Final

Remedial Investigation Report
Iron Mountain Road Ranges

Skeet Range, Parcel 69Q;
Range 19, Parcel 75Q;
Range 13, Parcel 71Q;
Range 12, Parcel 70Q;
Former Rifle Grenade Range at Skeet Range, Parcel 222Q-X;
and
Former Rifle Grenade Range
North of Washington Ranges, Parcel 221Q-X

Volume I of IV: Text, Tables, and Figures

Fort McClellan
Calhoun County, Alabama

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK11, Shaw Environmental, Inc. (Shaw) completed remedial investigation (RI) activities at the Iron Mountain Road (IMR) Ranges at Fort McClellan, located in Calhoun County, Alabama. This report summarizes RI field activities, assesses the nature and extent of contamination at the IMR Ranges, presents information on contaminant fate and transport, and evaluates risks to human health and the environment. The ranges and the sizes of the parcels that comprise the IMR Ranges are as follows:

- Skeet Range, Parcel 69Q – 13 acres total and area of investigation (AOI)
- Range 19 - Qualification Pistol Range Parcel 75Q – 1,529 acres total, including extensive range safety fan; AOI limited to 12-acre area encompassing range property (i.e., firing line range floor, and impact area)
- Range 13 - Qualification Pistol Range, Parcel 71Q – 549 acres total, including extensive range safety fan; AOI limited to 5-acre area encompassing range proper
- Range 12 - Competitive Pistol Range, Parcel 70Q – 311 acres total, including extensive range safety fan; AOI limited to 5-acre area encompassing range proper
- Former Rifle Grenade Range North of Washington Ranges, Parcel 221Q-X – 5.2 acres total and AOI
- Former Rifle Grenade Range at Skeet Range, Parcel 222Q-X – 1.7 acres total and AOI.

The IMR Ranges are located in the western portion of the Main Post, east of Iron Mountain Road and south of Summerall Gate Road. The western facing slopes of Sunset Hill and the Baltzell Hills form the primary range boundary to the east. The major surface water body is Remount Creek, which flows to the north through the ranges. Several ephemeral tributaries collect surface water from the western hillsides, carrying it into Remount Creek in the IMR Range area. Except for the former rifle grenade ranges, the IMR Ranges were mostly used for small-caliber weapons training and shotgun firing and were active immediately prior to base closure. Several of the ranges were constructed on land that was previously used for other types of ordnance training; several unexploded ordnance items were identified during investigation activities. Bullets and bullet fragments are found in great quantity on the surface of many of the IMR Range impact zones. A formal visual survey of the bullet fragments has not been conducted at the IMR Ranges.

RI field activities were performed in several stages from March 2000 to May 2003. A supplemental soil boring sample was collected in February 2007 in response to Alabama Department of Environmental Management (ADEM) comments on the IMR draft RI report. A total of 120 surface and depositional soil samples, 37 subsurface soil samples, 6 groundwater samples, and 9 surface water/sediment samples were collected and analyzed from the study areas of the IMR Ranges which encompass approximately 40 acres. In addition, eight groundwater monitoring wells were installed at the IMR Ranges to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information. However, two of the wells did not produce sufficient water for sampling. Installation of a ninth well was attempted at two locations in the Skeet Range in January 2008 in response to ADEM comments on the IMR draft RI report; however, hollow-stem auger refusal was encountered at over 60 feet below ground surface prior to reaching groundwater and the well was not installed. An informal visual survey was performed at Range 19, Range 13, and Range 12 to address the horizontal extent of bullet fragments in the impact zones of these ranges. An x-ray fluorescence (XRF) survey of 40 total samples was also performed for lead in surface soil within the range safety fans. Four of these samples were sent to the laboratory for confirmation analysis. When the data are compared for all XRF surveys performed base wide, the XRF and laboratory results generally show good correlation. This is especially true in the range of lead concentrations between background (14 milligrams per kilogram [mg/kg]) to 1,000 mg/kg, with a slight positive bias in the XRF results observed.

Metals contamination in surface soil (specifically lead, antimony, arsenic, and copper) was prevalent at the Skeet Range, Range 19, Range 13, and Range 12. Many of these concentrations exceeded risk-based criteria. Concentrations of lead that exceeded risk-based criteria were also found at the Former Rifle Grenade Range, Parcel 221Q-X. At the Skeet Range, surface soil, surface water, and sediment results indicate metals contamination. In most cases, the depth of subsurface contamination does not extend more than 1 foot below the surface. At the ranges that were active until base closure, the metals contamination is confined to the portion of the range that served as the impact zone, i.e., the area downrange of the target line(s) where bullets and shot struck the surface. Bullets, bullet fragments, and shot are clearly visible on the surface in the range impact zones. Samples from Remount Creek tributaries located in the vicinity of the Skeet Range show metals contamination in sediment and surface water.

An evaluation of contaminant fate and transport concluded that antimony and lead are the only metals that exceed U.S. Environmental Protection Agency default soil screening levels for the protection of groundwater. These screening levels describe hydraulic conditions in soil between

leachate and groundwater. The metals that exceed the screening levels appear to be immobile in the subsurface environment. Lead and antimony concentrations in sediment indicate that erosion of surface soils is an active transport mechanism at the IMR Ranges and that continued transport can be expected unless mitigated.

A streamlined human health risk assessment (SRA) conducted for the RI evaluated six plausible receptor scenarios: groundskeeper, construction worker, indoor worker, youth recreational site user and resident. Source-term concentrations (STC) were conservatively estimated based on the lower of the 95 percent upper confidence limit (UCL) of the mean or the maximum detected concentration (MDC), except for lead for which the arithmetic mean concentration was adopted as the STC to be consistent with the blood lead models which are used to develop cleanup levels for this metal. The SRA concluded that lead in total soil represents a potential health threat for all receptors evaluated herein; lead is the only metal that represents a health threat to the youth recreational site user. In addition, antimony and arsenic in total soil and 2-nitrotoluene in groundwater hypothetically developed as a potable source represent a potential health threat to the construction worker and indoor worker, depending on the location of EUs. Antimony, arsenic, and three polynuclear aromatic hydrocarbons in total soil, and 2-nitrotoluene in groundwater hypothetically developed as a potable source represent a potential health threat to the on-site resident. Lead levels in surface water and sediment are not sufficient to raise concern for health effects. Soil samples with antimony and arsenic concentrations sufficient to raise health concerns are associated with lead concentrations at the higher end of the detected range.

A baseline ecological risk assessment (BERA) conducted for the RI indicated that one or more constituents in surface soil, surface water, and sediment have the potential to pose adverse effects to sensitive ecological receptors at the IMR Ranges. Because the habitats present at the IMR and Bains Gap Road (BGR) Ranges are very similar and the constituents of potential ecological concern (COPEC) present at these ranges are also very similar, a single BERA was conducted to address the potential ecological risks at both the IMR and BGR Ranges. COPECs identified in surface soil were antimony, copper, lead, and zinc. Sediment COPECs identified were arsenic, barium, copper, lead, manganese, and thallium. The only surface water COPEC at the IMR Ranges was lead. The BERA evaluated various lines of evidence collected during the RI and calculated risk-based remedial goals for each of the COPECs identified in site media. The risk-based remedial goals are intended to be protective of sensitive ecological receptors that may be present at the IMR and BGR Ranges.

Based on the results of the RI, no further investigation is required to determine the nature and extent of contamination at the IMR Ranges. Shaw recommends conducting a feasibility study to

evaluate and select a remedial alternative for the protection of human health and the environment at the IMR Ranges.

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC), located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. USACE contracted Shaw Environmental, Inc. (Shaw) (formerly IT Corporation [IT]), to conduct a remedial investigation (RI) of the Iron Mountain Road (IMR) Ranges under Contract Number DACA21-96-D-0018, Task Order CK11.

The ranges and parcels that comprise the IMR Ranges are as follows:

- Skeet Range, Parcel 69Q
- Range 19 - Qualification Pistol Range Parcel 75Q
- Range 13 - Qualification Pistol Range, Parcel 71Q
- Range 12 - Competitive Pistol Range, Parcel 70Q
- Former Rifle Grenade Range North of Washington Ranges, Parcel 221Q-X
- Former Rifle Grenade Range at Skeet Range, Parcel 222Q-X.

These ranges are located within the western portion of the FTMC Main Post in Anniston, Alabama (Figure 1-1).

These sites were initially investigated as part of the engineering evaluation and cost analysis (EE/CA) for the IMR Ranges (IT, 2001a). Further investigation of the IMR Ranges included supplemental site investigation (SI) soil and groundwater sampling, an SI at Parcel 221Q-X, and soil sampling for a baseline ecological risk assessment (BERA). This RI report summarizes the results of all the samples collected to date at the IMR Ranges.

1.1 Scope and Objectives

The scope of the original EE/CA investigation is outlined in the draft final EE/CA report. The scope of the supplemental SI is outlined in the site-specific field sampling plan (SFSP) for the IMR and Bains Gap Road (BGR) Ranges (IT, 2001b). The SFSP was prepared to provide technical guidance for sample collection and analysis at both the IMR Ranges and other BGR firing ranges. The BGR Ranges, however, will be discussed in a separate RI report. The

sampling activities for the SI at Parcel 221Q-X are presented in the final SFSP attachment for the Parcel 221Q-X SI (IT, 2001c).

The site-specific work plans were used as attachments to the installation-wide work plan (IWWP) (IT, 1998) and the installation-wide sampling and analysis plan (SAP) (IT, 2000; 2002a). The SAP includes the installation-wide safety and health plan and quality assurance plan.

The primary objectives of this RI are to determine the nature and extent of contamination at the IMR Ranges and to identify chemicals that pose an unacceptable risk to human health and the environment. It is important to note that based on similar habitats and constituents of potential ecological concern (COPEC) present at both the IMR and BGR Ranges, a single BERA was conducted in order to address potential ecological risks at both the IMR and BGR Ranges. The results of the BERA are discussed with respect to the IMR Ranges only in this report. Completion of these objectives under the Installation Restoration Program process enables the preparation of a feasibility study (FS) for the evaluation and selection of potential remedial measures. Site description and history information for FTMC and the IMR Ranges is provided below.

1.2 Site Background

The following sections provide site background information for both FTMC and the IMR Ranges, including previous investigations.

1.2.1 Fort McClellan Site Description and History

FTMC is a U. S. Army facility under the control of the U. S. Army Training and Doctrine Command that was closed under the BRAC program in September 1999. Located in northeast Alabama, near the city of Anniston in Calhoun County, FTMC consisted of three tracts of land: the Main Post, Choccolocco Corridor, and Pelham Range (Figure 1-1). The majority of development at FTMC is in the northwest area of the Main Post. The city of Anniston is located to the south and west of the Main Post; adjoining the Main Post installation to the east are the Choccolocco Mountains of the Talladega National Forest.

The Main Post, consisting of 18,929 acres, was purchased by the federal government in March 1917 for the construction of a National Guard camp (Camp McClellan). Pistol and rifle ranges were established north of the camp, automatic rifle and machine gun ranges were established southwest of the camp, and artillery firing ranges were established southeast of the camp, toward the Choccolocco Mountains. Camp McClellan expanded throughout the 1920s and 1930s. The

advent of World War II in the 1940s brought continued growth for the installation. Most notably, the 22,245 acres of Pelham Range were purchased to the west of the Main Post in early 1940 for artillery, tank, and heavy mortar firing. Approximately 4,488 additional acres to the east of the Main Post (Choccolocco Corridor) were leased from the State of Alabama to connect the Main Post to the Talladega National Forest. Choccolocco Corridor was used for various range training activities. The lease was terminated in May 1998.

The post-war period initially brought a decline in operations at FTMC. A decrease in military spending placed the installation on inactive status. However, in 1950, the installation was reinstated to active status because of the Korean Conflict. The U.S. Army Chemical School was established at FTMC in 1951; the large outdoor training areas allowed for specialized chemical training involving chemical warfare protection, decontamination procedures, flame throwers, and the operation of smoke generators. The Base hospital was renovated to specialize in chest diseases. The first permanent Women's Army Corps (WAC) training facility was established in 1955, although two previous WAC detachments had been established at the installation during the 1940s. Radiological training was conducted in the mid-1950s at Iron Mountain, Alpha Field, and Bromine Field, all located on the Main Post, as well as at Rideout Field on Pelham Range.

The mission of FTMC was changed in 1966, and it became the U.S. Army School/Training Center. An Advanced Individual Training Infantry Brigade was activated in 1966 to meet requirements for the Vietnam War. The brigade was deactivated in 1970 due to continued force reductions in Vietnam.

In 1973, the Chemical Corps School closed, along with the U.S. Army Combat Developments Command Chemical/Biological Radiological Agency. Five years later, in 1978, the WAC was disbanded and the WAC school closed.

In 1979, the Military Police School was moved to FTMC. In the same year, the U.S. Army Chemical Corps school was re-established, along with a brigade for basic training. U.S. Army Forces Command units, such as D Company, 46th Engineers, were also garrisoned at the post during the 1970s and 1980s.

The mid-1980s brought additional operations to Pelham Range, which is located approximately 2 miles northwest of Anniston. This area was used for maneuver training and a wide range of activities, from small-arms to tank and artillery training. Pelham Range has also been used for chemical decontamination and radiological training. FTMC operations were deactivated and missions completed with the installation closure on September 30, 1999.

1.2.2 Site Description and History

The IMR Ranges are located in the western portion of the Main Post, east of Iron Mountain Road and south of Summerall Gate Road. The western facing slopes of Sunset Hill and Baltzell Hills form the primary range boundary to the east. Figure 1-2 shows the location of the IMR Ranges on the FTMC Main Post.

1.2.2.1 Skeet Range, Parcel 69Q, and Former Rifle Grenade Range at Skeet Range, Parcel 222Q-X

According to the Environmental Baseline Survey (EBS), the Skeet Range was constructed in 1988 and was in operation until October 1998 (Environmental Science and Engineering, Inc. [ESE], 1998). The Skeet Range (approximately 13 acres) was built on land formerly used as a rifle grenade range (Parcel 222Q-X). The area of the former rifle grenade range, approximately 1.7 acres, is completely encompassed by the 13-acre Skeet Range and, therefore, has not been separately investigated. Base personnel used the Skeet Range for clay skeet-and-trap shooting competition. Historically, weapons fired at the range consisted of 410-gauge, 12-gauge, 20-gauge, and 28-gauge shotguns. The Archives Search Report (ASR) indicated that the Skeet Range is within the impact zone of two unexploded ordnance (UXO) ranges: the rifle grenade range (Parcel 222Q-X) and the former Combat Range #2 (USACE, 2001a). Combat Range #2 was used from the inter-war period until 1958, and the weapons used there included grenades (rifle), rockets, and machine guns. Because of prior site use and proximity to these historical ranges, UXO items (2.36-inch rockets and World War II-era rifle grenades) have been found in and around the Skeet Range area, particularly in the northern half of the range.

The site layout of the Skeet Range is shown on Figure 1-3. The range includes two sets of concrete firing lines with a total of 14 firing points, with a direction of fire to the east and southeast. The western slope of Sunset Hill (rising over 100 feet above the range floor) serves as the main impact zone for the range. The range also included three concrete block houses for throwing skeet and one concrete trap bunker, a range office, covered picnic/shelter areas, and latrines. All range structures except for the concrete firing lines have been demolished and removed since base closure. A gravel road leads from IMR to the gravel parking lot located west of the range firing lines. The Alabama Department of Transportation (ALDOT) has recently cleared the southwestern portion of the parcel in preparation for the Eastern Bypass. Appendix J includes site photographs of the Skeet Range.

1.2.2.2 Range 19, Parcel 75Q

The EBS stated that Range 19, the Qualification Pistol Range, was constructed in 1976 and was in operation until October 1998. This range was used by Army personnel as the primary small-arms training range. Historically, weapons fired at the range primarily consisted of pistol (9-millimeter [mm], .38-caliber, and .45-caliber) and shotgun rounds. The ASR reported that this range was constructed during the Vietnam War and was initially used as a 10-meter machine gun range but was later converted to small arms training. Although the ASR stated that no further action was required for UXO, some items have been found at Range 19 during investigation activities, including World War II rifle grenades in the northern portion of the range and several 37-mm projectiles found along the top of the hillside impact zone.

The total Range 19 site, including its extensive range safety fan, occupies 1,529 acres. However, the area of investigation was limited to an approximately 12-acre area encompassing the range proper (i.e., firing line, range floor, and impact area). This area is shown in detail on Figure 1-4 and includes an open firing area with gravel firing lines spaced at 7, 10, 25, and 35 meters from the target zone located against the base of the hillside (rising over 50 feet above the range floor). Army range maintenance activities introduced several cuts into the hillside, resulting in its "3-tier" appearance. The direction of fire was to the east, into the hillside.

Nine outbuildings and supporting structures were included at Range 19. These buildings, which were removed in 1999, have been identified as the site office, male and female latrines, a target house, two concrete pads/foundations that may have been former structures, covered bleachers, and sheds. Currently, no structures remain at Range 19. According to the EBS, the range office at Range 19 had an aboveground storage tank (AST) associated with it. However, no releases were identified for this site, and the EBS did not identify this AST as requiring further investigation. Site access is via a semicircular gravel road that connects the firing line area to IMR. Range 19 site photographs are included in Appendix J.

1.2.2.3 Range 13, Parcel 71Q

As described in the EBS, Range 13, the Qualification Pistol Range, was constructed in 1951 and operated until October 1998. This range was most recently used for small arms training by U.S. Marine Corps personnel stationed at FTMC. Historically, weapons fired at the range consisted of 9-mm pistols and unidentified machine guns. FTMC Base Regulation 350-2 states .22- to .45-caliber pistols, 9-mm pistols, .22-caliber rifles, and 12-gauge shotguns were fired at Range 13. Spent rifle cartridge casings have been found at Range 13, indicating some larger caliber rifle firing may have also occurred. There is some evidence that this area may have been used as a machine gun range in the 1960s. The ASR does not describe this range as a UXO area, and

UXO was not found by Shaw personnel during site investigation activities. The AST at Range 13 was a 500-gallon capacity tank used to supply No. 2 fuel oil for heating the Range 13 office. The EBS reported that an audit conducted prior to base closure found the AST to be leaking (no drip pan was present). This AST was therefore assigned the parcel designation 176(7) in the EBS for tracking and reporting purposes. Subsequent to the IMR RI, which focused on the former firing ranges, the AST at Range 13 was investigated and reported separately (Shaw, 2005). The results of the investigation indicated that the AST had not adversely impacted the environment.

The total Range 13 site, including its extensive range safety fan, encompasses 549 acres. However, the area of investigation was limited to an approximately 5-acre area encompassing the actual range proper (i.e., firing line, range floor, and impact area). Figure 1-5 displays the site details for Range 13. Range 13 included a 20-station, covered firing line that was 120 feet long and located 35 meters west of an electrified target line. The firing lines and target lines were removed from the range in 1999. The direction of fire at Range 13 was easterly, towards the target line and a small soil berm that serves as the main impact zone for this portion of the range. The small soil berm is located immediately behind the electrified target line (approximately 25 to 30 feet further downrange). Approximately 150 feet further east of the berm, a secondary impact zone is formed by the hillside. Both impact zones contain bullets and fragments on the ground surface.

Immediately to the south of the existing covered firing line, depressions were found in the soil that indicated a second covered firing line previously existed. The approximate length of this structure was 180 feet. In addition to the depressions on the ground, two large signs are located on the hillside to the east, indicating the northern and southern limits of the range. The presence of bullets and fragments on the hillside correspond to the location of these signs.

Several outbuildings and supporting structures were included at Range 13. These buildings, which were removed in 1999, have been identified as a target house, range tower, two concrete pads/foundations that may have been former structures, and sheds. Site access is via a semicircular gravel road that connects the firing line area to IMR on the north and to Range 12 on the south. The southern part of the range and the area between Range 13 and Range 12 have been used recently by USACE-Huntsville for ongoing UXO operations in the Eastern Bypass Corridor (EBC). Site photographs of Range 13 are included in Appendix J.

1.2.2.4 Range 12, Parcel 70Q

The EBS indicates that Range 12 was constructed in 1951 and was operational until October 1998. When the range was built, it was first listed as "Range 14" and was described as the "1,000-inch range." By 1967, the range was renamed Range 12, the Competitive Pistol Range. Historically, weapons fired at the range consisted of 9-mm pistols and unidentified machine guns. FTMC Base Regulation 350-2 states .22 to .45-caliber pistols, 9-mm pistols, .22-caliber rifles, and .12-gauge shotguns were fired at Range 12. Interviews conducted with long-term FTMC employees for the EBS indicated that an area around Range 12 and Range 13 was used as a machine gun range in the 1960s. A map, dated 1966, confirms the interview reports identifying a range in the vicinity of Range 12 and Range 13 as a “Machine gun range, 30 m, Basic.”

The total Range 12 site, including its extensive range safety fan, consists of 311 acres. However, the area of investigation was limited to an approximately 5-acre area encompassing the actual range proper (i.e., firing line, range floor, and impact area). Figure 1-6 displays the site details for Range 12, including a (formerly) covered concrete firing line located 35 meters from the base of the hill that serves as the main target zone/bullet impact area for the range. This firing line is 275 feet in length and parallels IMR, traversing the site north-to-south. The covering and concrete foundation has been demolished and removed from the range. Four additional firing lines, at 25 meters, 15 meters, and 7 meters from the target zone, parallel the 35-meter firing line. Nine outbuildings and supporting structures were included at Range 12. These buildings, which were removed in 1999, have been identified as latrines, a target house, two concrete pads/foundations that may have been former structures, covered bleachers, and sheds. The outbuildings at Range 12 are not known to have been heated. The main target zone/bullet impact area consists of the westerly facing slopes of Baltzell Hills rising over 100 feet above the range floor. Site access is via a semicircular gravel road that connects the firing line area to Range 13 to the north and Iron Mountain Road to the west. Much of the Range 12 area has been cleared for the EBC and has been recently reused as a staging area for UXO operations by USACE-Huntsville. Appendix J includes site photographs of Range 12.

In 2004, USACE-Huntsville completed its UXO clearance of the EBC. To facilitate property transfer from the Army to ALDOT, a soil removal action was conducted at Range 12 to address the metals-impacted site surface soils within the ALDOT property with lead concentrations above the industrial cleanup goal of 880 milligrams per kilogram (mg/kg) (Shaw, 2006). The work plan for this soil removal was prepared in August 2004. Shaw conducted the soil removal in stages from November 2004 through March 2006. A total of 5,500 cubic yards of material was excavated from an area of approximately 0.6 acre from depths ranging from 1 to 3 feet

below surface. The excavated contaminated soil was stabilized on site with portland cement, characterized, and disposed of as a special waste at the Onyx Waste Services landfill in Ragland, Alabama.

The IMR RI report was issued by Shaw as draft in April 2004 and, therefore, includes data from samples collected in the remediated area which were removed in 2004-2006. Figure 1-7 has been included in this final version of the IMR RI report to summarize the area of the ALDOT property soil removal conducted at Range 12. Figures in Chapters 2.0 and 4.0 have been edited to show the limits of the soil removal action conducted in 2004-2006. However, all of the Range 12 sample data have been used in the human health and ecological risk assessments conducted to support the IMR RI and, therefore, have not been modified to reflect the soil removal.

1.2.2.5 Former Rifle Grenade Range North of Washington Ranges, Parcel 221Q-X

According to the EBS, the sole source of information about this range is the 1946 FTMC Reservation Map. The parcel boundary outlined in the EBS is 5.2 acres and is located northeast of Range 19. The ASR described the early use of this area before World War II as part of Combat Range #2, which was later subdivided during the war into several individual training ranges. The range was abandoned by 1958. The ASR also states that "the remnants of World War II vintage rifle grenades were found northeast of Range 19 on the south side of an old service road," which corresponds to the area of Parcel 221Q-X. Currently, this area is densely wooded and contains a tributary to Remount Creek.

Figure 1-4 shows the site layout and features of the Former Rifle Grenade Range North of Washington Range. This range lies in a shallow valley between Sunset Hill (approximately 950 feet above mean sea level (amsl) to the north and the unnamed hill (approximately 950 feet amsl) located directly west of the Range 19 impact zone to the south. An unimproved service road accessible from the Range 19 parking area provides access to Parcel 221Q-X. This road leads southeast towards the southern edge of Range 16.

1.2.3 Previous Investigations

An EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). 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 the following seven criteria:

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)

2. Areas where only release or disposal of petroleum products has occurred

3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response

4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken

5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken

6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented

7. Areas that are not evaluated or require further evaluation.

For non-Comprehensive Environmental Response, Compensation, and Liability Act (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 for 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 (PCB)
- R = Radon (in buildings)
- RD = Radionuclides/radiological issues
- X = UXO
- CWM = Chemical warfare material.

All the IMR Ranges were classified as CERFA Category 1 Qualified parcels in the EBS. Category 1 parcels are areas where no storage, release, or disposal (including migration) has occurred; however, the parcels were qualified because chemicals of potential concern may be present as a result of historical range activities. Parcels 221Q-X and 222Q-X were also assigned the “X” designation for potential UXO.

The EBS was conducted in accordance with the CERFA protocols (CERFA-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), 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.

The Former Rifle Grenade Range North of Washington Ranges, Parcel 221Q-X was originally investigated by Shaw as part of the Ranges West of Iron Mountain Road SI (IT, 2000b; 2001c). Shaw collected surface soil, subsurface soil, and depositional soil samples at this range. One surface soil sample (HR-221Q-GP01) contained lead at a concentration of 531 mg/kg. Supplemental sampling, consisting of four 10-foot step-out surface soil samples, was performed to the north, south, east, and west of the original location. Two of the four supplemental samples, GP01E and GP01W, contained 987 and 4,210 mg/kg of lead, respectively. Because the lead contamination in soil at Parcel 221Q-X is located near the IMR Ranges, the FTMC BRAC Cleanup Team (BCT) agreed in August 2002 to include this parcel in the IMR Range RI/FS.

As stated in Section 1.2.2.4, a soil removal was conducted at Range 12 subsequent to the RI fieldwork at IMR and the preparation of the draft RI report. The removal was successful in addressing the metals contamination in the ALDOT property of Range 12. Several additional figures have been added to this RI report to reflect the removal action; however, the geochemical evaluation and risk assessments have been performed using all the data collected, including those that were formerly located in the remediated area of Range 12.

1.3 Report Organization

This RI report is organized as follows:

- ***Chapter 1.0 – Introduction.*** This chapter provides site description and history information for FTMC and the IMR Ranges.
- ***Chapter 2.0 – Study Area Investigation.*** This chapter summarizes the RI field activities conducted by Shaw at the IMR Ranges, including environmental sampling and analysis and monitoring well installation.

- ***Chapter 3.0 – Physical Characteristics of Study Area.*** This chapter describes the physical characteristics of the IMR Ranges, including demography and land reuse, meteorology, physiography, sensitive environments, soils, geology, and hydrogeology.

- ***Chapter 4.0 – Nature and Extent of Contamination.*** This chapter summarizes the analytical results and compares data with human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values (BSV) to assess the nature and extent of contamination and probable sources.

- ***Chapter 5.0 – Contaminant Fate and Transport.*** This chapter evaluates the chemical and physical properties of the site-related chemicals identified in Chapter 4.0. It also describes potential migration mechanisms, contaminant persistence, and contaminant migration.

- ***Chapter 6.0 – Streamlined Human Health Risk Assessment.*** This chapter presents the results of the streamlined human health risk assessment (SRA), including the conceptual site exposure model (CSEM), chemicals of potential concern (COPC), exposure and toxicity assessments, and risk characterization.

- ***Chapter 7.0 – Baseline Ecological Risk Assessment.*** This chapter presents a summary of the baseline ecological risk assessment (BERA), including the environmental setting, constituents of potential ecological concern, results of toxicity tests and food web models, and presentation of risk-based remedial goals (RBRG).

- ***Chapter 8.0 – Summary, Conclusions, and Recommendations.*** This chapter summarizes the major conclusions of the RI report and provides recommendations for further action.

- ***Chapter 9.0 – References.*** This chapter lists the references cited in this RI report.

2.0 Study Area Investigation

This chapter summarizes site characterization activities conducted by Shaw during the field investigation activities at the IMR Ranges, including environmental sampling and analysis and groundwater monitoring well installation.

2.1 Unexploded Ordnance Avoidance

UXO avoidance was performed at the IMR Ranges following methodology outlined in the SAP. Shaw UXO personnel used a low-sensitivity magnetometer to perform a surface sweep of the parcels prior to site access. After the sites were cleared for access, sample locations were monitored by UXO personnel following procedures outlined in the SAP.

2.2 Environmental Sampling

The environmental sampling performed during the field investigation of the IMR Ranges included the collection of surface soil and depositional soil samples, subsurface soil samples, groundwater samples, surface water samples, and sediment samples for chemical analysis. The sample locations were determined by observing physical characteristics during a site walkover, including a visual survey of surficial bullet fragments and by reviewing historical documents.

The limits of investigation for the IMR Ranges were determined based on historical documentation, physical features (including topography, firing lines, impact areas, targets, berms, etc.), presence of visible bullets and bullet fragments, and site reconnaissance conducted in preparation for the RI. These ranges have well-defined firing lines and impact areas and are generally bounded by significant topographic relief in the impact areas which limit the potential extent of contamination resulting from munitions training to the well-defined impact areas. A great deal of work has been conducted with regard to small arms firing ranges and the nature and extent of contamination resulting from their use, and is summarized in a clear and concise fashion in the Interstate Technology and Regulatory Council (ITRC) (2003) guidance document. This ITRC report provides detailed descriptions of the distance, direction, depth, and other characteristics of the nature and extent of contamination expected to occur at different types of small arms firing ranges. This guidance document (in conjunction with the site-specific information described earlier) provides much of the general rationale for the design and conduct of many of the contaminant characterization studies carried out at the IMR Ranges, specifically, and FTMC in general.

The fieldwork was conducted in stages from March and April 2000 through May 2003. In response to comments from ADEM on the draft RI report, Shaw attempted to install an additional monitoring well in a downgradient location at the Skeet Range in 2007. Shaw tried in two nearby locations, but both borings were unsuccessful because auger refusal and bedrock were encountered. In February 2008, Shaw did collect a subsurface soil sample (HR-69Q-MW03-DS-BGR002-REG) at this location and analyzed the sample for nitroaromatic and nitramine explosives and target analyte list (TAL) metals. The data from this sample have been included in the final revision of this RI report, including geochemical evaluation, lines of evidence (Chapter 4.0), fate and transport, and human health risk assessment.

Table 2-1 summarizes the different IMR sampling events and Table 2-2 summarizes the number and type of samples collected and the analytical program. As shown in Table 2-2, many samples were analyzed only for lead or TAL metals, which are the primary suspected chemicals of concern (COC) at the IMR Ranges. Select samples were submitted for additional analyses to assess other potential COCs, including target compound list (TCL) volatile organic compounds (VOC), TCL semivolatile organic compounds (SVOC), nitroaromatic and nitramine explosive compounds, chlorinated and organophosphorus pesticides, chlorinated herbicides, PCBs, perchlorate, and cyanide. Soil pH and total organic carbon (TOC) measurements were also performed. Additional analyses were performed on impact zone sample locations where high concentrations of lead were suspected and in range support areas where organic solvents may have been used for gun cleaning and maintenance. The additional analyses were conducted on a limited number of samples because these constituents are not expected to be present at weapons firing ranges.

Bullets and fragments are found in dense concentrations in the impact areas of the IMR Ranges. Lead is by far the primary constituent of bullets and is expected to be present in the highest concentrations in environmental media. Other metals can reasonably be assumed to be collocated with lead. Therefore, in an effort to keep investigation costs lower, a number of samples were analyzed for lead only. The main objective of the RI was to define both the nature and extent of contamination at the IMR Ranges. Therefore, the full TAL metals analyses were targeted in the high-lead concentration impact areas in order to define the “nature” of the contamination present. Lead-only analysis was most commonly used in the peripheral range areas to help define the “extent” of contamination.

2.2.1 Surface Soil and Depositional Soil Sampling

A total of 120 surface soil and depositional soil samples were collected from 113 sampling locations at the IMR Ranges, as summarized in Table 2-2. Soil sampling locations are shown on

Figures 2-1 through 2-4. Sampling locations were determined in the field by the on-site geologist based on sampling rationale, presence of surficial bullet fragments, site features, and topography. Depositional soil samples were collected at proposed surface water/sediment sample locations if water was not present in the stream at the time of collection.

A detailed description of the sample location rationale is presented in the SFSP for the IMR and BGR Ranges (IT, 2001b), a summary of which is provided below.

Skeet Range Sample Location	Rationale
SAR-69-SS26, SAR-69-SS08, SAR-69-SS33, SAR-69-SS01, SAR-69-SS02	Upgradient of firing points
SAR-69-SS07, SAR-69-SS25, SAR-69-SS05, SAR-69-SS04, SAR-69-SS06, SAR-69-SS39, SAR-69-SS03	Firing points
SAR-69-SS11, HR-69Q-SS01, SAR-69-SS34, SAR-69-SS13, SAR-69-SS10, SAR-69-SS29, SAR-69-SS35, SAR-69-SS14, SAR-69-SS27, SAR-69-SS15, SAR-69-SS36, SAR-69-SS17, SAR-69-SS18, SAR-69-SS30, SAR-69-SS40, SAR-69-SS20, SAR-69-SS32, SAR-69-SS31, SAR-69-SS37, SAR-69-SS21, SAR-69-SS38, SAR-69-SS22, SAR-69-SS23, SAR-69-SS24	Potential shotfall areas
SAR-RC-DEP12, HR-69Q-DEP01, SAR,RC-DEP08, SAR-RC-DEP11	Depositional soil samples where water was not present in drainage feature

Range 19 Sample Location	Rationale
SAR-75-SS04, SAR-75-SS14, SAR-75-SS03, SAR-75-SS02, SAR-75-SS01	Upgradient of firing lines
SAR-75-SS15, SAR-75-SS13, SAR-75-SS19, SAR-75-SS12, SAR-75-SS11	Firing lines
SAR-75-SS05, SAR-75-SS06, HR-75Q-SS03, SAR-75-SS18, SAR-75-SS07, HR-75Q-SS02, SAR-75-SS20, SAR-75-SS08, SAR-75-SS09, SAR-75-SS17, HR-75Q-SS01, SAR-75-SS16, SAR-75-SS10, HR-221Q-GP03, HR-221Q-GP02, HR-221Q-GP01, HR-221Q-GP01N, HR-221Q-GP01E, HR-221Q-GP01S	Potential impact areas
HR-221Q-DEP02, HR-221Q-DEP01	Depositional soil samples where water was not present in drainage feature

Range 13 Sample Location	Rationale
SAR-71-SS18, SAR-71-SS03, SAR-71-SS02, SAR-71-SS19, SAR-71-SS01, SAR-71-SS13	Upgradient of firing lines
SAR-71-SS17, SAR-71-SS14	Firing lines
SAR-71-SS12, SAR-71-SS11, SAR-71-SS15, SAR-71-SS10, SAR-71-SS09, SAR-71-SS16, SAR-71-SS21, SAR-71-SS08, SAR-71-SS06, SAR-71-SS07, SAR-71-SS05, SAR-71-SS20, HR-71Q-SS01, SAR-71-SS04	Potential impact areas
SAR-RC-DEP02	Depositional soil samples where water was not present in drainage feature

Range 12 Sample Location	Rationale
SAR-70-SS02, SAR-70-SS01, SAR-70-SS15, SAR-70-SS11, SAR-70-SS10	Upgradient of firing lines
SAR-70-SS03, SAR-70-SS12, SAR-70-SS08, SAR-70-SS09	Firing lines
SAR-70-SS13, SAR-70-SS14, HR-70Q-SS02, SAR-70-SS04, SAR-70-SS05, SAR-70-SS06, SAR-70-SS16, HR-70Q-SS01, SAR-70-SS07	Potential impact areas

Sample Collection. Surface soil samples were collected from 0 to 1 foot below ground surface (bgs) using a stainless-steel hand auger, following the methodology specified in the SAP. Prior to collecting the surface soil samples, surface debris (e.g., rocks, vegetation, or bullet fragments) was removed from the immediate sample area. The soil was then collected with the sampling device and screened with a photoionization detector (PID) in accordance with procedures outlined in the SAP. A portable x-ray fluorescence (XRF) instrument was used to screen the soil samples for lead and copper during the BERA sampling.

Samples for VOC analysis were collected directly from the sampler using three EnCore® samplers. The remaining portion of the soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 2-2 using methods outlined in Section 2.4.

2.2.2 Subsurface Soil Sampling

A total of 37 subsurface soil samples were collected at the IMR Ranges, as shown on Figures 2-1 through 2-4. Soil boring sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surficial bullet fragments, and site topography.

Sample Collection. Subsurface soil samples were collected from soil borings at depths greater than 1 foot bgs in the unsaturated zone. The soil borings were advanced and soil samples collected using either a direct-push technology sampling system or a stainless-steel hand auger, following procedures specified in the SAP. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 2-2 using methods outlined in Section 2.4.

Subsurface soil samples were collected continuously to a maximum depth of 12 feet bgs or until sampler refusal was encountered. Samples were screened using a PID to measure for volatile organic vapors, mainly as a health and safety measure to ensure the protection of sampling personnel. If the PID indicated the presence of volatile organic vapors in the subsurface environment, the soil sample displaying the highest reading was selected and sent to the

laboratory for analysis. However, at those locations where PID readings were below background, the deepest soil sample interval up to a maximum depth of 12 feet bgs and above the saturated zone was submitted for analysis. Samples for VOC analysis were collected directly from the sampler with three EnCore samplers. The remaining portion of the soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The samples were analyzed for the parameters listed in Table 2-2 using methods outlined in Section 2.4. The on-site geologist constructed a detailed boring log for each soil boring (Appendix B).

At the completion of soil sampling, boreholes were abandoned with bentonite pellets and hydrated with potable water following borehole abandonment procedures summarized in the SAP.

2.2.3 Monitoring Well Installation

Eight monitoring wells (six residuum wells and two bedrock wells) were installed at the IMR Ranges to collect groundwater samples for laboratory analysis. Monitoring wells HR-69Q-MW01 and HR-69Q-MW02 were relocated because the UXO technicians were unable to safely access the proposed locations due to heavy surface and subsurface anomalies. Therefore, the two wells were relocated approximately 100 feet north of their proposed locations. Additionally, an attempt was made to install a ninth residuum well (HR-69Q-MW03) at the Skeet Range; however, the well was not installed because hollow-stem auger refusal was encountered at 63 feet bgs prior to reaching groundwater. The well locations are shown on Figures 2-1 through 2-4. Table 2-3 summarizes construction details of the monitoring wells installed at the site. The well construction logs are included in Appendix B. Variance reports documenting field changes are included in Appendix E.

2.2.3.1 Residuum Monitoring Wells

Shaw contracted Miller Drilling Company to install the six residuum wells using a hollow-stem auger and/or air rotary rig. The wells were installed following procedures outlined in the SAP. The placement of each residuum monitoring well was outlined in the rationale tables in the final site-specific work plans. The rationale for monitoring well installation including projected depths were repeatedly discussed throughout the duration of the project by the BCT members and later presented in the final work plans prior to initiating field work. The wells were installed within the first water-bearing zone encountered. It should be noted that some monitoring wells were concentrated within areas of visible lead contamination (i.e. impact areas, etc.) However, final residuum well locations were determined in the field by the on-site geologist and/or site manager, based on actual field observations, site topography, and UXO clearance.

The borehole at each well location was advanced with a 4¼-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone encountered or until auger refusal. A 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect geologic materials for observing and describing lithology. Air rotary drill cuttings were described in detail when an air rig was used because of hollow-stem auger refusal. The samples and cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geologic and hydrogeologic information. Soil characteristics were described using the "Burmeister Identification System" described in Hunt (1986) and the Unified Soil Classification System as outlined in the American Society for Testing and Materials (ASTM) Method D2488 (ASTM, 2000). Lithological logs are included in Appendix B.

Upon reaching the target depth in each borehole, a 15- or 20-foot length of 2-inch ID, 0.010-inch continuous slot, Schedule 40 polyvinyl chloride (PVC) screen with a PVC end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A filter pack consisting of Number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 5 feet above the top of the screen as the augers were removed. At well locations HR-70Q-MW02 and HR-75Q-MW03, the filter pack included a layer of extra fine filter sand (Number 0) placed on top of the Number 1 filter sand. A bentonite seal, consisting of approximately 5 feet of bentonite pellets, was placed immediately on top of the filter pack and hydrated with potable water. In wells where the bentonite seal was installed below the water table surface, the bentonite pellets were allowed to hydrate in the groundwater. Bentonite seal placement and hydration followed procedures in the SAP. Bentonite- cement grout was tremied into the remaining annular space of the well from the top of the bentonite seal to ground surface. A well cap was placed on the PVC riser. A locking protective steel casing was placed around the top of the PVC well casing, and a cement pad was constructed around the wellhead.

During drilling and well installation activities at HR-75Q-MW01 and HR-75Q-MW04, groundwater was encountered at depths of 28 and 29 feet bgs respectively. The well screens were installed with 15-foot screen sections (i.e. 21-36 feet and 23-38 feet) in the first water-bearing zone encountered. During drilling activities, groundwater was generally encountered in very stiff to hard laminated silty clay residuum. Static groundwater levels summarized in Table 2-4 are approximately 22 feet above the depth to water data from the boring logs for HR-75Q-MW01 and HR-75Q-MW04 (Appendix B). This indicates that the groundwater has an upward

vertical hydraulic head and is likely under semiconfined conditions. It should be noted that severe drought conditions existed in the Alabama area from 2000 to 2002, which would coincide with the time frame of the installation of the wells (September 2001). The water levels in Table 2-4 were recorded approximately 22 months after the wells were installed in June 2003.

2.2.3.2 Bedrock Monitoring Wells

Shaw contracted Miller Drilling Company to install the bedrock monitoring wells. The wells were installed following the procedures outlined in the SAP. The placement of each bedrock well was outlined in rationale tables in the final site-specific work plan. The rationale for monitoring well installation including the projected depths was repeatedly discussed throughout the duration of the project by the BCT members and later presented in the final work plan before initiating field work.

Two bedrock monitoring wells (locations HR-69Q-MW02 and HR-70Q-MW02) were installed at the IMR Ranges using a combination of hollow-stem auger, rock coring, and air rotary drilling techniques. The borehole at each well location was advanced with a 4¼-inch ID hollow-stem auger from ground surface to the depth of auger refusal. A 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect geologic materials for observing and describing lithology. The split-spoon samples were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. At the depth of auger refusal, an air rotary rig with a 12¼-inch rotary bit was used to ream the borehole and install 8-inch ID carbon steel International Pipe Standard outer casing into the borehole from ground surface to approximately 5 feet into bedrock.

At well location HR-69Q-MW02, after installing the 8-inch outer casing, an attempt was made to continue with rock coring. However, because of borehole collapse, the borehole was reamed with a 7⅞-inch air percussion bit and a 6-inch ID carbon steel International Pipe Standard inner casing was installed to 85.5 feet bgs. The borehole was advanced from the bottom of the inner casing to the target depth using a 7⅞-inch air percussion bit. A minimum of 2 inches of annular space was maintained between the outer casing and the borehole wall. The 8-inch outer casing and 6-inch inner casing (at HR-70Q-MW02) were grouted in place using a tremie pipe suspended in the annular space. The grout cured for a minimum of 48 hours. At well HR-70Q-MW02, a PQ wireline core barrel was used to collect core samples continuously beneath the outer casing depth to the target depth of the borehole. After completion of core sample collection, a 7⅞-inch air percussion bit was used to ream the borehole to the target depth. Both bedrock cores were described as outlined in USACE South Atlantic Division Manual DM 1110-1-1 (USACE, 1983).

Upon reaching the target depth in each borehole, a 10-foot section of threaded, flush joint, 0.010-inch continuous wrap 2-inch (HR-69Q-MW02) or 4-inch (HR-70Q-MW02) PVC well screen and end cap was installed through the casing at each borehole location. The screen and end cap were attached to a 2-or 4-inch ID, flush threaded, Schedule 40 or Schedule 80 PVC well riser. After the riser and screen material were lowered into the boring, a filter pack was installed around the well screen. The filter pack, consisting of Number 1 and Number 0 filter sand, was tremied into place from the bottom of the borehole to approximately 5 feet above the top of the screen. A bentonite seal, approximately 15 feet thick, was placed on top of the filter pack. The remaining annular space was grouted with a bentonite-cement mixture seal. After adequate time was allowed for the bentonite-cement grout to set, a locking protective steel casing was placed over the PVC well riser and a concrete pad was constructed around the wellhead. Four protective steel posts were installed around the well pad. The well construction logs are included in Appendix B.

2.2.3.3 Well Development

The wells were developed by surging and pumping with a submersible pump in accordance with methodology outlined in the SAP. The submersible pump used for well development was moved up and down the water column to encourage any residual well installation materials to enter the well. These materials were then pumped out of the well to re-establish the natural hydraulic flow conditions. Development continued until the water turbidity was equal to or less than 20 nephelometric turbidity units or for a maximum of 8 hours (for the residuum monitoring wells) or 12 hours (bedrock monitoring wells). The well development logs are included in Appendix C.

2.2.4 Groundwater Sampling

Groundwater samples were collected from six of the eight monitoring wells installed at the IMR Ranges. The wells at two locations (HR-70Q-MW02 and HR-75Q-MW03) did not produce sufficient water for sampling. The well/groundwater sample locations are shown on Figures 2-1 through 2-4. The samples were analyzed for the parameters listed in Table 2-2 using methods outlined in Section 2.4.

Sample Collection. Groundwater sampling was performed following procedures outlined in Section 6.1.1.5 and Attachment 5 of the SAP. The specific groundwater sample collection methodology is summarized in three standard operating procedures (SOP) included in Attachment 5. The SOPs cover the equipment requirements, well purging procedures, and stabilization criteria and include a sample decanting procedure. In most cases, groundwater was sampled after purging of a minimum of three well volumes and after field parameters (i.e.,

temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction potential [Eh], and turbidity) stabilized. Purging was performed using a peristaltic or bladder pump equipped with Teflon™ tubing. Sampling was performed with either the pump or a Teflon bailer. Peristaltic pump samples for VOC analysis were collected via the "tube evacuation" method. Field parameters were measured using a calibrated water quality meter, as summarized in Table 2-5. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 2-2 using methods outlined in Section 2.4.

2.2.5 Water Level Measurements

The depth to groundwater was measured in the permanent wells at the IMR Ranges and in select wells at surrounding parcels on June 26, 2003, following procedures outlined in the SAP. Depth to groundwater was measured with an electronic water level meter. The meter probe and cable were cleaned after use at each well following decontamination methodology presented in the SAP. Measurements were referenced to the top of the PVC well casing. A summary of groundwater level measurements for the IMR Ranges and adjacent parcels is presented in Table 2-4.

2.2.6 Surface Water Sampling

Nine surface water samples were collected at the IMR Ranges at the locations shown on Figure 2-5. The sampling locations were determined in the field, based on the drainage pathways of ditches, creeks, and other field observations.

Surface water sampling locations were identified based on the goal of assessing both upstream and downstream locations with respect to each individual range and also assessing "worst-case" conditions within each range study area. Upstream and downstream sampling locations were used to assess surface water conditions flowing onto a specific range and also flowing from a specific range. These samples can be used to determine the contaminant contribution to surface water from each individual range. Also, if a surface water body was located within the study area of a specific range, surface water sampling locations were identified where contaminants were most likely encountered (i.e. in close proximity to impact areas or where surface drainage from the impact areas entered the stream channel). A summary of the surface water sample location rationale is provided below.

Sample Location	Rationale
SAR-RC-SW01	Remount Creek upstream of Range 12 and all of IMR Ranges
SAR-RC-SW03	Remount Creek downstream of Range 12 and upstream of Range 13

Sample Location	Rationale
SAR-RC-SW04	Remount Creek downstream of Range 13 and upstream of Range 19
SAR-RC-SW05	Remount Creek downstream of Range 19 and upstream of Skeet Range
SAR-RC-SW06	Tributary running through shotfall area of Skeet Range
SAR-RC-SW07	Upstream location on tributary running through shotfall area of Skeet Range
SAR-RC-SW09	Tributary running through shotfall area of Skeet Range
SAR-RC-SW10	Tributary running through shotfall area of Skeet Range
SAR-RC-SW13	Remount Creek downstream of Skeet Range

Sample Collection. The surface water samples were collected by dipping a stainless-steel pitcher in the water and pouring the water into the appropriate sample containers, following procedures in the SAP. The samples were collected after field parameters had been measured using a calibrated water quality meter. All surface water samples were unfiltered; therefore, the results reflect total constituent concentrations. Surface water field parameters are summarized in Table 2-5. The sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 2-2 using methods outlined in Section 2.4.

2.2.7 Sediment Sampling

Sediment samples were collected from the same nine locations where surface water samples were collected at the IMR Ranges (Figure 2-5). Sampling locations were determined in the field, based on drainage pathways and actual field observations.

Sample Collection. Samples were collected from the upper 0.5 foot of sediment with a stainless-steel spoon and placed in a stainless-steel bowl following procedures outlined in the SAP. The sample was then homogenized and placed in the appropriate sample containers. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 2-2 using methods outlined in Section 2.4.

2.2.8 X-Ray Fluorescence Soil Screening

A total of 40 XRF soil screening samples were collected in the range safety fans associated with the IMR Ranges. These samples were collected in an area approximately 1,737 acres in size consisting of the combined range fan area of Range 19, Range 13, and Range 12. The XRF soil screening locations are shown on Figure 2-6. A calibrated, field portable XRF instrument (Niton 722S) was used to analyze the surface soil samples. Daily calibration checks were performed, including the analysis of a silica sand blank and three standard reference materials (SRM) of

prepared soil with certified metals concentrations. SRMs were purchased from the National Institute of Standards and Technology and contained lead at concentrations ranging from 432 to 5,532 mg/kg. XRF-measured lead concentrations of the SRMs had differences of less than 25 percent from the certified concentration before any sample analysis was performed.

The sample locations were surveyed using a global positioning system. Following the Shaw SOP for XRF sampling and analysis, the samples were collected from the top 2 inches of soil using a stainless-steel trowel and placed into an aluminum pan. Any remaining leaf litter, gravel, or debris was removed and the sample was homogenized in the pan by mixing. The pan was folded to accommodate the XRF instrument and a measurement was made directly on the prepared surface. When the analysis was complete, the lead concentration was recorded and the soil sample was placed in a resealable plastic bag for on-site archival.

XRF and Laboratory Confirmation Sampling. Ten percent of the XRF soil screening samples (four total samples) were selected for confirmation analysis at a fixed-base laboratory (EMAX Laboratories, Inc.) using EPA Method 6010B for lead. Samples containing the highest and the lowest concentrations of lead were selected for confirmation. Once selected, the archived portion of the field sample was air dried, crushed with a ceramic pestle, and passed through a standard No. 10 sieve (2-mm pore size) and reanalyzed with the XRF. The prepared sample results generally agreed with the original pan sample (less than 10 percent difference) and those results were substituted into the data set to replace the pan sample. The prepared soil was transferred into a clean 120-mm, clear glass, wide-mouth sample container, labeled, and shipped to EMAX under standard chain-of-custody.

Confirmation Data Evaluation. Because the number of XRF confirmation samples were so few for any specific scope of work, during the ADEM review of the draft RI report for IMR Ranges, ADEM requested that Shaw prepare an XRF to laboratory comparison summary to present the lead results of <u>all</u> the XRF confirmation samples collected to date at FTMC.

At the time of the preparation of the final IMR RI report, from 2001 to 2009, a total of 93 locations were analyzed for lead in the field using XRF and analyzed in the laboratory. The following text evaluates the data from all 93 locations.

Data Distribution. It should be noted the XRF was never used to generate data used in risk assessments. XRF data were used to determine the presence or absence of significant contamination in areas that were suspected of being devoid of contamination (i.e. range safety fans) to confirm that additional sampling and analyses were not needed in these areas and to

identify hot spots in areas of known or suspected contamination (i.e. impact areas). However, to place the range of XRF-measured values in context to better understand their distribution, the following summarizes key concentrations for lead data evaluation:

- Surface soil BSV - 40.05 mg/kg
- ESV - 50 mg/kg
- Residential human health SSSL - 400 mg/kg
- Recreational site user SSSL - 7,600 mg/kg.

If these levels are compared to the XRF confirmation sample concentrations, 23 results (25 percent) are less than the BSV; 28 results (30 percent) are less than the ESV; 71 results (76 percent) are less than the residential SSSL; and all results are less than the recreational site user SSSL. This distribution is somewhat biased towards the lower end of concentration scale because most of the XRF surveys at FTMC have been conducted to support range safety fan investigations where very low concentrations of lead are expected.

A total of 81 locations (87 percent) have lead values less than 1,000 mg/kg. Those remaining samples greater than 1,000 mg/kg were collected from range impact areas and, therefore, likely contain particulate lead. The presence of particulate lead directly leads to an increase of the variability among the analytical results because of the increased heterogeneity and the resulting biased distribution of lead particles in the analyzed sample aliquots.

Linear Regression Models. In a comparison summary of XRF data to laboratory confirmation data, increased variability due to particulate lead in only one or two samples can bias the entire comparison in a significantly negative way. To compensate for this, Shaw has prepared two data comparison figures. Figure 2-7 shows the comparison of all 93 sample data points as a simple linear regression. Figure 2-8 is also a linear regression model, but only displays the 81 results which were between the XRF reporting limit (RL) (approximately 14 mg/kg) and 1,000 mg/kg. Regression analysis on Figure 2-7 indicates a coefficient of determination (R^2) value of .7355 for all data, while on Figure 2-8, an R^2 value of .8877 is obtained using the smaller data set. In this kind of simple regression, a perfect relationship would be expressed by an R^2 value of 1.000. Therefore, a “good” relationship is reflected in Figure 2-7 for all values, and a “better” relationship is shown in Figure 2-8 for those values below 1,000 mg/kg.

Kendall’s Tau. Another statistical test was used to evaluate correlation using the data from the XRF and laboratory confirmation samples. Kendall’s tau is a nonparametric correlation coefficient intended to measure “strength of relationship.” Strength of relationship is generally

defined as the strength of the tendency of two variables, X and Y, to move in the same (opposite) direction. A value of "+1" indicates that the agreement between the two rankings is perfect (i.e., the two rankings are the same). A value of "-1" indicates the disagreement between the two rankings is perfect (i.e., one ranking is the reverse of the other) and a value of "0" indicates the rankings are completely independent. The Kendall's tau value for the complete set of XRF and laboratory results (93 total results) is 0.873, which confirms the linear regression model conclusion that the XRF and laboratory confirmation data are statistically in agreement and exhibit a strong relationship.

Relative Percent Difference. In addition to the regression data analysis, Shaw also calculated the relative percent difference (RPD) between paired XRF and laboratory confirmation results to determine how well they agree. Table 2-6 summarizes this comparison. As shown on Table 2-6, the range of RPDs from all 93 pairs of data varies from 0 to 137 percent, with an average RPD of 27 percent and standard deviation (σ) of 26 percent. When RPD is examined over the range of XRF-measured lead concentrations and broken out into the four groupings discussed in the earlier paragraph, it is evident that RPD increases in the range of values on the lowest end ("less than 50 mg/kg" – average RPD of 33 percent, σ of 30 percent) and the highest end ("greater than 1,000 mg/kg" – average RPD of 38 percent, σ of 42 percent). Values in the middle groupings, "greater than 50 but less than 400 mg/kg" (average RPD of 20 percent, σ of 17 percent) and "greater than 400 but less than 1,000 mg/kg" (average RPD of 29 percent, σ of 18 percent), showed the lowest average differences and lowest standard deviations.

This trend is expected as variability of the measurement increases at the lowest concentrations and variability of the sample increases at the highest concentrations. This distribution of calculated RPDs supports the conclusion that, for samples in the range of values that is most important for the RIs conducted, the percent differences are manageable and reasonable. The relatively small differences between XRF and laboratory-measured values, especially in the important middle value range, supports XRF data usability.

Assessing Potential XRF Bias. Using the slope/intercept data shown on the regression with the best linear relationship (Figure 2-8), it appears that the y-intercept for the regression line shows a computed laboratory concentration of -23.8 mg/kg when the x-axis value (the XRF result) would equal true "zero." This indicates that the XRF results are overall slightly elevated when compared to the laboratory method. This is somewhat expected because the XRF analysis uses x-rays to cause all metals present in the sample window to fluoresce during an analysis. Laboratory method SW-846 6010B relies on an acid digestion preparation step (SW-846, 3050B), and the preparation will have less than 100 percent extraction efficiency.

Conclusion. Figures 2-7 and 2-8 show quite clearly that, with the exception of a few samples in the upper end of the concentration range, the majority of samples correlate quite well. Evidence of this relationship is further supported by the Kendall's tau evaluation. In addition to the overall relationship of the data types, when the RPD of the paired values are also considered, especially in the range of values of interest (near the lead ESV and SSSL values), the individual results taken in total also support the conclusion that the XRF methodology is yielding data that are directly comparable to the laboratory method. Both the XRF and laboratory data agree that the XRF has been completely successful in differentiating samples with lower level lead concentrations from those with high concentrations.

It is important to realize that these lead measurements take two fundamentally different analytical approaches to quantify the concentrations present, and differences between the results are to be expected. For a field method, the XRF-measured data should be considered usable for their intended purpose to generate nondefinitive screening-level data, and therefore, specifically for the IMR Ranges, the safety fan survey is complete.

2.3 Surveying of Sample Locations

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

2.4 Analytical Program

Samples collected during the field investigations at the IMR Ranges were analyzed for various chemical parameters based on the potential site-specific chemicals and on EPA, ADEM, FTMC, and USACE requirements. Target analyses included the following parameters:

- TCL VOCs – EPA Method 8260B
- TCL SVOCs – EPA Method 8270C
- TAL metals – EPA Method 6010B/7000
- Chlorinated pesticides – EPA Method 8081A
- Chlorinated herbicides – EPA Method 8151A
- Organophosphorous pesticides – EPA Method 8141A
- Nitroaromatic/nitramine explosives – EPA Method 8330
- PCBs – EPA Method 8082
- Lead – EPA Method 6010B
- Cyanide – EPA Method 9012

- Perchlorate – EPA Method 314.0
- pH – EPA Method 8040A
- TOC – EPA Method 9060.

Some samples were analyzed only for lead or TAL metals, explosives, and perchlorate. Select samples were analyzed for a broader list that included selected organic compounds, cyanide, perchlorate, pH, and TOC. All samples were analyzed using EPA SW-846 methods, including Update III methods where applicable, as presented in the SAP.

2.5 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses are listed in the SAP. Sample documentation and chain-of-custody records (Appendix A) were completed as specified in the SAP.

Completed analysis request and chain-of-custody records were included with each shipment of sample coolers to either Quanterra Environmental Services in Knoxville, Tennessee, or to EMAX Laboratories, Inc. in Torrance, California. Split samples were shipped to the USACE South Atlantic Division Laboratory in Marietta, Georgia.

2.6 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in the SAP. IDW generated during the field investigations at the IMR Ranges 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 in a fenced area surrounding the FTMC Environmental Management office prior to characterization and disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analysis (EPA Method 1311) using the procedures described in the IDW management plan in the SAP. Based on the results, drill cuttings, spent well materials, and personal protective equipment generated during the RI were disposed as nonhazardous waste at either the Industrial Waste Landfill on the Main Post of FTMC (for waste disposed of before September 30, 2001) or at the Three Corners Landfill in Piedmont, Alabama (for waste disposed of after September 30, 2001).

Liquid IDW was contained in the sump associated with the former Directorate of Engineering and Housing Compound and/or in portable tanks. Liquid IDW was characterized by VOC, SVOC, and metals analyses using the ADEM-approved procedure described in the IDW management plan in the SAP. Based on the analytical results, liquid IDW was discharged on the ground surface as nonhazardous, nonregulated waste or sent to the city of Anniston wastewater treatment plant for disposal.

2.7 Variances/Nonconformances

Five variances to the SFSPs were recorded during completion of the RI at the IMR Ranges. These variances did not alter the intent of the investigation nor the sampling rationale presented in work plans. Copies of the variance reports are included in Appendix E.

No nonconformances were recorded during completion of field activities at the IMR Ranges.

2.8 Data Quality

The field sample analytical data are presented in tabular form in Appendix F. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the site-specific work plans; the FTMC SAP and quality assurance plan; and standard, accepted methods and procedures. Data were reported and evaluated in accordance with USACE Atlantic Savannah Level B criteria (USACE, 2001b) and the stipulated requirements for the generation of definitive data as described in the SAP. Chemical data were reported via hard copy data packages by the laboratory using Contract Laboratory Program-like forms.

It is noted that the method detection limits (MDL) for some constituents analyzed in the BGR RI samples are above one or more of the various screening criteria developed for FTMC. Early in the FTMC investigation planning process under the BRAC program, the BCT, consisting of representatives from ADEM, EPA, and the Army, specifically discussed the issue of analytical methods and detection limits and how the method selection would impact investigations at FTMC. Shaw prepared extensive comparison tables showing both the laboratory reporting limits and MDLs routinely achievable for the methods specified in the FTMC SAP and quality assurance plan (primarily EPA's SW-846 methods) and how those limits compared to the background screening values, SSSLs, and ESVs. As a result of the evaluation, the BCT agreed that: 1) the Army should be proactive and use the best available analytical technology and 2) that the methods proposed in the SAP/ quality assurance plan were generally acceptable for use to meet investigation objectives without incurring unreasonable time or cost impacts. The data presented in this report follow these two guiding principles. Although it is recognized that this

issue remains a small source of uncertainty for certain chemical constituents, the data presented in this report, except where qualified during data validation, meet the principal data quality objective for this investigation.

Data Validation. The reported analytical data were validated in accordance with EPA National Functional Guidelines by Level III criteria. The results of the data validation are summarized in the data validation summary report (Appendix G). Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC Shaw Environmental Information Management System database for tracking and reporting. The data presented in this report, except where qualified, meet the principle data quality objective for this investigation.

3.0 Physical Characteristics of Study Area

The physical characteristics of the IMR Ranges are important to understanding the current nature and extent of contamination and the future transport of contaminants. These characteristics can be described in terms of demography and land reuse, meteorology, physiography, sensitive environments, soils, geology, hydrology, and hydrogeology.

3.1 Demography and Land Reuse

FTMC includes 45,679 acres of government-owned and formerly leased land situated in the foothills of the Appalachian Mountains of northeast Alabama. The post is located in Calhoun County (population 112,249), approximately 60 miles northeast of Birmingham (population 242,820), approximately 75 miles northwest of Auburn (population 42,987), and approximately 90 miles west of Atlanta, Georgia (population 416,474). The city of Anniston (population 24,276) adjoins the Main Post on the south and east. The city of Weaver (population 2,619) is located approximately 1 mile northwest of the Main Post, and the city of Oxford (population 14,592) is approximately 5 miles south of Anniston (Science Applications International Corporation [SAIC], 2000; U.S. Census Bureau, 2000). In Calhoun County, 5 percent of the total labor force is in the armed forces. Of the civilian labor force, the top five industries in which people are employed are educational, health, and social services (19.3 percent); manufacturing (18.4 percent); retail trade (12.2 percent); construction (7.6 percent); and professional, scientific, management, administrative, and waste management services (7.1 percent) (U.S. Census Bureau, 2000).

Projected land reuse for FTMC and the IMR Ranges is presented in the *Fort McClellan Comprehensive Reuse Plan* (EDAW, Inc., 1997). The IMR Ranges are adjacent to and included in the ALDOT planned Eastern Bypass Corridor project. Other projected reuse activities for the IMR Ranges include passive recreation and development reserve (Figure 3-1).

3.2 Meteorology

FTMC is situated in a temperate, humid climate. Summers are long and hot, and winters are usually short and mild to moderately cold. The climate is influenced by frontal systems moving from northwest to southeast, and temperatures change rapidly from warm to cool due to the inflow of northern air. The average annual temperature is 63 degrees Fahrenheit (^{o}F). Summer temperatures usually reach 90°F or higher about 70 days per year, but temperatures above 100°F are rare. Freezing temperatures are common in winter but are usually of short duration. The first frost may arrive by late October. Snowfall averages 0.5 to 1 inch. On rare occasions, several

inches of snow accumulate from a single storm. At Anniston, the average date of the first 32°F temperature is November 6, and the last is March 30. This provides a growing season of 221 days (ESE, 1998).

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

Winds in the FTMC area are seldom strong and frequently blow from the northwest. However, there is no truly persistent wind direction. Normally, only light breezes or calm prevail, except during passages of cyclonic disturbances, when destructive local wind storms develop, some into tornadoes, with winds of 100 miles per hour or more.

3.3 Physiography

All of FTMC except for the easternmost portion of the Choccolocco Corridor lies within the Valley and Ridge Physiographic Province. The easternmost portion of the Choccolocco Corridor lies within the Piedmont Physiographic Province. Local relief on the Main Post of FTMC is in excess of 1,320 feet. The lower elevations (700 feet amsl) occur along Cane Creek, near Baltzell Gate Road, while the maximum elevations (2,063 feet amsl) occur on Choccolocco Mountain, with the steep easterly slopes grading abruptly into Choccolocco Valley. The western slopes are more continuous, with the southern extension near the western reservation boundary maintaining elevations up to 900 feet amsl. The northern extension decreases in elevation in the vicinity of Reilly Airfield. The central portion of FTMC is characterized by flat to gently sloping land (SAIC, 2000).

IMR Ranges firing line areas are relatively flat, with the range impact zones formed by natural hillsides with a maximum elevation of approximately 900 to 1,000 feet amsl. Remount Creek is present in all of the IMR Ranges and flows to the north along the eastern shoulder of IMR. Primary topographic and surface water features at the IMR Ranges are shown on Figure 3-2.

3.4 Sensitive Environments

3.4.1 Wetlands

A study conducted by Foster Wheeler in 1996 estimated over 3,000 acres of wetlands within FTMC. Major wetland communities were originally characterized and mapped in 1984. However, regulatory criteria for identifying wetlands have significantly changed since this original study was performed. Consequently, USACE performed a supplementary study in 1992 to identify larger wetland complexes (Reisz Engineering, 1998). The following are recognized wetland communities located within FTMC (Reisz Engineering, 1998): Bottomland Hardwoods, Depressions, Mixed Shrub Communities, Shrub Depression, and Herbaceous Wetlands.

Wetland habitats at FTMC are generally located in various topographical depressions, near stream seepage, and in valleys along creek floodplains (Roy F. Weston, Inc., 1990; SAIC, 1993). The indicator plant species that assist in defining a wetland include water oaks, sweet gum, bulrush, needlerush, and cattail. The Main Post, Pelham Range, and Choccolocco Corridor have an abundance of wetlands representing important habitats for a wide variety of plants and animals. The major wetland communities found on the Main Post are the Marcheta Hill Orchard Seep, Cane Creek Seep, South Branch of Cane Creek, and approximately 200 acres that comprise the tributary to Victoria Creek near Reilly Airfield (Garland, 1996; USACE, 1992). The major Pelham Range wetland communities occur along the banks of Cane Creek, Willett Spring, and Cabin Creek Spring (Alabama Department of Conservation and Natural Resources, 1994a,b). Additionally, wetland habitat potentially exists around the installation's lakes, namely, Reilly Lake, Lake Conteras, Yahou Lake, and Lake Willett, and along the nearly 10 miles of creeks, namely, Cane Creek and Cave Creek (Roy F. Weston, Inc., 1990).

No designated wetland areas are located within the IMR Ranges. The closest designated wetland area is approximately 3,000 feet north of the site, along Cave Creek (IT, 2002a).

3.4.2 Sensitive Habitats

FTMC operated under the guidelines of the Endangered Species Act of 1973, the regulations of the U.S. Fish and Wildlife Service (USFWS), Army Regulation 200-3, and the Endangered Species Management Plan (ESMP) (Garland, 1996). The overall objectives of the ESMP are to sustain the existing habitat that supports populations of species identified in the ESMP and to promote the augmentation of these species into unoccupied land that has similar habitats.

The ESMP identifies 11 Special Interest Natural Areas (SINA) on the Main Post. SINAs are locations where the habitat fosters one or more rare, threatened, or endangered species. Because

these species are sensitive to environmental degradation, SINAs require management practices that promote the continued well being of these ecosystems. According to the ESMP, the 11 SINAs located on the Main Post include the following:

- Mountain Longleaf Community Complex
- Cave Creek Seep
- Moorman Hill Mountain Juniper
- Frederick Hill Aster Site
- Bains Gap Seep
- Marcheta Hill Crow-Poison Seep
- Marcheta Hill Orchid Seep
- South Branch of Cane Creek Seep
- Stanley Hill Chestnut Oak Forest
- Reynolds Hill Turkey Oak
- Davis Hill Honeysuckle.

No SINAs are located within the IMR Ranges. The closest SINA is Reynolds Hill Turkey Oak, which is approximately 2,500 feet south of Range 12 (IT, 2002a).

3.4.3 Threatened and Endangered Species

Rare species deserving unofficial protection and management measures in the state of Alabama are inventoried and ranked by the Alabama Natural Heritage Program. The sensitivity of these rare species to environmental degradation is used to gauge the well-being of the habitat as a whole. Two species of fauna listed by the USFWS as endangered or threatened have been recorded on FTMC. They are the gray bat (*Myotis grisescens*), which uses the Cane Creek Corridor as foraging habitat, and the blue shiner (*Cyprinella caerulea*), located within the Choccolocco Creek watershed. An additional endangered species, the red-cockaded woodpecker, historically has inhabited the installation.

Remount Creek in the vicinity of the IMR Ranges has been classified as providing low quality foraging habitat for gray bats (Garland, 1996). This classification is based on the gray bat's preference for feeding on insects over open water. However, due to the ephemeral nature of Remount Creek at the IMR Ranges, water is quite often only present in the winter and spring months, during periods of higher precipitation. During the fall and winter, gray bats hibernate in caves and do not forage. Therefore, gray bats could occur at FTMC only during the periods of the year when water may be present in Remount Creek at the IMR Ranges, and when they are not hibernating. Additionally, the construction of the Eastern Bypass has removed most of the tree cover preferred by gray bats as they travel from their roosting caves to their foraging locations. Therefore, Remount Creek in the vicinity of the IMR Ranges no longer provides

suitable foraging habitat for gray bats, and gray bats are not expected to occur in the vicinity of the IMR Ranges.

The ephemeral nature of Remount Creek in the vicinity of the IMR Ranges and the heavy siltation that the creek receives from the clear-cut bypass corridor make the presence of blue shiners in Remount Creek at the IMR Ranges unlikely. Although historical records indicate the presence of red cockaded woodpeckers at FTMC, the last remaining active cluster of red cockaded woodpeckers at FTMC was recorded in 1968. Subsequent surveys in 1972, 1982, and 1985 failed to find any red cockaded woodpeckers at FTMC. Thus, it can be concluded that red cockaded woodpeckers no longer exist at FTMC.

3.5 Soils

The soil associations found at FTMC (U.S. Department of Agriculture [USDA], 1961), include the following:

- ***Anniston-Allen, Decatur-Cumberland.*** Alluvium, resulting from weathering of older residual soils developed from sandstone, shale, and quartzite; deep, well-drained, level to moderately steep soils in valleys underlain by limestone and shale. Subsoil is dark red sandy clay loam. Cumberland and Decatur soils are dark reddish brown gravelly loam developed from weathered limestone.

- ***Rarden-Montevallo-Lehew.*** Moderately deep or shallow soils on ridgetops and steep slopes and in local alluvium in draws. Soils are developed from the residuum of shale and fine-grained, micaceous sandstone; reddish brown to dark gray-brown to yellow-brown silt loam, clay, or silty clay.

- ***Stony Rough Land.*** Shallow, steep, and stony soils formed from the weathering of sandstone, limestone, and Talladega Slate. Infiltration is slow; the soils contain many boulders and fragments with clayey residuum. This association underlies a large portion of the Main Post at FTMC.

Site-Specific Soils. Two soil types and one miscellaneous land type are mapped at the IMR Ranges. The Anniston and Allen gravelly loam is mapped across the majority of Range 19 and the eastern third of the Skeet Range. The Jefferson stony fine sandy loam is mapped across the remaining portion of the Skeet Range and along Remount Creek in portions of Ranges 13 and 19. The Stony rough land sandstone is mapped across all of Range 12 and almost all of Ranges 13 and 19, with the exception of the aforementioned portions of these ranges (USDA, 1961) (Figure 3-3).

The Anniston and Allen gravelly loam is developed in old alluvium on the foot slopes and alluvial fans at the base of larger hills in the region. The surface soil ranges in color from very

dark grayish brown to dark reddish gray and dark reddish brown. The subsoil consists of a dark reddish gray and dark reddish brown clay or silty clay loam (USDA, 1961).

The Jefferson stony fine sandy loam is developed from old local alluvium derived from quartzite, sandstone, and shale. The surface soil is dark grayish brown and the subsoil consists of yellowish-brown, fine sandy clay. Cobble-size pieces of sandstone and quartzite are commonly found on the surface and throughout the soil profile (USDA, 1961).

The Stony rough land sandstone miscellaneous land type is found in rugged areas with steep relief where outcrops of sandstone and quartzite bedrock are common. The soil material consists of only a thin veneer of loose rock fragments and scattered patches of sandy soil (USDA, 1961).

3.6 Geology

The regional geology in the vicinity of FTMC and site-specific geology at the IMR Ranges are discussed in the following sections.

3.6.1 Regional Geology

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

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

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

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

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

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

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post, as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated, thinly interbedded grayish-red-purple mudstone, shale, and siltstone and greenish red and light gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962; Osborne and Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga

Formation is composed of dark gray, finely to coarsely crystalline, medium- to thick-bedded dolomite with minor shale and chert (Osborne, et al., 1989).

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 consists 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 Jacksonville 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 toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also

of Mississippian age, which consists of thin-bedded, fissile, brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale based on fossil data.

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

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

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

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

3.6.2 Site-Specific Geology

The IMR Ranges are located along the southwestern portion of the FTMC geologic window. Most of the IMR Ranges are underlain by the Shady Dolomite and the undifferentiated Chilhowee Group of the Jacksonville thrust sheet. However, the western half of the Skeet Range and the western boundary of Range 19 are located within the geologic window and are underlain by the undifferentiated Floyd and Athens Shale and/or the undifferentiated Ordovician Little Oak and Newala Limestones (Figure 3-4). Besides the Jacksonville fault, which frames the FTMC geologic window, two additional thrust faults and an inferred fault were mapped within the IMR Ranges. The two thrust faults strike northeast-southwest, one crossing the southwest corner of Range 19 and the other crossing Ranges 12 and 13. The inferred fault parallels Remount Creek from just south of Range 19 through Ranges 12 and 13. The direction of movement associated with the inferred fault is unknown.

Two geologic cross sections were constructed from the drilling and bedrock coring data collected during the investigations at the IMR Ranges and at adjacent Training Area T-5, Parcel 182(6), and Parcel 232Q-X. The locations of the geologic cross sections are shown on Figure 3-4 and the cross sections are presented on Figures 3-5 and 3-6. The geologic data collected show alluvium and colluvium underlying a majority of the IMR Ranges. The alluvial and colluvial materials generally consisted of light brown to brown to reddish brown to yellowish orange gravelly, sandy, silt and clay or gravelly, sand and clay. The gravel found within these soils generally consisted of rounded to subangular pieces of quartzite, sandstone, and chert.

Residuum was generally present beneath the alluvium and colluvium and varied depending on the parent material and degree of weathering. The residuum found underlying the alluvium and colluvium of all the IMR Ranges, except the western half of the Skeet Range and western

boundary of Range 19, was derived from the Shady Dolomite and/or the undifferentiated Chilhowee Group. This residuum consisted of a yellowish orange to light brown to brown to reddish brown, soft to stiff, laminated, sandy, silt and clay or hard laminated silt and clay with minor amounts of sand and gravel. Gravel in this residuum was generally sub-angular to angular and consisted of quartzite, sandstone, and siltstone. The residuum underlying the western half of the Skeet Range and the western Boundary of Range 19 was derived from the undifferentiated Little Oak and Newala Limestones and the undifferentiated Floyd and Athens Shale. This residuum was primarily composed of yellowish orange to light brown to brown to light to dark gray silty clay, which grades into a weathered shale or limestone.

Competent bedrock was only encountered at two monitoring wells at the IMR Ranges (HR-69Q-MW02 and HR-70Q-MW02). The bedrock encountered at HR-69Q-MW02 was moderately hard, slightly weathered, crystalline, medium light gray limestone consistent with the undifferentiated Little Oak and Newala Limestones. The bedrock encountered at HR-70Q-MW02 was hard to very hard, moderately weathered, highly fractured, light brown fine-grained sandstone and quartzite consistent with members of the undifferentiated Chilhowee Group.

A large clay-filled void was encountered in undifferentiated Little Oak and Newala Limestone bedrock at a depth ranging from approximately 59 to 77 feet bgs at HR-69Q-MW02. Slickensides were noted on fracture surfaces in both bedrock cores, providing evidence for the faulting in this area. Appendix B contains the boring logs and well completion diagrams.

3.7 Surface Water Hydrology

The regional surface water hydrology in the vicinity of FTMC and site-specific surface water hydrology at the IMR Ranges are discussed in the following sections.

3.7.1 Regional Surface Water Hydrology

Portions of three drainage basins (Cane Creek, Choccolocco Creek, and Tallasseehatchee Creek) are found within the Main Post of FTMC. All three of these drainage basins eventually empty into the Coosa River, approximately 16 miles west of the Main Post. Figure 3-7 is a map showing the surface water hydrology and drainage basins of the Main Post and Choccolocco Corridor.

The Choccolocco Mountains located in the eastern portion and the Skeleton Mountains located in the southern portion of the Main Post form a major surface water divide. East of the Choccolocco Mountains, FTMC consists of a narrow strip called Choccolocco Corridor, which extends approximately 3.5 to 4 miles from the mountains across the floodplain of Choccolocco

Creek to the base of Rattlesnake Mountain. Choccolocco Creek and its tributaries drain all of Choccolocco Corridor and the eastern and southernmost portions of the Main Post (Figure 3-7). The Choccolocco Creek drainage basin covers approximately 7.5 square miles of the Main Post.

On the western side of Choccolocco Mountains are the Cane Creek and Tallasseehatchee Creek drainage basins (Figure 3-7). The headwaters of the Cane Creek drainage basin originate in the Choccolocco Mountains and flow west through the main cantonment. Cane Creek has four named tributaries within the Main Post: Cave Creek, Remount Creek, South Branch of Cane Creek, and Ingram Creek. Although Cave Creek is a tributary to Cane Creek, it occurs as a separate drainage basin within the confines of the Main Post. Cave Creek eventually joins Cane Creek off post east of the unincorporated development of Sherman Heights, near McMinn Airfield. Cane Creek and its tributaries receive surface runoff from the central portion of the Post and exit the reservation at Baltzell Gate. Cave Creek and its unnamed tributaries drain the north-central portion of the Main Post. Cave Creek exits the Main Post near the unincorporated development of Sherman Heights. The on-post drainage area of the Cane Creek basin covers approximately 19.6 square miles.

The Tallasseehatchee Creek drainage basin drains the northernmost portion of the Main Post (Figure 3-7). Most of the surface runoff from this portion of the Main Post collects in unnamed tributaries to Reilly Lake. Reilly Lake empties into Dothard Creek, a tributary to the Tallasseehatchee, and exits the Main Post northwest of Reilly Airfield. The Tallasseehatchee drainage basin covers approximately 2.5 square miles of the Main Post.

Most surface water bodies are fed, at least in part, by fresh water springs. Fresh water springs occur abundantly on installation lands, often appearing along the trace of thrust faults. Karst features, including developed caves and sinkholes, have been identified in the FTMC area (SAIC, 2000).

Fresh water marshes are located along Cane Creek; most are limited to the cumulatively larger downstream watershed of Pelham Range. Only one major marsh area, the 25-acre marsh near Reilly Lake, occurs on the Main Post (SAIC, 2000).

3.7.2 Site-Specific Surface Water Hydrology

The IMR Ranges are located within the western portion of the Main Post within the Cane Creek Drainage Basin. The IMR Ranges are drained by Remount Creek and some of its headwater tributaries. The streams in the IMR Ranges are generally ephemeral, draining seasonal runoff from winter and spring rain events, and are often dry during the summer and fall. Surface water

in these creeks have a net flow direction towards the north. Remount Creek empties into Cane Creek within the main cantonment of FTMC near Baltzell Gate (Figure 3-7).

3.8 Hydrogeology

The regional hydrogeology in the vicinity of FTMC and site-specific hydrogeology at IMR Ranges are discussed in the following sections.

3.8.1 Regional Hydrogeology

The hydrogeology of Calhoun County has been investigated by the Geologic Survey of Alabama (Moser and DeJarnette, 1992) and the U.S. Geological Survey in cooperation with the General Services Administration (Warman and Causey, 1962) and ADEM (Planert and Pritchette, 1989). Groundwater near FTMC occurs in residuum derived from bedrock decomposition along fault zones within fractured bedrock and from the development of karst frameworks. Groundwater flow may be estimated to be toward major surface water features. Areas with well-developed residuum horizons may subtly reflect the surface topography, but the groundwater flow direction also may exhibit the influence of pre-existing structural fabrics or the presence of perched water horizons on unweathered ledges or impermeable clay lenses.

Precipitation and subsequent infiltration provide recharge to the groundwater flow system in the region. The main recharge areas for the aquifers in Calhoun County are located in the valleys. The ridges generally consist of sandstone, quartzite, and slate, which are resistant to weathering, relatively unaffected by faulting and, therefore, relatively impermeable. The ridges have steep slopes and thin to no soil cover, which enhances runoff to the edges of the valleys (Planert and Pritchette, 1989).

The thrust fault zones typical of the county form large storage reservoirs for groundwater. Points of discharge occur as springs, effluent streams, and lakes. Coldwater Spring is one of the largest springs in the state of Alabama, with a discharge of approximately 32 million gallons per day. This spring is the main source of water for the Anniston Water Department, from which FTMC purchases its water. The spring is located approximately 5 miles southwest of Anniston and discharges from the brecciated zone of the Jacksonville Fault (Warman and Causey, 1962).

