequences. Geologic formations within the Valley and Ridge Province portion of
28 Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984),
29 and Moser and DeJarnette (1992) and vary in age from Lower Cambrian to Pennsylvanian.
30

31 The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee
32 Group. The Chilhowee Group consists of the Cochran, Nichols, Wilson Ridge, and Weisner
33 Formations (Osborne and Szabo, 1984), but in Calhoun County it is either undifferentiated or
34 divided into the Cochran and Nichols Formations and an upper, undifferentiated Wilson Ridge
35 and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and

1 conglomerate with interbeds of greenish gray siltstone and mudstone. Massive to laminated
2 greenish gray and black mudstone makes up the Nichols Formation, with thin interbeds of
3 siltstone and very fine-grained sandstone (Osborne et al., 1988). These two formations are
4 mapped only in the eastern part of the county.

5
6 The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist
7 of both coarse-grained and fine-grained clastics. The coarse-grained facies appears to dominate
8 the unit and consists primarily of coarse-grained, vitreous quartzite and friable, fine- to coarse-
9 grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained
10 facies consists of sandy and micaceous shale and silty, micaceous mudstone, which are locally
11 interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and
12 quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to
13 the Weisner Formation (Osborne and Szabo, 1984).

14
15 The Cambrian Shady Dolomite overlies the Weisner Formation northeast, east, and southwest of
16 the Main Post and consists of interlayered bluish gray or pale yellowish gray sandy dolomitic
17 limestone and siliceous dolomite with coarsely crystalline, porous chert (Osborne et al., 1989). A
18 variegated shale and clayey silt have been included within the lower part of the Shady Dolomite
19 (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the
20 Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady
21 Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval
22 are still uncertain (Osborne, 1999).

23
24 The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and
25 southeast of the Main Post, as mapped by Warman and Causey (1962) and Osborne and Szabo
26 (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome
27 Formation consists of variegated, thinly interbedded grayish red-purple mudstone, shale,
28 siltstone, and greenish red and light gray sandstone, with locally occurring limestone and
29 dolomite. Weaver Cave, located approximately one mile west of the northwest boundary of the
30 Main Post, is situated in gray dolomite and limestone mapped as the Rome Formation (Osborne
31 et al., 1997). The Conasauga Formation overlies the Rome Formation and occurs along anticlinal
32 axes in the northeastern portion of Pelham Range (Warman and Causey, 1962; Osborne and
33 Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga
34 Formation is composed of dark gray, finely to coarsely crystalline, medium- to thick-bedded
35 dolomite with minor shale and chert (Osborne et al., 1989).

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

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

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites, and limestones and are mapped as one, undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish gray to red silty and sandy limestone.

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

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark to light gray limestone with abundant chert nodules and greenish gray to grayish red phosphatic shale, with increasing amounts of calcareous chert towards the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the

1 northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also
2 of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin
3 intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned
4 the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC,
5 to the Ordovician Athens Shale based on fossil data.

6
7 The Pennsylvanian Parkwood Formation overlies the Floyd Shale and consists of a medium to
8 dark gray, silty clay, shale, and mudstone with interbedded light to medium gray, very fine to fine
9 grained, argillaceous, micaceous sandstone. Locally the Parkwood Formation also contains beds
10 of medium to dark gray, argillaceous, bioclastic to cherty limestone and beds of clayey coal up to
11 a few inches thick (Raymond et al., 1988). The Parkwood Formation in Calhoun County is
12 generally found within a structurally complex area known as the Coosa deformed belt. In the
13 deformed belt, the Parkwood Formation and Floyd Shale are mapped as undifferentiated because
14 their lithologic similarity and significant deformation make it impractical to map the contact
15 (Thomas and Drahovzal, 1974; Osborne et al., 1988). The undifferentiated Parkwood Formation
16 and Floyd Shale are found throughout the western quarter of Pelham Range.

17
18 The Jacksonville thrust fault is the most significant structural geological feature in the vicinity of
19 the Main Post of FTMC, both for its role in determining the stratigraphic relationships in the area
20 and for its contribution to regional water supplies. The trace of the fault extends northeastward
21 for approximately 39 miles between Bynum, Alabama, and Piedmont, Alabama. The fault is
22 interpreted as a major splay of the Pell City fault (Osborne and Szabo, 1984). The Ordovician
23 sequence that makes up the Eden thrust sheet is exposed at FTMC through an eroded window, or
24 fenster, in the overlying thrust sheet. Rocks within the window display complex folding, with
25 the folds being overturned and tight to isoclinal. The carbonates and shales locally exhibit well-
26 developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest
27 by the Rome Formation; north by the Conasauga Formation; northeast, east, and southwest by the
28 Shady Dolomite; and southeast and southwest by the Chilhowee Group (Osborne et al., 1997).
29 Two small klippen of the Shady Dolomite, bounded by the Jacksonville fault, have been
30 recognized adjacent to the Pell City fault at the FTMC window (Osborne et al., 1997).

31
32 The Pell City fault serves as a fault contact between the bedrock within the FTMC window and
33 the Rome and Conasauga Formations. The trace of the Pell City fault is also exposed
34 approximately nine miles west of the FTMC window on Pelham Range, where it traverses

1 northeast to southwest across the western quarter of Pelham Range. Here, the trace of the Pell
2 City fault marks the boundary between the Pell City thrust sheet and the Coosa deformed belt.

3
4 The eastern three-quarters of Pelham Range are located within the Pell City thrust sheet, while
5 the remaining western quarter of Pelham Range is located within the Coosa deformed belt. The
6 Pell City thrust sheet is a large-scale thrust sheet containing Cambrian and Ordovician rocks and
7 is relatively less structurally complex than the Coosa deformed belt (Thomas and Neathery,
8 1982). The Pell City thrust sheet is exposed between the traces of the Jacksonville and Pell City
9 faults along the western boundary of the FTMC window and along the trace of the Pell City fault
10 on Pelham Range (Thomas and Neathery, 1982; Osborne et al., 1988). The Coosa deformed belt
11 is a narrow northeast-to-southwest-trending linear zone of complex structure (approximately 5 to
12 20 miles wide and approximately 90 miles in length) consisting mainly of thin imbricate thrust
13 slices. The structure within these imbricate thrust slices is often internally complicated by small-
14 scale folding and additional thrust faults (Thomas and Drahovzal, 1974).

15 16 **4.1.2 Site Geology**

17 Soils at Parcels 89Q-X and 215Q fall mainly into four mapping units: Anniston and Allen
18 gravelly loams in the extreme northwestern portion of the ranges; Atkins silt loams in the
19 extreme west-central portion of the ranges; Anniston and Allen stony loams in the southeastern
20 portion of the range; and Jefferson gravelly fine sandy loam in the central to northeastern portion
21 of the range (U.S. Department of Agriculture [USDA], 1961).

22
23 The Anniston and Allen Series of soils consists of strongly acidic, deep, well-drained soils that
24 have developed in old local alluvium. The parent material washed from the adjacent higher-lying
25 Linker, Muskingum, Enders, and Montevallo soils, which developed from weathered sandstone,
26 shale, and quartzite. Sandstone and quartzite gravel and cobbles, measuring as much as 8 inches
27 in diameter, are common throughout the soil. For this soil series, the depth to bedrock is
28 typically from 2 feet to greater than 10 feet, with depth to water greater than 20 feet. Some
29 severely eroded areas may be common on the surface for this soil type as well as a few shallow
30 gullies. The typical soil description is 2 to 10 feet of well-drained stony loam to clay loam over
31 stratified local alluvium; limestone or shale bedrock (USDA, 1961).

32
33 Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded consist of friable soils that
34 have developed in old alluvium on foot slopes and along the base of mountains. The color of the
35 surface soil ranges from very dark brown and dark brown to reddish brown and dark reddish

1 brown. The texture of subsoil ranges from light clay loam to clay or silty clay loam. Infiltration
2 and runoff are medium, permeability is moderate, and the capacity for available moisture is high
3 (USDA, 1961).

4
5 Anniston and Allen stony loams, 0 to 10 percent slopes, consist of a very dark brown to dark
6 grayish brown stony loam surface layer 6 to 10 inches thick. Below this is the dark red or dark
7 reddish brown upper subsoil of fine sandy clay loam. These soils have fair to poor tilth, are
8 permeable, have medium infiltration, and a high capacity for available moisture. These soils are
9 not well suited to cultivation due to the stoniness, and therefore most of the acreage is woodland
10 (USDA, 1961).

11
12 The Atkins series of soils consists of poorly drained, strongly acidic soils that are developing in
13 general alluvium. The parent material washed from soils underlain is sandstone and shale.
14 Atkins soils occur mainly in small narrow bands along flood plains. They are flooded part of the
15 time, and they generally vary in texture because they receive new deposits of alluvium. These
16 soils are high in organic matter and low in natural fertility (USDA, 1961).

17
18 Atkins silt loam, 0 to 2 percent slopes, is a poorly drained, friable, low producing soil developing
19 in alluvium on first bottoms. Soils are typically dark grayish brown and distinctly mottled. The
20 thickness of the alluvium ranges from 2 to 6 feet or more. Runoff is very slow, and the soil is
21 flooded after a prolonged rainfall or heavy rains of short duration. Infiltration is medium to slow,
22 permeability is slow, tilth is generally fair to good, and the capacity for available moisture high.
23 Small areas having better drainage and some areas having a fine sandy loam to loam surface soil
24 and fine sandy loam to clay loam subsoil are included with this soil (USDA, 1961).

25
26 The Jefferson series of soils consists of strongly acidic, well-drained soils occurring on fans and
27 on foot slopes in the Choccolocco, Colvin, and Coldwater Mountains. These soils have
28 developed from old local alluvium that washed or sloughed from ridges of sandstone, shale, and
29 Weisner quartzite.

30
31 Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded, is a friable soil developed from
32 old local alluvium on foot slopes and fans along the bases of ridges and mountains. The color of
33 the surface soil ranges from dark grayish brown and very dark grayish brown gray. The color of
34 the subsoil ranges from light olive brown to strong brown and reddish yellow. In some areas, the
35 lower part of the subsoil is mottled brown and red. The thickness of the solum ranges from 15 to

1 46 inches. Except in severely eroded places, the tilth of the soil is good. Runoff and infiltration
2 are medium, permeability is moderate, and the capacity for available moisture is high (USDA,
3 1961).

4
5 Bedrock beneath the majority of the site is mapped as the Cambrian Shady Dolomite (Figure
6 4-1). However, in the extreme western and southeastern areas of the site, the Cambrian
7 Chilhowee Group is mapped. The undifferentiated Chilhowee Group consists of a basal unit of
8 arkosic conglomerate and mudstone overlain by a unit of greenish gray mudstone with minor
9 siltstone and sandstone. The sequences grades upward into a white to moderate reddish orange
10 friable sandstone and conglomerate containing interbedded gray silty mudstone (Raymond et al.,
11 1988). The Chilhowee Group is overlain by the Shady Dolomite. The Shady Dolomite is
12 typically bluish gray thick bedded, medium crystalline limestone and light to dark gray,
13 argillaceous to sandy, massive to laminated dolomite with a local unit of silty clay and clayey
14 siltstone at the base (Raymond et al., 1988).

15
16 A geologic cross section was constructed from the hollow-stem auger boring data, as shown on
17 Figure 4-2. The geologic cross section location is shown on Figure 3-1. The residuum
18 encountered during drilling activities at Parcels 89Q-X and 215Q consisted of light brown to
19 yellowish orange clay, some silt, some sand, and little sandstone gravel and light brown to
20 yellowish orange sandy clay with trace silt and little sandstone gravel. Hollow-stem auger
21 refusal was encountered at only one location, HR-89Q-MW01, at a depth of 45 feet bgs. At a
22 depth of 40 feet bgs, the geologic material was described as white to light gray highly weathered
23 sandy dolomite and fine sand. This description is consistent with that of the Shady Dolomite.

24 25 **4.2 Site Hydrology**

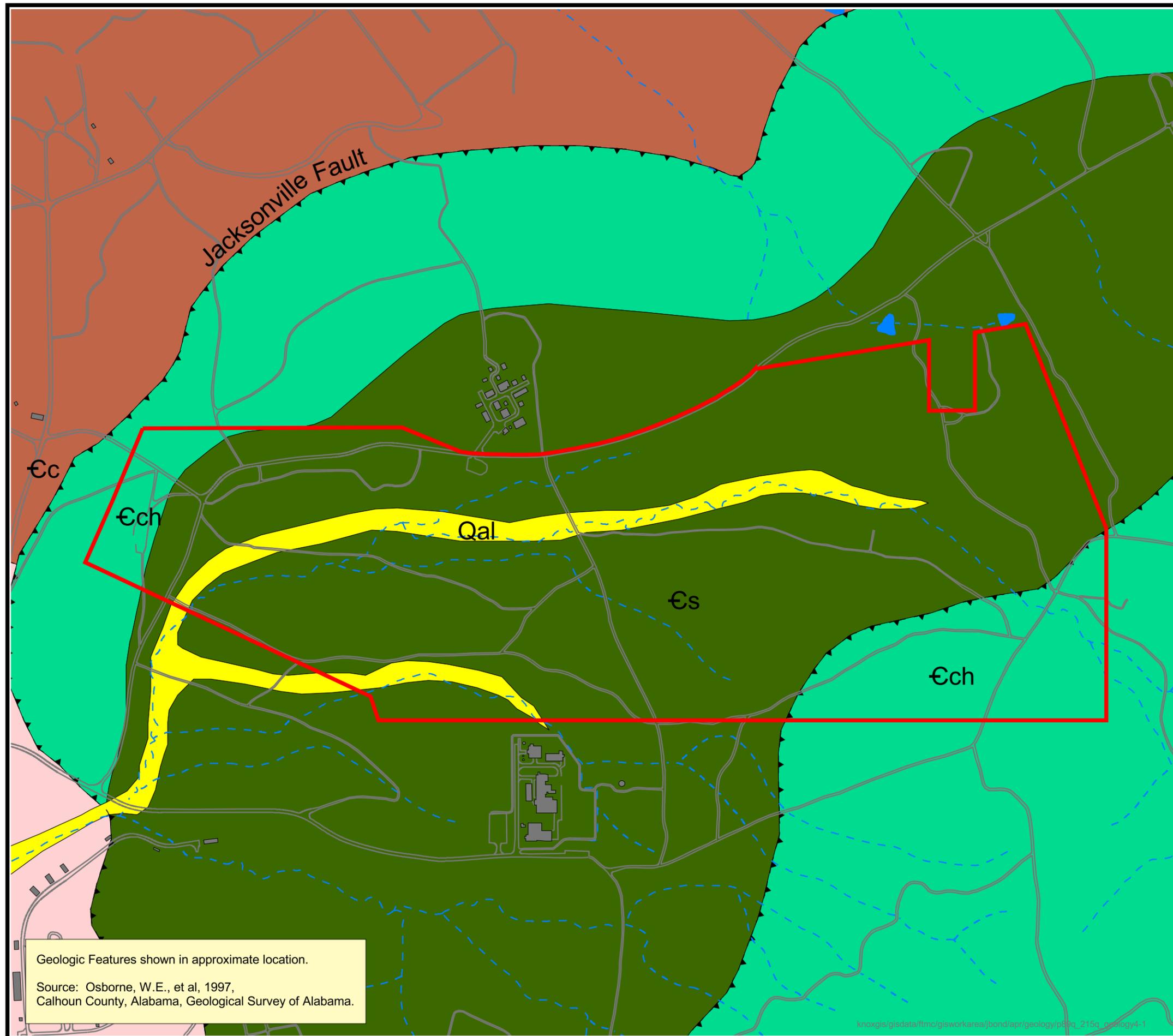
26 27 **4.2.1 Surface Hydrology**

28 Precipitation in the form of rainfall averages about 53 inches annually in Anniston, Alabama,
29 with infiltration rates annually exceeding evapotranspiration rates (U.S. Department of
30 Commerce, 1998). The major surface water features at the Main Post of FTMC include
31 Remount Creek, South Branch of Cane Creek, Ingram Creek, Cane Creek, and Cave Creek.
32 These waterways flow in a general northwest to westerly direction towards the Coosa River on
33 the western boundary of Calhoun County.

Figure 4-1

Site Geologic Map

Parcels 89Q-X and 215Q
Fort McClellan, Alabama



Legend

- Area of Investigation
- Roads
- - - Surface Drainage Feature (dashed where intermittent)
- Surface Water Feature (may be ephemeral)

Geology

- Qal Quaternary - Alluvium
- MOfa Missippian/Ordovician - Floyd & Athens Shale, undifferentiated
- Cc Cambrian - Conasauga Formation
- Cs Cambrian - Shady Dolomite
- Ech Cambrian - Chilhowee Group, undifferentiated
- ▼ Thrust Fault (dashed where inferred; barbs on upper sheet)

700 0 700 Feet



NAD83 State Plane Coordinates



U.S. Army Corps of Engineers
Mobile District

Shaw Shaw Environmental, Inc.

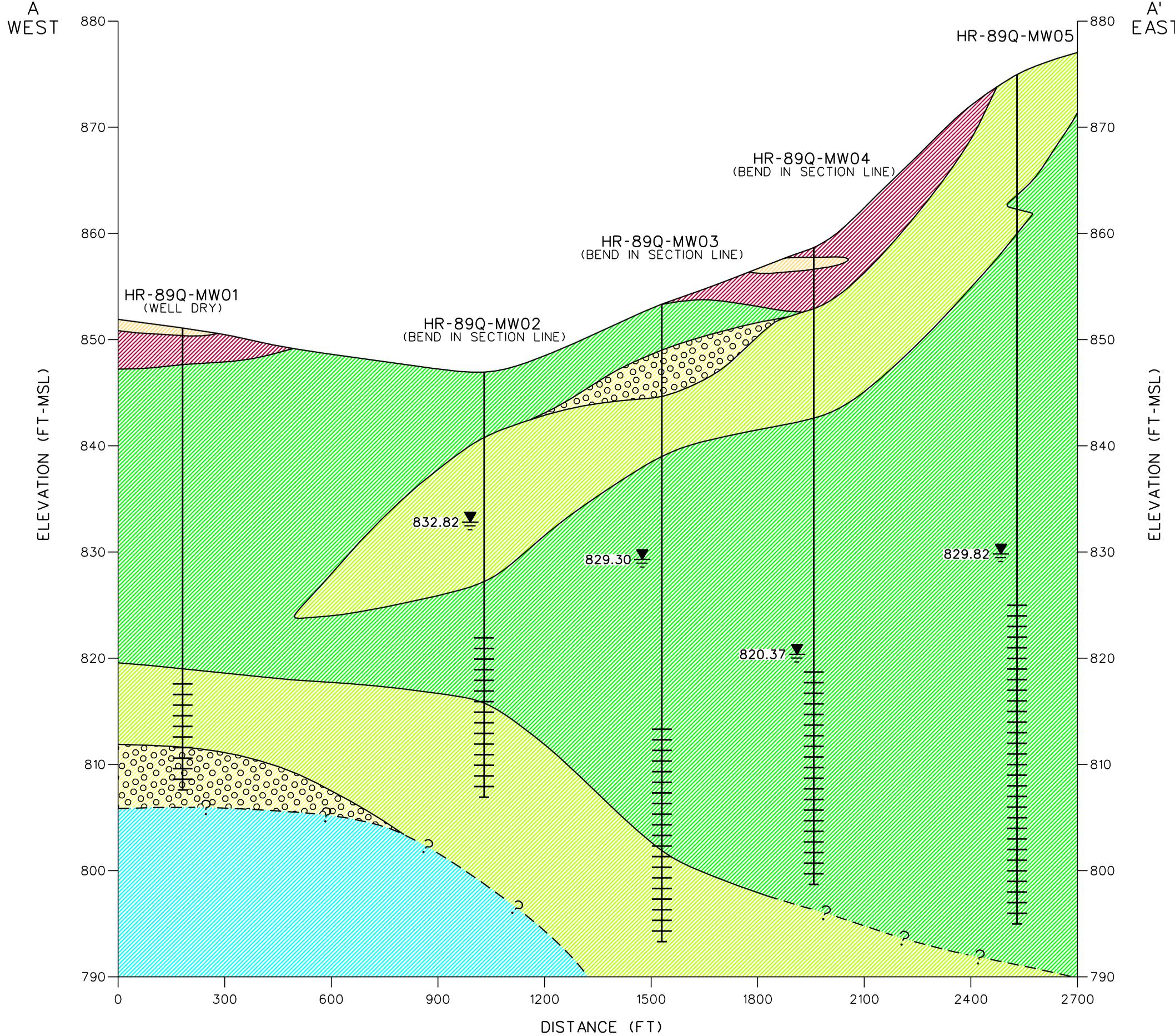
Contract No. DACA21-96-D-0018

Geologic Features shown in approximate location.

Source: Osborne, W.E., et al, 1997,
Calhoun County, Alabama, Geological Survey of Alabama.

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 PROJ. NO.: 796887
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 PROJ. MGR.: J. YACOUB
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LEGEND

- SCREEN INTERVAL
- WATER TABLE (JULY 26, 2002)
- 832.82 GROUNDWATER ELEVATION (FT MSL)
- - ? - - CONTACT DASHED WHERE INFERRED
- SAND AND GRAVEL
- SAND AND SILT
- SILT AND CLAY
- CLAY
- SAND AND CLAY
- SHADY DOLOMITE

- ### NOTES:
- ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
 - SEE FIGURE 3-1 FOR CROSS SECTION LOCATION.

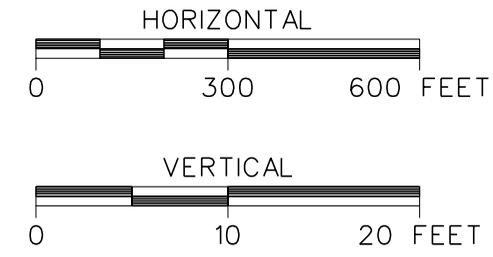


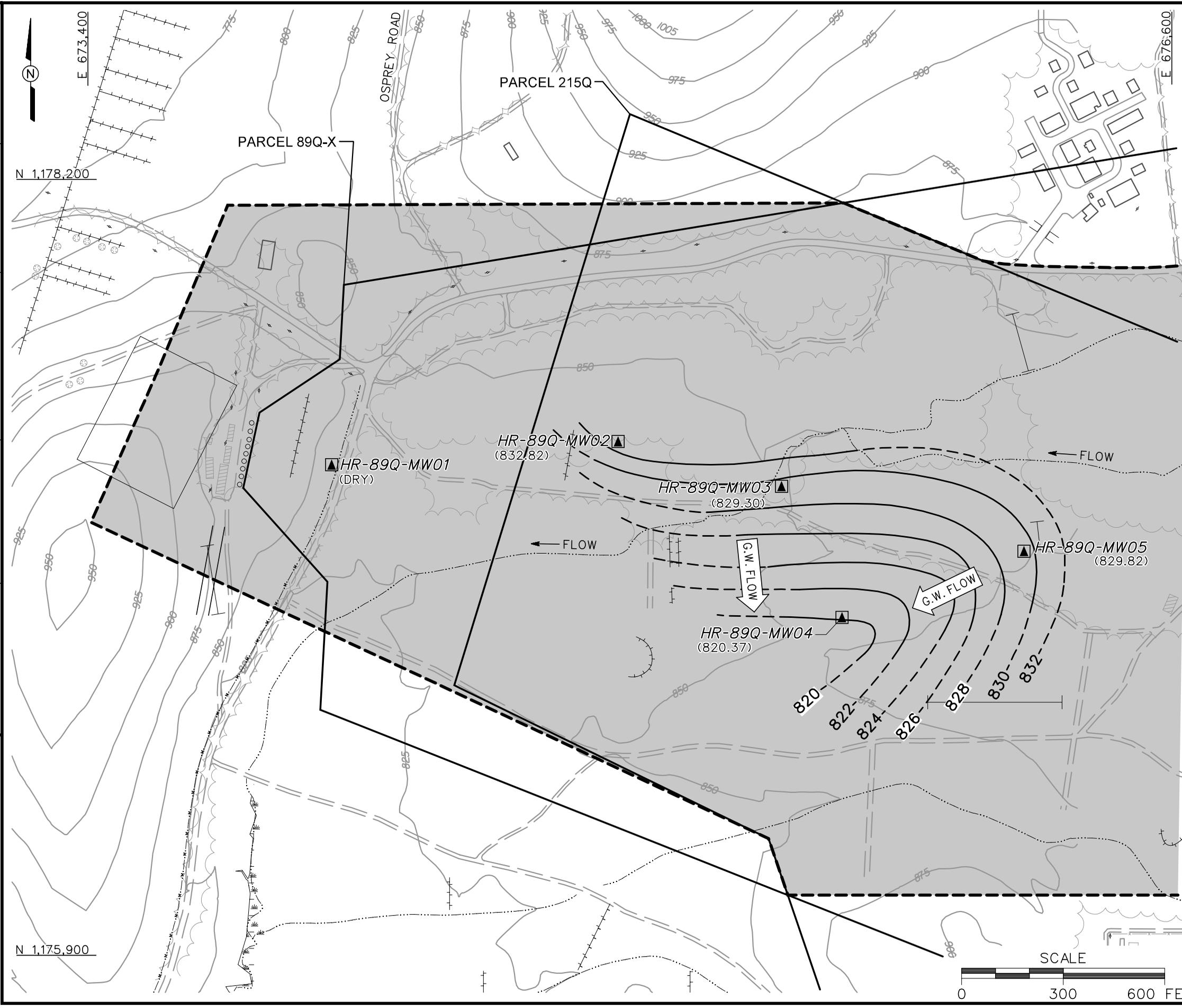
FIGURE 4-2
 GEOLOGIC CROSS SECTION A-A'
 RANGE 31 WEAPONS DEMONSTRATION
 RANGE, PARCEL 89Q-X
 FORMER DEFENDUM FIELD FIRING
 RANGE NO. 2, PARCEL 215Q
 U. S. ARMY CORPS OF ENGINEERS
 MOBILE DISTRICT
 FORT McCLELLAN
 CALHOUN COUNTY, ALABAMA
 Contract No. DACA21-96-D-0018

1 Ground elevation within the area of investigation at Parcels 89Q-X and 215Q ranges from
2 approximately 825 to 1,200 feet above mean sea level. Within the area of investigation, Cave
3 Creek is an intermittent stream that flows east to west across the central portion of the site. Flow
4 frequency, duration, and volume are dependent on the amount of precipitation received in the
5 area. Surface water runoff in the area of Parcels 89Q-X and 215Q drains into Cave Creek and its
6 tributaries, which flow west and southwest from the range.

7 8 **4.2.2 Hydrogeology**

9 Static groundwater levels were measured in monitoring wells at Parcels 89Q-X and 215Q on July
10 26, 2002, as summarized in Table 3-4. Groundwater elevations were calculated by measuring the
11 depth to groundwater relative to the surveyed top-of-casing elevations. A groundwater flow map
12 was constructed using the July 2002 data, as shown on Figure 4-3. Based on these elevations,
13 groundwater flow in the residuum is to the south and southwest.

DWG. NO.: ... 796887es.828
 PROJ. NO.: 796887
 INITIATOR: B. HEDBERG
 PROJ. MGR.: J. YACOUB
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 ENGR. CHK. BY: S. MORAN
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- LEGEND:**
- UNIMPROVED ROAD
 - PAVED ROAD AND PARKING
 - BUILDING
 - TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL - 25 FOOT)
 - GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
 - (832.82) GROUNDWATER ELEVATION (FT AMSL) (JULY 26, 2002)
 - G.W. FLOW GROUNDWATER FLOW DIRECTION
 - TREES / TREELINE
 - PARCEL BOUNDARY
 - AREA OF INVESTIGATION
 - SURFACE DRAINAGE / CREEK
 - MANMADE SURFACE DRAINAGE FEATURE
 - TRENCH
 - BERM
 - FENCE
 - RAILROAD
 - UTILITY POLE
 - MONITORING WELL LOCATION

FIGURE 4-3
 GROUNDWATER ELEVATION MAP
 RANGE 31 WEAPONS DEMONSTRATION
 RANGE, PARCEL 89Q-X
 FORMER DEFENDAUM FIELD FIRING
 RANGE NO. 2, PARCEL 215Q
 U. S. ARMY CORPS OF ENGINEERS
 MOBILE DISTRICT
 FORT McCLELLAN
 CALHOUN COUNTY, ALABAMA
 Contract No. DACA21-96-D-0018

5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at Range 31: Weapons Demonstration Range, Parcel 89Q-X and Former Defendum Field Firing Range No. 2, Parcel 215Q, indicate that metals, VOCs, one SVOC, pesticides, herbicides, explosives, and perchlorate were detected in site media. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed for human health and ecological risk evaluations as part of investigations performed under the BRAC Environmental Restoration Program at FTMC.