Shallow groundwater on FTMC occurs principally in the residuum developed from Cambrian sedimentary and carbonate bedrock units of the Weisner Formation and Shady Dolomite and locally in lower Ordovician carbonates. The residuum may yield adequate groundwater for domestic and livestock needs but may go dry during prolonged dry weather. Bedrock

permeability is locally enhanced by fracture zones associated with thrust faults and by the development of solution (karst) features.

Two major aquifers were identified by Planert and Pritchette (1989): the Knox-Shady and Tuscumbia-Fort Payne aquifers. The continuity of the aquifers has been disrupted by the complex geologic structure of the region, such that each major aquifer occurs repeatedly in different areas. The Knox-Shady aquifer group occurs over most of Calhoun County and is the main source of groundwater in the county. It consists of the Cambrian- and Ordovician-aged quartzite and carbonates. The Conasauga Formation is the most utilized unit of the Knox-Shady aquifer, with twice as many wells drilled as any other unit (Moser and DeJarnette, 1992).

Regional groundwater flow in the bedrock was approximated for the FTMC vicinity by the U.S. Geological Survey (Scott, et al., 1987). Regional groundwater elevation ranged from 800 feet amsl on the main Base to about 600 feet amsl to the west on Pelham Range, based on water depths in wells completed across multiple formations. Groundwater elevation contours suggest that regional groundwater flow is from the Main Post northwest toward the city of Weaver; however, there is not enough groundwater data to support this interpretation. Scott, et al. (1987) concluded that the groundwater surface broadly coincides with the surface topography and that the regional aquifers are hydraulically connected. Groundwater flow on a local scale may be more complex and may be affected by geologic structures such as shallow thrust faults, rock fracture systems, and karst development in soluble formations.

3.8.2 Site-Specific Hydrogeology

Three separate water-bearing zones were identified beneath the IMR Ranges: shallow residuum, deep residuum, and bedrock. The shallow residuum water-bearing zone was encountered across all of the IMR Ranges at depths ranging from 21 to 47 feet bgs. The deep residuum water-bearing zone was encountered only at Range 19 in one well, HR-75Q-MW03. In bedrock wells, a water-bearing zone was encountered at the Skeet Range, Parcel 69Q (monitoring well HR-69Q-MW02), but was absent or dry at Range 12, Parcel 70Q (monitoring well HR-70Q-MW02).

Static groundwater levels were measured in monitoring wells at the IMR Ranges on June 26, 2003 (Table 3-1). A potentiometeric surface map (Figure 3-8) was constructed for the shallow residuum water-bearing zone. As shown on Figure 3-8, contours depicting groundwater flow across the shallow water-bearing zone are contoured to follow the local topography to the west-northwest toward Remount Creek. Calculated horizontal hydraulic gradients ranged from 0.02 to 0.25 feet per/foot (ft/ft) with an arithmetic mean of 0.13 ft/ft (Table 3-2). Bedrock was not encountered during drilling activities at Ranges 13 and 19, and the bedrock monitoring well at

Range 12 (HR-70Q-MW02) was dry. Therefore, a potentiometric surface map for the bedrock water-bearing zone was not constructed. Hence, a vertical hydraulic gradient was only calculated at the Skeet Range, which revealed a gradient of 0.006 ft/ft for well pair HR-69Q-MW01 and HR-69Q-MW02 (Table 3-3).

The weak downward hydraulic gradient within well pair HR-69Q-MW01 and HR-69Q-MW02 suggests the shallow and bedrock water-bearing zones are interconnected in the area of the Skeet Range. However, the absence of groundwater beneath the shallow water-bearing zone at Ranges 12 and 13 and the difference in hydraulic head between the shallow and deep residuum water-bearing zones at Range 19 may suggest little communication with a deeper aquifer system in these areas. This is likely due in part to a hard laminated silty clay interval, which forms an aquitard between the shallow and deeper water-bearing zones in these areas. The difference in the hydraulic head between wells HR-75Q-MW01 and HR-75Q-MW04 is significant, as shown in Table 3-1 for data collected January 2002 and November 2001. Please note that the horizontal difference between HR-75Q-MW01 and HR-75Q-MW04 appears to be approximately 300 feet on Figure 3-8.

Review of a spring inventory map for Calhoun County (Moser and DeJarnette, 1992) did not reveal the presence of springs in the vicinity of the IMR Ranges. In addition, no springs or seeps were identified by Shaw at the IMR Ranges. However, based on the hydrologic and hydrogeologic setting of the IMR Ranges, the presence of seasonal seeps and small springs is likely.

4.0 Nature and Extent of Contamination

This chapter discusses the nature and extent of contamination at the IMR Ranges, including the results of the sampling and analysis activities conducted at the site. In addition, information is provided on potential sources of contamination.

4.1 Summary of Analytical Results

The results of the chemical analysis of samples collected at the IMR Ranges indicate that metals, VOCs, SVOCs, pesticides, herbicides, nitroaromatic explosive compounds, and PCBs were detected in site media. To help evaluate the nature and extent of contamination at the site, the analytical results were compared to background screening values, human health SSSLs, and ESVs for FTMC.

Early in the FTMC investigation planning process, the BCT discussed the analytical methods and detection limits and how the method selection would impact the investigation. Shaw prepared extensive comparison tables showing both the RLs and method detection limits routinely achievable for the methods specified in the FTMC base-wide SAP/quality assurance project plan (QAPP) and how those limits compared to proposed BSVs, SSSLs and ESVs. The BCT agreed that 1) the Army should use be proactive and use the best available analytical technology and 2) the methods proposed in the SAP/QAPP were generally acceptable for use to meet investigation objectives. All the data included in this RI report follow these two guiding principles.

The SSSLs and ESVs were developed by Shaw as part of the human health and ecological risk evaluations associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs, ESVs, and polynuclear aromatic hydrocarbon (PAH) background screening values are presented in the final human health and ESV and PAH background summary report (IT, 2000c). The PAH BSVs were developed by Shaw at the direction of the BCT to address the occurrence of PAH compounds in surface soils as a result of anthropogenic activities at FTMC. Background metals screening values are presented in the final background metals survey report (SAIC, 1998). In addition to comparing sample values against the background metals survey, an integrated statistical and geochemical evaluation of metals in soil, sediment, surface water, and groundwater was performed for the IMR Ranges and is included in Appendix H. Complete human health and ecological risk assessments are provided in Chapters 6.0 and 7.0, respectively, of this report.

The following sections and Tables 4-1 through 4-7 summarize the results of the comparison of detected constituents to the BSVs, SSSLs, and ESVs. Complete analytical results are presented in Appendix F.

4.1.1 Surface and Depositional Soil Analytical Results

A total of 120 surface and depositional soil samples were collected for chemical analysis from 113 sample locations at the IMR Ranges. Surface and depositional soil samples were collected from the uppermost foot at the locations shown on Figures 2-1 through 2-4. Analytical results were compared to metals BSVs, residential human health SSSLs, and ESVs, as presented in Table 4-1.

Lead. A total of 70 surface and depositional samples were analyzed for lead only, and 50 additional samples were analyzed for TAL metals (including lead). All 120 samples contained detectable concentrations of lead, ranging from 7.1 mg/kg at sample location SAR-RC-DEP02 in Remount Creek to 116,000 mg/kg at sample location HR-75Q-SS03 (at Range 19).

Table 4-2 summarizes the lead results in comparison to the various screening levels and presents the total number of samples exceeding each level and the estimated areal extent of contamination in acres. The data are presented for all of IMR Range samples and the range-specific information is included in the table and on the referenced figures.

Figure 4-1 is an isocontour map showing lead concentrations in surface soil at the Skeet Range. Nine lead results exceeded the SSSL (400 mg/kg) at the Skeet Range, with a maximum concentration of 41,300 mg/kg at SAR-69-SS11. The figure shows that the higher concentration samples were found in the southern portion of the range, west of an unimproved road that runs along the hillside in the Skeet Range impact zone. Based on the computer-generated contours shown on Figure 4-1, the main area of lead concentration above 400 mg/kg at the Skeet Range is approximately 400 feet wide by 500 feet long. A second, smaller area of lead concentration above 400 mg/kg, measuring approximately 150 feet by 150 feet, is located just north of the larger area of contamination. The area of lead concentration above 800 mg/kg is approximately 400 feet by 300 feet and is confined to the southern portion of the range. The lead contamination at the Skeet Range is almost exclusively limited to surface soil (0 to 1 foot bgs), with only two subsurface soil samples from the same location (SAR-69-SS35) containing lead above 400 mg/kg (see Section 4.1.2).

Figure 4-2 is an isocontour map showing lead concentrations in surface soil at Range 19. Three lead results exceeded the SSSL at Range 19, with a maximum concentration of 116,000 mg/kg at

HR-75Q-SS03. The figure shows that the higher concentration samples were found along the base of the hillside impact zone, in the southern portion of the range. Based on the computer-generated lead isocontours, the area of lead contamination above 400 mg/kg at Range 19 is approximately 300 feet wide by 750 feet long. The area of lead contamination above 800 mg/kg is approximately 150 feet wide by 675 feet long. The lead contamination at Range 19 is almost exclusively limited to surface soils, with only one of seven subsurface soil samples (from four locations) showing lead concentrations above 400 mg/kg.

Figure 4-2 also shows the concentrations of lead in nine surface soil samples at the Former Rifle Grenade Range, Parcel 221Q-X. Three lead results exceeded the SSSL at Parcel 221Q-X. One of the exceedances (531 mg/kg) was at sample location HR-221Q-GP01. The other two exceedances (987 and 4,210 mg/kg) were in step-out samples collected 10 feet east and west of HR-221Q-GP01. These samples were located near the western end of Parcel 221Q-X, just outside of the northeastern corner of the Skeet Range, Parcel 69Q. Based on the subsurface soil sample results, the lead contamination at Parcel 221Q-X is limited to surface soil (0 to 1 foot bgs) and possibly the shallow subsurface soil interval based on the RI data (Figure 4-2).

Figure 4-3 is an isocontour map showing lead concentrations in surface soil at Range 13. A total of 11 lead results exceeded the SSSL at Range 13, with a maximum concentration of 4,380 mg/kg at location SAR-71-SS20. The figure shows that the higher concentrations of lead were found along the base of hillside impact zone. Based on the contours shown on Figure 4-3, the area of lead concentration above 400 mg/kg at Range 13 is approximately 300 to 450 feet wide by 675 feet long. The main area of lead contamination above 800 mg/kg is approximately 225 feet wide by 375 feet long. A second, smaller area of lead contamination above 800 mg/kg, measuring approximately 75 feet by 75 feet, is located just north of the larger contamination area. The subsurface soil results (Section 4.1.2) indicate that the soil lead contamination at Range 13 is limited to the surface (0 to 1 foot bgs).

Figure 4-4 is an isocontour map showing lead concentrations in surface soil at Range 12. Four lead results exceeded the SSSL at Range 12,with a maximum concentration of 10,600 mg/kg at location HR-70Q-SS01. The figure shows that the higher concentrations of lead were found along the base of hillside impact zone. Based on the computer-generated contours shown on Figure 4-4, the area of lead contamination above 400 mg/kg at Range 12 is approximately 190 feet wide by 300 feet long. The area of lead contamination above 800 mg/kg is approximately 150 feet wide by 250 feet long. Based on the subsurface soil sample results (Section 4.1.2), the soil lead contamination at Range 12 is limited to the surface (0 to 1 foot bgs).

Subsequent to the RI field sampling, Shaw conducted a two-phase soil removal effort at Range 12 to facilitate transfer of the property to ALDOT for construction of the EBC. During the initial phase in 2005, Shaw excavated soil contaminated with lead and other metals associated with small arms ammunition within the EBC at Range 12, where lead concentrations exceeded the industrial cleanup level of 880 mg/kg. Soil removal activities were performed over an area of approximately 0.6 acres, resulting in the disposal of approximately 5,500 cubic yards of material. Based on the results of the removal action performed at Range 12, including confirmatory sampling and analysis and supplemental erosion control measures, lead-contaminated soil within the EBC was removed to levels below the industrial cleanup level of 880 mg/kg. Collocated contaminants were also removed within this area, but the residual concentrations of these non-lead constituents are unknown at this time.

Metals (Other than Lead). In addition to lead, 21 metals were detected in the surface and depositional soil samples collected at the IMR Ranges. The concentrations of eight metals (aluminum, antimony, arsenic, chromium, copper, iron, manganese, and thallium) exceeded SSSLs. Of these, the concentrations of antimony, arsenic, copper, and manganese exceeded BSVs. The concentrations of 15 metals exceeded ESVs. Of these, the concentrations of 10 metals (antimony, arsenic, beryllium, cobalt, copper, manganese, mercury, selenium, silver, and zinc) also exceeded their respective BSVs. Figure 4-5 shows the locations and concentrations of select metals (other than lead), identified as COPCs (see Chapters 6.0 and 7.0), that exceeded ESVs and BSVs in surface soil at the IMR Ranges. In almost every instance, these metals were found at the sample locations with the elevated lead results.

Volatile Organic Compounds. Of the 120 surface and depositional soil samples, 42 were analyzed for VOCs. A total of 10 VOCs were detected in the samples: 2-butanone, acetone, chloromethane, methylene chloride, naphthalene, n-butylbenzene, p-cymene, styrene, toluene, and trichlorofluoromethane. Several of the 2-butanone, naphthalene, methylene chloride, acetone, and trichlorofluoromethane results were flagged with a “B” data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. Many of the “B” constituents are common laboratory and sample collection-related contaminants. VOC concentrations in the surface and depositional soil samples ranged from 0.00099 to 0.56 mg/kg, and all results were below SSSLs and ESVs.

Semivolatile Organic Compounds. Of the 120 surface and depositional soil samples, 42 were analyzed for SVOCs. A total of 15 SVOCs, including 12 PAH compounds, were detected in the samples. The 12 PAH compounds were detected at three sample locations: SAR-69-SS05

and SAR-69-SS40 from the Skeet Range and SAR-70-SS02 from Range 12. The PAH concentrations in the sample from Range 12 were all less than SSSLs and ESVs.

The concentrations of three PAHs (benzo[a]anthracene, benzo[a]pyrene, and dibenz[a,h]anthracene) exceeded their respective SSSLs in one or two samples each from the Skeet Range. The concentrations of four PAHs (benzo[a]pyrene, fluoranthene, phenanthrene, and pyrene) exceeded their respective ESVs in one or two samples each from the Skeet Range. The two sample locations with the elevated PAHs at the Skeet Range (SAR-69-SS05 and SAR-69-SS40) were in an area containing numerous clay targets/pigeons, which are the probable source of the PAHs (ITRC, 2003).

The three non-PAH compound SVOCs detected were n-nitrosodiphenylamine (seven detections), di-n-butyl phthalate (six detections), and bis(2-ethylhexyl)phthalate (one detection). All of these results were less than SSSLs and ESVs.

Chlorinated Pesticides. Of the 120 surface and depositional soil samples, 15 were analyzed for chlorinated pesticides. A total of 16 pesticide compounds were detected in the samples. The majority of the pesticide results were flagged with a "J" data qualifier, indicating that the compounds were positively identified but that the concentrations were estimated. Pesticide concentrations in the samples ranged from 0.00034 to 0.034 mg/kg and all results were below SSSLs.

Of the 16 compounds, 8 were detected at concentrations exceeding their respective ESVs:

- 4,4'-Dichlorodiphenyldichloroethene (0.0043 and 0.0085 mg/kg) exceeded its ESV (0.0025 mg/kg) at two sample locations at Range 13 (SAR-71-SS05 and SAR-71-SS09).

- 4,4'-Dichlorodiphenyltrichloroethane (0.0028 to 0.015 mg/kg) exceeded its ESV (0.0025 mg/kg) at five sample locations (HR-70Q-SS01, SAR-69-SS11, SAR-69-SS37, SAR-70-SS09, and SAR-71-SS05).

- Aldrin (0.034 mg/kg) exceeded its ESV (0.0025 mg/kg) in one Skeet Range sample (SAR-69-SS37).

- alpha-Betahexachlorocyclohexane (BHC) (0.0056 mg/kg) exceeded its ESV (0.0025 mg/kg) in one Skeet Range sample (SAR-69-SS37).

- beta-BHC (0.0027 to 0.01 mg/kg) exceeded its ESV (0.001 mg/kg) in three samples (SAR-70-SS09, SAR-71-SS05, and SAR-71-SS09).

- Dieldrin (0.00061 and 0.0019 mg/kg) exceeded its ESV (0.0005 mg/kg) in two samples (SAR-70-SS12 and SAR-71-SS05).

- Endrin (0.0027 to 0.014 mg/kg) exceeded its ESV (0.001 mg/kg) in five samples (SAR-69-SS11, SAR-69-SS37, SAR-70-SS09, SAR-71-SS05, and SAR-71-SS09).

- gamma-BHC (0.0023 to 0.0045 mg/kg) exceeded its ESV (0.00005 mg/kg) in four samples (SAR-70-SS09, SAR-70-SS12, SAR-71-SS05, and SAR-71-SS09).

The pesticide results that exceeded ESVs were sporadically distributed at three of the ranges (Skeet Range, Range 12, and Range 13) and showed no discernable pattern of contamination. The highest pesticide concentration, aldrin (0.034 mg/kg), was detected at Skeet Range sample location SAR-69-SS37. However, aldrin was not detected in any other samples at the Skeet Range.

Organophosphorus Pesticides. Of the 120 surface and depositional soil samples, 15 were analyzed for organophosphorus pesticides. One organophosphorus pesticide (azinphosmethyl) was detected at one surface soil sample location (SAR-69-SS11) from the Skeet Range. The azinphosmethyl concentration (0.14 mg/kg) was below its SSSL but marginally exceeded its ESV (0.1 mg/kg).

Chlorinated Herbicides. Of the 120 samples and depositional soil samples, 15 were analyzed for chlorinated herbicides. One chlorinated herbicide (2,4-DB) was detected in four surface soil samples collected from Range 13 and Range 12. All of the reported results were less than the SSSL and ESV.

PCBs. Of the 120 surface and depositional soil samples, 15 were analyzed for PCBs. One PCB (Aroclor 1260) was detected in three surface soil samples collected from Range 13 and Range 12. The PCB results were below the SSSL. The PCB results in two Range 13 samples, SAR-71-SS05 (0.028 mg/kg) and SAR-71-SS09 (0.021 mg/kg), marginally exceeded the ESV (0.02 mg/kg).

The PCB Aroclor 1260 was detected at estimated ("J" flagged) concentrations (i.e. below method RLs) in 3 of 15 samples. The detected concentrations (0.01 to 0.028 mg/kg) only slightly exceed the ESV of 0.02 mg/kg in two of these samples. The source of these detections is unknown; however, other compounds (e.g. organochlorine pesticides) can mimic PCBs at the low levels detected in soil. Given the site history, the fact that there is no record of PCB use at the site, the infrequency of detection, the uncertainty of the analytical results, and the relative

magnitude of the exceedances, it is questionable whether these detections represent a site-related release.

Nitroaromatic Explosive Compounds. Explosive compounds were not detected in the 17 surface and depositional soil samples analyzed for explosives.

Perchlorate. Perchlorate was not detected in the 17 surface and depositional soil samples analyzed for perchlorate.

Cyanide. Cyanide was not detected in the eight surface and depositional soil samples analyzed for cyanide.

Total Organic Carbon and pH. TOC and pH were measured in select surface and depositional soil samples. The TOC measurements ranged from 117 mg/kg (HR-221Q-DEP01) to 40,300 mg/kg (SAR-71-SS09) in the nine surface and depositional samples analyzed for TOC. The soil pH measurements ranged from 4.42 (SAR-69-SS37) to 6.28 (HR-70Q-SS01) in the seven surface and subsurface samples analyzed for pH.

XRF Screening. In addition to the 120 surface and depositional soil samples collected for fixed-base laboratory analysis, 40 surface soil samples were collected within the IMR Ranges safety fans at the locations shown on Figure 2-6. A total of 40 representative locations were selected over several thousand acres of the range safety fans by evaluating topographic (both high elevations hillsides and low elevation drainage streams were considered) and geographical factors (i.e., direction and distance from the range firing lines, proximity to other small arms ranges inside the safety fan).

The samples were analyzed in the field for lead using XRF. Ten percent of the samples (four samples) were analyzed at a fixed-base laboratory for confirmation of the screening results. The MDC of lead was 108 mg/kg (129 mg/kg in the corresponding confirmation sample) at sample location IMR-XRF19. The XRF screening results are presented in Table 4-3. Additional information concerning XRF quality assurance is presented in Section 2.2.8.

4.1.2 Subsurface Soil Analytical Results

A total of 37 subsurface soil samples were collected from 22 soil borings at the IMR Ranges (Table 2-2). Subsurface soil samples were collected at depths greater than 1 foot bgs at the locations shown on Figures 2-1 through 2-4. Analytical results were compared to metals background screening values and human health SSSLs, as presented in Table 4-4.

Lead. A total of 20 subsurface soil samples were analyzed for lead only and 17 additional samples were analyzed for TAL metals (including lead). All 37 samples contained detectable concentrations of lead. The MDC was 1,350 mg/kg in sample SAR-75-SS19 (1 to 1.5 ft bgs) at Range 19. Seven samples exceeded the BSV of 38.53 mg/kg. Three samples had lead concentrations that exceeded the SSSL (400 mg/kg). In addition to SAR-75-SS19 at Range 19, the other two SSSL exceedances were in two samples from the same Skeet Range boring (SAR-69-SS35) at 1 to 1.5 feet bgs (561 mg/kg) and 2 to 2.5 feet bgs (423 mg/kg). The following table summarizes the subsurface soil lead results compared to the screening levels. No area calculations were performed because exceedances of screening levels in subsurface soil samples was so sporadic.

Lead Screening Level	Number of Samples Exceeding	Percentage of Samples Exceeding
Subsurface Soil Samples (37 total)		
Background (38.53 mg/kg)	7	19%
Residential SSSL (400 mg/kg)	3	8%
Groundskeeper/Construction Worker SSSL (880 mg/kg)	1	3%
Recreational Site User SSSL (7,600 mg/kg)	0	0%

Note: ecological screening values were not used for comparison because ecological exposures to subsurface soils are considered incomplete.

Metals (Other than Lead). In addition to lead, 19 metals were detected in subsurface soil samples collected at the IMR Ranges. Eight metals were detected at concentrations exceeding SSSLs: aluminum, antimony, arsenic, chromium, iron, manganese, thallium, and vanadium. Of these, four metals results also exceeded BSVs in one sample each: chromium (49 mg/kg) in SAR-69-SS39, 1 to 1.5 feet bgs; iron (48,000 mg/kg) in SAR-71-SS21, 1.5 to 2 feet bgs; and antimony (76.3 mg/kg) and arsenic (23 mg/kg) in sample SAR-75-SS19 at 1 to 1.5 feet bgs.

Volatile Organic Compounds. A total of 13 subsurface soil samples were analyzed for VOCs. A total of five VOCs (2-butanone, acetone, methylene chloride, p-cymene, and trichlorofluoromethane) were detected in the samples. The 2-butanone result, 5 acetone results,

and all 13 methylene chloride results were flagged with a “B” data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. VOC concentrations in subsurface soil ranged from 0.0016 to 0.23 mg/kg, and all results were below SSSLs.

Semivolatile Organic Compounds. A total of 13 subsurface soil samples were analyzed for SVOCs. A total of 12 SVOCs, including 9 PAHs, were detected in 8 of the samples. All of the bis(2-ethylhexyl)phthalate results were flagged with a “B” data qualifier, indicating that this compound was also detected in an associated laboratory or field blank sample. The remaining SVOC results were “J” flagged, indicating that the results were estimated. SVOC concentrations in the samples ranged from 0.037 to 0.25 mg/kg and were below SSSLs, except for benzo(a)pyrene (0.25 mg/kg), which exceeded its SSSL (0.085 mg/kg) at one Skeet Range location (SAR-69-SS40).

Nitroaromatic Explosive Compounds. Three subsurface soil samples were analyzed for explosives. Explosives were not detected in the samples.

Perchlorate. Three subsurface soil samples were analyzed for perchlorate. Perchlorate was not detected in the samples.

4.1.3 Groundwater Analytical Results

Six groundwater samples were collected for chemical analysis at the IMR Ranges in October and November of 2001. The groundwater samples were analyzed for metals, VOCs, SVOCs, nitroaromatic explosive compounds, and perchlorate (Table 2-2). All groundwater results are based on unfiltered samples. The sample locations are shown on Figures 2-1 through 2-4. Analytical results were compared to human health SSSLs and metals BSVs, as presented in Table 4-5.

Metals. A total of 13 metals were detected in the groundwater samples. The concentrations of five metals (arsenic, barium, beryllium, iron, and manganese) exceeded their respective SSSLs. Of these, barium, beryllium, and manganese also exceeded their respective BSVs in one or two samples each.

Volatile Organic Compounds. A total of seven VOCs were detected in the groundwater samples: 1,2,4-trimethylbenzene, 1,2-dimethylbenzene, acetone, ethylbenzene, m,p-xylenes, methylene chloride, and toluene. The VOCs were detected in only three samples (locations HR-69Q-MW01, HR-69Q-MW02, and HR-75Q-MW01) and were not detected at the remaining

sample locations. Two acetone results, the toluene result, and the methylene chloride result were flagged with a "B" data qualifier, signifying that these chemicals were also detected in the associated trip blank and/or equipment rinsate blank sample. The VOC concentrations in groundwater ranged from 0.00026 to 0.0067 milligrams per liter (mg/L), and all were below SSSLs.

Semivolatile Organic Compounds. SVOCs were not detected in the groundwater samples.

Nitroaromatic Explosive Compounds. Two explosive compounds were detected in the groundwater samples: 2-nitrotoluene and 4-amino-2,6-dinitrotoluene (4-ADNT). 2-Nitrotoluene was detected in three samples (HR-69Q-MW01, HR-70Q-MW01, and HR-75Q-MW04) at concentrations below its SSSL. 4-ADNT was detected in one Skeet Range sample (HR-69Q-MW01) at an estimated concentration (0.00047 mg/L) exceeding its SSSL (0.0000946 mg/L).

Perchlorate. Perchlorate was not detected in the groundwater samples.

4.1.4 Surface Water Analytical Results

Nine surface water samples were collected for chemical analysis at the IMR Ranges. Surface water samples were collected at the locations shown on Figure 2-5 and analyzed for metals, nitroaromatic explosive compounds, and perchlorate (Table 2-2). All surface water samples were analyzed for total (unfiltered) analytes. Analytical results were compared to metals background screening values, human health SSSLs, and ESVs as presented in Table 4-6.

Lead. Lead was detected in four of the nine surface water samples. Lead concentrations (0.087 and 0.036 mg/L) exceeded the SSSL (0.015 mg/L) and background in two samples collected at the Skeet Range (SAR-RC-SW/SD06 and SAR-RC-SW/SD10). All four lead results (0.0018 to 0.087 mg/L) exceeded the ESV (0.0013 mg/L), but only two results (at the aforementioned locations) also exceeded the BSV (0.0087 mg/L). The MDC was 0.087 mg/L in sample SAR-RC-SW/SD06. The surface water sample locations with the highest lead concentrations (SAR-RC-SW/SD06 and SAR-RC-SW/SD10) correspond to the sediment sample locations with the highest lead concentrations. Figure 4-6 presents the lead concentrations in surface water samples collected from the IMR Ranges.

Metals (Other than Lead). In addition to lead, 12 metals were detected in surface water samples collected at the IMR Ranges. Thallium concentrations exceeded its SSSL (and BSV) in three sample locations from the Skeet Range (SAR-RC-SW/SD05, SAR-RC-SW/SD06, and SAR-RC-SW/SD07); however, all of the results were "B" flagged, suggesting that thallium is a

laboratory artifact and not a site-related contaminant. Six metals exceeded ESVs: aluminum, barium, copper, manganese, mercury, and thallium. Of these, only the "B"-flagged thallium results also exceeded its BSV.

Nitroaromatic Explosive Compounds. Explosive compounds were not detected in the surface water samples.

Perchlorate. Perchlorate was not detected in the surface water samples.

4.1.5 Sediment Analytical Results

Nine sediment samples were collected for chemical analysis at the IMR Ranges. Sediment samples were collected at the same locations as the surface water samples, as shown on Figure 2-5. The samples were analyzed for metals, nitroaromatic explosive compounds, and perchlorate. Analytical results were compared to metals background screening values, human health SSSLs, and ESVs, as presented in Table 4-7.

Lead. Lead was detected in each of the sediment samples at concentrations ranging from 6 to 2,070 mg/kg. Two lead results (406 and 2,070 mg/kg) exceeded the SSSL of 400 mg/kg (and BSV) at Skeet Range sample locations SAR-RC-SW/SD06 and SAR-RC-SW/SD10. Five lead results (45.3 to 2,070 mg/kg) exceeded the ESV of 30.2 mg/kg (and BSV) at Skeet Range sample locations SAR-RC-SW/SD05, SAR-RC-SW/SD06, SAR-RC-SW/SD09, SAR-RC-SW/SD10, and SAR-RC-SW/SD13.

Figure 4-7 shows lead concentrations in sediments at the IMR Ranges. Lead-contaminated sediments are confined to the Skeet Range area. To assist in delineating lead contamination in sediments, depositional soil data (from dry stream beds) were also used.

The highest sediment lead concentrations (2,070 and 406 mg/kg) were in samples SAR-RC-SW/SD10 and SAR-RC-SW/SD06, collected in tributaries to Remount Creek. The third-highest concentration (247 mg/kg) was at sample location SAR-RC-SW/SD13, collected in Remount Creek just before it exits the Skeet Range. Samples collected upstream in Remount Creek (near Ranges 12 and 13) showed lead at background levels. In addition, downstream sample location FTA-147-SW/SD02, collected at adjacent Parcel 147(7), contained lead below the background concentration (Figure 4-6).

Metals (Other than Lead). In addition to lead, 18 metals were detected in sediment samples collected at the IMR Ranges. These metals results were all below SSSLs; however, three metals

exceeded ESVs: arsenic, copper, and nickel. Of these, five results also exceeded the BSVs: two arsenic values (38 mg/kg at SAR-RC-SW/SD10 and 22.8 mg/kg at SAR-RC-SW/SD09), two copper values (73 mg/kg at SAR-RC-SW/SD10 and 39.9 mg/kg at SAR-RC-SW/SD06), and nickel (34.6 mg/kg at SAR-RC-SW/SD10).

Nitroaromatic Explosive Compounds. Explosive compounds were not detected in the sediment samples.

Perchlorate. Perchlorate was not detected in the sediment samples.

4.2 Sources of Contamination

The obvious source of the metals contamination present at IMR Ranges is bullets, bullet fragments, and shot from historical use of the ranges in weapons training. Each range was oriented so that the direction of fire was toward a single range impact zone, typically defined by a natural hillside. These hillsides collected the bulk of the metals-containing expended rounds on the surface, with some penetration into the subsurface. As training continued over time, bullets would strike rocks or other bullets already on the ground surface, causing them to fragment and occasionally ricochet. In some cases, with range use over several years, the Army would periodically maintain the range by covering the expended rounds with a layer of fresh soil cover to help prevent ricochets.

Several types of bullets are present at the IMR Ranges: copper-jacketed rounds (mostly rifle), non-jacketed rounds (mostly pistol), and small-diameter shotgun pellet shot. When visually inspected, the expended jacketed rounds are observed to have remained largely intact on the surface and have experienced only moderate weathering and physical breakdown. Non-jacketed rounds and pellet shot show signs of more advanced breakdown. The metals results of impact zone soil samples supports these observations, with the higher metals concentrations found in samples collected in areas containing non-jacketed rounds and shotgun rounds.

Soils at small arms firing ranges may contain lead, antimony, copper, zinc, arsenic, and PAHs that may leach from bullets and bullet fragments, bullet jackets, and related sporting material (e.g. clay targets). The major components of small arms munitions are summarized below.

Constituent	Source
Lead	Primary constituent of projectiles.
Antimony	Increases hardness of projectile.
Arsenic	Present in lead. A small amount is necessary in the production of small shot because it increases the surface tension of dropped lead, thereby improving lead shot roundness.
Copper	Increases hardness of projectile and also a major component of jacket alloy metal.
Tin	Increases projectile hardness.
Iron	Iron tips on penetrating rounds.
Zinc	Component of jacket alloy metal.
PAHs	Concentration of PAHs in clay targets varies by manufacturer but may be as high as 1,000 mg/kg. Existing studies show that PAHs are bound within the limestone matrix of the target and are, therefore, not bioavailable.

Source: ITRC, 2003

Lead accounts for more than 85 percent of the weight of most projectiles and constitutes the greatest mass of contamination at small arms firing ranges.

4.3 Background Evaluation

During the February 2006 BCT meeting, ADEM, EPA, and the Army agreed to summarize the statistical and geochemical evaluations as well as evaluate other lines of evidence (e.g., site history, frequency of detection) to assess whether the metals detected in the various site media represent naturally occurring background conditions or a potential site-related release. Metals determined to be site-related COPCs through this evaluation are carried forward for further evaluation in the human health and ecological risk assessments (see Chapters 6.0 and 7.0), whereas those metals not determined to be site-related COPCs are not evaluated further. The results of the background evaluation for the IMR Ranges are presented in Tables 4-8 through 4-12.

5.0 Contaminant Fate and Transport

The fate and transport of contaminants in the environment depends on a variety of chemical, physical, and biological processes. This chapter describes the parameters that influence the fate and transport of contaminants found in soils at the IMR Ranges. Soils, surface water, sediments, and groundwater were sampled to identify contaminants present at the IMR Ranges, and the data have been summarized in Chapter 4.0.

5.1 Inclusion Criteria and Initial Screening

Not all constituents detected in samples are contaminants or related to site activities, and not all contaminants identified as site related will be mobile in the environment. Contamination of soils at the IMR Ranges results from weapons testing or training and mainly includes metals (e.g., lead, antimony, copper, and zinc). Some detectable concentrations of metals may be naturally occurring, and low levels of organic compounds (e.g., SVOCs) may not pose a threat to human health or the environment. Therefore, several means of screening the detected constituents have been applied and are described in the following sections.

Metal concentrations in the site data set were included in a site-to background comparison discussed in detail in Appendix H. The comparison included two tiers of statistical tests (Tier 1 and Tier 2). Any element failing both tiers of statistical tests was then subjected to geochemical evaluation (Tier 3) to determine if the site concentrations are natural or elevated due to Army activities. Detected concentrations were determined to be naturally occurring if their corresponding elemental ratios were consistent with background elemental ratios. The geochemical evaluation demonstrated that multiple surface and subsurface soil samples contained anomalously high concentrations of four metals that cannot be explained as a result of natural processes. Metals in surface and subsurface soil samples with concentrations that may be elevated due to site activities include:

- Antimony
- Lead
- Copper
- Zinc.

One surface soil sample exhibited an anomalously high concentration of silver.

Table 5-1 provides a summary of the metals that were determined to be present at anomalously high concentrations relative to background and not naturally occurring.

A second screening method compares detectable concentrations of metals and organic compounds to generic soil screening levels for protection of groundwater. Soil screening levels are soil concentrations of potential contaminants below which the soils should pose no threat to groundwater at the site. Generic soil screening levels were developed by EPA (EPA, 1996a), and may be applied where site soil chemical and hydraulic properties are not available. The development of the soil screening levels is described below.

5.1.1 Dilution-Attenuation Factors and Soil Screening Levels

A process for establishing soil screening levels that protect groundwater from impact by potentially contaminated soils was developed by EPA (EPA 1996a,b). This process provides a framework for screening contaminated soils either by comparison to default generic soil screening levels or by developing SSSLs where such site-specific input is available or known. There are two steps in determining soil screening levels:

- Derive a dilution-attenuation factor (DAF) that describes the hydraulic conditions representative of mixing between leachate and groundwater.
- Use the soil/water partitioning to obtain a soil contaminant concentration that is in equilibrium with an acceptable target leachate concentration (maximum contaminant level, preliminary remediation goal, etc.) and multiply it by the DAF.

The resulting soil concentration represents the soil screening level for that corresponding DAF. Soil concentrations in excess of this SSSL could result in a groundwater concentration that exceeds the target concentration and presents a risk to receptors.

Dilution-Attenuation Factor. In the soil screening level technical background document (EPA, 1996a), data from sites across the nation, representing a wide spectrum of hydrogeologic settings, were reviewed and generic values for the hydrogeologic conditions and soil properties considered representative of most site settings were established as default values for the soil screening level and DAF computations. Generic screening levels were calculated for DAF_1 (i.e. no dilution or attenuation) and DAF_{20} (a 20-times dilution) and are presented in EPA (1996a) and in EPA preliminary remediation goals tables (EPA, 2004a).

The DAF is calculated as follows:

$$DAF = 1 + ((K*dh/dl*b)/(I*L)) \qquad \text{Eq. 5-1}$$

where:

K	=	hydraulic conductivity (meters per year [m/yr])
dh/dl	=	hydraulic gradient (unitless)
b	=	mixing zone depth, meters (m)

given by:

$$b = (0.0112L^2)^{0.5} + b_A*\{1-\exp[(-L*I)/(K*dh/dl*b_A)]\} \qquad \text{Eq. 5-2}$$

b_A	=	thickness of the aquifer, m
I	=	infiltration rate, m/yr
L	=	length of flowpath, m.

The generic DAF soil screening levels are based on a number of default assumptions chosen to be protective of human health for most site conditions, and are expected to be more conservative than site-specific levels (EPA, 1996a). The default values used by EPA in deriving the generic DAF soil screening levels are:

	EPA Default
f_{oc}	0.002
n_W	0.30
n_A	0.134
p_b	1.50
p_s	2.65
pH	6.8

where:

f_{oc}	=	Organic carbon content
n_W	=	Water saturated porosity
n_A	=	Air saturated porosity
p_b	=	Bulk density
p_s	=	Soil particle density.

Table 5-2 provides generic soil screening levels for metals that were detected in soils above the BSV or that were determined to be not naturally occurring. The EPA generic DAF20 soil screening levels are used in this evaluation. Table 5-3 provides generic soil screening levels for organic compounds identified in soils.

The EPA process for screening soils for protection of groundwater is based on the following simplifying assumptions:

- There is an infinite source term (steady state over time).
- The contaminants are uniformly distributed throughout the vadose zone, extending to the top of the water table (essentially, the highest soil contamination is located at the water table regardless of where it is encountered in the subsurface).
- There is no contaminant attenuation via adsorption, biodegradation, or chemical degradation in the vadose zone.
- Soil/water equilibrium partitioning is instantaneous.
- The "receptor" well is located at the immediate downgradient edge of the source such that there is not additional dilution afforded by distance from the source.
- No contaminant attenuation is occurring in the aquifer apart from dilution and dispersion.

Contaminant Travel Times. Because of these assumptions, the site-specific SSSLs are conservative screening values and may overestimate impact by contaminated soils. Therefore, should a contaminant concentration exceed the EPA generic DAF_{20} soil screening level, further evaluation may be conducted to assess whether there is sufficient source term strength to create a current or potential future release to groundwater at a concentration that would pose a risk to a receptor. Generic soil screening levels can be used in place of SSSLs; however, in general, they are expected to be more conservative than site-specific levels (EPA, 1996b). Because soil contamination in excess of generic DAF_{20} soil screening levels may be observed at shallow depths, far from the underlying water table, it is possible that such contamination will not reach the aquifer below within a reasonable time frame. Alternatively, given how long many of the sites have been in use, the contaminants may have already leached to groundwater. The driving factor in contaminant leaching in the vadose zone is vertical infiltration. For the IMR Ranges, travel time is based on the annual recharge rate of the water table, calculated as follows:

$$I = P-(Ro+ET) \qquad \text{Eq. 5-3}$$

where:

I	=	recharge
P	=	annual precipitation (53 inches per year)
Ro	=	runoff; using the methods in USDA (1986)
ET	=	estimated evapotranspiration, (assumed as 60 percent of P).

Recharge is estimated to be about 17.56 inches per year (0.45 m/yr). The time required for a contaminant to leach to the water table is proportional to the infiltration rate and the depth to the water table from the depth where the contamination was detected. However, various processes

(e.g., mineral precipitation, cation exchange, sorption, and degradation) act to further retard migration. A preliminary estimate of the time required for a contaminant to leach to the water table is given by the following equation:

$$T = (z/I)*R \qquad \text{Eq. 5-4}$$

where:

T = transport time, years
z = vertical distance to water table, m
I = infiltration rate (0.45 m/yr)
R = retardation factor
= $(1 + (p_b/n) * K_d$.

Some of the IMR Ranges were active as early as the 1940s. Thus, contaminants with calculated transport times less than 70 years should be present or evident in the groundwater. Where the travel time is between 70 and 100 years, an impact in the near future may be expected. Where the travel times are more than 100 years, the impact of the contaminant to groundwater does not pose a significant risk to human health and the only action warranted is monitoring. Tables 5-2 and 5-3 give the travel times for inorganic and organic constituents in soils to migrate from the surface soils to the water table (20 feet below grade).

5.1.2 Comparison to Soil Screening Levels

The maximum concentrations of metals that failed comparison to background and the MDCs of organic compounds in soils and sediment are given in Table 5-4. Antimony and lead concentrations exceeded the generic DAF_{20} screening level in surface soil and sediment. Lead is the only metal that exceeds the generic DAF_{20} in subsurface soils. None of the detected concentrations of organic compounds in soils or sediment exceed the generic DAF_{20} screening levels. Table 5-4 lists the samples in which an EPA generic DAF of 20 is exceeded.

5.2 Migration Mechanisms

Potential routes of contaminant migration at the IMR Ranges include the following:

- Transport of soils by wind or water
- Contaminants leaching from soil to groundwater
- Transport of contaminants by migration with groundwater.

5.2.1 Physical Transport by Erosion

Metals may adhere to soil particles and be transported via erosion. Erosion of contaminated soils will occur where the surface soil is exposed and vegetation cover is poor or absent. Erosion of

soil by wind is not likely at the majority of IMR Ranges due to the presence of grassy areas and wooded cover. Where water erosion is important, sediment and surface water in receiving streams should exhibit contamination by the constituents identified for surface soils at the site. At the IMR Ranges, sediments exhibit impact by antimony and lead; therefore, erosion is an active transport mechanism and continued downstream transport can be expected.

5.2.2 Transport in Soil Waters

For metals, the primary migration pathway in soil waters will be migration to groundwater as ionic or complex species dissolved in infiltrating soil waters. Organic compounds will migrate in soil waters mainly in the dissolved phase; however, the dissolved concentration will be strongly affected by adsorption to organic mater in the soils.

Inorganic constituents exist in soils in several forms, and can derive from naturally occurring minerals and ore deposits, or in wastes. Contamination may result from improper disposal of solid or liquid wastes from municipal or industrial facilities, from mine tailings, or, in the case of the IMR Ranges, from bullets or shot used in weapons training.

Metal transport in the subsurface generally occurs in the ionic form and is influenced by various processes. These include oxidation-reduction reactions that change ionic state, adsorption of an ionic species, reactions that form insoluble precipitates, and formation of organic complexes or ionic radicals (Davis, et al., 1993). The degree to which these processes affect a metal in soil is dependent on the mineral composition of the soils, the acidity (pH) and Eh of the soil waters, and the presence or absence of ligands or anions with which to form complexes or ionic radicals.

Concentrations of inorganic ions in soil are usually controlled by adsorption-desorption reactions, most commonly to oxide, carbonate, or clay minerals (Davis and Kent, 1990). Adsorption behavior of metal ions is dependent on the ionic charge and size. Oxide and hydrous oxide minerals are the most important substrates for adsorption (Davis, et al., 1993). Clays and aluminosilicate minerals appear to be weak adsorpance substrates. Metal ion adsorption can be significantly decreased under conditions of low pH; however, the sorption behavior is highly dependent on both ionic speciation and mineral types present in the soil. In addition, if organic materials are present in the soils, metal-ligand complexes may form that prevent adsorption entirely (Davis, et al., 1993).

Oxidation and reduction reactions may occur in the soil system that change the valence of the metal ion, and by combining with anions present in the soil waters or with components of the soil

materials, an insoluble precipitate may form. These reactions are most common under reducing conditions producing insoluble sulfides. Because the soil environment commonly contains organic matter, the soil Eh may be low and mildly reducing (less than 500 millivolts), and oxides, nitrates, and sulfates may be reduced.

Models for solute transport of inorganic compounds focus mainly on metals. Most solute transport models emphasize sorption processes, oxidation-reduction reactions, and mineral solubility. Adsorption reactions are modeled in a similar way as sorption of organic molecules, using partition coefficients and a variety of isotherm equations; however, the derivation of the adsorption coefficients is different and is dependent on site-specific factors, including the following:

- Metal type and ionic species
- Mineralogical composition of the soils
- Soil moisture content, pH, and Eh environment
- Concentration of ligands that can form complexes with metal ions.

Adsorption to soil is a function of the abundance of sorption sites. Generally, metals adsorb to clay minerals in the soil, but organic material may also provide sorption sites for some metallic ions. Adsorption is governed by the metal's specific adsorption coefficient (K_d). A compound with a higher K_d value will be more strongly partitioned to the soil than compounds with a lower K_d value.

However, the distribution coefficient is variable and depends on the pH of the environment. The K_d values used for this report are the default values used by the EPA (EPA, 1996a,b) given in Tables 5-2 and 5-3.

Metals in IMR Range Soils. Lead and antimony are the only contaminants in IMR soils that may pose a threat to human and environmental receptors at the IMR Ranges. All lead and antimony concentrations in groundwater were found to be within the range of background. Thus, while the threat to environmental receptors attributable to the IMR Ranges is due to metals in soils, no measurable impact is evident in groundwater.

Organic Compounds in IMR Range Soils. Based on the travel times predicted in Table 5-3, organic compounds detected in groundwater that could be expected to have reached groundwater from surface or subsurface soils include acetone, toluene, and methylene chloride. However, the soil concentrations of these compounds are well below levels that would result in

groundwater contamination, and groundwater concentrations for all detected organic compounds are below their regulatory limits and will not be considered further. There are a few detectable concentrations of organic compounds, including nitroaromatics and VOCs related to petroleum hydrocarbons. However, nitroaromatic compounds were not detected in site soils and will not be considered further.

5.3 Compound Descriptions

Unlike organic constituents, metals are not degraded or readily detoxified by microbial activities, and thus can pose a long-term environmental hazard. Downward movement of inorganic constituents from surface soil will occur if the capacity of the soil to retain them is exceeded or if changes in site conditions, such as pH or oxidation state, transform them to a mobile form. If the soil loses its ability to retain the inorganic constituents, metals will migrate with the leaching waters. The inorganic constituents may rebind to soils in lower layers if reversals in the conditions that caused the mobility are encountered, creating chemical fronts in the soil column. The presence of such fronts is an indicator that the constituents are in fact mobile in the subsurface environment.

Surface transport via dust and erosion or soils are also common transport mechanisms. Surface transport normally does not involve changes in the chemical environment, and is driven mainly by physical forces such as wind or water erosion.

Properties and behavior of specific metals are discussed below. The information provided in this section was obtained from several sources including:

- Toxicological profiles published by the Agency for Toxic Substance and Disease Registry (ATSDR) (1995)
- World Health Organization (1996) guidelines for drinking water quality
- EPA drinking water contaminant fact sheets (EPA, 2006a).

Antimony. Only one antimony ore, stibnite (SbS), is abundant enough for commercial mining, but antimony is also economically recovered from copper and lead ores when they are smelted. Antimony is used as an alloy or an oxide. Antimony is alloyed with lead as a hardening agent for use in small arms ammunition and in lead-acid batteries and may be alloyed with tin or copper for use in machine bearings (EPA, 2002a). Antimony released to the environment has a strong affinity for soil particles containing iron, manganese, or aluminum (EPA, 2002a). Adsorption of antimony to soil and sediments is dependent on the soil and soil-water pH, organic

matter content of the soil, and ionic charge. Antimony may be highly mobile or may be strongly adsorped to soil, depending on site conditions. In water, it usually binds to sediments. There is no evidence of bioconcentration of most antimony compounds, though one report states that the tribromide salt can be concentrated by certain forms of marine life to over 300 times its concentration in water (EPA, 2002a).

Lead. Lead occurs as sulfide ores in natural deposits. Lead is produced as a primary product of smelting lead and zinc ores (galena and sphalerite). Where primary sulfide ore deposits intersect the water table, secondary supergene deposits develop containing lead carbonate, sulfate, and phosphate ores. Metallic lead is malleable, ductile, has a low melting point, is very reactive in acids, and is very dense. Because of these properties, there are many commercial uses for lead, primarily in small arms ammunition, lead-acid batteries, solder, and alloys. The organolead compounds tetraethyl and tetramethyl lead have also been used extensively as antiknock and lubricating agents in gasoline. Because of its ductile and malleable nature, lead has been used to manufacture pipes for water supplies (World Health Organization, 1996). Lead is also used extensively in manufacturing shot and sinkers because of its high density and ductility. Because of the serious health effects of lead, the EPA banned the use of lead pipes in 1998 and established a maximum soil contamination level of 400 mg/L.

Lead readily forms oxides and carbonates. Exposure to environmental conditions and acidic conditions (pH less than 6.0) tends to accelerate the weathering process of lead. At high pH levels and under reducing conditions, lead becomes nearly immobile (Scheuhammer and Norris, 1995).

5.4 Contaminant Transport and Persistence

Constituents identified in soils that exceeded the EPA generic DAF_{20} soil screening levels and background levels were retained for fate and transport evaluation, including the following:

- Antimony
- Lead.

Table 5-4 summarizes the maximum concentrations and locations of these contaminants in surface and subsurface soils and at the IMR Ranges.

Antimony was detected at concentrations above the EPA generic DAF_{20} soil screening level in 10 surface soil samples and 2 sediment samples (Table 5-5). Detectable concentrations in surface soil samples ranged up to 1,620 mg/kg, but antimony was not detected in subsurface

soils. Antimony appears to be immobile in soils (more than 3,000 years for migration to groundwater). Antimony was detected in sediments but not in surface waters. Therefore, the primary mode of antimony transport appears to be erosion of surface soils and with the bedload in streams.

Lead was detected at concentrations above the EPA generic DAF_{20} soil screening level in 30 surface soil samples and 3 subsurface soil samples, with a maximum concentration of 116,000 mg/kg in surface soil. Lead concentrations are near or above 1,000 mg/kg in more than half of the surface soil samples (Table 5-5). The travel time for lead to migrate from the surface to the water table is more than 20,000 years. As with antimony, lead was also detected in sediments, and therefore, erosion is a viable transport mechanism for lead at the IMR Ranges.

5.5 Contaminant Fate and Transport Evaluation Findings

- Formation of leachate and transport in soil waters is a viable transport mechanism for acetone, toluene, and methylene chloride at the IMR Ranges. However, concentrations of these compounds are below their generic DAF_{20} soil screening levels, and groundwater concentrations are expected to remain below their regulatory limits.

- Antimony and lead are the only metals at the IMR Ranges that exceed the generic DAF_{20} soil screening levels; however, these metals appear to be nearly immobile in the subsurface environment. Concentrations of antimony and lead in sediment indicate that erosion of surface soils is an active transport mechanism at the IMR Ranges, and continued transport can be expected unless some action is taken.

6.0 Streamlined Human Health Risk Assessment

Due to the large size and complexity of the FTMC installation, a human health SRA protocol has been developed to standardize risk assessments across sites and to simplify their presentation, resulting in a considerable economy of scale. The heart of the SRA protocol is the development of SSSLs, which are medium-specific and receptor-specific, risk-based screening concentrations. The SSSLs are used to quickly and efficiently screen the site for potential cancer risk and noncancer hazard from residual chemicals in environmental media. They address all significant exposure pathways and are sufficiently site specific regarding exposure assumptions that they are used to estimate risk with as much precision as a typical CERCLA baseline risk assessment. The exposure assumptions and SSSL methodology are described in detail in the approved FTMC IWWP (IT, 1998). It is assumed that the reader is familiar with the FTMC facility, with risk assessment in general, and with the IWWP.

As noted in the IWWP, the SSSLs are based on the most highly exposed receptor or receptor scenario for each of several uses to which an individual site on FTMC may be subject. For example, it was determined that current or future land use of most FTMC sites may be categorized broadly as follows:

- ***Residential:*** Living areas, schools, parks, playgrounds, golf courses, retirement centers, medical facilities, stores and other commercial facilities, and all other areas that support activities associated with living in a community.

- ***Industrial:*** Employment areas, office buildings, research facilities, motor pools and garages, transportation facilities, military facilities, training fields, landfills, dumps, disposal sites, and all other areas and activities other than residential, recreational, or unused space.

- ***Open space or recreational use:*** "Unused" land or buffer space, wetlands, wooded or meadow areas, and all other areas not used for residential or industrial activities. Hiking, hunting, fishing or other recreational use may occur.

The most highly exposed receptor for each land-use category was selected and SSSLs were developed for that receptor alone, rather than for each receptor that might be included in a land-use category. For example, an exposure scenario for an on-site resident was developed as a surrogate for all who may be exposed in a residential setting, and separate SSSLs were not developed for school children, municipal park visitors, etc. The on-site resident would be more highly and frequently exposed to site media such as soil and groundwater and would represent the upper bound on residential risk. Most sites are evaluated with the residential scenario even if the site is not slated for residential development, because the resident generally represents the

upper bound on long-term risk, and the information provided by this evaluation is useful to site managers. Sites that "pass" the residential evaluation generally can be released for unrestricted use with no further action. Sites that "fail" the residential evaluation do not necessarily require remediation, but the information may be useful for determining future site use, site-use restrictions, or other site management decisions.

An exposure scenario for an on-site groundskeeper was developed in the IWWP as a surrogate for all site workers. The groundskeeper would be more intensely exposed to site media than a delivery person or part-time maintenance person, and would represent the upper bound on worker risk. Recently, however, it was judged that an indoor worker might be exposed to a much smaller exposure unit (EU); therefore, an indoor worker receptor was developed as a new industrial receptor scenario (Section 6.4).

Similarly, an exposure scenario was developed for a recreational site user as a surrogate for all recreational site use. The original EDAW, Inc. (1997) comprehensive reuse plan distinguished active recreation (e.g., parks, playgrounds) from passive recreation (e.g., open space, hiking, or camping facilities), but the distinctions were insufficient for developing separate exposure assumptions with confidence. Therefore, the exposure assumptions for the recreational site user are intended to be sufficiently protective for either active or passive recreation.

The original recreational site user scenario developed in the IWWP was based on a youth, because it was judged that a youth would have more opportunity for recreational activities, and therefore exposure to the site, than an adult with adult responsibilities or a young child (0- through 6-year-old) who is likely to be dependent on an adult caretaker. This judgment was confirmed during a comment resolution meeting in December 2008 including the Army and its contractor, U.S. Fish and Wildlife Service, EPA, and the Alabama Department of Environmental Management (ADEM) and its contractor. Also, EPA (2003a) notes that a young child is likely to visit a recreational site much less than older individuals. In addition, ADEM (2008) recommends using a youth trespasser scenario to evaluate recreational site use. Since a youth recreational site user would be more highly exposed to the site than either an adult or young child recreational site user, SSSLs developed to be protective for the youth recreational site user would also be protective for the adult and child. Therefore, separate SSSLs are not developed for either an adult or child recreational site user

It should be noted that an SRA was performed for the IMR Ranges as part of an EE/CA dated April 2001 (IT, 2001a). Since that time, some important changes have been made that are reflected in this version of the SRA. First, groundwater data are available for the current

evaluation that were not previously available. Second, additional soil samples are available that permit better characterization of the distribution of lead and confirm that nitroaromatic explosives and propellants (perchlorate) are not associated with the site. Third, the reuse plan for the FTMC facility as a whole has been updated. Fourth, the IWWP has been updated (IT, 2002a), improving the manner in which STCs are estimated for soil, surface water, and sediment. Finally, the protocol for comparing site and background data for the identification of site-related chemicals has been revised since the updated IWWP. Changes in protocol are discussed in more detail in their appropriate sections in the remainder of this chapter.

6.1 Streamlined Risk Assessment Protocol

An SRA consists of the following steps, which are discussed in the following sections.

- Develop a CSEM
- Data evaluation
- Exposure assessment
- Toxicity assessment
- Characterize risk
- Discuss sources of uncertainty
- Summary and conclusions.

6.2 Develop a Conceptual Site Exposure Model

The CSEM identifies the potential contaminant sources and release mechanisms, the originally contaminated environmental media ("source" media), contaminant migration pathways, exposure media, plausible receptors, and exposure routes for the IMR Ranges (Figure 6-1). Briefly, the discharge of various weapons and firearms caused a variety of bullets and shot to affect surface soil and, to a lesser extent, subsurface soil, releasing into soil the metals associated with bullets and shot. This effect was most likely to have occurred at target locations or in the "fallout fan" associated with trap and skeet shooting. Soil at the firing lines may have been affected by chemicals associated with gunpowder, explosive, or propellants, or chemicals used to clean, lubricate, or maintain firearms. Chemicals in soil may leach to groundwater and remain in the groundwater beneath the ranges, or migrate by groundwater flow to downgradient and possibly off-site locations. A few small seeps may discharge groundwater to the ephemeral streams that flow into Remount Creek in the Skeet Range area. Chemicals in surface soil may enter surface water and sediment via runoff and erosion and migrate downgradient through various drainage features to the ephemeral streams and finally to the creek itself. Human receptors may come into contact with the chemicals by contacting soil, groundwater, surface water, and sediment. The sources, release mechanisms, and fate and transport pathways relevant to this site are identified and discussed in more detail in Chapter 5.0.

The IMR Ranges are currently unused. Future site use is projected to be almost entirely "development reserve" (not otherwise explained), with a small sliver at the southwest corner incorporated into the Eastern Bypass right of way (Figure 3-1). Five receptor scenarios were chosen to evaluate potential human exposure to the environmental media at the IMR Ranges. The receptor scenarios shown on Figure 6-1 are expanded in Table 6-1.

6.3 Data Evaluation

Data evaluation consists of the following steps, as described in the IWWP.

6.3.1 Establish Data Sets

Separate data sets were established for surface soil (Table 6-2) and subsurface soil (Table 6-3). Many more surface soil samples were taken than subsurface soil samples because most of the contamination from bullets and shot is expected to occur on or close to the surface. The surface soil data set consists of 120 samples taken from 113 sample locations across the six ranges included in this assessment. These included 50 samples that were analyzed for metals, 120 samples analyzed for lead; 42 that were analyzed for SVOCs and VOCs; 17 that were analyzed for perchlorate and nitroaromatic explosive compounds or residues; 15 that were analyzed for chlorinated herbicides, organochlorine pesticides, PCBs and organophosphate pesticides; and 8 that were analyzed for cyanide.

The subsurface soil data set consists of 37 samples taken from 22 sample locations across five of the ranges (Table 6-3). These include 17 samples that were analyzed for metals, 37 (all) that were analyzed for lead, 13 that were analyzed for SVOCs and VOCs, 3 that were analyzed for perchlorate, and 4 that were analyzed for nitroaromatic compounds.

The groundwater data set consists of six samples taken from six monitoring wells across four of the ranges (Table 6-4). All samples were analyzed for metals, nitroaromatic compounds, perchlorate, SVOCs, and VOCs.

Nine collocated surface water and sediment samples from nine sample locations in or related to Remount Creek comprise the surface water (Table 6-5) and sediment (Table 6-6) data sets. All samples were analyzed for metals, nitroaromatic compounds and perchlorate.

6.3.2 Identifying Site-Related Chemicals

Identifying site-related chemicals consists of excluding from the list of detected chemicals those that are present at concentrations comparable to background or reflect natural or anthropogenic background. The background evaluation at FTMC has evolved since the IWWP was written in

1998, making better use of background and site data, applying more precise statistical comparisons, and employing geochemical analysis and other lines of evidence (see below) to help resolve the site-related question as necessary (Shaw, 2003a; Appendix H). Briefly, the current procedure consists of the following three-tiered process:

- ***Tier 1*** - The MDC of the metal is compared with the BSV, which is two times the mean background concentration as estimated by SAIC (1998). If the MDC does not exceed the BSV, concentrations of that metal at all points within the geographic area represented by the data set are considered to be comparable to background, and that metal is not evaluated further. Metals whose MDCs exceed their BSVs are carried to Tier 2.

- ***Tier 2*** - Two additional statistical tests described in detail in Appendix H are used to determine whether the site concentrations are comparable to background concentrations. Metals that pass statistical testing are ordinarily not evaluated further, unless knowledge about site activities or the nature of the data set suggest that the metal could be site related. Such chemicals, as well as those that fail their statistical tests, are carried to Tier 3. In other words, the Tier 2 statistical evaluation is considered to contribute a line of evidence to the overall weight of evidence whether the metal of interest is present at its measured concentrations from natural origin or anthropogenic background (as defined by EPA [1989]), or as a result of site-related activity.

- ***Tier 3*** - Geochemical evaluation is based on the natural association between the metal of interest and one or more specific soil-forming minerals that concentrate that metal. The correlation of the metal of interest with a major element representing the abundance of the specific mineral that concentrates the trace element is evaluated. The geochemical evaluation is considered another line of evidence that contributes to the overall weight of evidence as described above for the Tier 2 statistical evaluation; however, it is not employed to override the results of the Tier 1 and Tier 2 evaluation. For example, geochemical evaluation indicates that the two highest concentrations of arsenic in sediment of 23 and 38 mg/kg are most likely natural, but arsenic was included as a COPC because the high concentrations occurred at the skeet shooting range where shotgun pellets, known to contain arsenic, were discharged.

Other lines of evidence that may be considered include the likelihood that the metal in question was used or released in known or probable site activities, its spatial distribution and concentration gradient, the nature of its statistical distribution, the number of detections that exceed the BSV, and the extent to which they exceed the BSV. The background evaluation is discussed in detail in Section 4.3 and Appendix H. Metals eliminated from COPC identification by the three-tiered system described above are termed background metals to differentiate them from site-related metals, which are subjected to COPC selection as described below.

The site-related chemicals selected for surface soil, subsurface soil, groundwater, surface water, and sediment are presented in Tables 6-7, 6-8, 6-9, 6-10 and 6-11, respectively.

Soil. All the metals selected as site-related in soil (antimony, arsenic, copper, lead, zinc) (Tables 6-7 and 6-8) are related to bullets and shot (EPA, 2003b).

All organic chemicals in soil (low levels of a chlorinated herbicide, organochlorine pesticides and PCBs, SVOCs [mostly PAHs] and VOCs) were selected as site related. Background data are available for PAHs with which to determine whether they are present at background concentrations, but PAHs may be present as constituents of clay targets used at the Skeet Range. The location of most PAH detections on the Skeet Range, rather than the other ranges, confirms this association, and all the PAHs were selected as site-related chemicals without comparing site and background concentrations.

Groundwater. Site-related metals in soil, in the metallic form in which they occur in bullets and shot, are not expected to leach significantly to groundwater (Hazardous Substance Data Bank, 2008). All the metals detected in groundwater were determined to be present at concentrations comparable to background, suggesting that leaching has not affected groundwater (Table 6-9).

Site-related chemicals in groundwater are limited to low levels of two nitroaromatic residues and four VOCs (Table 6-9). The nitroaromatic residues may be associated with shooting ranges. However, the source of the nitroaromatics and VOCs in the IMR Range groundwater is unclear, because none of these chemicals were identified in the surface or subsurface soil.

Surface Water. Site-related chemicals in surface water are limited to lead (Table 6-10). Other metals associated with bullets and shot either were not detected (antimony, arsenic, nickel) or were detected at levels below their BSVs (copper, zinc). Neither nitroaromatic explosives nor perchlorate were identified in surface water.

Sediment. Site-related chemicals in sediment are limited to antimony, arsenic, copper, and lead (Table 6-11). Neither nitroaromatic explosives nor perchlorate were identified in sediment.

6.3.3 Identify Chemicals of Potential Concern

The MDCs of the site-related chemicals were compared with their respective SSSLs to identify COPCs, as explained in the IWWP. Cancer-based SSSLs correspond to an incremental lifetime cancer risk (ILCR) of 1E-6, and non-cancer-based SSSLs correspond to a hazard index (HI) of

0.1 to provide additional protection for simultaneous exposure to multiple chemicals. COPCs, therefore, are the chemicals with MDCs above applicable risk-based concentrations that may present a significant risk to human health and are evaluated further in the cumulative risk assessment. Receptor-specific COPCs in surface soil, subsurface soil, total soil, groundwater, surface water, and sediment are identified in Tables 6-12, 6-13, 6-14, 6-15, 6-16 and 6-17, respectively.

COPCs in surface soil are limited to four metals, one organochlorine pesticide, and three PAHs (Table 6-12). Metal and PAH concentrations in subsurface soil were sufficient low that COPCs were limited to two metals and one PAH (Table 6-13).

An important change from the IWWP involves how COPCs are identified and STCs are estimated for total soil. A commonly used approach involves combining the surface and subsurface soil data sets into one data set for COPC identification. This approach implies that perfect blending of surface and subsurface soil over the entire site occurs as a result of excavation and grading. More realistically, soil at the surface to which a receptor may be exposed is likely to be predominantly surface soil or predominantly subsurface soil from one place to another within an EU. (Please see Section 6.4 for an explanation of the EU concept.) Therefore, the surface and subsurface soil data sets are not combined in this manner for the total soil evaluation. Instead, any chemical identified as a COPC for either surface or subsurface soil is identified as a COPC for total soil. The STC selected for a given COPC in total soil is the larger of the STCs estimated for surface or subsurface soil. This revision is somewhat more protective than the earlier protocol, because data from the more lightly contaminated soil level (e.g., subsurface soil in this case) do not “dilute” the data from the more heavily contaminated soil level. Therefore, for the IMR Ranges, the COPCs and their STCs in total soil (Table 6-14) are identical to those for surface soil (Table 6-12), because surface soil is more heavily contaminated than subsurface soil.

COPCs identified in groundwater are limited to 2-nitrotoluene (Table 6-15). Lead was identified as the only COPC in surface water (Table 6-16) and sediment (Table 6-17).

6.3.4 Estimate Source-Term Concentrations

Ideally, the STC of a given COPC in soil, surface water, and sediment is a single value that reflects a conservative estimate of average over the area represented by the entire data set. The 95th UCL on the arithmetic mean is usually estimated for this purpose. As an update to the methodology in the IWWP, the EPA (2007a) ProUCL Version 4.00.02 software is used to estimate the UCLs, provided that analytical data are available for at least five samples. One-half

the RL is substituted as the surrogate concentration for nondetects to complete the data set, except that nondetects with RLs greater than two times the MDC are not included in the data set (EPA, 1989). Generally, the UCL generated by the calculation method for the distribution that provides the best fit, as recommended by ProUCL (normal, lognormal, gamma, or nonparametric), is selected as the STC. Occasionally, ProUCL will recommend the 97.5 or 99 percent UCL on the arithmetic mean estimated by the Chebyshev method. In these cases, the 95 percent UCL estimated by the Chebyshev method is selected as the STC, because this is more consistent with the intent of the reasonable maximum exposure paradigm as defined by EPA (1989; 2002b). The chemical-specific output from the ProUCL software is compiled in Appendix I-1.

Regardless of the nature of the distribution, the UCL or the MDC, whichever is lower, is selected as the STC. This approach is interpreted as providing a conservative estimate of average for the STC. The arithmetic mean is selected as the STC for lead, as explained in Section 6.6.1. The STCs for surface soil, subsurface soil, total soil, surface water and sediment are estimated in Tables 6-12, 6-13, 6-14, 6-16, and 6-17, respectively.

EPA (2002c) specifies that the STC for COPCs in groundwater should be the mean of the concentration in the most highly contaminated area of the plume. Plumes, however, are often mobile, and their locations may depend on seasonal, meteorological, and other factors that make identification uncertain. In such cases, estimating the STC as the UCL on the mean as described above for soil and as has been done for groundwater in other recent risk assessments in Alabama has gained acceptance and will be applied when the data are sufficient. Otherwise, the MDC is selected as the STC.

6.4 Exposure Assessment

The exposure assessment involves developing the receptor scenarios, estimating exposure-point concentrations, and estimating exposure route-specific intake or uptake rates for all receptors. The receptor scenarios included in this evaluation were identified in the CSEM and, except for the indoor worker, were previously developed in the IWWP. The exposure scenario for the indoor worker is documented in Appendix I-2. The SSSLs incorporate the models and variable values that relate exposure-media concentrations to STCs, as well as the models and variable values for COPC intake and uptake, which obviates estimating exposure route-specific intake or uptake rates as a separate task in the risk assessment. In response to a comment and as agreed during the December 2008 meeting, the exposure assumptions for standard scenarios (e.g., outdoor worker, construction worker) were updated to capture the latest EPA (2002d, 2004b) recommended values. The comment and its response, which provide the documentation for the updated exposure assumptions, are provided in Appendix I-3.

The SSSL equations and exposure assumptions are documented in the IWWP and Appendix I-3. To simplify review, the exposure variable values for all relevant receptors are compiled in Table 6-18.

Also, the model for dermal uptake from water has been updated to capture the latest EPA (2004b) guidance. For simplicity, since dermal exposure to water is expected to be intermittent and short term, it is assumed that dermal uptake does not reach steady state, which guides selection of the specific EPA (2004b) dermal uptake model used in SSSL calculation. The variable values relevant for dermal uptake from soil (or sediment) and water are compiled in Table 6-19.

The exposure assessment is the appropriate place to introduce the EU concept, which applies to soil, surface water, and sediment. An EU is the area over which exposure is assumed to be random. For example, a reasonable EU for soil for a construction worker, indoor worker, or on-site resident may be as small as one-half acre or possibly smaller; i.e., the size of a building or small cluster of buildings, a building lot, or a small area on which a construction project is performed. An EU for a groundskeeper or recreational site user, on the other hand, may be much greater, because these receptors are expected to work or play over a larger area. The EU concept applies also to surface water bodies. It is assumed that the recreational site users that play in surface water would be randomly exposed to the entire length of Remount Creek and its feeder streams associated with the IMR Ranges.

Underestimating the size of a reasonable EU for soil will overestimate a reasonable STC and impart a conservative bias to the risk assessment if the EU is centered over the source area, or is otherwise limited to include only the highest concentrations at the site. Underestimating the size of the EU also may impart a conservative bias to a risk assessment because the size of the data set is reduced, which usually results in increased STC estimates. Overestimating the size of the EU, on the other hand, may impart a nonconservative bias to the risk assessment. This could occur because the analytical results from smaller, more heavily contaminated areas may be "diluted" by analytical data from larger, less heavily contaminated areas. In other words, the STC estimated from the entire data set may be less than the STC estimated from the data for a smaller area. It is usually impractical to divide the area of a site into reasonable EUs for the risk assessment, in part because the future site use is not that precisely known. The usual approach, therefore, is to include all of the soil data into a single data set; i.e., treat the entire site as a single EU, understanding that this approach results in EUs that are unrealistically large for the construction worker, indoor worker and on-site resident. The implications to the risk assessment,

including the measures taken to ensure that risks from smaller more highly contaminated areas are not overlooked, are discussed in Section 6.6.

6.5 Toxicity Assessment

The toxicity assessment involves identifying the nature of the adverse health effects and quantifying the dose-response relationship (i.e., the toxicity values) for the site-related chemicals. The dose-response relationship is generally quantified in the form of a cancer slope factor or unit risk factor for estimating cancer risk, and a threshold level called a reference dose or reference concentration for estimating the hazard of noncancer effects. These toxicity values are usually found in various EPA sources, or they may be developed from the primary literature or by analogy to more completely studied chemicals that behave similarly.

The toxicity values are incorporated into the SSSLs. The current cancer-based toxicity values are summarized in Table 6-20 and the noncancer toxicity values are summarized in Table 6-21.

Iron, which was detected in various media at the IMR Ranges, requires special discussion. Care should be taken in the application of the oral RfD for iron. An earlier (EPA, 1996c) provisional oral RfD (3E-1 mg/kg-day) derivation reflects estimates of iron intake based on a nutritional survey, but identifies neither a no-observed-adverse-effects-level (NOAEL) nor a lowest-observed-adverse-effects-level (LOAEL) for iron ingestion based on any toxicological endpoints. In other words, it is likely that a much higher level of dietary iron intake would be innocuous, although this probability was not incorporated into the oral RfD derivation. For example, EPA (1996c) reviewed a study that showed that Ethiopians have very high per capita iron intakes, ranging from 98 to 1418 mg/day (equivalent to 1.4 to 20.3 mg/kg-day) with an average of 471 mg/day (6.7 mg/kg-day). Increased tissue stores of iron and adverse effects were not observed. The lack of effects was attributed to low bioavailability of iron in the Ethiopian diet. Further, it should be noted that the earlier oral RfD of 3E-1 mg/kg-day is below the National Academy of Sciences (2001) dietary reference intake for children from 7 months to 8 years old and pregnant women.

A more recent provisional oral RfD of 7E-1 mg/kg-day (EPA, 2006b), although somewhat less restrictive, suffers from other deficiencies that compromise its application to environmental exposures. First, it should be noted that reports of iron toxicity due to environmental exposure has not been identified. Second, the exposure scenario on which the current provisional oral RfD is based, the therapeutic administration of ferrous salts and complexes to treat iron deficiency anemia in humans, is irrelevant to environmental exposure because the forms of ferrous iron used therapeutically are especially selected and formulated to optimize bioavailability. Third,

iron released to the environment is likely to oxidize to the ferric (+3) valence state (Hazardous Substances Data Bank, 2008), which forms complexes with other constituents in the environment and is likely to be much less bioavailable than the forms used to treat iron deficiency anemia. Therefore, it is likely that the more recent oral RfD for iron, like its predecessor, exaggerates noncancer human hazards beyond the conservative assumptions typically associated with EPA toxicity values. The EPA (2008) Region 4 position is to not use the oral RfD to evaluate the potential toxicity of iron in environmental media.

6.6 Risk Characterization

6.6.1 Protocol and Policy

Up to this point, the terms "risk" or "risk assessment" have been used generically to refer to the association or the evaluation of the association of adverse human health effects with exposure to hazardous chemicals. In the risk characterization discussion, however, it is often helpful to distinguish cancer risk and noncancer hazard. Cancer risk is more precisely called ILCR to reflect the assumption that risk above background levels is directly and linearly correlated with cumulative dose averaged over the receptor's lifetime. Cancer is generally assumed to be a nonthreshold phenomenon (i.e., exposure to a potential carcinogen in any amount, however small, leads to some measurable risk).

The nonthreshold assumption requires the application of policy to interpretation of ILCR estimates. EPA (1990) considers a cancer risk of 1E-6 to be a point of departure below which risks are generally considered to be insignificant. An ILCR between 1E-6 and 1E-4 is considered to fall within the risk management range, and is interpreted herein as not posing an unacceptable cancer risk. The regulators may exercise their prerogative to order further action, but they are not required to do so, particularly if further action is impractical. ILCR estimates that exceed 1E-4 are generally considered unacceptable.

The potential for the occurrence of noncancer effects is termed noncancer hazard, and is measured as a hazard quotient (HQ) or HI. An HQ is the ratio of an estimated dose rate to the threshold dose rate for a given chemical and exposure medium with exposure limited to a single route (e.g., incidental ingestion of soil). An HI is the sum of two or more HQ estimates. Noncancer effects are generally considered threshold phenomena; therefore, the HQ or HI is the ratio of the exposure-adjusted ambient concentration of the COPC to the threshold level at or below which adverse effects are not expected to occur. This elevates interpretation to a science rather than policy. By definition, an HQ or HI less than or equal to 1 is interpreted to mean that noncancer adverse health effects are unlikely. An HQ or HI greater than 1 is interpreted to mean

that the threshold has been exceeded, raising concern that adverse effects might occur. Total HI values that exceed the threshold level of 1 are subject to further refinement as described below.

EPA (1989) acknowledges that adding all HI values may overestimate hazard because the assumption of additivity is probably appropriate only for those chemicals that exert their toxicity by the same mechanism. However, sufficient data describing mechanisms of toxicity for use in predicting additivity with a high level of confidence are available for very few chemicals. In the absence of such data, EPA (1989) assumes that chemicals that act on the same target tissue or organ or that exert the same critical effect may do so by the same mechanism of toxicity. In other words, target organ or critical effect serves as a surrogate for mechanism of toxicity. When the sum of HI values for a receptor exceeds 1.0 due to the contributions of several chemicals, it may be appropriate to refine the HI estimate by segregating the chemicals by mechanism of toxicity (i.e., target organ or critical effect) and estimating separate HI values for each target tissue, organ, or critical effect. This is referred to herein as a "target organ evaluation," although it may involve an individual tissue (e.g., erythrocyte) or critical effect instead of an organized and recognized organ (e.g., liver).

As a practical matter, since human environmental exposures are likely to involve near- or sub-threshold dose rates, the target organ(s) chosen for a given chemical are those associated with dose rates at or near the critical effect. The target organ selected is also based on duration of exposure; i.e., the target organ for chronic or subchronic exposure to low or moderate dose rates is selected rather than the target organ for acute exposure to high dose rates.

Risk characterization involves combining the results of the exposure assessment and toxicity assessment to estimate cancer risk and noncancer hazard. As noted above, both the exposure assumptions and toxicity assessment are included in the SSSLs. Therefore, all that remains for risk estimation in the SRA is to divide the STC by the appropriate cancer or noncancer SSSL and adjust for the basis of the SSSL. Specifically, ILCR for a given receptor exposed to a given COPC in a given medium is estimated as follows:

$$ILCR = \frac{STC \bullet TR}{SSSLc} \qquad \text{Eq. 6.1}$$

where:

ILCR	=	incremental lifetime cancer risk (unitless, calculated)
STC	=	source-term concentration (mg/kg for solid media, mg/L for water)
TR	=	target cancer risk on which SSSLc is based (unitless, 1E-6)
SSSLc	=	site-specific screening level based on cancer risk (same units as STC).

Similarly, the HI for a given receptor exposed to a given COPC in a given medium is estimated as follows:

$$HI = \frac{STC \bullet THI}{SSSLnc} \qquad \text{Eq. 6.2}$$

where:

HI	=	hazard index (unitless, calculated)
STC	=	source-term concentration (mg/kg for solid media, mg/L for water)
THI	=	target HI on which SSSLnc is based (unitless, 1E-1)
SSSLnc	=	site-specific screening level based on noncancer hazard (same units as STC).

EPA (1989; 2002c) suggests rounding risk estimates to one significant figure to reflect the uncertainty inherent in their estimation. Numerical estimates in the tables and text are presented in scientific notation with one integer and two digits to the right of the decimal. This presentation facilitates document review and replication of the calculations.

Lead. Lead is not evaluated in the same manner as other chemicals for two reasons. One reason is that health effects appear to occur at levels so low as to have no practical threshold. The second reason is that lead is ubiquitous, so that exposure simultaneously involves multiple routes and sources. This means that toxicity values (reference doses and cancer slope factors), which generally apply only to one exposure route and source, may not be sufficiently protective. Therefore, neither a cancer slope factor nor noncancer reference dose is available or developed for lead. Instead, the EPA (2005) Integrated Exposure Uptake Biokinetic model (IEUBK) was developed to estimate blood lead levels of very young children (0 to 7 years old) exposed to lead from multiple sources. The unborn or very young child is the human receptor most sensitive to exposure to lead, and delayed or impaired neurological development is the critical endpoint. The EPA (2003c) adult blood lead model (ABLM) was developed to estimate blood lead levels of women of child-bearing age, assuming that the unborn child is the most sensitive receptor in an adult exposure context. The ABLM was designed primarily to address exposure to lead in soil, but can be applied to other media as well.

The most appropriate way to evaluate lead is to compare the average ambient concentration with receptor- and medium-specific cleanup levels. The average concentration is used instead of the more conservative UCL on the mean because the blood lead models contain a module that statistically adjusts for variation in exposure. The concept of EU, however, is very important to

ensure that data from relatively clean areas do not dilute the data from the more heavily contaminated areas.

EPA (1998) recommends using the IEUBK to back-calculate site-specific cleanup levels for lead in soil to which children might be regularly exposed. This recommendation was followed, along with the EPA (2007b) updated dietary intake recommendations to develop the SSSL for residential soil of 400 mg/kg (calculations not shown). The SSSL of 400 mg/kg is accepted as the cleanup level for lead in soil for residential exposure scenarios that may include children. The net effect of this exercise is to elevate the status of the 400 mg/kg soil lead concentration from a screening level to a cleanup level. The new designation of 400 mg/kg in residential soil as a cleanup level is consistent with the recent EPA (1998; 2001) evaluation that describes 400 mg/kg as a "level of public health concern" that "may pose a health risk to children through elevated blood lead levels." The EPA (2009) Regional Screening level of 800 mg/kg for lead in industrial soil is adopted as the cleanup level for soil for the groundskeeper, construction worker, and indoor worker.

The future use of most of the IMR Ranges site is projected to be "developmental reserve." Until such time that development occurs, the area is considered to be "open space" for which passive recreation appears to be the most plausible use. Passive recreation within open space or unsupervised areas is expected to result in far less intense exposure to surface soil than residential use. The most highly exposed receptor is visualized as a young woman, an avid wildlife/birdwatcher-hiker, who visits the site regularly for two days on each weekend of the year. The site-specific exposure parameters for the youth recreational site user scenario were developed and defended in the IWWP. A cleanup level for lead in soil of 7.60E+3 mg/kg was derived for areas designated as open space for passive recreational use by applying the site-specific exposure variables developed in the IWWP to the EPA (2003c) ABLM. The details of the calculation were presented in Appendix H of the April 2001 version of the EE/CA. Since the 2001 version of the SRA, EPA (2003d) provided an acute criterion for lead in soil of 6.5E+3 mg/kg for the protection of young children. Since the acute criterion is less than the concentration derived from the ABLM, the acute criterion is adopted as the cleanup level for lead in soil for the youth recreational site user. The cleanup level for lead in soil for recreational site use of 6.5E+3 mg/kg is adopted as the cleanup level for lead in sediment because the modes of exposure to soil and sediment are similar.

The EPA (2006a) regulatory action level for lead in tap water of 1.5E-2 mg/L, which serves as the SSSL, is adopted as the cleanup level for lead in groundwater that is or may be developed as a potable source.

A cleanup level for lead in surface water of 1.80E-1 mg/L is estimated for the youth recreational site user (please see Appendix I-4).

The cleanup levels for lead described above should be applied as average concentrations within the EUs of interest. The exception is the cleanup level for lead in soil and sediment of 6.5E+3 mg/kg for the youth recreational site user, which should be applied as a not-to-exceed concentration.