Metals concentrations exceeding the SSSLs and ESVs were subsequently compared to metals background screening values to determine if the metals concentrations are within natural background concentrations (SAIC, 1998). Site metals data were also evaluated using statistical and geochemical methods to select site-related metals (Appendix H).

The following sections and Tables 5-1 through 5-3 summarize the results of the comparison of detected constituent concentrations to the SSSLs, ESVs, and background screening values. Complete analytical results are presented in Appendix F.

5.1 Surface and Depositional Soil Analytical Results

Forty-two surface soil samples and five depositional soil samples were collected for chemical analysis at Parcels 89Q-X and 215Q. Surface soil samples were collected from the upper 1-foot of soil and depositional soil samples were collected from the upper 6 inches of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-1.

Metals. A total of 21 metals were detected in the surface and depositional soil samples. The concentrations of six metals (aluminum, antimony, arsenic, iron, manganese, and thallium) exceeded their respective SSSLs in one or more samples. Of these, only aluminum (at HR-89Q-GP06, HR-89Q-GP13, and HR-89Q-GP23) and antimony (HR-89Q-GP31) also exceeded their respective background concentrations. The antimony result was flagged with a “B” data qualifier indicating that the metal was also detected in an associated laboratory or field blank sample. Thus, the antimony detection is likely a laboratory-artifact rather than a site-related metal.

Table 5-1

**Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama**

(Page 1 of 17)

Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-DEP01 QU0093 16-Jul-02 0-0.5					HR-89Q-DEP02 QU0094 16-Jul-02 0-0.5					HR-89Q-DEP03 QU0096 16-Jul-02 0-0.5				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^c	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.02E+04			YES	YES	4.97E+03				YES	6.84E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.17E+00			YES		1.29E+00	B		YES		2.08E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	6.35E+01					3.15E+01					4.79E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	8.07E-01	J	YES			ND					8.19E-01	J	YES		
Calcium	mg/kg	1.72E+03	NA	NA	5.76E+02					1.20E+02	J				1.83E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	9.99E+00				YES	5.79E+00				YES	6.46E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.89E+00					1.66E+00	J				5.42E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.69E+01			YES		YES	1.31E+01		YES		3.34E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	9.61E+03			YES	YES	YES	4.14E+03		YES	YES	8.02E+03		YES	YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.15E+02			YES		YES	3.95E+01				7.13E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	4.46E+02					2.11E+02					2.98E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.33E+02	J			YES	3.12E+01	J				2.99E+02	J			YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	6.23E-02	J				5.57E-02	J				ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.09E+00					1.98E+00	J				3.22E+00				
Potassium	mg/kg	8.00E+02	NA	NA	5.27E+02	B				2.94E+02	B				3.33E+02	B			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					5.63E-01	J	YES			ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND					2.86E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.76E+01				YES	8.19E+00				YES	1.13E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.79E+01	J				9.58E+00	J				1.53E+01	J			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					1.10E-02	J			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					1.50E-01	J			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR					ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR					ND				
SEMIVOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR					ND				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					3.50E-03	J			YES
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					1.50E-03	J			
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					ND				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					ND				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					ND				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					ND				
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				

Table 5-1

**Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama**

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-DEP04 QU0097 16-Jul-02 0-0.5					HR-89Q-DEP05 QU0098 16-Jul-02 0-0.5					HR-89Q-GP01 QU0001 24-Jun-02 0-1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	3.89E+03				YES	5.22E+03				YES	4.34E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND									
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	9.98E-01	B		YES		9.65E-01	B		YES		1.10E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.61E+01					5.69E+01					4.31E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	4.50E-01	J				8.26E-01	J	YES			ND				
Calcium	mg/kg	1.72E+03	NA	NA	2.05E+02					2.36E+02					2.29E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	3.58E+00				YES	5.12E+00				YES	2.47E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.90E+00	J				ND					1.36E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	9.88E+00					2.31E+01		YES			2.40E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.93E+03			YES	YES	1.21E+03				YES	2.29E+03				YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.42E+01					3.91E+01					7.43E+00				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.76E+02					3.15E+02					2.18E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	6.34E+01	J				7.30E+00	J				2.03E+02	J			YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					1.51E-01		YES		YES	3.40E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.45E+00	J				2.67E+00					1.47E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	2.63E+02	B				4.92E+02	B				1.81E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					2.43E+01	J				1.93E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	6.04E+00				YES	5.53E+00				YES	4.31E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	7.54E+00	J				8.30E+00	J				1.22E+01				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	1.40E-02	J				NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	1.20E-01	J				NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	ND					NR					NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					NR					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					NR					NR				
SEMIVOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					NR					NR				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	ND					NR					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	ND					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	2.00E-03	J				NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	9.50E-04	J			YES	NR					NR				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	ND					NR					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	1.10E+00	J			YES	NR					NR				
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				

Table 5-1

**Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defundum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama**

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP02 QU0003 24-Jun-02 0-1					HR-89Q-GP03 QU0006 21-Jun-02 0-1					HR-89Q-GP04 QU0008 25-Jun-02 0-1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^c	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.25E+03				YES	1.24E+04	UJ		YES	YES	1.09E+04			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.22E+00		YES			2.67E+00			YES		2.96E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	1.63E+01					3.73E+01					6.51E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	7.59E+01	J				2.80E+02					4.43E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	4.60E+00				YES	1.02E+01				YES	8.70E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					1.38E+00	J				2.39E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.74E+00					2.99E+01		YES			4.56E+01		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	4.13E+03		YES	YES		8.54E+03			YES	YES	9.88E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	9.21E+00					8.34E+00					6.83E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.34E+02					4.69E+02					3.47E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	3.22E+01	J				3.59E+01	J				2.26E+02	J			YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.74E-02	J				6.52E-02	J				7.73E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.72E+00	J				4.12E+00					4.97E+00				
Potassium	mg/kg	8.00E+02	NA	NA	1.78E+02	J				3.39E+02	J				3.55E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	2.13E+01	J				1.93E+01	J				2.30E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	9.48E+00				YES	1.77E+01				YES	1.69E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	8.64E+00					2.18E+01					3.04E+01				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					2.80E-02	J			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					1.50E+00	J			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR					ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR					7.70E-03				
SEMIVOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR					1.80E-01	J			
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					ND				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					ND				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					ND				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					ND				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					1.50E-02	J			
MCP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					ND				
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					3.90E-01	J				ND				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP05 QU0010 27-Jun-02 0-1					HR-89Q-GP06 QU0012 27-Jun-02 0-1					HR-89Q-GP07 QU0015 27-Jun-02 0-1					
Parameter	Units	BKG ^a	SSSL ^b	ESV ^c	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	
METALS																				
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.04E+04				YES	YES	1.68E+04		YES	YES	YES	7.96E+03			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND						ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.06E+00				YES		5.29E+00			YES		1.17E+00	J		YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	4.88E+01						7.98E+01					3.30E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND						8.98E-01	J	YES			ND				
Calcium	mg/kg	1.72E+03	NA	NA	1.96E+02						2.54E+02					1.04E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	9.35E+00	J				YES	1.06E+01				YES	5.86E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.91E+00	J					7.79E+00					ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.03E+01						7.66E+00					2.15E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	8.01E+03				YES	YES	1.79E+04			YES	YES	5.11E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.92E+01						2.75E+01					5.81E+00				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.16E+02						4.54E+02					3.07E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.63E+02	J			YES		1.49E+03			YES	YES	1.21E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND						4.78E-02	J				ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.08E+00						8.48E+00					2.95E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.80E+02	J					3.38E+02	J				2.65E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	7.81E-01	B	YES				ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND						2.82E+01	J				ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND						ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.47E+01				YES		2.37E+01				YES	1.07E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.72E+01						2.18E+01	J				7.94E+00	J			
VOLATILE ORGANIC COMPOUNDS																				
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR						NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR						NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR						NR					NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR						NR					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR						NR					NR				
SEMIVOLATILE ORGANIC COMPOUNDS																				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR						NR					NR				
PESTICIDES																				
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR						NR					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR						NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR						NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR						NR					NR				
HERBICIDES																				
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR						NR					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR						NR					NR				
EXPLOSIVES																				
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND						ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND						ND					ND				
PERCHLORATE																				
Perchlorate	mg/kg	NA	7.04E+00	NA	ND						ND					ND				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP08 QU0017 27-Jun-02 0-1					HR-89Q-GP09 QU0019 27-Jun-02 0-1					HR-89Q-GP10 QU0022 27-Jun-02 0-1					
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	
METALS																				
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	7.65E+03				YES	8.85E+03				YES	YES	8.26E+03			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND						ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.55E+00		YES			1.73E+00	J		YES			2.64E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.80E+01					2.57E+01						1.20E+02				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND						4.96E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	3.69E+02					6.33E+01	J					2.24E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	5.62E+00				YES	1.14E+01	J			YES		1.06E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.29E+00	J				1.19E+00	J					2.60E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	4.71E+00					2.34E+01		YES				4.10E+01		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	5.65E+03		YES	YES		6.76E+03			YES	YES	YES	6.57E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.53E+01					8.12E+01		YES		YES	YES	1.01E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.00E+02					3.11E+02						3.46E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.07E+02				YES	3.52E+01	J					4.28E+02	J		YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.33E-02	J				3.15E-02	J					ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.34E+00					3.44E+00						4.39E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.22E+02	J				2.42E+02	J					2.77E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND						ND				
Sodium	mg/kg	6.34E+02	NA	NA	2.46E+01	J				ND						ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND						ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	9.94E+00			YES		1.25E+01				YES		1.01E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.71E+01	J				1.40E+01						2.25E+01				
VOLATILE ORGANIC COMPOUNDS																				
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					ND						NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					8.90E-02	J					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					ND						NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					1.20E-03	J					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					ND						NR				
SEMIVOLATILE ORGANIC COMPOUNDS																				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					ND						NR				
PESTICIDES																				
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					ND						NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					ND						NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					ND						NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					ND						NR				
HERBICIDES																				
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					ND						NR				
MCP	mg/kg	NA	7.77E+00	1.00E-01	NR					ND						NR				
EXPLOSIVES																				
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND						ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND						ND				
PERCHLORATE																				
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND						ND				

Table 5-1

**Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama**

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP11 QU0024 11-Jul-02 0-1					HR-89Q-GP12 QU0026 27-Jun-02 0-1					HR-89Q-GP13 QU0029 27-Jun-02 0-1					
Parameter	Units	BKG ^a	SSSL ^b	ESV ^c	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	
METALS																				
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.53E+03				YES	8.52E+03				YES	YES	2.02E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND										
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.65E+00		YES			2.25E+00			YES			3.64E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	4.21E+01					9.48E+01						6.17E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND						ND				
Calcium	mg/kg	1.72E+03	NA	NA	1.31E+02					6.48E+02						2.28E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	7.00E+00				YES	1.08E+01	J			YES	1.52E+01	J				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.56E+00	J				1.17E+00	J					1.83E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.07E+00					5.93E+01		YES		YES	8.60E+01		YES			YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	5.24E+03		YES	YES		7.65E+03			YES	YES	1.61E+04			YES	YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.63E+01					2.99E+02		YES		YES	2.65E+02		YES			YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.58E+02					3.08E+02						6.20E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.92E+02				YES	3.40E+02	J			YES	8.02E+01	J				
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.66E-02	J				3.20E-02	J					9.11E-02	J	YES		
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.53E+00					2.96E+00						6.39E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.24E+02	J				2.39E+02	J					4.17E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	6.96E-01	J	YES			ND						ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND						ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND						ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	8.82E+00				YES	1.30E+01				YES	2.70E+01					YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.57E+01	J				3.47E+01						4.78E+01		YES		
VOLATILE ORGANIC COMPOUNDS																				
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR					
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR					
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR					
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR					NR					
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR					NR					
SEMIVOLATILE ORGANIC COMPOUNDS																				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR					NR					
PESTICIDES																				
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR					
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR					
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR					
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR					
HERBICIDES																				
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR					
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR					
EXPLOSIVES																				
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND					
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND					
PERCHLORATE																				
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND					

Table 5-1

Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP14 QU0031 12-Jul-02 0-1					HR-89Q-GP15 QU0033 12-Jul-02 0-1					HR-89Q-GP16 QU0035 11-Jul-02 0-1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	5.41E+03				YES	4.69E+03				YES	4.79E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.17E+00		YES			1.85E+00			YES		1.88E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.85E+01					2.66E+01					3.30E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	1.12E+02					1.28E+02					1.85E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	3.60E+00				YES	4.54E+00				YES	7.82E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.19E+00	J				ND					4.34E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.88E+00					5.96E+00					9.53E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.45E+03		YES	YES		4.34E+03			YES	YES	1.02E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.07E+01					2.34E+01					2.82E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.41E+02					1.85E+02					2.80E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	8.60E+01					7.75E+01					2.19E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					3.11E-02	J				3.98E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.06E+00	B				1.55E+00	B				2.14E+00	B			
Potassium	mg/kg	8.00E+02	NA	NA	1.20E+02	J				1.51E+02	J				4.08E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	5.41E-01	J	YES			ND					6.86E-01	J	YES		
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND					ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	6.33E+00				YES	6.42E+00				YES	1.28E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	9.33E+00					1.11E+01	J				1.35E+01	J			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR					NR				
SEMIVOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR					NR				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP17 QU0037 12-Jul-02 0-1					HR-89Q-GP18 QU0039 27-Jun-02 0-1					HR-89Q-GP19 QU0042 11-Jul-02 0-1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	8.25E+03			YES	YES	7.73E+03				YES	5.65E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.00E+00			YES		1.41E+00			YES		1.38E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.35E+01	J				8.01E+01					7.46E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	8.99E+01	B				6.86E+02					6.56E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	6.62E+00				YES	4.30E+00	J			YES	4.34E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					ND					ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	5.25E+00					2.68E+00					2.64E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	7.21E+03			YES	YES	3.79E+03			YES	YES	4.45E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.41E+01					1.07E+01					1.64E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.54E+02					2.99E+02					2.06E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.40E+01	J				3.80E+02	J		YES	YES	1.93E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.96E-02	J				3.08E-02	J				3.94E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.19E+00	J				2.76E+00					1.33E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	2.41E+02	J				2.19E+02	J				1.21E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	9.29E-01	J	YES		YES	5.96E-01	B	YES			6.62E-01	J	YES		
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND					2.48E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.27E+01				YES	7.95E+00				YES	7.16E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.05E+01					1.20E+01					1.23E+01	J			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR					NR				
SEMIVOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR					NR				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					9.50E-01				YES
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				

Table 5-1

**Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defundum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama**

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP20 QU0044 10-Jul-02 0-1					HR-89Q-GP21 QU0046 28-Jun-02 0-1					HR-89Q-GP22 QU0048 10-Jul-02 0-1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	5.74E+03				YES	5.26E+03				YES	4.51E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.57E+00		YES			1.10E+00			YES		1.02E+00	J		YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	7.44E+01					4.09E+01					3.03E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	1.72E+02					6.04E+02					9.44E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	3.85E+00			YES		2.56E+00				YES	3.25E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.88E+00					ND					1.86E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	3.56E+00					2.16E+00	J				1.95E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.99E+03		YES	YES		3.02E+03			YES	YES	3.26E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.19E+01					8.76E+00					8.52E+00				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.21E+02					2.24E+02					2.16E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	3.61E+02			YES		9.09E+01					9.56E+01				
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					ND					ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.13E+00					1.74E+00	J				2.49E+00				
Potassium	mg/kg	8.00E+02	NA	NA	1.96E+02	J				1.60E+02	J				1.24E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	2.40E+01	J				2.24E+01	J				ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	5.67E+00			YES		5.67E+00				YES	6.51E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	7.83E+00					9.28E+00	J				1.02E+01	J			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR					NR				
SEMIVOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR					NR				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP23 QU0050 28-Jun-02 0-1					HR-89Q-GP24 QU0052 27-Jun-02 0-1					HR-89Q-GP25 QU0054 11-Jul-02 0-1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	2.72E+04		YES	YES	YES	5.48E+03				YES	5.84E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.66E+00			YES		1.76E+00			YES		1.52E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	1.31E+02		YES			2.67E+01					5.72E+01	J			
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	7.84E-01	J				ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	3.02E+02					9.60E+01	J				6.98E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.73E+01				YES	5.42E+00	J			YES	4.83E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.60E+00					ND					2.05E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.28E+01		YES			1.18E+01					3.07E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.09E+04		YES	YES		3.72E+03			YES	YES	7.68E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.17E+01					2.14E+02		YES		YES	1.10E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.06E+03		YES			2.29E+02					2.66E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.26E+01					9.55E+01	J				3.04E+02	J			YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	9.50E-02	J	YES			ND					4.00E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.02E+01					2.28E+00	J				3.40E+00				
Potassium	mg/kg	8.00E+02	NA	NA	7.37E+02					2.16E+02	J				ND				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					8.86E-01	J	YES		YES
Sodium	mg/kg	6.34E+02	NA	NA	4.77E+01	J				ND					ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.38E+01				YES	7.46E+00				YES	6.90E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.90E+01	J				1.10E+01					1.07E+01				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR					NR				
SEMIVOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR					NR				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP26 QU0056 28-Jun-02 0-1					HR-89Q-GP27 QU0058 27-Jun-02 0-1				HR-89Q-GP28 QU0060 11-Jul-02 0-1					
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	3.80E+03				YES	9.35E+03		YES	YES	4.84E+03					YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND				ND					
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.04E+00		YES			1.75E+00		YES		1.10E+00				YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	1.78E+01					7.77E+01				1.54E+02		YES			
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND				ND					
Calcium	mg/kg	1.72E+03	NA	NA	3.03E+02					1.90E+02				9.74E+02					
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	7.28E+00				YES	6.45E+00	J		YES	4.69E+00					YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					3.24E+00				9.56E+00					
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.41E+00					2.48E+01				3.12E+00					
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	9.97E+03		YES	YES		7.76E+03	J	YES	YES	4.24E+03				YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.49E+00					9.75E+01	J		YES	8.29E+00					
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	9.38E+01	J				3.30E+02				4.87E+02					
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.12E+01					2.72E+02	J		YES	6.73E+02				YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					3.21E-02	J			3.26E-02	J				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	ND					4.87E+00				3.76E+00					
Potassium	mg/kg	8.00E+02	NA	NA	1.56E+02	J				1.84E+02	J			2.59E+02	J				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND				5.46E-01	J	YES			
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND				ND					
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND				ND					
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.51E+01				YES	1.12E+01			YES	6.91E+00					YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	5.73E+00	J				1.01E+01	J			1.43E+01	J				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR				NR					
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR				NR					
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR				NR					
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR				NR					
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR				NR					
SEMIVOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR				NR					
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR				NR					
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR				NR					
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR				NR					
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR				NR					
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR				NR					
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR				NR					
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND				ND					
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND				ND					
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND				ND					

Table 5-1

**Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama**

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP29 QU0062 10-Jul-02 0-1					HR-89Q-GP30 QU0064 10-Jul-02 0-1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^c	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS														
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.35E+03				YES	4.86E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.88E+00			YES		1.68E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	6.80E+01					2.85E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	1.96E+02					1.40E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	5.98E+00				YES	2.63E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	4.19E+00					2.15E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	5.38E+03			YES	YES	3.14E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.05E+01					1.22E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.67E+02					1.79E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.63E+02				YES	9.81E+01				
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.44E-02	J				ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.58E+00					2.26E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	8.17E+01	J				1.39E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	2.03E+01	J				2.48E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	8.77E+00				YES	5.95E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	9.45E+00					1.22E+01				
VOLATILE ORGANIC COMPOUNDS														
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR				
SEMIVOLATILE ORGANIC COMPOUNDS														
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR				
PESTICIDES														
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR				
HERBICIDES														
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR				
EXPLOSIVES														
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND				
PERCHLORATE														
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND				

Table 5-1

**Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama**

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP31 QU0066 10-Jul-02 0-1					HR-89Q-GP32 QU0068 21-Jun-02 0-1					HR-89Q-GP33 QU0070 24-Jun-02 0-1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	7.51E+03				YES	4.65E+03				YES	6.36E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	4.72E+00	B	YES	YES	YES	ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	6.13E+00			YES		1.09E+00			YES		1.66E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.40E+01					4.24E+01					2.07E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	1.16E+02					9.32E+01	J				1.23E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.11E+01				YES	2.37E+00				YES	4.49E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	6.48E+00					1.52E+00	J				ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	5.29E+00					2.41E+00					2.94E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.12E+04			YES	YES	2.73E+03			YES	YES	4.06E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.48E+01					3.74E+00					8.35E+00				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.17E+02					2.04E+02					2.89E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.14E+02				YES	4.04E+02	J			YES	1.49E+01	J			
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.50E-02	J				2.70E-02	J				3.39E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	7.21E+00					3.32E+00					2.59E+00				
Potassium	mg/kg	8.00E+02	NA	NA	8.39E+01	J				ND					2.17E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	2.03E+00		YES		YES	ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					2.43E+01	J				1.96E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	9.21E-01	J		YES		ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.39E+01				YES	5.28E+00				YES	8.95E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.37E+01	J				5.79E+00					9.90E+00				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR					NR				
SEMI-VOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR					NR				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP34 QU0072 27-Jun-02 0-1					HR-89Q-GP35 QU0074 27-Jun-02 0-1					HR-89Q-GP36 QU0077 28-Jun-02 0-1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^c	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	9.45E+03			YES	YES	5.83E+03				YES	4.94E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.49E+00			YES		1.65E+00			YES		1.39E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	9.67E+01					8.19E+01					3.99E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	4.37E-01	J				ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	6.65E+02					9.09E+02					9.24E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.14E+01				YES	4.43E+00				YES	4.58E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.06E+00					1.73E+00	J				ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	7.38E+00					1.06E+01					1.46E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.13E+04			YES	YES	3.95E+03	J		YES	YES	5.10E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.66E+01					3.95E+01	J				8.56E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.14E+02					2.21E+02					2.11E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	5.38E+02			YES	YES	5.67E+02	J		YES	YES	1.57E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					ND					ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.28E+00					2.79E+00					1.88E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	2.15E+02	J				1.54E+02	J				1.70E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					6.16E-01	J	YES			ND				
Sodium	mg/kg	6.34E+02	NA	NA	2.45E+01	J				ND					ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.64E+01				YES	7.18E+00				YES	7.70E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.25E+01	J				1.56E+01	J				8.25E+00	J			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					ND					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					1.90E-01	J				NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					1.70E-03	J				NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					ND					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					ND					NR				
SEMIVOLATILE ORGANIC COMPOUNDS																			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					ND					NR				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					ND					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					ND					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					ND					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					ND					NR				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					ND					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					ND					NR				
EXPLOSIVES																			
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				

Table 5-1

**Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama**

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-GP37 QU0079 11-Jul-02 0-1					HR-89Q-MW01 QU0081 25-Jun-02 0-1					HR-89Q-MW02 QU0084 27-Jun-02 0-1					
Parameter	Units	BKG ^a	SSSL ^b	ESV ^c	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	
METALS																				
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	9.00E+03			YES	YES	6.80E+03				YES	1.49E+04			YES	YES	
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.89E+00			YES		1.59E+00			YES		4.71E+00			YES		
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	6.76E+01					3.97E+01					5.51E+01					
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	3.72E-01	J				ND					4.76E-01	J				
Calcium	mg/kg	1.72E+03	NA	NA	3.36E+02					1.69E+02					1.05E+02	J				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.38E+01				YES	4.72E+00				YES	1.63E+01				YES	
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	7.04E+00					1.64E+00	J				2.99E+00					
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.42E+01		YES			5.22E+00					5.20E+00					
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.61E+04			YES	YES	4.59E+03			YES	YES	1.78E+04			YES	YES	
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.36E+01					8.54E+00					1.36E+01					
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.36E+02					2.43E+02					5.21E+02					
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	7.79E+02			YES	YES	1.21E+02	J			YES	1.23E+02				YES	
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					2.77E-02	J				ND					
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	9.91E+00					2.29E+00					5.65E+00					
Potassium	mg/kg	8.00E+02	NA	NA	2.67E+02	J				2.43E+02	J				4.88E+02	J				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.34E+00		YES		YES	ND					ND					
Sodium	mg/kg	6.34E+02	NA	NA	1.95E+01	J				2.49E+01	J				2.24E+01	J				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND					
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.52E+01				YES	9.07E+00				YES	2.56E+01				YES	
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.91E+01	J				1.15E+01					1.36E+01	J				
VOLATILE ORGANIC COMPOUNDS																				
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR					
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR					
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR					
Toluene	mg/kg	NA	1.55E+03	5.00E-02	NR					NR					NR					
p-Cymene	mg/kg	NA	1.55E+03	NA	NR					NR					NR					
SEMIVOLATILE ORGANIC COMPOUNDS																				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	NR					NR					NR					
PESTICIDES																				
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR					
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR					
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR					
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR					
HERBICIDES																				
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR					
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR					
EXPLOSIVES																				
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND					ND					ND					
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND					ND					ND					
PERCHLORATE																				
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND					

Table 5-1

Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					HR-89Q-MW03 QU0086 27-Jun-02 0-1					HR-89Q-MW04 QU0088 11-Jul-02 0-1					HR-89Q-MW05 QU0090 27-Jun-02 0-1					
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	
METALS																				
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.24E+04				YES	YES	1.01E+04			YES	YES	1.57E+04			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND						ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.75E+00				YES		2.33E+00			YES		6.67E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.80E+01						6.51E+01					5.81E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	5.73E-01	J					4.74E-01	J				4.75E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	7.35E+01	J					1.25E+02					4.14E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	9.27E+00	J			YES		9.03E+00			YES		1.59E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.37E+00						3.16E+00					7.73E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.05E+00						2.46E+01	YES				6.18E+01	YES		YES	YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.30E+04	J		YES	YES		9.31E+03		YES	YES	YES	2.63E+04	J	YES	YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.10E+01	J					8.59E+01	YES		YES	YES	2.98E+02	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	4.89E+02						3.02E+02					5.53E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.37E+02	J			YES		5.56E+02		YES	YES		7.49E+02	J		YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	6.09E-02	J					4.36E-02	J				7.16E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.75E+00						3.68E+00					8.07E+00				
Potassium	mg/kg	8.00E+02	NA	NA	5.20E+02	J					8.64E+01	J				3.97E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND						6.71E-01	J	YES			ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND						1.96E+01	J				ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND						ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.84E+01				YES		1.55E+01			YES		3.18E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.20E+01	J					2.02E+01	J				2.79E+01	J			
VOLATILE ORGANIC COMPOUNDS																				
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND						NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	7.20E-02	J					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	1.80E-03	J					NR					NR				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND						NR					NR				
p-Cymene	mg/kg	NA	1.55E+03	NA	ND						NR					NR				
SEMIVOLATILE ORGANIC COMPOUNDS																				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND						NR					NR				
PESTICIDES																				
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	ND						NR					NR				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	ND						NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	ND						NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	ND						NR					NR				
HERBICIDES																				
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	ND						NR					NR				
MCPP	mg/kg	NA	7.77E+00	1.00E-01	ND						NR					NR				
EXPLOSIVES																				
2,4,6-Trinitrotoluene	mg/kg	NA	2.08E+01	3.00E-01	ND						ND					ND				
2,4-Dinitrotoluene	mg/kg	NA	9.27E-01	1.28E+00	ND						ND					ND				
PERCHLORATE																				
Perchlorate	mg/kg	NA	7.04E+00	NA	ND						ND					7.93E-01				