6.6.2 Results and Interpretation

6.6.2.1 Incremental Lifetime Cancer Risk and Hazard Index Estimates

ILCR and HI estimates for all receptors under current and future site-use scenarios are compiled for each medium and summed across media in Table 6-22. Documentation is provided in the form of receptor- and medium-specific tables that detail the risk from exposure to each COPC (Tables 6-23 through 6-32). The numerical results and their interpretation are discussed by receptor. Risks from exposure to lead are not evaluated with ILCR or HI estimates as discussed above.

Groundskeeper. The groundskeeper is assumed to be exposed to total soil and groundwater hypothetically developed as a potable source. Exposure to surface water and sediment is possible, but such exposures are expected to be sporadic and of short duration because they are not related to the groundskeeper's regular duties. Therefore, exposure to surface water and sediment is not quantified for this receptor.

The risk estimates for the groundskeeper are based on the entire total soil data set. In other words, the entire area of the IMR Ranges is considered to be a reasonable EU for a groundskeeper, who is expected to be randomly exposed over a large area. The cumulative ILCR of 5.29E-5 falls within the EPA (1990) risk management range. The cumulative HI of 7.74E-1 does not exceed the threshold level of 1. It is concluded that exposure to COPCs other than lead in total soil does not pose an unacceptable cancer risk and is unlikely to induce adverse noncancer health effects for the groundskeeper.

Construction Worker. The construction worker is assumed to be exposed to total soil and groundwater hypothetically developed as a potable source. The risk estimates for the construction worker were based on the entire total soil data set. Exposure to surface water and sediment is possible, but such exposures are expected to be sporadic and of short duration

because they are not related to the construction worker's regular duties. Therefore, exposure to surface water and sediment is not quantified.

The cumulative ILCR of 6.08E-6 falls within the EPA (1990) risk management range. The cumulative HI of 2.75E+0 exceeds the threshold level of 1 due to antimony and arsenic in total soil (Table 6-24). The target organ evaluation reveals that the HI for the heart exceeds the threshold of 1 due to antimony in total soil (Table 6-33).

Construction projects, however, may involve much smaller EUs than represented by the entire data set. This could result in underestimating potential risks, because the STC of a given COPC for a small area is likely to be greater than the STC for the entire data set. The EU issue for the construction worker is discussed in detail in Section 6.6.2.2.

Indoor Worker. The indoor worker is assumed to be exposed to total soil and groundwater hypothetically developed as a potable source. The risk estimates for the indoor worker were based on the entire total soil data set.

The cumulative ILCR of 2.25E-5 falls within the EPA (1990) risk management range. The cumulative HI of 4.07E-1 falls below the threshold level of 1.

The indoor worker, however, may occupy a single building or a suite of buildings that involve much smaller EUs than represented by the entire data set. This could result in underestimating potential risks, because the STC of a given COPC for a small area is likely to be greater than the STC for the entire data set. The EU issue for the indoor worker is discussed in detail in Section 6.6.2.2.

Youth Recreational Site Use. The recreational site user is assumed to be exposed to total soil, surface water, and sediment. The risk estimates for the current recreational site user are based on the entire total soil, surface water, and sediment data sets. In other words, the entire area of the IMR Ranges, including the associated portion of Remount Creek and its tributaries, is considered to be a reasonable EU for a recreational site user. The total ILCR summed across all relevant media of 2.61E-6 falls within the EPA risk management range. The total HI summed across all relevant media of 1.34E-1 falls below the threshold level of 1. ILCR or HI values were not estimated for exposure to surface water (Table 6-31) or sediment (Table 6-32) because no chemicals other than lead were selected as COPCs for this receptor in these media. It is concluded that exposure to COPCs other than lead in total soil, surface water, and sediment does not pose an unacceptable health risk to the youth recreational site user.

On-Site Resident. The on-site resident is assumed to be exposed to total soil, groundwater hypothetically developed as a potable source, surface water, and sediment. The assumptions for exposure to surface water and sediment are identical to those for the youth recreational site user, and therefore, risk estimates for exposure to these media are not recalculated; rather, the risk estimates for the youth recreational site user exposure to surface water and sediment were summed with those for on-site resident exposure to total soil and groundwater. The risk estimates for the on-site resident were based on the entire total soil, surface water, and sediment data sets.

The total ILCR summed across all relevant media of 2.09E-4 exceeds the EPA risk management range, due largely to arsenic, with a small but significant contribution from PAHs in total soil (Table 6-27), and to 2-nitrotoluene in groundwater (Table 6-30). The total HI summed across all relevant media of 1.090E+1 exceeds the threshold level of 1, due largely to antimony and arsenic in total soil (Table 6-27). The target organ evaluation reveals that HI values for the heart, peripheral vascular system, and skin exceed the threshold of 1 due to antimony and arsenic in total soil (Table 6-34).

Residential home sites, however, may involve much smaller EUs than represented by the entire data set. This could result in underestimating potential risk, because the STC of a given COPC for a small area is likely to be greater than the STC for the entire data set. The EU issue for the on-site resident is discussed in detail in Section 6.6.2.2.

6.6.2.2 Chemicals of Concern and Remedial Goal Options

EPA (2002c) requires identification of COCs and estimation of remedial goal options (RGO) in a BHHRA. COCs are the subset of COPCs that contribute significantly to unacceptable cumulative ILCR or to a cumulative target organ HI that exceeds the threshold level of 1.0. RGOs are concentrations that may be used to support risk management decisions for cleanup. COCs are identified if any of the following conditions are met (EPA, 2002c):

- Cancer-based COCs are identified if total ILCR for a given receptor summed across exposure routes, COPCs, and media exceeds 1×10^{-4}.
- Noncancer-based COCs are identified if total target organ HI for a given receptor summed across exposure routes, COPCs, and media exceeds the threshold limit of 1.0.

RGOs are risk-based concentrations (multiples of the SSSLs) that reflect the exposure and toxicity assumptions applied in the BHHRA. Consequently, the risk-based RGOs are specific to site, source medium, receptor, and chemical. RGOs are developed for all chemicals that are identified by the risk characterization as COCs for any receptor. In addition, RGOs are developed for all COPCs for those receptors (construction worker, indoor worker, on-site resident) for which a reasonable EU would be somewhat smaller than the entire area of the IMR ranges.

COCs are the COPCs that contribute significantly to unacceptable risk as defined above. Significant contribution to the ILCR is defined as a contribution across all exposure routes for a given chemical in a given source medium exceeding 1E-6. Significant contribution to noncancer hazard is defined as a contribution across all exposure routes for a given chemical in a given source medium exceeding 1E-1. COPCs with ILCR estimates less than 1E-6 or HI estimates less than 1E-1 are not considered to contribute significantly to overall risk or hazard and are not identified as COCs.

In addition to the risk-based criteria discussed above, any chemical present at a concentration exceeding its applicable or relevant and appropriate requirements (ARAR) is selected as a COC. Currently, ARARs are available only for groundwater and consist of the EPA (2006a) maximum contaminant levels, which are not entirely based on risk.

EPA (2002c) Region 4 recommends that RGOs for cancer-based COCs be estimated for target ILCR values of 1E-6, 1E-5, and 1E-4. The cancer-based SSSLs reflect a target ILCR of 1E-6; therefore, the cancer-based SSSL is adopted as the RGO for a target ILCR of 1E-6. RGOs for target ILCR values of 1E-5 and 1E-4 are the cancer-based SSSLs multiplied by 10 and 100, respectively. EPA (2002c) recommends that RGOs for noncancer-based COCs be estimated for target HI values of 1E-1, 1E+0, and 3E+0. The noncancer-based SSSLs reflect a target HI of 1E-1; therefore, for most chemicals, the noncancer-based SSSL is adopted as the RGO for a target HI of 1E-1. RGOs for target HI values of 1E+0 and 3E+0 are the noncancer-based SSSLs multiplied by 10 and 30, respectively.

The exception to the foregoing discussion is lead. Lead is identified as a COC under the following conditions:

- In **soil** for the **groundskeeper** if the STC exceeds the cleanup level of 800 mg/kg described above

- In **soil** for the **construction worker** and **indoor worker** if the MDC exceeds the cleanup level of 800 mg/kg, because the size and placement of EUs for these receptors are uncertain

- In **soil** for the **youth recreational site user** if the MDC exceeds the cleanup level of 6,500 mg/kg

- In **soil** for the **on-site resident** if the MDC exceeds the cleanup level of 400 mg/kg, because the size and placement of EUs for this receptor are uncertain.

- In **groundwater** if the MDC exceeds the cleanup level of 1.5E-2 mg/L, because the hypothetical placement of production wells and mobility of plumes is uncertain

- In **sediment** if the MDC exceeds the cleanup level of 6,500 mg/kg for the youth recreational site user

- In **surface water** if the STC exceeds the cleanup level of 1.80E-1 mg/L for the youth recreational site user.

RGOs are not estimated for lead because risk-based options cannot be calculated; cleanup levels are developed as described above.

The RGOs for COCs in total soil, groundwater, surface water, and sediment are compiled in Tables 6-35, 6-36, 6-37, and 6-38, respectively, as described below by receptor.

Groundskeeper. Lead was identified as the only COC in total soil for this receptor (Table 6-35). No chemicals were identified as COCs in groundwater (Table 6-36). It is concluded that exposure to lead in total soil may pose an unacceptable health risk to the groundskeeper.

Construction Worker. COCs are not identified in total soil because a reasonable EU for this receptor would be smaller than the whole of the IMR ranges. Instead, RGOs are estimated for all COPCs except lead (Table 6-35), for which the cleanup level of 800 mg/kg was established as described above. The MDC of arsenic falls below the RGO based on a cancer risk of 1E-4; therefore, it is concluded that no COPCs in total soil pose an unacceptable cancer risk to the construction worker regardless of how an EU is selected. The MDCs of antimony and arsenic, which share target organs with no other COPCs, exceed the RGO based on an HI of 1.0; therefore, it is concluded that antimony and arsenic in total soil may pose an unacceptable health risk to the construction worker where ambient concentrations exceed RGOs based on an HI of 1.0. Lead may pose a health hazard where ambient concentrations exceed the cleanup level of 800 mg/kg.

Indoor Worker. COCs are not identified because a reasonable EU for this receptor would be smaller than the whole of the IMR ranges. Instead, RGOs are estimated for all COPCs in groundwater (Table 6-36), and for all COPCs except lead in total soil (Table 6-35), for which the cleanup level of 800 mg/kg was established as described above. COPCs that contribute significantly to cancer risk include arsenic in total soil and 2-nitrotoluene in groundwater. In combination with exposure to groundwater developed as a potable source, arsenic in total soil may pose an unacceptable cancer risk to the indoor worker where its ambient concentration exceeds its RGO based on a cancer risk of 1E-5. The MDC of antimony, which shares a target organ with no other COPCs, exceeds the RGO based on an HI of 1.0. Antimony may pose an unacceptable noncancer health hazard where its ambient concentration exceeds its RGO based on an HI of 1.0. The MDC of arsenic does not exceed the RGO based on an HI of 1.0; therefore, antimony is unlikely to pose an unacceptable noncancer health threat regardless of how EUs are selected. Lead may pose a health hazard where ambient concentrations exceed the cleanup level of 800 mg/kg.

Youth Recreational Site User. Lead was identified as the only COC in total soil for this receptor (Table 6-35). No chemicals were identified as COCs in surface water (Table 6-37) or sediment (Table 6-38). The MDC of lead in total soil exceeds the acute criterion of 6500 mg/kg adopted as the cleanup level for recreational site use. It is concluded that exposure to lead in soil may pose an unacceptable noncancer health hazard where its ambient concentration exceeds its cleanup level.

On-Site Resident. COCs are not identified because a reasonable EU for this receptor would be smaller than the whole of the IMR ranges. Instead, RGOs are estimated for all COPCs in groundwater (Table 6-36), and for all COPCs except lead in total soil (Table 6-35), for which the cleanup level of 400 mg/kg was established as described above. COPCs that contribute significantly to cancer risk include arsenic, benzo(a)anthracene, benzo(a)pyrene and dibenz(a,h)anthracene in total soil and 2-nitrotoluene in groundwater. In combination with exposure to groundwater developed as a potable source, arsenic, benzo(a)anthracene, benzo(a)pyrene and dibenz(a,h)anthracene in total soil may pose an unacceptable cancer risk to the indoor worker where their ambient concentrations exceed their RGOs based on a cancer risk of 1E-5. The MDCs of antimony and arsenic, which share target organs with no other COPCs, exceed their RGOs based on an HI of 1.0. Antimony and arsenic may pose an unacceptable noncancer health hazard where their ambient concentrations exceed their RGOs based on an HI of 1.0. The MDC of copper, which shares target organs with no other COPCs, falls below its RGO based on an RGO of 1.0, and is unlikely to pose an unacceptable health threat regardless of

how EUs are identified. The MDC of lead exceeds its cleanup level of 400 mg/kg. Therefore, antimony, arsenic and lead may pose a noncancer health hazard where ambient concentrations exceed their RGOs based on an HI of 1.0 or cleanup level.

6.7 Uncertainty Evaluation

This section discusses some of the more significant uncertainties inherent in the risk assessment for the IMR Ranges that may affect the results or their interpretation. Uncertainty is a factor in each step of the SRA. Uncertainties associated with the earlier stages of the SRA become magnified when they are concatenated with uncertainties in the latter stages of the process. It is not possible to eliminate all uncertainty; however, a recognition of the uncertainties and how they have been managed in the risk assessment is fundamental to the understanding and reasonable use of risk assessment results.

Generally, risk assessments carry two types of uncertainty. Measurement uncertainty refers to the usual variance that accompanies the scientific measurements, e.g., instrument uncertainty (accuracy and precision) associated with contaminant concentrations. A different kind of uncertainty stems from data gaps, i.e., additional information needed to complete the database for the assessment. Often the data gap is significant, such as the absence of information on the effects of human exposure to a chemical (e.g., antimony) or the frequency with which a certain receptor (e.g., youth recreational site user) may visit the site.

Adequacy of the sampling program to identify the areas of greatest contamination is a source of uncertainty in any risk assessment. However, investigation of the IMR Ranges has undergone several iterations, including additional sampling to fill potential data gaps as requested by the regulatory community. Therefore, uncertainty about the adequacy of the sampling program is considered to be minimal for the IMR Ranges.

Variations in sampling and laboratory analytical procedures introduce uncertainty; it is unclear whether this imparts a positive or negative bias to the risk assessment. Along with this is the RL achieved by the laboratory. For example, the RL for antimony in soil ranged from 6.60E+0 to 1.42E+1 mg/kg. The proportion of samples in which antimony was not detected in soil ranged from 53 to 82 percent. In other words, more than one-half the samples were nondetects, for which one-half the RL was used as a surrogate concentration. However, the value of one-half the RL exceeds the background screening criterion for either surface soil (1.99E+0 mg/kg) or subsurface soil (1.31E+0 mg/kg), which suggests that its use as a surrogate concentration for nondetects artificially increases the mean concentration of antimony in soil.

Another source of uncertainty is the manner in which the data sets for soil are compiled for the various receptors. It is reasonable to assume that a groundskeeper or recreational site user may be exposed randomly over the entire site in the course of his activities, in which case estimating a single STC for a given COPC from the entire data set is appropriate. However, a building or suite of buildings in which an indoor worker may work, a construction project, or a residential site may be restricted to an EU as small as a quarter acre, in which case estimating a single STC from the entire data set may underestimate risk. Inability at this time to identify actual future EUs adds to the uncertainty. This source of uncertainty was addressed by identifying for these receptors RGOs for all COPCs, and mentioning specifically the COPCs with MDCs greater than their applicable RGOs (Section 6.6.2.2).

Uncertainty arises by excluding background metals from the quantitative risk assessment. A nonconservative bias could have been imparted to the results and interpretation if these chemicals had been excluded in error (i.e., if, in fact, their ambient concentrations reflect site-related releases rather than background conditions). The likelihood of error, however, is less for weapons ranges than for other kinds of sites (e.g., landfills) because the activities that took place at the ranges are well known and the metals associated with the discharge of weapons are generally limited to arsenic, antimony, copper, lead, nickel, and zinc (EPA, 2003c).

As noted above, the exclusion of background metals is performed as a 3-tiered process. Tier 1, comparison of the MDC with the BSC, is generally considered to be sufficiently conservative so that the uncertainty associated with metals excluded at this tier is minimal. Also, only metals present at concentrations greater than their SSSLs are considered to potentially contribute significant risk. Therefore, only metals excluded at Tier 2 or Tier 3, or based on other lines of evidence (Section 4.3), and that have MDCs that exceed their residential SSSLs, are considered to impart significant uncertainty. These metals are limited to manganese in surface soil, arsenic and chromium in subsurface soil, and beryllium, cobalt and manganese in groundwater. However, only arsenic (in subsurface soil) is expected to be associated with weapons discharge.

Iron was designated a background metal. The toxicity evaluation for iron, however, is considered irrelevant to environmental exposures. As noted above, adverse effects have not been reported from environmental exposure. Therefore, the exclusion of iron as a COPC is judged to contribute minimal uncertainty to the SRA.

Another source of uncertainty is the possibility that chemicals that could contribute significantly to risk remain undetected. This may occur if their detection limits are above their SSSLs. Detection limits available for the data sets evaluated in the IMR ranges SRA include RLs and

MDLs. The MDLs are significantly more sensitive than the RLs, generally by a factor of approximately two to five, but for some chemicals by as much as an order of magnitude. The RLs are developed with a 95 percent confidence against false negatives (nondetected chemical present at the RL). The confidence against false negatives for the MDLs is not known with certainty but is probably slightly less than the RLs.

Experience with similar projects has shown that few chemicals in soil have MDLs that exceed their SSSLs or various generic risk-based screening criteria. Exceptions include some of the PAHs and other SVOCs (e.g., the nitrosamines) – generally compounds that are not expected to be associated with shooting ranges. The situation with nondetects in groundwater hypothetically developed as a potable source is somewhat more uncertain. Some metals, including antimony and arsenic, some nitroaromatic compounds, some PAHs and other SVOCs, and the occasional VOC have MDLs that exceed their screening criteria. Antimony, arsenic and the nitroaromatic compounds may be associated with shooting ranges; therefore, nondetects including these chemicals represent a small source of uncertainty; although the nitroaromatic compounds were not detected in soil. It is not expected that nondetects in sediment would represent a significant source of uncertainty because SSSLs for exposure to sediment are much higher than those for soil, reflecting much less potential for exposure. The same can be said for nondetects in surface water, because exposure to surface water is much less intense than exposure to groundwater hypothetically developed as a potable source.

It should be noted that SSSLs for chemicals evaluated as potential carcinogens are based on a cancer risk of 1E-6, the lower end of the EPA (1990) risk management range and two orders of magnitude below the upper end of the EPA risk management range. This decreases the level of concern regarding nondetected potential carcinogens. Also, SSSLs for noncancer effects are based on an HI of 0.1, which may decrease the concern regarding overlooked noncancer effects.

Finally, it is noted that the issue of uncertainty from MDLs above various screening criteria was thoroughly discussed and understood by all members of the BCT, and that it was agreed that the data evaluated herein meet the required data quality objectives (please see Section 2.8).

Field duplicate data are used in a quality control function and are not included in the data set for STC estimation. This introduces a minor source of uncertainty that may impart a non-conservative bias if the concentration of a COPC in the field duplicate sample was significantly higher than the concentration in the original sample. Chemical concentrations in original samples and their field duplicate samples are compiled in Tables 6-39 and 6-40 for soil and groundwater, respectively. The higher of the field duplicate and original concentrations is

bolded. Examination of the tables reveals no chemical concentrations in the field duplicates that would make a significant difference in the HHRA had they been identified as COPCs and included in the quantitative assessment.

Another significant source of uncertainty regarding the SRA for the IMR Ranges is the presence of lead fragments or nuggets from bullets and shot on and near the ground surface. Lead fragments are unlikely to be incidentally ingested along with soil or sediment (EPA, 2000a). Also, the bioavailability of ingested lead fragments is expected to be low in humans (ATSDR, 2007). Empirical evidence, however, suggests that lead fragments in soil degrade, albeit very slowly, releasing more soluble and bioavailable forms of lead to the soil (EPA, 2000a; 2003b). This has the potential to increase the risk from exposure to lead in soil over current levels; however, it is not possible to predict the rate of degradation or the concentrations of lead in soil that may occur.

The purpose of the uncertainty discussion is not to disparage the results of the risk assessment, but to provide perspective to risk managers who may use this evaluation to make decisions regarding future use or management of the site.

6.8 Summary and Conclusions

A group of former small arms ranges known as the IMR Ranges were evaluated in an SRA. The area of the IMR Ranges is currently unused; future site use is designated “development reserve” (not otherwise explained). Environmental media of interest include surface soil, subsurface soil, groundwater, surface water, and sediment. A hypothetical medium designated total soil was developed to address the possibility that future development involving excavation and grading could result in direct exposure to subsurface soil or a mixture of surface and subsurface soil.

Evaluation of the analytical data identified the site-related chemicals, which included several metals associated with bullets and a wide range of organic chemicals, generally at low concentrations. COPCs, the site-related chemicals that might contribute to unacceptable risks, were identified. COPCs included several metals associated with bullets and shot, low levels of an organochlorine pesticide, and low levels of a few PAHs in surface soil, metals and benzo(a)pyrene in subsurface soil, 2-nitrotoluene in groundwater, and lead in surface water and sediment. STCs, representative concentrations that reflect a conservative estimate of average, were calculated for each COPC in each environmental medium. The total soil data set includes all COPCs identified in either surface or subsurface soil; the STCs for COPCs in total soil were the larger of the estimates for the two depths of soil. This approach obviates the need for

separate evaluations of surface and subsurface soil and conservatively accounts for a mixture of surface and subsurface soils.

The receptor scenarios evaluated in the SRA include a groundskeeper, construction worker, indoor worker, youth recreational site user and on-site resident. All receptors were evaluated for exposure to total soil; the groundskeeper, construction worker, indoor worker and on-site resident were evaluated also for exposure to groundwater hypothetically developed as a potable source. The youth recreational site user was evaluated also for exposure to surface water and sediment. The likelihood that the on-site resident may also be recreationally exposed to surface water and sediment was addressed by summing the risk estimates for the youth recreational site user with those for the on-site resident.

ILCR and HI values were estimated for exposure to most COPCs by comparing the STCs to SSSLs, which are receptor-, chemical-, and medium-specific risk-based concentrations. Exposure to lead involved comparing average concentrations in each medium with the medium- and receptor-specific lead cleanup level. Interpretation of the risk estimates and the COCs (i.e., those COPCs associated with unacceptable cancer risk or noncancer hazard) are discussed below by individual receptor.

Groundskeeper. The groundskeeper was evaluated for exposure to total soil and groundwater. It was assumed that the groundskeeper was exposed randomly across the entire IMR Range area, which is reasonable for this receptor. COPCs were limited to antimony, arsenic, lead, benzo(a)pyrene, and dibenzo(a,h)anthracene in total soil and 2-nitrotoluene in groundwater. Lead in total soil was identified as the only COC. It is concluded that exposure to lead in soil might give rise to adverse health effects for the groundskeeper.

Construction Worker. The construction worker was evaluated for exposure to total soil and groundwater. COPCs were limited to antimony, arsenic, and lead in total soil. No COPCs were identified in groundwater. COCs were not identified in total soil because a reasonable EU for this receptor would be smaller than the whole of the IMR ranges. Instead, RGOs were estimated for all COPCs except lead for which the cleanup level of 800 mg/kg was established as described above. Antimony and lead in total soil may pose an unacceptable health risk depending on where future EUs are located.

Indoor Worker. The indoor worker was evaluated for exposure to total soil and groundwater. COPCs included antimony, arsenic, lead, and benzo(a)pyrene in total soil and 2-nitrotoluene in groundwater. COCs were not identified in total soil because a reasonable EU for this receptor

would be smaller than the whole of the IMR ranges. Instead, RGOs were estimated for all COPCs except lead for which the cleanup level of 800 mg/kg was established as described above. Antimony, arsenic and lead in total soil, and 2-nitrotoluene in groundwater may pose an unacceptable health risk depending on where future EUs are located.

Youth Recreational Site User. The youth recreational site user was evaluated for exposure to total soil, surface water, and sediment. It was assumed that the youth recreational site user was exposed randomly across the entire IMR Range area, which is reasonable for this receptor. COPCs were limited to antimony, arsenic, and lead in total soil, lead in surface water, and lead in sediment. Lead in soil was identified as the only COC because the cleanup level for lead in soil should be applied as a not-to-exceed value. It is concluded that exposure to lead in soil might give rise to adverse health effects for the youth recreational site user.

On-Site Resident. Residential use is very unlikely for this site; the on-site resident was evaluated only for the additional information provided. The on-site resident is assumed to be exposed to total soil and groundwater. In addition, the on-site resident was evaluated for exposure to surface water and sediment by including the risk estimates for the young child recreational site user with those for the on-site resident. COPCs included antimony, arsenic, copper, lead, aldrin, and three PAHs in total soil, 2-nitrotoluene in groundwater, and lead in surface water and sediment. COCs were not identified in total soil because a reasonable EU for this receptor would be smaller than the whole of the IMR ranges. Instead, RGOs were estimated for all COPCs except lead for which the cleanup level of 400 mg/kg was established as described above. Antimony, arsenic, lead, benzo(a)anthracene, benzo(a)pyrene, and dibenz(a,h)anthracene in total soil, and 2-nitrotoluene in groundwater may pose an unacceptable health risk depending on where future EUs are located.

Conclusion. In conclusion, lead in total soil represents a potential health threat for all receptors evaluated herein; lead is the only metal that represents a health threat to the youth recreational site user. In addition, antimony in total soil represents a potential health threat to the construction worker, and arsenic may also represent a potential threat depending on the location of EUs. Antimony and arsenic in total soil and 2-nitrotoluene in groundwater may represent a threat to the indoor worker, depending on the location of EUs. Antimony, arsenic, and three PAHs in total soil and 2-nitrotoluene in groundwater hypothetically developed as a potable source represent a potential health threat to the on-site resident. Levels of lead in surface water and sediment are not sufficient to raise concern for health effects. Soil samples with antimony and arsenic concentrations sufficient to raise health concerns are associated with lead concentrations at the higher end of the detected range.

7.0 Baseline Ecological Risk Assessment

This chapter presents a summary of the BERA conducted for the IMR and BGR Ranges at FTMC (Figure 7-1). The BERA for the IMR and BGR Ranges incorporates the results of the screening-level ecological risk assessments (SLERA) conducted for the IMR and BGR Ranges at FTMC (IT, 2002b,c) and builds upon the information presented in the problem formulation and study design reports for these two groups of small arms ranges (Shaw, 2003b). The methods used in the BERA are consistent with the guidelines set forth in EPA's *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA, 1997) and the EPA Region 4 *Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders* (EPA, 2000b). The complete BERA for the IMR and BGR Ranges is presented in Appendix J.

7.1 Baseline Ecological Risk Assessment Summary

A SLERA for the IMR Ranges was completed in May 2002 (IT, 2002c) and a SLERA for the BGR Ranges was completed in April 2002 (IT, 2002b). The SLERAs for these two groups of small-arms ranges indicated that COPECs were present in various environmental media and that additional assessment was warranted to further identify and refine the potential ecological risks at these sites. In order to accomplish these tasks, a BERA was conducted for the IMR and BGR Ranges.

Because the habitats present at the IMR and BGR Ranges were very similar and the COPECs present at these ranges were also very similar, a single BERA was conducted to address the potential ecological risks at both the IMR and BGR Ranges. The following sections describe the BERA conducted for the IMR and BGR Ranges at FTMC.

7.1.1 Terrestrial Habitats at the IMR and BGR Ranges

The SLERAs for the IMR and BGR Ranges indicated that the habitats and COPECs present at these two groups of ranges were similar. The terrestrial habitat at the IMR and BGR Ranges falls into two general categories: "cleared" areas and forested areas. The cleared areas are those areas that were formerly maintained as lawns or mowed fields. Since maintenance activities have ceased in these areas, pioneer species are now colonizing these ranges. Typically, the species most likely to colonize these areas are the "weed" species that tend to be vigorous pioneer plants that grow and spread rapidly. The first of the pioneer species to invade these abandoned areas are the grasses and herbaceous species. These formerly maintained grassy areas

are classified as being in an early old field successional state. Over time, the grass and herbaceous species will be followed by shrubs and small trees. The forested areas outside of the cleared areas are best characterized as mixed deciduous/coniferous forest. With the exception of the forest stand around the Skeet Range, these rich and relatively unaltered forested regions represent the large safety fans across the Main Post.

7.1.1.1 Remount Creek Habitat

In the vicinity of the IMR Ranges, Remount Creek is a small, ephemeral stream that flows (when water is present) from south to north. The physical characteristics of Remount Creek and the surrounding land use vary along its length, from its headwaters at Yahou Lake to its confluence with Cane Creek near the west-northwest boundary of the Main Post. The headwaters of Remount Creek are formed by the discharge from Yahou Lake and its tributaries, approximately 0.75 mile south of Range 12. Remount Creek runs in a northerly direction along the topographic low formed by gently sloping hills to the east and west of the creek. Most of the length of Remount Creek between Yahou Lake and the IMR Ranges runs through the Eastern Bypass corridor. Virtually all of the trees in the bypass corridor have been clear cut and all of the vegetation removed. Immediately north of the Skeet Range, Remount Creek flows through a culvert under the old parade grounds/athletic fields and then through the grounds of the Cane Creek Golf Course until its confluence with Cane Creek in the west-northwestern corner of the Main Post.

The ecological value of Remount Creek is greatest as it flows through the Cane Creek Golf Course and intersects Cane Creek. It is in this stretch (downstream of the IMR Ranges) that the creek may support foraging of insectivorous mammals and a functional aquatic ecosystem. Remount Creek and its tributaries in the vicinity of the IMR Ranges may support semiaquatic species (e.g., amphibians) and provide a breeding ground for some small fish species during the periods when water is present.

7.1.1.2 Cane Creek Habitat

Cane Creek in the vicinity of the BGR Ranges is a perennial stream that flows east to west across the ranges at Bains Gap Road. The physical characteristics of Cane Creek at the BGR Ranges are relatively consistent; however, they differ both upstream and downstream of the BGR Ranges. Upstream (one-half to three-quarters of a mile east) of the BGR Ranges, the headwaters of Cane Creek are formed by several small tributaries created by surface runoff and seeps from the hills north, south, and east of the ranges. These headwater streams are small ephemeral streams with boulder and cobble substrate that carry runoff during storm events, but are dry

during significant portions of the year. The headwater areas are relatively undeveloped portions of Main Post and are almost entirely mixed deciduous/coniferous forest.

Downstream (west) of the BGR Ranges, Cane Creek continues to flow in a westerly direction across the developed portion of Main Post (including the Cane Creek golf course) and off site along the west-northwest boundary of the Main Post.

In general, the portion of Cane Creek that flows through the BGR Ranges is a low-gradient perennial stream with widths ranging from 4 to 10 feet and depths ranging from 0.5 to 2.0 feet. The banks of Cane Creek are steep (4 to 8 feet) and exhibit erosional features characteristic of occasional high-velocity flow (i.e., during significant storm events). The substrate of Cane Creek is mostly cobbles and boulders. There is very little evidence of organic matter present as substrate in Cane Creek in the vicinity of the BGR Ranges. In fact, large sections of the creek bed in this area are made up of exposed bedrock.

The vegetation surrounding Cane Creek at the BGR Ranges is variable. Because Cane Creek bisects these ranges, routine maintenance activities have historically controlled/eliminated the vegetation along the creek banks. Since maintenance activities have ceased, vegetative species have begun to recolonize the creek banks. Therefore, weeds, low-lying shrubs, and tree saplings dominate the creek banks.

7.1.1.3 Wetland/Seep Habitat

There are no known wetlands present at the IMR Ranges. The wetland/seep habitat present in the vicinity of the BGR Ranges is limited to the area south of Range 21. This area is known as the Marcheta Hill Orchid SINA. SINAs at FTMC consist of those biological communities that harbor federal, candidate, or state-listed species, or those habitats containing single or groups of unique or unusual species. The only SINA that could potentially be impacted by activities (both past and future) at the BGR Ranges is the Marcheta Hill Orchid Seep SINA, because it is located directly adjacent to Range 21.

The spring seepage to the west of Marcheta Hill constitutes one of the more important SINAs on the Main Post at FTMC. The boundary of the wetland seep is approximately 7.2 acres; however, the integrity of the adjacent watershed is critical to the maintenance of this seep. The area is located directly south of Range 21. This wetland is the largest forested seepage on the installation and contains two federal Candidate 2 species: white fringeless orchid (*Plantanthera integrilabia*) and Diana butterfly (*Speyeria diana*). The population of white fringeless orchid is particularly significant, with over 250 individuals recorded. Additional plants on the Alabama

Natural Heritage Program tracking list include rose pink (*Sabatia capitata*) and soapwort gentian (*Gentiana saponaria*).

7.1.2 Threatened and Endangered Species

Four species listed as threatened or endangered by USFWS have been recorded at FTMC. These threatened and endangered species are as follows:

- Gray bat (*Myotis grisescens*)
- Blue shiner (*Cyprinella caerules*)
- Mohr's Barbara buttons (*Marshallia mohrii*)
- Tennessee yellow-eyed grass (*Xyris tennesseensis*).

The only federally listed species that has the potential to occur in the vicinity of the IMR or BGR Ranges is the gray bat (Garland, 1996). The other federally listed species occur at Pelham Range or Choccolocco Creek.

Gray bat summer foraging habitat is found primarily over open water of rivers and reservoirs. The gray bat is entirely insectivorous, and surveys have shown that gray bats feed almost exclusively on mayflies at certain times of the year (Mount, 1986). Therefore, gray bats could be exposed to site-related constituents that have accumulated in aquatic insects from Remount Creek or Cane Creek. Because gray bats are flying mammals and the IMR and BGR Ranges do not provide roosting habitat, no other exposure pathways are complete for the gray bat.

Mist net surveys were conducted on and adjacent to FTMC in 1995. Gray bats were captured along both Choccolocco Creek (east of FTMC Main Post) and Cane Creek on Pelham Range (west of the FTMC Main Post) during these mist net surveys (Garland, 1996). These preliminary data suggest that these major stream corridors at FTMC may provide at least a minimal foraging habitat for gray bats. However, gray bat surveys have not been conducted on Remount Creek in the vicinity of the IMR Ranges or Cane Creek in the vicinity of the BGR Ranges.

Although not officially listed by USFWS as threatened or endangered, two species that are candidates for federal listing are known to occur at the Marcheta Hill Orchid Seep SINA located directly south of Range 21 (BGR Ranges); the white fringeless orchid (*Plantanthera integrilabia*) and the Diana butterfly (*Speyeria diana*). The white fringeless orchid occurs in bogs and seepages along wooded stream banks and ravines from the coastal plain of Mississippi through Alabama, Georgia, Tennessee, Kentucky, the Carolinas, and Virginia. The plant was recorded within two SINAs on the Main Post: Marcheta Hill Orchid Seep and Cave Creek Seep (Garland, 1996).

The other candidate species that is known to occur at the Marcheta Hill Orchid Seep is the Diana butterfly (*Speyeria diana*). Habitat affinity for this butterfly includes wet, rich forested valleys and mountainsides and relatively undisturbed forests, especially near streams (Garland, 1996).

7.1.3 COPECs Identified in SLERAs

The COPECs that were identified in the SLERA and formed the basis for the BERA at the IMR Ranges are the following:

- ***Surface Soil***: Antimony, copper, lead, and zinc
- ***Surface Water***: Lead
- ***Sediment***: Arsenic, barium, copper, lead, manganese, and thallium.

The COPECS that were identified in the SLERA for the BGR Ranges are the following:

- ***Surface Soil*:** Antimony, copper, lead, and zinc
- ***Surface Water***: Copper and lead
- ***Sediment***: Barium, copper, lead, manganese, and thallium.

7.1.4 Assessment and Measurement Endpoints

Given the overall goal of protecting the integrity and quality of the terrestrial old field ecosystems at the IMR and BGR Ranges, the terrestrial assessment endpoints focused on critical community niches within the old field system. The overall goal of the aquatic assessment endpoints was the protection of the integrity and quality of the semiaquatic ecosystem in Remount Creek at the IMR Ranges and the aquatic ecosystem in Cane Creek at the BGR Ranges. The aquatic assessment endpoints focused on critical community niches within these semiaquatic and aquatic ecosystems. The assessment endpoints, risk hypotheses, and measurement endpoints that were identified for the IMR and BGR Ranges were summarized in Table 7-1.

7.1.5 Data Quality Objectives

Based on the findings of the SLERAs and problem formulations conducted for the IMR and BGR Ranges, the objectives of this BERA were as follows:

- Collect site-specific data to address bioavailability and bioaccumulation potentials in lower trophic level organisms that form the basis of the terrestrial and aquatic food webs at the IMR and BGR Ranges.

- Collect site-specific data to address the existence and level of site-specific toxicity to terrestrial and aquatic receptors resulting from exposure to the COPECs.

- Determine the concentrations of the COPECs within the surface soils, surface water, and sediment at the IMR and BGR Ranges at which the ecological receptors are at risk.

- Provide data of sufficient quality to develop a technically defensible characterization of risk at the IMR and BGR Ranges for use by risk managers in their acceptance or rejection of present and future ecological risks posed by the COPECs in surface soil, surface water, and sediment and, if necessary, develop ecologically-based cleanup criteria.

The following decisions required site-specific data in order to address the issues identified in the objectives presented above.

- Determine if the COPECs at the IMR and BGR Ranges are available for biouptake (i.e., bioavailable) in terrestrial or aquatic systems.

- Determine what levels of COPECs in soil, sediment, and surface water promote acute or chronic toxicity to terrestrial and aquatic receptors.

- Determine if the COPECs bioaccumulate in the tissues of terrestrial invertebrates (e.g., earthworms) or benthic invertebrates, and if so, to what extent.

- Determine the probability of gallinaceous and other ground-feeding birds ingesting and retaining a lead bullet fragment at the IMR and BGR Ranges.

- Determine whether the tissue burdens of COPECs in terrestrial invertebrates have the potential to pose adverse effects to higher trophic level organisms that utilize terrestrial invertebrates as a major food source.

- Determine whether benthic communities within Cane Creek are adversely affected by exposure to COPECs in surface water and sediment.

- Determine whether the concentrations of COPECs in emergent benthic invertebrates have the potential to pose adverse effects to higher trophic level organisms that utilize emergent benthic invertebrates as a major food source.

- Develop constituent-specific cleanup goals for soil, surface water, or sediment if the BERA concludes that there is the potential for unacceptable ecological risk.

These data were used to help determine whether COPECs in surface soil, sediment, and surface water at the IMR and BGR Ranges present significant risk to ecological receptors.

7.1.6 Results of Earthworm Toxicity Tests

The results of the earthworm toxicity testing indicated that statistically-reduced survival and growth rates were exhibited in a number of soil samples from both the IMR and BGR Ranges.

The apparent effects thresholds (AET), based on 28-day earthworm survival, for antimony, copper, lead, and zinc are >1,620, 509, 15,600, and 139 mg/kg, respectively. The no-observable-effects concentrations (NOEC) and lowest-observable-effects concentrations (LOEC), based on 28-day earthworm survival, are 6.7 and 17.9 mg/kg for antimony, 127 and 334 mg/kg for copper, 779 and 2,310 mg/kg for lead, and 47.3 and 63.9 mg/kg for zinc. The AETs, based on weight loss, for copper, lead, and zinc are 334, 6,820, and 72.8 mg/kg, respectively. The NOECs and LOECs, based on weight loss, are 61.4 and 62.2 mg/kg for copper, 760 and 779 mg/kg for lead, and 33.5 and 35.1 mg/kg for zinc.

Antimony concentrations in soil were inversely correlated with weight loss; thus, there is no evidence to suspect that antimony is responsible for the observed effects.

7.1.7 Results of Earthworm Bioaccumulation Test

The correlations between earthworm tissue concentrations and soil concentrations were strongest for copper and lead (r = 0.95). The correlation between soil and earthworm tissue concentrations for zinc were somewhat weaker (r = 0.88), but still relatively strong. Although lead depicted a good correlation, the highest soil concentration tested resulted in a much lower concentration in the earthworm tissue than predicted. This lack of bioavailability in the sample may explain the relative absence of toxic effects in the sample with the highest lead soil concentrations. Antimony in earthworm tissue did not show a strong correlation and the weak correlation was also inverse, providing additional evidence that antimony is not likely responsible for the observed effects.

In order to define the relationship between soil concentrations and earthworm tissue concentrations of COPECs, the data were plotted for each of the soil COPECs (antimony, copper, lead, and zinc), and a number of different regression models were fitted to the data. The results of the analysis of different regression models suggested that the straight line regression of the natural log transformed concentrations of copper, lead, and zinc in soil and earthworm tissues fit the data best. As suggested earlier, the data for antimony do not suggest any correlation between soil concentrations and earthworm concentrations. The graphs depicting the soil-to-earthworm bioaccumulation factors (BAF) for antimony, copper, lead, and zinc are presented in Appendix J as Figures 6-9 through 6-12, respectively. The best fit regression models of the

natural log transformed data for copper, lead, and zinc represent the site-specific soil-to-earthworm BAFs and are summarized below:

Surface Soil COPEC	Site-Specific Soil-to-Earthworm BAF
Antimony	NA
Copper	y = 0.4673 x + 1.4266
Lead	y = 1.1088 x – 0.5168
Zinc	y = 0.321 x + 3.1208

where: y = natural logarithm of terrestrial invertebrate tissue concentration
x = natural logarithm of soil concentration

These soil-to-earthworm BAFs were used in the terrestrial food web model to estimate the transfer of COPECs from surface soil to terrestrial invertebrates**.** As stated previously, there is no clear relationship between antimony concentrations in soil and earthworm tissues. It is important to note that these soil-to-earthworm BAFs were estimated using earthworm tissues that were not depurated after exposure and prior to chemical analysis. The nondepurated earthworm tissues may result in artificially high COPEC concentrations in earthworm tissues and, therefore, artificially high soil-to-earthworm BAFs.

7.1.8 Results of Terrestrial Food Web Model

In order to assess the potential risks to various terrestrial-based feeding guilds from soil-related COPECs, a food web was constructed. Based on the fact that the COPECs in surface soil at the IMR and BGR Ranges (antimony, copper, lead, and zinc) do not bioconcentrate or biomagnify appreciably through the food chain and do not accumulate appreciably in plant tissues (Kabata-Pendias and Pendias, 1992), the terrestrial ecological receptors with the potential for the greatest exposure to COPECs were determined to be invertivorous and omnivorous small mammals and birds. Herbivores were considered to have a lower exposure potential to COPECs because the COPECs do not accumulate appreciably in plant tissues, the herbivores' main food source. Carnivores were determined to have lower exposure potential to COPECs because the COPECs do not biomagnify in the food chain and would not be expected to occur at elevated concentrations in prey animal tissues. Additionally, carnivores in general have larger home ranges that would tend to minimize their exposures to COPECs at the IMR and BGR Ranges. Likewise, piscivores were determined to have lower exposure potential to COPECs because the COPECs do not bioconcentrate or biomagnify in fish tissue to any appreciable extent and fish are not readily found in Remount Creek at the IMR Ranges or Cane Creek at the BGR Ranges. Therefore, the terrestrial food web model focused on the protection of the terrestrial omnivorous and invertivorous feeding guilds present at the IMR and BGR Ranges.

In order to calculate COPEC exposures, indicator species that represent the feeding guilds of interest were identified. For this risk assessment, the small, terrestrial invertivorous mammal was represented by the shorttail shrew (*Blarina brevicauda*) and the terrestrial invertivorous bird was represented by the American woodcock (*Philohela minor*). The small, terrestrial omnivorous mammal was represented by the white-footed mouse (*Peromyscus leucopus*) and the terrestrial omnivorous bird was represented by the American robin (*Turdus migratorius*).

The terrestrial food web model was executed with maximum and mean exposure point concentrations in order to estimate a range of potential terrestrial wildlife exposures. The food web model was executed with site-specific area use factors, site-specific soil-to-earthworm BAFs, and literature-derived values for the other input variables.

Estimated maximum and mean exposures for the receptor species were compared to the toxicity reference values to estimate maximum and mean hazard quotients for each receptor species. These calculated hazard quotients are summarized below.

	Maximum Exposure		***Mean Exposure***	
	NOAEL HQ	**LOAEL HQ**	**NOAEL HQ**	**LOAEL HQ**
White-footed Mouse:				
Antimony	348	34.8	26.7	2.67
Copper	12	9.32	1.73	1.35
Lead	337	33.7	51.5	5.15
Zinc	0.458	0.0149	0.284	0.00924
American Robin :				
Antimony	581	116	44.5	8.9
Copper	3.9	2.97	0.594	0.452
Lead	1460	498	222	75.8
Zinc	0.0767	0.00767	0.0484	0.00483
Short-tail Shrew :				
Antimony	270	27	20.7	2.07
Copper	2.87	2.23	0.71	0.553
Lead	789	78.9	119	11.9
Zinc	1.1	0.0356	0.704	0.0229
American Woodcock:				
Antimony	149	29.9	11.4	2.29
Copper	0.369	0.281	0.0855	0.0651
Lead	729	248	110	37.6
Zinc	0.0415	0.00414	0.0252	0.00252

NOAEL HQ - No-Observed-Adverse-Effects-Level Hazard Quotient
LOAEL HQ - Lowest-Observed-Adverse-Effects-Level Hazard Quotient

The results of the terrestrial food web model indicate that there are potential risks to terrestrial receptors at the IMR and BGR Ranges from exposures to soil-related COPECs. Antimony,

copper, and lead in surface soil have the potential to pose risks to all of the terrestrial receptors assessed via the food web model. The terrestrial food web model indicates that zinc does not pose any significant risk to terrestrial wildlife receptors at the IMR or BGR Ranges.

The terrestrial food web model was also executed in order to estimate soil concentrations of COPECs that would result in hazard quotients (HQ) of one or lower. These estimated soil concentrations (assuming all of the conservatism inherent in the food web model) based on an HQ equal to 1.0 are summarized below.

	Soil Conc. Based on NOAEL TRV and HQ = 1.0 (mg/kg)	**Soil Conc. Based on LOAEL TRV and HQ = 1.0** (mg/kg)
White-Footed Mouse :		
- antimony	4.67	46.7
- copper	267	350
- lead	205	1,680
- zinc	1,750	193,000
American Robin :		
- antimony	2.8	14
- copper	850	1,140
- lead	55	147
- zinc	39,000	555,000
Short-tailed Shrew :		
- antimony	6.01	60.1
- copper	820	1,185
- lead	100	800
- zinc	215	173,000
American Woodcock :		
- antimony	10.85	54.2
- copper	11,870	16,200
- lead	105.5	280
- zinc	46,500	550,000

NOAEL TRV - No-Observed-Adverse-Effects-Level Toxicity Reference Value
LOAEL TRV - Lowest-Observed-Adverse-Effects-Level Toxicity Reference Value

7.1.9 Results of Particulate Lead Ingestion Model

Risks to birds from ingestion of particulate lead in soil at the small arms ranges at FTMC were assessed via a three-tier process, as outlined in the technical memorandum entitled *Ecological Risk Assessment Methodology for Particulate Lead Ingestion at Fort McClellan* (Shaw, 2003c). Tier 1 of the process consisted of collecting soil samples from the IMR and BGR Ranges and determining the particle size fractions present in surface soils at these ranges. Of particular interest were the particle size ranges corresponding to the preferred grit sizes of the northern bobwhite quail (*Colinus virginianus*) and eastern wild turkey (*Meleagris gallopavo*). The northern bobwhite quail prefers grit that ranges from 0.8 to 2.2 mm in diameter (Best and

Gionfriddo, 1991), while the eastern wild turkey prefers grit that ranges from 2.8 to 4.2 mm in diameter (extrapolated from grit size preferred by ring-necked pheasant and normalized to the wild turkey body weight) (Best and Gionfriddo, 1991). These two bird species were identified by the FTMC, ecological risk assessment subcommittee as surrogates for all of the bird species at FTMC, because the grit sizes preferred by these two species represent a broad range of available grit and these two species are known to occur at FTMC. The results of the particle size analysis indicate that the preferred particle sizes for both the bobwhite quail and wild turkey occur at both the IMR and BGR Ranges.

Tier 2 of the agreed-upon particulate lead risk assessment process consisted of using the Peddicord and LaKind (2000) model to determine the risks from ingesting particulate lead, and also determining the density of lead particles that could remain in soil while maintaining the health of the bobwhite quail and wild turkey populations at FTMC.

The Peddicord and LaKind model was executed with a range of values for the grit retention time for the bobwhite quail because the literature provides a wide range of values for this parameter. Grit retention is also variable based on the species of bird, grit shape and surface roughness, and numerous environmental conditions such as grit availability, food preferences, time of year, and other environmental factors. Gionfriddo and Best (1999) report grit retention times for necropsied bobwhite quail ranging from 42 days to 270 days. A grit retention time of 10 days is recommended by USFWS (USFWS, 2003) based on studies conducted by McConnell (1968) that measured the rate of deterioration of lead shot in bobwhite quail. No noticeable deterioration was observed in shot expelled by quail after 1 to 3 days. Shot expelled after 10 days were half eroded and shot expelled after 22 days were one-sixth their original size. Based on these deterioration rates and the assumption that grit will be expelled and replaced when they are half eroded, USFWS has recommended a grit retention time of 10 days. The grit retention time of 83 days is based on the entire range of values presented by Gionfriddo and Best (1999) and USFWS. The arithmetic mean of the values reported by Gionfriddo and Best (1999) is 156 days. This value was used as the longest grit retention time in the Peddicord and LaKind model. The arithmetic mean of 156 days and 10 days is 83 days. This value was used as the “mean” grit retention time. The value suggested by USFWS (10 days) was used as the shortest grit retention time. Executing the model over a range of grit retention times also serves to incorporate many different bird species (other than the bobwhite quail and wild turkey, which serve as surrogate receptor species) in the evaluation process.

The Peddicord and LaKind model was executed to calculate two different results. The model was first used to calculate the probability that a bobwhite quail or wild turkey would ingest and

retain a single lead particle in its crop during its lifetime. It was assumed that quail and turkey would utilize the range areas and surrounding habitats randomly for foraging, with no regard to habitat quality. It was also assumed that the percent lead particles present in soil at the range areas was the mean of the percent lead particles determined by laboratory analysis and presented in Table 5-7 (Appendix J) for the two size fractions. The percent lead particles at the range areas are summarized below:

- 0.8 – 2.2 mm (bobwhite quail) : 1.66 percent lead particles
- 2.8 – 4.2 mm (wild turkey): 4.9 percent lead particles.

In other words, within the preferred particle size range for bobwhite quail, 1.66 percent of the particles at the IMR and BGR Ranges are lead fragments and within the preferred particle size range for wild turkey, 4.9 percent of the particles at the IMR and BGR Ranges are lead fragments. These measured percentages of lead particles in the soil at the IMR and BGR Ranges are very conservative because the soil samples for particle separation and enumeration were collected from areas of known high bullet fragment densities (e.g. range impact zones) and are not representative of the lead particle densities known to occur across the entire IMR or BGR Range complexes, or the foraging areas of the bobwhite quail or wild turkey. The lead bullet fragment densities are known to be significantly lower in the majority of the areas of these range complexes. Therefore, the results of the Peddicord and LaKind probability model are highly conservative in this assessment.

The probabilities that a bobwhite quail would ingest and retain a lead particle were calculated to range from 8.4 percent to 74 percent at the IMR Ranges and from 18 percent to 95 percent at the BGR Ranges, depending upon the grit retention time (Table 7-2). The probabilities that a wild turkey would ingest and retain a lead particle were calculated to be 4.5 percent at the IMR Ranges and 12.9 percent at the BGR Ranges (Table 7-2).

The model equations were then rearranged in order to solve for the number of lead particles that would result in a 20 percent probability of a bobwhite quail or wild turkey ingesting and retaining a single lead particle in its crop during its lifetime. An acceptable exposure level of 20 percent was based on the level of effect that is considered biologically significant and/or distinguishable for a given ecological community or population (Suter, et al., 2000). Adverse effects to a population or community that occur at a frequency less than 20 percent are indistinguishable from the natural variability inherent in natural biological systems and are considered biologically insignificant. A detailed description of the Peddicord and LaKind model

and the input parameters used in this assessment are presented in Section 6.1.4 of Appendix J of this report.

It was also assumed that ingestion of a single lead particle by a bobwhite quail or wild turkey could result in adverse effects; therefore, the probability of a receptor ingesting and retaining a single lead particle is equal to the probability of a receptor experiencing adverse effects. These results indicate that lead particle densities in soil that would result in a 20 percent probability of ingestion and retention by a bobwhite quail range from 24.6 to 846 fragments per square foot. Likewise, the results indicate that lead particle densities in soil that would result in a 20 percent probability of ingestion and retention by a wild turkey range from 68 to 204 fragments per square foot.

The results of the lead particle separation and enumeration summarized in Table 5-6 (Appendix J) indicate that none of the areas sampled had lead particle densities that would result in adverse effects to wild turkeys. At the lowest grit retention time (10 days), four of the five samples from the IMR Ranges exhibited densities that could pose adverse effects to bobwhite quail. Assuming a grit retention time of 83 days, two of the samples from the IMR Ranges (HR-70Q-SS01 and SAR-71-SS09) exhibited lead particle densities that could pose adverse effects to bobwhite quail. Assuming a grit retention time of 156 days, one sample from the IMR Ranges (HR-70Q-SS01) exhibited lead particle densities that could pose adverse effects to bobwhite quail.

At the lowest grit retention time (10 days), 9 of the 13 samples from the BGR Ranges exhibited densities that could pose adverse effects to bobwhite quail. Assuming a grit retention time of 83 days, two of the samples from the BGR Ranges (SAR-85-SS37 and HR-77Q-SS01) exhibited densities that could pose adverse effects to bobwhite quail. Assuming a grit retention time of 156 days, only one sample (HR-77Q-SS01) from the BGR Ranges exhibited a lead particle density that could pose adverse effects to bobwhite quail.

7.1.10 Results of Fathead Minnow Toxicity Tests

The results of the fathead minnow toxicity testing indicated 7-day survival rates were reduced in one surface water sample that exhibited a lead concentration of 0.0462 mg/L and a copper concentration of 0.0608 mg/L. All of the other surface water samples exhibited fathead minnow survival rates that were statistically similar to the reference site sample. Therefore, the AET and LOEC, based on survival, are equivalent and are 0.0608 mg/L for copper and 0.0462 for lead. The NOECs are 0.0527 mg/L copper and 0.0422 mg/L for lead.

Fathead minnow growth was statistically reduced in surface water samples with copper concentrations as low as 0.0346 mg/L and with lead concentrations as low as 0.0306 mg/L. The five surface water samples that elicited adverse effects had the five highest concentrations of both copper and lead. Thus, the AET and LOEC, based on these endpoints, are equivalent and are 0.0346 mg/L for copper and 0.0306 for lead. The NOECs are 0.0129 mg/L for copper and 0.0105 mg/L for lead.

7.1.11 Results of Ceriodaphnid Toxicity Tests

The results of the ceriodaphnid toxicity testing indicate that 7-day survival rates were reduced in two surface water samples (SAR-77-SW19 and SAR-77-SW20), both of which exhibited nondetectable levels of copper; one sample had a nondetectable level of lead and the other had a lead concentration of 0.00236 mg/L. Of the three samples that had concentrations of lead in the interval between sample SAR-77-SW20 (which had 0.00236 mg/L lead) and sample SAR 78-SW12 (which had 0.0306 mg/L lead), none induced any toxic effects: SAR-77-SW15 with 0.00357 mg/L lead, SAR-78-SW14 with 0.00762 mg/L lead, and SAR-78-SW13 with 0.0105 mg/L lead. The toxicity observed in SAR-77-SW20 with only 0.00236 mg/L lead, as well as the toxicity in SAR-77-SW19 with no detectable lead, was likely not due to lead but to other, unknown factors. Copper similarly had lower levels in the same three samples than any other samples with toxicity except for SAR-77-12 and SAR-22-SW20, where copper was not detected. The available data are not conclusive as to the cause of the observed toxicity in samples SAR-77-SW19 and SAR-77-SW20. These toxicity test results indicate that a factor other than lead or copper in surface water may be the cause of reduced ceriodaphnid survival in these two samples.

The toxicity test results for ceriodaphnid reproduction were very similar to the test results for fathead minnow growth. Ceriodaphnid reproduction was statistically reduced in surface water samples with copper and lead concentrations as low as 0.0346 and 0.0306 mg/L, respectively. Reproduction was not evaluated for statistical significance in samples SAR-77-SW19 or SAR-77-SW20 because ceriodaphnid survival was significantly reduced in these two samples. The five surface water samples that elicited adverse reproductive effects had the five highest concentrations of both copper and lead. Thus, the AET and LOEC, based on reproductive endpoints, are equivalent and are 0.0346 mg/L for copper and 0.0306 mg/L for lead. The NOECs, based on reproductive endpoints, are 0.0129 mg/L for copper and 0.0105 mg/L for lead. The AETs for copper and lead, based on ceriodaphnid survival, are 0.0346 and 0.0306 mg/L, respectively. The NOECs based on ceriodaphnid survival are 0.0129 mg/L for copper and less than the detection limit for lead. The LOECs for copper and lead, based on ceriodaphnid survival, are 0.0346 and 0.00236 mg/L, respectively.

7.1.12 Results of the Chironomid Toxicity Tests

The results of the 10-day chironomid survival test showed that survival was statistically reduced in sediment samples with arsenic concentrations as low as 2.4 mg/kg, barium concentrations as low as 32.5 mg/kg, copper concentrations as low as 160 mg/kg, lead concentrations as low as 605 mg/kg, and manganese concentrations as low as 181 mg/kg. Thallium was not detected in any of the sediment samples collected for toxicity testing.

For all of the sediment COPECs except copper, the sample with the highest sediment concentration showed no observable effect on survival. Due to the poor correlations between arsenic, barium, and manganese in sediment and survival, toxicity values were not derived for these chemicals. Significant correlations were only found for copper and lead in sediment and chironomid survival. The AETs, based on survival, for copper and lead were 380 and more than 1,730 mg/kg, respectively. The NOECs and LOECs, based on survival, were 126 and 160 mg/kg for copper and 495 and 605 mg/kg for lead.

For barium and manganese, the sample with the highest concentration also showed no observable effect on growth. Due to the poor correlations with arsenic, barium, and manganese, toxicity values based on growth were not derived for these chemicals. Significant correlations were only found for copper and lead in sediment and chironomid growth. The AETs, based on growth, for copper and lead are 74.9 and 432 mg/kg, respectively. The NOECs and LOECs, based on growth, are 9.06 and 10.4 mg/kg for copper and 23.1 and 76.7 mg/kg for lead.

7.1.13 Results of Chironomid Bioaccumulation Test

Chironomid bioaccumulation tests were conducted in order to assess the potential COPEC transfer from sediment to emergent benthic invertebrates and to estimate a sediment-to-benthic invertebrate BAF. These site-specific sediment-to-benthic invertebrate BAFs are used in the riparian food web model to assess the potential uptake of sediment COPECs in benthic invertebrates and the subsequent transfer of sediment COPECs to higher trophic level organisms that feed on benthic invertebrates (e.g. marsh wren and little brown bat).

Data collected as part of the ecological site investigation indicate that arsenic, barium, copper, lead, and manganese may accumulate in chironomid tissues, albeit at lower concentrations than ambient sediment concentrations. Since thallium was not detected in any of the sediment samples used for toxicity testing/bioaccumulation study, accumulation of thallium in chironomid tissues was assumed to be negligible.

The correlations between tissue concentrations and sediment concentrations were strongest for copper (r = 0.86), lead (r = 0.92), and manganese (r = 0.7). Although lead depicted a fairly good correlation (r = 0.92), the highest sediment concentration tested resulted in a much lower concentration in the chironomid tissue than predicted. Arsenic and barium in chironomid tissue did not show strong correlations (r = 0.27 and 0.56, respectively), providing additional evidence that these constituents are not likely responsible for the observed effects in the toxicity tests.

In order to define the relationship between sediment concentrations and chironomid tissue concentrations of COPECs, the data were plotted for each of the sediment COPECs (arsenic, barium, copper, lead, and manganese), and a number of different regression models were fitted to the data. The results of the analysis of different regression models suggested that the straight-line regression of the natural log transformed concentrations of arsenic, barium, copper, lead, and manganese in sediment and chironomid tissues fit the data best. As presented earlier, although thallium was identified as a sediment COPEC, none of the sediment samples collected as part of this BERA exhibited any detectable concentrations of thallium. Therefore, it was not possible to correlate sediment concentrations and chironomid tissue concentrations of thallium. The graphs depicting the sediment-to-chironomid BAFs for arsenic, barium, copper, lead, and manganese are presented in Appendix J as Figures 6-31 through 6-35, respectively. The best fit regression models of the natural log transformed data for arsenic, barium, copper, lead, and manganese represent the site-specific sediment-to-chironomid BAFs and are summarized below:

Sediment COPEC	Sediment-to-Chironomid BAF
Arsenic	y = 0.2095 x + 0.6143
Barium	y = 0.3665 x + 2.1605
Copper	y = 0.5117 x + 3.1964
Lead	y = 0.7772 x + 2.1714
Manganese	y = 0.6647 x + 1.4114
Thallium	NA

where: y = natural logarithm of terrestrial invertebrate tissue concentration
x = natural logarithm of soil concentration

Thallium was not detected in any of the sediment samples or chironomid tissue samples; therefore, a sediment-to-chironomid BAF could not be calculated. These sediment-to-chironomid BAFs were used in the riparian food web model to estimate the transfer of COPECs from sediment to riparian invertivores.

7.1.14 Results of Benthic Invertebrate Community Analysis

Benthic invertebrate samples were collected from 10 locations in Cane Creek and its tributaries within the BGR Ranges and one reference location. A riffle/run sample and a coarse particulate

organic matter (CPOM) sample were collected from each sampling location. Using the raw benthic data, a numerical value was calculated for the eight metrics (measures of benthic macroinvertebrate community quality) described in the *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (Barbour, et al., 1999). Calculated values were then compared to values derived from the reference location. Each metric was then assigned a score of 6, 3, or 0 according to the comparability (percent similarity) of calculated and reference values (Plafkin, et al., 1989). Scores for the eight metrics were then totaled and compared to the total metric score for the reference location. The percent comparison between the total scores provides a final evaluation of biological condition. The inclusion of an integrated multimetric approach to benthic habitat integrity incorporates many components of benthic community structure and, therefore, provides a more reliable assessment than obtainable with a single metric analysis.

Taxa richness was calculated by counting the number of taxa present in each sample. Taxa richness reflects the health of the community through a measurement of the variety of taxa present. Taxa richness for the Cane Creek drainage riffle/run samples ranged from 1 at sample location SAR-85-SW/SD08 to 7 at locations HR-85Q-SW/SD02, SAR-77-SW/SD25 and SAR-77-SW/SD23. Eight taxa were found at reference location REFST. Inclusion of taxa in the CPOM samples gives a range of 2 to 9 taxa for the Cane Creek and tributary locations and 10 taxa for REFST.

All locations on Cane Creek and its tributaries had fewer taxa than the reference location. Low taxa richness (1 to 3 taxa present) was found at SAR-85-SW/SD02, SAR-85-SW/SD08, SAR-85-SW/SD10, SAR-80Q-SW/SD03, and SAR-80Q-SW/SD06. The taxa richness data indicate that benthic macroinvertebrate habitats in the drainage basin containing the BGR Ranges may be of lower quality than the reference location.

The modified Family Biotic Index (FBI), developed by Hilsenhoff (1988), summarizes the tolerances of the benthic arthropod community to organic pollutants with a single value. Tolerance values used in the calculation of the FBI were obtained from Hilsenhoff (1988) and Bode (1988). The FBI is calculated by multiplying the number of organisms in each taxon by the tolerance value for that taxon, summing the products, and dividing by the total number of organisms.

The FBI ranged from 2.27 at sample location SAR-85-SW/SD02 to 8 at sample location SAR-85-SW/SD08. The FBI score at the reference site was 4.8. Two locations had FBI values that indicated better water quality than the reference location. However, because the tolerance values

of individual taxa are based on sensitivity to organic pollution, the FBI may not give completely consistent results with other types of stressors. Of the 10 locations in the Cane Creek drainage, 5 had a percent comparability to reference score of 6, and 5 locations had a score of 3. No location had a score of zero for the FBI metric.

The relative abundance of scrapers and filtering collectors in the riffle/run habitat is an indicator of the food sources available. The proportion of the two feeding groups is important because predominance of a particular feeding type may indicate an unbalanced community responding to an overabundance of a particular food source. Functional feeding group designations for the taxa identified were obtained from Merritt and Cummins (1984) and Barbour, et al., (1999). This metric was calculated by dividing the relative abundance of scrapers by the relative abundance of filter feeding organisms.

The ratio of scrapers and filterers was only calculable at two sites, SAR-77-SW/SD23 and REFST, with values of 0.125 and 0.14, respectively. Location SAR-77-SW/SD23 received the maximum reference comparability score of 6 for the scraper/filterer ratio. This index was not calculable at the remaining nine sites because no scraper-feeding invertebrates were present at these sites. Because the scraper/filterer ratio was obtained at the reference location, all Cane Creek drainage locations where the ratio could not be calculated because of a lack of scraper feeding invertebrates received a score of zero.

The ratio of Ephemeroptera, Plecoptera, and Trichoptera (EPT) and Chironomidae abundance is calculated by dividing the relative abundance of EPT taxa by the relative abundance of Chironomidae. The ratio of EPT to Chironomidae indicates if there is an even distribution between the pollution-sensitive EPT taxa and more pollution-tolerant Chironomidae. Good biotic conditions are reflected in communities having a fairly even distribution among all four major groups and with substantial representation in the sensitive EPT groups. Skewed populations having a disproportionate number of the generally tolerant Chironomidae relative to the more sensitive insect groups may indicate environmental stress.

The ratio of EPT and Chironomidae at the seven Cane Creek drainage sample locations that had both EPT taxa and Chironomidae ranged from 0.07 at SAR-77-SW/SD25 to 2.29 at SAR-77-SW/SD23. The ratio was 4.5 at reference location REFST. Chironomidae were not present at SAR-85-SW/SD02 and HR-80Q-SW/SD06; therefore, this index could not be calculated for these two locations. This index also could not be calculated at SAR-85-SW/SD08 because no EPT taxa were present at this site. Locations HR-78Q-SW/SD01 on Cane Creek and tributary

location SAR-77- SW/SD23 had EPT/Chironomidae percent comparability to reference scores of 3. All other locations in the Cane Creek drainage had a score of zero.

The percent contribution of the numerically dominant taxon to the total number of organisms is an indication of community balance at the lowest positive taxonomic level. A community dominated by relatively few species would indicate environmental stress. The percent contribution of the dominant taxon is calculated by dividing the abundance of the taxon which is numerically dominant by the total number of organisms in the sample. A low percent contribution of the dominant family indicates a balanced community and generally indicates a higher quality habitat. Factors influencing this percentage include environmental stress, habitat quality, and life histories of the organisms collected in the sample.

The percent contribution of the dominant taxon ranged from 100 at sample location SAR-85-SW/SD08 to 25 at location HR-78Q-SW/SD01. The numerically dominant organisms at SAR-85-SW/SD08 were Chironomidae, the only taxon found at this location. Perlodidae (stonefly larvae) and Tanypodinae (midge larvae) were numerically dominant at location HR-78Q-SW/SD01. Locations HR-78Q-SW/SD01 on Cane Creek had a lower dominant taxon percentage than the reference location and had the maximum percent comparability to the reference score of 6. Locations SAR-85-SW/SD02 and SAR-85-SW/SD08, on Cane Creek, and tributary station SAR-77-SW/SD25 had percent comparability to reference scores of zero.

The EPT index is the total number of distinct taxa within the EPT orders. This value summarizes taxa richness within the insect orders that are generally considered to be pollution sensitive. The EPT index usually increases with increasing water quality.

The EPT index for the Cane Creek drainage locations ranged from 0 at SAR-85-SW/SD08 to 3 at HR-78Q-SW/SD01. The EPT was 5 at reference location REFST. Although EPT taxa were present at 9 of 10 Cane Creek drainage sampling locations, the percent comparability to reference score was zero for all 10 locations for the EPT Index.

The Community Similarity Index evaluates the benthic populations at on-site locations relative to populations present at the reference location. The Community Similarity Index measures the loss of benthic species between a reference station and the location of comparison. It is an index of dissimilarity with values increasing as the degree of dissimilarity from the reference station increases. The community similarity index is calculated by subtracting the number of taxa common to both locations from the number of taxa present at the reference location, divided by the number of taxa present at the potential impact location.

The community similarity index ranged from 7 at sample location SAR-85-SW/SD08 to 0.57 at location SAR-77-SW/SD23. Location SAR-85-SW/SD08 on Cane Creek had a percent similarity with reference score of zero. All other Cane Creek drainage locations had a percent similarity with reference score of 3.

The abundance of the shredder functional group relative to the abundance of all other functional groups allows evaluation of potential impairment as indicated by the CPOM-based shredder community. Shredders are sensitive to riparian zone impacts and are particularly good indicators of toxic effects when the toxicants involved are readily absorbed to the CPOM and either affect the microbial communities colonizing the CPOM or the shredders directly. The ratio of the relative abundance of shredders to the abundance of all other functional feeding groups is calculated by dividing the relative abundance of shredders by the total number of organisms in a given sample.

No shredder feeding organisms were found at locations SAR-85-SW/SD02, HR-85Q-SW/SD02, SAR-85-SW/SD08, SAR-78-SW/SD10, and HR-80Q-SW/SD03; therefore, this index was not calculable at these sites. The ratio of shredders and total organisms at the remaining sites within the Cane Creek drainage ranged from 0.01 at SAR-77-SW/SD25 to 0.57 at HR-80Q-SW/SD06. The ratio was 0.78 at reference location REFST.

The percent comparison to reference for all eight metrics was presented in Table 5-10 (Appendix J). These values were used to assess the benthic invertebrate habitat quality at each sampling location.

Most sampling locations within the Cane Creek drainage were evaluated as being moderately impaired relative to the reference location, with percent comparison to the reference location ranging from 50 percent at SAR-77-SW/SD23 to 25 percent at SAR-78-SW/SD10, SAR-77-SW/SD25, and HR-80Q-SW/SD03. Location SAR-77-SW/SD23, which had the greatest similarity to the reference location, is on a Cane Creek tributary. Other tributary locations were less similar to the reference location, but no tributary location was found to be severely impaired. The Cane Creek tributary streams are known to be ephemeral, and may be dry for significant time intervals each year. This is likely to significantly impact the composition of the benthic community and reduce the similarity to the reference stream, which is a perennial stream with at least some water flow throughout the year. Cane Creek is a perennial stream, and therefore, the benthic community in Cane Creek is not likely to be impacted by drying of the substrate.

Two sampling locations were evaluated as severely impaired relative to the reference location. These locations were SAR-85-SW/SD02 and SAR-85-SW/SD08. Both of these sampling locations are on Cane Creek within Range 27 (Parcel 85Q). Two other sampling locations at Range 27 that exhibited only moderate impairment. One of these locations, HR-85Q-SW/SD02, is in a small drainage ditch north of Cane Creek. The other, SAR-85-SW/SD05, is located between the sampling locations where severe impairment was found. Therefore, there does not appear to be a pattern of increasing or decreasing benthic community impairment along Cane Creek.

One possible reason for the benthic habitat in Cane Creek at the BGR Ranges being classified as less than optimal could be the fact that Cane Creek exhibits very high energy flows during storm events because the creek bank confines the flow to a static width. This high energy flow tends to scour the cobble and boulder substrate and remove many of the benthic invertebrates that may have colonized this area. Strong storm events the month before the benthic invertebrate sampling (June 2003) most likely scoured the substrate of Cane Creek (and specifically Cane Creek at Range 27) and removed many of the benthic invertebrates that may have been present before the storms. Sampling locations SAR-85-SW/SD02 and SAR-85-SW/SD08 are in high-energy areas of Cane Creek. The substrate in these areas is almost entirely cobbles and boulders, with no or very little organic substrate. Significant scouring of the substrate is evident in these two sampling locations. These physical constraints may limit the ability of many benthic invertebrates to colonize these areas.

In addition to benthic invertebrate community structure and COPEC concentrations in sediment, the stream habitat was assessed and characterized as suboptimal to poor in quality. There does not appear to be a clear correlation between COPEC concentrations in sediment, the biological condition of the benthic invertebrate community, and the stream habitat, as summarized in Table 6-29 (Appendix J).

The benthic macroinvertebrate community data, sediment sample analytical data, and stream habitat characterization data indicate that the impairment in benthic macroinvertebrate communities of Cane Creek and its tributaries are most likely due to a combination of habitat restrictions and the presence of site-related constituents, particularly lead.

7.1.15 Results of Riparian Food Web Model

In order to assess the potential risks to various riparian-based feeding guilds from sediment-related constituents, a riparian food web was constructed. The riparian food web model was executed with site-specific surface water and sediment concentrations, site-specific area use

factors, site-specific sediment-to-chironomid BAFs, and literature-derived values for the other input variables. The model was executed with both maximum and mean detected concentrations as the exposure point concentrations for surface water and sediment in order to calculate a range of potential risks to riparian receptors.

Estimated maximum and mean exposures for the receptor species were compared to the toxicity reference values to estimate maximum and mean HQs for each receptor species. The calculated HQs for the surface water and sediment COPECs are summarized below.

	Maximum Exposure		**Mean Exposure**	
	NOAEL HQ	**LOAEL HQ**	**NOAEL HQ**	**LOAEL HQ**
Little Brown Bat:				
Arsenic	0.0758	0.00758	0.0657	0.00657
Barium	0.482	0.0482	0.317	0.0317
Copper	1.49	1.16	0.846	0.659
Lead	12.6	1.26	5.15	0.515
Manganese	0.172	0.0534	0.0653	0.0202
Thallium	NA	NA	NA	NA
Marsh Wren :				
Arsenic	0.202	0.0673	0.175	0.0584
Barium	0.619	0.309	0.407	0.203
Copper	1.99	1.52	1.13	0.862
Lead	137	46.7	56.1	19.1
Manganese	0.0797	0.00797	0.0302	0.00302
Thallium	NA	NA	NA	NA

The results of the riparian food web model indicate that there is a potential risk to riparian invertivorous mammals and riparian invertivorous birds from food web exposure to copper and lead in sediment. None of the other COPECs in surface water or sediment (arsenic, barium, manganese, and thallium) indicated the potential for adverse affects from exposure to even the MDCs.

The riparian food web model was also executed to determine the sediment concentrations of copper and lead that would result in HQs of one or lower. These calculated sediment concentrations represent concentrations of copper and lead that could remain in sediment and still be protective of riparian receptors. Sediment concentrations based on an HQ of 1.0 are not calculated for arsenic, barium, manganese, or thallium because the riparian food web model did not indicate any risk to riparian wildlife species due to food web exposures to these COPECs. The estimated sediment concentrations based on HQs equal to 1.0 are summarized below.

Riparian Receptor Species	Sediment Conc. Based on NOAEL TRV and HQ = 1.0 (mg/kg)	Sediment Conc. Based on LOAEL TRV and HQ = 1.0 (mg/kg)
Little Brown Bat :		
- Copper	175	287
- Lead	66	1,290
Marsh Wren :		
- Copper	99	169
- Lead	3.1	12.4

7.2 Baseline Ecological Risk Assessment Conclusions

The results of this BERA indicate that one or more constituents in surface soil, surface water, and sediment have the potential to pose adverse effects to sensitive ecological receptors in the terrestrial and riparian ecosystems at the IMR and BGR Ranges.

In order to identify site-specific concentrations of the COPECs that are protective of the sensitive receptors potentially present at the IMR and BGR Ranges, the various lines of evidence collected during the BERA were analyzed. From the various lines of evidence were derived RBRGs. These RBRGs are concentrations of COPECs in the various environmental media that are protective of the assessment endpoints described in Chapter 3.0 of the BERA (Appendix J) and summarized in Table 7-1. Because several lines of evidence were assessed for some of the assessment endpoints and COPECs, several RBRGs were also derived for these assessment endpoints and COPECs. The selection of the most reasonable or appropriate RBRG for a given endpoint or COPEC is a risk management decision and is not the province of this BERA.

7.2.1 Terrestrial Ecosystems

Earthworm toxicity tests (survival and growth endpoints) indicated that COPECs in soil at the IMR and BGR Ranges may cause adverse effects in terrestrial invertebrates (e.g., reduced survival and/or growth). Additionally, the terrestrial food web model indicated that sensitive terrestrial receptors could experience adverse effects due to exposure to COPECs in soil at the IMR and BGR Ranges through food web interactions. The results of the earthworm toxicity tests indicated that antimony is most likely not responsible for the observed effects in any of the earthworm tests. Adverse effects in earthworms (e.g., reduced growth) were observed at copper concentrations as low as 62.2 mg/kg, lead concentrations as low as 779 mg/kg, and zinc concentrations as low as 35.1 mg/kg. Copper, lead, and zinc were found to accumulate in the tissues of terrestrial invertebrates (earthworms) at minimal levels, such that the concentrations of COPECs were similar in soil and earthworm tissues.

The terrestrial food web model was used to predict soil concentrations that would be protective of the sensitive terrestrial feeding guilds found at these ranges. The food web model indicated that adverse effects to terrestrial receptors could be expected at antimony concentrations as low as 2.8 mg/kg, copper concentrations in soil as low as 267 mg/kg, lead concentrations as low as 55 mg/kg, and zinc concentrations as low as 215 mg/kg.

The calculated RBRGs for soil COPECs at the IMR and BGR Ranges ranged from 2.8 to greater than 1,620 mg/kg for antimony, 61.4 to greater than 16,200 mg/kg for copper, 55 to above 15,600 mg/kg for lead, and 33.5 to 555,000 mg/kg for zinc. The potential ecological RBRGs for surface soil at the IMR and BGR Ranges are summarized in Table 7-3. It is important to note that these soil RBRGs represent only those remedial goals resulting from the specific assessments conducted as part of this BERA. Any number of other remedial goal options is available based on human health risk, ARARs, other ecological endpoints, and other rationale. It is a risk management decision as to which remedial option, if any, is most appropriate for a given site.

In order to assess the potential risks to birds from ingesting lead particles, the Peddicord and LaKind (2000) model was utilized. The probabilities that a bobwhite quail would ingest and retain a single lead particle were calculated to range from 8.4 to 74 percent at the IMR Ranges and from 18 to 95 percent at the BGR Ranges, depending on the grit retention time. The probability that a wild turkey would ingest and retain a single lead particle was calculated to be 4.5 percent at the IMR Ranges and 12.9 percent at the BGR Ranges (Table 7-2). These results indicate that lead particle densities at the IMR and BGR Ranges would not be expected to result in adverse effects to the wild turkey populations at these ranges (probability of ingesting and retaining a lead particle is less than 20 percent). However, lead particle densities in the impact areas of the IMR and BGR Ranges could potentially pose a risk to the bobwhite quail populations at these ranges.

The Peddicord and LaKind (2000) model was also used to calculate lead particle densities that would result in a 20 percent probability of an individual turkey or bobwhite quail ingesting and retaining a single lead particle. These lead particle densities could be used as RBRGs for lead particles in surface soil and are summarized below.

	Acceptable Lead Particle Density at the IMR Ranges (particles/ft^2)	**Acceptable Lead Particle Density at the BGR Ranges** (particles/ft^2)
Bobwhite Quail	55 - 846	25 - 381
Wild Turkey	205	68

The RBRGs for bobwhite quail were calculated assuming a grit retention time ranging from 10 days to 156 days. The large range in values for "acceptable" lead particle densities for the bobwhite quail is attributable to the significant uncertainty and variability in the bobwhite quail's grit retention time. The RBRGs for wild turkeys were calculated assuming a grit retention time of 42 days (Gionfriddo and Best, 1999).

7.2.2 Riparian Ecosystems

Fathead minnow and ceriodaphnid toxicity tests indicated that COPEC concentrations in surface water at the BGR Ranges may cause adverse effects in aquatic vertebrates (reduced fathead minnow survival and growth) and aquatic invertebrates (reduced ceriodaphnid survival and reproduction). The toxicity tests indicated that copper and lead were the most likely causative agents in the observed adverse effects in the surface water toxicity tests. Adverse effects were observed in fathead minnows and ceriodaphnids at copper concentrations as low as 0.0346 mg/L and at nondetectable levels of lead.

The calculated RBRGs for surface water COPECs at the IMR and BGR Ranges ranged from 0.0129 to 0.0608 mg/L for copper and nondetectable to 0.0462 mg/L for lead. The potential ecological RBRGs for surface water at the IMR and BGR Ranges are summarized in Table 7-3. It is important to note that these surface water RBRGs represent only those remedial goals resulting from the specific assessments conducted as part of this BERA. Any number of other RGOs is available based on human health risk, ARARs, ambient water quality criteria, and other rationale. It is a risk management decision as to which remedial option, if any, is most appropriate for a given site.

Chironomid toxicity tests (survival and growth endpoints) indicated that COPECs in sediment at the BGR Ranges may cause adverse effects in benthic invertebrates (e.g., reduced chironomid survival and growth). Thallium was not detected in any sediment samples and was not considered to be a causative agent in the observed adverse effects. Arsenic, barium, and manganese concentrations in sediment were poorly correlated with chironomid survival and growth and were, therefore, not considered causative agents in the observed adverse effects. Adverse impacts were observed in chironomid survival and growth at copper concentrations as low as 10.4 mg/kg and lead concentrations as low as 76.7 mg/kg. Copper, lead, and manganese were found to accumulate in the tissues of benthic invertebrates (chironomids) at minimal levels, such that the concentrations of COPECs were similar in sediment and chironomid tissues. Arsenic, barium, and thallium did not exhibit any tendencies to bioaccumulate in chironomid tissues.

The riparian food web model indicated that sensitive riparian receptors could experience adverse effects due to exposure to copper and lead in sediment at the IMR and BGR Ranges through food web interactions. Arsenic, barium, manganese, and thallium are unlikely to cause any adverse effects to sensitive riparian receptors through food web interactions.

The riparian food web model was also used to predict soil concentrations that would be protective of the sensitive riparian feeding guilds found at these ranges. The food web model indicated that adverse effects to riparian receptors could be expected at copper concentrations in sediment as low as 99 mg/kg and lead concentrations as low as 3.1 mg/kg.