Table 5-1

**Surface and Depositional Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
FTMC, Calhoun County, Alabama**

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

^a BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

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

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

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

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP01 QU0002 24-Jun-02 1 - 2				HR-89Q-GP02 QU0005 24-Jun-02 1 - 2				HR-89Q-GP03 QU0007 21-Jun-02 3 - 4				HR-89Q-GP04 QU0009 25-Jun-02 2 - 3			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL												
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	3.29E+03				5.91E+03				1.53E+04		YES	YES	1.78E+04		YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND															
Arsenic	mg/kg	1.83E+01	4.26E-01	9.95E-01	J		YES	1.56E+00			YES	2.95E+00			YES	3.31E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.43E+01				1.59E+01				1.89E+01				2.71E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND															
Calcium	mg/kg	6.37E+02	NA	8.70E+01	J			6.71E+01	J			4.55E+01	J			1.45E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	2.53E+00				4.17E+00				1.61E+01				1.48E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	1.90E+00	J			ND				ND				1.25E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	1.55E+00	J			1.82E+00	J			7.04E+00				8.27E+00			
Iron	mg/kg	4.48E+04	2.34E+03	2.10E+03				3.45E+03			YES	1.25E+04			YES	1.47E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	3.41E+00				5.28E+00				5.57E+00				7.44E+00			
Magnesium	mg/kg	7.66E+02	NA	1.59E+02	J			2.23E+02				3.31E+02				3.72E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	1.06E+02				2.25E+01	J			1.25E+01				3.32E+01	J		
Mercury	mg/kg	7.00E-02	2.33E+00	ND				3.83E-02	J			5.62E-02	J			1.33E-01		YES	
Nickel	mg/kg	1.29E+01	1.54E+02	1.04E+00	J			1.90E+00	J			3.37E+00				4.26E+00			
Potassium	mg/kg	7.11E+02	NA	7.86E+01	J			1.92E+02	J			2.78E+02	J			3.85E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND															
Sodium	mg/kg	7.02E+02	NA	1.94E+01	J			2.04E+01	J			2.34E+01	J			2.00E+01	J		
Thallium	mg/kg	1.40E+00	5.08E-01	ND															
Vanadium	mg/kg	6.49E+01	5.31E+01	4.52E+00				7.69E+00				2.43E+01				2.66E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	4.81E+00				7.16E+00				1.06E+01				1.19E+01			
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				9.50E-02	J		
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				ND			
p-Cymene	mg/kg	NA	1.55E+03	NR				NR				NR				5.90E-03			
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	NR				NR				NR				ND			
Endrin	mg/kg	NA	2.32E+00	NR				NR				NR				ND			
Heptachlor	mg/kg	NA	1.40E-01	NR				NR				NR				ND			
Heptachlor epoxide	mg/kg	NA	6.91E-02	NR				NR				NR				ND			
Methoxychlor	mg/kg	NA	3.89E+01	NR				NR				NR				ND			
alpha-BHC	mg/kg	NA	1.00E-01	NR				NR				NR				ND			
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	NR				NR				NR				ND			
HERBICIDES																			
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	NR				NR				NR				ND			

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP05 QU0011 27-Jun-02 2 - 3				HR-89Q-GP06 QU0014 27-Jun-02 2 - 3				HR-89Q-GP07 QU0016 27-Jun-02 3 - 4				HR-89Q-GP08 QU0018 27-Jun-02 1 - 2			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL												
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.14E+04			YES	2.06E+04		YES	YES	5.54E+03				4.38E+03			
Antimony	mg/kg	1.31E+00	3.11E+00	ND															
Arsenic	mg/kg	1.83E+01	4.26E-01	6.90E+00			YES	4.23E+00			YES	1.59E+00		YES		9.72E-01	J		YES
Barium	mg/kg	2.34E+02	5.47E+02	5.61E+01				4.77E+01				1.39E+01				2.33E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	3.58E-01	J			4.85E-01	J			ND				ND			
Calcium	mg/kg	6.37E+02	NA	2.65E+02				1.70E+02				9.00E+01	J			1.20E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	6.46E+01	J	YES	YES	1.48E+01				1.18E+01				7.29E+00			
Cobalt	mg/kg	1.75E+01	4.68E+02	2.40E+00				3.09E+00				ND				ND			
Copper	mg/kg	1.94E+01	3.13E+02	1.08E+01				6.71E+00				2.38E+00				1.22E+00	J		
Iron	mg/kg	4.48E+04	2.34E+03	2.54E+04			YES	1.97E+04		YES		8.03E+03		YES		4.44E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	4.38E+01		YES		1.17E+01				3.21E+00				4.32E+00			
Magnesium	mg/kg	7.66E+02	NA	3.62E+02				6.29E+02				2.08E+02				1.75E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	2.84E+02	J			2.20E+02				1.17E+01				4.54E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	ND				4.68E-02	J			ND				ND			
Nickel	mg/kg	1.29E+01	1.54E+02	5.10E+00				9.10E+00				1.48E+00	J			1.48E+00	J		
Potassium	mg/kg	7.11E+02	NA	2.93E+02	J			5.27E+02	J			2.27E+02	J			1.75E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND															
Sodium	mg/kg	7.02E+02	NA	ND				2.47E+01	J			ND				ND			
Thallium	mg/kg	1.40E+00	5.08E-01	ND															
Vanadium	mg/kg	6.49E+01	5.31E+01	2.51E+01				2.75E+01				1.45E+01				8.06E+00			
Zinc	mg/kg	3.49E+01	2.34E+03	2.85E+01				1.91E+01	J			4.47E+00	J			4.98E+00	J		
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR															
Methylene chloride	mg/kg	NA	8.41E+01	NR															
p-Cymene	mg/kg	NA	1.55E+03	NR															
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	NR															
Endrin	mg/kg	NA	2.32E+00	NR															
Heptachlor	mg/kg	NA	1.40E-01	NR															
Heptachlor epoxide	mg/kg	NA	6.91E-02	NR															
Methoxychlor	mg/kg	NA	3.89E+01	NR															
alpha-BHC	mg/kg	NA	1.00E-01	NR															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	NR															
HERBICIDES																			
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	NR															

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP09 QU0021 27-Jun-02 1 - 2				HR-89Q-GP10 QU0023 27-Jun-02 3 - 4				HR-89Q-GP11 QU0025 11-Jul-02 1.5- 2.5				HR-89Q-GP12 QU0028 27-Jun-02 3 - 4			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.18E+04			YES	1.07E+04			YES	6.46E+03				8.91E+03			YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	2.22E+00			YES	3.60E+00			YES	1.67E+00			YES	2.36E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.65E+01				3.96E+01				5.77E+01				2.24E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				ND				ND			
Calcium	mg/kg	6.37E+02	NA	7.68E+01	J			1.33E+02				2.47E+02				1.20E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	1.09E+01	J			1.39E+01	J			5.16E+00				1.18E+01	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	ND				3.33E+00				1.48E+00	J			ND			
Copper	mg/kg	1.94E+01	3.13E+02	1.37E+01				9.50E+00				6.45E+00				4.75E+01		YES	
Iron	mg/kg	4.48E+04	2.34E+03	7.76E+03			YES	2.13E+04			YES	4.22E+03			YES	9.63E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	4.18E+01		YES		1.34E+01				3.50E+01				2.02E+02		YES	
Magnesium	mg/kg	7.66E+02	NA	4.73E+02				4.69E+02				2.71E+02				2.61E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	3.07E+01	J			5.18E+01	J			2.53E+02				8.23E+01	J		
Mercury	mg/kg	7.00E-02	2.33E+00	4.58E-02	J			ND				4.62E-02	J			3.62E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	4.83E+00				4.44E+00				2.51E+00				2.78E+00			
Potassium	mg/kg	7.11E+02	NA	3.18E+02	J			5.48E+02	J			8.06E+01	J			3.12E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				6.58E-01	J	YES		ND			
Sodium	mg/kg	7.02E+02	NA	ND				ND				2.25E+01	J			ND			
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND				ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	1.56E+01				2.33E+01				8.10E+00				1.64E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.57E+01				1.43E+01				1.85E+01	J			1.09E+01			
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	1.60E-01	J			NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	1.70E-03	B			NR				NR				NR			
p-Cymene	mg/kg	NA	1.55E+03	ND				NR				NR				NR			
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	ND				NR				NR				NR			
Endrin	mg/kg	NA	2.32E+00	ND				NR				NR				NR			
Heptachlor	mg/kg	NA	1.40E-01	ND				NR				NR				NR			
Heptachlor epoxide	mg/kg	NA	6.91E-02	ND				NR				NR				NR			
Methoxychlor	mg/kg	NA	3.89E+01	ND				NR				NR				NR			
alpha-BHC	mg/kg	NA	1.00E-01	ND				NR				NR				NR			
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	ND				NR				NR				NR			
HERBICIDES																			
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	1.80E-02	J			NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP13 QU0030 28-Jun-02 2 - 3				HR-89Q-GP14 QU0032 12-Jul-02 3 - 4				HR-89Q-GP15 QU0034 12-Jul-02 2 - 3				HR-89Q-GP16 QU0036 11-Jul-02 1 - 2			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL												
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.69E+04		YES	YES	2.00E+04		YES	YES	1.36E+04		YES	YES	7.96E+03			YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND															
Arsenic	mg/kg	1.83E+01	4.26E-01	7.95E+00			YES	2.33E+00			YES	3.16E+00			YES	2.25E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	1.80E+01				3.81E+01				2.68E+01				5.02E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				ND				4.82E-01	J		
Calcium	mg/kg	6.37E+02	NA	2.56E+01	J			1.46E+02				6.01E+01	J			2.71E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	2.94E+01	J		YES	1.99E+01				1.28E+01				1.45E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	1.33E+00	J			2.44E+00				1.87E+00	J			3.36E+00			
Copper	mg/kg	1.94E+01	3.13E+02	1.05E+01				1.76E+01				4.61E+00				1.15E+01			
Iron	mg/kg	4.48E+04	2.34E+03	3.14E+04			YES	1.79E+04			YES	1.53E+04			YES	9.33E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	8.59E+00				1.14E+01				5.57E+00				1.94E+01			
Magnesium	mg/kg	7.66E+02	NA	3.60E+02				8.30E+02		YES		5.38E+02				4.93E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	1.78E+01	J			2.85E+01				9.97E+00				3.53E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	7.74E-02	J	YES		3.28E-02	J			3.18E-02	J			5.20E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	3.60E+00				5.45E+00				2.97E+00	B			4.26E+00	B		
Potassium	mg/kg	7.11E+02	NA	3.33E+02	J			6.49E+02				4.84E+02	J			6.25E+02			
Selenium	mg/kg	4.70E-01	3.91E+01	ND				1.40E+00		YES		8.68E-01	J	YES		9.33E-01	J	YES	
Sodium	mg/kg	7.02E+02	NA	ND				2.23E+01	J			ND				2.27E+01	J		
Thallium	mg/kg	1.40E+00	5.08E-01	ND															
Vanadium	mg/kg	6.49E+01	5.31E+01	4.68E+01				3.42E+01				2.25E+01				1.23E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.02E+01				1.74E+01	J			1.09E+01	J			2.22E+01	J		
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR															
Methylene chloride	mg/kg	NA	8.41E+01	NR															
p-Cymene	mg/kg	NA	1.55E+03	NR															
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	NR															
Endrin	mg/kg	NA	2.32E+00	NR															
Heptachlor	mg/kg	NA	1.40E-01	NR															
Heptachlor epoxide	mg/kg	NA	6.91E-02	NR															
Methoxychlor	mg/kg	NA	3.89E+01	NR															
alpha-BHC	mg/kg	NA	1.00E-01	NR															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	NR															
HERBICIDES																			
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	NR															

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP17 QU0038 12-Jul-02 2 - 3				HR-89Q-GP18 QU0041 27-Jun-02 3 - 4				HR-89Q-GP19 QU0043 11-Jul-02 2 - 3				HR-89Q-GP20 QU0045 10-Jul-02 1.5- 2.5			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.08E+04			YES	3.21E+04		YES	YES	1.12E+04			YES	8.66E+03			YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	1.65E+00			YES	4.83E+00			YES	2.47E+00			YES	2.12E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.48E+01	J			4.58E+01				3.54E+01				5.02E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				4.37E-01	J			ND			
Calcium	mg/kg	6.37E+02	NA	6.85E+01	B			1.03E+02	J			1.23E+02				2.01E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	7.32E+00				2.82E+01	J		YES	1.70E+01				8.42E+00			
Cobalt	mg/kg	1.75E+01	4.68E+02	1.33E+00	J			2.14E+00	J			1.51E+00	J			1.61E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	3.49E+00				9.74E+00				2.77E+00				3.82E+00			
Iron	mg/kg	4.48E+04	2.34E+03	7.09E+03			YES	2.30E+04			YES	2.23E+04			YES	7.68E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	7.73E+00				8.57E+00				1.43E+01				7.93E+00			
Magnesium	mg/kg	7.66E+02	NA	4.74E+02				9.02E+02		YES		2.28E+02				3.40E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	2.32E+01	J			3.25E+01	J			7.03E+01				8.50E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	2.89E-02	J			7.02E-02	J	YES		6.45E-02	J			3.08E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	3.82E+00				8.15E+00				1.83E+00	J			3.51E+00			
Potassium	mg/kg	7.11E+02	NA	1.97E+02	J			6.79E+02				1.21E+02	J			1.92E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	8.46E-01	J	YES		ND				1.66E+00		YES		ND			
Sodium	mg/kg	7.02E+02	NA	ND				ND				ND				2.00E+01	J		
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND				ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	1.32E+01				4.65E+01				2.09E+01				1.06E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.17E+01				2.40E+01				6.18E+00	J			8.83E+00			
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				NR			
p-Cymene	mg/kg	NA	1.55E+03	NR				NR				NR				NR			
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	NR				NR				NR				NR			
Endrin	mg/kg	NA	2.32E+00	NR				NR				NR				NR			
Heptachlor	mg/kg	NA	1.40E-01	NR				NR				NR				NR			
Heptachlor epoxide	mg/kg	NA	6.91E-02	NR				NR				NR				NR			
Methoxychlor	mg/kg	NA	3.89E+01	NR				NR				NR				NR			
alpha-BHC	mg/kg	NA	1.00E-01	NR				NR				NR				NR			
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	NR				NR				NR				NR			
HERBICIDES																			
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP21 QU0047 28-Jun-02 3 - 4				HR-89Q-GP22 QU0049 10-Jul-02 1 - 2				HR-89Q-GP23 QU0051 28-Jun-02 3 - 4				HR-89Q-GP24 QU0053 27-Jun-02 3 - 4			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL												
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.04E+04			YES	4.64E+03				2.00E+04		YES	YES	1.91E+04		YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND															
Arsenic	mg/kg	1.83E+01	4.26E-01	1.79E+00			YES	1.19E+00			YES	4.46E+00			YES	3.95E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	2.04E+01				2.75E+01				3.96E+01				3.63E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND															
Calcium	mg/kg	6.37E+02	NA	1.09E+02	J			7.50E+01	J			9.20E+01	J			1.29E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	6.29E+00				3.67E+00				1.69E+01				2.61E+01	J		YES
Cobalt	mg/kg	1.75E+01	4.68E+02	1.29E+00	J			2.46E+00				2.15E+00	J			1.61E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	3.08E+00				2.11E+00	J			6.02E+00				7.52E+00			
Iron	mg/kg	4.48E+04	2.34E+03	6.78E+03			YES	3.66E+03			YES	2.31E+04			YES	2.02E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	4.58E+00				4.51E+00				1.07E+01				6.34E+00			
Magnesium	mg/kg	7.66E+02	NA	3.92E+02				2.28E+02				6.76E+02				7.69E+02			YES
Manganese	mg/kg	1.36E+03	3.63E+02	2.21E+01				5.24E+01				1.89E+01				2.36E+01	J		
Mercury	mg/kg	7.00E-02	2.33E+00	ND				ND				4.38E-02	J			7.26E-02	J		YES
Nickel	mg/kg	1.29E+01	1.54E+02	3.98E+00				2.21E+00				5.27E+00				6.20E+00			
Potassium	mg/kg	7.11E+02	NA	2.97E+02	J			1.12E+02	J			4.51E+02	J			7.15E+02			YES
Selenium	mg/kg	4.70E-01	3.91E+01	ND				5.22E-01	J	YES		ND				ND			
Sodium	mg/kg	7.02E+02	NA	ND															
Thallium	mg/kg	1.40E+00	5.08E-01	ND															
Vanadium	mg/kg	6.49E+01	5.31E+01	1.32E+01				7.50E+00				3.50E+01				3.65E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.07E+01	J			8.72E+00	J			1.62E+01	J			1.65E+01			
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR															
Methylene chloride	mg/kg	NA	8.41E+01	NR															
p-Cymene	mg/kg	NA	1.55E+03	NR															
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	NR															
Endrin	mg/kg	NA	2.32E+00	NR															
Heptachlor	mg/kg	NA	1.40E-01	NR															
Heptachlor epoxide	mg/kg	NA	6.91E-02	NR															
Methoxychlor	mg/kg	NA	3.89E+01	NR															
alpha-BHC	mg/kg	NA	1.00E-01	NR															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	NR															
HERBICIDES																			
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	NR															

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP25 QU0055 11-Jul-02 2 - 3				HR-89Q-GP26 QU0057 28-Jun-02 2 - 3				HR-89Q-GP27 QU0059 27-Jun-02 3 - 4				HR-89Q-GP28 QU0061 11-Jul-02 2.5- 3.5			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	9.09E+03			YES	4.52E+03				2.60E+04		YES	YES	1.74E+04		YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	1.99E+00			YES	1.15E+00			YES	2.82E+00		YES		1.30E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	4.16E+01	J			3.92E+01				3.06E+01				3.90E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				ND				ND			
Calcium	mg/kg	6.37E+02	NA	2.62E+02				4.93E+02				4.51E+01	J			1.97E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	6.03E+00				5.36E+00				2.01E+01	J			1.89E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	1.54E+00	J			ND				1.46E+00	J			2.68E+00			
Copper	mg/kg	1.94E+01	3.13E+02	3.64E+00				1.19E+00	B			6.59E+00				7.12E+00			
Iron	mg/kg	4.48E+04	2.34E+03	6.31E+03			YES	4.41E+03			YES	1.77E+04	J		YES	1.84E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	5.97E+00				4.84E+00				7.55E+00				6.09E+00			
Magnesium	mg/kg	7.66E+02	NA	4.51E+02				1.50E+02				7.26E+02				2.15E+03		YES	
Manganese	mg/kg	1.36E+03	3.63E+02	4.45E+01	J			8.37E+01				2.56E+01	J			4.53E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	3.88E-02	J			ND				4.17E-02	J			4.92E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	4.57E+00				2.33E+00				6.97E+00				6.97E+00			
Potassium	mg/kg	7.11E+02	NA	2.20E+02	J			1.28E+02	J			4.40E+02	J			2.78E+03		YES	
Selenium	mg/kg	4.70E-01	3.91E+01	6.42E-01	J	YES		ND				ND				9.05E-01	J	YES	
Sodium	mg/kg	7.02E+02	NA	ND				ND				2.14E+01	B			2.46E+01	J		
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND				ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	1.14E+01				6.19E+00				3.29E+01				2.61E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.26E+01				5.29E+00	J			2.21E+01	J			1.98E+01	J		
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				NR			
p-Cymene	mg/kg	NA	1.55E+03	NR				NR				NR				NR			
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	NR				NR				NR				NR			
Endrin	mg/kg	NA	2.32E+00	NR				NR				NR				NR			
Heptachlor	mg/kg	NA	1.40E-01	NR				NR				NR				NR			
Heptachlor epoxide	mg/kg	NA	6.91E-02	NR				NR				NR				NR			
Methoxychlor	mg/kg	NA	3.89E+01	NR				NR				NR				NR			
alpha-BHC	mg/kg	NA	1.00E-01	NR				NR				NR				NR			
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	NR				NR				NR				NR			
HERBICIDES																			
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP29 QU0063 10-Jul-02 1 - 2				HR-89Q-GP30 QU0065 10-Jul-02 1.5- 2.5				HR-89Q-GP31 QU0067 10-Jul-02 3 - 4				HR-89Q-GP32 QU0069 21-Jun-02 1 - 2			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	5.96E+03				3.38E+03				1.96E+04		YES	YES	5.68E+03			
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				4.84E+00	B	YES	YES	ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	1.78E+00		YES		1.00E+00	B		YES	1.39E+01			YES	1.36E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.81E+01				1.49E+01				2.06E+01				3.64E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				4.67E-01	J			ND			
Calcium	mg/kg	6.37E+02	NA	1.13E+02	J			6.63E+01	J			8.53E+01	J			9.55E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	7.58E+00				2.67E+00				3.03E+01			YES	3.72E+00			
Cobalt	mg/kg	1.75E+01	4.68E-02	ND				ND				2.96E+00				2.10E+00			
Copper	mg/kg	1.94E+01	3.13E+02	2.84E+00				1.85E+00	J			1.14E+01				2.09E+00			
Iron	mg/kg	4.48E+04	2.34E+03	5.94E+03		YES		3.32E+03			YES	6.39E+04		YES	YES	4.06E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	4.60E+00				4.61E+00				1.65E+01				3.47E+00			
Magnesium	mg/kg	7.66E+02	NA	1.91E+02				1.16E+02	J			4.55E+02				2.83E+02	J		
Manganese	mg/kg	1.36E+03	3.63E+02	4.85E+01				2.71E+01				5.42E+01				1.38E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	ND				ND				9.59E-02	J	YES		ND			
Nickel	mg/kg	1.29E+01	1.54E+02	2.63E+00				2.27E+00	J			5.44E+00				3.23E+00			
Potassium	mg/kg	7.11E+02	NA	ND				ND				2.89E+02	J			2.57E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				3.48E+00		YES		ND			
Sodium	mg/kg	7.02E+02	NA	2.21E+01	J			2.46E+01	J			2.03E+01	J			ND			
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND				1.77E+00	J	YES	YES	ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	1.03E+01				4.54E+00				7.39E+01		YES	YES	7.90E+00			
Zinc	mg/kg	3.49E+01	2.34E+03	5.31E+00				5.43E+00				1.63E+01	J			7.13E+00			
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				NR			
p-Cymene	mg/kg	NA	1.55E+03	NR				NR				NR				NR			
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	NR				NR				NR				NR			
Endrin	mg/kg	NA	2.32E+00	NR				NR				NR				NR			
Heptachlor	mg/kg	NA	1.40E-01	NR				NR				NR				NR			
Heptachlor epoxide	mg/kg	NA	6.91E-02	NR				NR				NR				NR			
Methoxychlor	mg/kg	NA	3.89E+01	NR				NR				NR				NR			
alpha-BHC	mg/kg	NA	1.00E-01	NR				NR				NR				NR			
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	NR				NR				NR				NR			
HERBICIDES																			
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP33 QU0071 24-Jun-02 1 - 2				HR-89Q-GP34 QU0073 27-Jun-02 1.5- 2.5				HR-89Q-GP35 QU0075 27-Jun-02 1.5- 2.5				HR-89Q-GP36 QU0078 28-Jun-02 3 - 4			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	7.45E+03				2.61E+04		YES	YES	7.84E+03			YES	4.22E+03			
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	1.70E+00			YES	4.62E+00			YES	1.96E+00			YES	1.15E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	2.14E+01				4.51E+01				8.81E+01				5.78E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				3.61E-01	J			ND			
Calcium	mg/kg	6.37E+02	NA	6.69E+01	J			2.94E+02				1.08E+03		YES		1.77E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	4.85E+00				1.77E+01				5.26E+00	J			3.43E+00			
Cobalt	mg/kg	1.75E+01	4.68E+02	ND				2.41E+00				2.26E+00				ND			
Copper	mg/kg	1.94E+01	3.13E+02	2.25E+00				7.06E+00				9.86E+00				1.00E+01			
Iron	mg/kg	4.48E+04	2.34E+03	4.26E+03			YES	2.21E+04			YES	5.07E+03	J		YES	4.03E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	5.24E+00				1.19E+01				3.96E+01	J	YES		1.83E+01			
Magnesium	mg/kg	7.66E+02	NA	3.25E+02				6.76E+02				2.74E+02				1.76E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	1.63E+01	J			5.16E+01				6.27E+02	J		YES	1.49E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	3.71E-02	J			7.41E-02	J	YES		3.60E-02	J			ND			
Nickel	mg/kg	1.29E+01	1.54E+02	2.77E+00				6.90E+00				3.31E+00				1.87E+00	J		
Potassium	mg/kg	7.11E+02	NA	2.36E+02	J			4.72E+02	J			8.55E+01	J			1.46E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	1.95E+01	J			2.71E+01	J			2.36E+01	B			2.44E+01	J		
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND				ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	9.32E+00				3.75E+01				8.93E+00				5.85E+00			
Zinc	mg/kg	3.49E+01	2.34E+03	1.06E+01				1.79E+01	J			1.88E+01	J			6.80E+00	J		
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR				NR				2.60E-01	J			NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				ND				NR			
p-Cymene	mg/kg	NA	1.55E+03	NR				NR				ND				NR			
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	NR				NR				1.30E-03	J			NR			
Endrin	mg/kg	NA	2.32E+00	NR				NR				2.20E-03	J			NR			
Heptachlor	mg/kg	NA	1.40E-01	NR				NR				1.30E-03	J			NR			
Heptachlor epoxide	mg/kg	NA	6.91E-02	NR				NR				5.30E-04	J			NR			
Methoxychlor	mg/kg	NA	3.89E+01	NR				NR				6.40E-03	J			NR			
alpha-BHC	mg/kg	NA	1.00E-01	NR				NR				2.60E-04	J			NR			
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	NR				NR				5.40E-04	J			NR			
HERBICIDES																			
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	NR				NR				ND				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-GP37 QU0080 11-Jul-02 3 - 4				HR-89Q-MW01 QU0083 25-Jun-02 3 - 4				HR-89Q-MW02 QU0085 27-Jun-02 3 - 4			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS															
Aluminum	mg/kg	1.36E+04	7.80E+03	1.33E+04			YES	1.82E+04		YES	YES	1.61E+04		YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	3.42E+00			YES	2.75E+00			YES	3.44E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.63E+01				2.71E+01				3.92E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				ND			
Calcium	mg/kg	6.37E+02	NA	1.63E+02				6.83E+01	J			1.82E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	2.03E+01				1.47E+01				1.25E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	3.19E+00				1.38E+00	J			2.40E+00			
Copper	mg/kg	1.94E+01	3.13E+02	5.62E+00				5.23E+00				5.10E+00			
Iron	mg/kg	4.48E+04	2.34E+03	1.71E+04			YES	1.36E+04			YES	1.93E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.42E+01				8.01E+00				1.19E+01			
Magnesium	mg/kg	7.66E+02	NA	3.97E+02				4.55E+02				6.03E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	2.04E+02				2.56E+01	J			5.37E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	6.79E-02	J			1.78E-01	J	YES		ND			
Nickel	mg/kg	1.29E+01	1.54E+02	3.60E+00				4.92E+00				4.99E+00			
Potassium	mg/kg	7.11E+02	NA	2.34E+02	J			3.37E+02	J			6.25E+02			
Selenium	mg/kg	4.70E-01	3.91E+01	1.11E+00		YES		ND				ND			
Sodium	mg/kg	7.02E+02	NA	2.23E+01	J			2.58E+01	J			2.66E+01	J		
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	2.44E+01				2.50E+01				2.66E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.46E+01	J			1.29E+01				1.47E+01	J		
VOLATILE ORGANIC COMPOUNDS															
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR			
p-Cymene	mg/kg	NA	1.55E+03	NR				NR				NR			
PESTICIDES															
4,4'-DDT	mg/kg	NA	1.79E+00	NR				NR				NR			
Endrin	mg/kg	NA	2.32E+00	NR				NR				NR			
Heptachlor	mg/kg	NA	1.40E-01	NR				NR				NR			
Heptachlor epoxide	mg/kg	NA	6.91E-02	NR				NR				NR			
Methoxychlor	mg/kg	NA	3.89E+01	NR				NR				NR			
alpha-BHC	mg/kg	NA	1.00E-01	NR				NR				NR			
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	NR				NR				NR			
HERBICIDES															
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				HR-89Q-MW03 QU0087 27-Jun-02 2 - 3				HR-89Q-MW04 QU0089 11-Jul-02 2 - 3				HR-89Q-MW05 QU0092 27-Jun-02 3 - 4			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS															
Aluminum	mg/kg	1.36E+04	7.80E+03	1.08E+04			YES	1.13E+04			YES	1.21E+04			YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	2.62E+00			YES	2.65E+00			YES	2.34E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	2.80E+01				2.17E+01				2.50E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	3.94E-01	J			ND				ND			
Calcium	mg/kg	6.37E+02	NA	2.31E+02				6.49E+01	J			6.25E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	9.37E+00	J			1.31E+01				9.13E+00	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	2.00E+00	J			1.12E+00	J			1.28E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	5.30E+00				4.83E+00				6.69E+00			
Iron	mg/kg	4.48E+04	2.34E+03	1.23E+04	J		YES	1.16E+04			YES	1.03E+04	J		YES
Lead	mg/kg	3.85E+01	4.00E+02	1.10E+01	J			6.88E+00				1.86E+01	J		
Magnesium	mg/kg	7.66E+02	NA	4.39E+02				4.21E+02				3.84E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	1.30E+02	J			2.18E+01				2.59E+01	J		
Mercury	mg/kg	7.00E-02	2.33E+00	5.19E-02	J			2.67E-02	J			5.58E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	5.05E+00				3.15E+00	B			4.45E+00			
Potassium	mg/kg	7.11E+02	NA	4.43E+02	J			2.75E+02	J			2.59E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				9.36E-01	J	YES		ND			
Sodium	mg/kg	7.02E+02	NA	ND				ND				ND			
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	1.73E+01				1.89E+01				1.80E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.11E+01	J			1.08E+01	J			1.17E+01	J		
VOLATILE ORGANIC COMPOUNDS															
Acetone	mg/kg	NA	7.76E+02	5.70E-02	J			NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	1.70E-03	J			NR				NR			
p-Cymene	mg/kg	NA	1.55E+03	ND				NR				NR			
PESTICIDES															
4,4'-DDT	mg/kg	NA	1.79E+00	ND				NR				NR			
Endrin	mg/kg	NA	2.32E+00	ND				NR				NR			
Heptachlor	mg/kg	NA	1.40E-01	ND				NR				NR			
Heptachlor epoxide	mg/kg	NA	6.91E-02	ND				NR				NR			
Methoxychlor	mg/kg	NA	3.89E+01	ND				NR				NR			
alpha-BHC	mg/kg	NA	1.00E-01	ND				NR				NR			
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	ND				NR				NR			
HERBICIDES															
2,2-Dichloropropanoic Acid	mg/kg	NA	2.33E+02	ND				NR				NR			