The calculated RBRGs for sediment COPECs at the IMR and BGR Ranges ranged from 9.06 to 380 mg/kg for copper and 3.1 to 1,730 mg/kg for lead. The potential ecological RBRGs for sediment at the IMR and BGR Ranges are summarized in Table 7-3. It is important to note that these sediment RBRGs represent only those remedial goals resulting from the specific assessments conducted as part of this BERA. Any number of other RGOs is available based on human health risk, ARARs, and other rationale. It is a risk management decision as to which remedial option, if any, is most appropriate for a given site.

7.3 Baseline Ecological Risk Assessment Uncertainties

There are a number of uncertainties that are inherent in the ecological risk assessment process. Some of the major areas of uncertainty in this BERA are summarized below. A more thorough discussion of the uncertainties present in this BERA is presented in Chapter 7.0 of Appendix J of this report.

Uncertainties in the COPEC identification process:

- Some analytical detection limits were greater than certain ESVs.
- Data from field duplicate samples were not used in risk assessment, only for QA/QC purposes.
- Metals detected at concentrations less than naturally occurring levels were eliminated as COPECs.

Uncertainties in the earthworm survival and growth tests:

- Physical and chemical differences between on-site soils and reference soils.

- Toxicity test does not directly identify the causative agent(s).
- All test treatments exhibited earthworm weight loss because no food was provided during test.
- Unimpacted soils may not support a viable earthworm community at FTMC.
- Earthworm species used in toxicity tests (*Eisenia fetida*) may not be representative of invertebrates present at FTMC.

Uncertainties in earthworm bioaccumulation test:

- Physical and chemical differences between on-site soils and reference soils.
- Presence of other chemicals in soil and the physical characteristics of soil may enhance or inhibit bioaccumulation of COPECs.
- Unimpacted soils may not support a viable earthworm community at FTMC.
- Earthworm species used in toxicity tests (*Eisenia fetida*) may not be representative of invertebrates present at FTMC.
- Test duration (28 days) may not be sufficient for worm tissues to reach equilibrium with soil.
- Earthworms were not depurated prior to chemical analysis.

Uncertainties in terrestrial food web model:

- Use of a single surrogate species to represent an entire feeding guild.
- Use of a single point estimate to represent each exposure parameter.
- Simplified feeding preferences to represent complex feeding behavior.
- Simplified transfer rates to estimate the transfer of COPECs from abiotic media to food items.
- Literature-based toxicity reference values may not represent on-site conditions.
- Food web model did not account for dermal or inhalation exposures because these pathways were assumed to be negligible compared to ingestion.

Uncertainties in lead particle ingestion model:

- Although avian species are known to ingest lead shot from the soil surface for use as digestive grit, there is limited information regarding either preferential ingestion of lead bullet fragments or avoidance of lead bullet fragments as digestive grit.
- Lead bullet fragment size was considered, but fragment shape and texture were not considered.
- Conservative assumptions were applied to the consideration of foraging range and the areal extent of lead bullet fragment contamination.
- Grit retention times are variable depending on a number of factors, including food availability, breeding condition, season, and other environmental factors, and the Peddicord and LaKind model is sensitive to changes in this parameter.
- It was assumed that ingestion and retention of a single lead particle would induce toxic effects.
- It was assumed that exposure of 20 percent of a given bird population to lead particles was acceptable.

Uncertainties in fathead minnow survival and growth tests:

- Physical and chemical differences between on-site surface water and reference site surface water.
- Toxicity test does not directly identify the causative agent(s).
- Surface water samples were analyzed for total metals only, but toxicity is more closely related to dissolved concentrations.
- Fish species used in toxicity tests (*Pimephales promelas*) may not be representative of fish species present at FTMC.
- The relatively short duration of the tests (seven days) may not accurately assess chronic exposures.

Uncertainties in ceriodaphnid survival and reproduction tests:

- Physical and chemical differences between on-site surface water and reference site surface water.
- Toxicity test does not directly identify the causative agent(s).

- Surface water samples were analyzed for total metals only, but toxicity is more closely related to dissolved concentrations.

- Ceriodaphnid species used in toxicity tests (*Ceriodaphnia dubia*) may not be representative of aquatic invertebrate species present at FTMC.

- The relatively short duration of the tests (seven days) may not accurately assess chronic exposures.

Uncertainties in chironomid survival and growth tests:

- Physical and chemical differences between on-site sediment and reference site sediment.

- Toxicity test does not directly identify the causative agent(s).

- Toxicity test results indicate un-impacted sediment may not support a viable benthic invertebrate community at FTMC.

- Chironomid species used in toxicity tests (*Chironomus riparius*) may not be representative of benthic invertebrate species present at FTMC.

Uncertainties in chironomid bioaccumulation test:

- The large number of chironomids necessary to achieve the required volume of tissue necessitated the use of nonstandard sample volumes and test chambers.

- On-site sediments were not conducive to chironomid survival; therefore, bioaccumulation was difficult to measure.

- The relatively short duration of the tests (10 days) may not accurately assess chronic exposures.

Uncertainties in benthic invertebrate community analysis:

- The assessment technique (RBP-II) provides a “snapshot” of the benthic community structure, but does not address temporal changes.

- Several of the metrics used to assess community structure are based on the assessment of organic pollutants.

- Assessment technique identifies areas of impact regardless of stressor (Biological, chemical, physical, or other).

- Benthic habitat was characterized as sub-optimal or poor; therefore, benthic community structure may not be a discriminating factor in the assessment of sediment.

- Surrounding land use is important in the assessment, but can only be qualitatively described.

- Applicability of benthic community analysis to Remount Creek is uncertain.

Uncertainties in riparian food web model:

- Use of a single surrogate species to represent an entire feeding guild.

- Use of a single point estimate to represent each exposure parameter.

- Simplified feeding preferences to represent complex feeding behavior.

- Simplified transfer rates to estimate the transfer of COPECs from abiotic media to food items.

- Literature-based toxicity reference values may not represent on-site conditions.

8.0 Summary, Conclusions, and Recommendations

This chapter summarizes the results of the RI conducted at the IMR Ranges and presents the major conclusions. In addition, recommendations are made regarding the path forward for this site under the CERCLA process.

8.1 Summary of Findings

8.1.1 Surface Soil Contaminant Distribution

A total of 120 surface and depositional soil samples were collected from IMR Ranges and analyzed for lead, while select samples were analyzed for TAL metals, VOCs, SVOCs, pesticides and herbicides, PCBs, perchlorate, explosives, cyanide, pH, and TOC.

Metals. Lead was the major metal contaminant in surface soils. All 120 samples contained detectable concentrations. The BSV of 40.05 mg/kg was exceeded in 79 samples. Thirty samples exceeded the SSSL for lead (400 mg/kg), and 75 samples exceeded the ESV (50 mg/kg). The MDC was 116,000 mg/kg. The lead concentrations were plotted as isopleth maps (Figures 2-1 through 2-4) that showed contamination was mostly contained by the range hillside impact zones. Other metals, including antimony, arsenic, and copper, also were detected in concentrations that exceeded risk-based screening values, although these metals were most often found collocated with lead in the range impact zones.

Organic Compounds. VOCs and herbicides were detected in surface and depositional soil samples but at concentrations below SSSLs and/or ESVs. Perchlorate, explosives, and cyanide were not detected. Of the 15 SVOCs detected in surface soils, 12 were PAH compounds that were detected in two surface soil samples at the Skeet Range at concentrations exceeding SSSLs and/or ESVs. The PAH contamination may be attributed to the clay targets used on this range as both samples were located within an area where skeet and trap targets were routinely shot. Several pesticide compounds and one PCB (Aroclor 1260) were detected in surface soil samples at levels above ESVs; however, all concentrations were less than SSSLs. No pattern was evident in the distribution of these compounds.

8.1.2 Subsurface Soil Contaminant Distribution

A total of 37 subsurface soil samples were collected for chemical analysis at the IMR Ranges at depths greater than 1 foot bgs. These samples were analyzed for lead, TAL metals, VOCs, SVOCs, perchlorate, and explosives.

Metals. Lead was the major metal contaminant in subsurface soils. All 37 samples contained detectable concentrations of lead. Only three samples contained lead in concentrations that exceeded the SSSL (400 mg/kg); two of the three were located in the same boring in the Skeet Range impact zone (at 1 to 2.5 feet bgs). The MDC was 1,350 mg/kg at the Range 19 impact zone. In addition to lead, four metals (chromium, iron, antimony, and arsenic) were detected in individual samples at concentrations exceeding SSSLs and background screening values.

Organic Compounds. All VOCs and SVOCs detected were below SSSLs with the exception of one PAH (benzo[a]pyrene) in a single Skeet Range impact zone sample (at 1 to 1.5 feet bgs). Explosives and perchlorate were not detected.

8.1.3 Groundwater Contaminant Distribution

Six groundwater samples were collected for chemical analysis at the IMR Ranges from residuum and bedrock monitoring wells. These samples were analyzed for TAL metals, VOCs, SVOCs, perchlorate, and explosive compounds.

Metals. Three metals (barium, beryllium, and manganese) were detected in one or two groundwater samples each at concentrations exceeding SSSLs and background.

Organic Compounds. One explosive compound, 4-ADNT, was detected in a groundwater sample collected from the Skeet Range, at an estimated concentration exceeding its SSSL. All other explosive, VOC, SVOC, and perchlorate results were below SSSLs.

8.1.4 Surface Water Contaminant Distribution

Nine surface water samples were collected for chemical analysis at the IMR Ranges. These samples were analyzed for TAL metals, perchlorate, and explosives.

Metals. Lead exceeded its SSSL, ESV, and background in two samples from the Skeet Range, with a maximum concentration of 0.0871 mg/L. These samples were located in the Skeet Range impact zone. After statistical and geochemical evaluation, the maximum lead detection at the Skeet Range was found to be the only anomalous concentration in surface water.

Organic Compounds. Explosives and perchlorate were not detected in any surface water samples.

8.1.5 Sediment Contaminant Distribution

Nine sediment samples were collected for chemical analysis at IMR Ranges. These samples were analyzed for TAL metals, perchlorate, and explosives.

Metals. Lead exceeded its SSSL and background in two samples, with a maximum concentration of 2,070 mg/kg. These samples were located in the Skeet Range impact zone. In addition, lead (five samples), arsenic (two samples), copper (two samples), and nickel (one sample) were detected at concentrations exceeding ESVs and background.

Organic Compounds. Explosives and perchlorate were not detected in any sediment samples.

8.1.6 Streamlined Human Health Risk Assessment

An SRA was performed to determine the potential threat to human health from exposure to environmental media at IMR Ranges. The receptor scenarios evaluated in the SRA included a groundskeeper, construction worker, indoor worker, youth recreational site user, and on-site resident. All receptors were evaluated for exposure to total soil, a combination of the surface and subsurface soil data sets. The groundskeeper, construction worker, indoor worker, and on-site resident were evaluated also for exposure to groundwater hypothetically developed as a potable source. The youth recreational site user was evaluated also for exposure to surface water and sediment. The likelihood that the on-site resident may also be recreationally exposed to surface water and sediment was addressed by summing the risk estimates for the youth recreational site user with those for the on-site resident.

The SRA concluded that lead in total soil represents a potential health threat for all receptors evaluated herein; lead is the only metal that represents a health threat to the groundskeeper and youth recreational site user. In addition, antimony and arsenic in total soil and 2-nitrotoluene in groundwater hypothetically developed as a potable source represent a potential health threat to the construction worker and indoor worker, depending on the location of EUs. Antimony, arsenic, and three PAHs in total soil and 2-nitrotoluene in groundwater hypothetically developed as a potable source represent a potential health threat to the on-site resident. Levels of lead in surface water and sediment are not sufficient to raise concern for health effects. Soil samples

with antimony and arsenic concentrations sufficient to raise health concerns are associated with lead concentrations at the higher end of the detected range.

8.1.7 Baseline Ecological Risk Assessment

A BERA was conducted for the IMR and BGR Ranges that incorporated the results of SLERAs previously conducted. The SLERAs identified several COPECs in various environmental media and concluded that additional assessment was warranted to further identify and refine the potential ecological risks.

The BERA consisted of several tests and evaluations of the different site media:

- ***Soil*** - Earthworm toxicity tests and earthworm bioaccumulation test, terrestrial food web modeling, and particulate lead ingestion modeling
- ***Surface water*** - Fathead minnow toxicity tests and ceriodaphnid toxicity tests
- ***Sediment*** - Chironomid toxicity tests and chironomid bioaccumulation tests.

In addition, benthic invertebrate community analysis and riparian food web modeling were performed and discussed in the BERA.

The results of the BERA indicated that one or more constituents in surface soil, surface water, and sediment have the potential to pose adverse effects to sensitive ecological receptors in the terrestrial and riparian ecosystems at the IMR and BGR Ranges. In order to identify site-specific concentrations of the COPECs that are protective of the sensitive receptors potentially present at the IMR and BGR Ranges, the various lines of evidence collected during the BERA were analyzed. RBRGs were derived from the various lines of evidence. These RBRGs are concentrations of COPECs in the various environmental media that are protective of the assessment endpoints.

Because several lines of evidence were assessed for some of the assessment endpoints and COPECs, several RBRGs were also derived for these assessment endpoints and COPECs. The selection of the most reasonable or appropriate RBRG for a given endpoint or COPEC is a risk management decision and is not the province of this BERA.

Terrestrial Ecosystems. Earthworm toxicity tests (survival and growth endpoints) indicated that COPECs in soil at the IMR and BGR Ranges may cause adverse effects in terrestrial

invertebrates (e.g., reduced survival and/or growth). Additionally, the terrestrial food web model indicated that sensitive terrestrial receptors could experience adverse effects due to exposure to COPECs in soil at the IMR and BGR Ranges through food web interactions. The results of the earthworm toxicity tests indicated that antimony is most likely not responsible for the observed effects in any of the earthworm tests. Adverse effects in earthworms (e.g., reduced growth) were observed at copper concentrations as low as 62.2 mg/kg, lead concentrations as low as 779 mg/kg, and zinc concentrations as low as 35.1 mg/kg. Copper, lead, and zinc were found to accumulate in the tissues of terrestrial invertebrates (earthworms) at minimal levels, such that the concentrations of COPECs were similar in soil and earthworm tissues.

The terrestrial food web model was used to predict soil concentrations that would be protective of the sensitive terrestrial feeding guilds found at these ranges. The food web model indicated that adverse effects to terrestrial receptors could be expected at antimony concentrations as low as 2.8 mg/kg, copper concentrations in soil as low as 267 mg/kg, lead concentrations as low as 55 mg/kg, and zinc concentrations as low as 215 mg/kg.

The calculated RBRGs for soil COPECs at the IMR and BGR Ranges ranged from 2.8 to more than 1,620 mg/kg for antimony, 61.4 to 16,200 mg/kg for copper, 55 to more than 15,600 mg/kg for lead, and 33.5 to 555,000 mg/kg for zinc. The potential ecological RBRGs for surface soil at the IMR and BGR Ranges are summarized in Table 8-1. It is important to note that these soil RBRGs represent only those remedial goals resulting from the specific assessments conducted as part of this BERA. Any number of other RGOs is available based on human health risk, ARARs, other ecological endpoints, and other rationale. It is a risk management decision as to which remedial option, if any, is most appropriate for a given site.

In order to assess the potential risks to birds from ingesting lead particles, the Peddicord and LaKind (2000) model was utilized. The probabilities that a bobwhite quail would ingest and retain a single lead particle were calculated to range from 8.4 percent to 74 percent at the IMR Ranges and from 18 percent to 95 percent at the BGR Ranges, depending on the grit retention time. The probability that a wild turkey would ingest and retain a single lead particle was calculated to be 4.5 percent at the IMR Ranges and 12.9 percent at the BGR Ranges. These results indicate that lead particle densities at the IMR and BGR Ranges would not be expected to result in adverse effects to the wild turkey populations at these ranges (probability of ingesting and retaining a lead particle is less than 20 percent). However, lead particle densities in the impact areas of the IMR and BGR Ranges could potentially pose a risk to the bobwhite quail populations at these ranges.

The Peddicord and LaKind (2000) model was also used to calculate lead particle densities that would result in a 20 percent probability of an individual turkey or bobwhite quail ingesting and retaining a single lead particle. These lead particle densities could be used as RBRGs for lead particles in surface soil and are summarized below.

	Acceptable Lead Particle Density at the IMR Ranges (particles/ft^2)	**Acceptable Lead Particle Density at the BGR Ranges** (particles/ft^2)
Bobwhite Quail	55 - 846	25 - 381
Wild Turkey	205	68

Riparian Ecosystems. Fathead minnow and ceriodaphnid toxicity tests indicated that COPEC concentrations in surface water at the BGR Ranges may cause adverse effects in aquatic vertebrates (reduced fathead minnow survival and growth) and aquatic invertebrates (reduced ceriodaphnid survival and reproduction). The toxicity tests indicated that copper and lead were the most likely causative agents in the observed adverse effects in the surface water toxicity tests. Adverse effects were observed in fathead minnows and ceriodaphnids at copper concentrations as low as 0.0346 mg/L and at nondetectable levels of lead.

The calculated RBRGs for surface water COPECs at the IMR and BGR Ranges ranged from 0.0129 to 0.0608 mg/L for copper and nondetectable to 0.0462 mg/L for lead. The potential ecological RBRGs for surface water at the IMR and BGR Ranges are summarized in Table 8-1. It is important to note that these surface water RBRGs represent only those remedial goals resulting from the specific assessments conducted as part of this BERA. Any number of other RGOs is available based on human health risk, ARARs, ambient water quality criteria, and other rationale. It is a risk management decision as to which remedial option, if any, is most appropriate for a given site.

Chironomid toxicity tests (survival and growth endpoints) indicated that COPECs in sediment at the BGR Ranges may cause adverse effects in benthic invertebrates (e.g., reduced chironomid survival and growth). Thallium was not detected in any sediment samples and was not considered to be a causative agent in the observed adverse effects. Arsenic, barium, and manganese concentrations in sediment were poorly correlated with chironomid survival and growth and were, therefore, not considered causative agents in the observed adverse effects. Adverse impacts were observed in chironomid survival and growth at copper concentrations as low as 10.4 mg/kg and lead concentrations as low as 76.7 mg/kg. Copper, lead, and manganese

were found to accumulate in the tissues of benthic invertebrates (chironomids) at minimal levels, such that the concentrations of COPECs were similar in sediment and chironomid tissues. Arsenic, barium, and thallium did not exhibit any tendencies to bioaccumulate in chironomid tissues.

The riparian food web model indicated that sensitive riparian receptors could experience adverse effects due to exposure to copper and lead in sediment at the IMR and BGR Ranges through food web interactions. Arsenic, barium, manganese, and thallium are unlikely to cause any adverse effects to sensitive riparian receptors through food web interactions.

The riparian food web model was also used to predict sediment concentrations that would be protective of the sensitive riparian feeding guilds found at these ranges. The food web model indicated that adverse effects to riparian receptors could be expected at copper concentrations in sediment as low as 99 mg/kg and lead concentrations as low as 3.1 mg/kg.

The calculated RBRGs for sediment COPECs at the IMR and BGR Ranges ranged from 9.06 to 380 mg/kg for copper and 3.1 to 1,730 mg/kg for lead. The potential ecological RBRGs for sediment at the IMR and BGR Ranges are summarized in Table 8-1. It is important to note that these sediment RBRGs represent only those remedial goals resulting from the specific assessments conducted as part of this BERA. Any number of other RGOs is available based on human health risk, ARARs, and other rationale. It is a risk management decision as to which remedial option, if any, is most appropriate for a given site.

8.2 Conclusions

Metals contamination is the major source of environmental concern at IMR Ranges. Lead and the other metals found in bullets and shot residues are present in surface soil and to a lesser extent in subsurface soil, surface water, and sediment matrices in concentrations which exceed human health and ecological limits. The obvious source of the contamination present at IMR Ranges is from weapons training. The limited extent of subsurface soil contamination indicates that metals contamination from range use is mostly limited to the range surface (0 to 1 foot bgs). Metals-containing expended rounds are present on the surface, with some penetration into the shallow subsurface, and they have had some impact on the ephemeral streams and tributaries of Remount Creek in the area of the Skeet Range.

8.3 Recommendations

Based on the summary and conclusions presented above, no further actions are warranted with respect to defining the nature and extent of soil contamination at IMR Ranges. The human health and ecological risks have been evaluated using the data available. Surface and some limited shallow subsurface soil contamination is present and surface water and sediment matrices have been impacted by historical site activities. The contamination may pose a risk to human health and ecological receptors.

To address the contamination concerns identified in this RI report, Shaw recommends conducting an FS to evaluate and select a remedial alternative to ensure protection of human health and the environment at the IMR Ranges.

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2-ADNT	2-amino-4,6-dinitrotoluene
4-ADNT	4-amino-2,6-dinitrotoluene
2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	2,4,5-trichlorophenoxypropionic acid
3D	3D International Environmental Group
AB	ambient blank
AbB3	Anniston gravelly clay loam, 2 to 6 percent slopes, severely eroded
AbC3	Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded
ABLM	adult blood lead model
Abs	skin absorption
ABS	dermal absorption factor
AC	hydrogen cyanide
ACAD	AutoCadd
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
ACM	asbestos-containing material
AdE	Anniston and Allen stony loam, 10 to 25 percent slope
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AEC	U.S. Army Environmental Center
AEDA	ammunition, explosives, and other dangerous articles
AEL	airborne exposure limit
AET	adverse effect threshold; apparent effects threshold
AF	soil-to-skin adherence factor
AHA	ammunition holding area
AL	Alabama
ALARNG	Alabama Army National Guard
ALAD	δ-aminolevulinic acid dehydratase
ALDOT	Alabama Department of Transportation
amb.	amber
amsl	above mean sea level
ANAD	Anniston Army Depot
ANOVA	Analysis of Variance
AOC	area of concern
AOI	area of investigation
AP	armor piercing
APEC	areas of potential ecological concern
APT	armor-piercing tracer
AR	analysis request
ARAR	applicable or relevant and appropriate requirement
AREE	area requiring environmental evaluation
AS/SVE	air sparging/soil vapor extraction
ASP	Ammunition Supply Point
ASR	Archives Search Report
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AT	averaging time
atm-m^3/mol	atmospheres per cubic meter per mole
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	all-terrain vehicle
AUF	area use factor
AWARE	Associated Water and Air Resources Engineers, Inc.
AWQC	ambient water quality criteria
AWWSB	Anniston Water Works and Sewer Board
'B'	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BAF	bioaccumulation factor
BBGR	Baby Bains Gap Road
BCF	blank correction factor; bioconcentration factor
BCT	BRAC Cleanup Team
BERA	baseline ecological risk assessment
BEHP	bis(2-ethylhexyl)phthalate
BFB	bromofluorobenzene
BFE	base flood elevation
BFM	bonded fiber matrix
BG	Bacillus globigii
BGR	Bains Gap Road
bgs	below ground surface
BHC	hexachlorocyclohexane
BHHRA	baseline human health risk assessment
BIRTC	Branch Immaterial Replacement Training Center
bkg	background
bls	below land surface
BOD	biological oxygen demand
Bp	soil-to-plant biotransfer factors
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BSAF	biota-to-sediment accumulation factors
BSC	background screening criterion
BSV	background screening values
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethyl benzene, and xylenes
BTOC	below top of casing
BTV	background threshold value
BW	biological warfare; body weight
BZ	breathing zone; 3-quinuclidinyl benzilate
C	ceiling limit value
Ca	carcinogen
$CaCO_3$	calcium carbonate
CAA	Clean Air Act
CAB	chemical warfare agent breakdown products
CACM	Chemical Agent Contaminated Media
CAIS	chemical agent identification set
CAMU	corrective action management unit
CBR	chemical, biological, and radiological
CCAL	continuing calibration
CCB	continuing calibration blank
CCV	continuing calibration verification
CD	compact disc
CDTF	Chemical Defense Training Facility
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CF	chloroform
CF	conversion factor
CFC	chlorofluorocarbon
CFDP	Center for Domestic Preparedness
CFR	Code of Federal Regulations
CG	phosgene (carbonyl chloride)
CGI	combustible gas indicator
ch	inorganic clays of high plasticity
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CIH	Certified Industrial Hygienist
CK	cyanogen chloride
cl	inorganic clays of low to medium plasticity
Cl	chlorinated
CLP	Contract Laboratory Program
cm	centimeter
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
CO	carbon monoxide
CO_2	carbon dioxide
Co-60	cobalt-60
CoA	Code of Alabama
COC	chain of custody; chemical of concern
COE	Corps of Engineers
Con	skin or eye contact
COPC	chemical of potential concern
COPEC	constituent of potential ecological concern
CPOM	coarse particulate organic matter
CPSS	chemicals present in site samples
CQCSM	Contract Quality Control System Manager
CRDL	contract-required detection limit
CRL	certified reporting limit
CRQL	contract-required quantitation limit
CRZ	contamination reduction zone
Cs-137	cesium-137

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

GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
H&S	health and safety
HA	hand auger
HC	mixture of hexachloroethane, aluminum powder, and zinc oxide (smoke producer)
HCl	hydrochloric acid
HD	distilled mustard (bis-[dichloroethyl]sulfide)
HDPE	high-density polyethylene
HE	high explosive
HEAST	Health Effects Assessment Summary Tables
Herb.	herbicides
HHRA	human health risk assessment
HI	hazard index
HN	hydrogen mustard
H_2O_2	hydrogen peroxide
HPLC	high-performance liquid chromatography
HNO_3	nitric acid
HQ	hazard quotient
HQ_{screen}	screening-level hazard quotient
hr	hour
HRC	hydrogen releasing compound
HSA	hollow-stem auger
HSDB	Hazardous Substance Data Bank
HTRW	hazardous, toxic, and radioactive waste
'I'	out of control, data rejected due to low recovery
IASPOW	Impact Area South of POW Training Facility
IATA	International Air Transport Authority
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
IF	ingestion factor; inhalation factor
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IR	ingestion rate
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information Service
IRP	Installation Restoration Program
IS	internal standard
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System™
ITRC	Interstate Trade and Regulatory Council
IWWP	installation-wide work plan
'J'	estimated concentration
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
JPA	Anniston-Calhoun County Fort McClellan Development Joint Powers Authority
K	conductivity
K_d	soil-water distribution coefficient
kg	kilogram
KeV	kilo electron volt
K_{oc}	organic carbon partioning coefficient
K_{ow}	octonal-water partition coefficient
$KMnO_4$	potassium permanganate
L	liter; Lewisite (dichloro-[2-chloroethyl]sulfide)
L/kg/day	liters per kilogram per day
l	liter
LAW	light anti-tank weapon
lb	pound
LBP	lead-based paint
LC	liquid chromatography
LCS	laboratory control sample
LC_{50}	lethal concentration for 50 percent population tested
LD_{50}	lethal dose for 50 percent population tested
LEL	lower explosive limit
LOAEL	lowest-observed-adverse-effects-level
LOEC	lowest-observable-effect-concentration
LRA	land redevelopment authority
LT	less than the certified reporting limit
LUC	land-use control
LUCAP	land-use control assurance plan
LUCER	land-use control effectiveness report
LUCIP	land-use control implementation plan
m	meter
m/yr	meters per year
max	maximum
MB	method blank
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MCPA	4-chloro-2-methylphenoxyacetic acid
MCPP	2-(2-methyl-4-chlorophenoxy)propionic acid
MCS	media cleanup standard
MD	matrix duplicate
MDA	Calhoun County McClellan Development Authority
MDC	maximum detected concentration
MDCC	maximum detected constituent concentration
MDL	method detection limit
MEC	munitions and explosives of concern
MeV	mega electron volt
mg	milligrams
mg/kg	milligrams per kilogram
mg/kg/day	milligram per kilogram per day
mg/kgbw/day	milligrams per kilogram of body weight per day
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
min	minimum
MINICAMS	miniature continuous air monitoring system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MMBtu/hr	million Btu per hour
MNA	monitored natural attenuation
MnO_4-	permanganate ion
MOA	Memorandum of Agreement
MOGAS	motor vehicle gasoline
MOUT	Military Operations in Urban Terrain
MP	Military Police
MPA	methyl phosphonic acid
MPC	maximum permissible concentration
MPM	most probable munition
MQL	method quantitation limit
MR	molasses residue
MRL	method reporting limit
MS	matrix spike
mS/cm	millisiemens per centimeter
mS/m	millisiemens per meter

MSD	matrix spike duplicate; minimum separation distance
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
MWI&MP	Monitoring Well Installation and Management Plan
Na	sodium
NA	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
$NaMnO_4$	sodium permanganate
NAVD88	North American Vertical Datum of 1988
NAS	National Academy of Sciences
NCEA	National Center for Environmental Assessment
NCP	National Contingency Plan
NCRP	National Council on Radiation Protection and Measurements
ND	not detected
NE	no evidence; northeast
ne	not evaluated
NEW	net explosive weight
NFA	No Further Action
NG	National Guard
NGP	National Guardsperson
ng/L	nanograms per liter
NGVD	National Geodetic Vertical Datum
Ni	nickel
NIC	notice of intended change
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NLM	National Library of Medicine
NO_3^-	nitrate
NOEC	no-observable-effect-concentration
NPDES	National Pollutant Discharge Elimination System
NPW	net present worth
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effects-level
NR	not requested; not recorded; no risk
NRC	National Research Council
NRCC	National Research Council of Canada
NRHP	National Register of Historic Places
NRT	near real time
ns	nanosecond
N-S	north to south
NS	not surveyed
NSA	New South Associates, Inc.
nT	nanotesla
nT/m	nanoteslas per meter
NTU	nephelometric turbidity unit
nv	not validated
O_2	oxygen
O_3	ozone
O&G	oil and grease
O&M	operation and maintenance
OB/OD	open burning/open detonation
OD	outside diameter
OE	ordnance and explosives
oh	organic clays of medium to high plasticity
OH•	hydroxyl radical
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus
ORC	Oxygen Releasing Compound
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OVM-PID/FID	organic vapor meter-photoionization detector/flame ionization detector
OWS	oil/water separator
oz	ounce
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
Parsons	Parsons Engineering Science, Inc.
Pb	lead
PBMS	performance-based measurement system
PC	permeability coefficient
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzofurans
PCE	perchloroethene
PCP	pentachlorophenol
PDS	Personnel Decontamination Station
PEF	particulate emission factor
PEL	permissible exposure limit
PERA	preliminary ecological risk assessment
PERC	perchloroethene
PES	potential explosive site
Pest.	pesticides
PETN	pentaerythritoltetranitrate
PFT	portable flamethrower
PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
PM	project manager
POC	point of contact
POL	petroleum, oils, and lubricants
POTW	publicly owned treatment works
POW	prisoner of war
PP	peristaltic pump; Proposed Plan
ppb	parts per billion
ppbv	parts per billion by volume
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PR	potential risk
PRA	preliminary risk assessment
PRG	preliminary remediation goal
PS	chloropicrin
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAM	quality assurance manual
QAO	quality assurance officer
QAP	installation-wide quality assurance plan
QC	quality control
QST	QST Environmental, Inc.
qty	quantity
Qual	qualifier
QuickSilver	QuickSilver Analytics, Inc.
R	rejected data; resample; retardation factor
R^2	coefficient of determination
R&A	relevant and appropriate
RA	remedial action
RAO	remedial action objective
RBC	risk-based concentration; red blood cell
RBP	Rapid Bioassessment Protocol
RBRG	risk-based remedial goal
RCRA	Resource Conservation and Recovery Act
RCWM	Recovered Chemical Warfare Material
RD	remedial design
RDX	cyclotrimethylenetrinitramine
ReB3	Rarden silty clay loams
REG	regular field sample
REL	recommended exposure limit
RFA	request for analysis
RfC	reference concentration
RfD	reference dose
RGO	remedial goal option
RI	remedial investigation
RL	reporting limit

RME	reasonable maximum exposure
ROD	Record of Decision
RPD	relative percent difference
RR	range residue
RRF	relative response factor
RRSE	Relative Risk Site Evaluation
RSD	relative standard deviation
RTC	Recruiting Training Center
RTECS	Registry of Toxic Effects of Chemical Substances
RTK	real-time kinematic
RWIMR	Ranges West of Iron Mountain Road
SA	exposed skin surface area
SAD	South Atlantic Division
SAE	Society of Automotive Engineers
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
SARA	Superfund Amendments and Reauthorization Act
sc	clayey sands; sand-clay mixtures
Sch.	schedule
SCM	site conceptual model
SD	sediment
SDG	sample delivery group
SDWA	Safe Drinking Water Act
SDZ	safe distance zone; surface danger zone
SEMS	Southern Environmental Management & Specialties, Inc.
SF	cancer slope factor
SFSP	site-specific field sampling plan
SGF	standard grade fuels
Shaw	Shaw Environmental, Inc.
SHP	installation-wide safety and health plan
SI	site investigation
SINA	Special Interest Natural Area
SL	standing liquid
SLERA	screening-level ecological risk assessment
sm	silty sands; sand-silt mixtures
SM	Serratia marcescens
SMDP	Scientific Management Decision Point
s/n	signal-to-noise ratio
SO_4^{-2}	sulfate
SOD	soil oxidant demand
SOP	standard operating procedure
SOPQAM	U.S. EPA's *Standard Operating Procedure/Quality Assurance Manual*
sp	poorly graded sands; gravelly sands
SP	submersible pump
SPCC	system performance calibration compound
SPCS	State Plane Coordinate System
SPM	sample planning module
SQRT	screening quick reference tables
Sr-90	strontium-90
SRA	streamlined human health risk assessment
SRI	supplemental remedial investigation
SRM	standard reference material
Ss	stony rough land, sandstone series
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSL	soil screening level
SSSL	site-specific screening level
SSSSL	site-specific soil screening level
STB	supertropical bleach
STC	source-term concentration
STD	standard deviation
STEL	short-term exposure limit
STL	Severn-Trent Laboratories
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SUXOS	senior UXO supervisor
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA's *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SWMU	solid waste management unit
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TBC	to be considered
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDEC	Tennessee Department of Environment and Conservation
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TEA	triethylaluminum
TeCA	1,1,2,2-tetrachloroethane
Tetryl	trinitrophenylmethylnitramine
TERC	Total Environmental Restoration Contract
TEU	Technical Escort Unit
THI	target hazard index
TIC	tentatively identified compound
TLV	threshold limit value
TN	Tennessee
TNB	trinitrobenzene
TNT	trinitrotoluene
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TR	target cancer risk
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TRV	toxicity reference value
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
TSS	total suspended solids
TWA	time-weighted average
UCL	upper confidence limit
UCR	upper certified range
'U'	not detected above reporting limit
UIC	underground injection control
UF	uncertainty factor
URF	unit risk factor
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATCES	U.S. Army Technical Center for Explosive Safety
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level; upper tolerance limit
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
VC	vinyl chloride
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
WAC	Women's Army Corps

Weston	Roy F. Weston, Inc.
WP	white phosphorus
WRS	Wilcoxon rank sum
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd^3	cubic yards
ZVI	zero-valent iron

TABLES

Table 2-1

Summary of Sampling Events
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Date of Sampling Event	Sample Type						Area Sampled	Comments
	SS	Dep	SubSoil	GW	SW	SD		
March-April 2000	X	X	X		X	X	Skeet Range, Ranges 19, 13, 12, Remount Creek	Main investigation sampling event for IMR ranges
April 2001	X		X				Rifle Grenade Range (221Q-X)	Main investigation for 221Q-X area
July - August 2001	X	X					Skeet Range, Ranges 19, 13, 12, Rifle Grenade Range	Supplemental IMR range investigation, 2 dep soil collected at 221Q-X
October - November 2001				X			Skeet Range, Ranges 19, 13, 12	Monitoring wells installed and sampled at IMR
May 2002	X						Rifle Grenade Range	Lead hotspot step outs
May 2003	X						Skeet Range, Ranges 19, 13, 12	BERA soil sampling for IMR ranges
February 2008			X				Skeet Range	Supplemental RI in response to ADEM comments

SS - Surface soil.
Dep - Depositional soil.
SubSoil - Subsurface soil.
GW - Groundwater.
SW - Surface water.
SD - Sediment.

IMR - Iron Mountain Road Ranges.
BERA - Baseline ecological risk assessment.

Table 2-2

Summary of Samples Collected and Analytical Program
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Type	Total	Analytical Program									
		Pb	TAL	VOC	SVOC	P/NA	P/H	PCB	CN	pH	TOC
Surface/Dep Soils	120	70	50	42	42	17	15	15	8	7	9
Subsurface Soils	37	20	17	13	13	4 [a]					
Groundwater	6		6	6	6	6					
Sediment	9		9			9					
Surface Water	9		9			9					
Totals:	181	90	91	61	61	45	15	15	8	7	9

Pb - Lead, Method 6010B.
TAL - Target analyte list metals (including lead), Methods 6010B/7000.
VOC - Volatile organic compounds, Method 5035/8260B.
SVOC - Semivolatile organic compounds, Method 8270C.
P/NA - Perchlorate and nitroaromatic/nitramine explosives, Methods 314.0 and 8330.
P/H - Chlorinated and organophosphorus pesticides/chlorinated herbicides, Methods 8081A, 8141A, and 8151A.
PCB - Polychlorinated biphenyls, Method 8082.
CN - Cyanide, Method 9012.
pH - pH (soil), Method 8040A.
TOC - Total organic carbon, Method 9060.

[a] Supplemental RI subsurface soil sample collected in February 2008 at the Skeet Range was analyzed for nitroaromatic/nitramine explosives and not perchorate.

Table 2-3

Monitoring Well Construction Summary
Iron Mountain Road Ranges
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-69Q-MW01	1165779.18	665455.28	797.73	799.58	47	20	27 - 47	2" ID Sch. 40 PVC
HR-69Q-MW02*	1165769.61	665468.55	797.73	799.58	102	10	92 - 102	2" ID Sch. 80 PVC
HR-70Q-MW01	1161721.29	664879.80	897.90	899.89	29.6	20	9.6 - 29.6	2" ID Sch. 40 PVC
HR-70Q-MW02*	1161730.76	664882.64	897.88	899.90	76	10	66 - 76	4" ID Sch. 40 PVC
HR-71Q-MW01	1162474.07	664840.16	875.25	877.31	36	15	21 - 36	2" ID Sch. 40 PVC
HR-75Q-MW01	1164257.50	665144.23	842.56	844.33	36	15	21 - 36	2" ID Sch. 40 PVC
HR-75Q-MW03	1164540.48	665233.36	837.67	839.62	83	20	63 - 83	2" ID Sch. 40 PVC
HR-75Q-MW04	1163966.00	665038.58	846.19	847.93	38	15	23 - 38	2" ID Sch. 40 PVC

Residuum monitoring wells installed using hollow-stem auger or air-rotary drilling except as noted by *.
*Bedrock monitoring well installed using a combination of hollow-stem auger, rock coring, and air-rotary drilling techniques.

Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983.
Elevations referenced to the North American Vertical Datum of 1988.

2" Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.
4" Sch. 80 PVC - 4-inch inside diameter, Schedule 80, polyvinyl chloride.
amsl - Above mean sea level.
bgs - Below ground surface.
ft - Feet.

Table 2-4

Water Levels
Iron Mountain Road Ranges
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-69Q-MW01	26-Jun-03	4.87	799.58	797.73	794.71
HR-69Q-MW02	26-Jun-03	5.21	799.58	797.73	794.37
HR-70Q-MW01	26-Jun-03	16.12	899.89	897.90	883.77
HR-70Q-MW02	26-Jun-03	NA	899.90	897.88	NA
HR-71Q-MW01	26-Jun-03	13.37	877.31	875.25	863.94
HR-75Q-MW01	26-Jun-03	4.48	844.33	842.56	839.85
HR-75Q-MW03	26-Jun-03	85.45	839.62	837.67	754.17
HR-75Q-MW04	26-Jun-03	6.87	847.93	846.19	841.06

Elevations referenced to the North American Vertical Datum of 1988.

amsl - Above mean sea level.
BTOC - Below top of casing.
ft - Feet.
NA - Not available; well was dry.

Table 2-5

Groundwater and Surface Water Field Parameters
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Date	Media	Specific Conductivity (mS/cm)[a]	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (^{o}C)	Turbidity (NTU)	pH (SU)
HR-69Q-MW01	6-Nov-01	GW	0.132	9.45	172	15.4	999	5.78
HR-69Q-MW02	14-Nov-01	GW	0.426	3.60	311	22.8	5.4	7.74
HR-70Q-MW01	6-Nov-01	GW	0.030	2.49	210	23.1	3	5.04
HR-71Q-MW01	5-Nov-01	GW	0.023	6.70	160	22.4	3	4.81
HR-75Q-MW01	8-Oct-01	GW	0.057	3.07	55	23.1	9.8	5.51
HR-75Q-MW04	11-Oct-01	GW	0.093	9.50	106	20.1	54	5.59
SAR-RC-SW/SD01	1-Apr-00	SW	0.091	7.60	70	18.4	33	6.77
SAR-RC-SW/SD03	1-Apr-00	SW	0.088	9.04	80	22.9	17	8.03
SAR-RC-SW/SD04	1-Apr-00	SW	-0.057	6.41	100	19.7	5	6.52
SAR-RC-SW/SD05	1-Apr-00	SW	0.059	7.91	120	18.0	13	6.01
SAR-RC-SW/SD06	1-Apr-00	SW	0.019	2.01	115	15.6	2	4.50
SAR-RC-SW/SD07	1-Apr-00	SW	0.069	9.27	180	15.2	3	5.18
SAR-RC-SW/SD09	1-Apr-00	SW	0.011	7.99	230	15.1	7	4.35
SAR-RC-SW/SD10	7-Apr-00	SW	0.740	19.51	265	6.5	201	3.93
SAR-RC-SW/SD13	1-Apr-00	SW	0.103	3.77	220	16.2	2	5.69

[a] Specific conductivity values standardized to millisiemens per centimeter.

^{o}C - Degrees Celsius.
GW - Groundwater.
mg/L - Milligrams per liter.
mS/cm - Millisiemens per centimeter.
mV - Millivolts.
NR - Not recorded.
NTU - Nephelometric turbidity units.
ORP - Oxidation-reduction potential.
SU - Standard units.
SW - Surface water.

Table 2-6

XRF vs. Laboratory Comparisons - Relative Percent Difference
All XRF Surveys Collected (2001-2008)
Fort McClellan, Calhoun County, Alabama

(Page 1 of 2)

Area of Investigation Parcel(s)	Sample Location	Lead, mg/kg XRF	Lead, mg/kg Lab	RPD	
CC SS (RI)	CCRI-SS-(S2000, E600)	14	15.3	9%	
CC SS (RI)	CCRI-SS-(S400, E1000)	14	13.5	4%	
P137Q SS (RI)	137Q-SS-(N400, W600)	16.3	14.5	12%	
CC SS (RI)	CCRI-SS-(S1400, E1000)	17.1	11.9	36%	
T24A Range Safety Fans	R24X33	17.1	15.6	9%	
IMR / BGR Safety Fan	IMR-XRF06	18	29.9	50%	
CC SS (RI)	CCRI-SS-(N2400, E800)	19.1	28.5	39%	
CC SS (RI)	CCRI-SS-(N1000, E1400)	20.1	21.7	8%	
CC SS (RI)	CCRI-SS-(S1600, E0)	20.6	16.3	23%	
IMR / BGR Safety Fan	BGR-XRF10	22.6	15.8	35%	
P137Q SS (RI)	137Q-SS-(N200, W400)	23.2	37.5	47%	
IMR / BGR Safety Fan	BGR-XRF34	23.8	37.7	45%	
CC Safety Fan	CCX13	24.1	24.1	0%	
BBGR Supp (Range 20, Parcel 76Q-X)	76-GP19 (2 to 2.5)	24.2	21.9	10%	
CC Safety Fan	CCX31	25.2	20.9	19%	
CC SS (RI)	CCRI-SS-(S800, E400)	26.1	21.8	18%	
T24A SS (RI)	T24A-RI-(S400, W500)	26.1	39.3	40%	
T24A SS (RI)	T24A-RI-(S200, E300)	29.3	19.9	38%	
BBGR Supp (Range 18, Parcel 74Q)	74-GP60	30.4	24.4	22%	
CC SS (RI)	CCRI-SS-(S1400, E200)	32.3	36.4	12%	
IMR / BGR Safety Fan	IMR-XRF09	33.1	6.23	137%	
CC Safety Fan	CCX01	35.5	45.6	25%	
IMR / BGR Safety Fan	IMR-XRF27	35.5	10.8	107%	
BBGR R25 Safety Fan	R25X23	42.5	34	22%	
CC SS (RI)	CCRI-SS-(S1400, W1200)	47.9	51	6%	All <50 mg/kg,
BBGR Supp (Range 20, Parcel 76Q-X)	76-GP14 (2 to 2.5)	48.2	27.2	56%	N=28
CC Safety Fan	CCX26	48.6	29.1	50%	Avg - 33% RPD
BBGR R25 Safety Fan	R25X13	48.7	34.5	34%	Std Dev - 30%
CC SS (RI)	CCRI-SS-(S200, E600)	51.8	40.3	25%	
CC SS (RI)	CCRI-SS-(N600, E400)	54.7	42.4	25%	
IMR / BGR Safety Fan	BGR-XRF39	55.6	54.8	1%	
T24A Range Safety Fans	R24X16	56.4	35.5	45%	
CC Safety Fan	CCX10	58	70.2	19%	
T24A SS (RI)	T24A-RI-(N100, E600)	64.2	72	11%	
OA-03 (SI)	OA03-XRF-43	68	107	45%	
CC SS (RI)	CCRI-SS-(S1400, W2000)	74	71.4	4%	
CC SS (RI)	CCRI-SS-(N1400, W600)	75.4	86.5	14%	
CC SS (RI)	CCRI-SS-(S1600, W400)	81.2	97.7	18%	
OA-03 (SI)	OA03-XRF-44	87	119	31%	
T24A Range Safety Fans	R24X24	87.1	57.1	42%	
OA-03 (SI)	OA03-XRF-35	93	139	40%	
CC SS (RI)	CCRI-SS-(N1800, E300)	99.1	116	16%	
CC SS (RI)	CCRI-SS-(S900, W600)	101.7	121	17%	
CC SS (RI)	CCRI-SS-(N300, E200)	107.1	122	13%	
IMR / BGR Safety Fan	IMR-XRF19	108	129	18%	
T24A SS (RI)	T24A-RI-(N500, W100)	115.8	106	9%	
P137Q SS (RI)	137Q-SS-(N200, W300)	125.1	155	21%	
CC SS (RI)	CCRI-SS-(N200, W100)	129.4	133	3%	
OA-03 (SI)	OA03-XRF-34	142	157	10%	
CC SS (RI)	CCRI-SS-(S1200, W1400)	147.1	138	6%	
BBGR Supp (Range 18, Parcel 74Q)	74-GP61	155	140	10%	
CC SS (RI)	CCRI-SS-(S1200, W1800)	157.1	153	3%	

Table 2-6

XRF vs. Laboratory Comparisons - Relative Percent Difference
All XRF Surveys Collected (2001-2008)
Fort McClellan, Calhoun County, Alabama

Area of Investigation Parcel(s)	Sample Location	Lead, mg/kg XRF	Lab	RPD	
CC SS (RI)	CCRI-SS-(N1200, W400)	159.9	198	21%	
P137Q SS (RI)	137Q-SS-(S300, E700)	164.1	238	37%	
T24A SS (RI)	T24A-RI-(N100, E300)	167	129	26%	
T24A SS (RI)	T24A-RI-(S300, E200)	177	143	21%	
BBGR R25 Safety Fan	R25X03	195	183	6%	
CC SS (RI)	CCRI-SS-(S1300, W1300)	199.3	201	1%	
T24A SS (RI)	T24A-RI-(N300, E100)	204.4	222	8%	
T24A SS (RI)	T24A-RI-(N400, W100)	212.8	182	16%	
BBGR Supp (Range 20, Parcel 76Q-X)	76-GP14 (0 to 1)	220	539	84%	
OA-03 (SI)	OA03-XRF-41	228	342	40%	
T24A SS (RI)	T24A-RI-(N200, W300)	261.6	255	3%	
IMR / BGR Safety Fan	BGR-XRF04	272	433	46%	
OA-03 (SI)	OA03-XRF-23	273	281	3%	
CC SS (RI)	CCRI-SS-(S1000, W1200)	278.2	207	29%	
T24A SS (RI)	T24A-RI-(N100, 0)	283.8	309	9%	All >50 mg/kg,
P137Q SS (RI)	137Q-SS-(S100, W100)	311.6	441	34%	and <400 mg/kg,
CC SS (RI)	CCRI-SS-(S600, E1000)	337.4	421	22%	N=43
CC SS (RI)	CCRI-SS-(N2300, E200)	392.4	419	7%	Avg - 20% RPD
BBGR Supp (Range 18, Parcel 74Q)	74-GP66+400'SE	397	486	20%	Std Dev - 17%
T24A SS (RI)	T24A-RI-(N400, E200)	428.8	354	19%	
T24A SS (RI)	T24A-RI-(S100, W600)	465.2	531	13%	
CC SS (RI)	CCRI-SS-(S1600, W1000)	483.6	533	10%	
OA-03 (SI)	OA03-XRF-33	494	359	32%	
T24A Range Safety Fans	R24X05	495	434	13%	
OA-03 (SI)	OA03-XRF-36	557	295	62%	All >400 mg/kg,
P137Q SS (RI)	137Q-SS-(N100, E100)	843.2	1120	28%	and <1,000 mg/kg,
CC SS (RI)	CCRI-SS-(N1300, W500)	858.4	1600	60%	N=10
BBGR Supp (Range 20, Parcel 76Q-X)	76-GP15 (0 to 1)	882	1120	24%	Avg - 29% RPD
OA-03 (SI)	OA03-XRF-42	891	1170	27%	Std Dev - 18%
T24A SS (RI)	T24A-RI-(N300, E500)	1089.6	883	21%	
BBGR Supp (Range 18, Parcel 74Q)	74-GP57+50'SE	1340	1280	5%	
CC SS (RI)	CCRI-SS-(S600, W1000)	1360	1450	6%	
CC SS (RI)	CCRI-SS-(S1000, W400)	1360	4620	109%	
T24A SS (RI)	T24A-RI-(S300, 0)	1969.6	1400	34%	
BBGR Supp (Range 25, Parcel 83Q/118Q-X)	118-GP13	2820	2650	6%	
BBGR Supp (Range 18, Parcel 74Q)	74-GP57	3700	14400	118%	
BBGR Supp (Range 18, Parcel 74Q)	74-GP47	3950	3890	2%	
T24A SS (RI)	T24A-RI-(S100, W250 (Mound))	4928	4180	16%	All >1,000 mg/kg
BBGR Supp (Range 18, Parcel 74Q)	74-GP64	5520	5000	10%	N=12
CC SS (RI)	CCRI-SS-(S400, W300)	5558.4	9820	55%	Avg - 38% RPD
P137Q SS (RI)	137Q-SS-(0, E500)	6009.6	13500	77%	Std Dev - 42%
		All values:	Max:	137%	
		N=93	Min:	0.0%	
			Avg:	27%	
			Std Dev:	26%	

mg/kg - Milligrams per kilogram.
RPP - Relative percent difference.
XRF - X-ray fluorescence.

Table 3-1

Groundwater Elevations
Iron Mountain Road Ranges
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-69Q-MW01	21-Nov-01	45.31	799.58	797.73	754.27
	8-Jan-02	20.28	799.58	797.73	779.30
	26-Jun-03	4.87	799.58	797.73	794.71
HR-69Q-MW02	21-Nov-01	53.34	799.58	797.73	746.24
	8-Jan-02	20.50	799.58	797.73	779.08
	26-Jun-03	5.21	799.58	797.73	794.37
HR-70Q-MW01	21-Nov-01	28.67	899.89	897.90	871.22
	8-Jan-02	27.00	899.89	897.90	872.89
	26-Jun-03	16.12	899.89	897.90	883.77
HR-71Q-MW01	21-Nov-01	18.30	877.31	875.25	859.01
	8-Jan-02	15.43	877.31	875.25	861.88
	26-Jun-03	13.37	877.31	875.25	863.94
HR-75Q-MW01	21-Nov-01	20.62	844.33	842.56	823.71
	8-Jan-02	21.31	844.33	842.56	823.02
	26-Jun-03	4.48	844.33	842.56	839.85
HR-75Q-MW04	21-Nov-01	10.75	847.93	846.19	837.18
	8-Jan-02	9.71	847.93	846.19	838.22
	26-Jun-03	6.87	847.93	846.19	841.06

Elevations referenced to the North American Vertical Datum of 1988.

amsl - Above mean sea level.
BTOC - Below top of casing.
ft - Feet.

Table 3-2

Horizontal Hydraulic Gradient
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Upgradient Point	GW Elevation June 2003 (ft above msl)	Downgradient Point	GW Elevation June 2003 (ft above msl)	Horizontal Distance Between Points (ft)	Horizontal Hydraulic Gradient (ft/ft)
Transect T-69 *	800 ft Contour	HR-69Q-MW01	794.71	220	0.02
Transect T-75 *	860 ft Contour	HR-75Q-MW01	839.85	80	0.25
Transect T-71 *	880 ft Contour	HR-71Q-MW01	863.94	120	0.13
				Arithmetic Mean	0.13

Notes:
* Line of transection shown on Figure 3-8.
msl - Mean sea level.
ft - Feet.
GW - Groundwater.
TOC - Top of casing.

Table 3-3

Vertical Hydraulic Gradient
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Well Location	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Middle of Screen (ft bgs)	GW Elevation June 2003 (ft above msl)	dH (ft)	dL Mid. Screen (ft)	Vertical Hydraulic Gradient (I)
HR-69Q-MW01	27	47	37.00	794.71	0.34	60.00	0.006
HR-69Q-MW02	92	102	97.00	794.37			

Notes:
I, Vertical hydraulic gradient = dH / dL, + if downward gradient, - if upward gradient.
dH - Head of shallower well - head of deeper well.
dL - Vertical distance between midpoint of screens.
msl - Mean sea level.
ft - Feet.
bgs - Below ground surface.
GW - Groundwater.

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-221Q-DEP01					HR-221Q-DEP02					HR-221Q-GP01				
				Sample Number:	NB0008					NB0009					NB0001				
				Sample Date:	18-Jul-01					18-Jul-01					2-Apr-01				
				Sample Depth (Feet):	0- .5					0- .5					0- 1				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	9.07E+03			YES	YES	9.91E+03			YES	YES	3.54E+03	J			YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					1.00E+01	J	YES	YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	4.47E+00			YES		2.18E+00			YES		8.91E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	6.77E+01					6.22E+01					9.29E+00	J			
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	3.85E-01	J				7.23E-01	J				4.25E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	1.41E+02					2.02E+02					8.41E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.48E+01				YES	1.12E+01				YES	1.41E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.52E+00					1.59E+00	J				3.66E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.07E+01		YES			1.08E+01					7.48E+01		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.55E+04			YES	YES	7.90E+03			YES	YES	1.77E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	7.64E+01		YES		YES	3.29E+01					5.31E+02		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.26E+02					3.33E+02					1.46E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.92E+02				YES	2.43E+01					1.53E+02	J			YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	5.50E-02	J				8.60E-02	J	YES			ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.05E+00					3.90E+00					9.20E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.08E+02	J				2.53E+02	J				2.44E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	5.92E-01	J	YES			1.21E+00	J	YES		YES	ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					9.40E-01	B	YES			4.93E-01	J	YES		
Sodium	mg/kg	6.34E+02	NA	NA	ND					4.61E+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	2.60E+01				YES	1.78E+01				YES	2.36E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	4.52E+01		YES			1.48E+01					3.25E+01	J			

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-221Q-DEP01					HR-221Q-DEP02					HR-221Q-GP01				
				Sample Number:	NB0008					NB0009					NB0001				
				Sample Date:	18-Jul-01					18-Jul-01					2-Apr-01				
				Sample Depth (Feet):	0- .5					0- .5					0- 1				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA	1.17E+02					1.47E+02									
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-221Q-GP01E					HR-221Q-GP01N					HR-221Q-GP01S				
				Sample Number:	NB0012					NB0010					NB0011				
				Sample Date:	17-May-02					17-May-02					17-May-02				
				Sample Depth (Feet):	0- 1					0- 1					0- 1				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	9.87E+02		YES	YES	YES	1.15E+02		YES		YES	2.20E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-221Q-GP01E					HR-221Q-GP01N					HR-221Q-GP01S				
				Sample Number:	NB0012					NB0010					NB0011				
				Sample Date:	17-May-02					17-May-02					17-May-02				
				Sample Depth (Feet):	0- 1					0- 1					0- 1				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-221Q-GP01W					HR-221Q-GP02					HR-221Q-GP03				
				Sample Number:	NB0013					NB0003					NB0006				
				Sample Date:	17-May-02					2-Apr-01					6-Apr-01				
				Sample Depth (Feet):	0- 1					0- 1					0- 1				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01						7.20E+03	J			YES	8.15E+03			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						1.24E+00	J		YES		1.89E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02						1.92E+01	J				5.53E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00						2.42E-01	J				1.90E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA						6.46E+01	J				1.01E+03				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01						9.15E+00				YES	5.56E+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						4.79E+00					1.99E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02						5.91E+03			YES	YES	5.78E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.21E+03		YES	YES	YES	1.92E+01	J				2.38E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05						1.72E+02					3.23E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02						9.05E+00	J				1.00E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01						ND					ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01						1.50E+00	J				2.52E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA						ND					ND				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01						ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00						ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA						ND					ND				
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						1.36E+01				YES	1.00E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01						6.31E+00	J				1.44E+01				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**HR-221Q-GP01W**					**HR-221Q-GP02**					**HR-221Q-GP03**				
				Sample Number:	**NB0013**					**NB0003**					**NB0006**				
				Sample Date:	**17-May-02**					**2-Apr-01**					**6-Apr-01**				
				Sample Depth (Feet):	**0- 1**					**0- 1**					**0- 1**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-69Q-DEP01					HR-69Q-SS01					HR-70Q-SS01				
				Sample Number:	HJJ0003					HJJ0001					HEE0001				
				Sample Date:	20-Aug-01					15-Aug-01					16-Aug-01				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01	ND					ND					3.20E-02				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	ND					ND					ND				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	ND					ND					2.80E-03	J			YES
Aldrin	mg/kg	NA	3.65E-02	2.50E-03	ND					ND					ND				
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	ND					ND					ND				
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01	ND					ND					ND				
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01	ND					ND					ND				
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02	ND					ND					ND				
Endrin	mg/kg	NA	2.32E+00	1.00E-03	ND					ND					ND				
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02	ND					ND					ND				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	ND					ND					ND				
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01	ND					ND					ND				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	ND					ND					ND				
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01	ND					ND					ND				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	ND					ND					ND				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	ND					ND					ND				
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01	ND					ND					ND				
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.39E+03	J			YES	7.32E+03				YES	6.65E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					4.97E+00	J	YES	YES	YES	1.44E+01	J	YES	YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.73E+00			YES		1.12E+01			YES	YES	1.98E+01		YES	YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	7.61E+00	J				6.01E+01					5.72E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	1.20E-01	B				8.65E-01	B	YES			4.38E-01	B			
Calcium	mg/kg	1.72E+03	NA	NA	8.88E+01	J				4.50E+02	J				2.81E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	5.48E+00				YES	2.08E+01	J			YES	1.31E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.70E+00	B				4.53E+00					7.40E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	5.30E+01		YES		YES	1.34E+02		YES		YES	3.70E+02	J	YES	YES	YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	7.84E+03			YES	YES	2.84E+04			YES	YES	1.10E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	5.76E+02		YES	YES	YES	1.78E+03		YES	YES	YES	8.12E+03		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	6.98E+01	J				4.20E+02					2.89E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	6.31E+01	J				2.54E+02	J			YES	8.50E+02			YES	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	1.63E+00	J				7.50E+00	J				4.18E+00				
Potassium	mg/kg	8.00E+02	NA	NA	1.91E+02	B				9.43E+02	J	YES			3.40E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					7.07E+01	B				4.70E+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	9.87E+00				YES	3.36E+01				YES	1.32E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.10E+01					6.24E+01	J	YES		YES	7.62E+01		YES		YES

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-69Q-DEP01					HR-69Q-SS01					HR-70Q-SS01				
				Sample Number:	HJJ0003					HJJ0001					HEE0001				
				Sample Date:	20-Aug-01					15-Aug-01					16-Aug-01				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01	ND					ND					ND				
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02	ND					ND					ND				
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND					ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND					ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					ND					ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					ND					ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					ND					ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND					ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	ND					7.70E-02	B				ND				
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND					ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND					ND				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND					ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND					ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND					ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					ND					ND				
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND					ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					ND					ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					5.60E-03	J				9.60E-03	J			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	1.80E-02	J				1.50E-01	J				1.40E-01	J			
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND					ND					ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	ND					1.80E-03	B				ND				
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND					ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND					ND					ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND					1.80E-03	J			
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND					1.60E-02				
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					ND					ND				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-70Q-SS01					HR-70Q-SS02					HR-71Q-SS01				
				Sample Number:	RW0001					HEE0002					HFF0001				
				Sample Date:	13-May-03					16-Aug-01					16-Aug-01				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01	ND					1.80E-02	J				9.30E-03	J			
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	ND					ND					ND				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	1.70E-03	J				ND					ND				
Aldrin	mg/kg	NA	3.65E-02	2.50E-03	ND					ND					ND				
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	ND					ND					ND				
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01	ND					ND					ND				
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01	ND					ND					ND				
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02	ND					ND					ND				
Endrin	mg/kg	NA	2.32E+00	1.00E-03	ND					ND					ND				
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02	ND					ND					ND				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	1.30E-03	J				ND					ND				
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01	1.90E-03	J				ND					ND				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	7.10E-04	J				ND					ND				
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01	ND					ND					ND				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	ND					ND					ND				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	ND					ND					ND				
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01	ND					ND					ND				
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.51E+04			YES	YES	1.20E+04			YES	YES	8.86E+03			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	9.22E+01	J	YES	YES	YES	2.03E+01	J	YES	YES	YES	ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	4.20E+01		YES	YES	YES	6.57E+00			YES		3.37E+01		YES	YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	8.81E+01					8.96E+01					6.80E+01	J			
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	7.69E-01	J				7.73E-01	B				5.50E-01	B			
Calcium	mg/kg	1.72E+03	NA	NA	5.91E+02					3.39E+02					3.76E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.16E+01				YES	1.38E+01				YES	2.12E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.07E+01					1.21E+01					5.92E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	5.09E+02	J	YES	YES	YES	9.40E+01	J	YES		YES	7.45E+01		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.51E+04			YES	YES	1.45E+04			YES	YES	1.42E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.06E+04		YES	YES	YES	3.28E+03		YES	YES	YES	2.34E+03		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	9.36E+02					5.73E+02					3.19E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.17E+03			YES	YES	9.03E+02			YES	YES	9.76E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					3.80E-02	J				ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.20E+01		YES			8.88E+00					5.94E+00				
Potassium	mg/kg	8.00E+02	NA	NA	7.51E+02					4.89E+02	J				3.23E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.44E+00		YES		YES	ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					5.18E+01	J				4.41E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					9.19E-01	J		YES		ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.04E+01				YES	1.67E+01				YES	2.04E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.39E+02		YES		YES	4.24E+01		YES			2.75E+01				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-70Q-SS01					HR-70Q-SS02					HR-71Q-SS01				
				Sample Number:	RW0001					HEE0002					HFF0001				
				Sample Date:	13-May-03					16-Aug-01					16-Aug-01				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01	ND					ND					ND				
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02	ND					ND					ND				
pH																			
pH	Std	NA	NA	NA	6.28E+00														
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND					ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND					ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					ND					ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					ND					ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					ND					ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND					ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	ND					ND					ND				
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND					ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND					ND				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND					ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND					ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND					ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					ND					ND				
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND					ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					ND					ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA	1.62E+04														
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	1.70E-02	J				1.30E-02	J				2.20E-02	J			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	2.30E-01					1.30E-01	J				3.40E-01	J			
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	3.30E-03	J				ND					ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	ND					ND					ND				
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND					ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND					ND					ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND					ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					8.70E-03					3.00E-03	J			
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					ND					ND				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-75Q-SS01					HR-75Q-SS02					HR-75Q-SS03				
				Sample Number:	HGG0001					HGG0002					HGG0004				
				Sample Date:	15-Aug-01					15-Aug-01					15-Aug-01				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01	ND					ND					ND				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	ND					ND					ND				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	ND					ND					ND				
Aldrin	mg/kg	NA	3.65E-02	2.50E-03	ND					ND					ND				
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	ND					ND					ND				
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01	ND					ND					ND				
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01	ND					ND					ND				
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02	ND					ND					ND				
Endrin	mg/kg	NA	2.32E+00	1.00E-03	ND					ND					ND				
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02	ND					ND					ND				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	ND					ND					ND				
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01	ND					ND					ND				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	ND					ND					ND				
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01	ND					ND					ND				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	ND					ND					ND				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	ND					ND					ND				
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01	ND					ND					ND				
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	5.13E+03				YES	6.51E+03				YES	2.15E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	3.16E+01	J	YES	YES	YES	ND					1.24E+03	J	YES	YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.00E+01			YES	YES	1.31E+01	J		YES	YES	3.43E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	4.88E+01	J				5.19E+01	J				2.41E+01	J			
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	7.01E-01	B				5.84E-01	B				2.05E-01	B			
Calcium	mg/kg	1.72E+03	NA	NA	1.39E+02					3.70E+02	J				6.54E+01	B			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.35E+01				YES	1.73E+01				YES	4.59E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	5.31E+00					4.04E+00	J				2.57E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	9.91E+02		YES	YES	YES	1.05E+02	J	YES		YES	2.48E+02		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.12E+04			YES	YES	2.09E+04			YES	YES	7.44E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	8.33E+03		YES	YES	YES	1.40E+03	J	YES	YES	YES	1.16E+05		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.74E+02					3.53E+02	J				7.78E+01	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.34E+02	J			YES	2.02E+02	J			YES	1.10E+02	J			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	8.38E+00					8.36E+00	J				3.26E+00				
Potassium	mg/kg	8.00E+02	NA	NA	4.80E+02	J				7.53E+02	J				1.79E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					3.69E+00		YES		YES
Sodium	mg/kg	6.34E+02	NA	NA	5.83E+01	J				5.13E+01	J				4.69E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					2.76E+00			YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.27E+01				YES	2.72E+01				YES	1.17E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.53E+02	J	YES		YES	5.18E+01	J	YES		YES	9.78E+01	J	YES		YES

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	HR-75Q-SS01					HR-75Q-SS02					HR-75Q-SS03				
				Sample Number:	HGG0001					HGG0002					HGG0004				
				Sample Date:	15-Aug-01					15-Aug-01					15-Aug-01				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01	ND					ND					ND				
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02	ND					ND					ND				
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND					ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND					ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					ND					ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					ND					ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					ND					ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND					ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	ND					ND					ND				
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND					ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND					ND				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND					ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND					ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND					ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					ND					ND				
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND					ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					ND					ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					ND					ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	2.30E-02	J				1.40E-02	J				8.00E-03	J			
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND					ND					ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	ND					ND					ND				
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND					ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND					ND					ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND					ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	1.40E-02	B				1.40E-02	B				4.10E-03	B			
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					ND					ND				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS01					SAR-69-SS02					SAR-69-SS03				
				Sample Number:	HJ0001					HJ0002					HJ0003				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	5.22E+03				YES	7.08E+03				YES	1.02E+04			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					1.90E+00	J				ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.20E+00	B		YES		5.60E+00	B		YES		3.90E+00	B		YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	4.18E+01					5.68E+01					9.20E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	5.20E-01	J				5.50E-01	J				8.50E-01		YES		
Calcium	mg/kg	1.72E+03	NA	NA	1.27E+02	J				8.46E+02					4.07E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.44E+01	J			YES	1.28E+01	J			YES	9.10E+00	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.50E+00	J				3.60E+00	J				4.90E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	3.70E+00					1.26E+01					5.30E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.23E+04			YES	YES	1.61E+04			YES	YES	1.28E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.00E+01					1.32E+02		YES		YES	1.77E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.33E+02	J				3.06E+02	J				2.72E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.02E+02			YES	YES	4.03E+02			YES	YES	7.01E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.00E-02					7.70E-02					6.70E-02				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.70E+00	J				5.60E+00					5.80E+00				
Potassium	mg/kg	8.00E+02	NA	NA	6.14E+01	J				3.57E+02	J				1.27E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					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					6.40E-01	B		YES		5.80E-01	B		YES	
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.33E+01	J			YES	2.35E+01	J			YES	1.64E+01	J			YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.25E+01	J				2.92E+01	J				2.33E+01	J			

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-69-SS01**					**SAR-69-SS02**					**SAR-69-SS03**				
				Sample Number:	**HJ0001**					**HJ0002**					**HJ0003**				
				Sample Date:	**18-Mar-00**					**18-Mar-00**					**18-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND					ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND					ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					ND					ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					ND					ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					ND					ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND					ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	8.70E-02	B				1.70E-01	B				8.20E-02	B			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND					ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND					ND				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND					ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND					ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND					ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					ND					ND				
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND					ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					ND					ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					7.20E-03	B				6.20E-03	B			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	5.10E-02	J				1.20E-01	J				1.50E-01	J			
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND					ND					ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.50E-03	B				4.20E-03	B				2.00E-03	B			
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND					ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND					ND					ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND					ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND					ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	1.00E-03	J				1.30E-02					1.80E-03	J			

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS04					SAR-69-SS05					SAR-69-SS06				
				Sample Number:	HJ0004					HJ0005					HJ0006				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	9.65E+03			YES	YES	7.56E+03				YES					
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					5.20E-01	J								
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.20E+00	B		YES		3.50E+00	B		YES						
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.35E+01					6.14E+01									
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	5.70E-01	J				6.60E-01									
Calcium	mg/kg	1.72E+03	NA	NA	1.42E+02	J				4.26E+02	J								
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	9.10E+00	J			YES	7.40E+00	J			YES					
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.40E+00	J				4.10E+00	J								
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	8.90E+00					2.65E+01		YES							
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.14E+04			YES	YES	1.07E+04			YES	YES					
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.38E+01					1.05E+02		YES		YES	3.78E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.41E+02	J				2.18E+02	J								
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	3.49E+02				YES	7.45E+02			YES	YES					
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.80E-02					4.10E-02									
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.60E+00					7.00E+00									
Potassium	mg/kg	8.00E+02	NA	NA	8.30E+01	J				1.18E+02	J								
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND									
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND									
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND									
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	6.80E-01	B		YES		5.70E-01	B		YES						
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.68E+01	J			YES	1.45E+01	J			YES					
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.04E+01	J				1.36E+01	J								

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS04					SAR-69-SS05					SAR-69-SS06				
				Sample Number:	HJ0004					HJ0005					HJ0006				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND									
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					8.40E-02	J								
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					1.70E-01	J		YES	YES					
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					7.10E-02	J								
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					9.20E-02	J								
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND									
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	9.50E-02	B				9.40E-02	B								
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					1.20E-01	J								
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND									
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND									
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND									
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND									
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					2.00E-01	J								
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND									
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					1.30E-01	J			YES					
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					ND									
Acetone	mg/kg	NA	7.76E+02	2.50E+00	ND					8.20E-03	B								
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND					ND									
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.40E-03	B				2.50E-03	B								
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND									
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND									
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND					ND									
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND									
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND									
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					ND									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS07					SAR-69-SS08					SAR-69-SS10				
				Sample Number:	HJ0008					HJ0009					HJ0011				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.44E+01					6.29E+01		YES		YES	1.24E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS07					SAR-69-SS08					SAR-69-SS10				
				Sample Number:	HJ0008					HJ0009					HJ0011				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS11					SAR-69-SS11					SAR-69-SS13				
				Sample Number:	HJ0012					RW0021					HJ0015				
				Sample Date:	18-Mar-00					12-May-03					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01						ND									
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03						ND									
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03						6.90E-03				YES					
Aldrin	mg/kg	NA	3.65E-02	2.50E-03						ND									
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04						ND									
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01						ND									
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01						ND									
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02						ND									
Endrin	mg/kg	NA	2.32E+00	1.00E-03						5.40E-03	J			YES					
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02						2.50E-03	J								
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01						1.50E-03	J								
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01						ND									
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03						9.50E-04	J								
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01						ND									
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03						ND									
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05						ND									
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01						ND									
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01						5.22E+03				YES					
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00						1.62E+03	J	YES	YES	YES					
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01						5.60E+02		YES	YES	YES					
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02						3.83E+01									
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00						6.25E-01	J								
Calcium	mg/kg	1.72E+03	NA	NA						2.42E+02									
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01						1.41E+01				YES					
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01						5.59E+00	J								
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01						9.00E+01	J	YES		YES					
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02						2.30E+04			YES	YES					
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.30E+03		YES	YES	YES	4.13E+04		YES	YES	YES	6.95E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05						3.10E+02									
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02						3.11E+02				YES					
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01						ND									
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01						9.65E+00									
Potassium	mg/kg	8.00E+02	NA	NA						7.59E+02									
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01						1.69E+00		YES		YES					
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00						ND									
Sodium	mg/kg	6.34E+02	NA	NA						ND									
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00						ND									
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00						2.47E+01				YES					
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01						4.73E+01		YES							

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS11					SAR-69-SS11					SAR-69-SS13				
				Sample Number:	HJ0012					RW0021					HJ0015				
				Sample Date:	18-Mar-00					12-May-03					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01						1.40E-01				YES					
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02						ND									
pH																			
pH	Std	NA	NA	NA						5.12E+00									
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01						ND									
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00						ND									
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01						ND									
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01						ND									
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02						ND									
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02						ND									
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01						ND									
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00						ND									
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02						ND									
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01						ND									
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01						ND									
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02						ND									
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01						ND									
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01						ND									
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01						ND									
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA						1.22E+04									
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01						ND									
Acetone	mg/kg	NA	7.76E+02	2.50E+00						2.00E-01									
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01						ND									
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00						ND									
N-Butylbenzene	mg/kg	NA	7.77E+01	NA						ND									
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01						ND									
Styrene	mg/kg	NA	1.55E+03	1.00E-01						ND									
Toluene	mg/kg	NA	1.55E+03	5.00E-02						1.90E-03	J								
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01						2.50E-03	J								
p-Cymene	mg/kg	NA	1.55E+03	NA						8.10E-03									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS14					SAR-69-SS15					SAR-69-SS17				
				Sample Number:	HJ0016					HJ0017					HJ0019				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	9.29E+01		YES		YES	1.95E+01					3.12E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS14					SAR-69-SS15					SAR-69-SS17				
				Sample Number:	HJ0016					HJ0017					HJ0019				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS18					SAR-69-SS20					SAR-69-SS21				
				Sample Number:	HJ0020					HJ0023					HJ0024				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.89E+02	J	YES		YES	8.69E+01		YES		YES	1.22E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS18					SAR-69-SS20					SAR-69-SS21				
				Sample Number:	HJ0020					HJ0023					HJ0024				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS22					SAR-69-SS23					SAR-69-SS24				
				Sample Number:	HJ0025					HJ0026					HJ0027				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.16E+02		YES		YES	3.59E+01					1.08E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS22					SAR-69-SS23					SAR-69-SS24				
				Sample Number:	HJ0025					HJ0026					HJ0027				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**				
				Sample Location:	**SAR-69-SS25**					**SAR-69-SS26**				
				Sample Number:	**HJ0028**					**HJ0029**				
				Sample Date:	**18-Mar-00**					**18-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES														
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01										
PESTICIDES														
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03										
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03										
Aldrin	mg/kg	NA	3.65E-02	2.50E-03										
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04										
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01										
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01										
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02										
Endrin	mg/kg	NA	2.32E+00	1.00E-03										
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02										
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01										
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01										
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03										
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01										
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03										
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05										
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01										
METALS														
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.63E+03				YES	6.20E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					8.10E-01	J			
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.70E+00			YES		3.10E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	6.86E+01					4.73E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	6.60E-01					7.00E-01				
Calcium	mg/kg	1.72E+03	NA	NA	5.04E+02	J				6.65E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	5.70E+00	J			YES	6.40E+00	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.70E+00	J				2.50E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	4.20E+00					5.10E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	7.94E+03			YES	YES	8.61E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.66E+01					6.07E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.78E+02	J				1.46E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.03E+02			YES	YES	1.70E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.90E-02					2.90E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.80E+00	J				3.60E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	6.52E+01	J				6.86E+01	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					8.00E-01	J		YES	
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.05E+01				YES	1.15E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.40E+01	J				1.38E+01	J			

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**				
				Sample Location:	**SAR-69-SS25**					**SAR-69-SS26**				
				Sample Number:	**HJ0028**					**HJ0029**				
				Sample Date:	**18-Mar-00**					**18-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES														
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01										
PCBs														
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02										
pH														
pH	Std	NA	NA	NA										
SEMIVOLATILE ORGANIC COMPOUNDS														
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	1.30E-01	B				1.20E-01	B			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					ND				
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					ND				
TOTAL ORGANIC CARBON														
Total Organic Carbon	mg/kg	NA	NA	NA										
VOLATILE ORGANIC COMPOUNDS														
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	7.90E-03	B				6.30E-02	B			
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND					ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.40E-03	B				2.60E-03	B			
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND					ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					ND				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-69-SS27**					**SAR-69-SS29**					**SAR-69-SS30**				
				Sample Number:	**HJ0030**					**HJ0032**					**HJ0033**				
				Sample Date:	**18-Mar-00**					**18-Mar-00**					**18-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	5.81E+03				YES	3.96E+03				YES	9.94E+03			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	1.50E+00	J				1.60E+00	J				ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.16E+01			YES	YES	6.20E+00			YES		7.60E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	1.18E+02					6.78E+01					1.01E+02				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	8.20E-01		YES			6.60E-01					1.40E+00		YES		YES
Calcium	mg/kg	1.72E+03	NA	NA	3.06E+02	J				9.73E+01	J				1.28E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	7.60E+00	J			YES	1.15E+01	J			YES	2.14E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.35E+01					6.10E+00					2.49E+01		YES		YES
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.60E+01		YES			2.77E+01		YES			8.60E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.23E+04			YES	YES	1.47E+04			YES	YES	1.90E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.90E+02		YES	YES	YES	3.82E+02		YES		YES	1.57E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.27E+02	J				1.12E+02	J				3.80E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.01E+03			YES	YES	4.87E+02			YES	YES	1.93E+03		YES	YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	5.50E-02					3.40E-02	J				5.70E-02				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.22E+01		YES			7.40E+00					1.59E+01		YES		
Potassium	mg/kg	8.00E+02	NA	NA	2.64E+02	J				1.58E+02	J				2.43E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					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	7.80E-01	J		YES		ND					1.20E+00	J		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.37E+01				YES	1.69E+01				YES	2.21E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	4.32E+01	J	YES			3.43E+01	J				3.10E+01	J			

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS27					SAR-69-SS29					SAR-69-SS30				
				Sample Number:	HJ0030					HJ0032					HJ0033				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND					ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND					ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					ND					ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					ND					ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					ND					ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND					ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	5.10E-02	B				1.30E-01	B				4.90E-02	B			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND					ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND					ND				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND					ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND					ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND					ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					ND					ND				
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND					ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					ND					ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	1.20E-02	B				ND					ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	3.30E-01	B				9.00E-02	B				5.00E-02	B			
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND					ND					ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	3.00E-03	B				3.10E-03	B				2.90E-03	B			
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND					ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND					ND					ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND					ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND					ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	2.30E-02					9.90E-04	J				ND				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-69-SS31**					**SAR-69-SS32**					**SAR-69-SS33**				
				Sample Number:	**HJ0034**					**HJ0035**					**HJ0036**				
				Sample Date:	**18-Mar-00**					**18-Mar-00**					**18-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.36E+03				YES	6.93E+03				YES					
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					3.80E+00	J	YES	YES	YES					
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	5.30E+00			YES		1.23E+01			YES	YES					
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	8.21E+01					3.78E+01									
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	1.20E+00		YES		YES	8.20E-01		YES							
Calcium	mg/kg	1.72E+03	NA	NA	2.20E+02	J				1.53E+02	J								
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.16E+01	J			YES	1.27E+01	J			YES					
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.25E+01					3.70E+00	J								
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	9.30E+00					3.47E+01		YES							
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.50E+04			YES	YES	1.84E+04			YES	YES					
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.37E+02		YES		YES	8.25E+02		YES	YES	YES	9.88E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.99E+02	J				2.06E+02	J								
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	9.30E+02			YES	YES	9.83E+01									
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	6.50E-02					4.60E-02									
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.04E+01		YES			7.90E+00									
Potassium	mg/kg	8.00E+02	NA	NA	3.75E+02	J				2.96E+02	J								
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND									
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND									
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND									
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	8.30E-01	J		YES		7.00E-01	J		YES						
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.62E+01				YES	2.52E+01				YES					
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	3.78E+01	J				3.01E+01	J								