Table 5-2

**Subsurface Soil Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama**

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

^a BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

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

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

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

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 5-3

Groundwater Analytical Results
Range 31: Weapons Demonstration Range, Parcel 89Q-X
Former Defendum Field Firing Range No. 2, Parcel 215Q
Fort McClellan, Calhoun County, Alabama

Sample Location Sample Number Sample Date				HR-89Q-MW02 QU3002 17-Jul-02				HR-89Q-MW03 QU3004 15-Jul-02				HR-89Q-MW04 QU3005 16-Jul-02				HR-89Q-MW05 QU3006 23-Jul-02			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL												
METALS																			
Aluminum	mg/L	2.34E+00	1.56E+00	5.90E-02	J			8.98E-02	J			1.84E+00			YES	2.01E-01			
Barium	mg/L	1.27E-01	1.10E-01	1.95E-02				1.06E-02				1.69E-02				8.55E-03	J		
Calcium	mg/L	5.65E+01	NA	3.22E+00				2.08E+00				1.13E+01				8.67E-01	J		
Copper	mg/L	2.55E-02	6.26E-02	ND				ND				ND				8.30E-03	J		
Iron	mg/L	7.04E+00	4.69E-01	8.31E-02	J			2.23E-01	J			1.55E+00			YES	3.98E-01	J		
Lead	mg/L	8.00E-03	1.50E-02	ND				1.56E-03	J			ND				ND			
Magnesium	mg/L	2.13E+01	NA	1.30E+00				9.64E-01	J			4.71E+00				3.12E-01	J		
Manganese	mg/L	5.81E-01	7.35E-02	1.98E-01			YES	2.05E-01			YES	2.35E-01			YES	2.25E-01			YES
Potassium	mg/L	7.20E+00	NA	9.41E-01	B			ND				7.27E+00		YES		8.12E+00		YES	
Selenium	mg/L	NA	7.82E-03	ND				4.50E-03	J			ND				ND			
Sodium	mg/L	1.48E+01	NA	1.22E+00				1.02E+00	B			2.16E+00				2.70E+00			
PESTICIDES																			
4,4'-DDD	mg/L	NA	1.83E-04	NR				1.10E-04	J			NR				NR			
4,4'-DDE	mg/L	NA	1.36E-04	NR				1.40E-04	J		YES	NR				NR			
Endrin aldehyde	mg/L	NA	3.70E-05	NR				6.50E-05	J		YES	NR				NR			
Heptachlor	mg/L	NA	1.40E-05	NR				2.00E-05	J		YES	NR				NR			
Heptachlor epoxide	mg/L	NA	6.00E-06	NR				2.80E-05	J		YES	NR				NR			
EXPLOSIVES																			
RDX	mg/L	NA	6.69E-04	ND				ND				3.60E-04	J			ND			
Tetryl	mg/L	NA	1.56E-02	ND				2.10E-04	J			ND				ND			

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

^a BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama July*.

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

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

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

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

1 Ten metals were detected at concentrations exceeding ESVs: aluminum, antimony, chromium,
2 copper, iron, lead, manganese, mercury, selenium, and vanadium. Of these, six metals also
3 exceeded their respective background concentrations in one or more samples:
4

- 5 • Aluminum (16,800 to 27,200 mg/kg) exceeded its ESV (50 mg/kg) and background
6 (16,306 mg/kg) at three sample locations (HR-89Q-GP06, HR-89Q-GP13, and HR-
7 89Q-GP23).
8
- 9 • Antimony (4.72 mg/kg) exceeded its ESV (3.5 mg/kg) and UBR (2.6 mg/kg) at
10 sample location HR-89Q-GP31. The antimony result was flagged with a “B” data
11 qualifier indicating that the metal was also detected in an associated laboratory or
12 field blank sample.
13
- 14 • Copper (41 to 86 mg/kg) exceeded its ESV (40 mg/kg) and background (12.7 mg/kg)
15 at six sample locations (HR-89Q-DEP01, HR-89Q-GP04, HR-89Q-GP10, HR-89Q-
16 GP12, HR-89Q-GP13, and HR-89Q-MW05).
17
- 18 • Lead (68.3 to 299 mg/kg) exceeded its ESV (50 mg/kg) and background (40 mg/kg)
19 at 12 sample locations (HR-89Q-DEP01, HR-89Q-DEP03, HR-89Q-GP04, HR-89Q-
20 GP09, HR-89Q-GP10, HR-89Q-GP12, HR-89Q-GP13, HR-89Q-GP24, HR-89Q-
21 GP27, HR-89Q-GP36, HR-89Q-MW04, and HR-89Q-MW05).
22
- 23 • Mercury (0.15 mg/kg) exceeded its ESV (0.1 mg/kg) and background (0.08 mg/kg) at
24 one sample location (HR-89Q-DEP05).
25
- 26 • Selenium (0.89 to 2.03 mg/kg) exceeded its ESV (0.81 mg/kg) and background (0.48
27 mg/kg) at four sample locations (HR-89Q-GP17, HR-89Q-GP25, HR-89Q-GP31,
28 and HR-89Q-GP37).
29

30 ***Volatile Organic Compounds.*** Six surface and depositional soil sample locations were
31 analyzed for VOCs: HR-89Q-DEP03, HR-89Q-DEP04, HR-89Q-GP04, HR-89Q-GP09, HR-
32 89Q-GP35, and HR-89Q-MW03. A total of five VOCs (2-butanone, acetone, methylene
33 chloride, p-cymene, and toluene) were detected in the samples at concentrations below SSSLs
34 and ESVs.
35

36 ***Semivolatile Organic Compounds.*** Six surface and depositional soil sample locations were
37 analyzed for SVOCs: HR-89Q-DEP03, HR-89Q-DEP04, HR-89Q-GP04, HR-89Q-GP09, HR-
38 89Q-GP35, and HR-89Q-MW03. One SVOC (di-n-butyl phthalate) was detected at one sample
39 location (HR-89Q-GP04) at a concentration below its SSSL and ESV.
40

1 **Pesticides.** Six surface and depositional soil sample locations were analyzed for pesticides:
2 HR-89Q-DEP03, HR-89Q-DEP04, HR-89Q-GP04, HR-89Q-GP09, HR-89Q-GP35, and HR-
3 89Q-MW03. A total of four pesticides (4,4'-dichlorodiphenyldichloroethene [DDE], 4,4'-
4 dichlorodiphenyltrichloro-ethane [DDT], alpha-hexachlorocyclohexane [BHC], and gamma-
5 BHC) were detected in two of the samples. All of the pesticide results were flagged with a "J"
6 data qualifier, indicating that the compounds were detected at estimated concentrations. The
7 pesticide concentrations were below their respective SSSLs. The concentrations of two
8 pesticides exceeded their respective ESVs in one sample each:

- 9
- 10 • 4,4'-DDE (0.0035 mg/kg) exceeded its ESV (0.0025 mg/kg) at sample location HR-
11 89Q-DEP03.
- 12
- 13 • Gamma-BHC (0.00095 mg/kg) exceeded its ESV (0.00005 mg/kg) at sample
14 location HR-89Q-DEP04.
- 15

16 **Herbicides.** Six surface and depositional soil sample locations were analyzed for herbicides:
17 HR-89Q-DEP03, HR-89Q-DEP04, HR-89Q-GP04, HR-89Q-GP09, HR-89Q-GP35, and HR-
18 89Q-MW03. 2-(2-methyl-4-chlorophenoxy)propionic acid (MCPP) and 2,4-
19 dichlorophenoxyacetic acid (D) were detected in one sample each at concentrations below their
20 respective SSSLs. However, the MCPP result (1.1 mg/kg) at sample location HR-89Q-DEP04
21 exceeded its ESV (0.1 mg/kg). The MCPP result was flagged with a "J" data qualifier indicating
22 that the concentration was estimated.

23

24 **Explosives.** Two explosive compounds (2,4-dinitrotoluene and 2,4,6-trinitrotoluene) were
25 detected in one sample each at concentrations below their respective SSSLs. However, the 2,4,6-
26 trinitrotoluene result (0.95 mg/kg) at sample location HR-89Q-GP19 exceeded its ESV (0.3
27 mg/kg).

28

29 **Perchlorate.** Perchlorate was detected at one sample location (HR-89Q-MW05) at a
30 concentration below its SSSL (note: no ESV exists for perchlorate).

31

32 **5.2 Subsurface Soil Analytical Results**

33 Forty-two subsurface soil samples were collected for chemical analysis at Parcels 89Q-X and
34 215Q. Subsurface soil samples were collected at depths greater than 1-foot bgs at the locations
35 shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and
36 metals background concentrations, as presented in Table 5-2.

1
2 **Metals.** A total of 21 metals were detected in the subsurface soil samples. The concentrations
3 of eight metals (aluminum, antimony, arsenic, chromium, iron, manganese, thallium, and
4 vanadium) exceeded their respective SSSLs in one or more samples. Of these, aluminum (at 15
5 locations), antimony (HR-89Q-GP31), chromium (HR-89Q-GP05), iron (HR-89Q-GP31),
6 thallium (HR-89Q-GP31), and vanadium (HR-89Q-GP31) also exceeded their respective
7 background concentrations. The antimony result was “B”-flagged indicating that the metal was
8 also detected in a laboratory or field blank sample. Thus, the antimony detection is probably a
9 laboratory artifact rather than a site-related metal.

10
11 **Volatile Organic Compounds.** Four subsurface soil sample locations were analyzed for
12 VOCs: HR-89Q-GP04, HR-89Q-GP09, HR-89Q-GP35, and HR-89Q-MW03. A total of three
13 VOCs (acetone, methylene chloride, and p-cymene) were detected in the samples at
14 concentrations below their respective SSSLs.

15
16 **Semivolatile Organic Compounds.** Four subsurface soil sample locations were analyzed
17 for SVOCs: HR-89Q-GP04, HR-89Q-GP09, HR-89Q-GP35, and HR-89Q-MW03. SVOCs
18 were not detected in the samples.

19
20 **Pesticides.** Four subsurface soil sample locations were analyzed for pesticides: HR-89Q-
21 GP04, HR-89Q-GP09, HR-89Q-GP35, and HR-89Q-MW03. Seven pesticides (4,4'-DDT,
22 endrin, heptachlor, heptachlor epoxide, methoxychlor, alpha-BHC, and gamma-BHC) were
23 detected at only one sample location (HR-89Q-GP35) at estimated concentrations below their
24 respective SSSLs.

25
26 **Herbicides.** Four subsurface soil sample locations were analyzed for herbicides: HR-89Q-
27 GP04, HR-89Q-GP09, HR-89Q-GP35, and HR-89Q-MW03. One compound (2,2-
28 dichloropropanoic acid) was detected at one sample location (HR-89Q-GP09) at an estimated
29 concentration below its SSSL.

30
31 **Explosives.** Explosives were not detected in the subsurface soil samples.

32
33 **Perchlorate.** Perchlorate was not detected in the subsurface soil samples.

1 **5.3 Groundwater Analytical Results**

2 Four groundwater samples were collected for chemical analysis at Parcels 89Q-X and 215Q, at
3 the locations shown on Figure 3-1. Analytical results were compared to residential human health
4 SSSLs and metals background concentrations, as presented in Table 5-3.

5
6 **Metals.** Eleven metals were detected in the groundwater samples collected at the site. The
7 concentrations of three metals (aluminum, iron, and manganese) exceeded their respective SSSLs
8 but were below background values.

9
10 **Volatile Organic Compounds.** One groundwater sample (location HR-89Q-MW03) was
11 analyzed for VOCs. VOCs were not detected in the sample.

12
13 **Semivolatile Organic Compounds.** One groundwater sample (location HR-89Q-MW03)
14 was analyzed for SVOCs. SVOCs were not detected in the sample.

15
16 **Pesticides.** One groundwater sample (location HR-89Q-MW03) was analyzed for pesticides.
17 Five pesticides (4,4'-DDE, 4,4'-DDT, endrin aldehyde, heptachlor, and heptachlor epoxide) were
18 detected in the sample. All of the pesticide results were flagged with a "J" data qualifier,
19 indicating that the compounds were detected at estimated concentrations below method reporting
20 limits. The following results exceeded SSSLs:

- 21
22
- 23 • 4,4'-DDE (0.00014 milligrams per liter [mg/L]) (SSSL = 0.000136 mg/L).
 - 24 • Endrin aldehyde (0.000065 mg/L) (SSSL = 0.000038 mg/L).
 - 25 • Heptachlor (0.00002 mg/L) (SSSL = 0.000015 mg/L).
 - 26 • Heptachlor epoxide (0.000028 mg/L) (SSSL = 0.000007 mg/L).

27 **Herbicides.** One groundwater sample (location HR-89Q-MW03) was analyzed for herbicides.
28 Herbicides were not detected in the sample.

29
30 **Explosives.** A total of two explosive compounds were detected in the groundwater samples.
31 Trinitrophenylmethylnitramine (tetryl) and cyclotrimethylenetrinitramine (RDX) were detected in
32 one sample each at estimated concentrations below their respective SSSLs.

33
34 **Perchlorate.** Perchlorate was not detected in the groundwater samples.

1 **5.4 Statistical and Geochemical Evaluation of Site Metals Data**

2 Site metals were further evaluated using statistical and geochemical methods to determine if the
3 metals detected in site media are site related (Appendix H). This multi-tiered approach is
4 described in the Shaw technical memorandum “Selecting Site-Related Chemicals for Human
5 Health and Ecological Risk Assessments for FTMC: Revision 2” (Shaw, 2003). The statistical
6 and geochemical evaluation determined that copper and/or lead concentrations were anomalously
7 high in several surface soil samples and two subsurface soil samples. The concentration of
8 mercury was also judged to be anomalously high in one surface soil sample.

6.0 Summary, Conclusions, and Recommendations

Shaw completed an SI at Range 31: Weapons Demonstration Range, Parcel 89Q-X and Former Defendum Field Firing Range No. 2, Parcel 215Q at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site as a result of historical mission-related Army activities. The SI consisted of the collection and analysis of 42 surface soil samples, 5 depositional soil samples, 42 subsurface soil samples, and 4 groundwater samples. In addition, five permanent monitoring wells were installed in the saturated zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information. However, one of the wells was dry and could not be sampled.

Chemical analysis of samples collected at the site indicates that metals, VOCs, one SVOC, pesticides, herbicides, explosives, and perchlorate were detected in site media. Analytical results were compared to SSSLs, ESVs, and background screening values developed for human health and ecological risk evaluations as part of investigations performed under the BRAC Environmental Restoration Program at FTMC. Site metals data were also evaluated using statistical and geochemical methods to select site-related metals.

Constituents detected at concentrations exceeding SSSLs and background (where available) were selected as chemicals of potential concern (COPC) in site media. COPCs were aluminum in surface soil, five metals (aluminum, chromium, iron, thallium, and vanadium) in subsurface soil, and four pesticides in groundwater. The statistical and geochemical evaluation determined that the metals identified as COPCs were present at naturally occurring levels.

In groundwater, four pesticides (4,4'-DDE, endrin aldehyde, heptachlor, and heptachlor epoxide) were detected at concentrations exceeding their respective SSSLs in the one groundwater sample analyzed for pesticides. All of the pesticide results, however, were "J" flagged indicating that these compounds were detected at low estimated concentrations below method reporting limits. It should be noted that the heptachlor and heptachlor epoxide results were below their respective EPA maximum contaminant levels (MCL) for drinking water. Although no MCLs exist for 4,4'-DDE and endrin aldehyde, the detected levels of these pesticides were low and were within the same order of magnitude as their SSSLs. Given the uncertainty associated with the analytical results, the relative magnitude of the exceedances, and taking into account comparisons to

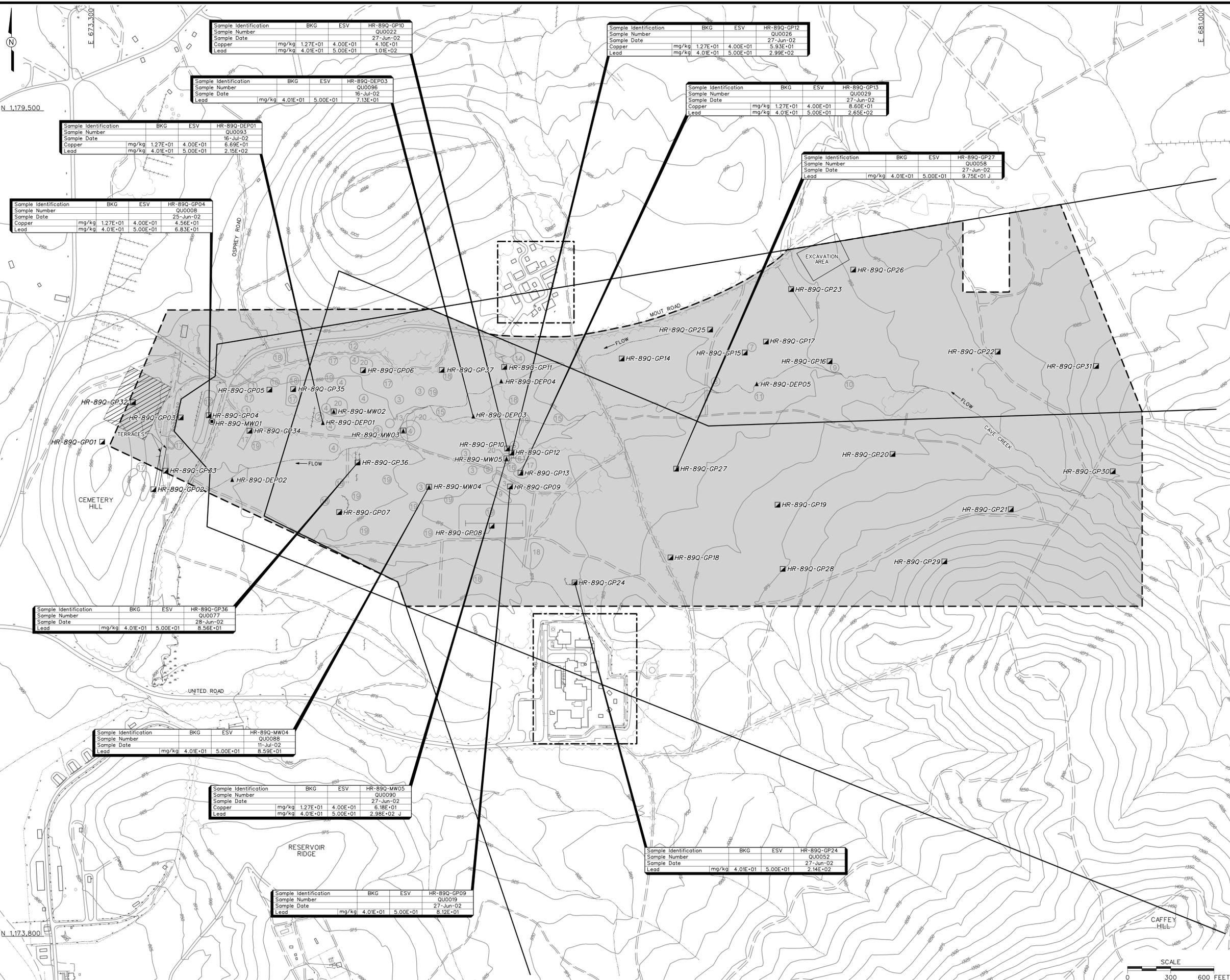
1 available MCLs, it is concluded that the pesticides in groundwater do not pose an unacceptable
2 threat to human health.

3
4 Constituents detected at concentrations exceeding ESVs and background (where available) were
5 selected as constituents of potential ecological concern (COPEC) in surface soil. COPECs were
6 five metals (aluminum, copper, lead, mercury, and selenium), one herbicide (MCP), two
7 pesticides (4,4'-DDE and gamma-BHC), and one explosive compound (2,4,6-trinitrotoluene).
8 The pesticide and herbicide COPECs were detected at low estimated concentrations in only one
9 of five samples each and do not appear to be widely distributed. Similarly, 2,4,6-trinitrotoluene
10 was detected in only one of 47 samples. Furthermore, the ESVs are highly conservative values,
11 based on either no-observed-adverse-effects levels or the most health-protective values available,
12 and are intended to be protective of the most sensitive individual ecological receptor. Based on
13 the conservatism inherent in the ESVs, the relative magnitude of the exceedances, and their
14 infrequent detection in surface soil, it is concluded that these constituents do not pose an
15 unacceptable risk to ecological receptors at this site.

16
17 The statistical and geochemical evaluation determined that the metals identified as COPECs were
18 present at naturally occurring levels except for copper and lead in several samples and mercury in
19 one sample. Although mercury was identified as anomalously high in one sample, the result
20 (0.15 mg/kg) only slightly exceeded the ESV (0.1 mg/kg). All other mercury results in soil were
21 determined to be naturally occurring and were below the ESV. Alternative ESVs for mercury are
22 presented in EPA's *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste*
23 *Combustion Facilities* (EPA, 1999). An alternative ESV based on terrestrial plant toxicity is
24 0.349 mg/kg (Panda et al., 1992) and an alternative ESV based on terrestrial invertebrate toxicity
25 is 2.5 mg/kg (Beyer et al., 1985). If these alternative ESVs are considered for mercury, then all
26 of the detected concentrations of mercury in surface soil at Range 31 were less than this
27 alternative ESV. Given the relatively small amount by which it exceeded the ESV, its infrequent
28 detection at levels above the ESV, and the fact that none of the detected values exceeded the
29 alternative ESVs, mercury is excluded as a COPEC. Lead and copper, both of which are known
30 constituents of ammunition, are retained as site-related COPECs.

31
32 Analysis of the spatial distribution of anomalously high copper and lead concentrations above
33 ESVs indicates that these metals are almost exclusively found in the western portion of the area
34 of investigation (Figure 6-1). The elevated copper and lead concentrations are located in areas
35 where targets and target-related features are present and bullet fragments are visible on the

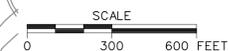
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 PROJ. NO.: 796887
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 PROJ. MGR.: J. YACOUB
 DRAFT: T. WINTON
 ENGR. CHECK: J. YACOUB
 STARTING DATE: 06/08/04
 DATE LAST REV.:
 DRAWN BY: D. BOMAR
 ENGR. CHECK: B. S. MORAN
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- LEGEND:**
- UNIMPROVED ROAD
 - PAVED ROAD AND PARKING
 - BUILDING
 - TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL - 25 FOOT)
 - TREES / TREELINE
 - PARCEL BOUNDARY
 - AREA OF INVESTIGATION
 - AWWSB WATER TANK SITE
 - SURFACE DRAINAGE / CREEK
 - MANMADE SURFACE DRAINAGE FEATURE
 - TRENCH
 - BERM
 - FENCE
 - RAILROAD
 - UTILITY POLE
 - MONITORING WELL / SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
 - SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
 - GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
 - DEPOSITIONAL SOIL SAMPLE LOCATION
 - BKG BACKGROUND
 - ESV ECOLOGICAL SCREENING VALUE
 - J COMPOUND WAS POSITIVELY IDENTIFIED; REPORTED VALUE IS AN ESTIMATED CONCENTRATION
 - mg/kg MILLIGRAMS PER KILOGRAM

- APPROXIMATE LOCATION OF OBSERVED FEATURES**
- 1 UTILITY JUNCTION BOX
 - 2 CINDER BLOCK BUILDING USED TO ASSIST MOVING TARGET. A 55-GALLON DRUM IS LOCATED SOUTHEAST OF THE BUILDING
 - 3 JEEP(S)
 - 4 ARMORED PERSONNEL CARRIER(S)
 - 5 TANK(S)
 - 6 TARGET DEPRESSION WITH FUEL TANK
 - 7 55-GALLON DRUM
 - 8 METAL CONTAINERS AND AMMO CANS
 - 9 PIT WITH STONE AROUND TOP, BRICK FOUNDATION
 - 10 STONE WALLS AND WWI ERA METAL SHRAPNEL
 - 11 35-GALLON DRUM
 - 12 CINDER BLOCK BUILDING
 - 13 RUBBLE
 - 14 DUMP TRUCK BED, TWO 5-GALLON DRUMS
 - 15 DRUM(S)
 - 16 AIR CANNISTER
 - 17 DEPRESSION(S)
 - 18 MOUND(S)
 - 19 POP-UP TARGET(S)
 - 20 AMMUNITION FRAGMENTS

FIGURE 6-1
COPPER AND LEAD RESULTS EXCEEDING
ESVs AND BACKGROUND IN SURFACE SOIL
RANGE 31 WEAPONS DEMONSTRATION
RANGE, PARCEL 89Q-X
FORMER DEFENDUM FIELD FIRING
RANGE NO. 2, PARCEL 215Q
 U. S. ARMY CORPS OF ENGINEERS
 MOBILE DISTRICT
 FORT MCLELLAN
 CALHOUN COUNTY, ALABAMA
 Contract No. DACA21-96-D-0018



1 ground, particularly in the central downrange area approximately 750 feet west of the dirt road
2 that bisects the area of investigation. The single exception is the lead result (97.5 mg/kg) at
3 sample location HR-89Q-GP27 that exceeded its ESV (50 mg/kg) and background (40 mg/kg) in
4 the eastern portion of the site.

5
6 The results of the SI indicate that historical Army activities at Parcels 89Q-X and 215Q have
7 impacted the environment. In addition, bullet fragments are present on the ground surface in
8 some areas in the western portion of the area of investigation. Copper and lead were identified as
9 site-related COPECs in surface soil but were almost exclusively found in the western portion of
10 the site in areas where targets and bullet fragments are present. Based on the spatial distribution
11 of contamination and the projected reuse of the area of investigation, the following
12 recommendations are made:

- 13
14
- 15 • For the JPA portion of the property, the available analytical data indicate that
16 historical Army activities have impacted the environment. Specifically, surface
17 soils are contaminated with certain metals (i.e., copper and lead) that are
18 constituents of small-arms ammunition. In addition, bullet fragments are present
19 on the ground surface in some areas. The levels of copper and lead do not pose a
20 threat to human health but may pose a risk to ecological receptors. Therefore,
21 Shaw recommends disposition of the property in accordance with the requirements
22 of Environmental Services Cooperative Agreement No. DASW01-03-2-0001
23 between the Army and JPA, and in accordance with Cleanup Agreement No. AL4
24 210 020 562 between ADEM and JPA.
 - 25 • For the USFWS portion of the property, the available analytical data indicate that
26 historical Army activities have not adversely impacted the environment. The
27 metals and chemical constituents detected in site media do not pose an
28 unacceptable risk to human health or the environment. Therefore, Shaw
29 recommends “No Further Action” and unrestricted land reuse with regard to
30 CERCLA-regulated hazardous substances.
 - 31 • For the AWWSB tank site, which is located at the far western end of the area of
32 investigation and does not contain visible bullets, Shaw recommends “No Further
33 Action” and unrestricted land reuse with regard to CERCLA-regulated hazardous
34 substances.
35
36
37
38
39

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

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

List of Abbreviations and Acronyms (Continued)

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

List of Abbreviations and Acronyms (Continued)

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

List of Abbreviations and Acronyms (Continued)

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

List of Abbreviations and Acronyms (Continued)

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