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS31					SAR-69-SS32					SAR-69-SS33				
				Sample Number:	HJ0034					HJ0035					HJ0036				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND									
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND									
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					ND									
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					ND									
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					ND									
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND									
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	1.00E-01	B				9.40E-02	B								
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND									
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND									
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND									
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND									
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND									
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					ND									
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND									
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					ND									
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					ND									
Acetone	mg/kg	NA	7.76E+02	2.50E+00	8.30E-02	B				4.40E-02	B								
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND					ND									
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	3.20E-03	B				3.50E-03	B								
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND									
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND									
Styrene	mg/kg	NA	1.55E+03	1.00E-01	5.70E-03	J				1.20E-03	J								
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND									
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND									
p-Cymene	mg/kg	NA	1.55E+03	NA	4.60E-03	J				ND									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS34					SAR-69-SS35					SAR-69-SS36				
				Sample Number:	HJ0039					HJ0042					HJ0046				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.50E+02		YES	YES	YES	6.08E+02		YES	YES	YES	6.62E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-69-SS34**					**SAR-69-SS35**					**SAR-69-SS36**				
				Sample Number:	**HJ0039**					**HJ0042**					**HJ0046**				
				Sample Date:	**18-Mar-00**					**18-Mar-00**					**18-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS37					SAR-69-SS37					SAR-69-SS38				
				Sample Number:	HJ0049					RW0008					HJ0052				
				Sample Date:	18-Mar-00					12-May-03					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01						ND									
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03						ND									
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03						9.60E-03				YES					
Aldrin	mg/kg	NA	3.65E-02	2.50E-03						3.40E-02	J			YES					
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04						ND									
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01						1.00E-03	J								
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01						ND									
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02						ND									
Endrin	mg/kg	NA	2.32E+00	1.00E-03						1.30E-02	J			YES					
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02						3.40E-03	J								
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01						5.40E-03									
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01						4.60E-03									
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03						5.60E-03	J			YES					
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01						ND									
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03						ND									
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05						ND									
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01						ND									
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01						9.80E+03			YES	YES					
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00						ND									
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01						3.98E+00			YES						
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02						4.62E+01									
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00						ND									
Calcium	mg/kg	1.72E+03	NA	NA						2.46E+02									
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01						2.13E+01				YES					
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01						4.19E+00									
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01						4.25E+00	J								
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02						1.03E+04			YES	YES					
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.95E+01	J				3.83E+01					2.44E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05						4.32E+02									
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02						3.67E+02			YES	YES					
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01						4.61E-02	J								
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01						4.49E+00									
Potassium	mg/kg	8.00E+02	NA	NA						2.63E+02	J								
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01						1.32E+00		YES		YES					
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00						ND									
Sodium	mg/kg	6.34E+02	NA	NA						2.28E+01	B								
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00						ND									
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00						2.05E+01				YES					
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01						1.92E+01									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS37					SAR-69-SS37					SAR-69-SS38				
				Sample Number:	HJ0049					RW0008					HJ0052				
				Sample Date:	18-Mar-00					12-May-03					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01						ND									
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02						ND									
pH																			
pH	Std	NA	NA	NA						4.42E+00									
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01						ND									
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00						ND									
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01						ND									
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01						ND									
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02						ND									
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02						ND									
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01						ND									
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00						ND									
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02						ND									
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01						ND									
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01						ND									
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02						ND									
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01						ND									
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01						ND									
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01						ND									
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA						2.68E+04									
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01						1.90E-02	J								
Acetone	mg/kg	NA	7.76E+02	2.50E+00						5.60E-01									
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01						ND									
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00						ND									
N-Butylbenzene	mg/kg	NA	7.77E+01	NA						ND									
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01						ND									
Styrene	mg/kg	NA	1.55E+03	1.00E-01						ND									
Toluene	mg/kg	NA	1.55E+03	5.00E-02						ND									
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01						4.20E-03	J								
p-Cymene	mg/kg	NA	1.55E+03	NA						1.40E-03	J								

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-69-SS39					SAR-69-SS40					SAR-70-SS01				
				Sample Number:	HJ0055					HJ0058					HE0001				
				Sample Date:	18-Mar-00					18-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.47E+03				YES	7.37E+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	3.30E+00	J		YES		3.50E+00	J		YES						
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	1.07E+02					5.43E+01									
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	8.60E-01		YES			5.40E-01	J								
Calcium	mg/kg	1.72E+03	NA	NA	3.23E+02	J				4.84E+03	J	YES							
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	5.10E+00				YES	6.50E+00				YES					
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	7.50E+00	J				3.30E+00	J								
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	3.79E+01		YES			5.70E+00									
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	7.85E+03			YES	YES	1.02E+04			YES	YES					
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	8.40E+01	J	YES		YES	2.76E+01	J				4.47E+01	J	YES		
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.88E+02	J				3.16E+02	J								
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.21E+03			YES	YES	4.68E+02			YES	YES					
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	5.30E-02					4.30E-02									
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	9.30E+00					4.20E+00	J								
Potassium	mg/kg	8.00E+02	NA	NA	6.19E+01	J				8.32E+01	J								
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND									
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND									
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND									
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					5.40E-01	B		YES						
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.06E+01				YES	1.29E+01				YES					
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	5.64E+01		YES		YES	1.64E+01									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-69-SS39**					**SAR-69-SS40**					**SAR-70-SS01**				
				Sample Number:	**HJ0055**					**HJ0058**					**HE0001**				
				Sample Date:	**18-Mar-00**					**18-Mar-00**					**17-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					5.00E-02	J								
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					8.80E-01			YES						
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					1.90E+00	J	YES	YES	YES					
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					5.70E-01	J								
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					9.20E-01	J								
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					2.40E-01	J								
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	8.60E-02	B				9.20E-02	B								
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					1.20E+00									
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND									
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					4.10E-01	J		YES						
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					1.60E-01	J			YES					
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					2.90E-01	J								
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					ND									
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					2.40E-01	J			YES					
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					1.20E+00				YES					
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					ND									
Acetone	mg/kg	NA	7.76E+02	2.50E+00	5.50E-02	B				ND									
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND					ND									
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.70E-03	B				2.60E-03	B								
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND									
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND									
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND					ND									
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND									
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND									
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					ND									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-70-SS02**					**SAR-70-SS03**					**SAR-70-SS04**				
				Sample Number:	**HE0002**					**HE0003**					**HE0004**				
				Sample Date:	**17-Mar-00**					**17-Mar-00**					**17-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	4.52E+03				YES										
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND														
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.50E+00			YES											
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.22E+01	J													
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	4.60E-01	B													
Calcium	mg/kg	1.72E+03	NA	NA	9.29E+01	J													
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	6.90E+00				YES										
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.20E+00	J													
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	3.00E+00														
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	7.04E+03			YES	YES										
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.46E+01	J				4.12E+01	J	YES			2.52E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	9.12E+01	J													
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	9.60E+01	J													
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.30E-02														
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.20E+00	J													
Potassium	mg/kg	8.00E+02	NA	NA	5.18E+01	J													
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND														
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND														
Sodium	mg/kg	6.34E+02	NA	NA	ND														
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	7.60E-01	B		YES											
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	8.60E+00				YES										
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	8.30E+00	J													

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-70-SS02					SAR-70-SS03					SAR-70-SS04				
				Sample Number:	HE0002					HE0003					HE0004				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND														
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	7.00E-02	J													
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	7.30E-02	J													
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	7.20E-02	J													
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	3.90E-02	J													
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	6.10E-02	J													
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	1.20E-01	B													
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	9.10E-02	J													
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	1.40E-01	J													
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND														
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	7.80E-02	J													
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND														
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	2.20E-01	J													
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND														
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	8.70E-02	J													
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND														
Acetone	mg/kg	NA	7.76E+02	2.50E+00	4.10E-02	B													
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND														
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.30E-03	B													
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND														
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND														
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND														
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND														
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND														
p-Cymene	mg/kg	NA	1.55E+03	NA	ND														

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-70-SS05**					**SAR-70-SS06**					**SAR-70-SS07**				
				Sample Number:	**HE0005**					**HE0007**					**HE0008**				
				Sample Date:	**17-Mar-00**					**17-Mar-00**					**17-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	6.32E+01	J	YES		YES	1.16E+02	J	YES		YES	3.58E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-70-SS05					SAR-70-SS06					SAR-70-SS07				
				Sample Number:	HE0005					HE0007					HE0008				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-70-SS08**					**SAR-70-SS09**					**SAR-70-SS09**				
				Sample Number:	**HE0009**					**HE0010**					**RW0009**				
				Sample Date:	**17-Mar-00**					**17-Mar-00**					**13-May-03**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01											ND				
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03											ND				
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03											1.50E-02	J			YES
Aldrin	mg/kg	NA	3.65E-02	2.50E-03											ND				
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04											ND				
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01											8.80E-04	J			
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01											ND				
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02											ND				
Endrin	mg/kg	NA	2.32E+00	1.00E-03											1.40E-02	J			YES
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02											2.80E-03	J			
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01											4.00E-03				
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01											ND				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03											2.20E-03	J			
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01											ND				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03											7.90E-03	J			YES
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05											3.00E-03				YES
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01											ND				
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01											1.04E+04			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00											ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01											5.70E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02											1.21E+02				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00											7.79E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA											5.08E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01											2.22E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01											2.27E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01											7.66E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02											2.28E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.18E+02	J	YES		YES	2.60E+01	J				9.44E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05											3.81E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02											3.43E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01											ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01											6.67E+00				
Potassium	mg/kg	8.00E+02	NA	NA											9.54E+02		YES		
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01											1.48E+00		YES		YES
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00											ND				
Sodium	mg/kg	6.34E+02	NA	NA											2.66E+01	B			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00											ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00											2.69E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01											2.26E+01				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-70-SS08					SAR-70-SS09					SAR-70-SS09				
				Sample Number:	HE0009					HE0010					RW0009				
				Sample Date:	17-Mar-00					17-Mar-00					13-May-03				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01											ND				
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02											ND				
pH																			
pH	Std	NA	NA	NA											5.01E+00				
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01											ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00											ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01											ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01											ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02											ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02											ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01											ND				
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00											ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02											ND				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01											ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01											ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02											ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01											ND				
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01											ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01											ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA											2.54E+04				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01											1.40E-02	J			
Acetone	mg/kg	NA	7.76E+02	2.50E+00											3.70E-01				
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01											ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00											ND				
N-Butylbenzene	mg/kg	NA	7.77E+01	NA											2.10E-03	J			
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01											ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01											ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02											2.60E-03	J			
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01											3.90E-03	J			
p-Cymene	mg/kg	NA	1.55E+03	NA											2.20E-02				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-70-SS10					SAR-70-SS11					SAR-70-SS12				
				Sample Number:	HE0011					HE0012					HE0013				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01											7.52E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00											2.80E+00	J	YES		
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01											5.30E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02											4.64E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00											8.80E-01	B	YES		
Calcium	mg/kg	1.72E+03	NA	NA											2.40E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01											1.95E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01											5.10E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01											3.65E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02											2.05E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.42E+01	J				1.15E+01	J				5.39E+02	J	YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05											2.25E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02											2.57E+02	J			YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01											2.40E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01											7.10E+00				
Potassium	mg/kg	8.00E+02	NA	NA											2.79E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01											ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00											ND				
Sodium	mg/kg	6.34E+02	NA	NA											ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00											1.00E+00	B		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00											2.42E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01											3.36E+01	J			

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-70-SS10					SAR-70-SS11					SAR-70-SS12				
				Sample Number:	HE0011					HE0012					HE0013				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01											ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00											ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01											ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01											ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02											ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02											ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01											1.70E-01	B			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00											ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02											2.10E-01	J			
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01											ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01											ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02											ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01											1.90E-01	J			
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01											ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01											ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01											ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00											2.10E-02	B			
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01											ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00											2.90E-03	B			
N-Butylbenzene	mg/kg	NA	7.77E+01	NA											ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01											ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01											ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02											ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01											ND				
p-Cymene	mg/kg	NA	1.55E+03	NA											ND				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-70-SS12					SAR-70-SS13					SAR-70-SS14				
				Sample Number:	RW0024					HE0014					HE0015				
				Sample Date:	8-May-03					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01	ND														
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	ND														
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	ND														
Aldrin	mg/kg	NA	3.65E-02	2.50E-03	ND														
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	1.90E-03	J			YES										
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01	ND														
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01	ND														
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02	ND														
Endrin	mg/kg	NA	2.32E+00	1.00E-03	5.50E-04	J													
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02	ND														
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	8.40E-04	J													
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01	1.50E-03	J													
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	ND														
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01	ND														
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	ND														
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	3.80E-03	J			YES										
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01	ND														
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.10E+04			YES	YES										
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND														
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	4.50E+00			YES											
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	7.31E+01														
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	6.48E-01	J													
Calcium	mg/kg	1.72E+03	NA	NA	2.49E+02														
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.64E+01				YES										
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	5.32E+00														
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.23E+01		YES												
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.61E+04	J		YES	YES										
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.42E+02	J	YES		YES	3.98E+01	J				5.12E+01	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	4.16E+02														
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.05E+02				YES										
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	9.59E-02	J	YES												
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	5.19E+00														
Potassium	mg/kg	8.00E+02	NA	NA	4.65E+02	J													
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	7.84E-01	B	YES												
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND														
Sodium	mg/kg	6.34E+02	NA	NA	3.76E+01	J													
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND														
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.87E+01				YES										
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	3.35E+01														

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-70-SS12					SAR-70-SS13					SAR-70-SS14				
				Sample Number:	RW0024					HE0014					HE0015				
				Sample Date:	8-May-03					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01	ND														
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02	1.00E-02	J													
pH																			
pH	Std	NA	NA	NA	5.01E+00														
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND														
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND														
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND														
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND														
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND														
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND														
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	1.30E-01	J													
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND														
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	9.10E-02	J													
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND														
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND														
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND														
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	2.10E-01	J													
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND														
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND														
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA	1.11E+04														
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND														
Acetone	mg/kg	NA	7.76E+02	2.50E+00	9.20E-02														
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND														
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	ND														
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND														
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND														
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND														
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND														
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	1.70E-03	J													
p-Cymene	mg/kg	NA	1.55E+03	NA	ND														

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-70-SS15**					**SAR-70-SS16**					**SAR-71-SS01**				
				Sample Number:	**HE0018**					**HE0021**					**HF0001**				
				Sample Date:	**17-Mar-00**					**17-Mar-00**					**17-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.19E+03				YES										
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	6.00E-01	J													
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	4.70E+00			YES											
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	6.25E+01														
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	7.80E-01	B													
Calcium	mg/kg	1.72E+03	NA	NA	1.80E+03	J	YES												
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.26E+01				YES										
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	4.30E+00	J													
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.77E+01		YES		YES										
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.13E+04			YES	YES										
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.85E+01	J	YES			1.95E+02	J	YES		YES	1.30E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	6.53E+02	J													
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	5.32E+02	J		YES	YES										
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.40E-02														
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.90E+00	J													
Potassium	mg/kg	8.00E+02	NA	NA	1.22E+02	J													
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND														
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND														
Sodium	mg/kg	6.34E+02	NA	NA	ND														
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	8.10E-01	B		YES											
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.29E+01				YES										
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.64E+02	J	YES		YES										

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-70-SS15					SAR-70-SS16					SAR-71-SS01				
				Sample Number:	HE0018					HE0021					HF0001				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND														
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND														
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND														
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND														
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND														
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND														
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	1.30E-01	B													
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND														
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	1.00E-01	J													
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND														
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND														
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND														
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	2.30E-01	J													
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND														
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND														
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND														
Acetone	mg/kg	NA	7.76E+02	2.50E+00	ND														
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND														
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.50E-03	B													
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND														
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND														
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND														
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND														
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND														
p-Cymene	mg/kg	NA	1.55E+03	NA	ND														

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-71-SS02**					**SAR-71-SS03**					**SAR-71-SS04**				
				Sample Number:	**HF0002**					**HF0003**					**HF0004**				
				Sample Date:	**17-Mar-00**					**17-Mar-00**					**17-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.27E+01					2.76E+01					6.49E+02		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS02					SAR-71-SS03					SAR-71-SS04				
				Sample Number:	HF0002					HF0003					HF0004				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS05					SAR-71-SS05					SAR-71-SS06				
				Sample Number:	HF0005					RW0005					HF0006				
				Sample Date:	17-Mar-00					8-May-03					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01						ND									
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03						4.30E-03	J			YES					
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03						5.10E-03	J			YES					
Aldrin	mg/kg	NA	3.65E-02	2.50E-03						1.40E-03	J								
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04						6.10E-04	J			YES					
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01						1.40E-03	J								
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01						ND									
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02						2.60E-03	J								
Endrin	mg/kg	NA	2.32E+00	1.00E-03						2.70E-03	J			YES					
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02						ND									
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01						2.70E-03	J								
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01						1.60E-03	J								
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03						ND									
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01						3.60E-03	J								
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03						1.00E-02	J			YES					
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05						2.30E-03	J			YES					
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01						3.40E-04	J								
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01						1.08E+04			YES	YES					
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00						ND									
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01						2.20E+00			YES						
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02						5.93E+01									
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00						ND									
Calcium	mg/kg	1.72E+03	NA	NA						2.28E+02									
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01						1.10E+01				YES					
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01						1.93E+00	J								
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01						6.22E+01		YES		YES					
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02						8.05E+03	J		YES	YES					
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.15E+03		YES	YES	YES	7.79E+02	J	YES	YES	YES	7.05E+02		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05						2.77E+02									
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02						1.16E+02				YES					
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01						ND									
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01						3.19E+00									
Potassium	mg/kg	8.00E+02	NA	NA						2.63E+02	J								
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01						ND									
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00						ND									
Sodium	mg/kg	6.34E+02	NA	NA						4.56E+01	J								
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00						ND									
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00						1.50E+01				YES					
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01						3.51E+01									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-71-SS05**					**SAR-71-SS05**					**SAR-71-SS06**				
				Sample Number:	**HF0005**					**RW0005**					**HF0006**				
				Sample Date:	**17-Mar-00**					**8-May-03**					**17-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01						ND									
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02						2.80E-02	J			YES					
pH																			
pH	Std	NA	NA	NA						4.56E+00									
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01						ND									
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00						ND									
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01						ND									
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01						ND									
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02						ND									
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02						ND									
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01						ND									
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00						ND									
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02						ND									
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01						ND									
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01						ND									
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02						ND									
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01						ND									
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01						ND									
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01						ND									
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA						3.01E+04									
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01						ND									
Acetone	mg/kg	NA	7.76E+02	2.50E+00						3.00E-01									
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01						ND									
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00						ND									
N-Butylbenzene	mg/kg	NA	7.77E+01	NA						ND									
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01						ND									
Styrene	mg/kg	NA	1.55E+03	1.00E-01						ND									
Toluene	mg/kg	NA	1.55E+03	5.00E-02						ND									
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01						4.80E-03	J								
p-Cymene	mg/kg	NA	1.55E+03	NA						ND									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**				
				Sample Location:	**SAR-71-SS07**					**SAR-71-SS08**				
				Sample Number:	**HF0008**					**HF0009**				
				Sample Date:	**17-Mar-00**					**17-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES														
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01										
PESTICIDES														
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03										
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03										
Aldrin	mg/kg	NA	3.65E-02	2.50E-03										
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04										
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01										
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01										
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02										
Endrin	mg/kg	NA	2.32E+00	1.00E-03										
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02										
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01										
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01										
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03										
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01										
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03										
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05										
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01										
METALS														
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01										
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00										
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01										
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02										
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00										
Calcium	mg/kg	1.72E+03	NA	NA										
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01										
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01										
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01										
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02										
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.53E+02		YES	YES	YES	3.78E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05										
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02										
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01										
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01										
Potassium	mg/kg	8.00E+02	NA	NA										
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01										
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00										
Sodium	mg/kg	6.34E+02	NA	NA										
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00										
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00										
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01										

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**				
				Sample Location:	**SAR-71-SS07**					**SAR-71-SS08**				
				Sample Number:	**HF0008**					**HF0009**				
				Sample Date:	**17-Mar-00**					**17-Mar-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES														
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01										
PCBs														
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02										
pH														
pH	Std	NA	NA	NA										
SEMIVOLATILE ORGANIC COMPOUNDS														
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01										
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00										
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01										
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01										
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02										
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02										
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01										
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00										
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02										
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01										
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01										
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02										
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01										
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01										
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01										
TOTAL ORGANIC CARBON														
Total Organic Carbon	mg/kg	NA	NA	NA										
VOLATILE ORGANIC COMPOUNDS														
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01										
Acetone	mg/kg	NA	7.76E+02	2.50E+00										
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01										
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00										
N-Butylbenzene	mg/kg	NA	7.77E+01	NA										
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01										
Styrene	mg/kg	NA	1.55E+03	1.00E-01										
Toluene	mg/kg	NA	1.55E+03	5.00E-02										
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01										
p-Cymene	mg/kg	NA	1.55E+03	NA										

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS09					SAR-71-SS09					SAR-71-SS10				
				Sample Number:	HF0010					RW0006					HF0012				
				Sample Date:	17-Mar-00					8-May-03					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01						2.50E-02									
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03						8.50E-03	J			YES					
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03						ND									
Aldrin	mg/kg	NA	3.65E-02	2.50E-03						1.20E-03	J								
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04						ND									
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01						ND									
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01						2.80E-03	J								
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02						ND									
Endrin	mg/kg	NA	2.32E+00	1.00E-03						5.50E-03				YES					
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02						ND									
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01						1.00E-02	J								
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01						3.20E-03	J								
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03						1.80E-03	J								
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01						2.60E-03	J								
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03						2.70E-03				YES					
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05						4.50E-03	J			YES					
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01						ND									
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01						9.88E+03			YES	YES					
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00						ND									
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01						2.92E+00			YES						
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02						9.43E+01									
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00						5.84E-01	J								
Calcium	mg/kg	1.72E+03	NA	NA						4.24E+02									
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01						8.44E+00				YES					
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01						2.74E+00									
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01						3.49E+01		YES							
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02						1.23E+04	J		YES	YES					
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.66E+02		YES		YES	4.80E+02	J	YES	YES	YES	3.94E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05						2.03E+02									
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02						4.74E+02			YES	YES					
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01						ND									
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01						4.11E+00									
Potassium	mg/kg	8.00E+02	NA	NA						1.27E+02	B								
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01						1.03E+00	B	YES		YES					
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00						ND									
Sodium	mg/kg	6.34E+02	NA	NA						3.37E+01	J								
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00						ND									
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00						1.70E+01				YES					
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01						3.93E+01									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS09					SAR-71-SS09					SAR-71-SS10				
				Sample Number:	HF0010					RW0006					HF0012				
				Sample Date:	17-Mar-00					8-May-03					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01						ND									
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02						2.10E-02	J			YES					
pH																			
pH	Std	NA	NA	NA						4.68E+00									
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01						ND									
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00						ND									
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01						ND									
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01						ND									
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02						ND									
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02						ND									
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01						ND									
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00						ND									
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02						ND									
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01						ND									
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01						ND									
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02						ND									
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01						ND									
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01						ND									
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01						ND									
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA						4.03E+04									
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01						ND									
Acetone	mg/kg	NA	7.76E+02	2.50E+00						4.70E-01	J								
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01						ND									
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00						ND									
N-Butylbenzene	mg/kg	NA	7.77E+01	NA						ND									
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01						ND									
Styrene	mg/kg	NA	1.55E+03	1.00E-01						ND									
Toluene	mg/kg	NA	1.55E+03	5.00E-02						ND									
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01						ND									
p-Cymene	mg/kg	NA	1.55E+03	NA						ND									

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS11					SAR-71-SS12					SAR-71-SS13				
				Sample Number:	HF0013					HF0014					HF0015				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	6.61E+02		YES	YES	YES	9.64E+02		YES	YES	YES	5.16E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS11					SAR-71-SS12					SAR-71-SS13				
				Sample Number:	HF0013					HF0014					HF0015				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS14					SAR-71-SS15					SAR-71-SS16				
				Sample Number:	HF0016					HF0017					HF0018				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.28E+04			YES	YES										
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	6.20E-01	J													
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.05E+01			YES	YES										
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.50E+01														
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	5.80E-01	B													
Calcium	mg/kg	1.72E+03	NA	NA	1.45E+02	J													
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.43E+01				YES										
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	6.30E+00														
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.45E+01		YES												
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.87E+04			YES	YES										
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	7.85E+01	J	YES		YES	2.50E+02		YES		YES	3.19E+03		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.96E+02	J													
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.04E+03			YES	YES										
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.20E-02														
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	7.20E+00														
Potassium	mg/kg	8.00E+02	NA	NA	2.68E+02	J													
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND														
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND														
Sodium	mg/kg	6.34E+02	NA	NA	ND														
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	9.70E-01	B		YES											
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.86E+01				YES										
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.85E+01	J													

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS14					SAR-71-SS15					SAR-71-SS16				
				Sample Number:	HF0016					HF0017					HF0018				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND														
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND														
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND														
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND														
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND														
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND														
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	8.70E-02	B													
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND														
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND														
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND														
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND														
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND														
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND														
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND														
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND														
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND														
Acetone	mg/kg	NA	7.76E+02	2.50E+00	2.10E-02	B													
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND														
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.90E-03	B													
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND														
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND														
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND														
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND														
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND														
p-Cymene	mg/kg	NA	1.55E+03	NA	ND														

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS17					SAR-71-SS18					SAR-71-SS19				
				Sample Number:	HF0019					HF0020					HF0021				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.04E+04			YES	YES						6.32E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND										2.40E+00	J	YES		
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	9.00E+00			YES							4.40E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.15E+01	J									3.57E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	4.60E-01	B									4.20E-01	B			
Calcium	mg/kg	1.72E+03	NA	NA	8.38E+01	J									4.99E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.35E+01				YES						1.06E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.80E+00	J									4.30E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.09E+01										2.66E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.48E+04			YES	YES						1.27E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	6.22E+01	J	YES		YES	2.08E+02		YES		YES	9.95E+01	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.14E+02	J									2.74E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	5.58E+02			YES	YES						3.95E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.80E-02										2.20E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	5.70E+00										3.90E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	1.96E+02	J									1.90E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND										ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND										ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND										ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	1.10E+00	B		YES	YES						9.60E-01	B		YES	
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.39E+01				YES						1.84E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.39E+01	J									7.01E+01	J	YES		YES

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS17					SAR-71-SS18					SAR-71-SS19				
				Sample Number:	HF0019					HF0020					HF0021				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND										ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND										ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND										ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND										ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND										ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND										ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	9.10E-02	B									8.90E-02	B			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND										ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND										1.00E-01	J			
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND										ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND										ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND										ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND										2.40E-01	J			
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND										ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND										ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND										ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	ND										ND				
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND										ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.40E-03	B									2.60E-03	B			
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND										ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND										ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND										ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND										ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND										ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	ND										ND				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS20					SAR-71-SS21					SAR-75-SS01				
				Sample Number:	HF0025					HF0028					HG0001				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.80E+03				YES	7.45E+03				YES					
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	3.91E+01		YES	YES	YES	8.60E-01	J								
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.80E+00			YES		3.10E+00			YES						
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.98E+01					5.12E+01									
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	3.70E-01	B				3.30E-01	B								
Calcium	mg/kg	1.72E+03	NA	NA	5.87E+02	J				1.15E+02	J								
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	6.60E+00				YES	8.60E+00				YES					
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.40E+00	J				2.50E+00	J								
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	4.56E+02		YES	YES	YES	4.81E+01		YES		YES					
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	7.85E+03			YES	YES	8.26E+03			YES	YES					
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.38E+03	J	YES	YES	YES	3.13E+02	J	YES		YES	1.32E+02	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.90E+02	J				2.28E+02	J								
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	3.56E+02				YES	1.60E+02				YES					
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.10E-02	J				5.30E-02									
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.40E+00	J				3.30E+00	J								
Potassium	mg/kg	8.00E+02	NA	NA	7.91E+01	J				1.17E+02	J								
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND									
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND									
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND									
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	8.20E-01	B		YES		6.70E-01	B		YES						
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.17E+01				YES	1.42E+01				YES					
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.10E+02	J	YES		YES	2.39E+01	J								

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-71-SS20					SAR-71-SS21					SAR-75-SS01				
				Sample Number:	HF0025					HF0028					HG0001				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND									
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND									
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					ND									
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					ND									
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					ND									
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND									
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	8.40E-02	B				1.10E-01	B								
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND									
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND					ND									
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND									
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND									
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND									
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND					ND									
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND									
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					ND									
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					7.60E-03	B								
Acetone	mg/kg	NA	7.76E+02	2.50E+00	4.20E-02	B				2.00E-01	J								
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND					ND									
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.90E-03	B				3.60E-03	B								
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND									
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND									
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND					ND									
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND									
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND									
p-Cymene	mg/kg	NA	1.55E+03	NA	6.50E-03	J				1.90E-03	J								

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS02					SAR-75-SS03					SAR-75-SS04				
				Sample Number:	HG0002					HG0003					HG0004				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.58E+02	J	YES		YES	1.32E+01	J				1.81E+02	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS02					SAR-75-SS03					SAR-75-SS04				
				Sample Number:	HG0002					HG0003					HG0004				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS05					SAR-75-SS06					SAR-75-SS07				
				Sample Number:	HG0005					HG0007					HG0008				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.78E+01		YES			2.63E+01					2.36E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS05					SAR-75-SS06					SAR-75-SS07				
				Sample Number:	HG0005					HG0007					HG0008				
				Sample Date:	18-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS08					SAR-75-SS09					SAR-75-SS10				
				Sample Number:	HG0009					HG0010					HG0011				
				Sample Date:	18-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01															
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00															
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01															
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02															
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00															
Calcium	mg/kg	1.72E+03	NA	NA															
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01															
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01															
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01															
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02															
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.53E+01					6.73E+01	J	YES		YES	2.02E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05															
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02															
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01															
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01															
Potassium	mg/kg	8.00E+02	NA	NA															
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01															
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00															
Sodium	mg/kg	6.34E+02	NA	NA															
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00															
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00															
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS08					SAR-75-SS09					SAR-75-SS10				
				Sample Number:	HG0009					HG0010					HG0011				
				Sample Date:	18-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01															
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00															
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01															
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01															
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02															
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01															
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02															
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01															
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01															
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01															
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01															
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01															
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01															
Acetone	mg/kg	NA	7.76E+02	2.50E+00															
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01															
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00															
N-Butylbenzene	mg/kg	NA	7.77E+01	NA															
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01															
Styrene	mg/kg	NA	1.55E+03	1.00E-01															
Toluene	mg/kg	NA	1.55E+03	5.00E-02															
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01															
p-Cymene	mg/kg	NA	1.55E+03	NA															

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS11					SAR-75-SS12					SAR-75-SS13				
				Sample Number:	HG0012					HG0013					HG0014				
				Sample Date:	18-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.79E+03				YES						6.57E+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	5.90E+00			YES							3.60E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.88E+01										6.94E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	5.40E-01	J									6.50E-01	B			
Calcium	mg/kg	1.72E+03	NA	NA	2.39E+02	J									1.77E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	9.40E+00	J			YES						1.08E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	6.60E+00	J									8.10E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.07E+01										1.29E+01	J	YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.54E+04			YES	YES						1.06E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.33E+01					1.58E+01	J				6.51E+01	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.61E+02	J									2.56E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	3.51E+02				YES						6.58E+02	J		YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	2.20E-02	J									4.40E-02				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	7.70E+00	J									5.50E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	2.92E+02	J									2.75E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND										ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND										ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND										ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	8.30E-01	J		YES							5.50E-01	J		YES	
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.63E+01				YES						1.30E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.65E+01	J									1.69E+01	J			

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS11					SAR-75-SS12					SAR-75-SS13				
				Sample Number:	HG0012					HG0013					HG0014				
				Sample Date:	18-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND										ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND										ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND										ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND										ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND										ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND										ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	8.70E-02	B									1.40E-01	B			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND										ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND										ND				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND										ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND										ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND										ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND										ND				
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND										ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND										ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND										ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	1.30E-02	B									ND				
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND										ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.50E-03	B									2.40E-03	B			
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND										ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	1.10E-03	B									ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND										ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND										ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND										ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	ND										ND				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS14					SAR-75-SS15					SAR-75-SS16				
				Sample Number:	HG0015					HG0016					HG0017				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	7.68E+03				YES										
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND														
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.39E+01		YES	YES	YES										
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.40E+01														
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	6.70E-01														
Calcium	mg/kg	1.72E+03	NA	NA	8.19E+02														
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.85E+01	J			YES										
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	6.60E+00														
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.42E+01	J	YES												
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.09E+04			YES	YES										
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.32E+01	J				1.66E+02	J	YES		YES	6.89E+01	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	5.96E+02														
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.00E+02	J			YES										
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.50E-02														
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.17E+01	J	YES												
Potassium	mg/kg	8.00E+02	NA	NA	3.46E+02	J													
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND														
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND														
Sodium	mg/kg	6.34E+02	NA	NA	ND														
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	5.40E-01	J		YES											
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.23E+01				YES										
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	3.60E+01	J													

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS14					SAR-75-SS15					SAR-75-SS16				
				Sample Number:	HG0015					HG0016					HG0017				
				Sample Date:	17-Mar-00					17-Mar-00					17-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND														
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND														
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND														
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND														
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND														
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND														
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	1.50E-01	B													
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND														
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND														
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND														
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND														
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND														
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND														
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND														
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND														
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND														
Acetone	mg/kg	NA	7.76E+02	2.50E+00	ND														
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND														
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.60E-03	B													
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND														
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND														
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND														
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND														
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND														
p-Cymene	mg/kg	NA	1.55E+03	NA	ND														

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS17					SAR-75-SS18					SAR-75-SS19				
				Sample Number:	HG0018					HG0022					HG0027				
				Sample Date:	17-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01											7.68E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00											9.20E-01	J			
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01											1.03E+01			YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02											5.05E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00											6.40E-01				
Calcium	mg/kg	1.72E+03	NA	NA											3.00E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01											3.58E+01	J		YES	YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01											9.30E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01											1.39E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02											2.01E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.85E+01	J				1.67E+02		YES		YES	3.62E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05											3.34E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02											3.93E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01											1.90E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01											9.10E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA											2.73E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01											ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00											ND				
Sodium	mg/kg	6.34E+02	NA	NA											ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00											7.60E-01	J		YES	
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00											2.64E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01											2.74E+01	J			

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS17					SAR-75-SS18					SAR-75-SS19				
				Sample Number:	HG0018					HG0022					HG0027				
				Sample Date:	17-Mar-00					18-Mar-00					18-Mar-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01											ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00											ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01											ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01											ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02											ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02											ND				
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01											7.80E-02	B			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00											ND				
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02											2.00E-01	J			
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01											ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01											ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02											ND				
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01											2.60E-01	J			
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01											ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01											ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01											ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00											1.40E-02	B			
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01											ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00											2.90E-03	B			
N-Butylbenzene	mg/kg	NA	7.77E+01	NA											ND				
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01											ND				
Styrene	mg/kg	NA	1.55E+03	1.00E-01											ND				
Toluene	mg/kg	NA	1.55E+03	5.00E-02											ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01											ND				
p-Cymene	mg/kg	NA	1.55E+03	NA											ND				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS20					SAR-RC-DEP02					SAR-RC-DEP08				
				Sample Number:	HG0030					HE1002					HJ1004				
				Sample Date:	18-Mar-00					1-Apr-00					1-Apr-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES																			
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01															
PESTICIDES																			
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03															
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03															
Aldrin	mg/kg	NA	3.65E-02	2.50E-03															
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04															
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01															
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02															
Endrin	mg/kg	NA	2.32E+00	1.00E-03															
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02															
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01															
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01															
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03															
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03															
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05															
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01															
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	5.41E+03				YES	2.90E+03				YES	4.53E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	1.80E+00	J				ND					1.04E+01		YES	YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	6.90E+00			YES		2.40E+00			YES		2.22E+01		YES	YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.77E+01					1.27E+01	J				3.78E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	2.00E-01	B				2.90E-01	B				9.20E-01		YES		
Calcium	mg/kg	1.72E+03	NA	NA	7.50E+01	J				2.87E+02	J				3.08E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	5.30E+00	J			YES	8.20E+00				YES	2.27E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	8.60E-01	J				1.60E+00	J				6.70E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.53E+01		YES		YES	5.10E+00					1.53E+02	J	YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	7.25E+03			YES	YES	1.23E+04			YES	YES	3.37E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.50E+02		YES		YES	7.10E+00					2.42E+03		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.00E+02	J				1.31E+02	J				2.36E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	8.52E+01					8.97E+01					3.91E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	6.80E-02					9.80E-03	J				2.00E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.00E+00	J				3.10E+00	J				1.42E+01		YES		
Potassium	mg/kg	8.00E+02	NA	NA	3.08E+01	J				1.39E+02	J				4.63E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					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					8.40E-01	J		YES	
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.11E+01				YES	1.67E+01				YES	4.00E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.11E+01	J				1.03E+01					7.48E+01		YES		YES

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-75-SS20					SAR-RC-DEP02					SAR-RC-DEP08				
				Sample Number:	HG0030					HE1002					HJ1004				
				Sample Date:	18-Mar-00					1-Apr-00					1-Apr-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES																			
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01															
PCBs																			
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02															
pH																			
pH	Std	NA	NA	NA															
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND														
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND														
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND														
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND														
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND														
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND														
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	ND														
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND														
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	ND														
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND														
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND														
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND														
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01	ND														
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND														
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND														
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	7.80E-03	B													
Acetone	mg/kg	NA	7.76E+02	2.50E+00	2.30E-01	J													
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01	ND														
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	2.70E-03	B													
N-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND														
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND														
Styrene	mg/kg	NA	1.55E+03	1.00E-01	ND														
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND														
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND														
p-Cymene	mg/kg	NA	1.55E+03	NA	1.30E-01	J													

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**				
				Sample Location:	**SAR-RC-DEP11**					**SAR-RC-DEP12**				
				Sample Number:	**HJ1007**					**HJ1008**				
				Sample Date:	**1-Apr-00**					**1-Apr-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
HERBICIDES														
2,4-DB	mg/kg	NA	6.22E+01	1.00E-01										
PESTICIDES														
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03										
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03										
Aldrin	mg/kg	NA	3.65E-02	2.50E-03										
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04										
Endosulfan I	mg/kg	NA	4.66E+01	1.19E-01										
Endosulfan II	mg/kg	NA	4.66E+01	1.19E-01										
Endosulfan sulfate	mg/kg	NA	4.66E+01	3.58E-02										
Endrin	mg/kg	NA	2.32E+00	1.00E-03										
Endrin aldehyde	mg/kg	NA	2.32E-01	1.05E-02										
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01										
Heptachlor epoxide	mg/kg	NA	6.91E-02	1.52E-01										
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03										
alpha-Chlordane	mg/kg	NA	1.69E+00	1.00E-01										
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03										
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05										
gamma-Chlordane	mg/kg	NA	1.69E+00	1.00E-01										
METALS														
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	5.60E+03				YES	7.16E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	7.70E-01	J				ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	5.80E+00			YES		7.40E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.80E+01					5.48E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	6.20E-01					6.70E-01				
Calcium	mg/kg	1.72E+03	NA	NA	5.53E+02	J				7.73E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.30E+01				YES	1.60E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	4.00E+00	J				9.00E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.20E+01	J				9.90E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.83E+04			YES	YES	2.23E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.22E+01					2.04E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.96E+02	J				3.82E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	6.05E+02			YES	YES	7.60E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	1.20E-01		YES		YES	3.60E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.60E+00					8.20E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.46E+02	J				6.13E+02				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND				
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	2.25E+01				YES	2.47E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.02E+01					3.40E+01				

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**				
				Sample Location:	**SAR-RC-DEP11**					**SAR-RC-DEP12**				
				Sample Number:	**HJ1007**					**HJ1008**				
				Sample Date:	**1-Apr-00**					**1-Apr-00**				
				Sample Depth (Feet):	**0- .5**					**0- .5**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
OP PESTICIDES														
Azinphosmethyl	mg/kg	NA	6.98E-01	1.00E-01										
PCBs														
Aroclor 1260	mg/kg	NA	2.93E-01	2.00E-02										
pH														
pH	Std	NA	NA	NA										
SEMIVOLATILE ORGANIC COMPOUNDS														
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01										
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00										
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01										
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01										
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02										
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02										
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01										
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00										
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02										
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01										
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01										
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02										
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	2.00E+01										
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01										
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01										
TOTAL ORGANIC CARBON														
Total Organic Carbon	mg/kg	NA	NA	NA										
VOLATILE ORGANIC COMPOUNDS														
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01										
Acetone	mg/kg	NA	7.76E+02	2.50E+00										
Chloromethane	mg/kg	NA	4.85E+01	1.00E-01										
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00										
N-Butylbenzene	mg/kg	NA	7.77E+01	NA										
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01										
Styrene	mg/kg	NA	1.55E+03	1.00E-01										
Toluene	mg/kg	NA	1.55E+03	5.00E-02										
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01										
p-Cymene	mg/kg	NA	1.55E+03	NA										

Table 4-1

Surface and Depositional Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

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, Fort McClellan, Alabama* , July.
For SVOCs, value listed is the background screening criterion for soils adjacent to asphalt as given in IT (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July.*
[b] Residential human health site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT (2000).
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.
VQ - Data validation qualifier.

Table 4-2

Lead Distribution Summary: Total and Per-Range Results for Surface/Depositional Soil
Iron Mountain Road Ranges
Fort McClellan, Alabama

Lead Screening Level	All IMR Ranges Combined				Skeet Range, Parcel 69Q				Range 19/Rifle Grenade, Parcel 75Q/221Q-X			
	Number of Samples Exceeding	Percentage of Samples Exceeding	Horizontal Extent of Lead Exceeding Screening Value (sq feet)	Horizontal Extent of Lead Exceeding Screening Value (acres)	Number of Samples Exceeding	Percentage of Samples Exceeding	Horizontal Extent of Lead Exceeding Screening Value (sq feet)	Horizontal Extent of Lead Exceeding Screening Value (acres)	Number of Samples Exceeding	Percentage of Samples Exceeding	Horizontal Extent of Lead Exceeding Screening Value (sq feet)	Horizontal Extent of Lead Exceeding Screening Value (acres)
	Surface/Depositional Soil Samples (120 total)				42 samples in Skeet Range				32 samples in Range 19/Rifle Grenade			
Background (40.05 mg/kg)	79	66%	1,219,985	28.007	24	57%	525,072	12.054	20	63%	267,458	6.140
ESV (50 mg/kg)	75	63%	1,178,385	27.052	24	57%	520,586	11.951	19	59%	260,315	5.976
Residential SSSL (400 mg/kg)	30	25%	506,385	11.625	9	21%	126,934	2.914	6	19%	177,333	4.071
Groundskeeper/Construction Worker SSSL (880 mg/kg)	17	14%	294,204	6.754	4	10%	69,522	1.596	5	16%	155,074	3.560
Recreational Site User SSSL (7,600 mg/kg)	5	4%	67,039	1.539	1	2%	14,636	0.336	2	6%	49,876	1.145

Lead Screening Level	Range 13, Parcel 71Q				Range 12, Parcel 70Q [a]			
	Number of Samples Exceeding	Percentage of Samples Exceeding	Horizontal Extent of Lead Exceeding Screening Value (sq feet)	Horizontal Extent of Lead Exceeding Screening Value (acres)	Number of Samples Exceeding	Percentage of Samples Exceeding	Horizontal Extent of Lead Exceeding Screening Value (sq feet)	Horizontal Extent of Lead Exceeding Screening Value (acres)
	25 samples in Range 13				21 samples in Range 12			
Background (40.05 mg/kg)	21	84%	351,791	8.076	14	67%	75,664	1.737
ESV (50 mg/kg)	21	84%	326,700	7.500	11	52%	70,785	1.625
Residential SSSL (400 mg/kg)	11	44%	153,462	3.523	4	19%	48,657	1.117
Groundskeeper/Construction Worker SSSL (880 mg/kg)	5	20%	39,945	0.917	3	14%	29,664	0.681
Recreational Site User SSSL (7,600 mg/kg)	0	0%	0	0.000	2	10%	2,526	0.058

[a] Range 12 results include samples which were collected in the ALDOT Bypass Corridor where a soil removal action was completed. Reference text for discussion.
ESV - Ecological screening value.
SSSL - Site-specific screening level (human health).
mg/kg - Milligrams per kilogram.

Table 4-3

Surface Soil XRF Screening Results for Range Safety Fans
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	XRF Result (mg/kg)			Sample Location	XRF Result (mg/kg)		
	Lead	Qual	Confirmation		Lead	Qual	Confirmation
IMR-XRF01	36.0	U	NA	IMR-XRF21	48.7	J	NA
IMR-XRF02	67.1	J	NA	IMR-XRF22	32.2	U	NA
IMR-XRF03	47.6	U	NA	IMR-XRF23	26.4	U	NA
IMR-XRF04	35.8	J	NA	IMR-XRF24	42.5	U	NA
IMR-XRF05	53.7	J	NA	IMR-XRF25	40.7	U	NA
IMR-XRF06	**18.0**	**U**	**29.9**	IMR-XRF26	32.6	U	NA
IMR-XRF07	45.4	J	NA	**IMR-XRF27**	**35.5**	**J**	**45.6**
IMR-XRF08	42.9	U	NA	IMR-XRF28	43.3	J	NA
IMR-XRF09	**33.1**	**U**	**6.2**	IMR-XRF29	60.2	J	NA
IMR-XRF10	37.6	U	NA	IMR-XRF30	36.9	J	NA
IMR-XRF11	27.2	U	NA	IMR-XRF31	28.6	U	NA
IMR-XRF12	47.3	U	NA	IMR-XRF32	43.4	J	NA
IMR-XRF13	42.1	J	NA	IMR-XRF33	46.6	J	NA
IMR-XRF14	61.9	J	NA	IMR-XRF34	59.2	J	NA
IMR-XRF15	41.4	U	NA	IMR-XRF35	58.5	J	NA
IMR-XRF16	46.5	J	NA	IMR-XRF36	37.5	U	NA
IMR-XRF17	39.0	J	NA	IMR-XRF37	30.6	U	NA
IMR-XRF18	41.9	U	NA	IMR-XRF38	54.4	J	NA
IMR-XRF19	**108**	**J**	**129**	IMR-XRF39	57.5	J	NA
IMR-XRF20	29.8	J	NA	IMR-XRF40	30.0	U	NA

Bold indicates sample was analyzed using XRF screening then sent to fixed-base laboratory for confirmation.
Confirmation analysis was performed using EPA Method 6010B.

IMR - Iron Mountain Road.
J - Lead result was less than 10X the standard deviation of the measurement and is considered estimated.
mg/kg - Milligrams per kilogram.
NA - Not analyzed.
Qual - Instrument measurement uncertainty (based on standard deviation).
U - Lead result was less than 3X the standard deviation of the measurement and is considered not detected.
XRF - X-ray fluorescence.

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR				IMR			
			Sample Location:	HR-221Q-GP01				HR-221Q-GP02				HR-221Q-GP03				SAR-69-SS33			
			Sample Number:	NB0002				NB0005				NB0007				HJ0037			
			Sample Date:	2-Apr-01				2-Apr-01				6-Apr-01				18-Mar-00			
			Sample Depth (Feet):	3 - 4				8 - 9				5 - 6				1 - 1.5			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.04E+04	J		YES	1.67E+03	J			1.19E+04			YES				
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND							
Arsenic	mg/kg	1.83E+01	4.26E-01	3.68E+00			YES	ND				8.59E+00			YES				
Barium	mg/kg	2.34E+02	5.47E+02	4.61E+01	J			1.24E+00	J			9.89E+00							
Beryllium	mg/kg	8.60E-01	9.60E+00	2.39E-01	J			8.14E-02	J			1.91E-01	J						
Calcium	mg/kg	6.37E+02	NA	1.01E+02	J			4.51E+01	J			3.64E+01	J						
Chromium	mg/kg	3.83E+01	2.32E+01	1.09E+01				1.19E+01				2.30E+01							
Cobalt	mg/kg	1.75E+01	4.68E+02	6.05E+00				ND				1.31E+00	J						
Copper	mg/kg	1.94E+01	3.13E+02	6.29E+00				2.80E+00				8.69E+00							
Iron	mg/kg	4.48E+04	2.34E+03	1.16E+04			YES	9.58E+03			YES	2.87E+04			YES				
Lead	mg/kg	3.85E+01	4.00E+02	1.02E+01				7.06E-01	J			6.94E+00				7.40E+00			
Magnesium	mg/kg	7.66E+02	NA	4.21E+02				1.71E+01	J			2.33E+02							
Manganese	mg/kg	1.36E+03	3.63E+02	1.87E+02	J			1.74E+00	J			2.70E+01							
Mercury	mg/kg	7.00E-02	2.33E+00	ND				ND				ND							
Nickel	mg/kg	1.29E+01	1.54E+02	5.64E+00				1.26E+00	J			3.12E+00							
Potassium	mg/kg	7.11E+02	NA	1.92E+02	J			ND				ND							
Silver	mg/kg	2.40E-01	3.91E+01	ND				5.11E-01	J	YES		ND							
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND				ND							
Vanadium	mg/kg	6.49E+01	5.31E+01	1.77E+01				3.68E+01				4.17E+01							
Zinc	mg/kg	3.49E+01	2.34E+03	5.26E+01	J	YES		5.65E+00	J			1.35E+01							
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01																
Benzo(a)pyrene	mg/kg	NA	8.51E-02																
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01																
Benzo(ghi)perylene	mg/kg	NA	2.32E+02																
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01																
Chrysene	mg/kg	NA	8.61E+01																
Di-n-butyl phthalate	mg/kg	NA	7.80E+02																
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02																
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01																
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02																
Phenanthrene	mg/kg	NA	2.32E+03																
Pyrene	mg/kg	NA	2.33E+02																
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03																
Acetone	mg/kg	NA	7.76E+02																
Methylene chloride	mg/kg	NA	8.41E+01																
Trichlorofluoromethane	mg/kg	NA	2.33E+03																
p-Cymene	mg/kg	NA	1.55E+03																

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR				IMR			
			Sample Location:	SAR-69-SS33				SAR-69-SS34				SAR-69-SS34				SAR-69-SS35			
			Sample Number:	HJ0038				HJ0040				HJ0041				HJ0044			
			Sample Date:	18-Mar-00				18-Mar-00				18-Mar-00				18-Mar-00			
			Sample Depth (Feet):	2 - 2.5				1 - 1.5				2 - 2.5				1 - 1.5			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03																
Antimony	mg/kg	1.31E+00	3.11E+00																
Arsenic	mg/kg	1.83E+01	4.26E-01																
Barium	mg/kg	2.34E+02	5.47E+02																
Beryllium	mg/kg	8.60E-01	9.60E+00																
Calcium	mg/kg	6.37E+02	NA																
Chromium	mg/kg	3.83E+01	2.32E+01																
Cobalt	mg/kg	1.75E+01	4.68E+02																
Copper	mg/kg	1.94E+01	3.13E+02																
Iron	mg/kg	4.48E+04	2.34E+03																
Lead	mg/kg	3.85E+01	4.00E+02	2.70E+00				1.28E+01				2.38E+01				5.61E+02		YES	YES
Magnesium	mg/kg	7.66E+02	NA																
Manganese	mg/kg	1.36E+03	3.63E+02																
Mercury	mg/kg	7.00E-02	2.33E+00																
Nickel	mg/kg	1.29E+01	1.54E+02																
Potassium	mg/kg	7.11E+02	NA																
Silver	mg/kg	2.40E-01	3.91E+01																
Thallium	mg/kg	1.40E+00	5.08E-01																
Vanadium	mg/kg	6.49E+01	5.31E+01																
Zinc	mg/kg	3.49E+01	2.34E+03																
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01																
Benzo(a)pyrene	mg/kg	NA	8.51E-02																
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01																
Benzo(ghi)perylene	mg/kg	NA	2.32E+02																
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01																
Chrysene	mg/kg	NA	8.61E+01																
Di-n-butyl phthalate	mg/kg	NA	7.80E+02																
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02																
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01																
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02																
Phenanthrene	mg/kg	NA	2.32E+03																
Pyrene	mg/kg	NA	2.33E+02																
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03																
Acetone	mg/kg	NA	7.76E+02																
Methylene chloride	mg/kg	NA	8.41E+01																
Trichlorofluoromethane	mg/kg	NA	2.33E+03																
p-Cymene	mg/kg	NA	1.55E+03																

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR				IMR			
			Sample Location:	SAR-69-SS35				SAR-69-SS36				SAR-69-SS36				SAR-69-SS37			
			Sample Number:	HJ0045				HJ0047				HJ0048				HJ0050			
			Sample Date:	18-Mar-00				18-Mar-00				18-Mar-00				18-Mar-00			
			Sample Depth (Feet):	2 - 2.5				1 - 1.5				2 - 2.5				1 - 1.5			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03																
Antimony	mg/kg	1.31E+00	3.11E+00																
Arsenic	mg/kg	1.83E+01	4.26E-01																
Barium	mg/kg	2.34E+02	5.47E+02																
Beryllium	mg/kg	8.60E-01	9.60E+00																
Calcium	mg/kg	6.37E+02	NA																
Chromium	mg/kg	3.83E+01	2.32E+01																
Cobalt	mg/kg	1.75E+01	4.68E+02																
Copper	mg/kg	1.94E+01	3.13E+02																
Iron	mg/kg	4.48E+04	2.34E+03																
Lead	mg/kg	3.85E+01	4.00E+02	4.23E+02		YES	YES	3.43E+01	J			1.33E+01	J			8.20E+00	J		
Magnesium	mg/kg	7.66E+02	NA																
Manganese	mg/kg	1.36E+03	3.63E+02																
Mercury	mg/kg	7.00E-02	2.33E+00																
Nickel	mg/kg	1.29E+01	1.54E+02																
Potassium	mg/kg	7.11E+02	NA																
Silver	mg/kg	2.40E-01	3.91E+01																
Thallium	mg/kg	1.40E+00	5.08E-01																
Vanadium	mg/kg	6.49E+01	5.31E+01																
Zinc	mg/kg	3.49E+01	2.34E+03																
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01																
Benzo(a)pyrene	mg/kg	NA	8.51E-02																
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01																
Benzo(ghi)perylene	mg/kg	NA	2.32E+02																
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01																
Chrysene	mg/kg	NA	8.61E+01																
Di-n-butyl phthalate	mg/kg	NA	7.80E+02																
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02																
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01																
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02																
Phenanthrene	mg/kg	NA	2.32E+03																
Pyrene	mg/kg	NA	2.33E+02																
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03																
Acetone	mg/kg	NA	7.76E+02																
Methylene chloride	mg/kg	NA	8.41E+01																
Trichlorofluoromethane	mg/kg	NA	2.33E+03																
p-Cymene	mg/kg	NA	1.55E+03																

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR				IMR			
			Sample Location:	SAR-69-SS37				SAR-69-SS38				SAR-69-SS38				SAR-69-SS39			
			Sample Number:	HJ0051				HJ0053				HJ0054				HJ0056			
			Sample Date:	18-Mar-00				18-Mar-00				18-Mar-00				18-Mar-00			
			Sample Depth (Feet):	2 - 2.5				1 - 1.5				2 - 2.5				1 - 1.5			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03													7.21E+03			
Antimony	mg/kg	1.31E+00	3.11E+00													ND			
Arsenic	mg/kg	1.83E+01	4.26E-01													3.40E+00	J		YES
Barium	mg/kg	2.34E+02	5.47E+02													7.14E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00													6.40E-01			
Calcium	mg/kg	6.37E+02	NA													1.27E+02	J		
Chromium	mg/kg	3.83E+01	2.32E+01													4.90E+01		YES	YES
Cobalt	mg/kg	1.75E+01	4.68E+02													4.90E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02													1.16E+01			
Iron	mg/kg	4.48E+04	2.34E+03													9.05E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	6.80E+00	J			9.00E+00	J			1.02E+01	J			3.86E+01	J	YES	
Magnesium	mg/kg	7.66E+02	NA													1.92E+02	J		
Manganese	mg/kg	1.36E+03	3.63E+02													6.28E+02			YES
Mercury	mg/kg	7.00E-02	2.33E+00													3.20E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02													2.60E+01		YES	
Potassium	mg/kg	7.11E+02	NA													7.41E+01	J		
Silver	mg/kg	2.40E-01	3.91E+01													ND			
Thallium	mg/kg	1.40E+00	5.08E-01													5.30E-01	B		YES
Vanadium	mg/kg	6.49E+01	5.31E+01													1.29E+01			
Zinc	mg/kg	3.49E+01	2.34E+03													1.88E+01			
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01													ND			
Benzo(a)pyrene	mg/kg	NA	8.51E-02													ND			
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01													ND			
Benzo(ghi)perylene	mg/kg	NA	2.32E+02													ND			
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01													7.00E-02	B		
Chrysene	mg/kg	NA	8.61E+01													ND			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02													ND			
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02													ND			
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01													ND			
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02													ND			
Phenanthrene	mg/kg	NA	2.32E+03													ND			
Pyrene	mg/kg	NA	2.33E+02													ND			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03													ND			
Acetone	mg/kg	NA	7.76E+02													ND			
Methylene chloride	mg/kg	NA	8.41E+01													2.30E-03	B		
Trichlorofluoromethane	mg/kg	NA	2.33E+03													ND			
p-Cymene	mg/kg	NA	1.55E+03													ND			

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR				IMR			
			Sample Location:	SAR-69-SS39				SAR-69-SS40				SAR-70-SS14				SAR-70-SS14			
			Sample Number:	HJ0057				HJ0060				HE0016				HE0017			
			Sample Date:	18-Mar-00				18-Mar-00				17-Mar-00				17-Mar-00			
			Sample Depth (Feet):	2 - 2.5				1 - 1.5				2 - 2.5				4 - 4.5			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	3.84E+03				6.01E+03											
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND											
Arsenic	mg/kg	1.83E+01	4.26E-01	2.00E+00	J		YES	4.20E+00	J		YES								
Barium	mg/kg	2.34E+02	5.47E+02	2.23E+01				3.02E+01											
Beryllium	mg/kg	8.60E-01	9.60E+00	2.30E-01	B			4.40E-01	B										
Calcium	mg/kg	6.37E+02	NA	4.85E+01	J			3.47E+02	J										
Chromium	mg/kg	3.83E+01	2.32E+01	6.50E+00				1.14E+01											
Cobalt	mg/kg	1.75E+01	4.68E+02	1.50E+00	J			4.40E+00	J										
Copper	mg/kg	1.94E+01	3.13E+02	3.30E+00				4.40E+00											
Iron	mg/kg	4.48E+04	2.34E+03	7.52E+03			YES	1.40E+04			YES								
Lead	mg/kg	3.85E+01	4.00E+02	1.03E+01	J			1.30E+01	J			5.70E+00	J			8.20E+00	J		
Magnesium	mg/kg	7.66E+02	NA	1.10E+02	J			1.69E+02	J										
Manganese	mg/kg	1.36E+03	3.63E+02	1.20E+02				2.30E+02											
Mercury	mg/kg	7.00E-02	2.33E+00	1.70E-02	J			3.30E-02	J										
Nickel	mg/kg	1.29E+01	1.54E+02	2.90E+00	J			4.50E+00											
Potassium	mg/kg	7.11E+02	NA	8.07E+01	J			1.00E+02	J										
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND											
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND											
Vanadium	mg/kg	6.49E+01	5.31E+01	1.04E+01				1.79E+01											
Zinc	mg/kg	3.49E+01	2.34E+03	6.50E+00				1.21E+01											
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01	ND				1.50E-01	J										
Benzo(a)pyrene	mg/kg	NA	8.51E-02	ND				2.50E-01	J		YES								
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01	ND				8.20E-02	J										
Benzo(ghi)perylene	mg/kg	NA	2.32E+02	ND				1.30E-01	J										
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	7.90E-02	B			1.10E-01	B										
Chrysene	mg/kg	NA	8.61E+01	ND				1.80E-01	J										
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	ND				ND											
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02	ND				5.10E-02	J										
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01	ND				3.70E-02	J										
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	ND				ND											
Phenanthrene	mg/kg	NA	2.32E+03	ND				4.00E-02	J										
Pyrene	mg/kg	NA	2.33E+02	ND				1.90E-01	J										
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	ND				ND											
Acetone	mg/kg	NA	7.76E+02	ND				ND											
Methylene chloride	mg/kg	NA	8.41E+01	2.30E-03	B			2.50E-03	B										
Trichlorofluoromethane	mg/kg	NA	2.33E+03	ND				ND											
p-Cymene	mg/kg	NA	1.55E+03	ND				ND											

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR				IMR			
			Sample Location:	SAR-70-SS15				SAR-70-SS15				SAR-70-SS16				SAR-70-SS16			
			Sample Number:	HE0019				HE0020				HE0023				HE0024			
			Sample Date:	17-Mar-00				17-Mar-00				17-Mar-00				17-Mar-00			
			Sample Depth (Feet):	1 - 1.5				2 - 2.5				2 - 2.5				4 - 4.5			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	3.86E+03				4.26E+03											
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND											
Arsenic	mg/kg	1.83E+01	4.26E-01	2.10E+00			YES	3.10E+00			YES								
Barium	mg/kg	2.34E+02	5.47E+02	2.94E+01				3.71E+01											
Beryllium	mg/kg	8.60E-01	9.60E+00	4.70E-01	B			5.30E-01	B										
Calcium	mg/kg	6.37E+02	NA	3.77E+02	J			4.83E+02	J										
Chromium	mg/kg	3.83E+01	2.32E+01	9.70E+00				1.28E+01											
Cobalt	mg/kg	1.75E+01	4.68E+02	2.50E+00	J			2.90E+00	J										
Copper	mg/kg	1.94E+01	3.13E+02	3.10E+00				3.90E+00											
Iron	mg/kg	4.48E+04	2.34E+03	7.42E+03			YES	1.12E+04			YES								
Lead	mg/kg	3.85E+01	4.00E+02	1.23E+01	J			9.80E+00	J			2.60E+01	J			3.75E+01	J		
Magnesium	mg/kg	7.66E+02	NA	1.83E+02	J			2.08E+02	J										
Manganese	mg/kg	1.36E+03	3.63E+02	1.81E+02	J			2.08E+02	J										
Mercury	mg/kg	7.00E-02	2.33E+00	3.80E-02				2.50E-02	J										
Nickel	mg/kg	1.29E+01	1.54E+02	4.80E+00				5.80E+00											
Potassium	mg/kg	7.11E+02	NA	4.66E+01	J			9.79E+01	J										
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND											
Thallium	mg/kg	1.40E+00	5.08E-01	5.40E-01	B		YES	8.50E-01	B		YES								
Vanadium	mg/kg	6.49E+01	5.31E+01	8.60E+00				1.11E+01											
Zinc	mg/kg	3.49E+01	2.34E+03	1.26E+01	J			1.30E+01	J										
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01	ND				ND											
Benzo(a)pyrene	mg/kg	NA	8.51E-02	ND				ND											
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01	ND				ND											
Benzo(ghi)perylene	mg/kg	NA	2.32E+02	ND				ND											
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	1.20E-01	B			1.50E-01	B										
Chrysene	mg/kg	NA	8.61E+01	ND				ND											
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	ND				ND											
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02	ND				ND											
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01	ND				ND											
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	ND				ND											
Phenanthrene	mg/kg	NA	2.32E+03	ND				ND											
Pyrene	mg/kg	NA	2.33E+02	ND				ND											
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	ND				ND											
Acetone	mg/kg	NA	7.76E+02	1.40E-02	B			ND											
Methylene chloride	mg/kg	NA	8.41E+01	3.30E-03	B			2.50E-03	B										
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.60E-03	J			ND											
p-Cymene	mg/kg	NA	1.55E+03	ND				ND											

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR				IMR			
			Sample Location:	SAR-71-SS19				SAR-71-SS19				SAR-71-SS20				SAR-71-SS21			
			Sample Number:	HF0023				HF0024				HF0026				HF0029			
			Sample Date:	17-Mar-00				17-Mar-00				17-Mar-00				17-Mar-00			
			Sample Depth (Feet):	1 - 1.5				2 - 2.5				2 - 2.5				1.5 - 2			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	5.66E+03				6.78E+03				1.08E+04			YES	1.00E+04			YES
Antimony	mg/kg	1.31E+00	3.11E+00	7.50E-01	J			ND				2.00E+00	J	YES		ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	2.60E+00			YES	3.20E+00			YES	2.80E+00			YES	1.14E+01			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.93E+01				3.85E+01				2.58E+01				3.10E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	4.80E-01	B			6.00E-01	B			3.00E-01	B			1.40E+00		YES	
Calcium	mg/kg	6.37E+02	NA	2.51E+02	J			1.37E+02	J			9.47E+01	J			2.06E+01	B		
Chromium	mg/kg	3.83E+01	2.32E+01	8.40E+00				9.60E+00				1.27E+01				3.31E+01			YES
Cobalt	mg/kg	1.75E+01	4.68E+02	3.00E+00	J			3.50E+00	J			2.00E+00	J			1.30E+01	J		
Copper	mg/kg	1.94E+01	3.13E+02	1.39E+01				4.70E+00				1.87E+01				1.50E+01			
Iron	mg/kg	4.48E+04	2.34E+03	8.28E+03			YES	1.27E+04			YES	1.22E+04			YES	4.80E+04		YES	YES
Lead	mg/kg	3.85E+01	4.00E+02	2.77E+01	J			1.05E+01	J			1.39E+02	J	YES		1.84E+01	J		
Magnesium	mg/kg	7.66E+02	NA	1.99E+02	J			1.92E+02	J			2.27E+02	J			2.16E+02	J		
Manganese	mg/kg	1.36E+03	3.63E+02	2.40E+02				1.55E+02				3.58E+01				1.25E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	2.80E-02	J			3.00E-02	J			2.80E-02	J			2.90E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	3.20E+00	J			3.80E+00	J			4.30E+00	J			1.27E+01			
Potassium	mg/kg	7.11E+02	NA	1.07E+02	J			9.02E+01	J			8.65E+01	J			1.62E+02	J		
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Thallium	mg/kg	1.40E+00	5.08E-01	7.10E-01	B		YES	6.20E-01	B		YES	ND				9.20E-01	B		YES
Vanadium	mg/kg	6.49E+01	5.31E+01	1.19E+01				1.61E+01				2.22E+01				5.92E+01			YES
Zinc	mg/kg	3.49E+01	2.34E+03	3.33E+01	J			1.53E+01	J			1.45E+01	J			2.98E+01	J		
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01	ND				ND				ND				ND			
Benzo(a)pyrene	mg/kg	NA	8.51E-02	ND				ND				ND				ND			
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01	ND				ND				ND				ND			
Benzo(ghi)perylene	mg/kg	NA	2.32E+02	ND				ND				ND				ND			
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	8.00E-02	B			9.20E-02	B			1.00E-01	B			1.00E-01	B		
Chrysene	mg/kg	NA	8.61E+01	ND				ND				ND				ND			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	ND				ND				ND				ND			
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02	ND				ND				ND				ND			
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01	ND				ND				ND				ND			
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	ND				ND				ND				ND			
Phenanthrene	mg/kg	NA	2.32E+03	ND				ND				ND				ND			
Pyrene	mg/kg	NA	2.33E+02	ND				ND				ND				ND			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	ND				ND				ND				ND			
Acetone	mg/kg	NA	7.76E+02	1.00E-02	B			8.90E-02	J			4.80E-02	B			1.40E-02	B		
Methylene chloride	mg/kg	NA	8.41E+01	2.90E-03	B			2.60E-03	B			2.90E-03	B			2.80E-03	B		
Trichlorofluoromethane	mg/kg	NA	2.33E+03	ND				ND				ND				ND			
p-Cymene	mg/kg	NA	1.55E+03	ND				ND				ND				ND			

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR				IMR			
			Sample Location:	SAR-71-SS21				SAR-75-SS17				SAR-75-SS17				SAR-75-SS18			
			Sample Number:	HF0030				HG0019				HG0020				HG0024			
			Sample Date:	17-Mar-00				18-Mar-00				18-Mar-00				18-Mar-00			
			Sample Depth (Feet):	3 - 3.5				2 - 2.5				3 - 3.5				2 - 2.5			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	9.14E+03			YES												
Antimony	mg/kg	1.31E+00	3.11E+00	ND															
Arsenic	mg/kg	1.83E+01	4.26E-01	7.30E+00			YES												
Barium	mg/kg	2.34E+02	5.47E+02	2.53E+01	J														
Beryllium	mg/kg	8.60E-01	9.60E+00	4.00E-01	B														
Calcium	mg/kg	6.37E+02	NA	3.25E+01	J														
Chromium	mg/kg	3.83E+01	2.32E+01	3.50E+01			YES												
Cobalt	mg/kg	1.75E+01	4.68E+02	2.60E+00	J														
Copper	mg/kg	1.94E+01	3.13E+02	1.25E+01															
Iron	mg/kg	4.48E+04	2.34E+03	3.89E+04			YES												
Lead	mg/kg	3.85E+01	4.00E+02	2.96E+01	J			3.00E+00				5.80E+00				3.88E+01		YES	
Magnesium	mg/kg	7.66E+02	NA	1.91E+02	J														
Manganese	mg/kg	1.36E+03	3.63E+02	3.48E+01															
Mercury	mg/kg	7.00E-02	2.33E+00	3.70E-02	J														
Nickel	mg/kg	1.29E+01	1.54E+02	4.60E+00	J														
Potassium	mg/kg	7.11E+02	NA	2.91E+02	J														
Silver	mg/kg	2.40E-01	3.91E+01	ND															
Thallium	mg/kg	1.40E+00	5.08E-01	7.90E-01	B		YES												
Vanadium	mg/kg	6.49E+01	5.31E+01	5.98E+01			YES												
Zinc	mg/kg	3.49E+01	2.34E+03	1.12E+01	J														
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01	ND															
Benzo(a)pyrene	mg/kg	NA	8.51E-02	ND															
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01	ND															
Benzo(ghi)perylene	mg/kg	NA	2.32E+02	ND															
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.20E-02	B														
Chrysene	mg/kg	NA	8.61E+01	ND															
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	ND															
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02	ND															
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01	ND															
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02	ND															
Phenanthrene	mg/kg	NA	2.32E+03	ND															
Pyrene	mg/kg	NA	2.33E+02	ND															
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	ND															
Acetone	mg/kg	NA	7.76E+02	1.10E-02	B														
Methylene chloride	mg/kg	NA	8.41E+01	3.30E-03	B														
Trichlorofluoromethane	mg/kg	NA	2.33E+03	ND															
p-Cymene	mg/kg	NA	1.55E+03	ND															

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR				IMR			
			Sample Location:	SAR-75-SS18				SAR-75-SS19				SAR-75-SS20				SAR-75-SS20			
			Sample Number:	HG0025				HG0028				HG0032				HG0033			
			Sample Date:	18-Mar-00				18-Mar-00				18-Mar-00				18-Mar-00			
			Sample Depth (Feet):	3 - 3.5				1 - 1.5				2 - 2.5				3 - 3.5			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**	**Result**	**QV**	**>BKG**	**>SSSL**
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03					2.56E+03				9.14E+03			YES	1.48E+03			
Antimony	mg/kg	1.31E+00	3.11E+00					7.63E+01	J	YES	YES	ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01					2.30E+01		YES	YES	7.40E+00			YES	1.80E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02					2.04E+01	J			3.88E+01				2.50E+00	J		
Beryllium	mg/kg	8.60E-01	9.60E+00					7.30E-01				2.60E-01	B			ND			
Calcium	mg/kg	6.37E+02	NA					9.27E+01	J			3.43E+02	J			ND			
Chromium	mg/kg	3.83E+01	2.32E+01					1.41E+01	J			7.50E+00	J			4.90E+00	J		
Cobalt	mg/kg	1.75E+01	4.68E+02					6.70E+00	J			1.00E+00	J			ND			
Copper	mg/kg	1.94E+01	3.13E+02					1.12E+02		YES		1.01E+01				2.70E+00	J		
Iron	mg/kg	4.48E+04	2.34E+03					2.43E+04			YES	8.99E+03			YES	5.30E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.21E+01				1.35E+03		YES	YES	3.80E+01				7.80E+00			
Magnesium	mg/kg	7.66E+02	NA					1.02E+02	J			1.16E+02	J			1.47E+01	B		
Manganese	mg/kg	1.36E+03	3.63E+02					2.08E+02				1.30E+02				6.30E+00			
Mercury	mg/kg	7.00E-02	2.33E+00					5.60E-02				2.40E-02	J			1.20E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02					1.32E+01	J	YES		2.70E+00	J			5.60E-01	J		
Potassium	mg/kg	7.11E+02	NA					1.24E+02	J			3.61E+01	J			ND			
Silver	mg/kg	2.40E-01	3.91E+01					ND				ND				ND			
Thallium	mg/kg	1.40E+00	5.08E-01					9.20E-01	J		YES	6.70E-01	J		YES	ND			
Vanadium	mg/kg	6.49E+01	5.31E+01					2.97E+01				1.44E+01				1.22E+01			
Zinc	mg/kg	3.49E+01	2.34E+03					5.47E+01	J	YES		1.35E+01	J			1.50E+00	J		
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01					ND				ND				ND			
Benzo(a)pyrene	mg/kg	NA	8.51E-02					ND				ND				ND			
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01					ND				ND				ND			
Benzo(ghi)perylene	mg/kg	NA	2.32E+02					ND				ND				ND			
Bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01					6.40E-02	B			1.00E-01	B			8.30E-02	B		
Chrysene	mg/kg	NA	8.61E+01					ND				ND				ND			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02					7.90E-02	J			ND				ND			
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02					ND				ND				ND			
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01					ND				ND				ND			
N-Nitrosodiphenylamine	mg/kg	NA	1.29E+02					1.10E-01	J			ND				ND			
Phenanthrene	mg/kg	NA	2.32E+03					ND				ND				ND			
Pyrene	mg/kg	NA	2.33E+02					ND				ND				ND			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03					ND				6.50E-03	B			ND			
Acetone	mg/kg	NA	7.76E+02					ND				2.30E-01	J			6.00E-02	J		
Methylene chloride	mg/kg	NA	8.41E+01					2.70E-03	B			3.20E-03	B			2.80E-03	B		
Trichlorofluoromethane	mg/kg	NA	2.33E+03					ND				ND				ND			
p-Cymene	mg/kg	NA	1.55E+03					ND				1.00E-02				3.10E-03	J		

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	**IMR**			
			Sample Location:	**HR-69Q-MW03**			
			Sample Number:	**BGR002**			
			Sample Date:	**14-Feb-08**			
			Sample Depth (Feet):	**1 - 2.5**			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**
METALS							
Aluminum	mg/kg	1.36E+04	7.80E+03	1.01E+04			YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	5.10E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	9.61E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	8.52E-01	J		
Calcium	mg/kg	6.37E+02	NA	1.89E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	1.75E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	5.92E+00			
Copper	mg/kg	1.94E+01	3.13E+02	1.13E+01			
Iron	mg/kg	4.48E+04	2.34E+03	1.20E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	6.91E+01		YES	
Magnesium	mg/kg	7.66E+02	NA	2.21E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	9.17E+02			YES
Mercury	mg/kg	7.00E-02	2.33E+00	ND			
Nickel	mg/kg	1.29E+01	1.54E+02	7.43E+00			
Potassium	mg/kg	7.11E+02	NA	1.48E+02	J		
Silver	mg/kg	2.40E-01	3.91E+01	ND			
Thallium	mg/kg	1.40E+00	5.08E-01	ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	1.77E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	2.19E+01			

Table 4-4

Subsurface Soil Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

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 Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama,* July.
[b] Residential human health site-specific screening level (SSSL) as given in IT (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama,* July.
J - Compound was positively identified; reported value is an estimated concentration.
mg/kg - Milligrams per kilogram.
NA - Not available.
ND - Not detected.
VQ - Data validation qualifier.

Table 4-5

Groundwater Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR			
			Sample Location:	HR-69Q-MW01				HR-69Q-MW02				HR-70Q-MW01			
			Sample Number:	HJJ3001				HJJ3002				HEE3001			
			Sample Date:	6-Nov-01				14-Nov-01				6-Nov-01			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**
METALS															
Aluminum	mg/L	2.34E+00	1.56E+00	7.27E-01				6.44E-02	J			1.03E+00			
Arsenic	mg/L	1.78E-02	4.46E-05	ND				2.37E-03	B		YES	ND			
Barium	mg/L	1.27E-01	1.10E-01	2.87E-02				1.29E-01		YES	YES	2.38E-02			
Beryllium	mg/L	1.25E-03	3.13E-03	ND				ND				3.21E-03	J	YES	YES
Calcium	mg/L	5.65E+01	NA	1.78E+01				5.57E+01				1.40E+00			
Cobalt	mg/L	2.34E-02	9.39E-02	3.59E-02		YES		ND				ND			
Iron	mg/L	7.04E+00	4.69E-01	5.85E-01	J		YES	3.12E-02	B			5.28E-01	J		YES
Lead	mg/L	8.00E-03	1.50E-02	ND				ND				ND			
Magnesium	mg/L	2.13E+01	NA	1.34E+00				2.83E+00				7.67E-01	J		
Manganese	mg/L	5.81E-01	7.35E-02	2.42E+00		YES	YES	ND				1.30E-01			YES
Potassium	mg/L	7.20E+00	NA	ND				ND				3.05E+00	J		
Selenium	mg/L	NA	7.82E-03	ND				ND				4.40E-03	J		
Sodium	mg/L	1.48E+01	NA	9.53E-01	J			9.59E-01	B			9.92E-01	J		
NITROAROMATICS															
2-Nitrotoluene	mg/L	NA	1.53E-02	1.20E-03				ND				2.70E-03	J		
4-Amino-2,6-dinitrotoluene	mg/L	NA	9.36E-05	4.70E-04	J		YES	ND				ND			
VOLATILE ORGANIC COMPOUNDS															
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND			
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND				ND			
Acetone	mg/L	NA	1.56E-01	4.10E-03	B			6.70E-03	B			ND			
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND				ND			
Methylene chloride	mg/L	NA	7.85E-03	ND				ND				ND			
Toluene	mg/L	NA	2.59E-01	5.90E-04	B			ND				ND			
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND			

Table 4-5

Groundwater Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

			Area of Investigation:	IMR				IMR				IMR			
			Sample Location:	HR-71Q-MW01				HR-75Q-MW01				HR-75Q-MW04			
			Sample Number:	HFF3001				HGG3001				HGG3005			
			Sample Date:	5-Nov-01				8-Oct-01				11-Oct-01			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**	**Result**	**VQ**	**>BKG**	**>SSSL**
METALS															
Aluminum	mg/L	2.34E+00	1.56E+00	8.57E-01				ND				5.50E-01			
Arsenic	mg/L	1.78E-02	4.46E-05	ND				ND				2.36E-03	B		YES
Barium	mg/L	1.27E-01	1.10E-01	2.78E-02				3.44E-03	B			9.52E-02			
Beryllium	mg/L	1.25E-03	3.13E-03	ND				ND				ND			
Calcium	mg/L	5.65E+01	NA	1.72E+00				1.91E+00				2.76E+00			
Cobalt	mg/L	2.34E-02	9.39E-02	ND				ND				ND			
Iron	mg/L	7.04E+00	4.69E-01	6.92E-01	J		YES	2.93E+00			YES	3.54E+00			YES
Lead	mg/L	8.00E-03	1.50E-02	2.07E-03	J			3.84E-03	J			ND			
Magnesium	mg/L	2.13E+01	NA	6.63E-01	J			8.18E-01	J			1.72E+00			
Manganese	mg/L	5.81E-01	7.35E-02	1.58E-01			YES	1.39E-01			YES	5.60E+00		YES	YES
Potassium	mg/L	7.20E+00	NA	1.15E+00	J			3.25E+00	J			6.46E+00			
Selenium	mg/L	NA	7.82E-03	ND				3.30E-03	B			ND			
Sodium	mg/L	1.48E+01	NA	8.47E-01	J			ND				ND			
NITROAROMATICS															
2-Nitrotoluene	mg/L	NA	1.53E-02	ND				ND				3.90E-03	J		
4-Amino-2,6-dinitrotoluene	mg/L	NA	9.36E-05	ND				ND				ND			
VOLATILE ORGANIC COMPOUNDS															
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				3.60E-04	J			ND			
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				4.60E-04	J			ND			
Acetone	mg/L	NA	1.56E-01	ND				ND				ND			
Ethylbenzene	mg/L	NA	1.40E-01	ND				2.60E-04	J			ND			
Methylene chloride	mg/L	NA	7.85E-03	ND				7.30E-04	B			ND			
Toluene	mg/L	NA	2.59E-01	ND				ND				ND			
m,p-Xylenes	mg/L	NA	2.80E+00	ND				5.90E-04	J			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 Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama,* July.

[b] Residential human health site-specific screening level (SSSL) 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/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

VQ - Data validation qualifier.

Table 4-6

Surface Water Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	**IMR**					**IMR**					**IMR**				
				Sample Location:	**SAR-RC-SW/SD01**					**SAR-RC-SW/SD03**					**SAR-RC-SW/SD04**				
				Sample Number:	**HE2001**					**HE2003**					**HF2001**				
				Sample Date:	**1-Apr-00**					**1-Apr-00**					**1-Apr-00**				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
METALS																			
Aluminum	mg/L	5.26E+00	1.53E+01	8.70E-02	2.16E-01	B			YES	3.69E-01	B			YES	1.51E-01	B			YES
Barium	mg/L	7.54E-02	1.10E+00	3.90E-03	1.87E-02	J			YES	1.30E-02	J			YES	2.12E-02	J			YES
Calcium	mg/L	2.52E+01	NA	1.16E+02	1.57E+01					1.33E+01					6.01E+00				
Copper	mg/L	1.27E-02	6.23E-01	6.54E-03	ND					ND					ND				
Iron	mg/L	1.96E+01	4.70E+00	1.00E+00	6.43E-01					3.25E-01					6.34E-02	J			
Lead	mg/L	8.67E-03	1.50E-02	1.32E-03	ND					ND					ND				
Magnesium	mg/L	1.10E+01	NA	8.20E+01	1.37E+00	J				2.54E+00	J				2.78E+00	J			
Manganese	mg/L	5.65E-01	6.40E-01	8.00E-02	5.69E-02					1.84E-02					4.60E-03	J			
Mercury	mg/L	NA	4.25E-03	1.20E-05	6.30E-05	B			YES	9.80E-05	B			YES	1.00E-04	B			YES
Potassium	mg/L	2.56E+00	NA	5.30E+01	3.36E-01	J				3.50E-01	J				3.81E-01	J			
Sodium	mg/L	3.44E+00	NA	6.80E+02	8.42E-01	J				5.10E-01	J				6.25E-01	J			
Thallium	mg/L	2.49E-03	1.02E-03	4.00E-03	ND					ND					ND				
Zinc	mg/L	4.04E-02	4.65E+00	5.89E-02	ND					ND					ND				

Table 4-6

Surface Water Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-RC-SW/SD05					SAR-RC-SW/SD06					SAR-RC-SW/SD07				
				Sample Number:	HJ2001					HJ2002					HJ2003				
				Sample Date:	1-Apr-00					1-Apr-00					1-Apr-00				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
METALS																			
Aluminum	mg/L	5.26E+00	1.53E+01	8.70E-02	2.07E-01	B			YES	2.30E-01	B			YES	5.22E-01				YES
Barium	mg/L	7.54E-02	1.10E+00	3.90E-03	2.13E-02	J			YES	3.23E-02	J			YES	1.23E-02	J			YES
Calcium	mg/L	2.52E+01	NA	1.16E+02	6.07E+00					9.65E-01	J				2.95E-01	J			
Copper	mg/L	1.27E-02	6.23E-01	6.54E-03	ND					7.60E-03	B			YES	ND				
Iron	mg/L	1.96E+01	4.70E+00	1.00E+00	1.42E-01					2.10E-01					5.16E-01				
Lead	mg/L	8.67E-03	1.50E-02	1.32E-03	ND					8.71E-02		YES	YES	YES	ND				
Magnesium	mg/L	1.10E+01	NA	8.20E+01	2.12E+00	J				7.23E-01	J				3.25E-01	J			
Manganese	mg/L	5.65E-01	6.40E-01	8.00E-02	1.57E-02					8.81E-02				YES	1.72E-02				
Mercury	mg/L	NA	4.25E-03	1.20E-05	7.30E-05	B			YES	8.50E-05	B			YES	8.50E-05	B			YES
Potassium	mg/L	2.56E+00	NA	5.30E+01	3.06E-01	J				2.13E-01	J				2.49E-01	J			
Sodium	mg/L	3.44E+00	NA	6.80E+02	7.71E-01	J				7.78E-01	J				1.01E+00	J			
Thallium	mg/L	2.49E-03	1.02E-03	4.00E-03	5.30E-03	B	YES	YES	YES	5.50E-03	B	YES	YES	YES	5.20E-03	B	YES	YES	YES
Zinc	mg/L	4.04E-02	4.65E+00	5.89E-02	ND					1.72E-02	J				3.40E-03	J			

Table 4-6

Surface Water Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-RC-SW/SD09					SAR-RC-SW/SD10					SAR-RC-SW/SD13				
				Sample Number:	HJ2005					HJ2006					HJ2009				
				Sample Date:	1-Apr-00					7-Apr-00					1-Apr-00				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
METALS																			
Aluminum	mg/L	5.26E+00	1.53E+01	8.70E-02	4.42E-01				YES	3.34E-01	B			YES	1.92E-01	B			YES
Barium	mg/L	7.54E-02	1.10E+00	3.90E-03	1.67E-02	J			YES	2.38E-02	J			YES	3.25E-02	J			YES
Calcium	mg/L	2.52E+01	NA	1.16E+02	2.88E-01	J				1.04E+00	J				1.39E+01				
Copper	mg/L	1.27E-02	6.23E-01	6.54E-03	ND					4.60E-03	J				ND				
Iron	mg/L	1.96E+01	4.70E+00	1.00E+00	3.57E-01					3.93E-01					1.24E-01				
Lead	mg/L	8.67E-03	1.50E-02	1.32E-03	1.80E-03	J			YES	3.56E-02		YES	YES	YES	2.70E-03	J			YES
Magnesium	mg/L	1.10E+01	NA	8.20E+01	3.66E-01	J				6.10E-01	J				1.88E+00	J			
Manganese	mg/L	5.65E-01	6.40E-01	8.00E-02	2.11E-02					1.46E-02	J				2.42E-02				
Mercury	mg/L	NA	4.25E-03	1.20E-05	9.70E-05	B			YES	ND					9.20E-05	B			YES
Potassium	mg/L	2.56E+00	NA	5.30E+01	2.63E-01	J				3.99E-01	J				3.88E-01	J			
Sodium	mg/L	3.44E+00	NA	6.80E+02	1.05E+00	J				7.20E-01	J				6.73E-01	J			
Thallium	mg/L	2.49E-03	1.02E-03	4.00E-03	ND					ND					ND				
Zinc	mg/L	4.04E-02	4.65E+00	5.89E-02	3.90E-03	J				1.75E-02	J				3.20E-03	J			

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 Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama,* July.

[b] Recreational site user 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/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

VQ - Data validation qualifier.

Table 4-7

Sediment Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-RC-SW/SD01					SAR-RC-SW/SD03					SAR-RC-SW/SD04				
				Sample Number:	HE1001					HE1003					HF1001				
				Sample Date:	1-Apr-00					1-Apr-00					1-Apr-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
METALS																			
Aluminum	mg/kg	8.59E+03	1.15E+06	NA	4.63E+03					3.02E+03					1.82E+03				
Antimony	mg/kg	7.30E-01	4.22E+02	1.20E+01	ND					ND					ND				
Arsenic	mg/kg	1.13E+01	5.58E+01	7.24E+00	2.10E+00					8.60E+00				YES	2.70E+00				
Barium	mg/kg	9.89E+01	8.36E+04	NA	2.82E+01	J				2.14E+01	J				1.70E+01	J			
Beryllium	mg/kg	9.70E-01	1.50E+02	NA	4.00E-01	B				4.10E-01	J				4.80E-01	J			
Calcium	mg/kg	1.11E+03	NA	NA	1.37E+03		YES			4.10E+02	J				2.75E+02	J			
Chromium	mg/kg	3.12E+01	2.79E+03	5.23E+01	7.50E+00					2.52E+01					7.60E+00				
Cobalt	mg/kg	1.10E+01	6.72E+04	5.00E+01	2.00E+00	J				2.70E+00	J				3.90E+00	J			
Copper	mg/kg	1.71E+01	4.74E+04	1.87E+01	4.20E+00					4.10E+00					8.90E+00				
Iron	mg/kg	3.53E+04	3.59E+05	NA	1.09E+04					2.80E+04					1.56E+04				
Lead	mg/kg	3.78E+01	4.00E+02	3.02E+01	1.41E+01					1.41E+01					6.00E+00				
Magnesium	mg/kg	9.06E+02	NA	NA	1.49E+02	J				1.10E+02	J				1.39E+02	J			
Manganese	mg/kg	7.12E+02	4.38E+04	NA	1.52E+02					2.92E+02					2.69E+02				
Mercury	mg/kg	1.10E-01	2.99E+02	1.30E-01	2.70E-02	J				1.70E-02	J				ND				
Nickel	mg/kg	1.30E+01	1.76E+04	1.59E+01	2.30E+00	J				2.70E+00	J				4.30E+00	J			
Potassium	mg/kg	1.01E+03	NA	NA	2.02E+02	J				1.15E+02	J				1.64E+02	J			
Thallium	mg/kg	1.30E-01	7.78E+01	NA	ND					ND					ND				
Vanadium	mg/kg	4.09E+01	4.83E+03	NA	1.31E+01					2.95E+01					1.62E+01				
Zinc	mg/kg	5.27E+01	3.44E+05	1.24E+02	1.93E+01					1.81E+01					1.42E+01				

Table 4-7

Sediment Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-RC-SW/SD05					SAR-RC-SW/SD06					SAR-RC-SW/SD07				
				Sample Number:	HJ1001					HJ1002					HJ1003				
				Sample Date:	1-Apr-00					1-Apr-00					1-Apr-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
METALS																			
Aluminum	mg/kg	8.59E+03	1.15E+06	NA	3.01E+03					1.12E+03					4.72E+03				
Antimony	mg/kg	7.30E-01	4.22E+02	1.20E+01	ND					6.90E+00	J	YES			ND				
Arsenic	mg/kg	1.13E+01	5.58E+01	7.24E+00	5.20E+00					8.10E+00				YES	7.00E+00				
Barium	mg/kg	9.89E+01	8.36E+04	NA	3.86E+01					9.00E+00	J				2.47E+01	J			
Beryllium	mg/kg	9.70E-01	1.50E+02	NA	4.00E-01	B				4.00E-01	B				7.20E-01				
Calcium	mg/kg	1.11E+03	NA	NA	4.91E+02	J				3.23E+01	J				9.52E+01	J			
Chromium	mg/kg	3.12E+01	2.79E+03	5.23E+01	1.16E+01					8.30E+00					1.89E+01				
Cobalt	mg/kg	1.10E+01	6.72E+04	5.00E+01	4.10E+00	J				5.00E+00	J				4.30E+00	J			
Copper	mg/kg	1.71E+01	4.74E+04	1.87E+01	8.10E+00	J				3.99E+01	J	YES		YES	1.59E+01	J			
Iron	mg/kg	3.53E+04	3.59E+05	NA	1.46E+04					1.77E+04					2.18E+04				
Lead	mg/kg	3.78E+01	4.00E+02	3.02E+01	4.53E+01		YES		YES	4.06E+02		YES	YES	YES	1.02E+01				
Magnesium	mg/kg	9.06E+02	NA	NA	1.40E+02	J				5.17E+01	J				1.83E+02	J			
Manganese	mg/kg	7.12E+02	4.38E+04	NA	5.98E+02					1.62E+02					8.77E+01				
Mercury	mg/kg	1.10E-01	2.99E+02	1.30E-01	ND					ND					1.30E-02	J			
Nickel	mg/kg	1.30E+01	1.76E+04	1.59E+01	3.90E+00	J				4.40E+00	J				6.50E+00				
Potassium	mg/kg	1.01E+03	NA	NA	1.65E+02	J				9.90E+01	J				5.21E+02	J			
Thallium	mg/kg	1.30E-01	7.78E+01	NA	7.10E-01	J	YES			ND					ND				
Vanadium	mg/kg	4.09E+01	4.83E+03	NA	1.87E+01					1.77E+01					2.28E+01				
Zinc	mg/kg	5.27E+01	3.44E+05	1.24E+02	2.26E+01					2.56E+01					2.44E+01				

Table 4-7

Sediment Analytical Results
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

				Area of Investigation:	IMR					IMR					IMR				
				Sample Location:	SAR-RC-SW/SD09					SAR-RC-SW/SD10					SAR-RC-SW/SD13				
				Sample Number:	HJ1005					HJ1006					HJ1009				
				Sample Date:	1-Apr-00					1-Apr-00					1-Apr-00				
				Sample Depth (Feet):	0- .5					0- .5					0- .5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**VQ**	**>BKG**	**>SSSL**	**>ESV**
METALS																			
Aluminum	mg/kg	8.59E+03	1.15E+06	NA	5.26E+03					5.41E+03					3.68E+03				
Antimony	mg/kg	7.30E-01	4.22E+02	1.20E+01	1.10E+00	J	YES			1.03E+01	J	YES			3.40E+00	J	YES		
Arsenic	mg/kg	1.13E+01	5.58E+01	7.24E+00	2.28E+01		YES		YES	3.80E+01		YES		YES	5.10E+00				
Barium	mg/kg	9.89E+01	8.36E+04	NA	2.88E+01					4.78E+02	J	YES			2.97E+01				
Beryllium	mg/kg	9.70E-01	1.50E+02	NA	1.20E+00		YES			9.90E-01		YES			6.00E-01	J			
Calcium	mg/kg	1.11E+03	NA	NA	7.41E+01	J				2.51E+02	J				2.70E+02	J			
Chromium	mg/kg	3.12E+01	2.79E+03	5.23E+01	5.03E+01		YES			2.04E+01					9.40E+00				
Cobalt	mg/kg	1.10E+01	6.72E+04	5.00E+01	1.24E+01		YES			1.41E+01	J	YES			6.60E+00				
Copper	mg/kg	1.71E+01	4.74E+04	1.87E+01	1.28E+01	J				7.30E+01		YES		YES	1.68E+01	J			
Iron	mg/kg	3.53E+04	3.59E+05	NA	6.25E+04		YES			3.07E+04					1.31E+04				
Lead	mg/kg	3.78E+01	4.00E+02	3.02E+01	1.22E+02		YES		YES	2.07E+03	J	YES	YES	YES	2.47E+02		YES		YES
Magnesium	mg/kg	9.06E+02	NA	NA	1.36E+02	J				2.14E+02	J				1.37E+02	J			
Manganese	mg/kg	7.12E+02	4.38E+04	NA	4.10E+02					2.83E+03	J	YES			3.91E+02				
Mercury	mg/kg	1.10E-01	2.99E+02	1.30E-01	1.50E-02	J				4.80E-02	B				3.10E-02	J			
Nickel	mg/kg	1.30E+01	1.76E+04	1.59E+01	8.60E+00					3.46E+01	J	YES		YES	5.80E+00				
Potassium	mg/kg	1.01E+03	NA	NA	3.23E+02	J				3.66E+02	J				1.97E+02	J			
Thallium	mg/kg	1.30E-01	7.78E+01	NA	7.10E-01	J	YES			2.70E+00		YES			ND				
Vanadium	mg/kg	4.09E+01	4.83E+03	NA	4.30E+01		YES			3.27E+01					1.52E+01				
Zinc	mg/kg	5.27E+01	3.44E+05	1.24E+02	3.73E+01					6.17E+01		YES			2.44E+01				

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 Science Applications International Corporation (1998),*Final Background Metals Survey Report, Fort McClellan, Alabama,* July.

[b] Residential human health site-specific screening level (SSSL) 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.

VQ - Data validation qualifier.

Table 4-8

Summary of Inorganic Data Evaluations for Surface Soil
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Metal	Results of Tier 1 Background Screening[a]	Results of Tier 2 Statistical Evaluation[a]	Results of Tier 3 Geochemical Evaluation[a]	Other Lines of Evidence	Site-Related COPC?
Aluminum	Passed	NA	NA		No
Antimony	Failed	Failed	Failed	Known constituent of small arms ammunition[b].	Yes
Arsenic	Failed	Failed	Failed	Although not a major constituent of typical small arms ammunition, small amounts of arsenic are used to improve the roundness of lead shot[b]. Sample with highest concentration (560 mg/kg) was collected at Skeet Range, where shotgun shells were used.	Yes
Barium	Passed	NA	NA		No
Beryllium	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of small arms ammunition. Maximum detected concentration (1.4 mg/kg) only marginally above BSV (0.8 mg/kg).	No
Cadmium	ND	NA	NA		No
Calcium	Failed	Failed	Passed	Essential macronutrient[c]; no evidence of use at the site; not a known constituent of small arms ammunition.	No
Chromium	Passed	NA	NA		No
Cobalt	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition such as that used at the IMR Ranges[d]. Only 1 of 51 samples (24.9 mg/kg) exceeded BSV (15.2 mg/kg).	No
Copper	Failed	Failed	Failed	Known constituent of small arms ammunition.	Yes
Iron	Passed	NA	NA		No
Lead	Failed	Failed	Failed	Major constituent of small arms ammunition.	Yes
Magnesium	Passed	NA	NA		No
Manganese	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition. Only 1 of 51 samples (1,930 mg/kg) exceeded BSV (1,579 mg/kg).	No
Mercury	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition. Maximum detected concentration (0.12 mg/kg) only marginally above BSV (0.08 mg/kg).	No
Nickel	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of typical small arms ammunition such as that used at the IMR Ranges[d]; maximum detected concentration (15.9 mg/kg) only marginally above BSV (10.3 mg/kg).	No

Table 4-8

Summary of Inorganic Data Evaluations for Surface Soil
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Metal	Results of Tier 1 Background Screening[a]	Results of Tier 2 Statistical Evaluation[a]	Results of Tier 3 Geochemical Evaluation[a]	Other Lines of Evidence	Site-Related COPC?
Potassium	Failed	Failed	Passed	Essential macronutrient; no evidence of use at the site; not a known constituent of small arms ammunition.	No
Selenium	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of small arms ammunition.	No
Silver	Failed	Failed	Failed	Only detected in 2 of 51 samples and only 1 result identified as anomalously elevated; no evidence of use at the site; not a known constituent of small arms ammunition.	No
Sodium	Passed	NA	NA		No
Thallium	Passed	NA	NA		No
Vanadium	Passed	NA	NA		No
Zinc	Failed	Failed	Failed	Known constituent of small arms ammunition.	Yes

Note: “B”-flagged data not used in evaluation.

[a] Per Shaw (2005), *Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC, Revision 3,* Technical Memorandum, March 14. See Appendix H of the RI report.

"Passed" indicates metal was present at concentrations comparable to background levels and no further assessment was performed.
"Failed" indicates metal was present at anomalous concentrations relative to background levels and further evaluation was performed at Tier 2 or Tier 3 level.

[b] Interstate Technology and Regulatory Council (ITRC), 2003, *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges,* January.

[c] U. S. Environmental Protection Agency, 1989, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual.*

[d] Although these metals may be associated with more recent types of ammunition (ITRC, 2005, *Environmental Management at Operating Outdoor Small Arms Ranges*), these metals do not appear to be associated with the typical small arms ammunition used historically at the IMR Ranges. These metals were not identified in the 2003 ITRC document, and analytical results from the IMR Ranges and other small arms ranges investigated at FTMC over the past decade do not indicate the presence of elevated levels of these metals.

BSV - background screening value (2X mean).
COPC - Chemical of potential concern.
mg/kg - Milligrams per kilogram.
NA - Not applicable.
ND - Not detected.

Table 4-9

Summary of Inorganic Data Evaluations for Subsurface Soil
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Metal	Results of Tier 1 Background Screening[a]	Results of Tier 2 Statistical Evaluation[a]	Results of Tier 3 Geochemical Evaluation[a]	Other Lines of Evidence	Site-Related COPC?
Aluminum	Passed	NA	NA		No
Antimony	Failed	Failed	Failed	Known constituent of small arms ammunitionb.	Yes
Arsenic	Failed	Passed	NA	Detected above BSV in one sample from Range 19. Although expected to be present in lead shot, not a known constituent of typical small arms ammunition such as that used at Range 19. Sample with highest concentration (23 mg/kg) marginally above BSV (18.3 mg/kg) in only 1 of 17 samples.	No
Barium	Passed	NA	NA		No
Beryllium	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition. Only 1 of 17 samples (1.4 mg/kg) exceeded BSV (0.86 mg/kg).	No
Cadmium	ND	NA	NA		No
Calcium	Passed	NA	NA		No
Chromium	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition such as that used at the IMR Ranges[d]. Only 1 of 17 samples (49 mg/kg) exceeded BSV (38.3 mg/kg).	No
Cobalt	Passed	NA	NA		No
Copper	Failed	Failed	Failed	Known constituent of small arms ammunition.	Yes
Iron	Failed	Failed	Passed	Abundant element in native soils; essential macronutrientc; no evidence of use at the site; not a constituent of typical small arms ammunition such as that used at the IMR Ranges[d]; only 1 of 17 samples (48,000 mg/kg) exceeded BSV (44,817 mg/kg).	No
Lead	Failed	Failed	Failed	Major constituent of small arms ammunition.	Yes
Magnesium	Passed	NA	NA		No
Manganese	Passed	NA	NA		No
Mercury	Passed	NA	NA		No
Nickel	Failed	Passed	NA	No evidence of use at the site; not a known constituent of typical small arms ammunition such as that used at the IMR Ranges[d]; only 2 of 17 samples (13.2 and 26 mg/kg) exceeded BSV (12.9 mg/kg).	No
Potassium	Passed	NA	NA		No

Table 4-9

Summary of Inorganic Data Evaluations for Subsurface Soil
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Metal	Results of Tier 1 Background Screening[a]	Results of Tier 2 Statistical Evaluation[a]	Results of Tier 3 Geochemical Evaluation[a]	Other Lines of Evidence	Site-Related COPC?
Selenium	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of small arms ammunition. Only detected in 1 of 17 samples.	No
Silver	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition. Only detected 1 of 17 samples.	No
Sodium	Passed	NA	NA		No
Thallium	Passed	NA	NA		No
Vanadium	Passed	NA	NA		No
Zinc	Failed	Passed	NA	Although a known constituent of small arms ammunition, only 2 of 17 samples (52.6 and 54.7 mg/kg) were marginally above BSV (34.9 mg/kg).	No

Note: “B”-flagged data not used in evaluation.

[a] Per Shaw (2005), *Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC, Revision 3,* Technical Memorandum, March 14. See Appendix H of the RI report.

"Passed" indicates metal was present at concentrations comparable to background levels and no further assessment was performed.
"Failed" indicates metal was present at anomalous concentrations relative to background levels and further evaluation was performed at Tier 2 or Tier 3 level.

[b] Interstate Technology and Regulatory Council (ITRC), 2003, *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges,* January.

[c] U. S. Environmental Protection Agency, 1989, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual.*

[d] Although these metals may be associated with more recent types of ammunition (ITRC, 2005, *Environmental Management at Operating Outdoor Small Arms Ranges*), these metals do not appear to be associated with the typical small arms ammunition used historically at the IMR Ranges. These metals were not identified in the 2003 ITRC document, and analytical results from the IMR Ranges and other small arms ranges investigated at FTMC over the past decade do not indicate the presence of elevated levels of these metals.

BSV - background screening value (2X mean).
COPC - Chemical of potential concern.
mg/kg - Milligrams per kilogram.
NA - Not applicable.
ND - Not detected.

Table 4-10

Summary of Inorganic Data Evaluations for Groundwater
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Metal	Results of Tier 1 Background Screening[a]	Results of Tier 2 Statistical Evaluation[a]	Results of Tier 3 Geochemical Evaluation[a]	Other Lines of Evidence	Site-Related COPC?
Aluminum	Passed	NA	NA		No
Antimony	ND	NA	NA		No
Arsenic	ND	NA	NA		No
Barium	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition[b].	No
Beryllium	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition[b].	No
Cadmium	ND	NA	NA		No
Calcium	Passed	NA	NA		No
Chromium	ND	NA	NA		No
Cobalt	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of small arms ammunition such as that used at the IMR Ranges[b,d].	No
Copper	ND	NA	NA		No
Iron	Passed	NA	NA		No
Lead	Passed	NA	NA		No
Magnesium	Passed	NA	NA		No
Manganese	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of small arms ammunition[b].	No
Mercury	ND	NA	NA		No
Nickel	ND	NA	NA		No
Potassium	Passed	NA	NA		No
Selenium	NA	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition[b].	No
Silver	ND	NA	NA		No
Sodium	Passed	NA	NA		No
Thallium	ND	NA	NA		No
Vanadium	ND	NA	NA		No
Zinc	ND	NA	NA		No

Note: “B”-flagged data not used in evaluation.

[a] Per Shaw (2005), *Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC, Revision 3,* Technical Memorandum, March 14. See Appendix H of the RI report.

"Passed" indicates metal was present at concentrations comparable to background levels and no further assessment was performed.
"Failed" indicates metal was present at anomalous concentrations relative to background levels and further evaluation was performed at Tier 2 or Tier 3 level.

[b] Interstate Technology and Regulatory Council (ITRC), 2003, *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges,* January.

[c] U. S. Environmental Protection Agency, 1989, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual.*

[d] Although these metals may be associated with more recent types of ammunition (ITRC, 2005, *Environmental Management at Operating Outdoor Small Arms Ranges*), these metals do not appear to be associated with the typical small arms ammunition used historically at the IMR Ranges. These metals were not identified in the 2003 ITRC document, and analytical results from the IMR Ranges and other small arms ranges investigated at FTMC over the past decade do not indicate the presence of elevated levels of these metals.

COPC - Chemical of potential concern.
NA - Not applicable.
ND - Not detected.

Table 4-11

Summary of Inorganic Data Evaluations for Surface Water
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Metal	Results of Tier 1 Background Screening[a]	Results of Tier 2 Statistical Evaluation[a]	Results of Tier 3 Geochemical Evaluation[a]	Other Lines of Evidence	Site-Related COPC?
Aluminum	Passed	NA	NA		No
Antimony	ND	NA	NA		No
Arsenic	ND	NA	NA		No
Barium	Passed	NA	NA		No
Beryllium	ND	NA	NA		No
Cadmium	ND	NA	NA		No
Calcium	Passed	NA	NA		No
Chromium	ND	NA	NA		No
Cobalt	ND	NA	NA		No
Copper	Passed	NA	NA		No
Iron	Passed	NA	NA		No
Lead	Failed	Failed	Failed	Major constituent of small arms ammunition[b].	Yes
Magnesium	Passed	NA	NA		No
Manganese	Passed	NA	NA		No
Mercury	*	NA	NA		No
Nickel	ND	NA	NA		No
Potassium	Passed	NA	NA		No
Selenium	ND	NA	NA		No
Silver	ND	NA	NA		No
Sodium	Passed	NA	NA		No
Thallium	*	NA	NA		No
Vanadium	ND	NA	NA		No
Zinc	Passed	NA	NA		No

Note: “B”-flagged data not used in evaluation.

[a] Per Shaw (2005), *Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC, Revision 3,* Technical Memorandum, March 14. See Appendix H of the RI report.

"Passed" indicates metal was present at concentrations comparable to background levels and no further assessment was performed.
"Failed" indicates metal was present at anomalous concentrations relative to background levels and further evaluation was performed at Tier 2 or Tier 3 level.

[b] Interstate Technology and Regulatory Council, 2003, *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges,* January.

[c] U. S. Environmental Protection Agency, 1989, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual.*

COPC - Chemical of potential concern.
NA - Not applicable.
ND - Not detected.
* - Metal was detected in one or more samples; however, all reported results were "B" flagged data and not used in three-tiered assessment.

Table 4-12

Summary of Inorganic Data Evaluations for Sediment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Metal	Results of Tier 1 Background Screening[a]	Results of Tier 2 Statistical Evaluation[a]	Results of Tier 3 Geochemical Evaluation[a]	Other Lines of Evidence	Site-Related COPC?
Aluminum	Passed	NA	NA		No
Antimony	Failed	Failed	Failed	Known constituent of small arms ammunitionb.	Yes
Arsenic	Failed	Failed	Passed	Although not a major constituent of typical small arms ammunition, small amounts of arsenic are used to improve the roundness of lead shotb. Samples with highest concentrations (23 and 38 mg/kg) were collected at Skeet Range, where shotgun shells were used.	Yes
Barium	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of small arms ammunition. Only 1 of 9 samples (478 mg/kg) exceeded BSV (99 mg/kg).	No
Beryllium	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition. Maximum concentration (1.2 mg/kg) only marginally above BSV (0.97 mg/kg).	No
Cadmium	ND	NA	NA		No
Calcium	Failed	Passed	NA	Essential macronutrientc; no evidence of use at the site; not a known constituent of small arms ammunition.	No
Chromium	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition such as that used at the IMR Ranges[d]. Only 1 of 9 samples (50.3 mg/kg) exceeded BSV (31.2 mg/kg).	No
Cobalt	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition such as that used at the IMR Ranges[d]. Maximum concentration (14.1 mg/kg) only marginally above BSV (11 mg/kg).	No
Copper	Failed	Failed	Failed	Known constituent of small arms ammunition.	Yes
Iron	Failed	Failed	Passed	Abundant element in native soils; essential macronutrientc; no evidence of use at the site; not a constituent of typical small arms ammunition such as that used at the IMR Ranges[d]. Only 1 of 9 samples (62,500 mg/kg) exceeded BSV (35,300 mg/kg).	No
Lead	Failed	Failed	Failed	Major constituent of small arms ammunition.	Yes
Magnesium	Passed	NA	NA		No
Manganese	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of small arms ammunition. Only 1 of 9 samples (2,830 mg/kg) exceeded BSV (712.3 mg/kg).	No
Mercury	Passed	NA	NA		No
Nickel	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of typical small arms ammunition such as that used at the IMR Ranges[d]. Only 1 of 9 samples (34.6 mg/kg) exceeded background (13 mg/kg).	No

Table 4-12

Summary of Inorganic Data Evaluations for Sediment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Metal	Results of Tier 1 Background Screening[a]	Results of Tier 2 Statistical Evaluation[a]	Results of Tier 3 Geochemical Evaluation[a]	Other Lines of Evidence	Site-Related COPC?
Potassium	Passed	NA	NA		No
Selenium	ND	NA	NA		No
Silver	ND	NA	NA		No
Sodium	ND	NA	NA		No
Thallium	Failed	Failed	Passed	No evidence of use at the site; not a known constituent of small arms ammunition.	No
Vanadium	Failed	Passed	NA	No evidence of use at the site; not a known constituent of small arms ammunition. Only 1 of 9 samples (43 mg/kg) marginally exceeded BSV (41 mg/kg).	No
Zinc	Failed	Passed	NA	Although a known constituent of small arms ammunition, only one result (61.7 mg/kg) marginally exceeded background (52.7 mg/kg).	No

Note: “B”-flagged data not used in evaluation.

[a] Per Shaw (2005), *Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC, Revision 3,* Technical Memorandum, March 14. See Appendix H of the RI report.

"Passed" indicates metal was present at concentrations comparable to background levels and no further assessment was performed.
"Failed" indicates metal was present at anomalous concentrations relative to background levels and further evaluation was performed at Tier 2 or Tier 3 level.

[b] Interstate Technology and Regulatory Council (ITRC), 2003, *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges,* January.

[c] U. S. Environmental Protection Agency, 1989, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual.*

[d] Although these metals may be associated with more recent types of ammunition (ITRC, 2005, *Environmental Management at Operating Outdoor Small Arms Ranges*), these metals do not appear to be associated with the typical small arms ammunition used historically at the IMR Ranges. These metals were not identified in the 2003 ITRC document, and analytical results from the IMR Ranges and other small arms ranges investigated at FTMC over the past decade do not indicate the presence of elevated levels of these metals.

BSV - background screening value (2X mean).
COPC - Chemical of potential concern.
mg/kg - milligrams per kilogram.
NA - Not applicable.
ND - Not detected.

Table 5-1

Summary of Contaminant Impact to Soil and Sediment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

	Surface Soil	Subsurface Soil	Sediment
METALS			
Antimony	12	1	2
Copper	26	1	3
Lead	65	7	2
Silver	1	N	N
Zinc	5	N	N
ORGANIC COMPOUNDS			
Acetone	35	8	NA
2-Butanone	12	1	NA
Chloromethane	1	U	NA
Methylene chloride	28	13	NA
Naphthalene	1	U	NA
N-Butylbenzene	1	U	NA
p-Cymene	12	2	NA
Styrene	2	U	NA
Toluene	3	U	NA
Trichlorofluoromethane	11	1	NA
Anthracene	1	U	NA
Benzo(a)anthracene	3	1	NA
Benzo(a)pyrene	3	1	NA
Benzo(b)fluoranthene	3	1	NA
Benzo(ghi)perylene	2	1	NA
Benzo(k)fluoranthene	2	U	NA
Bis(2-Ethylhexyl)phthalate	28	13	NA
Chrysene	3	1	NA
Dibenz(a,h)anthracene	1	1	NA
Di-n-butyl phthalate	6	1	NA
Fluoranthene	2	U	NA
Indeno(1,2,3-cd)pyrene	1	1	NA
N-Nitrosodiphenylamine	7	1	NA
Phenanthrene	1	1	NA
Pyrene	4	1	NA

N - Geochemical evaluation indicates all detected concentrations are naturally occurring.
Numeric Value:
Metals - Number of detected concentrations that may not be naturally occurring
Organic Compounds - Number of detected concentrations.
U - Not detected.
NA - Not analyzed, sediment samples were not analyzed for volatile or semivolatile organic compounds.

EPA - U.S. Environmental Protection Agency.
mg/kg - Milligrams per kilogram.

Table 5-2

Soil Screening Levels and Travel Times for Metal COCs in Soils
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Metal	Limit[a] (mg/L)	Partition Coefficient (K_d)[b] (L/kg)	Generic DAF_1 SSL (mg/kg)	Generic DAF_{20} SSL (mg/kg)	Retardation Factor	Transport Rate V (m/yr)	Travel Time T (years)
Antimony	0.006	45	0.3	5	2.26E+02	1.99E-03	3,129
Arsenic	0.01	25	1	29	1.26E+02	3.57E-03	1,705
Copper	1.3	79	103	2,059	3.96E+02	1.13E-03	5,513
Lead	0.015	3,373	51	1,012	1.69E+04	2.67E-03	228,253
Silver	0.02	0.10	2	34	1.50E+00	3.00E-01	20
Thallium	**0.002**	44	0.04	0.7	2.20E+02	2.05E-03	2,977
Vanadium	0.26	1,000	300	6,000	5.00E+03	9.00E-05	69,242
Zinc	11	16	620	12,000	8.10E+01	5.56E-03	1,096

[a] Limits are federal maximum contaminant levels (MCL), MCL goals (MCLG), or EPA Region 9 preliminary remediation goals (PRG).
Bold values are EPA Region 3 or 9 PRGs for tap water.
[b] Partition coefficients from EPA (1996a) except for copper and lead from HydroGeoLogic, Inc. (1999) and HSDB (2009), respectively.
Retardation factor, transport rate (V), and travel time (T) are calculated using EPA (1996a) guidance and soil properties.
Travel time is computed for the distance from the surface to the water table (20 feet or 6.1 meters).

cm^3/g - Cubic centimeters per gram.
COC - Chemical of concern.
DAF - Dilution-attenuation factor.
EPA - U.S. Environmental Protection Agency
L/kg - Liters per kilogram.
m/yr - Meters per year.
mg/kg - Milligrams per kilogram.
mg/L - Milligrams per liter.

Table 5-3

Physiochemical Properties and Soil Screening Levels for Organic Compounds Detected in Soil and Sediment Samples Iron Mountain Road Ranges Fort McClellan, Calhoun County, Alabama

Parameter	Maximum Contaminant Level (mg/L)	K_{oc} [a] (L/kg or cm^3/g)	H'	Generic SSL 1 (mg/kg)	Calculated DAF1 SSL (mg/kg)	Generic DAF20 SSL (mg/kg)	Retardation Factor	V (m/yr)	T (years)
VOLATILES									
Acetone[b]	0.6	0.58	0.000159	0.8	0.1	16	1.17E+00	0.3837818	5
Toluene	1	140	0.272	0.60	0.5	12	4.30E+01	0.0337131	55
Naphthalene	6	*1,191*	*0.020*	4	16	84	3.58E+02	0.0040459	462
N-Butylbenzene[b,c]	243	*17*	*0.537*		69	1,372	6.10E+00	0.2378914	8
p-Isopropyltoluene[d]	Toluene used as a surrogate						4.30E+01	0.0337131	55
Bromomethane[b,c]	0.009	*0.05*	*0.256*		0.002	0.04	1.02E+00	1.426879	1
2-Butanone[b,c,d]	1.90	*5*	*0.0011*		0.40	8	2.35E+00	0.6169366	3
Chloromethane[b,c]	0.002	*35*	*1.804*		0.001	0.01	1.15E+01	0.1260595	15
Methylene chloride	0.005	12	0.0898	0.001	0.001	0.02	4.51E+00	0.321448	6
Styrene	0.1	912	0.113	0.2	0.2	4	2.75E+02	0.0052792	354
Trichlorofluormethane[b,c]	1.3	*160*	*4*		1	23	4.90E+01	0.0295849	63
SEMIVOLATILES									
Anthracene[b]	1.83	23,500	2.67E-03	600	86	12,000	7.05E+03	0.0002056	33,335
Benzo(a)anthracene[b]	9.21E-05	358,000	1.37E-04	0.08	0.07	2	1.07E+05	1.35E-05	507,764
Benzo(a)pyrene[a]	9.21E-06	969,000	4.63E-05	0.4	0.02	8	2.91E+05	4.987E-06	1,374,358
Benzo(b)fluoranthene[b]	9.21E-05	1,230,269	4.55E-03	0.25	0.23	5	3.69E+05	3.928E-06	1,744,921
Benzo(ghi)perylene[a]	Anthracene used as surrogate						7.05E+03	0.0002056	33,335
Benzo(k)fluoranthene[b,c]	9.21E-04	1,230,269	3.40E-05	2	2	49	3.69E+05	3.928E-06	1,744,921
Chrysene[b]	9.21E-03	398,107		8	7	160	1.19E+05	1.214E-05	564,649
Dibenz(a,h)anthracene		1,790,000					5.37E+05	2.7E-06	2,538,800
Fluoranthene[b]	1	49,700	6.60E-04	215	145	4,300	1.49E+04	9.722E-05	70,495
Indeno(1,2,3-cd)pyrene[b]	9.21E-05	3,467,369	6.56E-05	0.7	0.64	14	1.04E+06	1.394E-06	4,917,848
N-Nitrosodiphenylamine[b]	14	1,288	2.05E-04		38	762	3.88E+02	0.0037413	1,832
Phenanthrene[b]		23,500					7.05E+03	0.0002056	33,335
Pyrene[b]	1.83E-01	680,000	4.51E-04	210	248.24	4,200	2.04E+05	7.106E-06	964,463
Di-n-butyl phthalate[b]	3.65	1,570	3.85E-08		12.19	244	4.72E+02	0.0030713	609
bis(2-Ethylhexyl)phthalate[b]	0.0001	111,000	4.18E-06	180	0.0	3,600	3.33E+04	4.353E-05	42,938

[a] K_{oc} from measured K_{oc} as reported in EPA 1996, italicized K_{oc} values were obtained from EPA Region 9 data tables.
[b] Shaded values are EPA Region 9 PRGs for tap water.
[c] DAF_1 SSL calculated from Region 9 PRG for tap water.
[d] p-Isopropyl toluene = p-Cymene, 2-Butanone = Methylethylketone, 4-Methyl-2-pentanone = Methylisobutylketone.
Blank cells indicate that the data are not available

cm^3 - Cubic centimeters per gram.
DAF - Dilution-attenuation factor.
EPA - U.S. Environmental Protection Agency
L/kg - Liters per kilogram.
m/yr - Meters per year.
mg/L - Milligrams per liter.
PRG - Preliminary remediation goal.
SSL - Soil screening level.

Table 5-4

Maximum Concentrations in Site Media
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

	Generic DAF_{20} (mg/kg)	Maximum Detected Concentrations IMR Ranges[a]			
		Surface Soil	Subsurface Soil	Sediment	Groundwater
METALS					
Antimony	5	1620	2	10.3	U
Copper	2059	991	112	73	U
Lead	1012	116000	1350	2070	0.0038
Silver	34	3	N	N	U
Zinc	12000	164	54.7	N	U
ORGANIC COMPOUNDS					
Acetone	16	0.56	0.23	NA	0.0067
2-Butanone	8	0.022	0.0065	NA	U
Chloromethane	0.01	0.0033	U	NA	U
Methylene chloride	0.02	0.0042	0.0033	NA	0.00073
Naphthalene	84	0.0011	U	NA	U
N-Butylbenzene	1372	0.0021	U	NA	U
p-Cymene		0.13	0.01	NA	U
Styrene	4	0.0057	U	NA	U
Toluene	12	0.0026	U	NA	0.00059
Trichlorofluoromethane	23	0.016	0.0016	NA	U
Anthracene	12000	0.05	U	NA	U
Benzo(a)anthracene	2	0.88	0.15	NA	U
Benzo(a)pyrene	8	1.9	0.25	NA	U
Benzo(b)fluoranthene	5	0.57	0.082	NA	U
Benzo(ghi)perylene		0.92	0.13	NA	U
Benzo(k)fluoranthene	49	0.24	U	NA	U
Bis(2-Ethylhexyl)phthalate	3600	0.13	0.15	NA	U
Chrysene	160	1.2	0.18	NA	U
Dibenz(a,h)anthracene		0.41	0.051	NA	U
Di-n-butyl phthalate	244	0.21	0.079	NA	U
Fluoranthene	4300	0.16	U	NA	U
Indeno(1,2,3-cd)pyrene	14	0.29	0.037	NA	U
N-Nitrosodiphenylamine	762	0.26	0.11	NA	U
Phenanthrene		0.24	0.04	NA	U
Pyrene	4200	1.2	0.19	NA	U

N - Geochemical evaluation indicates all detected concentrations are naturally occurring.
Concentrations exceeding the generic DAF_{20} are shaded.
U - Not detected.
NA - Not analyzed, sediment samples were not analyzed for volatile or semivolatile organic compounds.
[a] - Soil and sediment concentrations are in milligrams per kilogram (mg/kg); groundwater concentrations are in milligrams per liter (mg/L).

DAF - Dilution-attenuation factor.
EPA - U. S. Environmental Protection Agency.

Table 5-5

Summary of Soil and Sediment Samples Exceeding Generic DAF_{20} Screening Levels
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Parameter	Concentration (mg/kg)
Surface Soil		
HR-69Q-SS01	Antimony	4.97
HR-221Q-GP01	Antimony	10
SAR-RC-DEP08	Antimony	10.4
HR-70Q-SS01	Antimony	14.4
HR-70Q-SS02	Antimony	20.3
HR-75Q-SS01	Antimony	31.6
SAR-71-SS20	Antimony	39.1
HR-70Q-SS01	Antimony	92.2
HR-75Q-SS03	Antimony	1240
SAR-69-SS11	Antimony	1620
SAR-69-SS34	Lead	450
SAR-71-SS07	Lead	453
SAR-71-SS09	Lead	480
SAR-69-SS27	Lead	490
HR-221Q-GP01	Lead	531
SAR-70-SS12	Lead	539
HR-69Q-DEP01	Lead	576
SAR-69-SS35	Lead	608
SAR-71-SS04	Lead	649
SAR-71-SS11	Lead	661
SAR-71-SS06	Lead	705
SAR-71-SS05	Lead	779
SAR-69-SS32	Lead	825
SAR-71-SS12	Lead	964
HR-221Q-GP01E	Lead	987
SAR-71-SS05	Lead	1150
SAR-69-SS11	Lead	1300
HR-75Q-SS02	Lead	1400
HR-69Q-SS01	Lead	1780
HR-71Q-SS01	Lead	2340
SAR-RC-DEP08	Lead	2420
SAR-71-SS16	Lead	3190
HR-70Q-SS02	Lead	3280
HR-221Q-GP01W	Lead	4210
SAR-71-SS20	Lead	4380
HR-70Q-SS01	Lead	8120
HR-75Q-SS01	Lead	8330
HR-70Q-SS01	Lead	10600
SAR-69-SS11	Lead	41300
HR-75Q-SS03	Lead	116000
Subsurface Soil		
SAR-69-SS35	Lead	423
SAR-69-SS35	Lead	561
SAR-75-SS19	Lead	1350
Sediment		
SAR-RC-SW/SD06	Antimony	6.9
SAR-RC-SW/SD10	Antimony	10.3
SAR-RC-SW/SD06	Lead	406
SAR-RC-SW/SD10	Lead	2070

Table 6-1

Receptor Exposure Scenarios
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Source Medium	Transport Model	Exposure Medium	Exposure Route
Groundskeeper			
Total soil[a]	None	Soil	Incidental ingestion Dermal contact
	Dust emissions	Air	Inhalation
Groundwater[b]	None	Water	Drinking water consumption Dermal contact
Construction Worker			
Total Soil[a]	None	Soil	Incidental ingestion Dermal contact
	Dust emissions, volatilization	Air	Inhalation
Groundwater[b]	None	Water	Drinking water consumption Dermal contact
Indoor Worker			
Total soil[a]	None	Soil	Incidental Ingestion
Groundwater[b]	None	Water	Drinking water consumption
Youth Recreational Site User			
Total soil[a]	None	Soil	Incidental ingestion Dermal contact
	Dust emissions	Air	Inhalation
Surface water	None	Water	Ingestion Dermal contact
Sediment	None	Sediment	Incidental ingestion Dermal contact

Table 6-1

Receptor Exposure Scenarios
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Source Medium	Transport Model	Exposure Medium	Exposure Route
On-Site Resident			
Total Soil[a]	None	Soil	Incidental ingestion Dermal contact
Groundwater[b]	None	Water	Drinking water consumption Dermal contact
	Volatilization	Air	Inhalation
Surface water	None	Water	Incidental ingestion Dermal contact
Sediment	None	Sediment	Incidental ingestion Dermal contact

[a]Please see Section 6.3 for explanation of total soil.
[b]It is conservatively assumed that groundwater is developed as a potable source.

Table 6-2

Surface Soil Samples Used in Streamlined Risk Assessment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Number	Sample Date	Depth of sample (ft)	Chemical Analysis Performed
HR-221Q-DEP01	NB0008	18-Jul-01	0 - 0.5	Metals, NITRO, PERCHLORATE, TOC
HR-221Q-DEP02	NB0009	18-Jul-01	0 - 0.5	Metals, NITRO, PERCHLORATE, TOC
HR-221Q-GP01	NB0001	2-Apr-01	0 - 1	Metals, NITRO, PERCHLORATE
HR-221Q-GP01E	NB0012	17-May-02	0 - 1	Lead
HR-221Q-GP01N	NB0010	17-May-02	0 - 1	Lead
HR-221Q-GP01S	NB0011	17-May-02	0 - 1	Lead
HR-221Q-GP01W	NB0013	17-May-02	0 - 1	Lead
HR-221Q-GP02	NB0003	2-Apr-01	0 - 1	Metals, NITRO, PERCHLORATE
HR-221Q-GP03	NB0006	6-Apr-01	0 - 1	Metals, NITRO, PERCHLORATE
HR-69Q-DEP01	HJJ0003	20-Aug-01	0 - 0.5	CL HERB, CL PEST, CYANIDE, Metals, NITRO, OP PEST, PCBs, PERCHLORATES, SVOCs, VOCs
HR-69Q-SS01	HJJ0001	15-Aug-01	0 - 0.5	CL HERB, CL PEST, CYANIDE, Metals, NITRO, OP PEST, PCBs, PERCHLORATES, SVOCs, VOCs
HR-70Q-SS01	HEE0001	16-Aug-01	0 - 0.5	CL HERB, CL PEST, CYANIDE, Metals, NITRO, OP PEST, PCBs, PERCHLORATES, SVOCs, VOCs
HR-70Q-SS01	RW0001	13-May-03	0 - 0.5	CL HERB, CL PEST, Metals, OP PEST, PCBs, SVOCs, TOC, VOCs
HR-70Q-SS02	HEE0002	16-Aug-01	0 - 0.5	CL HERB, CL PEST, CYANIDE, Metals, NITRO, OP PEST, PCBs, PERCHLORATES, SVOCs, VOCs
HR-71Q-SS01	HFF0001	16-Aug-01	0 - 0.5	CL HERB, CL PEST, CYANIDE, Metals, NITRO, OP PEST, PCBs, PERCHLORATES, SVOCs, VOCs
HR-75Q-SS01	HGG0001	15-Aug-01	0 - 0.5	CL HERB, CL PEST, CYANIDE, Metals, NITRO, OP PEST, PCBs, PERCHLORATES, SVOCs, VOCs
HR-75Q-SS02	HGG0002	15-Aug-01	0 - 0.5	CL HERB, CL PEST, CYANIDE, Metals, NITRO, OP PEST, PCBs, PERCHLORATES, SVOCs, VOCs
HR-75Q-SS03	HGG0004	15-Aug-01	0 - 0.5	CL HERB, CL PEST, CYANIDE, Metals, NITRO, OP PEST, PCBs, PERCHLORATES, SVOCs, VOCs
SAR-69-SS01	HJ0001	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS02	HJ0002	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS03	HJ0003	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS04	HJ0004	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS05	HJ0005	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS06	HJ0006	18-Mar-00	0 - 0.5	Lead
SAR-69-SS07	HJ0008	18-Mar-00	0 - 0.5	Lead
SAR-69-SS08	HJ0009	18-Mar-00	0 - 0.5	Lead
SAR-69-SS10	HJ0011	18-Mar-00	0 - 0.5	Lead
SAR-69-SS11	HJ0012	18-Mar-00	0 - 0.5	Lead
SAR-69-SS11	RW0021	12-May-03	0 - 0.5	CL HERB, CL PEST, Metals, OP PEST, PCBs, SVOCs, TOC, VOCs
SAR-69-SS13	HJ0015	18-Mar-00	0 - 0.5	Lead
SAR-69-SS14	HJ0016	18-Mar-00	0 - 0.5	Lead
SAR-69-SS15	HJ0017	18-Mar-00	0 - 0.5	Lead

Table 6-2

Surface Soil Samples Used in Streamlined Risk Assessment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Number	Sample Date	Depth of sample (ft)	Chemical Analysis Performed
SAR-69-SS17	HJ0019	18-Mar-00	0 - 0.5	Lead
SAR-69-SS18	HJ0020	18-Mar-00	0 - 0.5	Lead
SAR-69-SS20	HJ0023	18-Mar-00	0 - 0.5	Lead
SAR-69-SS21	HJ0024	18-Mar-00	0 - 0.5	Lead
SAR-69-SS22	HJ0025	18-Mar-00	0 - 0.5	Lead
SAR-69-SS23	HJ0026	18-Mar-00	0 - 0.5	Lead
SAR-69-SS24	HJ0027	18-Mar-00	0 - 0.5	Lead
SAR-69-SS25	HJ0028	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS26	HJ0029	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS27	HJ0030	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS29	HJ0032	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS30	HJ0033	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS31	HJ0034	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS32	HJ0035	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS33	HJ0036	18-Mar-00	0 - 0.5	Lead
SAR-69-SS34	HJ0039	18-Mar-00	0 - 0.5	Lead
SAR-69-SS35	HJ0042	18-Mar-00	0 - 0.5	Lead
SAR-69-SS36	HJ0046	18-Mar-00	0 - 0.5	Lead
SAR-69-SS37	HJ0049	18-Mar-00	0 - 0.5	Lead
SAR-69-SS37	RW0008	12-May-03	0 - 0.5	CL HERB, CL PEST, Metals, OP PEST, PCBs, SVOCs, TOC, VOCs
SAR-69-SS38	HJ0052	18-Mar-00	0 - 0.5	Lead
SAR-69-SS39	HJ0055	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-69-SS40	HJ0058	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-70-SS01	HE0001	17-Mar-00	0 - 0.5	Lead
SAR-70-SS02	HE0002	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-70-SS03	HE0003	17-Mar-00	0 - 0.5	Lead
SAR-70-SS04	HE0004	17-Mar-00	0 - 0.5	Lead
SAR-70-SS05	HE0005	17-Mar-00	0 - 0.5	Lead
SAR-70-SS06	HE0007	17-Mar-00	0 - 0.5	Lead
SAR-70-SS07	HE0008	17-Mar-00	0 - 0.5	Lead
SAR-70-SS08	HE0009	17-Mar-00	0 - 0.5	Lead
SAR-70-SS09	HE0010	17-Mar-00	0 - 0.5	Lead

Table 6-2

Surface Soil Samples Used in Streamlined Risk Assessment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Number	Sample Date	Depth of sample (ft)	Chemical Analysis Performed
SAR-70-SS09	RW0009	13-May-03	0 - 0.5	CL HERB, CL PEST, Metals, OP PEST, PCBs, SVOCs, TOC, VOCs
SAR-70-SS10	HE0011	17-Mar-00	0 - 0.5	Lead
SAR-70-SS11	HE0012	17-Mar-00	0 - 0.5	Lead
SAR-70-SS12	HE0013	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-70-SS12	RW0024	8-May-03	0 - 0.5	CL HERB, CL PEST, Metals, OP PEST, PCBs, SVOCs, TOC, VOCs
SAR-70-SS13	HE0014	17-Mar-00	0 - 0.5	Lead
SAR-70-SS14	HE0015	17-Mar-00	0 - 0.5	Lead
SAR-70-SS15	HE0018	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-70-SS16	HE0021	17-Mar-00	0 - 0.5	Lead
SAR-71-SS01	HF0001	17-Mar-00	0 - 0.5	Lead
SAR-71-SS02	HF0002	17-Mar-00	0 - 0.5	Lead
SAR-71-SS03	HF0003	17-Mar-00	0 - 0.5	Lead
SAR-71-SS04	HF0004	17-Mar-00	0 - 0.5	Lead
SAR-71-SS05	HF0005	17-Mar-00	0 - 0.5	Lead
SAR-71-SS05	RW0005	8-May-03	0 - 0.5	CL HERB, CL PEST, Metals, OP PEST, PCBs, SVOCs, TOC, VOCs
SAR-71-SS06	HF0006	17-Mar-00	0 - 0.5	Lead
SAR-71-SS07	HF0008	17-Mar-00	0 - 0.5	Lead
SAR-71-SS08	HF0009	17-Mar-00	0 - 0.5	Lead
SAR-71-SS09	HF0010	17-Mar-00	0 - 0.5	Lead
SAR-71-SS09	RW0006	8-May-03	0 - 0.5	CL HERB, CL PEST, Metals, OP PEST, PCBs, SVOCs, TOC, VOCs
SAR-71-SS10	HF0012	17-Mar-00	0 - 0.5	Lead
SAR-71-SS11	HF0013	17-Mar-00	0 - 0.5	Lead
SAR-71-SS12	HF0014	17-Mar-00	0 - 0.5	Lead
SAR-71-SS13	HF0015	17-Mar-00	0 - 0.5	Lead
SAR-71-SS14	HF0016	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-71-SS15	HF0017	17-Mar-00	0 - 0.5	Lead
SAR-71-SS16	HF0018	17-Mar-00	0 - 0.5	Lead
SAR-71-SS17	HF0019	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-71-SS18	HF0020	17-Mar-00	0 - 0.5	Lead
SAR-71-SS19	HF0021	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-71-SS20	HF0025	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-71-SS21	HF0028	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs

Table 6-2

Surface Soil Samples Used in Streamlined Risk Assessment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Number	Sample Date	Depth of sample (ft)	Chemical Analysis Performed
SAR-75-SS01	HG0001	17-Mar-00	0 - 0.5	Lead
SAR-75-SS02	HG0002	17-Mar-00	0 - 0.5	Lead
SAR-75-SS03	HG0003	17-Mar-00	0 - 0.5	Lead
SAR-75-SS04	HG0004	17-Mar-00	0 - 0.5	Lead
SAR-75-SS05	HG0005	18-Mar-00	0 - 0.5	Lead
SAR-75-SS06	HG0007	18-Mar-00	0 - 0.5	Lead
SAR-75-SS07	HG0008	18-Mar-00	0 - 0.5	Lead
SAR-75-SS08	HG0009	18-Mar-00	0 - 0.5	Lead
SAR-75-SS09	HG0010	17-Mar-00	0 - 0.5	Lead
SAR-75-SS10	HG0011	17-Mar-00	0 - 0.5	Lead
SAR-75-SS11	HG0012	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-75-SS12	HG0013	17-Mar-00	0 - 0.5	Lead
SAR-75-SS13	HG0014	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-75-SS14	HG0015	17-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-75-SS15	HG0016	17-Mar-00	0 - 0.5	Lead
SAR-75-SS16	HG0017	17-Mar-00	0 - 0.5	Lead
SAR-75-SS17	HG0018	17-Mar-00	0 - 0.5	Lead
SAR-75-SS18	HG0022	18-Mar-00	0 - 0.5	Lead
SAR-75-SS19	HG0027	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-75-SS20	HG0030	18-Mar-00	0 - 0.5	Metals, SVOCs, VOCs
SAR-RC-DEP02	HE1002	1-Apr-00	0 - 0.5	Metals, NITRO, PERCHLORATE
SAR-RC-DEP08	HJ1004	1-Apr-00	0 - 0.5	Metals, NITRO, PERCHLORATE
SAR-RC-DEP11	HJ1007	1-Apr-00	0 - 0.5	Metals, NITRO, PERCHLORATE
SAR-RC-DEP12	HJ1008	1-Apr-00	0 - 0.5	Metals, NITRO, PERCHLORATE

SVOC - Semivolatile organic compounds
VOC - Volatile organic compounds
NITRO - Nitroaromatic compounds
CL HERB - Chlorinated herbicides
CL PEST - Organochlorine pesticides
OP PEST - Organophosphate pesticides
PCBs - Polychlorinated biphenyls
TOC - Total organic carbons

Table 6-3

Subsurface Soil Samples Used in Streamlined Risk Assessment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Number	Sample Date	Depth of sample (ft)	Chemical Analysis Performed
HR-69Q-MW03	BGR002	14-Feb-08	1 - 2.5	Metals, NITRO
HR-221Q-GP01	NB0002	2-Apr-01	3 - 4	Metals, NITRO, PERCHLORATE
HR-221Q-GP02	NB0005	2-Apr-01	8 - 9	Metals, NITRO, PERCHLORATE
HR-221Q-GP03	NB0007	6-Apr-01	5 - 6	Metals, NITRO, PERCHLORATE
SAR-69-SS33	HJ0037	18-Mar-00	1 - 1.5	Lead
SAR-69-SS33	HJ0038	18-Mar-00	2 - 2.5	Lead
SAR-69-SS34	HJ0040	18-Mar-00	1 - 1.5	Lead
SAR-69-SS34	HJ0041	18-Mar-00	2 - 2.5	Lead
SAR-69-SS35	HJ0044	18-Mar-00	1 - 1.5	Lead
SAR-69-SS35	HJ0045	18-Mar-00	2 - 2.5	Lead
SAR-69-SS36	HJ0047	18-Mar-00	1 - 1.5	Lead
SAR-69-SS36	HJ0048	18-Mar-00	2 - 2.5	Lead
SAR-69-SS37	HJ0050	18-Mar-00	1 - 1.5	Lead
SAR-69-SS37	HJ0051	18-Mar-00	2 - 2.5	Lead
SAR-69-SS38	HJ0053	18-Mar-00	1 - 1.5	Lead
SAR-69-SS38	HJ0054	18-Mar-00	2 - 2.5	Lead
SAR-69-SS39	HJ0056	18-Mar-00	1 - 1.5	Metals, SVOCs, VOCs
SAR-69-SS39	HJ0057	18-Mar-00	2 - 2.5	Metals, SVOCs, VOCs
SAR-69-SS40	HJ0060	18-Mar-00	1 - 1.5	Metals, SVOCs, VOCs
SAR-70-SS14	HE0016	17-Mar-00	2 - 2.5	Lead
SAR-70-SS14	HE0017	17-Mar-00	4 - 4.5	Lead
SAR-70-SS15	HE0019	17-Mar-00	1 - 1.5	Metals, SVOCs, VOCs
SAR-70-SS15	HE0020	17-Mar-00	2 - 2.5	Metals, SVOCs, VOCs
SAR-70-SS16	HE0023	17-Mar-00	2 - 2.5	Lead
SAR-70-SS16	HE0024	17-Mar-00	4 - 4.5	Lead
SAR-71-SS19	HF0023	17-Mar-00	1 - 1.5	Metals, SVOCs, VOCs
SAR-71-SS19	HF0024	17-Mar-00	2 - 2.5	Metals, SVOCs, VOCs
SAR-71-SS20	HF0026	17-Mar-00	2 - 2.5	Metals, SVOCs, VOCs
SAR-71-SS21	HF0029	17-Mar-00	1.5 - 2	Metals, SVOCs, VOCs
SAR-71-SS21	HF0030	17-Mar-00	3 - 3.5	Metals, SVOCs, VOCs
SAR-75-SS17	HG0019	18-Mar-00	2 - 2.5	Lead
SAR-75-SS17	HG0020	18-Mar-00	3 - 3.5	Lead
SAR-75-SS18	HG0024	18-Mar-00	2 - 2.5	Lead
SAR-75-SS18	HG0025	18-Mar-00	3 - 3.5	Lead
SAR-75-SS19	HG0028	18-Mar-00	1 - 1.5	Metals, SVOCs, VOCs
SAR-75-SS20	HG0032	18-Mar-00	2 - 2.5	Metals, SVOCs, VOCs
SAR-75-SS20	HG0033	18-Mar-00	3 - 3.5	Metals, SVOCs, VOCs

SVOC - Semivolatile organic compounds
VOC - Volatile organic compounds
NITRO - Nitroaromatic compounds

Table 6-4

Groundwater Samples Used in Streamlined Risk Assessment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Number	Sample Date	Chemical Analysis Performed
HR-70Q-MW01	HEE3001	6-Nov-01	Metals, NITRO, Perchlorate, SVOCs, VOCs
HR-71Q-MW01	HFF3001	5-Nov-01	Metals, NITRO, Perchlorate, SVOCs, VOCs
HR-75Q-MW01	HGG3001	8-Oct-01	Metals, NITRO, Perchlorate, SVOCs, VOCs
HR-75Q-MW04	HGG3005	11-Oct-01	Metals, NITRO, Perchlorate, SVOCs, VOCs
HR-69Q-MW01	HJJ3001	6-Nov-01	Metals, NITRO, Perchlorate, SVOCs, VOCs
HR-69Q-MW02	HJJ3002	14-Nov-01	Metals, NITRO, Perchlorate, SVOCs, VOCs

SVOC - Semivolatile organic compounds
VOC - Volatile organic compounds
NITRO - Nitroaromatic compounds

Table 6-5

Surface Water Samples Used in Streamlined Risk Assessment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Number	Sample Date	Depth of sample (ft)	Chemical Analysis Performed
SAR-RC-SW/SD01	HE2001	1-Apr-00	NA	Metals, NITRO, Perchlorate
SAR-RC-SW/SD03	HE2003	1-Apr-00	NA	Metals, NITRO, Perchlorate
SAR-RC-SW/SD04	HF2001	1-Apr-00	NA	Metals, NITRO, Perchlorate
SAR-RC-SW/SD05	HJ2001	1-Apr-00	NA	Metals, NITRO, Perchlorate
SAR-RC-SW/SD06	HJ2002	1-Apr-00	NA	Metals, NITRO, Perchlorate
SAR-RC-SW/SD07	HJ2003	1-Apr-00	NA	Metals, NITRO, Perchlorate
SAR-RC-SW/SD09	HJ2005	1-Apr-00	NA	Metals, NITRO, Perchlorate
SAR-RC-SW/SD10	HJ2006	7-Apr-00	NA	Metals, NITRO, Perchlorate
SAR-RC-SW/SD13	HJ2009	1-Apr-00	NA	Metals, NITRO, Perchlorate

NA = Not applicable
NITRO - Nitroaromatic compounds

Table 6-6

Sediment Samples Used in Streamlined Risk Assessment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Number	Sample Date	Depth of sample (ft)	Chemical Analysis Performed
SAR-RC-SW/SD01	HE1001	1-Apr-00	0 - 0.5	Metals, NITRO, Perchlorate
SAR-RC-SW/SD03	HE1003	1-Apr-00	0 - 0.5	Metals, NITRO, Perchlorate
SAR-RC-SW/SD04	HF1001	1-Apr-00	0 - 0.5	Metals, NITRO, Perchlorate
SAR-RC-SW/SD05	HJ1001	1-Apr-00	0 - 0.5	Metals, NITRO, Perchlorate
SAR-RC-SW/SD06	HJ1002	1-Apr-00	0 - 0.5	Metals, NITRO, Perchlorate
SAR-RC-SW/SD07	HJ1003	1-Apr-00	0 - 0.5	Metals, NITRO, Perchlorate
SAR-RC-SW/SD09	HJ1005	1-Apr-00	0 - 0.5	Metals, NITRO, Perchlorate
SAR-RC-SW/SD10	HJ1006	1-Apr-00	0 - 0.5	Metals, NITRO, Perchlorate
SAR-RC-SW/SD13	HJ1009	1-Apr-00	0 - 0.5	Metals, NITRO, Perchlorate

NITRO - Nitroaromatic compounds

Table 6-7

Selection of Site-Related Chemicals for Surface Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Chemical	Detection Frequency		Percent hits	Range of values (mg/kg) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limit Minimum	Reporting Limit Maximum	Arithmetic Mean (mg/kg)	BSV [b] (mg/kg)	Site-Related?[c]
Metals										
Aluminum	51 / 51		100	1.39E+03	1.51E+04	2.17E+01	2.84E+01	7.37E+03	1.63E+04	N (a)
Antimony	24 / 51		47	5.20E-01	1.62E+03	6.80E+00	1.42E+01	6.34E+01	1.99E+00	Y
Arsenic	46 / 46	d	100	1.24E+00	5.60E+02	1.09E+00	1.42E+00	1.99E+01	1.37E+01	Y
Barium	51 / 51		100	7.61E+00	1.21E+02	1.09E+00	2.78E+01	5.57E+01	1.24E+02	N (a)
Beryllium	30 / 32	d	94	1.90E-01	1.40E+00	5.60E-01	1.42E+00	6.73E-01	8.00E-01	N (b)
Calcium	50 / 50	d	100	6.46E+01	4.84E+03	1.09E+02	6.94E+02	4.34E+02	1.72E+03	N (c)
Chromium	51 / 51	d	100	4.59E+00	3.58E+01	1.09E+00	2.84E+00	1.28E+01	3.70E+01	N (a)
Cobalt	48 / 50	d	96	8.60E-01	2.49E+01	2.17E+00	6.90E+00	5.34E+00	1.52E+01	N (b)
Copper	51 / 51		100	1.99E+00	9.91E+02	2.17E+00	3.50E+00	8.02E+01	1.27E+01	Y
Iron	51 / 51		100	5.78E+03	3.37E+04	1.13E+01	6.08E+01	1.48E+04	3.42E+04	N (a)
Lead	120 / 120		100	7.10E+00	1.16E+05	3.30E-01	5.45E+01	1.90E+03	4.01E+01	Y
Magnesium	51 / 51		100	6.98E+01	9.36E+02	1.09E+02	6.94E+02	2.85E+02	1.03E+03	N (c)
Manganese	51 / 51		100	9.05E+00	1.93E+03	1.09E+00	2.10E+00	4.59E+02	1.58E+03	N (b)
Mercury	36 / 51		71	9.80E-03	1.20E-01	3.70E-02	1.42E-01	5.12E-02	8.00E-02	N (b)
Nickel	51 / 51		100	1.50E+00	1.59E+01	2.17E+00	5.60E+00	6.25E+00	1.03E+01	N (b)
Potassium	47 / 49	d	96	3.08E+01	9.54E+02	5.43E+02	7.10E+02	2.99E+02	8.00E+02	N (c)
Selenium	6 / 49	d	12	5.92E-01	1.69E+00	5.60E-01	1.42E+00	4.95E-01	4.80E-01	N (b)
Silver	2 / 50	d	4	4.93E-01	3.69E+00	1.09E+00	2.84E+00	7.56E-01	3.60E-01	N (b)
Sodium	10 / 13	d	77	3.37E+01	5.83E+01	1.09E+02	1.38E+02	4.88E+01	6.34E+02	N (c)
Thallium	12 / 38	d	32	5.40E-01	2.76E+00	1.10E+00	2.84E+00	1.02E+00	3.43E+00	N (a)
Vanadium	51 / 51		100	8.60E+00	4.00E+01	1.09E+00	6.90E+00	1.92E+01	5.88E+01	N (a)
Zinc	51 / 51		100	6.31E+00	1.64E+02	1.15E+00	2.81E+00	4.03E+01	4.06E+01	Y
Herbicides										
2,4-DB	4 / 15		27	9.30E-03	3.20E-02	2.20E-02	2.80E-02	1.43E-02		Y
Pesticides and PCBs										
4,4'-DDE	2 / 15		13	4.30E-03	8.50E-03	4.30E-03	5.70E-03	2.94E-03		Y
4,4'-DDT	6 / 15		40	1.70E-03	1.50E-02	4.30E-03	5.70E-03	4.17E-03		Y
Aldrin	3 / 15		20	1.20E-03	3.40E-02	2.20E-03	2.80E-03	3.39E-03		Y
alpha-BHC	5 / 15		33	7.10E-04	5.60E-03	2.20E-03	2.80E-03	1.54E-03		Y
alpha-Chlordane	2 / 15		13	2.60E-03	3.60E-03	2.20E-03	2.80E-03	1.45E-03		Y
Aroclor 1260	3 / 14	d	21	1.00E-02	2.80E-02	4.30E-02	5.60E-02	2.28E-02		Y
Azinphosmethy	1 / 15		7	1.40E-01	1.40E-01	3.60E-02	4.70E-02	2.79E-02		Y
beta-BHC	3 / 15		20	2.70E-03	1.00E-02	2.20E-03	2.80E-03	2.33E-03		Y
Dieldrin	2 / 2	d	100	6.10E-04	1.90E-03	4.80E-03	5.30E-03	1.26E-03		Y
Endosulfan I	3 / 15		20	8.80E-04	1.40E-03	2.20E-03	2.80E-03	1.18E-03		Y
Endosulfan II	1 / 14	d	7	2.80E-03	2.80E-03	4.30E-03	5.60E-03	2.42E-03		Y
Endosulfan sulfate	1 / 15		7	2.60E-03	2.60E-03	4.30E-03	5.70E-03	2.44E-03		Y
Endrin	6 / 15		40	5.50E-04	1.40E-02	4.30E-03	5.70E-03	4.14E-03		Y
Endrin aldehyde	3 / 15		20	2.50E-03	3.40E-03	4.30E-03	5.70E-03	2.49E-03		Y
gamma-BHC (Lindane)	4 / 15		27	2.30E-03	4.50E-03	2.20E-03	2.80E-03	1.78E-03		Y

Table 6-7

Selection of Site-Related Chemicals for Surface Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Chemical	Detection Frequency		Percent hits	Range of values (mg/kg) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limit Minimum	Reporting Limit Maximum	Arithmetic Mean (mg/kg)	BSV [b] (mg/kg)	Site-Related?[c]
gamma-Chlordane	1 / 1	d	100	3.40E-04	3.40E-04	2.60E-03	2.60E-03	3.40E-04		Y
Heptachlor	7 / 15		47	8.40E-04	1.00E-02	2.20E-03	2.80E-03	2.34E-03		Y
Heptachlor epoxide	5 / 15		33	1.50E-03	4.60E-03	2.20E-03	2.80E-03	1.65E-03		Y
Semivolatile Organic Compounds										
Anthracene	1 / 1	d	100	5.00E-02	5.00E-02	3.90E-01	3.90E-01	5.00E-02		Y
Benzo(a)anthracene	3 / 42		7	7.00E-02	8.80E-01	3.60E-01	4.70E-01	2.10E-01		Y
Benzo(a)pyrene	3 / 42		7	7.30E-02	1.90E+00	3.60E-01	4.70E-01	2.37E-01		Y
Benzo(b)fluoranthene	3 / 42		7	7.10E-02	5.70E-01	3.60E-01	4.70E-01	2.03E-01		Y
Benzo(ghi)perylene	3 / 42		7	3.90E-02	9.20E-01	3.60E-01	4.70E-01	2.11E-01		Y
Benzo(k)fluoranthene	2 / 42		5	6.10E-02	2.40E-01	3.60E-01	4.70E-01	1.97E-01		Y
Bis(2-Ethylhexyl)phthalate	1 / 1	d	100	1.30E-01	1.30E-01	3.90E-01	3.90E-01	1.30E-01		Y
Chrysene	3 / 42		7	9.10E-02	1.20E+00	3.60E-01	4.70E-01	2.19E-01		Y
Dibenz(a,h)anthracene	1 / 42		2	4.10E-01	4.10E-01	3.60E-01	4.70E-01	2.05E-01		Y
Di-n-butyl phthalate	6 / 34	d	18	9.10E-02	2.10E-01	3.60E-01	4.20E-01	1.84E-01		Y
Fluoranthene	2 / 2	d	100	7.80E-02	1.60E-01	3.80E-01	3.90E-01	1.19E-01		Y
Indeno(1,2,3-cd)pyrene	1 / 42		2	2.90E-01	2.90E-01	3.60E-01	4.70E-01	2.02E-01		Y
N-Nitrosodiphenylamine	7 / 42		17	1.90E-01	2.60E-01	3.60E-01	4.70E-01	2.04E-01		Y
Phenanthrene	1 / 42		2	2.40E-01	2.40E-01	3.60E-01	4.70E-01	2.00E-01		Y
Pyrene	3 / 42		7	8.70E-02	1.20E+00	3.60E-01	4.70E-01	2.19E-01		Y
Volatile Organic Compounds										
2-Butanone	7 / 36	d	19	5.60E-03	2.20E-02	2.00E-02	4.10E-02	1.26E-02		Y
Acetone	20 / 27	d	74	8.00E-03	5.60E-01	2.00E-02	1.40E+00	1.44E-01		Y
Chloromethane	1 / 9	d	11	3.30E-03	3.30E-03	5.10E-03	6.60E-03	3.04E-03		Y
N-Butylbenzene	1 / 1	d	100	2.10E-03	2.10E-03	6.20E-03	6.20E-03	2.10E-03		Y
p-Cymene	12 / 41	d	29	9.90E-04	1.30E-01	5.10E-03	1.00E-02	7.41E-03		Y
Styrene	2 / 41	d	5	1.20E-03	5.70E-03	5.10E-03	1.00E-02	3.10E-03		Y
Toluene	3 / 41	d	7	1.80E-03	2.60E-03	5.10E-03	1.00E-02	3.00E-03		Y
Trichlorofluoromethane	8 / 38	d	21	1.70E-03	1.60E-02	5.10E-03	1.40E-02	5.64E-03		Y

mg/kg - milligram per kilogram; BSV = Background Screening Valu

N = Chemical is determined not to be site-related ; Y = Chemical is determined to be site-related; NA = not applica

[a] Surface soil is defined as soil from 0 to 1 foot bgs.

[b] Background screening values for inorganic constituents is 2 times the mean background concentration for surface soil.
(Science Applications International Corporation, 1998, Background Metals Survey Report, Fort McClell, Anniston, Alabama, July)

[c] Rationale for exclusion or inclusion of a chemical as site-related:

N (a) = Excluded as a site-related chemical because the maximum detected concentration does not exceed the background screening va

N (b) = Please see discussion of background evaluation in Section 4.

N (c) = Essential nutrien

[d] Some samples were excluded from the dataset because of blank contamination or because the reporting limits for nondetected samples were greater than two times the maximum detected concentratio

Table 6-8

Selection of Site-Related Chemicals for Subsurface Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, AL

Chemical	Detection Frequency		Percent hits	Range of values (mg/kg) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limit Minimum	Reporting Limit Maximum	Arithmetic Mean (mg/kg)	BSV [d] (mg/kg)	Site-Related?[e]
Metals										
Aluminum	17 / 17		100	1.48E+03	1.19E+04	2.21E+01	2.57E+01	6.75E+03	1.36E+04	N (a)
Antimony	3 / 17		18	7.50E-01	7.63E+01	6.60E+00	1.19E+01	8.09E+00	1.31E+00	Y
Arsenic	16 / 17		94	1.80E+00	2.30E+01	1.10E+00	1.30E+00	5.43E+00	1.83E+01	N (b)
Barium	17 / 17		100	1.24E+00	9.61E+01	1.17E+00	2.57E+01	3.33E+01	2.34E+02	N (a)
Beryllium	7 / 8	d	88	8.14E-02	1.40E+00	5.70E-01	1.19E+00	5.54E-01	8.60E-01	N (b)
Calcium	15 / 16	d	94	3.25E+01	4.83E+02	1.17E+02	6.42E+02	1.88E+02	6.37E+02	N (c)
Chromium	17 / 17		100	4.90E+00	4.90E+01	1.10E+00	2.38E+00	1.64E+01	3.83E+01	N (b)
Cobalt	15 / 17		88	1.00E+00	1.30E+01	2.34E+00	6.40E+00	3.85E+00	1.75E+01	N (a)
Copper	17 / 17		100	2.70E+00	1.12E+02	2.34E+00	3.20E+00	1.44E+01	1.94E+01	Y
Iron	17 / 17		100	5.30E+03	4.80E+04	1.11E+01	5.88E+01	1.59E+04	4.48E+04	N (c)
Lead	37 / 37		100	7.06E-01	1.35E+03	3.30E-01	1.70E+00	8.22E+01	3.85E+01	Y
Magnesium	16 / 16	d	100	1.71E+01	4.21E+02	1.17E+02	6.42E+02	1.87E+02	7.66E+02	N (c)
Manganese	17 / 17		100	1.74E+00	9.17E+02	1.17E+00	1.90E+00	2.02E+02	1.36E+03	N (a)
Mercury	13 / 17		76	1.20E-02	5.60E-02	3.70E-02	1.19E-01	3.67E-02	7.00E-02	N (a)
Nickel	17 / 17		100	5.60E-01	2.60E+01	2.34E+00	5.10E+00	6.27E+00	1.29E+01	N (b)
Potassium	14 / 14	d	100	3.61E+01	2.91E+02	5.54E+02	6.42E+02	1.17E+02	7.11E+02	N (c)
Selenium	1 / 17		6	6.89E-01	6.89E-01	5.50E-01	1.19E+00	3.67E-01	4.70E-01	N (c)
Silver	1 / 17		6	5.11E-01	5.11E-01	1.10E+00	2.38E+00	6.13E-01	2.40E-01	N (b)
Sodium	1 / 1	d	100	2.08E+01	2.08E+01	1.19E+02	1.19E+02	2.08E+01	7.02E+02	N (c)
Thallium	2 / 10	d	20	6.70E-01	9.20E-01	1.10E+00	2.38E+00	8.60E-01	1.40E+00	N (a)
Vanadium	17 / 17		100	8.60E+00	5.98E+01	1.17E+00	6.40E+00	2.35E+01	6.49E+01	N (a)
Zinc	17 / 17		100	1.50E+00	5.47E+01	1.19E+00	2.60E+00	1.94E+01	3.49E+01	N (b)
Semivolatile Organics										
Benzo(a)anthracene	1 / 1	d	100	1.50E-01	1.50E-01	3.70E-01	3.70E-01	1.50E-01		Y
Benzo(a)pyrene	1 / 13		8	2.50E-01	2.50E-01	3.70E-01	4.20E-01	1.97E-01		Y
Benzo(b)fluoranthene	1 / 1	d	100	8.20E-02	8.20E-02	3.70E-01	3.70E-01	8.20E-02		Y
Benzo(ghi)perylene	1 / 1	d	100	1.30E-01	1.30E-01	3.70E-01	3.70E-01	1.30E-01		Y
Chrysene	1 / 1	d	100	1.80E-01	1.80E-01	3.70E-01	3.70E-01	1.80E-01		Y
Dibenz(a,h)anthracene	1 / 1	d	100	5.10E-02	5.10E-02	3.70E-01	3.70E-01	5.10E-02		Y
Di-n-butyl phthalate	1 / 1	d	100	7.90E-02	7.90E-02	3.70E-01	3.70E-01	7.90E-02		Y
Indeno(1,2,3-cd)pyrene	1 / 1	d	100	3.70E-02	3.70E-02	3.70E-01	3.70E-01	3.70E-02		Y
N-Nitrosodiphenylamine	1 / 1	d	100	1.10E-01	1.10E-01	3.70E-01	3.70E-01	1.10E-01		Y
Phenanthrene	1 / 1	d	100	4.00E-02	4.00E-02	3.70E-01	3.70E-01	4.00E-02		Y
Pyrene	1 / 8	d	13	1.90E-01	1.90E-01	3.70E-01	3.80E-01	1.87E-01		Y

Table 6-8

Selection of Site-Related Chemicals for Subsurface Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, AL

Chemical	Detection Frequency	Percent hits	Range of values (mg/kg) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limit Minimum	Reporting Limit Maximum	Arithmetic Mean (mg/kg)	BSV [d] (mg/kg)	Site-Related?[e]
Volatile Organics									
Acetone	3 / 8 d	38	6.00E-02	2.30E-01	2.20E-02	2.60E-02	5.44E-02		Y
p-Cymene	2 / 13	15	3.10E-03	1.00E-02	5.50E-03	6.40E-03	3.45E-03		Y
Trichlorofluoromethane	1 / 1 d	100	1.60E-03	1.60E-03	1.10E-02	1.10E-02	1.60E-03		Y

mg/kg = milligram per kilogram; BSV = Background Screening Value
N = Chemical is determined not to be site-related ; Y = Chemical is determined to be site-related; NA = not applicable.
[a] Subsurface soil is defined as soil from 1 to 9 feet bgs.
[b] Background screening values for inorganic constituents is 2 times the mean background concentration for subsurface soil.
(Science Applications International Corporation, 1998, Background Metals Survey Report, Fort McClellar, Anniston, Alabama, July).
[c] Rationale for exclusion or inclusion of a chemical as site-related:
N (a) = Excluded as a site-related chemical because the maximum detected concentration does not exceed the background screening value.
N (b) = Please see discussion of background evaluation in Section 4.3.
N (c) = Essential nutrient
[d] Some samples were excluded from the dataset because of blank contamination or because the reporting limits for nondetected samples were greater than two times the maximum detected concentration.

Table 6-9

Selection of Site-Related Chemicals for Groundwater
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Chemical	Detection Frequency	Percent hits	Range of values (mg/L) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limit Minimum	Reporting Limit Maximum	Arithmetic Mean (mg/L)	BSV[a] (mg/L)	Site-Related?[b]
Metals									
Aluminum	5 / 6	83	6.44E-02	1.03E+00	2.00E-01	2.00E-01	5.55E-01	2.34E+00	N (a)
Barium	5 / 5 [c]	100	2.38E-02	1.29E-01	1.00E-02	1.00E-02	6.09E-02	1.27E-01	N (b)
Beryllium	1 / 1 [c]	100	3.21E-03	3.21E-03	1.00E-02	1.00E-02	3.21E-03	1.25E-03	N (b)
Calcium	6 / 6	100	1.40E+00	5.57E+01	1.00E+00	1.00E+00	1.35E+01	5.65E+01	N (c)
Cobalt	1 / 6	17	3.59E-02	3.59E-02	2.00E-02	2.00E-02	1.43E-02	2.34E-02	N (b)
Iron	5 / 5 [c]	100	5.28E-01	3.54E+00	1.00E+00	1.00E+00	1.66E+00	7.04E+00	N (a)
Lead	2 / 2 [c]	100	2.07E-03	3.84E-03	1.00E-02	1.00E-02	2.96E-03	8.00E-03	N (a)
Magnesium	6 / 6	100	6.63E-01	2.83E+00	1.00E+00	1.00E+00	1.36E+00	2.13E+01	N (c)
Manganese	5 / 6	83	1.30E-01	5.60E+00	1.00E-01	1.00E-01	1.42E+00	5.81E-01	N (b)
Potassium	4 / 6	67	1.15E+00	6.46E+00	5.00E+00	5.00E+00	3.15E+00	7.20E+00	N (c)
Selenium	1 / 1 [c]	100	4.40E-03	4.40E-03	1.00E-02	1.00E-02	4.40E-03		N (b)
Sodium	3 / 5 [c]	60	8.47E-01	9.92E-01	1.00E+00	1.00E+00	7.58E-01	1.48E+01	N (c)
Nitroaromatics									
2-Nitrotoluene	3 / 6	50	1.20E-03	3.90E-03	4.00E-04	4.00E-04	1.40E-03		Y
4-Amino-2,6-dinitrotoluene	1 / 6	17	4.70E-04	4.70E-04	4.00E-04	4.00E-04	2.45E-04		Y
Volatile Organic									
1,2,4-Trimethylbenzene	1 / 1 [c]	100	3.60E-04	3.60E-04	1.00E-03	1.00E-03	3.60E-04		Y
1,2-Dimethylbenzene	1 / 1 [c]	100	4.60E-04	4.60E-04	1.00E-03	1.00E-03	4.60E-04		Y
Ethylbenzene	1 / 1 [c]	100	2.60E-04	2.60E-04	1.00E-03	1.00E-03	2.60E-04		Y
m,p-Xylenes	1 / 1 [c]	100	5.90E-04	5.90E-04	2.00E-03	2.00E-03	5.90E-04		Y

mg/L = milligram per Liter; BSV = Background Screening Value
N = Chemical is determined not to be site-related ; Y = Chemical is determined to be site-related.
[a] Background screening values for inorganic constituents is 2 times the mean background concentration for groundwater.
(Science Applications International Corporation, 1998, Background Metals Survey Report, Fort McClellan , Anniston, Alabama, July).
[b] Rationale for exclusion or inclusion of a chemical as site-related:
N (a) = Excluded as a site-related chemical because the maximum detected concentration does not exceed the background screening value.
N (b) = Please see discussion of background evaluation in Section 4.3.
N (c) = Essential nutrient
[c] Some samples were excluded from the dataset because of blank contamination or because the reporting limits for nondetected samples were greater than two times the maximum detected concentration.

Table 6-10

Selection of Site-Related Chemicals for Surface Water
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Chemical	Detection Frequency	Percent hits	Range of values (mg/L) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limit Minimum	Reporting Limit Maximum	Arithmetic Mean (mg/L)	BSV[a] (mg/L)	Site-Related?[b]
Metals									
Aluminum	2 / 2 [c]	100	4.42E-01	5.22E-01	2.00E-01	2.00E-01	4.82E-01	5.26E+00	N (a)
Barium	9 / 9	100	1.23E-02	3.25E-02	2.00E-01	2.00E-01	2.13E-02	7.54E-02	N (a)
Calcium	9 / 9	100	2.88E-01	1.57E+01	5.00E+00	5.00E+00	6.40E+00	2.52E+01	N (c)
Copper	1 / 1 [c]	100	4.60E-03	4.60E-03	2.50E-02	2.50E-02	4.60E-03	1.27E-02	N (a)
Iron	9 / 9	100	6.34E-02	6.43E-01	1.00E-01	1.00E-01	3.08E-01	1.96E+01	N (a)
Lead	4 / 9	44	1.80E-03	8.71E-02	3.00E-03	3.00E-03	1.50E-02	8.67E-03	Y
Magnesium	9 / 9	100	3.25E-01	2.78E+00	5.00E+00	5.00E+00	1.41E+00	1.10E+01	N (c)
Manganese	9 / 9	100	4.60E-03	8.81E-02	1.50E-02	1.50E-02	2.90E-02	5.65E-01	N (a)
Potassium	9 / 9	100	2.13E-01	3.99E-01	5.00E+00	5.00E+00	3.21E-01	2.56E+00	N (c)
Sodium	9 / 9	100	5.10E-01	1.05E+00	5.00E+00	5.00E+00	7.75E-01	3.44E+00	N (c)
Zinc	5 / 9	56	3.20E-03	1.75E-02	2.00E-02	2.00E-02	9.47E-03	4.04E-02	N (a)

NA = Not applicable; mg/L = milligram per liter; BSV = Background Screening Values
N = Chemical is determined not to be site-related ; Y = Chemical is determined to be site-related.
[a] Background screening values for inorganic constituents is 2 times the mean background concentration for surface water.
(Science Applications International Corporation, 1998, Background Metals Survey Report, Fort McClellar, Anniston, Alabama, July).
[b] Rationale for exclusion or inclusion of a chemical as site-related:
N (a) = Excluded as a site-related chemical because the maximum detected concentration does not exceed the background screening value.
N (b) = Please see discussion of background evaluation in Section 4.3.
N (c) = Essential nutrient
[c] Some samples were excluded from the dataset because of blank contamination or because the reporting limits for nondetected samples were greater than two times the maximum detected concentration.

Table 6-11

Selection of Site-Related Chemicals for Sediment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Chemical	Detection Frequency	Percent hits	Range of values (mg/kg) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limit Minimum	Reporting Limit Maximum	Arithmetic Mean (mg/kg)	BSV [a] (mg/kg)	Site-Related?[b]
Metals									
Aluminum	9 / 9	100	1.12E+03	5.41E+03	2.37E+01	2.95E+01	3.63E+03	8.59E+03	N (a)
Antimony	4 / 9	44	1.10E+00	1.03E+01	7.10E+00	8.80E+00	4.61E+00	7.30E-01	Y
Arsenic	9 / 9	100	2.10E+00	3.80E+01	1.20E+00	1.50E+00	1.11E+01	1.13E+01	Y
Barium	9 / 9	100	9.00E+00	4.78E+02	2.37E+01	2.95E+01	7.50E+01	9.89E+01	N (b)
Beryllium	6 / 6	100	4.10E-01	1.20E+00	5.90E-01	7.30E-01	7.33E-01	9.70E-01	N (b)
Calcium	9 / 9	100	3.23E+01	1.37E+03	5.92E+02	7.36E+02	3.63E+02	1.11E+03	N (c)
Chromium	9 / 9	100	7.50E+00	5.03E+01	1.20E+00	1.50E+00	1.77E+01	3.12E+01	N (b)
Cobalt	9 / 9	100	2.00E+00	1.41E+01	5.90E+00	7.40E+00	6.12E+00	1.10E+01	N (b)
Copper	9 / 9	100	4.10E+00	7.30E+01	3.00E+00	3.70E+00	2.04E+01	1.71E+01	Y
Iron	9 / 9	100	1.09E+04	6.25E+04	1.18E+01	7.13E+01	2.39E+04	3.53E+04	N (b)
Lead	9 / 9	100	6.00E+00	2.07E+03	3.60E-01	2.20E+00	3.26E+02	3.78E+01	Y
Magnesium	9 / 9	100	5.17E+01	2.14E+02	5.92E+02	7.36E+02	1.40E+02	9.06E+02	N (c)
Manganese	9 / 9	100	8.77E+01	2.83E+03	1.80E+00	2.20E+00	5.77E+02	7.12E+02	N (b)
Mercury	5 / 8	63	1.30E-02	3.10E-02	3.90E-02	4.90E-02	2.06E-02	1.10E-01	N (a)
Nickel	9 / 9	100	2.30E+00	3.46E+01	4.70E+00	5.90E+00	8.12E+00	1.30E+01	N (b)
Potassium	9 / 9	100	9.90E+01	5.21E+02	5.92E+02	7.36E+02	2.39E+02	1.01E+03	N (c)
Thallium	3 / 9	33	7.10E-01	2.70E+00	1.20E+00	1.50E+00	9.02E-01	1.30E-01	N (b)
Vanadium	9 / 9	100	1.31E+01	4.30E+01	5.90E+00	7.40E+00	2.32E+01	4.09E+01	N (b)
Zinc	9 / 9	100	1.42E+01	6.17E+01	2.40E+00	2.90E+00	2.75E+01	5.27E+01	N (b)

mg/kg = milligram per kilogram; BSV = Background Screening Values
N = Chemical is determined not to be site-related ; Y = Chemical is determined to be site-related; NA = not applicable.
[a] Background screening values for inorganic constituents is 2 times the mean background concentration for sediment.
(Science Applications International Corporation, 1998, Background Metals Survey Report, Fort McClellar, Anniston, Alabama, July).
[b] Rationale for exclusion or inclusion of a chemical as site-related:
N (a) = Excluded as a site-related chemical because the maximum detected concentration does not exceed the background screening value.
N (b) = Please see discussion of background evaluation in Section 4.3.
N (c) = Essential nutrient

Table 6-12

Selection of Chemicals of Potential Concern for Surface Soil [a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Site-Related Chemical	Maximum Detected Concentration (mg/kg)	Applicable SSSL (mg/kg) Groundskeeper				Applicable SSSL (mg/kg) Construction Worker				Applicable SSSL (mg/kg) Indoor Worker			
		Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?
Metals													
Antimony	1.62E+03	NA	NA	4.54E+01	Y	NA	NA	1.24E+01	Y	NA	NA	8.18E+01	Y
Arsenic	5.60E+02	1.52E+00	Y	2.84E+01	Y	1.19E+01	Y	8.52E+00	Y	3.82E+00	Y	6.13E+01	Y
Copper	9.91E+02	NA	NA	4.54E+03	N	NA	NA	1.24E+03	N	NA	NA	8.18E+03	N
Lead	1.16E+05	NA	NA	8.00E+02	Y	NA	NA	8.00E+02	Y	NA	NA	8.00E+02	Y
Zinc	1.64E+02	NA	NA	3.41E+04	N	NA	NA	9.29E+03	N	NA	NA	6.13E+04	N
Herbicides													
2,4-DB	3.20E-02	NA	NA	6.83E+02	N	NA	NA	2.15E+02	N	NA	NA	1.64E+03	N
Pesticides and PCBs													
4,4'-DDE	8.50E-03	7.81E+00	N	NA	NA	5.85E+01	N	NA	NA	1.68E+01	N	NA	NA
4,4'-DDT	1.50E-02	7.68E+00	N	4.74E+01	N	5.79E+01	N	1.42E+01	N	1.68E+01	N	1.02E+02	N
Aldrin	3.40E-02	1.11E-01	N	2.05E+00	N	9.72E-01	N	7.15E-01	N	3.37E-01	N	6.13E+00	N
alpha-BHC	5.60E-03	3.93E-01	N	NA	NA	3.04E+00	N	NA	NA	9.08E-01	N	NA	NA
alpha-Chlordane	3.60E-03	7.08E+00	N	4.32E+01	N	5.47E+01	N	1.35E+01	N	1.64E+01	N	1.02E+02	N
Aroclor 1260	2.80E-02	8.18E-01	N	NA	NA	7.57E+00	N	NA	NA	2.86E+00	N	NA	NA
Azinphosmethyl	1.40E-01	NA	NA	6.16E+00	N	NA	NA	2.14E+00	N	NA	NA	1.84E+01	N
beta-BHC	1.00E-02	1.38E+00	N	NA	NA	1.06E+01	N	NA	NA	3.18E+00	N	NA	NA
Dieldrin	1.90E-03	1.18E-01	N	3.42E+00	N	1.03E+00	N	1.19E+00	N	3.58E-01	N	1.02E+01	N
Endosulfan I	1.40E-03	NA	NA	4.10E+02	N	NA	NA	1.43E+02	N	NA	NA	1.23E+03	N
Endosulfan II	2.80E-03	NA	NA	4.10E+02	N	NA	NA	1.43E+02	N	NA	NA	1.23E+03	N
Endosulfan sulfate	2.60E-03	NA	NA	4.10E+02	N	NA	NA	1.43E+02	N	NA	NA	1.23E+03	N
Endrin	1.40E-02	NA	NA	2.05E+01	N	NA	NA	7.15E+00	N	NA	NA	6.13E+01	N
Endrin aldehyde	3.40E-03	NA	NA	2.05E+00	N	NA	NA	7.15E-01	N	NA	NA	6.13E+00	N
gamma-BHC (Lindane)	4.50E-03	1.93E+00	N	2.70E+01	N	1.49E+01	N	8.30E+00	N	4.40E+00	N	6.13E+01	N
gamma-Chlordane	3.40E-04	7.08E+00	N	4.32E+01	N	5.47E+01	N	1.35E+01	N	1.64E+01	N	1.02E+02	N
Heptachlor	1.00E-02	4.21E-01	N	3.42E+01	N	3.67E+00	N	1.19E+01	N	1.27E+00	N	1.02E+02	N
Heptachlor epoxide	4.60E-03	2.08E-01	N	8.89E-01	N	1.82E+00	N	3.10E-01	N	6.29E-01	N	2.66E+00	N
Semivolatile Organic Compounds													
Anthracene	5.00E-02	NA	NA	3.41E+04	N	NA	NA	9.29E+03	N	NA	NA	6.13E+04	N
Benzo(a)anthracene	8.80E-01	2.33E+00	N	NA	NA	2.13E+01	N	NA	NA	7.84E+00	N	NA	NA
Benzo(a)pyrene	1.90E+00	2.33E-01	Y	NA	NA	2.13E+00	N	NA	NA	7.84E-01	Y	NA	NA
Benzo(b)fluoranthene	5.70E-01	2.33E+00	N	NA	NA	2.13E+01	N	NA	NA	7.84E+00	N	NA	NA
Benzo(ghi)perylene	9.20E-01	NA	NA	1.83E+03	N	NA	NA	6.68E+02	N	NA	NA	6.13E+03	N
Benzo(k)fluoranthene	2.40E-01	2.33E+01	N	NA	NA	2.13E+02	N	NA	NA	7.84E+01	N	NA	NA
Bis(2-Ethylhexyl)phthalate	1.30E-01	1.35E+02	N	1.37E+03	N	1.18E+03	N	4.76E+02	N	4.09E+02	N	4.09E+03	N
Chrysene	1.20E+00	2.33E+02	N	NA	NA	2.13E+03	N	NA	NA	7.84E+02	N	NA	NA
Dibenz(a,h)anthracene	4.10E-01	2.33E-01	Y	NA	NA	2.13E+00	N	NA	NA	7.84E-01	N	NA	NA
Di-n-butyl phthalate	2.10E-01	NA	NA	6.84E+03	N	NA	NA	2.38E+03	N	NA	NA	2.04E+04	N
Fluoranthene	1.60E-01	NA	NA	2.44E+03	N	NA	NA	8.91E+02	N	NA	NA	8.18E+03	N
Indeno(1,2,3-cd)pyrene	2.90E-01	2.33E+00	N	NA	NA	2.13E+01	N	NA	NA	7.84E+00	N	NA	NA
N-Nitrosodiphenylamine	2.60E-01	3.91E+02	N	NA	NA	3.40E+03	N	NA	NA	1.17E+03	N	NA	NA
Phenanthrene	2.40E-01	NA	NA	3.41E+03	N	NA	NA	9.29E+02	N	NA	NA	6.13E+03	N
Pyrene	1.20E+00	NA	NA	1.83E+03	N	NA	NA	6.68E+02	N	NA	NA	6.13E+03	N

Table 6-12

Selection of Chemicals of Potential Concern for Surface Soil [a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Site-Related Chemical	Maximum Detected Concentration (mg/kg)	Applicable SSSL (mg/kg) Groundskeeper				Applicable SSSL (mg/kg) Construction Worker				Applicable SSSL (mg/kg) Indoor Worker			
		Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?
Volatile Organic Compounds													
2-Butanone	2.20E-02	NA	NA	6.76E+04	N	NA	NA	1.85E+04	N	NA	NA	1.23E+05	N
Acetone	5.60E-01	NA	NA	1.02E+05	N	NA	NA	2.79E+04	N	NA	NA	1.84E+05	N
Chloromethane	3.30E-03	NA	NA	1.48E+06	N	NA	NA	6.64E+05	N	NA	NA	NA	NA
N-Butylbenzene	2.10E-03	NA	NA	4.54E+03	N	NA	NA	1.24E+03	N	NA	NA	8.18E+03	N
p-Cymene	1.30E-01	NA	NA	2.27E+04	N	NA	NA	6.19E+03	N	NA	NA	4.09E+04	N
Styrene	5.70E-03	NA	NA	2.24E+04	N	NA	NA	6.14E+03	N	NA	NA	4.09E+04	N
Toluene	2.60E-03	NA	NA	9.07E+03	N	NA	NA	2.48E+03	N	NA	NA	1.64E+04	N
Trichlorofluoromethane	1.60E-02	NA	NA	3.31E+04	N	NA	NA	9.13E+03	N	NA	NA	6.13E+04	N

SSSL = Site-specific screening level
COPC = Chemical of potential concern; mg/kg = milligram per kilogram.
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC; NA = Not applicable.
[a] Surface soil is defined as soil from 0 to 1 foot bgs.
[b] Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at http://www.epa.gov/esd/tsc/form.htm.) The recommended UCL was used unless the recommendation was the 97.5% or 99% Chebyshev UCL. In those cases, the 95% Chebyshev UCL was used (*). If more than one UCL was recommended, the more conservative UCL was selected
[c] The UCL or maximum concentration, whichever is lower, is selected as the source-term concentration. The source-term concentration for lead is the arithmetic mean.

Table 6-12

Selection of Chemicals of Potential Concern for Surface Soil [a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Site-Related Chemical	Applicable SSSL (mg/kg) Youth Recreational Site User				Applicable SSSL (mg/kg) On-Site Resident				Recommended 95% UCL [b] (mg/kg)	Recommended Statistical Method [a]	Source-Term Concentration [c] (mg/kg)
	Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?			
Metals											
Antimony	NA	NA	2.53E+02	Y	NA	NA	3.13E+00	Y	2.36E+02	* 95% KM (Chebyshev) UCL	2.36E+02
Arsenic	2.77E+01	Y	1.78E+02	Y	3.90E-01	Y	2.16E+00	Y	7.25E+01	* 95% Chebyshev(Mean, Sd) UCL	7.25E+01
Copper	NA	NA	2.53E+04	N	NA	NA	3.13E+02	Y	1.29E+02	Use 95% H-UCL	1.29E+02
Lead	NA	NA	4.00E+02	Y	NA	NA	4.00E+02	Y	NA	Arithmetic Mean	1.90E+03
Zinc	NA	NA	1.90E+05	N	NA	NA	2.35E+03	N			
Herbicides											
2,4-DB	NA	NA	4.57E+03	N	NA	NA	5.49E+01	N			
Pesticides and PCBs											
4,4'-DDE	1.22E+02	N	NA	NA	1.72E+00	N	NA	NA			
4,4'-DDT	1.22E+02	N	2.97E+02	N	1.72E+00	N	3.61E+00	N			
Aldrin	2.15E+00	N	1.57E+01	N	2.86E-02	Y	1.83E-01	N	1.47E-02	* 95% KM (Chebyshev) UCL	1.47E-02
alpha-BHC	6.48E+00	N	NA	NA	9.02E-02	N	NA	NA			
alpha-Chlordane	1.17E+02	N	2.91E+02	N	1.62E+00	N	3.52E+00	N			
Aroclor 1260	1.71E+01	N	NA	NA	2.22E-01	N	NA	NA			
Azinphosmethyl	NA	NA	4.70E+01	N	NA	NA	5.50E-01	N			
beta-BHC	2.27E+01	N	NA	NA	3.16E-01	N	NA	NA			
Dieldrin	2.28E+00	N	2.61E+01	N	3.04E-02	N	3.06E-01	N			
Endosulfan I	NA	NA	3.13E+03	N	NA	NA	3.67E+01	N			
Endosulfan II	NA	NA	3.13E+03	N	NA	NA	3.67E+01	N			
Endosulfan sulfate	NA	NA	3.13E+03	N	NA	NA	3.67E+01	N			
Endrin	NA	NA	1.57E+02	N	NA	NA	1.83E+00	N			
Endrin aldehyde	NA	NA	1.57E+01	N	NA	NA	1.83E-01	N			
gamma-BHC (Lindane)	3.14E+01	N	1.75E+02	N	4.37E-01	N	2.11E+00	N			
gamma-Chlordane	1.17E+02	N	2.91E+02	N	1.62E+00	N	3.52E+00	N			
Heptachlor	8.12E+00	N	2.61E+02	N	1.08E-01	N	3.06E+00	N			
Heptachlor epoxide	4.02E+00	N	6.79E+00	N	5.35E-02	N	7.94E-02	N			
Semivolatile Organic Compounds											
Anthracene	NA	NA	1.90E+05	N	NA	NA	2.35E+03	N			
Benzo(a)anthracene	4.76E+01	N	NA	NA	6.22E-01	Y	NA	NA	8.80E-01	95% KM (BCA) UCL	8.80E-01
Benzo(a)pyrene	4.76E+00	N	NA	NA	6.22E-02	Y	NA	NA	2.74E-01	95% KM (t) UCL	2.74E-01
Benzo(b)fluoranthene	4.76E+01	N	NA	NA	6.22E-01	N	NA	NA			
Benzo(ghi)perylene	NA	NA	1.49E+04	N	NA	NA	1.72E+02	N			
Benzo(k)fluoranthene	4.76E+02	N	NA	NA	6.22E+00	N	NA	NA			
Bis(2-Ethylhexyl)phthalate	2.61E+03	N	1.04E+04	N	3.48E+01	N	1.22E+02	N			
Chrysene	4.76E+03	N	NA	NA	6.22E+01	N	NA	NA			
Dibenz(a,h)anthracene	4.76E+00	N	NA	NA	6.22E-02	Y	NA	NA	2.14E-01	95% Student's-t	2.14E-01
Di-n-butyl phthalate	NA	NA	5.22E+04	N	NA	NA	6.11E+02	N			
Fluoranthene	NA	NA	1.99E+04	N	NA	NA	2.29E+02	N			
Indeno(1,2,3-cd)pyrene	4.76E+01	N	NA	NA	6.22E-01	N	NA	NA			
N-Nitrosodiphenylamine	7.46E+03	N	NA	NA	9.93E+01	N	NA	NA			
Phenanthrene	NA	NA	1.90E+04	N	NA	NA	2.35E+02	N			
Pyrene	NA	NA	1.49E+04	N	NA	NA	1.72E+02	N			

Table 6-12

Selection of Chemicals of Potential Concern for Surface Soil [a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Site-Related Chemical	Applicable SSSL (mg/kg) Youth Recreational Site User				Applicable SSSL (mg/kg) On-Site Resident				Recommended 95% UCL [b] (mg/kg)	Recommended Statistical Method [a]	Source-Term Concentration [c] (mg/kg)
	Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?			
Volatile Organic Compounds											
2-Butanone	NA	NA	3.79E+05	N	NA	NA	4.69E+03	N			
Acetone	NA	NA	5.69E+05	N	NA	NA	7.04E+03	N			
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA			
N-Butylbenzene	NA	NA	2.53E+04	N	NA	NA	3.13E+02	N			
p-Cymene	NA	NA	1.26E+05	N	NA	NA	1.56E+03	N			
Styrene	NA	NA	1.26E+05	N	NA	NA	1.56E+03	N			
Toluene	NA	NA	5.05E+04	N	NA	NA	6.26E+02	N			
Trichlorofluoromethane	NA	NA	1.90E+05	N	NA	NA	2.35E+03	N			

SSSL = Site-specific screening level
COPC = Chemical of potential concern; mg/kg = milligram per kilogram.
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC; NA = Not applicable.
[a] Surface soil is defined as soil from 0 to 1 foot bgs.
[b] Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at http://www.epa.gov/esd/tsc/form.htm.) The recommended UCL was used unless the recommendation was the 97.5% or 99% Chebyshev UCL. In those cases, the 95% Chebyshev UCL was used (*). If more than one UCL was recommended, the more conservative UCL was selected
[c] The UCL or maximum concentration, whichever is lower, is selected as the source-term concentration. The source-term concentration for lead is the arithmetic mean.

Table 6-13

Selection of Chemicals of Potential Concern for Subsurface Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

(Page 1 of 2)

Site-Related Chemical	Maximum Detected Concentration (mg/kg)	Applicable SSSL (mg/kg) Groundskeeper				Applicable SSSL (mg/kg) Construction Worker				Applicable SSSL (mg/kg) Indoor Worker			
		Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?
Metals													
Antimony	7.63E+01	NA	NA	4.54E+01	Y	NA	NA	1.24E+01	Y	NA	NA	8.18E+01	N
Copper	1.12E+02	NA	NA	4.54E+03	N	NA	NA	1.24E+03	N	NA	NA	8.18E+03	N
Lead	1.35E+03	NA	NA	8.00E+02	Y	NA	NA	8.00E+02	Y	NA	NA	8.00E+02	Y
Semivolatile Organic Compounds													
Benzo(a)anthracene	1.50E-01	2.33E+00	N	NA	NA	2.13E+01	N	NA	NA	7.84E+00	N	NA	NA
Benzo(a)pyrene	2.50E-01	2.33E-01	Y	NA	NA	2.13E+00	N	NA	NA	7.84E-01	N	NA	NA
Benzo(b)fluoranthene	8.20E-02	2.33E+00	N	NA	NA	2.13E+01	N	NA	NA	7.84E+00	N	NA	NA
Benzo(ghi)perylene	1.30E-01	NA	NA	1.83E+03	N	NA	NA	6.68E+02	N	NA	NA	6.13E+03	N
Chrysene	1.80E-01	2.33E+02	N	NA	NA	2.13E+03	N	NA	NA	7.84E+02	N	NA	NA
Dibenz(a,h)anthracene	5.10E-02	2.33E-01	N	NA	NA	2.13E+00	N	NA	NA	7.84E-01	N	NA	NA
Di-n-butyl phthalate	7.90E-02	NA	NA	6.84E+03	N	NA	NA	2.38E+03	N	NA	NA	2.04E+04	N
Indeno(1,2,3-cd)pyrene	3.70E-02	2.33E+00	N	NA	NA	2.13E+01	N	NA	NA	7.84E+00	N	NA	NA
N-Nitrosodiphenylamine	1.10E-01	3.91E+02	N	NA	NA	3.40E+03	N	NA	NA	1.17E+03	N	NA	NA
Phenanthrene	4.00E-02	NA	NA	3.41E+03	N	NA	NA	9.29E+02	N	NA	NA	6.13E+03	N
Pyrene	1.90E-01	NA	NA	1.83E+03	N	NA	NA	6.68E+02	N	NA	NA	6.13E+03	N
Volatile Organic Compounds													
Acetone	2.30E-01	NA	NA	1.02E+05	N	NA	NA	2.79E+04	N	NA	NA	1.84E+05	N
p-Cymene	1.00E-02	NA	NA	2.27E+04	N	NA	NA	6.19E+03	N	NA	NA	4.09E+04	N
Trichlorofluoromethane	1.60E-03	NA	NA	3.31E+04	N	NA	NA	9.13E+03	N	NA	NA	6.13E+04	N

SSSL = Site-specific screening level
COPC = Chemical of potential concern; mg/kg = milligram per kilogram.
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC; NA = Not applicable.
[a] Subsurface soil is defined as soil from 1 to 9 feet bgs.
[b] Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at http://www.epa.gov/esd/tsc/form.htm.) The recommended UCL was used unless the recommendation was the 97.5% or 99% Chebyshev UCL. In those cases, the 95% Chebyshev UCL was used (*). If more than one UCL was recommended, the more conservative UCL was selected.
[c] The UCL or maximum concentration, whichever is lower, is selected as the source-term concentration. The source-term concentration for lead is the arithmetic mean.

Table 6-13

Selection of Chemicals of Potential Concern for Subsurface Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Site-Related Chemical	Applicable SSSL (mg/kg) Youth Recreational Site User				Applicable SSSL (mg/kg) On-Site Resident				Recommended 95% UCL [b] (mg/kg)	Recommended Statistical Method [b]	Source-Term Concentration [c] (mg/kg)
	Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?			
Metals											
Antimony	NA	NA	2.53E+02	N	NA	NA	3.13E+00	Y	2.87E+01	*95% KM (Chebyshev)	2.87E+01
Copper	NA	NA	2.53E+04	N	NA	NA	3.13E+02	N			
Lead	NA	NA	4.00E+02	Y	NA	NA	4.00E+02	Y	NA	Arithmetic Mean	8.22E+01
Semivolatile Organic Compounds											
Benzo(a)anthracene	4.76E+01	N	NA	NA	6.22E-01	N	NA	NA			
Benzo(a)pyrene	4.76E+00	N	NA	NA	6.22E-02	Y	NA	NA	2.06E-01	95% Student's-t	2.06E-01
Benzo(b)fluoranthene	4.76E+01	N	NA	NA	6.22E-01	N	NA	NA			
Benzo(ghi)perylene	NA	NA	1.49E+04	N	NA	NA	1.72E+02	N			
Chrysene	4.76E+03	N	NA	NA	6.22E+01	N	NA	NA			
Dibenz(a,h)anthracene	4.76E+00	N	NA	NA	6.22E-02	N	NA	NA			
Di-n-butyl phthalate	NA	NA	5.22E+04	N	NA	NA	6.11E+02	N			
Indeno(1,2,3-cd)pyrene	4.76E+01	N	NA	NA	6.22E-01	N	NA	NA			
N-Nitrosodiphenylamine	7.46E+03	N	NA	NA	9.93E+01	N	NA	NA			
Phenanthrene	NA	NA	1.90E+04	N	NA	NA	2.35E+02	N			
Pyrene	NA	NA	1.49E+04	N	NA	NA	1.72E+02	N			
Volatile Organic Compounds											
Acetone	NA	NA	5.69E+05	N	NA	NA	7.04E+03	N			
p-Cymene	NA	NA	1.26E+05	N	NA	NA	1.56E+03	N			
Trichlorofluoromethane	NA	NA	1.90E+05	N	NA	NA	2.35E+03	N			

SSSL = Site-specific screening level
COPC = Chemical of potential concern; mg/kg = milligram per kilogram.
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC; NA = Not applicable.
[a] Subsurface soil is defined as soil from 1 to 9 feet bgs.
[b] Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at http://www.epa.gov/esd/tsc/form.htm.) The recommended UCL was used unless the recommendation was the 97.5% or 99% Chebyshev UCL. In those cases, the 95% Chebyshev UCL was used (*). If more than one UCL was recommended, the more conservative UCL was selected.
[c] The UCL or maximum concentration, whichever is lower, is selected as the source-term concentration. The source-term concentration for lead is the arithmetic mean.

Table 6-14

Selection of Chemicals of Potential Concern for Total Soil
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

(Page 1 of 2)

Chemical	Groundskeeper COPC			Construction Worker COPC			Indoor Worker COPC		
	Surface Soil Source-Term Concentratior	Subsurface Soil Source-Term Concentratior	Total Soil Source-Term Concentratior	Surface Soil Source-Term Concentratior	Subsurface Soil Source-Term Concentratior	Total Soil Source-Term Concentratior	Surface Soil Source-Term Concentratior	Subsurface Soil Source-Term Concentratior	Total Soil Source-Term Concentratior
Metals									
Antimony	2.36E+02	2.87E+01	2.36E+02	2.36E+02	2.87E+01	2.36E+02	2.36E+02	NA	2.36E+02
Arsenic	7.25E+01	NA	7.25E+01	7.25E+01	NA	7.25E+01	7.25E+01	NA	7.25E+01
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	1.90E+03	8.22E+01	1.90E+03	1.90E+03	8.22E+01	1.90E+03	1.90E+03	8.22E+01	1.90E+03
Pesticides and PCBs									
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds									
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	2.74E-01	2.06E-01	2.74E-01	NA	NA	NA	2.74E-01	NA	2.74E-01
Dibenz(a,h)anthracene	2.14E-01	NA	2.14E-01	NA	NA	NA	NA	NA	NA

COPC = Chemical of potential concern
NA = not applicable; the source-term concentration is presented only if the chemical is selected as a COF

Table 6-14

Selection of Chemicals of Potential Concern for Total Soil
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Chemical	Youth Recreational Site-User COPC			On-site Resident COPC		
	Surface Soil Source-Term Concentration	Subsurface Soil Source-Term Concentration	Total Soil Source-Term Concentration	Surface Soil Source-Term Concentration	Subsurface Soil Source-Term Concentration	Total Soil Source-Term Concentration
Metals						
Antimony	2.36E+02	NA	2.36E+02	2.36E+02	2.87E+01	2.36E+02
Arsenic	7.25E+01	NA	7.25E+01	7.25E+01	NA	7.25E+01
Copper	NA	NA	NA	1.29E+02	NA	1.29E+02
Lead	1.90E+03	8.22E+01	1.90E+03	1.90E+03	8.22E+01	1.90E+03
Pesticides and PCBs						
Aldrin	NA	NA	NA	1.47E-02	NA	1.47E-02
Semivolatile Organic Compounds						
Benzo(a)anthracene	NA	NA	NA	8.80E-01	NA	8.80E-01
Benzo(a)pyrene	NA	NA	NA	2.74E-01	2.06E-01	2.74E-01
Dibenz(a,h)anthracene	NA	NA	NA	2.14E-01	NA	2.14E-01

COPC = Chemical of potential concern
NA = not applicable; the source-term concentration is presented only if the chemical is selected as a COF

Table 6-15

Selection of Chemicals of Potential Concern for Groundwater
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Site-Related Chemical	Maximum Detected Concentration (mg/L)	Applicable SSSL (mg/L)											
		Groundskeeper				Construction Worker				Indoor Worker			
		Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?	Cancer	COPC?	Noncancer	COPC?
Nitroaromatics													
2-Nitrotoluene	3.90E-03	1.28E-03	Y	1.05E-01	N	2.88E-02	N	9.47E-02	N	1.24E-03	Y	1.02E-01	N
4-Amino-2,6-dinitrotoluene	4.70E-04	NA	NA	5.53E-03	N	NA	NA	4.98E-03	N	NA	NA	5.11E-03	N
Volatile Organic													
1,2,4-Trimethylbenzene	3.60E-04	NA	NA	3.41E-01	N	NA	NA	3.06E-01	N	NA	NA	5.11E-01	N
1,2-Dimethylbenzene (Xylenes)	4.60E-04	NA	NA	1.63E+01	N	NA	NA	1.47E+01	N	NA	NA	2.04E+01	N
Ethylbenzene	2.60E-04	NA	NA	8.35E-01	N	NA	NA	7.52E-01	N	NA	NA	1.02E+00	N
m,p-Xylenes (Xylenes)	5.90E-04	NA	NA	1.63E+01	N	NA	NA	1.47E+01	N	NA	NA	2.04E+01	N

SSSL = Site-specific screening level
COPC = Chemical of potential concern; mg/L = milligram per liter
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC; NA = Not applicable.
[a] Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at http://www.epa.gov/esd/tsc/form.htm.) The recommended UCL was used unless the recommendation was the 97.5% or 99% Chebyshev UCL. In those cases, the 95% Chebyshev UCL was used (*). If more than one UCL was recommended, the more conservative UCL was selected
[b] The UCL or maximum concentration, whichever is lower, is selected as the source-term concentration.

Table 6-15

Selection of Chemicals of Potential Concern for Groundwater
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Site-Related Chemical	Applicable SSSL (mg/L) On Site Resident Cancer	COPC?	Noncancer	COPC?	95% UCL [a] (mg/L)	Statistical Method [a]	Source-Term Concentration [b] (mg/L)
Nitroaromatics							
2-Nitrotoluene	2.91E-04	Y	1.47E-02	N	3.90E-03	95% KM (Percentile Bootstrap) UCL	3.90E-03
4-Amino-2,6-dinitrotoluene	NA	NA	7.66E-04	N			
Volatile Organic							
1,2,4-Trimethylbenzene	NA	NA	5.11E-02	N			
1,2-Dimethylbenzene	NA	NA	2.39E+00	N			
Ethylbenzene	NA	NA	1.22E-01	N			
m,p-Xylenes	NA	NA	2.39E+00	N			

SSSL = Site-specific screening level
COPC = Chemical of potential concern; mg/L = milligram per liter
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC; NA = Not applicable.
[a] Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at http://www.epa.gov/esd/tsc/form.htm.) The recommended UCL was used unless the recommendation was the 97.5% or 99% Chebyshev UCL. In those cases, the 95% Chebyshev UCL was used (*). If more than one UCL was recommended, the more conservative UCL was selected.
[b] The UCL or maximum concentration, whichever is lower, is selected as the source-term concentration.

Table 6-16

Selection of Chemicals of Potential Concern for Surface Water
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Site-Related Chemical	Maximum Detected Concentration (mg/L)	Applicable SSSL (mg/L)				Source-Term Concentration[a] (mg/L)
		Youth Recreational Site User				
		Cancer	COPC?	Noncancer	COPC?	
Metals						
Lead	8.71E-02	NA	N	1.50E-02	Y	1.50E-02

SSSL = Site-specific screening level
COPC = Chemical of potential concern.
NA = Not applicable; mg/L = milligram per liter.
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC.
[a] The Source-Term Concentration for lead is the arithmetic mean.

Table 6-17

Selection of Chemicals of Potential Concern for Sediment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Site-Related Chemical	Maximum Detected Concentration (mg/kg)	Applicable SSSL (mg/kg)				Source-Term Concentration [a] (mg/kg)
		Youth Recreational Site User				
		Cancer	COPC?	Noncancer	COPC?	
Metals						
Antimony	1.03E+01	NA	NA	4.86E+02	N	
Arsenic	3.80E+01	3.89E+01	N	2.50E+02	N	
Copper	7.30E+01	NA	NA	4.86E+04	N	
Lead	2.07E+03	NA	NA	4.00E+02	Y	3.26E+02

mg/kg = milligram per kilogram
SSSL = Site-specific screening level; COPC = Chemical of potential concern.
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC; NA = Not applicable.
[a] The source-term concentration for lead is the arithmetic mean.

Table 6-18

Receptor-Specific Exposure Assumptions
Fort McClellan, Calhoun County, Alabama

Pathway Variable	Units	Groundskeeper	Construction Worker	Indoor Worker	Youth Recreational Site User	On-Site Resident
General Variables						
Exposure frequency (EF)	d/y	225	250	250	104	350
Exposure duration (ED)	y	25	1	25	10	Child: 6, Adult: 24
Body weight (BW)	kg	70	70	70	45	Child: 15, Adult:70
Averaging time - noncancer (ATn)	d	9125	365	9125	3650	Child: 2190, Adult: 8760
Averaging time - cancer (ATc)	d	25550	25550	25550	25550	25550
Incidental Ingestion of Soil						
Age-adjusted incidental ingestion factor (IFadj)	mg-y/kg-d	NA	NA	NA	NA	114
Incidental ingestion rate (IRso)	mg/d	100	330	50	100	Child: 200
Fraction exposed to contaminated medium (FIso)	unitless	1	1	1	0.25	1
Inhalation of VOCs and Resuspended Dust from Soil						
Inhalation rate (IRa)	m^3/d	20	20	NA	NA	NA
Fraction exposed to contaminated medium (FIa)	unitless	1	1	NA	NA	NA
Dermal Contact with Soil						
Age-adjusted body surface area factor	cm^2y/kg-d	NA	NA	NA	NA	2520
Body surface area exposed (SAso)	cm^2	3300	3300	NA	5250	Child: 1800
Soil-to-skin adherence factor (AFso)	mg/cm^2	0.2	0.3	NA	0.04	0.07
Fraction exposed to contaminated medium (FIso)	unitless	1	1	NA	0.25	1
Incidental Ingestion of Sediment						
Incidental ingestion rate (IRsd)	mg/d	NA	NA	NA	100	NA
Fraction exposed to contaminated medium (FIsd)	unitless	NA	NA	NA	0.13	NA
Dermal Contact with Sediment						
Body surface area exposed (SAsd)	cm^2	NA	NA	NA	5250	NA
Soil-to-skin adherence factor (AFsd)	mg/cm^2	NA	NA	NA	0.29	NA
Fraction exposed to contaminated medium (FIsd)	unitless	NA	NA	NA	0.13	NA
Ingestion of Surface Water						
Surface water ingestion rate (IRsw)	L/d	NA	NA	NA	1	NA
Dermal Contact with Surface Water						
Body surface area exposed (SA)	cm^2	NA	NA	NA	4000	NA
Exposure time (ETsw)	h/d	NA	NA	NA	2	NA
Drinking Water Ingestion of Potable Groundwater						
Age-adjusted drinking water consumption factor	L-y/kg-d	NA	NA	NA	NA	1.09
Drinking water ingestion rate (IR_w)	L/d	1	1	1	NA	Child: 1
Dermal Contact with Potable Groundwater						
Age-adjusted body surface area factor (SAWadj)	cm^2y/kg-d	NA	NA	NA	NA	9140
Body surface area exposed (SA)	cm^2	4100	4100	NA	NA	Child: 7300
Exposure time (ETgw)	hr/day	1	NA		1	1

d = day; y = year; kg = kilogram; mg = milligram; m^3 = cubic meter; cm^2 = square centimeter; L = liter; hr = hour; NA = not applicable.

Table 6-19

Physical Properties of Site-Related Chemicals
Iron Mountain Road Ranges
Fort McClellan, Alabama

Chemical of Potential Concern	BCF (L-water/kg-Fish)	Ref	Bp (unitless)	Ref	Bb (days/kg)	Ref	Bv (mg soil/g venison)	Ref	BSAF (unitless)	Ref	Df (unitless)	log Kow	Ref	ABS (unitless)	Ref	PC (cm/hour)	*tau* (hours)	FA (unitless)	Ref	Molecular Weight (g/mole)	Ref
Metals																					
Antimony	ND	(1)	ND		ND		ND		ND		ND	NA		NA	(9)	NA	NA	NA	(9)	121.75	(11)
Arsenic	ND	(1)	ND		ND		ND		ND		ND	NA		0.03	(9)	1.00E-03	NA	NA	(9)	74.92	(11)
Copper	ND	(1)	ND		ND		ND		ND		ND	NA		NA	(9)	NA	NA	NA	(9)	63.55	(11)
Lead	ND	(1)	ND		ND		ND		ND		ND	NA		NA	(9)	NA	NA	NA	(9)	207.2	(11)
Zinc	ND	(1)	ND		ND		ND		ND		ND	NA		NA	(9)	6.00E-04	NA	NA	(9)	65.39	(11)
Herbicides																					
2,4-DB	ND		ND		ND		ND		ND		ND	3.53	(11)	0.05	(9) (4)	3.76E-03	9.46E+00	0.9	(7)	349.09	(11)
Pesticides and PCBs																					
4,4'-DDE	1.39E+04	(3)	1.99E-02	(8)	1.23E-02	(8)	4.26E-03	(12)	7.7	(2)	1.35E+01	5.69	(9)	0.03	(9)	1.60E-01	6.48E+00	0.8	(9)	318	(9)
4,4'-DDT	1.55E+04	(3)	8.16E-03	(8)	5.75E-02	(8)	8.17E-03	(12)	1.67	(2)	2.92E+00	6.36	(9)	0.03	(9) (5)	2.70E-01	1.05E+01	0.7	(9)	355	(9)
Aldrin	8.96E+01	(3)	7.05E-01	(8)	2.57E-05	(8)	3.15E-04	(12)	ND		ND	3.01	(9)	0.1	(9)	1.40E-03	1.19E+01	1	(9)	365	(11)
alpha-BHC	4.66E+02	(3)	2.46E-01	(8)	1.58E-04	(8)	6.79E-04	(12)	2.45	(2)	4.29E+00	3.8	(11)	0.04	(9) (6)	1.10E-02	4.57E+00	0.9	(7)	290.83	(11)
alpha-Chlordane	1.18E+04	(3)	2.43E-02	(8)	8.71E-03	(8)	3.68E-03	(12)	2	(2)	3.50E+00	5.54	(9)	0.04	(9)	3.80E-03	2.12E+01	0.7	(9)	410	(9)
Aroclor 1260 (solid media, food chain)	1.05E+04	(3)	5.06E-03	(8)	1.32E-01	(8)	1.16E-02	(12)	1.85	(2)	3.24E+00	6.72	(9)	0.14	(9)	ND	ND	ND		375.7	(11)
Aroclor 1260 (water)	1.05E+04	(3)	NA		NA		NA		1.85	(2)	3.24E+00	6.72	(9)	NA		2.78E+00	1.72E+01	0.2	(9)	375.7	(11)
Azinphos-methyl	ND		9.97E-01		1.41E-05		2.45E-04		ND		ND	2.75	(11)	0.1	(9)	1.73E-03	6.28E+00	1	(7)	317.33	(11)
beta-BHC	4.47E+02	(3)	2.53E-01	(8)	1.51E-04	(8)	6.66E-04	(12)	2.45	(2)	4.29E+00	3.78	(11)	0.04	(9) (6)	1.10E-02	4.57E+00	0.9	(7)	290.83	(11)
Dieldrin	2.20E+03	(3)	8.96E-02	(8)	9.12E-04	(8)	1.42E-03	(12)	6.65	(2)	1.16E+01	4.56	(9)	0.1	(9)	1.20E-02	1.46E+01	0.8	(9)	381	(9)
Endosulfan I	4.96E+02	(3)	2.37E-01	(8)	1.70E-04	(8)	7.00E-04	(12)	ND		ND	3.83	(11)	0.1	(9)	2.81E-03	1.99E+01	0.8	(7)	406.93	(11)
Endosulfan II	4.96E+02	(3)	2.37E-01	(8)	1.70E-04	(8)	7.00E-04	(12)	ND		ND	3.83	(11)	0.1	(9)	1.77E-03	2.45E+01	0.8	(7)	406.93	(11)
Endosulfan sulfate	3.48E+02	(3)	2.97E-01	(8)	1.15E-04	(8)	5.93E-04	(12)	ND		ND	3.66	(11)	0.1	(9)	1.77E-03	2.45E+01	0.7	(7)	422.95	(11)
Endrin	2.20E+03	(3)	8.96E-02	(8)	9.12E-04	(8)	1.42E-03	(12)	ND		ND	4.56	(9)	0.1	(9)	1.20E-02	1.46E+01	0.8	(9)	381	(9)
Endrin aldehyde	3.51E+03	(3)	6.51E-02	(8)	1.58E-03	(8)	1.80E-03	(12)	ND		ND	4.8	(11)	0.1	(9)	1.72E-02	1.43E+01	0.8	(7)	380.89	(11)
gamma-BHC (Lindane)	3.95E+02	(3)	2.74E-01	(8)	1.32E-04	(8)	6.29E-04	(12)	0.69	(2)	1.21E+00	3.72	(9)	0.04	(9)	1.10E-02	4.57E+00	0.9	(9)	291	(9)
gamma-Chlordane	1.18E+04	(3)	2.43E-02	(8)	8.71E-03	(8)	3.68E-03	(12)	2	(2)	3.50E+00	5.54	(9)	0.04	(9)	3.80E-03	2.12E+01	0.7	(9)	410	(9)
Heptachlor	1.23E+03	(3)	1.32E-01	(8)	4.68E-04	(8)	1.07E-03	(12)	2	(2)	3.50E+00	4.27	(9)	0.1	(9)	8.60E-03	1.33E+01	0.8	(9)	373.5	(9)
Heptachlor epoxide	9.81E+03	(3)	2.93E-02	(8)	6.31E-03	(8)	3.22E-03	(12)	2	(2)	3.50E+00	5.4	(11)	0.1	(9)	8.60E-03	1.33E+01	0.8	(7)	389.4	(11)
Nitroaromatics																					
2-Nitrotoluene (o-Nitrotoluene)	ND		ND		ND		NA		ND		ND	2.3	(11)	NA		8.91E-03	6.15E-01	1	(7)	137.14	(11)
4-Amino-2,6-dinitrotoluene	ND		ND		ND		ND		ND		ND	1.84	(10)	0.1		2.04E-03	1.33E+00	1	(7)	197.15	(10)
Semivolatile Organic Compounds																					
Anthracene	ND		ND		ND		ND		ND		ND	4.45	(11)	NA	(9)	1.38E-01	1.05E+00	1	(7)	178.24	(11)
Benzo(a)anthracene	ND		ND		ND		ND		ND		ND	5.66	(9)	0.13	(9)	4.70E-01	2.03E+00	1	(9)	228.3	(9)
Benzo(a)pyrene	ND		ND		ND		ND		ND		ND	6.1	(9)	0.13	(9)	7.00E-01	2.69E+00	1	(9)	250	(9)
Benzo(b)fluoranthene	ND		ND		ND		ND		ND		ND	6.12	(9)	0.13	(9)	4.00E-01	2.72E+00	0.9	(9)	252.3	(9)
Benzo(g,h,I)perylene	ND		ND		ND		ND		ND		ND	6.63	(11)	0.13	(9)	1.07E+00	3.70E+00	0.6	(7)	276.34	(11)
Benzo(k)fluoranthene	ND		ND		ND		ND		ND		ND	6.84	(11)	0.13	(9)	6.60E-01	2.72E+00	0.8	(7)	252.32	(11)
Bis(2-Ethylhexyl)phthalate	ND		ND		ND		ND		ND		ND	5.11	(9)	0.1	(9)	2.50E-02	1.66E+01	0.8	(9)	391	(9)
Chrysene	ND		ND		ND		ND		ND		ND	5.66	(9)	0.13	(9)	4.70E-01	2.03E+00	1	(9)	228.3	(9)
Dibenz(a,h)anthracene	ND		ND		ND		ND		ND		ND	6.84	(9)	0.13	(9)	1.50E+00	3.88E+00	0.6	(9)	278.4	(9)
Di-n-butyl phthalate	ND		ND		ND		ND		ND		ND	4.13	(9)	0.1	(9)	2.40E-02	3.86E+00	0.9	(9)	278	(9)
Fluoranthene	ND		ND		ND		ND		ND		ND	4.95	(9)	0.13	(9)	2.20E-01	1.45E+00	1	(9)	202.3	(9)
Indeno(1,2,3-cd)pyrene	ND		ND		ND		ND		ND		ND	6.58	(9)	0.13	(9)	1.00E+00	3.78E+00	0.6	(9)	276.3	(9)
N-Nitrosodiphenylamine	ND		ND		ND		ND		ND		ND	3.13	(11)	0.1	(9)	1.43E-02	1.35E+00	1	(7)	198.23	(11)
Phenanthrene	ND		ND		ND		ND		ND		ND	4.46	(9)	NA	(9)	1.40E-01	1.05E+00	1	(9)	178.2	(9)
Pyrene	ND		ND		ND		ND		ND		ND	4.88	(11)	0.13	(9)	1.94E-01	1.43E+00	1	(7)	202.26	(11)
Volatile Organic Compounds																					
1,2,4-Trimethylbenzene	ND		ND		ND		NA		ND		ND	3.78	(11)	NA	(9)	8.37E-02	4.95E-01	1	(7)	120.2	(11)
1,2-Dimethylbenzene (o-Xylene)	ND		ND		ND		NA		ND		ND	3.2	(11)	NA	(9)	5.30E-02	4.20E-01	1	(7)	106.2	(11)
2-Butanone	ND		ND		ND		NA		ND		ND	0.29	(9)	NA	(9)	9.60E-04	2.70E-01	1	(9)	72	(9)
Acetone	ND		ND		ND		NA		ND		ND	-0.24	(11)	NA	(9)	5.20E-04	2.22E-01	1	(7)	58.08	(11)
Chloromethane (Methyl Chloride)	ND		ND		ND		NA		ND		ND	0.91	(9)	NA	(9)	3.30E-03	2.00E-01	1	(9)	50.5	(9)
Ethylbenzene	ND		ND		ND		NA		ND		ND	3.15	(9)	NA	(9)	4.90E-02	4.20E-01	1	(9)	106.2	(9)

Table 6-19

Physical Properties of Site-Related Chemicals
Iron Mountain Road Ranges
Fort McClellan, Alabama

Chemical of Potential Concern	BCF (L-water/kg-Fish)	Ref	Bp (unitless)	Ref	Bb (days/kg)	Ref	Bv (mg soil/g venison)	Ref	BSAF (unitless)	Ref	Df (unitless)	log Kow	Ref	ABS (unitless)	Ref	PC (cm/hour)	*tau* (hours)	FA (unitless)	Ref	Molecular Weight (g/mole)	Ref
m,p-Xylenes	ND		ND		ND		NA		ND		ND	3.2	(9)	NA	(9)	5.30E-02	4.20E-01	1	(9)	106.2	(9)
N-Butylbenzene	ND		ND		ND		NA		ND		ND	4.38	(11)	NA	(9)	2.18E-01	5.93E-01	1	(7)	134.22	(11)
p-Cymene (Isopropyl toluene)	ND		ND		ND		NA		ND		ND	4.1	(11)	NA	(9)	1.43E-01	5.93E-01	1	(7)	134.22	(11)
Styrene	ND		ND		ND		NA		ND		ND	2.95	(9)	NA	(9)	3.70E-02	4.10E-01	1	(9)	104.1	(9)
Toluene	ND		ND		ND		NA		ND		ND	2.73	(9)	NA	(9)	3.10E-02	3.50E-01	1	(9)	92.1	(9)
Trichlorofluoromethane	ND		ND		ND		NA		ND		ND	2.53	(9)	NA	(9)	1.30E-02	6.30E-01	1	(9)	137.4	(9)

References

(1) U.S. Environmental Protection Agency (EPA), 1995, "Final Water Quality Guidance for the Great Lakes System; Final Rule," (40 CFR 9, 122, 123, 131, and 132), Federal Register, 60(56): 15365-15425.
(2) Based on data for trout in the Great Lakes ecosystem (U.S. Environmental Protection Agency (EPA), 1995, ***Great Lakes Water Quality Initiative, Technical Support Document for the Procedure to Determine Bioaccumulation Factors***, EPA.820.8.95.CC5, PB95-187290.)
(3) Calculated as per Devillers, J., S. Bintein and D. Domine, 1996, "Comparison of BCF Models Based on Log P," ***Chemosphere***, 33(6): 1047-1065.
(4) By analogy to 2,4-dichlorophenoxy acetic acid.
(5) By analogy to DDT.
(6) By analogy to lindane.
(7) Calculated as per EPA, 2004a.
(8) Calculated as per Travis, C.C. and A.D. Arms, 1988, "Bioconcentration of Organics in Beef, Milk and Vegetation," Environmental Science and Technology, 22(3): 271-274.
(9) U.S. Environmental Protection Agency (EPA), 2004a, Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final, Office of Superfund Remediation and Technology Innovation, Washington, DC, EPA/540/R/99/005, OSWER 9285.7-02EP, July, including errata @ http://www.epa.gov/oswer/riskassessment/ragse/index.htm accessed 18 October 2007.
(10) U.S. Environmental Protection Agency (EPA), 2004b, ***EPI Suite Version 3.12*** Software for estimating physical properties, online, 30 November.
(11) Hazardous Substances Data Bank (HSDB), 2008, National Library of Medicine, on line at http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB,
(12) Installation-Wide Work Plan

Table 6-20

Summary of Cancer Assessment
Iron Mountain Road Ranges
Fort McClellan, Alabama

Chemical of Potential Concern	GAF	Ref	Weight of Evidence	Oral Slope Factor (mg/kg-day) $^{-1}$	Ref	Dermal Slope Factor (mg/kg-day) $^{-1}$	Weight of Evidence	Inhalation Slope Factor (mg/kg-day) $^{-1}$	Ref
Metals									
Antimony	0.15	(1)	ND	ND		ND	ND	ND	
Arsenic	1	(1)	A	1.50E+00	(2)	1.50E+00	A	1.50E+01	(2)
Copper	1	ATSDR	D	ND	(2)	ND	D	ND	(2)
Lead	1		B2	ND	(2)	ND	B2	ND	(2)
Zinc	1	(1)	D	ND	(2)	ND	D	ND	(2)
Herbicides									
2,4-DB	1	(1)	ND	ND	NA	ND	ND	ND	NA
Pesticides and PCBs									
4,4'-DDE	1	(1)	B2	3.40E-01	(2)	3.40E-01	ND	ND	(2)
4,4'-DDT	1	(1)	B2	3.40E-01	(2)	3.40E-01	B2	3.40E-01	(2)
Aldrin	1	(1)	B2	1.70E+01	(2)	1.70E+01	B2	1.70E+01	(2)
alpha-BHC	1	(1)	B2	6.30E+00	(2)	6.30E+00	B2	6.30E+00	(2)
alpha-Chlordane	1	(1)	B2	3.50E-01	(2)	3.50E-01	B2	3.50E-01	(2)
Aroclor 1260 (solid media, food chain)	1	(1)	B2	2.00E+00	(2)	2.00E+00	B2	2.00E+00	(2)
Aroclor 1260 (water)	1	(1)	B2	2.00E+00	(2)	2.00E+00	B2	2.00E+00	(2)
Azinphos-methyl	1	(1)		ND		ND		ND	
beta-BHC	1	(1)	C	1.80E+00	(2)	1.80E+00	C	1.80E+00	(2)
Dieldrin	1	(1)	B2	1.60E+01	(2)	1.60E+01	B2	1.60E+01	(2)
Endosulfan I	1	(1)		ND		ND		ND	
Endosulfan II	1	(1)		ND		ND		ND	
Endosulfan sulfate	1	(1)		ND		ND		ND	
Endrin	1	(1)	D	ND	(2)	ND	D	ND	(2)
Endrin aldehyde	1	(1)		ND		ND		ND	
gamma-BHC (Lindane)	1	(1)	B2-C	1.30E+00	(2)	1.30E+00	NA	ND	NA
gamma-Chlordane	1	(1)	B2	3.50E-01	(2)	3.50E-01	B2	3.50E-01	(2)
Heptachlor	1	(1)	B2	4.50E+00	(2)	4.50E+00	B2	4.50E+00	(2)
Heptachlor epoxide	1	(1)	B2	9.10E+00	(2)	9.10E+00	B2	9.10E+00	(2)
Nitroaromatics									
2-Nitrotoluene (o-Nitrotoluene)	1	(1)	B2	2.30E-01	PPRTV 09/19/02	2.30E-01	ND	ND	
4-Amino-2,6-dinitrotoluene	1	(1)		ND		ND		ND	
Semivolatile Organic Compounds									
Anthracene	1	(1)	D	ND	(2)	ND	D	ND	(2)
Benzo(a)anthracene	1	(1)	B2	7.30E-01	(2) (3)	7.30E-01	B2	3.10E-01	(2) (3) (4)
Benzo(a)pyrene	1	(1)	B2	7.30E+00	(2)	7.30E+00	B2	3.10E+00	(2) (3) (4)

Table 6-20

Summary of Cancer Assessment
Iron Mountain Road Ranges
Fort McClellan, Alabama

Chemical of Potential Concern	GAF	Ref	Weight of Evidence	Oral Slope Factor (mg/kg-day) $^{-1}$	Ref	Dermal Slope Factor (mg/kg-day) $^{-1}$	Weight of Evidence	Inhalation Slope Factor (mg/kg-day) $^{-1}$	Ref
Benzo(b)fluoranthene	1	(1)	B2	7.30E-01	(2) (3)	7.30E-01	B2	3.10E-01	(2) (3) (4)
Benzo(g,h,I)perylene	1	(1)	D	ND	(2)	ND	D	ND	(2)
Benzo(k)fluoranthene	1	(1)	B2	7.30E-02	(2) (3)	7.30E-02	B2	3.10E-02	(2) (3) (4)
Bis(2-Ethylhexyl)phthalate	1	(1)	B2	1.40E-02	(2)	1.40E-02	B2	1.40E-02	(2)
Chrysene	1	(1)	B2	7.30E-03	(2) (3)	7.30E-03	B2	3.10E-03	(2) (3) (4)
Dibenz(a,h)anthracene	1	(1)	B2	7.30E+00	(2) (3)	7.30E+00	B2	3.10E+00	(2) (3) (4)
Di-n-butyl phthalate	1	(1)	D	ND	(2)	ND	D	ND	(2)
Fluoranthene	1	(1)	D	ND	(2)	ND	D	ND	(2)
Indeno(1,2,3-cd)pyrene	1	(1)	B2	7.30E-01	(2) (3)	7.30E-01	B2	3.10E-01	(2) (3) (4)
N-Nitrosodiphenylamine	1	(1)	B2	4.90E-03	(2)	4.90E-03	B2	ND	(2)
Phenanthrene	1	(1)	D	ND	(2)	ND	D	ND	(2)
Pyrene	1	(1)	D	ND	(2)	ND	D	ND	(2)
Volatile Organic Compounds									
1,2,4-Trimethylbenzene	1	(1)	D	ND	(5)	ND	D	ND	(5)
1,2-Dimethylbenzene (Xylenes)	1	(1)	Inadequate	ND	(2)	ND	Inadequate	ND	(2)
2-Butanone	1	(1)	Inadequate	ND	(2)	ND	Inadequate	ND	(2)
Acetone	1	(1)	Inadequate	ND	(2)	ND	Inadequate	ND	(2)
Chloromethane (Methyl Chloride)	1	(1)	D	ND	(2)	ND	D	ND	(2)
Ethylbenzene	1	(1)	D	ND	(2)	ND	D	ND	(2)
m,p-Xylenes (Xylenes)	1		Inadequate	ND	(2)	ND	Inadequate	ND	(2)
N-Butylbenzene	1	(1)	Inadequate	ND	PPRTV 11/20/03	ND	Inadequate	ND	PPRTV 11/20/03
p-Cymene (Isopropyl toluene)	1	(1)		ND		ND		ND	
Styrene	1		C	ND	(5)	ND	C	ND	(5)
Toluene	1		Inadequate	ND	(2)	ND	Inadequate	ND	(2)
Trichlorofluoromethane	1	(1)		ND		ND		ND	

GAF = gastrointestinal absorption factor; Ref = Reference

Weight of Evidence (WOE) EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available.
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans.
C - Possible human carcinogen
D - Not classifiable as a human carcinogen

Table 6-20

Summary of Cancer Assessment
Iron Mountain Road Ranges
Fort McClellan, Alabama

Chemical of Potential Concern	GAF	Ref	Weight of Evidence	Oral Slope Factor (mg/kg-day) $^{-1}$	Ref	Dermal Slope Factor (mg/kg-day) $^{-1}$	Weight of Evidence	Inhalation Slope Factor (mg/kg-day) $^{-1}$	Ref

ATSDR = most recent Agency for Toxic Substances and Disease Registry toxicological profile for this chemical.
PPRTV = Provisional Peer-Reviewed Toxicity Value.

(1) U.S. Environmental Protection Agency (EPA), 2004a, Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final, Office of Superfund Remediation and Technology Innovation, Washington, DC, EPA/540/R/99/005, OSWER 9285.7-02EP, July, including errata @ http://www.epa.gov/oswer/riskassessment/ragse/index.htm accessed 18 October 2007.
(2) U.S. Environmental Protection Agency (EPA), 2009, Integrated Risk Information System (IRIS), National Center for Environmental Assessment, Cincinnati, OH, on line, http://cfpub.epa.gov/ncea/iris/index.cfm.
(3) U.S. Environmental Protection Agency (EPA), 1993, ***Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons***, Office of Health and Environmental Assessment, Cincinnati, OH, EPA/600/R-93/089, March.
(4) U.S. Environmental Protection Agency (EPA), 1994, ***Risk Assessment Issue Paper: Status of Inhalation Cancer Unit Risk for Benzo(a)Pyrene (CAS No. 50-32-8)***, National Center for Environmental Assessment, Cincinnati, OH, November 18.
(5) U.S. Environmental Protection Agency (EPA), 2006, ***2006 Edition of the Drinking Water Standards and Health Advisories***, Office of Water, Washington, DC, EPA 822-R-06-013, August.

Table 6-21

Summary of Noncancer Assessment
Iron Mountain Road Ranges
Fort McClellan, Alabama

Chemical of Potential Concern	GAF	Ref	Oral Reference Dose mg/kg-day	Ref	Dermal Reference Dose mg/kg-day	Target Organs	Inhalation Reference Dose mg/kg-day	Ref	Target Organs
Metals									
Antimony	0.15	(1)	4.00E-04	(2)	6.00E-05	Heart	ND	NA	NA
Arsenic	1	(1)	3.00E-04	(2)	3.00E-04	Skin, PVS	ND	NA	NA
Copper	1	ATSDR	4.00E-02	(3)	4.00E-02	Liver, Kidney, Erythrocyte, GI	ND	NA	NA
Lead	ND		ND		ND	NA	ND	NA	NA
Zinc	1	(1)	3.00E-01	(2)	3.00E-01	Erythrocyte	ND	NA	NA
Herbicides									
2,4-DB	1	(1)	8.00E-03	(2)	8.00E-03	Liver	ND	NA	NA
Pesticides and PCBs									
4,4'-DDE	1	(1)	ND		ND	NA	ND	NA	NA
4,4'-DDT	1	(1)	5.00E-04	(2)	5.00E-04	Liver	ND	NA	NA
Aldrin	1	(1)	3.00E-05	(2)	3.00E-05	Liver	ND	NA	NA
alpha-BHC	1	(1)	ND	NA	ND	NA	ND	NA	NA
alpha-Chlordane	1	(1)	5.00E-04	(2)	5.00E-04	Liver	2.00E-04	(2)	Liver
Aroclor 1260 (solid media, food chain)	1	(1)	ND	NA	ND	NA	ND	NA	NA
Aroclor 1260 (water)	1	(1)	ND	NA	ND	NA	ND	NA	NA
Azinphos-methyl	1	(1)	9.00E-05	(4) (5)	9.00E-05	Decreased cholinesterase activity	ND	NA	NA
beta-BHC	1	(1)	ND	NA	ND	NA	ND	NA	NA
Dieldrin	1	(1)	5.00E-05	(2)	5.00E-05	Liver	ND	NA	NA
Endosulfan I	1	(1)	6.00E-03	(2) (6)	6.00E-03	Kidney, vasculature	ND	NA	NA
Endosulfan II	1	(1)	6.00E-03	(2) (6)	6.00E-03	Kidney, vasculature	ND	NA	NA
Endosulfan sulfate	1	(1)	6.00E-03	(2) (6)	6.00E-03	Kidney, vasculature	ND	NA	NA
Endrin	1	(1)	3.00E-04	(2)	3.00E-04	Liver, central nervous system	ND	NA	NA
Endrin aldehyde	1	(1)	3.00E-05	(2) (7)	3.00E-05	Liver, central nervous system	ND	NA	NA
gamma-BHC (Lindane)	1	(1)	3.00E-04	(2)	3.00E-04	Liver	ND	NA	NA
gamma-Chlordane	1	(1)	5.00E-04	(2)	5.00E-04	Liver	2.00E-04	(2)	Liver
Heptachlor	1	(1)	5.00E-04	(2)	5.00E-04	Liver	ND	NA	NA
Heptachlor epoxide	1	(1)	1.30E-05	(2)	1.30E-05	Liver	ND	NA	NA
Nitroaromatics									
2-Nitrotoluene (o-Nitrotoluene)	1	(1)	1.00E-02	(4)	1.00E-02	Spleen	ND	NA	NA
4-Amino-2,6-dinitrotoluene	1	(1)	5.00E-04	NCEA 1/23/03	5.00E-04	Liver, erythrocyte	ND	NA	NA
Semivolatile Organic Compounds									
Anthracene	1	(1)	3.00E-01	(2)	3.00E-01	ND	ND	NA	NA
Benzo(a)anthracene	1	(1)	ND	NA	ND	NA	ND	NA	NA
Benzo(a)pyrene	1	(1)	ND	NA	ND	NA	ND	NA	NA
Benzo(b)fluoranthene	1	(1)	ND	NA	ND	NA	ND	NA	NA
Benzo(g,h,I)perylene	1	(1)	3.00E-02	(2) (8)	3.00E-02	Kidney	ND	NA	NA
Benzo(k)fluoranthene	1	(1)	ND	NA	ND	NA	ND	NA	NA
Bis(2-Ethylhexyl)phthalate	1	(1)	2.00E-02	(2)	2.00E-02	Liver	ND	NA	NA
Chrysene	1	(1)	ND	NA	ND	NA	ND	NA	NA
Dibenz(a,h)anthracene	1	(1)	ND	NA	ND	NA	ND	NA	NA

Table 6-21

Summary of Noncancer Assessment
Iron Mountain Road Ranges
Fort McClellan, Alabama

Chemical of Potential Concern	GAF	Ref	Oral Reference Dose mg/kg-day	Ref	Dermal Reference Dose mg/kg-day	Target Organs	Inhalation Reference Dose mg/kg-day	Ref	Target Organs
Di-n-butyl phthalate	1	(1)	1.00E-01	(2)	1.00E-01	Increased mortality	ND	NA	NA
Fluoranthene	1	(1)	4.00E-02	(2)	4.00E-02	Kidney, liver, blood	ND	NA	NA
Indeno(1,2,3-cd)pyrene	1	(1)	ND	NA	ND	NA	ND	NA	NA
N-Nitrosodiphenylamine	1	(1)	ND	NA	ND	NA	ND	NA	NA
Phenanthrene	1	(1)	3.00E-02	(2) (8)	3.00E-02	Kidney	ND	NA	NA
Pyrene	1	(1)	3.00E-02	(2)	3.00E-02	Kidney	ND	NA	NA
Volatile Organic Compounds									
1,2,4-Trimethylbenzene	1	(1)	5.00E-02	NCEA 3/8/96	5.00E-02	Liver, kidney	3.30E-02		
1,2-Dimethylbenzene (Xylenes)	1	(1)	2.00E+00	(2)	2.00E+00	Decr. body weight, Incr. mortalilty	ND	(2)	CNS
2-Butanone	1	(1)	6.00E-01	(2)	6.00E-01	Fetus	1.40E+00	(2)	Fetus
Acetone	1	(1)	9.00E-01	(2)	9.00E-01	Kidney	ND	NA	NA
Chloromethane (Methyl Chloride)	1	(1)	ND	NA	ND	NA	2.60E-01	(2)	CNS
Ethylbenzene	1	(1)	1.00E-01	(2)	1.00E-01	Liver, kidney	2.90E-01	(2)	Fetus
m,p-Xylenes (Xylenes)	1	(1)	2.00E+00	(2)	2.00E+00	Decr. body weight, Incr. mortalilty	ND	(2)	CNS
N-Butylbenzene	1	(1)	4.00E-02	NCEA 7/26/99	4.00E-02	Liver, kidney	ND	NA	NA
p-Cymene (Isopropyl toluene)	1	(1)	2.00E-01	(2) (9)	2.00E-01	Decr. body weight, Incr. mortalilty	ND	NA	NA
Styrene	1		2.00E-01	(2)	2.00E-01	Erythrocyte, liver	2.90E-01	(2)	CNS
Toluene	1		8.00E-02	(2)	8.00E-02	Kidney	1.40E+00	(2)	CNS
Trichlorofluoromethane	1	(1)	3.00E-01	(2)	3.00E-01	Decreased survival	2.00E-01	(4)	Lung, kidney

GAF = gastrointestinal absorption factor; Ref = Reference

ATSDR = most recent Agency for Toxic Substances and Disease Registry toxicological profile for this chemical.
NCEA = National Center for Environmental Assessment
(1) U.S. Environmental Protection Agency (EPA), 2004a, Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final, Office of Superfund Remediation and Technology Innovation, Washington, DC, EPA/540/R/99/005, OSWER 9285.7-02EP, July, including errata @ http://www.epa.gov/oswer/riskassessment/ragse/index.htm accessed 18 October 2007.
(2) U.S. Environmental Protection Agency (EPA), 2009, ***Integrated Risk Information System (IRIS),*** National Center for Environmental Assessment, Cincinnati, OH, on line, http://cfpub.epa.gov/ncea/iris/index.cfm,
(3) U.S. Environmental Protection Agency (EPA), 1997, ***Risk Assessment Issue Paper for: Derivation of a Provisional Oral RfD for Copper (CASRN 7440-50-8)***, National Center for Environmental Assessment, Cincinnati, OH, 29 April.
(4) US EPA, 1997, ***Health Effects Assessment Summary Tables, FY 1997 Update***, Office of Solid Waste and Emergency Response, Washington, DC, 9200.6-303(97-1), EPA 540/R-97-036, PB97-921199.
(5) By analogy to diazinon with an additional uncertainty factor of 10 for data base deficiencies.
(6) By analogy to endosulfan.
(7) By analogy to endrin with an additional uncertainty factor of 10 for data base deficiencies.
(8) By analogy to pyrene.
(9) By analogy to xylenes with an additional uncertainty factor of 10 for data base deficiencies.

Table 6-22

Cancer Risk and Noncancer Hazard Estimates Summed Across All Media
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Medium	Groundskeeper		Construction Worker		Indoor Worker		Youth Recreation Site User		On-Site Resident	
	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI
Total Soil	4.99E-05	7.74E-01	6.08E-06	2.75E+00	1.93E-05	4.07E-01	2.61E-06	1.34E-01	1.96E-04	1.09E+01
Groundwater	3.04E-06	NA	NA	NA	3.13E-06	NA	NE	NE	1.34E-05	NA
Surface Water	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA
Sediment	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA
Total HI / ILCR	**5.29E-05**	**7.74E-01**	**6.08E-06**	**2.75E+00**	**2.25E-05**	**4.07E-01**	**2.61E-06**	**1.34E-01**	**2.09E-04**	**1.09E+01**

HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable; no chemicals of potential concern (with the possible exception of lead) were selected for this receptor in this medium.
NE = Not evaluated; the receptor is not evaluated for exposure to this medium.

Table 6-23

Cancer Risk and Noncancer Hazard Estimates for the Groundskeeper Exposed to Total Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Alabama

COPC	Source-Term Concentration (mg/kg)	Total Cancer Risk / Noncancer Hazard			
		Groundskeeper			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Metals					
Antimony	2.36E+02	NA	NA	4.54E+01	5.19E-01
Arsenic	7.25E+01	1.52E+00	4.78E-05	2.84E+01	2.55E-01
Lead	1.90E+03	NA	NA	8.00E+02	NA
Semivolatile Organic Compounds					
Benzo(a)pyrene	2.74E-01	2.33E-01	1.17E-06	NA	NA
Dibenz(a,h)anthracene	2.14E-01	2.33E-01	9.17E-07	NA	NA
Total HI / ILCR			**4.99E-05**		**7.74E-01**

[a] Total soil combines COPCs from surface soil and subsurface soil, using the higher source-term concentration.

mg/kg = milligram per kilogram
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable
SSSL = Site-specific screening level

Table 6-24

Cancer Risk and Noncancer Hazard Estimates for the Construction Worker Exposed to Total Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Alabama

COPC	Source-Term Concentration (mg/kg)	Total Cancer Risk / Noncancer Hazard			
		Construction Worker			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Metals					
Antimony	2.36E+02	NA	NA	1.24E+01	1.90E+00
Arsenic	7.25E+01	1.19E+01	6.08E-06	8.52E+00	8.50E-01
Lead	1.90E+03	NA	NA	8.00E+02	NA
Total HI / ILCR			**6.08E-06**		**2.75E+00**

[a] Total soil combines COPCs from surface soil and subsurface soil, using the higher source-term concentration.

mg/kg = milligram per kilogram
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable
SSSL = Site-specific screening level

Table 6-25

Cancer Risk and Noncancer Hazard Estimates for the Indoor Worker Exposed to Total Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Alabama

COPC	Source-Term Concentration (mg/kg)	Total Cancer Risk / Noncancer Hazard Indoor Worker			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Metals					
Antimony	2.36E+02	NA	NA	8.18E+01	2.88E-01
Arsenic	7.25E+01	3.82E+00	1.90E-05	6.13E+01	1.18E-01
Lead	1.90E+03	NA	NA	8.00E+02	NA
Semivolatile Organic Compounds					
Benzo(a)pyrene	2.74E-01	7.84E-01	3.49E-07	NA	NA
Total HI / ILCR			**1.93E-05**		**4.07E-01**

[a] Total soil combines COPCs from surface soil and subsurface soil, using the higher source-term concentratior

mg/kg = milligram per kilogram
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risl
NA = Not applicable
SSSL = Site-specific screening level

Table 6-26

Cancer Risk and Noncancer Hazard Estimates for the Youth Recreational Site User Exposed to Total Soil [a]
Iron Mountain Road Ranges
Fort McClellan, Alabama

COPC	Source-Term Concentration (mg/kg)	Total Cancer Risk / Noncancer Hazard Youth Recreational Site Use			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Metals					
Antimony	2.36E+02	NA	NA	2.53E+02	9.33E-02
Arsenic	7.25E+01	2.77E+01	2.61E-06	1.78E+02	4.07E-02
Lead	1.90E+03	NA	NA	4.00E+02	NA
Total HI / ILCR			**2.61E-06**		**1.34E-01**

[a] Total soil combines COPCs from surface soil and subsurface soil, using the higher source-term concentratio

mg/kg = milligram per kilogram
COPC = Chemical of potential concer
HI = Hazard inde
ILCR = Incremental lifetime cancer risl
NA = Not applicble
SSSL = Site-specific screening level

Table 6-27

Cancer Risk and Noncancer Hazard Estimates for the On-Site Resident Exposed to Total Soil[a]
Iron Mountain Road Ranges
Fort McClellan, Alabama

COPC	Source-Term Concentration (mg/kg)	Total Cancer Risk / Noncancer Hazard On-Site Resident			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Metals					
Antimony	2.36E+02	NA	NA	3.13E+00	7.54E+00
Arsenic	7.25E+01	3.90E-01	1.86E-04	2.16E+00	3.35E+00
Copper	1.29E+02	NA	NA	3.13E+02	4.11E-02
Lead	1.90E+03	NA	NA	4.00E+02	NA
Pesticides and PCBs					
Aldrin	1.47E-02	2.86E-02	5.13E-07	NA	NA
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.80E-01	6.22E-01	1.42E-06	NA	NA
Benzo(a)pyrene	2.74E-01	6.22E-02	4.41E-06	NA	NA
Dibenz(a,h)anthracene	2.14E-01	6.22E-02	3.44E-06	NA	NA
Total HI / ILCR			**1.96E-04**		**1.09E+01**

[a] Total soil combines COPCs from surface soil and subsurface soil, using the higher source-term concentration.

mg/kg = milligram per kilogram
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable
SSSL = Site-specific screening level

Table 6-28

Cancer Risk and Noncancer Hazard Estimates for the Groundskeeper Exposed to Groundwater
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

COPC	Source-Term Concentration (mg/L)	Total Cancer Risk / Noncancer Hazard			
		Groundskeeper			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Nitroaromatics					
2-Nitrotoluene	3.90E-03	1.28E-03	3.04E-06	NA	NA
Total HI / ILCR			**3.04E-06**		**NA**

mg/L = milligram per liter
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable
SSSL = Site-specific screening level

Table 6-29

Cancer Risk and Noncancer Hazard Estimates for the Indoor Worker Exposed to Groundwater
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

COPC	Source-Term Concentration (mg/L)	Total Cancer Risk / Noncancer Hazard			
		Indoor Worker			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Nitroaromatics					
2-Nitrotoluene	3.90E-03	1.24E-03	3.13E-06	NA	NA
Total HI / ILCR			**3.13E-06**		**NA**

mg/L = milligram per liter
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable
SSSL = Site-specific screening level

Table 6-30

Cancer Risk and Noncancer Hazard Estimates for the On-Site Resident Exposed to Groundwater
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

COPC	Source-Term Concentration (mg/L)	Total Cancer Risk / Noncancer Hazard On-Site Resident			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Nitroaromatics					
2-Nitrotoluene	3.90E-03	2.91E-04	1.34E-05	NA	NA
Total HI / ILCR			**1.34E-05**		**NA**

mg/L = milligram per liter
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable
SSSL = Site-specific screening level

Table 6-31

Cancer Risk and Noncancer Hazard Estimates for the Youth Recreational Site User Exposed to Surface Water
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

COPC	Source-Term Concentration (mg/L)	Total Cancer Risk / Noncancer Hazard			
		Youth Recreational Site User			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Metals					
Lead	1.50E-02	NA	NA	1.50E-02	NA
Total HI / ILCR			**NA**		**NA**

mg/L = milligram per Liter
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable
SSSL = Site-specific screening level

Table 6-32

Cancer Risk and Noncancer Hazard Estimates for the Youth Recreational Site User Exposed to Sediment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

COPC	Source-Term Concentration (mg/kg)	Total Cancer Risk / Noncancer Hazard			
		Youth Recreational Site User			
		Cancer SSSL	ILCR	Noncancer SSSL	HI
Metals					
Lead	3.26E+02	NA	NA	4.00E+02	NA
Total HI / ILCR			**NA**		**NA**

mg/kg = milligram per kilogram
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable
SSSL = Site-specific screening level

Table 6-33

Separation of Noncancer Hazard by Target Organ
for the Construction Worker
Iron Mountain Road Ranges
Fort McClellan, Alabama

	Target Organ Hazard*		
COPC	Heart	Peripheral Vascular System	Skin
Total Soil			
Metals			
Antimony	1.90E+00	NA	NA
Arsenic	NA	8.50E-01	8.50E-01
HI by Target Organ:	**1.90E+00**	**8.50E-01**	**8.50E-01**

* See Table 6-21 for data regarding selection of target organs.

COPC = Chemical of potential concern
NA = Not applicable.

Table 6-34

Separation of Noncancer Hazard by Target Organ
for the On-Site Resident
Iron Mountain Road Ranges
Fort McClellan, Alabama

	Target Organ Hazard*						
COPC	Heart	Peripheral Vascular System	Skin	Liver	Kidney	Erythrocyte	GI
Total Soil							
Metals							
Antimony	7.54E+00	NA	NA	NA	NA	NA	NA
Arsenic	NA	3.35E+00	3.35E+00	NA	NA	NA	NA
Copper	NA	NA	NA	4.11E-02	4.11E-02	4.11E-02	4.11E-02
HI by Target Organ:	**7.54E+00**	**3.35E+00**	**3.35E+00**	**4.11E-02**	**4.11E-02**	**4.11E-02**	**4.11E-02**

* See Table 6-21 for data regarding selection of target organs.

COPC = Chemical of potential concern
NA = Not applicable.

Table 6-35

Chemicals of Concern and Remedial Goal Options for Total Soil
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Groundskeeper

Chemical of Potential Concern	Maximum Concentration (mg/kg)	Source-Term Concentration (mg/kg)	ILCR	COC for Cancer?	Cancer RGOs (mg/kg) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/kg) Target Hazard Index 0.1	1	3
Metals												
Antimony	1.62E+03	2.36E+02	NA	NA	---	---	---	5.19E-01	No	---	---	---
Arsenic	5.60E+02	7.25E+01	4.78E-05	No	---	---	---	2.55E-01	No	---	---	---
Lead	1.16E+05	1.90E+03	NA	NA	---	---	---	NA	Yes	---	---	---
Semivolatile Organic Compounds												
Benzo(a)pyrene	1.90E+00	2.74E-01	1.17E-06	No	---	---	---	NA	NA	---	---	---
Dibenz(a,h)anthracene	4.10E-01	2.14E-01	9.17E-07	No	---	---	---	NA	NA	---	---	---

Construction Worker

Chemical of Potential Concern	Maximum Concentration (mg/kg)	Source-Term Concentration (mg/kg)	ILCR	COC for Cancer?	Cancer RGOs (mg/kg) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/kg) Target Hazard Index 0.1	1	3
Metals												
Antimony	1.62E+03	2.36E+02	NA	NA	---	---	---	1.90E+00	NA	1.24E+01	1.24E+02	3.72E+02
Arsenic	5.60E+02	7.25E+01	6.08E-06	NA	1.19E+01	1.19E+02	1.19E+03	8.50E-01	NA	8.52E+00	8.52E+01	2.56E+02
Lead	1.16E+05	1.90E+03	NA	NA	---	---	---	NA	Yes	---	---	---

Indoor Worker

Chemical of Potential Concern	Maximum Concentration (mg/kg)	Source-Term Concentration (mg/kg)	ILCR	COC for Cancer?	Cancer RGOs (mg/kg) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/kg) Target Hazard Index 0.1	1	3
Metals												
Antimony	1.62E+03	2.36E+02	NA	NA	---	---	---	2.88E-01	NA	8.18E+01	8.18E+02	2.45E+03
Arsenic	5.60E+02	7.25E+01	1.90E-05	NA	3.82E+00	3.82E+01	3.82E+02	1.18E-01	NA	6.13E+01	6.13E+02	1.84E+03
Lead	1.16E+05	1.90E+03	NA	NA	---	---	---	NA	Yes	---	---	---
Semivolatile Organic Compounds												
Benzo(a)pyrene	1.90E+00	2.74E-01	3.49E-07	NA	7.84E-01	7.84E+00	7.84E+01	NA	NA	---	---	---

Youth Recreational Site User

Chemical of Potential Concern	Maximum Concentration (mg/kg)	Source-Term Concentration (mg/kg)	ILCR	COC for Cancer?	Cancer RGOs (mg/kg) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/kg) Target Hazard Index 0.1	1	3
Metals												
Antimony	1.62E+03	2.36E+02	NA	NA	---	---	---	9.33E-02	No	---	---	---
Arsenic	5.60E+02	7.25E+01	2.61E-06	No	---	---	---	4.07E-02	No	---	---	---
Lead	1.16E+05	1.90E+03	NA	NA	---	---	---	NA	Yes	---	---	---

Table 6-35

Chemicals of Concern and Remedial Goal Options for Total Soil
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

On-Site Resident

Chemical of Potential Concern	Maximum Concentration (mg/kg)	Source-Term Concentration (mg/kg)	ILCR	COC for Cancer?	Cancer RGOs (mg/kg) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/kg) Target Hazard Index 0.1	1	3
Metals												
Antimony	1.62E+03	2.36E+02	NA	NA	---	---	---	7.54E+00	NA	3.13E+00	3.13E+01	9.39E+01
Arsenic	5.60E+02	7.25E+01	1.86E-04	NA	3.90E-01	3.90E+00	3.90E+01	3.35E+00	NA	2.16E+00	2.16E+01	6.49E+01
Copper	9.91E+02	1.29E+02	NA	NA	---	---	---	4.11E-02	NA	3.13E+02	3.13E+03	9.39E+03
Lead	1.16E+05	1.90E+03	NA	NA	---	---	---	NA	Yes	---	---	---
Pesticides and PCBs												
Aldrin	3.40E-02	1.47E-02	5.13E-07	NA	2.86E-02	2.86E-01	2.86E+00	NA	NA	---	---	---
Semivolatile Organic Compounds												
Benzo(a)anthracene	8.80E-01	8.80E-01	1.42E-06	NA	6.22E-01	6.22E+00	6.22E+01	NA	NA	---	---	---
Benzo(a)pyrene	1.90E+00	2.74E-01	4.41E-06	NA	6.22E-02	6.22E-01	6.22E+00	NA	NA	---	---	---
Dibenz(a,h)anthracene	4.10E-01	2.14E-01	3.44E-06	NA	6.22E-02	6.22E-01	6.22E+00	NA	NA	---	---	---

mg/kg - Milligrams per kilogram.
ILCR - Incremental lifetime cancer risk.
COC - Chemical of concern.
RGO - Remedial goal option.
HI - hazard index.
NA - Not applicable.
--- = Not calculated

Table 6-36

Chemicals of Concern and Remedial Goal Options for Groundwater
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Groundskeeper

Chemical of Potential Concern	Maximum Concentration (mg/L)	Source-Term Concentration (mg/L)	ILCR	COC for Cancer?	Cancer RGOs (mg/L) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/L) Target Hazard Index 0.1	1	3
Nitroaromatics												
2-Nitrotoluene	3.90E-03	3.90E-03	3.04E-06	No	---	---	---	NA	NA	---	---	---

Indoor Worker

Chemical of Potential Concern	Maximum Concentration (mg/L)	Source-Term Concentration (mg/L)	ILCR	COC for Cancer?	Cancer RGOs (mg/L) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/L) Target Hazard Index 0.1	1	3
Nitroaromatics												
2-Nitrotoluene	3.90E-03	3.90E-03	3.13E-06	NA	1.24E-03	1.24E-02	1.24E-01	NA	NA	---	---	---

On-Site Resident

Chemical of Potential Concern	Maximum Concentration (mg/L)	Source-Term Concentration (mg/L)	ILCR	COC for Cancer?	Cancer RGOs (mg/L) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/L) Target Hazard Index 0.1	1	3
Nitroaromatics												
2-Nitrotoluene	3.90E-03	3.90E-03	1.34E-05	NA	2.91E-04	2.91E-03	2.91E-02	NA	NA	---	---	---

mg/L - Milligrams per liter.
ILCR - Incremental lifetime cancer risk.
COC - Chemical of concern.
RGO - Remedial goal option.
HI - hazard index.
NA - Not applicable.
--- = Not calculated

Table 6-37

Chemicals of Concern and Remedial Goal Options for Surface Water
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Youth Recreational Site User

Chemical of Potential Concern	Maximum Concentration (mg/L)	Source-Term Concentration (mg/L)	ILCR	COC for Cancer?	Cancer RGOs (mg/L) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/L) Target Hazard Index 0.1	1	3
Metals												
Lead	8.71E-02	1.50E-02	NA	NA	---	---	---	NA	No	---	---	---

mg/L - Milligrams per liter.
ILCR - Incremental lifetime cancer risk.
COC - Chemical of concern.
RGO - Remedial goal option.
HI - hazard index.
NA - Not applicable.
--- = Not calculated

Table 6-38

Chemicals of Concern and Remedial Goal Options for Sediment
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Youth Recreational Site User

Chemical of Potential Concern	Maximum Concentration (mg/kg)	Source-Term Concentration (mg/kg)	ILCR	COC for Cancer?	Cancer RGOs (mg/kg) Target Risk Level 1.00E-06	1.00E-05	1.00E-04	HI	COC for Noncancer?	Noncancer RGOs (mg/kg) Target Hazard Index 0.1	1	3
Metals												
Lead	2.07E+03	3.26E+02	NA	NA	---	---	---	NA	No	---	---	---

mg/kg - Milligrams per kilogram.
ILCR - Incremental lifetime cancer risk.
COC - Chemical of concern.
RGO - Remedial goal option.
HI - hazard index.
NA - Not applicable.
--- = Not calculated

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	HR-221Q-GP02				HR-69Q-DEP01				HR-69Q-SS01			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	NB0004		NB0003		HJJ0004		HJJ0003		HJJ0002		HJJ0001	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Metals												
Aluminum	**9400**	J	7200	J	1320	J	***1390***	J	6880		***7320***	
Antimony	**4.63**	J	12.9	UJ		Not Detected			14.2	UJ	***4.97***	J
Arsenic	0.915	J	**1.24**	J	2.6		***2.73***		10.6		***11.2***	
Barium	**21.2**	J	19.2	J	***7.84***	J	7.61	J	51.5		***60.1***	
Beryllium	0.216	J	**0.242**	J		Not Detected				Not Detected		
Calcium	**65.6**	J	64.6	J	***107***	J	88.8	J	***470***	J	450	J
Chromium	**11.7**		9.15		5.22		***5.48***		19.8	J	***20.8***	J
Cobalt	**0.502**	J	2.57	U		Not Detected			***5.46***		4.53	
Copper	4.17		**4.79**		43.6		***53***		***155***		134	
Iron	5300		**5910**		***7870***		7840		23400		***28400***	
Lead	11.5	J	**19.2**	J	497		***576***		***2870***		1780	
Magnesium	**233**		172		***83.4***	J	69.8	J	409		***420***	
Manganese	**9.62**	J	9.05	J	52.1	J	***63.1***	J	***551***	J	254	J
Mercury		Not Detected				Not Detected				Not Detected		
Nickel	**2.27**	J	1.5	J	1.48	J	***1.63***	J	***8.41***	J	7.5	J
Potassium		Not Detected				Not Detected			933	J	***943***	J
Sodium		Not Detected				Not Detected				Not Detected		
Thallium		Not Detected				Not Detected				Not Detected		
Vanadium	**14.7**		13.6		9.67		***9.87***		32.8		***33.6***	
Zinc	**7.61**	J	6.31	J	16.2		***21***		61.2	J	***62.4***	J
Herbicides												
2,4-DB		NA				Not Detected				Not Detected		
Semivolatile Organic Compounds												
Anthracene		NA				Not Detected				Not Detected		
Benzo(a)anthracene		NA				Not Detected				Not Detected		
Benzo(a)pyrene		NA				Not Detected				Not Detected		
Benzo(b)fluoranthene		***NA***				Not Detected				Not Detected		
Benzo(ghi)perylene		NA				Not Detected				Not Detected		
Benzo(k)fluoranthene		NA				Not Detected				Not Detected		
Chrysene		NA				Not Detected				Not Detected		
Dibenz(a,h)anthracene		NA				Not Detected				Not Detected		
Di-n-butyl phthalate		NA				Not Detected				Not Detected		
Fluoranthene		NA				Not Detected				Not Detected		
Indeno(1,2,3-cd)pyrene		NA				Not Detected				Not Detected		
N-Nitrosodiphenylamine		NA				Not Detected				Not Detected		
Phenanthrene		NA				Not Detected				Not Detected		
Pyrene		NA				Not Detected				Not Detected		
Volatile Organic Compounds												
2-Butanone		NA				Not Detected			***0.006***	J	0.0056	J
Acetone		NA			***0.024***	J	0.018	J	0.15	J	0.15	J

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	HR-221Q-GP02				HR-69Q-DEP01				HR-69Q-SS01			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	NB0004		NB0003		HJJ0004		HJJ0003		HJJ0002		HJJ0001	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
p-Cymene	NA				Not Detected				Not Detected			
Toluene	NA				Not Detected				***0.0016***	J	0.0061	U
Trichlorofluoromethane	NA				Not Detected				Not Detected			

All result values are in milligram per kilogram
NA - Not analyzed.
VQ - Validation qualifier.
U - nondetect
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
B - blank contamination found in the sample
Detected results shown in bold italic font are the greater of the two samples comparing the field duplicate to the regular sample.

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	HR-70Q-SS02				HR-71Q-SS01				HR-75Q-SS02			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	HEE0003		HEE0002		HFF0002		HFF0001		HGG0003		HGG0002	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Metals												
Aluminum	11300		***12000***		7370		***8860***		3930		***6510***	
Antimony	***27.2***	J	20.3	J	Not Detected				***170***	J	11.1	UJ
Arsenic	***8.48***		6.57		22.1		***33.7***		7.17	J	***13.1***	J
Barium	83.9		***89.6***		62.5	J	***68***	J	16.4	J	***51.9***	J
Beryllium	Not Detected				Not Detected				Not Detected			
Calcium	320		***339***		***380***		376		156	J	***370***	J
Chromium	13		***13.8***		15.9		***21.2***		11.9		***17.3***	
Cobalt	10.3		***12.1***		5		***5.92***		1.55	B	***4.04***	J
Copper	77.1	J	***94***	J	72.4		***74.5***		***764***	J	105	J
Iron	12400		***14500***		11500		***14200***		12800		***20900***	
Lead	***4400***		3280		2080		***2340***		***32200***	J	1400	J
Magnesium	550		***573***		302		***319***		156	J	***353***	J
Manganese	861		***903***		771		***976***		50.5	J	***202***	J
Mercury	***0.044***	J	0.038	J	***0.036***	J	0.122	U	***0.03***	J	0.111	U
Nickel	7.68		***8.88***		4.86		***5.94***		3.46	J	***8.36***	J
Potassium	392	J	***489***	J	***338***	J	323	J	176	J	***753***	J
Sodium	44.7	J	***51.8***	J	122	U	***44.1***	J	32.7	J	***51.3***	J
Thallium	2.27	U	***0.919***	J	Not Detected				Not Detected			
Vanadium	15.9		***16.7***		16.7		***20.4***		19.1		***27.2***	
Zinc	35.8		***42.4***		***28.1***		27.5		***102***	J	51.8	J
Herbicides												
2,4-DB	0.023	U	***0.018***	J	***0.01***	J	0.0093	J	Not Detected			
Semivolatile Organic Compounds												
Anthracene	Not Detected				Not Detected				Not Detected			
Benzo(a)anthracene	Not Detected				Not Detected				Not Detected			
Benzo(a)pyrene	Not Detected				Not Detected				Not Detected			
Benzo(b)fluoranthene	Not Detected				Not Detected				Not Detected			
Benzo(ghi)perylene	Not Detected				Not Detected				Not Detected			
Benzo(k)fluoranthene	Not Detected				Not Detected				Not Detected			
Chrysene	Not Detected				Not Detected				Not Detected			
Dibenz(a,h)anthracene	Not Detected				Not Detected				Not Detected			
Di-n-butyl phthalate	Not Detected				Not Detected				Not Detected			
Fluoranthene	Not Detected				Not Detected				Not Detected			
Indeno(1,2,3-cd)pyrene	Not Detected				Not Detected				Not Detected			
N-Nitrosodiphenylamine	Not Detected				Not Detected				Not Detected			
Phenanthrene	Not Detected				Not Detected				Not Detected			
Pyrene	Not Detected				Not Detected				Not Detected			
Volatile Organic Compounds												
2-Butanone	0.01	J	***0.013***	J	0.022	J	0.022	J	Not Detected			
Acetone	0.11	J	***0.13***	J	***0.35***	J	0.34	J	***0.0097***	J	0.014	B

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	HR-70Q-SS02				HR-71Q-SS01				HR-75Q-SS02			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	HEE0003		HEE0002		HFF0002		HFF0001		HGG0003		HGG0002	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
p-Cymene	Not Detected				Not Detected				Not Detected			
Toluene	Not Detected				***0.0029***	J	0.01	U	Not Detected			
Trichlorofluoromethane	0.0078		***0.0087***		***0.022***	J	0.003	J	Not Detected			

All result values are in milligram per kilogram
NA - Not analyzed.
VQ - Validation qualifier.
U - nondetect
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
B - blank contamination found in the sample
Detected results shown in bold italic font are the greater of the two samples comparing the field duplicate to the regular sample.

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	SAR-69-SS40				SAR-71-SS19				SAR-75-SS20			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	HJ0059		HJ0058		HF0022		HF0021		HG0031		HG0030	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Metals												
Aluminum	7310		***7370***		***8940***		6320		5070		***5410***	
Antimony	Not Detected				***3***	J	2.4	J	***1.9***	J	1.8	J
Arsenic	3	J	***3.5***	J	***6.8***		4.4		***8.2***		6.9	
Barium	53.3		***54.3***		***40.3***		35.7		26.9		***27.7***	
Beryllium	***0.55***	J	0.54	J	Not Detected				Not Detected			
Calcium	693	J	***4840***	J	***548***	J	499	J	74.3	J	***75***	J
Chromium	***7.1***		6.5		***12.3***		10.6		***5.6***	J	5.3	J
Cobalt	3.3	J	3.3	J	***5.1***	J	4.3	J	***0.87***	J	0.86	J
Copper	5.3		***5.7***		26.3		***26.6***		***75.5***		65.3	
Iron	9770		***10200***		***18900***		12700		***7400***		7250	
Lead	27.4	J	***27.6***	J	***110***	J	99.5	J	232		***250***	
Magnesium	200	J	***316***	J	***379***	J	274	J	85.4	J	***100***	J
Manganese	426		***468***		***520***		395		***102***		85.2	
Mercury	***0.063***		0.043		***0.04***	J	0.022	J	0.058		***0.068***	
Nickel	3.8	J	***4.2***	J	***5.6***		3.9	J	***2.2***	J	2	J
Potassium	71	J	***83.2***	J	***271***	J	190	J	***31.3***	J	30.8	J
Sodium	Not Detected				Not Detected				Not Detected			
Thallium	Not Detected				Not Detected				Not Detected			
Vanadium	***13.1***		12.9		***24.4***		18.4		11.1		11.1	
Zinc	15.7		***16.4***		41.2	J	***70.1***	J	***24.6***	J	21.1	J
Herbicides												
2,4-DB	NA				NA				NA			
Semivolatile Organic Compounds												
Anthracene	0.029	J	***0.05***	J	Not Detected				Not Detected			
Benzo(a)anthracene	0.6		***0.88***		Not Detected				Not Detected			
Benzo(a)pyrene	0.9	J	***1.9***	J	Not Detected				Not Detected			
Benzo(b)fluoranthene	0.27	J	***0.57***	J	Not Detected				Not Detected			
Benzo(ghi)perylene	0.46	J	***0.92***	J	Not Detected				Not Detected			
Benzo(k)fluoranthene	0.11	J	***0.24***	J	Not Detected				Not Detected			
Chrysene	0.78		***1.2***		Not Detected				Not Detected			
Dibenz(a,h)anthracene	0.21	J	***0.41***	J	Not Detected				Not Detected			
Di-n-butyl phthalate	Not Detected				***0.13***	J	0.1	J	Not Detected			
Fluoranthene	0.073	J	***0.16***	J	Not Detected				Not Detected			
Indeno(1,2,3-cd)pyrene	0.13	J	***0.29***	J	Not Detected				Not Detected			
N-Nitrosodiphenylamine	Not Detected				***0.31***	J	0.24	J	Not Detected			
Phenanthrene	0.17	J	***0.24***	J	Not Detected				Not Detected			
Pyrene	0.74		***1.2***		Not Detected				Not Detected			
Volatile Organic Compounds												
2-Butanone	Not Detected				Not Detected				Not Detected			
Acetone	Not Detected				Not Detected				***0.31***	J	0.23	J

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	SAR-69-SS40				SAR-71-SS19				SAR-75-SS20			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	HJ0059		HJ0058		HF0022		HF0021		HG0031		HG0030	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
p-Cymene	Not Detected				Not Detected				***0.24***	J	0.13	J
Toluene	Not Detected				Not Detected				***0.00075***	J	0.0059	U
Trichlorofluoromethane	Not Detected				Not Detected				Not Detected			

All result values are in milligram per kilogram
NA - Not analyzed.
VQ - Validation qualifier.
U - nondetect
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
B - blank contamination found in the sample
Detected results shown in bold italic font are the greater of the two samples comparing the field duplicate to the regular sample.

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	SAR-70-SS05				SAR-70-SS16				SAR-71-SS06				SAR-71-SS09			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	HE0006		HE0005		HE0022		HE0021		HF0007		HF0006		HF0011		HF0010	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Metals																
Aluminum		NA				NA				NA				NA		
Antimony		NA				NA				NA				NA		
Arsenic		NA				NA				NA				NA		
Barium		NA				NA				NA				NA		
Beryllium		NA				NA				NA				NA		
Calcium		NA				NA				NA				NA		
Chromium		NA				NA				NA				NA		
Cobalt		NA				NA				NA				NA		
Copper		NA				NA				NA				NA		
Iron		NA				NA				NA				NA		
Lead	***74.2***	J	63.2	J	***314***	J	195	J	560		***705***		***325***		266	
Magnesium		NA				NA				NA				NA		
Manganese		NA				NA				NA				NA		
Mercury		NA				NA				NA				NA		
Nickel		NA				NA				NA				NA		
Potassium		NA				NA				NA				NA		
Sodium		NA				NA				NA				NA		
Thallium		NA				NA				NA				NA		
Vanadium		NA				NA				NA				NA		
Zinc		NA				NA				NA				NA		
Herbicides																
2,4-DB		NA				NA				NA				NA		
Semivolatile Organic Compounds																
Anthracene		NA				NA				NA				NA		
Benzo(a)anthracene		NA				NA				NA				NA		
Benzo(a)pyrene		NA				NA				NA				NA		
Benzo(b)fluoranthene		NA				NA				NA				NA		
Benzo(ghi)perylene		NA				NA				NA				NA		
Benzo(k)fluoranthene		NA				NA				NA				NA		
Chrysene		NA				NA				NA				NA		
Dibenz(a,h)anthracene		NA				NA				NA				NA		
Di-n-butyl phthalate		NA				NA				NA				NA		
Fluoranthene		NA				NA				NA				NA		
Indeno(1,2,3-cd)pyrene		NA				NA				NA				NA		
N-Nitrosodiphenylamine		NA				NA				NA				NA		
Phenanthrene		NA				NA				NA				NA		
Pyrene		NA				NA				NA				NA		
Volatile Organic Compounds																
2-Butanone		NA				NA				NA				NA		
Acetone		NA				NA				NA				NA		

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	SAR-70-SS05				SAR-70-SS16				SAR-71-SS06				SAR-71-SS09			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	HE0006		HE0005		HE0022		HE0021		HF0007		HF0006		HF0011		HF0010	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
p-Cymene	NA				NA				NA				NA			
Toluene	NA				NA				NA				NA			
Trichlorofluoromethane	NA				NA				NA				NA			

All result values are in milligram per kilogram
NA - Not analyzed.
VQ - Validation qualifier.
U - nondetect
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
B - blank contamination found in the sample
Detected results shown in bold italic font are the greater of the two samples comparing the field duplicate to the regular sample.

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	SAR-69-SS06				SAR-69-SS18				SAR-69-SS35			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	HJ0007		HJ0006		HJ0021		HJ0020		HJ0043		HJ0042	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Metals												
Aluminum			NA				NA				NA	
Antimony			NA				NA				NA	
Arsenic			NA				NA				NA	
Barium			NA				NA				NA	
Beryllium			NA				NA				NA	
Calcium			NA				NA				NA	
Chromium			NA				NA				NA	
Cobalt			NA				NA				NA	
Copper			NA				NA				NA	
Iron			NA				NA				NA	
Lead	***55.3***		37.8		57.9	J	***189***	J	554		***608***	
Magnesium			NA				NA				NA	
Manganese			NA				NA				NA	
Mercury			NA				NA				NA	
Nickel			NA				NA				NA	
Potassium			NA				NA				NA	
Sodium			NA				NA				NA	
Thallium			NA				NA				NA	
Vanadium			NA				NA				NA	
Zinc			NA				NA				NA	
Herbicides												
2,4-DB			NA				NA				NA	
Semivolatile Organic Compounds												
Anthracene			NA				NA				NA	
Benzo(a)anthracene			NA				NA				NA	
Benzo(a)pyrene			NA				NA				NA	
Benzo(b)fluoranthene			NA				NA				NA	
Benzo(ghi)perylene			NA				NA				NA	
Benzo(k)fluoranthene			NA				NA				NA	
Chrysene			NA				NA				NA	
Dibenz(a,h)anthracene			NA				NA				NA	
Di-n-butyl phthalate			NA				NA				NA	
Fluoranthene			NA				NA				NA	
Indeno(1,2,3-cd)pyrene			NA				NA				NA	
N-Nitrosodiphenylamine			NA				NA				NA	
Phenanthrene			NA				NA				NA	
Pyrene			NA				NA				NA	
Volatile Organic Compounds												
2-Butanone			NA				NA				NA	
Acetone			NA				NA				NA	

Table 6-39

Summary of Detected Results in Soil Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	SAR-69-SS06				SAR-69-SS18				SAR-69-SS35			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	HJ0007		HJ0006		HJ0021		HJ0020		HJ0043		HJ0042	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
p-Cymene	NA				NA				NA			
Toluene	NA				NA				NA			
Trichlorofluoromethane	NA				NA				NA			

All result values are in milligram per kilogram
NA - Not analyzed.
VQ - Validation qualifier.
U - nondetect
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
B - blank contamination found in the sample
Detected results shown in bold italic font are the greater of the two samples comparing the field duplicate to the regular sample.

Table 6-40

Summary of Detected Results in Groundwater Sample Field Duplicates
Iron Mountain Road Ranges
Fort McClellan, Calhoun County, Alabama

Sample Location	HR-75Q-MW04				HR-69Q-MW02			
Sample Type	Field Duplicate		Regular		Field Duplicate		Regular	
Sample Number	HGG3003		HGG3005		HJJ3003		HJJ3002	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Metals								
Aluminum	***0.695***		0.55		***0.0655***	J	0.0644	J
Barium	***0.105***		0.0952		***0.137***		0.129	
Calcium	***3.08***		2.76		***59.3***		55.7	
Iron	***3.72***		3.54		Not Detected			
Magnesium	***1.92***		1.72		***2.98***		2.83	
Manganese	***6.18***		5.6		Not Detected			
Potassium	***7.11***		6.46		Not Detected			
Herbicides								
2-Nitrotoluene	0.0033	P	***0.0039***	J	Not Detected			

All result values are in milligram per liter
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
Note: Detected results shown in bold italic font are the greater of the two samples comparing the field duplicate to the regular sample.

Table 7-1

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints
IMR and BGR Ranges
Fort McClellan, Calhoun County, Alabama

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint
Terrestrial Ecosystems		
I. Maintenance of a healthy terrestrial invertebrate community.	I. Survival and growth of terrestrial invertebrates exposed to surface soil collected from the IMR and BGR ranges is statistically significantly different from that of invertebrates exposed to reference soil from non-impacted areas.	I. Statistical comparison of earthworm survival and growth rates between earthworms exposed to soils from the IMR and BGR ranges to earthworms exposed to reference site soils.
II. Maintenance of healthy local populations of gallinaceous and other ground-feeding birds.	II. Calculated probabilities of birds ingesting and retaining lead bullet fragments are statistically and biologically significant in local bird populations.	II. Calculation of the probability of bobwhite quail and wild turkeys ingesting and retaining a lead bullet fragment from the IMR or BGR ranges.
III. Maintenance of healthy local populations and communities of terrestrial invertivorous small mammals and birds.	III. Calculated hazard quotients using measured body burdens of COPECs in earthworms, site-specific diet composition, and area use factors indicate statistically significant potential for risk to either terrestrial invertivorous small mammals or birds.	III. Calculation of hazard quotients for terrestrial invertivorous small mammal (shorttail shrew) and invertivorous bird (American woodcock) using measured earthworm tissue concentrations of COPECs.
IV. Maintenance of healthy local populations and communities of terrestrial omnivorous small mammals and birds.	IV. Calculated hazard quotients using measured body burdens of COPECs in earthworms, site-specific diet composition, and area use factors indicate statistically significant potential for risk to terrestrial omnivorous small mammals or birds.	IV. Calculation of hazard quotients for terrestrial omnivorous small mammal (white-footed mouse) and omnivorous bird (American robin) using measured earthworm tissue concentrations of COPECs and modeled vegetation concentrations of COPECs.

Table 7-1

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints
IMR and BGR Ranges
Fort McClellan, Calhoun County, Alabama

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint
Aquatic Ecosystems		
I. Maintenance of a healthy aquatic benthic invertebrate community.	I. Survival and growth of aquatic benthic invertebrates exposed to sediment collected from Cane Creek is statistically significantly different from that of benthic invertebrates exposed to sediment from non-impacted reference stream.	IA. Statistical comparison of survival and growth of *Chironomus sp*. exposed to sediment from Cane Creek to survival and growth of *Chironomus sp*. exposed sediment from reference stream.
		IB. Comparison of benthic community assemblage from Cane Creek with the benthic community assemblage from a reference stream using RBPII methodology and literature-based community assemblages.
II. Maintenance of a healthy aquatic water-column invertebrate community.	II. Survival and reproduction of aquatic water-column invertebrates exposed to surface water collected from Cane Creek is statistically significantly different from that of aquatic water-column invertebrates exposed to surface water from non-impacted reference stream.	II. Statistical comparison of survival and reproduction of *Ceriodaphnia dubia* exposed to surface water from Cane Creek to survival and growth of *Ceriodaphnia dubia* exposed surface water from reference stream.
III. Maintenance of a healthy aquatic vertebrate (e.g., finfish) community.	III. Survival and growth of aquatic vertebrates exposed to surface water collected from Cane Creek is statistically significantly different from that of aquatic vertebrates exposed to surface water from non-impacted reference stream.	III. Statistical comparison of survival and growth of *Pimephales promelas* exposed to surface water from Cane Creek to survival and growth of *Pimephales promelas* exposed to surface water from reference stream.
IV. Maintenance of healthy local populations and communities of riparian invertivorous mammals and birds.	IV. Calculated hazard quotients using modeled COPEC concentrations in aquatic insects, site-specific diet composition, and area use factors indicate statistically significant potential for risk to either riparian invertivorous mammals or birds.	IV. Calculation of hazard quotients for riparian invertivorous mammal (little brown bat) and invertivorous bird (marsh wren) using modeled tissue concentrations of COPECs in emergent benthic invertebrates.

BGR – Bains Gap Road.
COPEC – Chemical of potential ecological concern.
IMR – Iron Mountain Road.

Table 7-2

Calculated Risks and Lead Particle Densities
Protective of Bobwhite Quail and Wild Turkey
Fort McClellan, Calhoun County, Alabama

Location	Northern Bobwhite Quail			Eastern Wild Turkey		
	Grit Retention Time (days)	Probability of Bobwhite Quail Ingesting Lead Particle	Acceptable Lead Particle Density [1] (fragments/ft^2)	Grit Retention Time (days)	Probability of Wild Turkey Ingesting Lead Particle	Acceptable Lead Particle Density [1] (fragments/ft^2)
IMR Ranges :	10	0.7455	54.60	42	0.045	204.53
	83	0.152	452.14			
	156	0.084	846.26			
BGR Ranges :	10	0.9529	24.58	42	0.129	68.26
	83	0.3079	203.50			
	156	0.1778	380.82			

NOTES :
[1] Acceptable bullet fragment densities calculated using the input parameters summarized in letter report to Doyle Brittain (EPA Region 4) from Ron Levy (U.S. Army) dated 18 September, 2003.
number of grit-size particles (turkey) per sample at the IMR and BGR ranges range from 24 to 3,823; mean = 863.
number of grit-size particles (bobwhite) per sample at the IMR and BGR ranges range from 1,597 to 75,946; mean = 20,149.
mean percent lead particles in 0.8 - 2.2 mm size range (bobwhite) at IMR and BGR ranges = 1.66%
mean percent lead particles in 2.8 - 4.2 mm size range (turkey) at IMR and BGR ranges = 4.9%

BGR - Bains Gap Road.
EPA - U.S. Environmental Protection Agency.
IMR - Iron Mountain Road.
mm - Millimeter.

Table 7-3

Summary of Potential Ecological Risk-Based Remedial Goals
Iron Mountain Road and Bains Gap Road Ranges BERA
Fort McClellan, Calhoun County, Alabama

Measurement Endpoints	Soil COPECs			
	Antimony (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Terrestrial Invertebrate Survival and Growth				
28-Day Earthworm Survival NOEC	6.7	127	779	47.3
28-Day Earthworm Survival LOEC	17.9	334	2,310	63.9
28-Day Earthworm Survival AET	>1,620	509	15,600	139
28-Day Earthworm Growth NOEC	NA	61.4	760	33.5
28-Day Earthworm Growth LOEC	NA	62.2	779	35.1
28-Day Earthworm Growth AET	NA	334	6,820	72.8
Terrestrial Food Web Exposures				
White-Footed Mouse NOAEL	4.67	267	205	1,500
White-Footed Mouse LOAEL	46.7	350	1,680	145,000
American Robin NOAEL	2.8	850	55	31,500
American Robin LOAEL	14	1,140	147	434,000
Short-Tailed Shrew NOAEL	6.01	820	100	215
Short-Tailed Shrew LOAEL	60.1	1,185	800	173,000
American Woodcock NOAEL	10.85	11,870	105.5	46,500
American Woodcock LOAEL	54.2	16,200	280	550,000
Soil RBRG Range :	2.8 - >1,620	61.4 - 16,200	55 - >15,600	33.5 - 550,000

NA - Antimony concentrations in soil were poorly correlated with measured earthworm growth; therefore, it was determined that antimony was not a causative agent in reduced earthworm growth.

Table 7-3

Summary of Potential Ecological Risk-Based Remedial Goals
Iron Mountain Road and Bains Gap Road Ranges BERA
Fort McClellan, Calhoun County, Alabama

Measurement Endpoints	Surface Water COPECs	
	Copper (mg/L)	Lead (mg/L)
Finfish Survival and Growth		
Fathead Minnow Survival NOEC	0.0527	0.0422
Fathead Minnow Survival LOEC	0.0608	0.0462
Fathead Minnow Survival AET	0.0608	0.0462
Fathead Minnow Growth NOEC	0.0129	0.0105
Fathead Minnow Growth LOEC	0.0346	0.0306
Fathead Minnow Growth AET	0.0346	0.0306
Aquatic Invertebrate Survival and Reproduction		
Ceriodaphnid Survival NOEC	0.0129	ND
Ceriodaphnid Survival LOEC	0.0346	0.00236
Ceriodaphnid Survival AET	0.0346	0.0306
Ceriodaphnid Reproduction NOEC	0.0129	0.0105
Ceriodaphnid Reproduction LOEC	0.0346	0.0306
Ceriodaphnid Reproduction AET	0.0346	0.0306
Surface Water RBRG Range :	0.0129 - 0.0608	ND - 0.0462

ND - Less than the analytical detection limit.

Table 7-3

Summary of Potential Ecological Risk-Based Remedial Goals
Iron Mountain Road and Bains Gap Road Ranges BERA
Fort McClellan, Calhoun County, Alabama

Measurement Endpoints	Sediment COPECs				
	Arsenic (mg/kg)	Barium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)
Benthic Invertebrate Survival and Growth					
Chironomid Survival NOEC	NA	NA	126	495	NA
Chironomid Survival LOEC	NA	NA	160	605	NA
Chironomid Survival AET	NA	NA	380	>1,730	NA
Chironomid Growth NOEC	NA	NA	9.06	23.1	NA
Chironomid Growth LOEC	NA	NA	10.4	76.7	NA
Chironomid Growth AET	NA	NA	74.9	432	NA
Riparian Food Web Exposures					
Little Brown Bat NOAEL	ND	ND	4,060	530	ND
Little Brown Bat LOAEL	ND	ND	6,600	10,200	ND
Marsh Wren NOAEL	ND	ND	112	3.33	ND
Marsh Wren LOAEL	ND	ND	191	13.3	ND
Sediment RBRG Range :	NA / ND	NA / ND	9.06 - 6,600	3.33 - 10,200	NA / ND

ND - Detected concentrations of these COPECs did not result in HQs > 1.0 for any of the feeding guilds assessed in the riparian food web model; therefore, RBRGs are not necessary for these particular endpoints.

NA - Arsenic, barium, and manganese concentrations in sediment were poorly correlated with chironomid survival and growth; therefore, it was determined that these sediment COPECs were not causative agents in reduced chironomid survival or growth.

AET - Apparent effect threshold.
BERA - Baseline ecological risk assessment.
COPEC - Chemical of potential ecological concern.
LOAEL - Lowest-obscured-adverse-effects level.
LOEC - Lowest-observable-effect concentration.
mg/kg - Milligrams per kilogram.
NOAEL - No-obscured-adverse-effects level.
NOEC - No-observable-effect concentration.
RBRG - Risk-based remedial goal.

Table 8-1

Summary of Potential Ecological Risk-Based Remedial Goals
Iron Mountain Road and Bains Gap Road Ranges BERA
Fort McClellan, Calhoun County, Alabama

Measurement Endpoints	Soil COPECs			
	Antimony (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Terrestrial Invertebrate Survival and Growth :				
28-Day Earthworm Survival NOEC	6.7	127	779	47.3
28-Day Earthworm Survival LOEC	17.9	334	2,310	63.9
28-Day Earthworm Survival AET	>1,620	509	15,600	139
28-Day Earthworm Growth NOEC	NA	61.4	760	33.5
28-Day Earthworm Growth LOEC	NA	62.2	779	35.1
28-Day Earthworm Growth AET	NA	334	6,820	72.8
Terrestrial Food Web Exposures :				
White-Footed Mouse NOAEL	4.67	267	205	1,500
White-Footed Mouse LOAEL	46.7	350	1,680	145,000
American Robin NOAEL	2.8	850	55	31,500
American Robin LOAEL	14	1,140	147	434,000
Short-Tailed Shrew NOAEL	6.01	820	100	215
Short-Tailed Shrew LOAEL	60.1	1,185	800	173,000
American Woodcock NOAEL	10.85	11,870	105.5	46,500
American Woodcock LOAEL	54.2	16,200	280	550,000
Soil RBRG Range :	2.8 - >1,620	61.4 - 16,200	55 - >15,600	33.5 - 550,000

NA - Antimony concentrations in soil were poorly correlated with measured earthworm growth; therefore, it was determined that antimony was not a causative agent in reduced earthworm growth.

Table 8-1

Summary of Potential Ecological Risk-Based Remedial Goals
Iron Mountain Road and Bains Gap Road Ranges BERA
Fort McClellan, Calhoun County, Alabama

Measurement Endpoints	Sediment COPECs				
	Arsenic (mg/kg)	Barium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)
Benthic Invertebrate Survival and Growth :					
Chironomid Survival NOEC	NA	NA	126	495	NA
Chironomid Survival LOEC	NA	NA	160	605	NA
Chironomid Survival AET	NA	NA	380	>1,730	NA
Chironomid Growth NOEC	NA	NA	9.06	23.1	NA
Chironomid Growth LOEC	NA	NA	10.4	76.7	NA
Chironomid Growth AET	NA	NA	74.9	432	NA
Riparian Food Web Exposures :					
Little Brown Bat NOAEL	ND	ND	4,060	530	ND
Little Brown Bat LOAEL	ND	ND	6,600	10,200	ND
Marsh Wren NOAEL	ND	ND	112	3.33	ND
Marsh Wren LOAEL	ND	ND	191	13.3	ND
Sediment RBRG Range :	NA / ND	NA / ND	9.06 - 6,600	3.33 - 10,200	NA / ND

ND - Detected concentrations of these COPECs did not result in HQs > 1.0 for any of the feeding guilds assessed in the riparian food web model; therefore, RBRGs are not necessary for these particular endpoints.

NA - Arsenic, barium, and manganese concentrations in sediment were poorly correlated with chironomid survival and growth; therefore, it was determined that these sediment COPECs were not causative agents in reduced chironomid survival or growth.

Table 8-1

Summary of Potential Ecological Risk-Based Remedial Goals
Iron Mountain Road and Bains Gap Road Ranges BERA
Fort McClellan, Calhoun County, Alabama

Measurement Endpoints	Surface Water COPECs	
	Copper (mg/L)	Lead (mg/L)
Finfish Survival and Growth :		
Fathead Minnow Survival NOEC	0.0527	0.0422
Fathead Minnow Survival LOEC	0.0608	0.0462
Fathead Minnow Survival AET	0.0608	0.0462
Fathead Minnow Growth NOEC	0.0129	0.0105
Fathead Minnow Growth LOEC	0.0346	0.0306
Fathead Minnow Growth AET	0.0346	0.0306
Aquatic Invertebrate Survival and Reproduction :		
Ceriodaphnid Survival NOEC	0.0129	ND
Ceriodaphnid Survival LOEC	0.0346	0.00236
Ceriodaphnid Survival AET	0.0346	0.0306
Ceriodaphnid Reproduction NOEC	0.0129	0.0105
Ceriodaphnid Reproduction LOEC	0.0346	0.0306
Ceriodaphnid Reproduction AET	0.0346	0.0306
Surface Water RBRG Range :	0.0129 - 0.0608	ND - 0.0462

ND - Less than the analytical detection limit

FIGURES

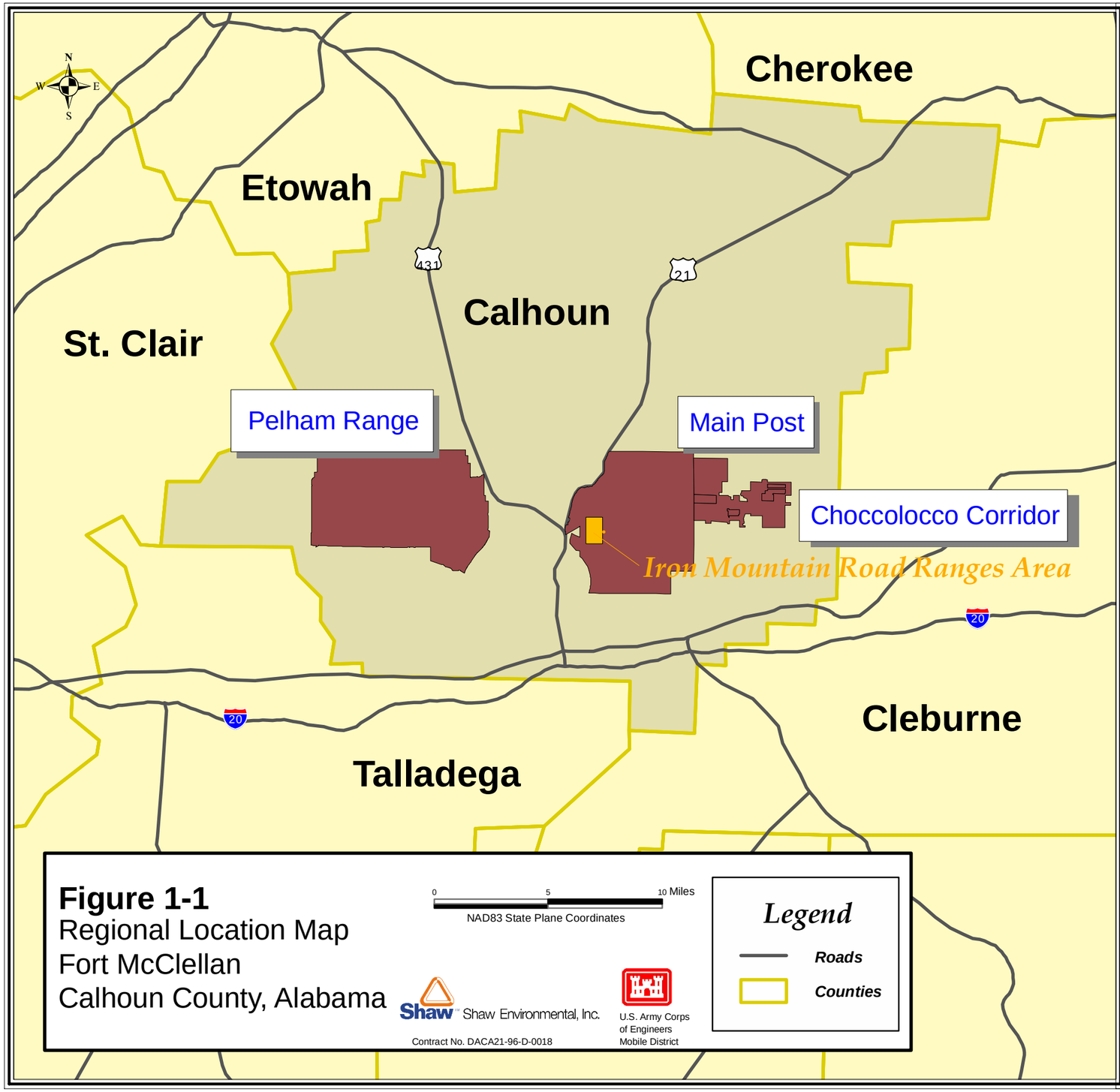
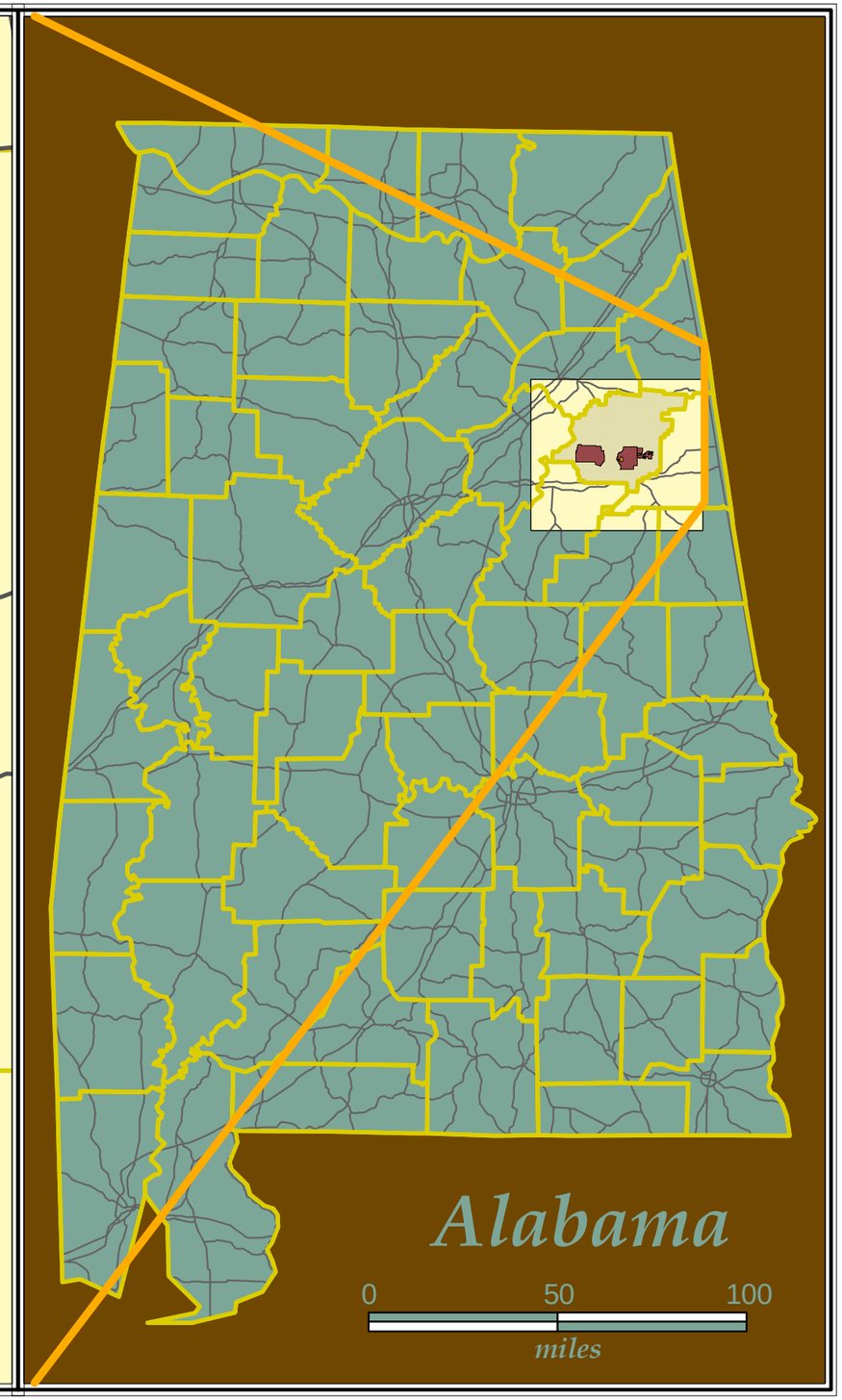


Figure 1-1
Regional Location Map
Fort McClellan
Calhoun County, Alabama



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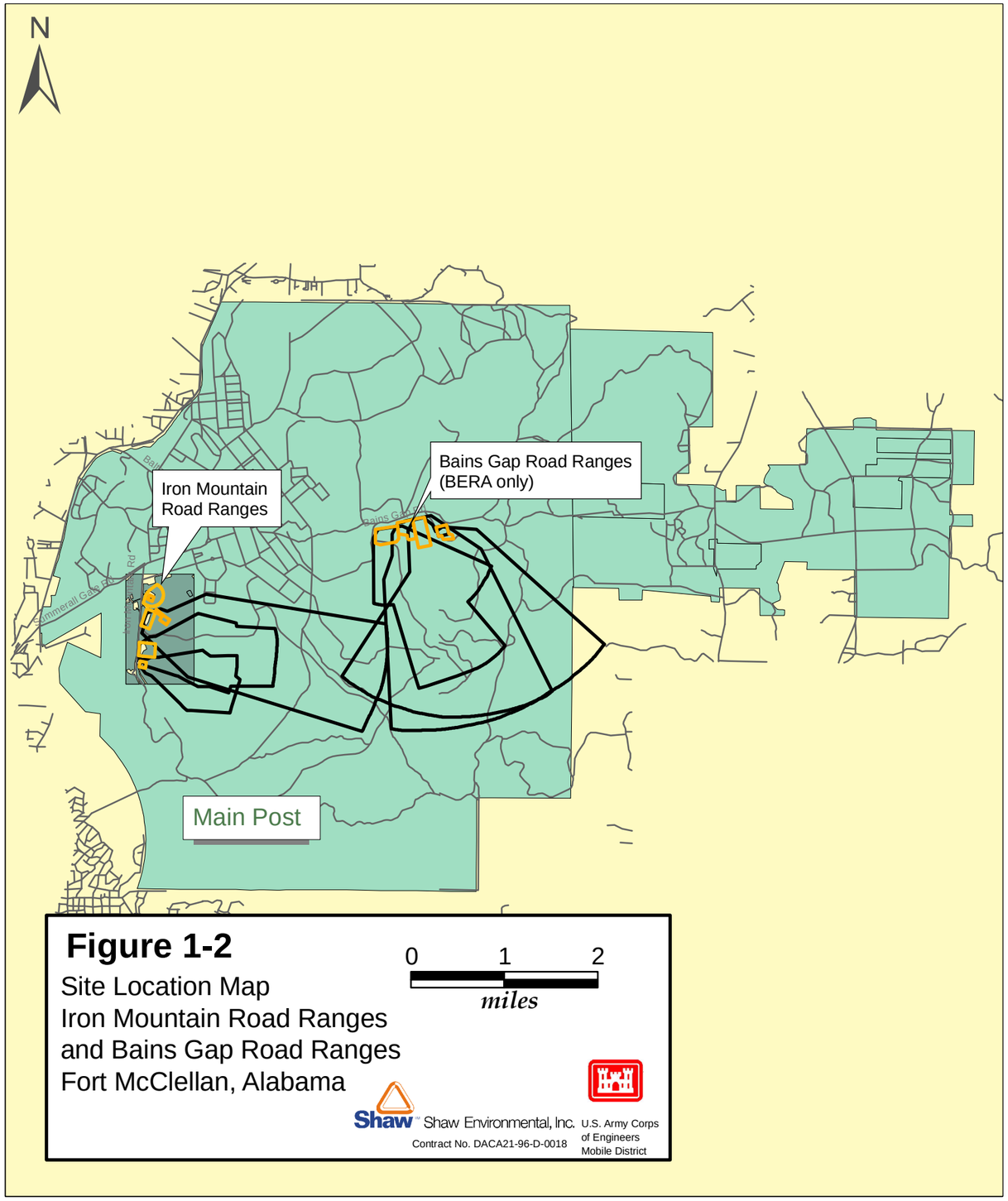

Figure 1-2

Site Location Map
Iron Mountain Road Ranges
and Bains Gap Road Ranges
Fort McClellan, Alabama

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

U.S. Army Corps of Engineers
Mobile District

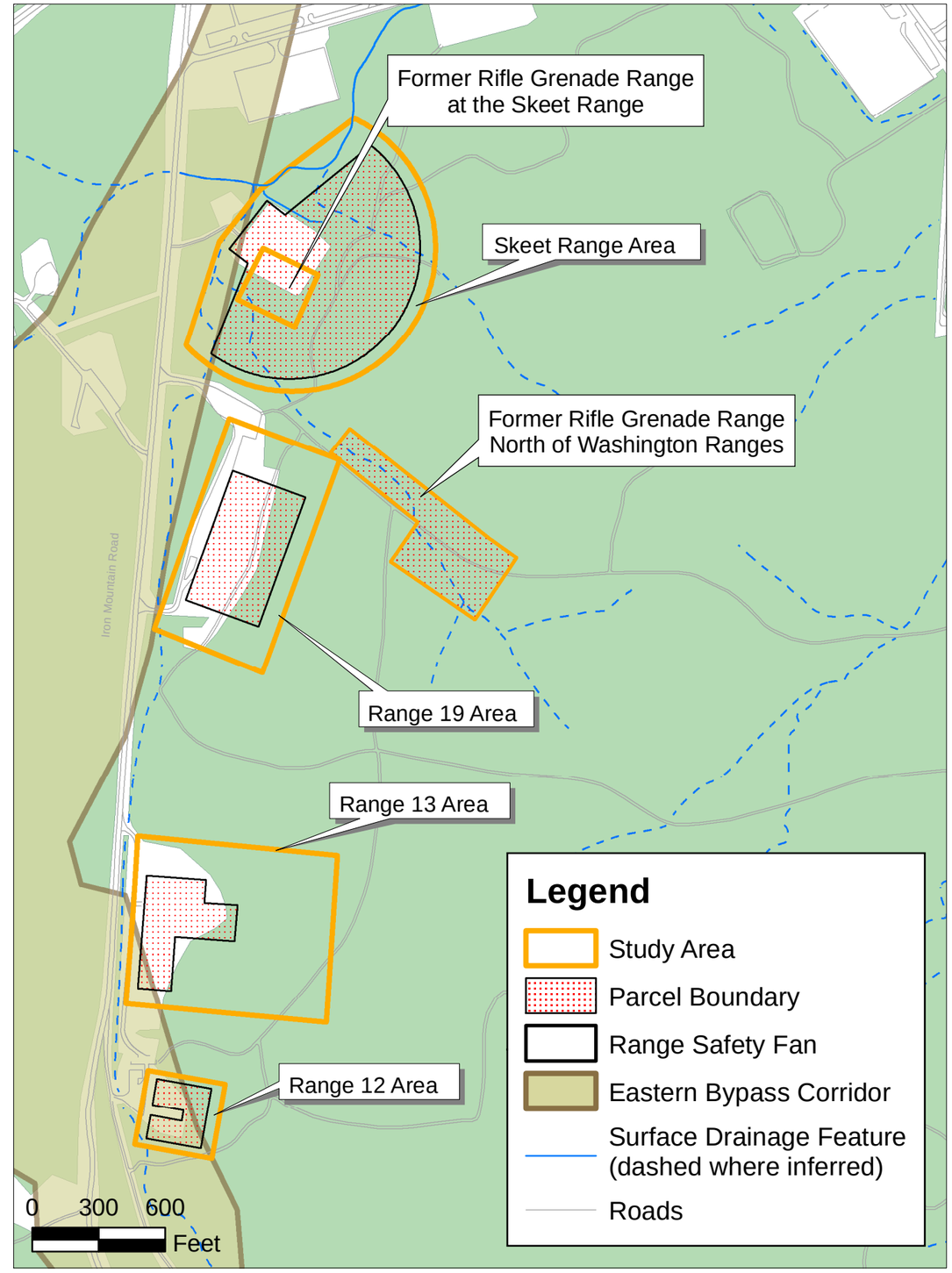

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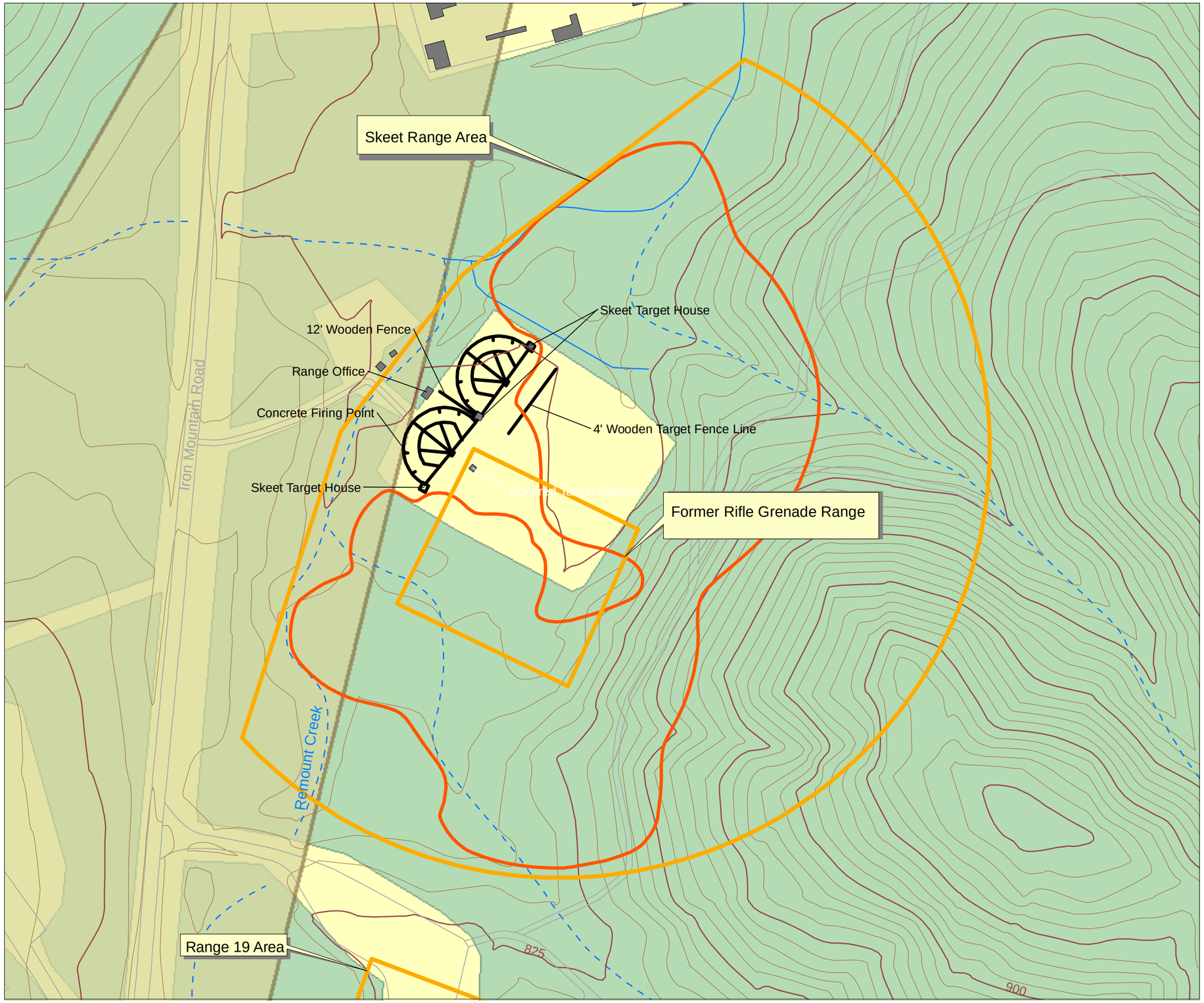
Figure 1-3

Site Map

Skeet Range, Parcel 69Q and
Former Rifle Grenade Range,
Parcel 222Q-X
Fort McClellan, Alabama



Legend

- Study Area
- Estimated Extent of Impact Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Surface Drainage Feature (dashed where intermittent)
- Topographic Contour (5-foot interval)

150 0 150 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

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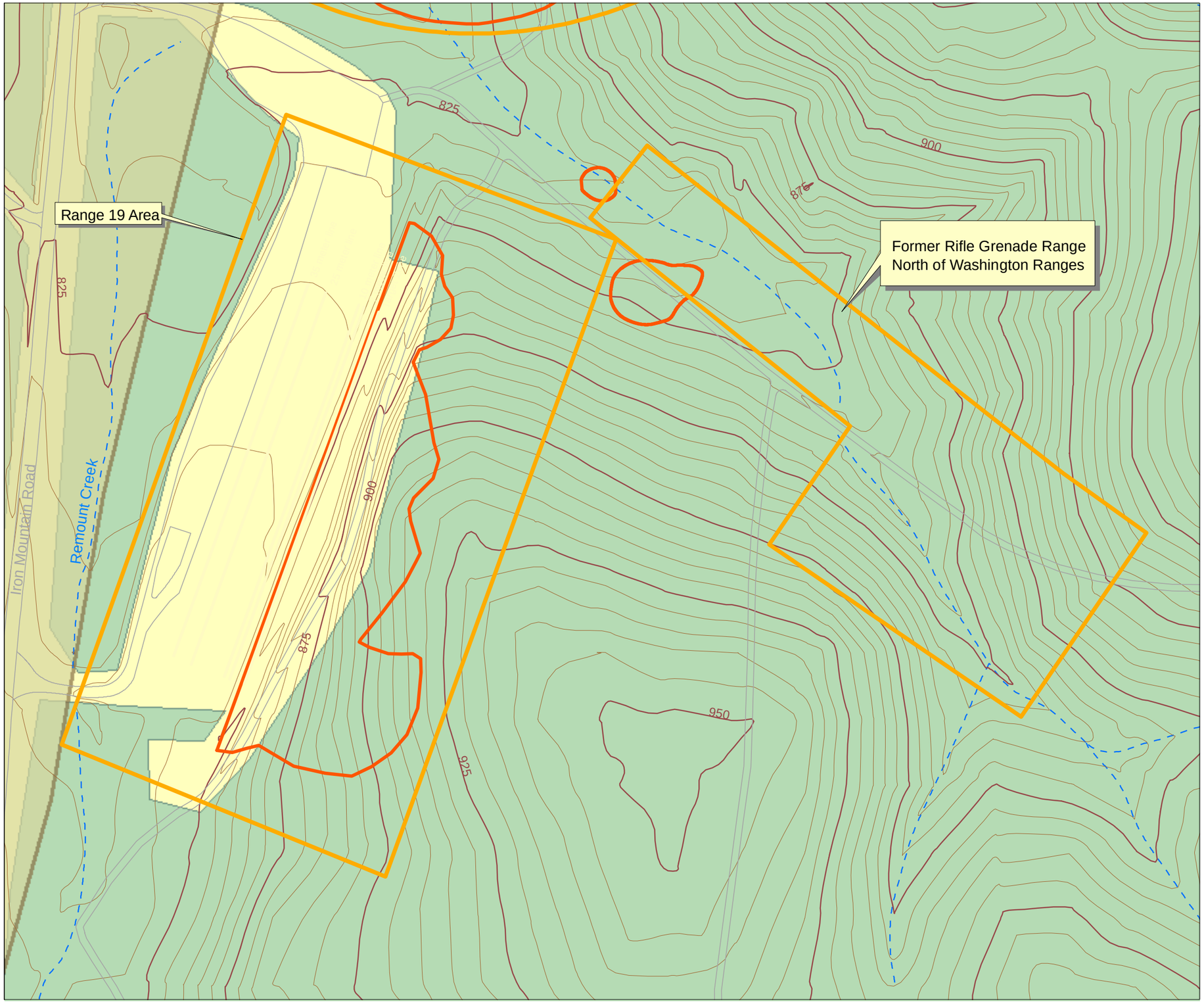

Figure 1-4

Site Map

Range 19, Parcel 75Q and
Former Rifle Grenade
Range North of Washington
Ranges, Parcel 221Q-X
Fort McClellan, Alabama

Legend

- Study Area
- Estimated Extent of Impact Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Surface Drainage Feature (dashed where intermittent)
- Topographic Contour (5-foot interval)

150 0 150 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

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Mobile District

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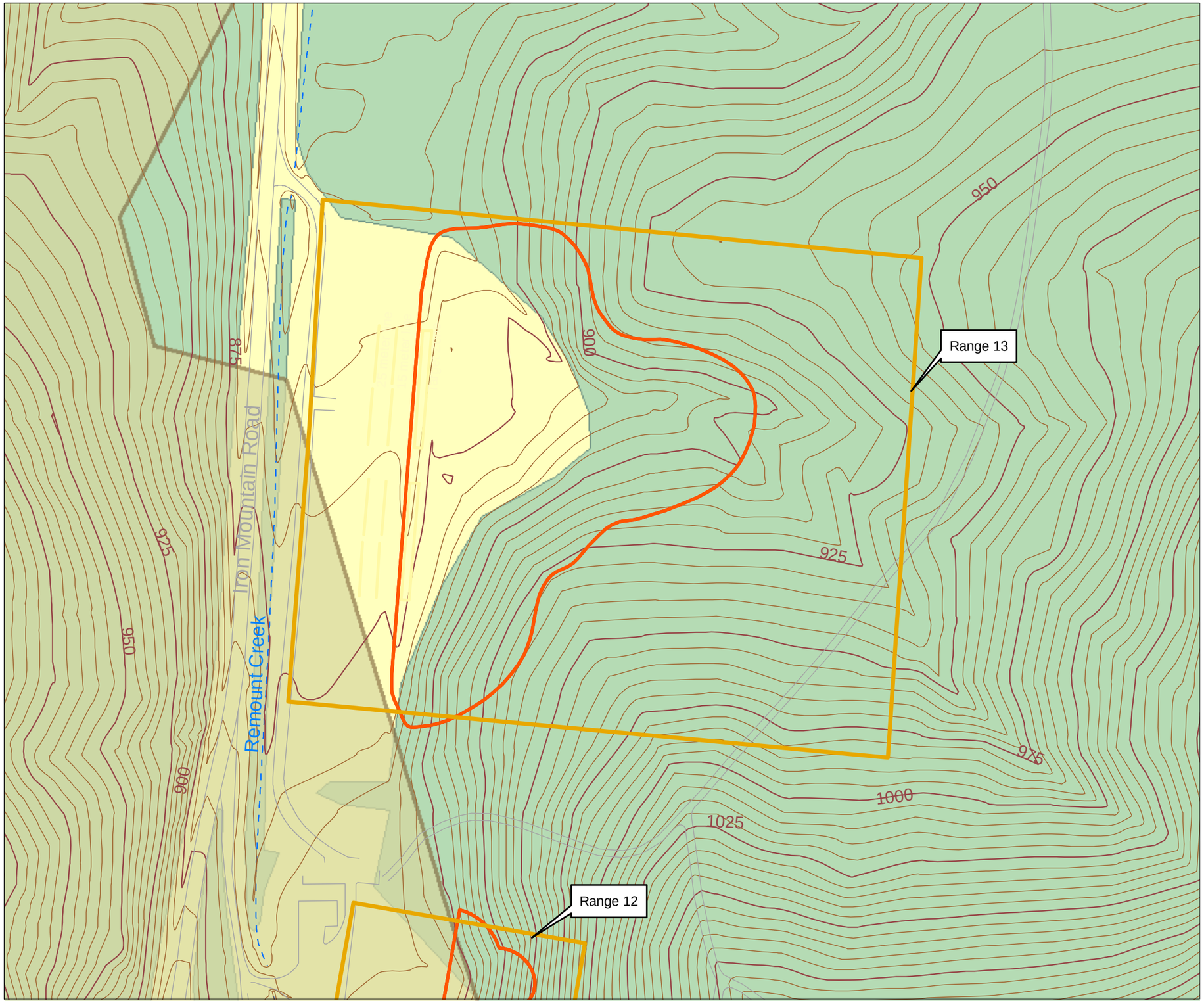

Figure 1-5

Site Map

Range 13, Parcel 71Q
Fort McClellan, Alabama

Legend

- Study Area
- Estimated Extent of Impact Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Surface Drainage Feature (dashed where intermittent)
- Topographic Contour (5-foot interval)

150 0 150 Feet

NAD83 State Plane Coordinates

N

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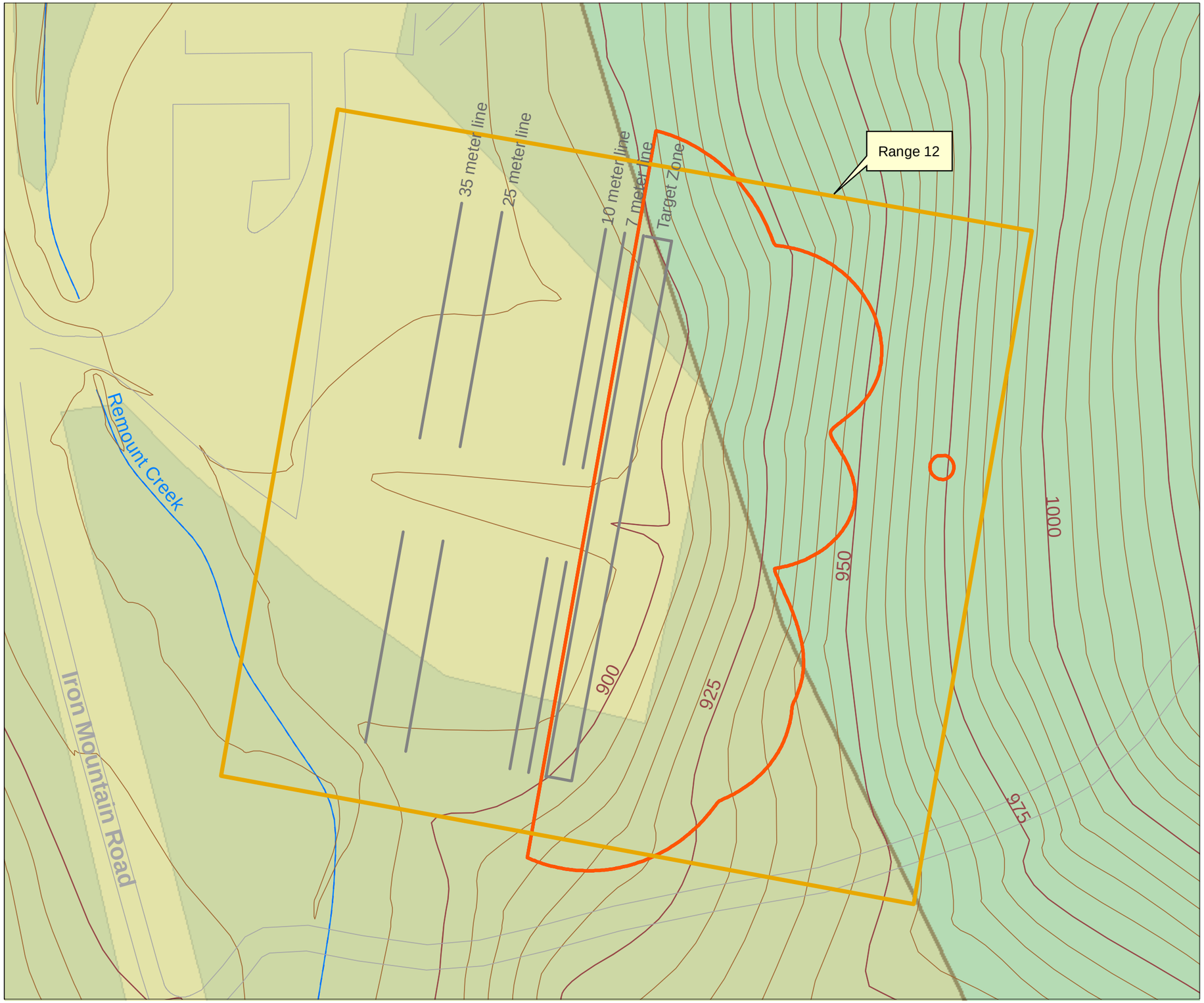

Figure 1-6

Site Map

Range 12, Parcel 70Q
Fort McClellan, Alabama

Legend

- Study Area
- Estimated Extent of Impact Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Surface Drainage Feature (dashed where intermittent)
- Topographic Contour (5-foot interval)

50 0 50 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

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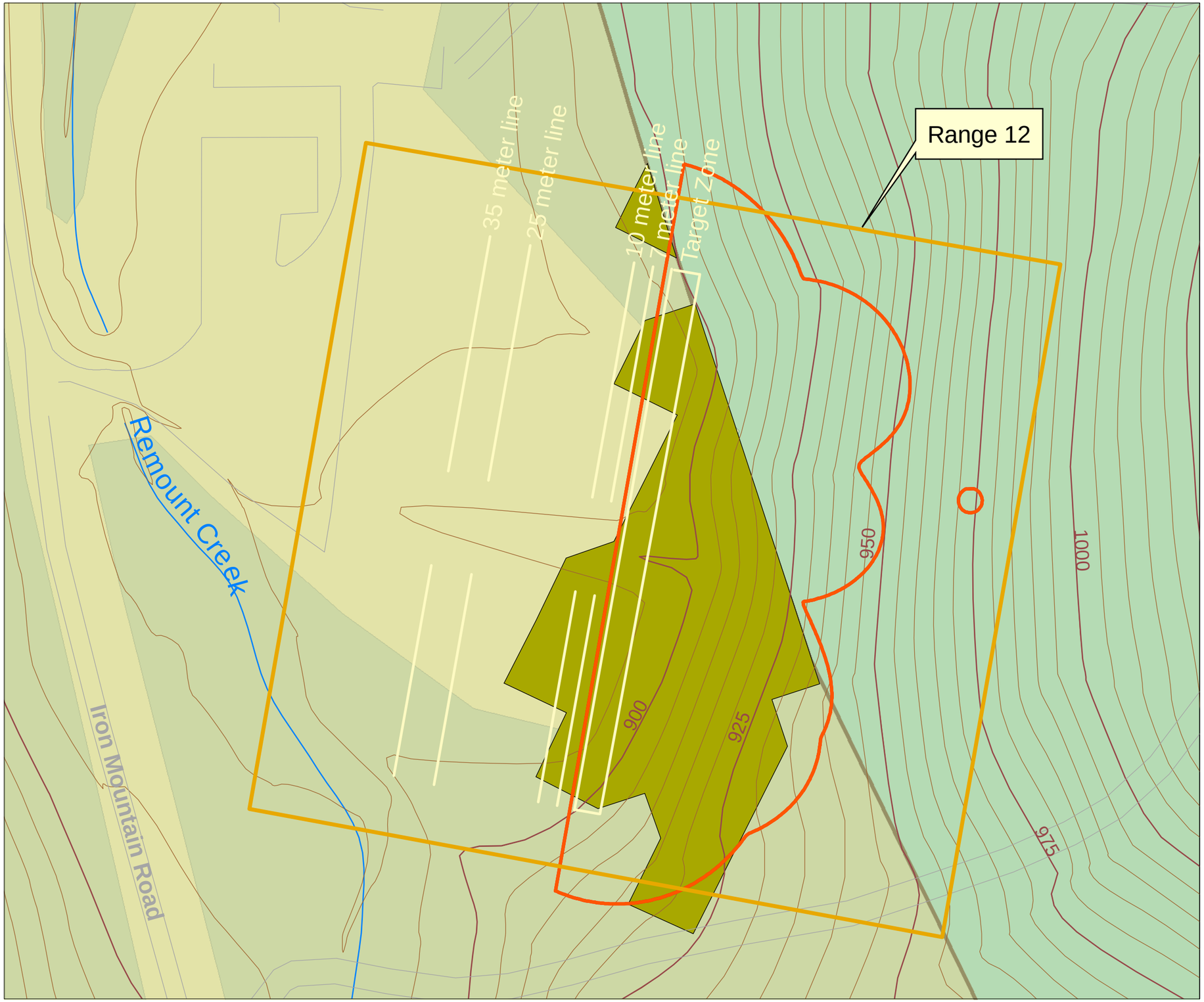

Figure 1-7

Excavation Limit from 2004-2006 Soil Removal Action

Range 12, Parcel 70Q
Fort McClellan, Alabama

Legend

- Study Area
- Estimated Extent of Impact Area
- Excavation Area from the 2004-2006 Soil Removal Action (Reference report section 1.2.2.4)
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Surface Drainage Feature (dashed where intermittent)
- Topographic Contour (5-foot interval)

50 0 50 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

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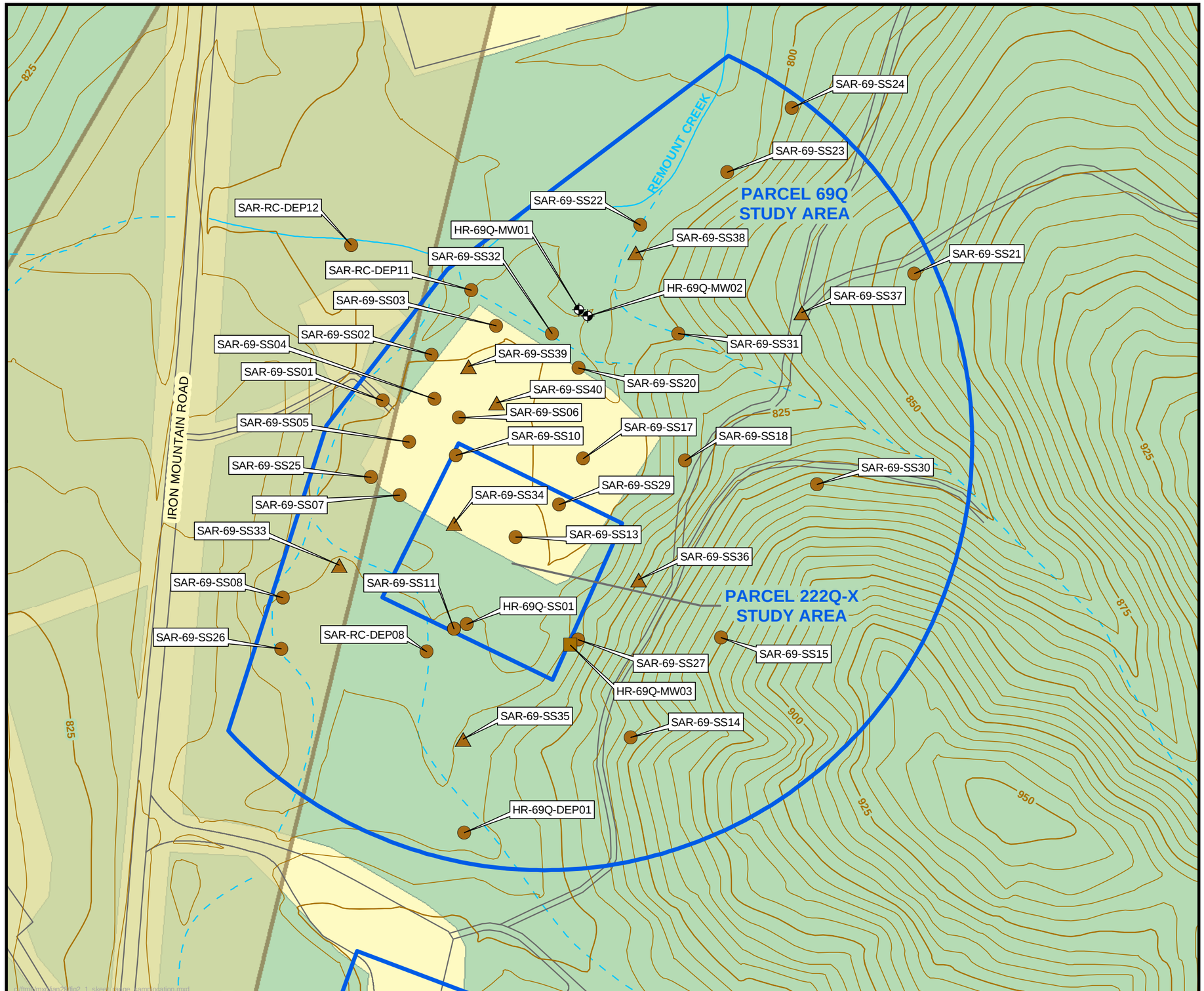

Figure 2-1

Sample Location Map

Skeet Range, Parcel 69Q and
Former Rifle Grenade Range,
Parcel 222Q-X
Fort McClellan, Alabama

Legend

- Surface Soil Sample Location
- Surface and Subsurface Soil Sample Location
- Subsurface Soil Sample Location
- Monitoring Well/Groundwater Sample Location
- Study Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (5-foot interval)

150 0 150 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

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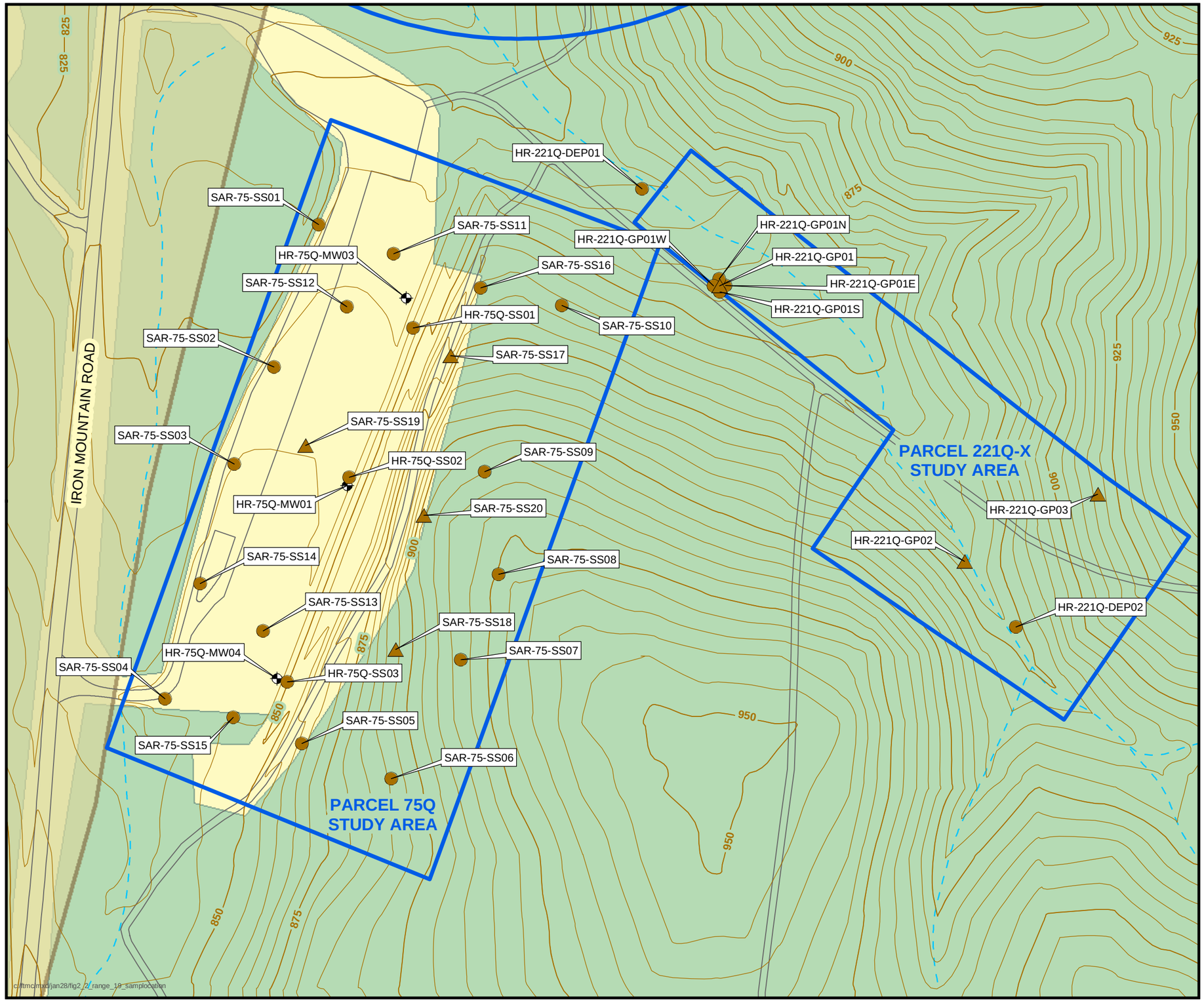

Figure 2-2

Sample Location Map

Range 19, Parcel 75Q and
Former Rifle Grenade
Range North of Washington
Ranges, Parcel 221Q-X
Fort McClellan, Alabama

Legend

- Surface Soil Sample Location
- Surface and Subsurface Soil Sample Location
- Monitoring Well/Groundwater Sample Location (HR-75Q-MW03 - not sampled because well was dry)
- Study Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Intermittent Surface Drainage Feature
- Topographic Contour (5-foot interval)

150 0 150 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

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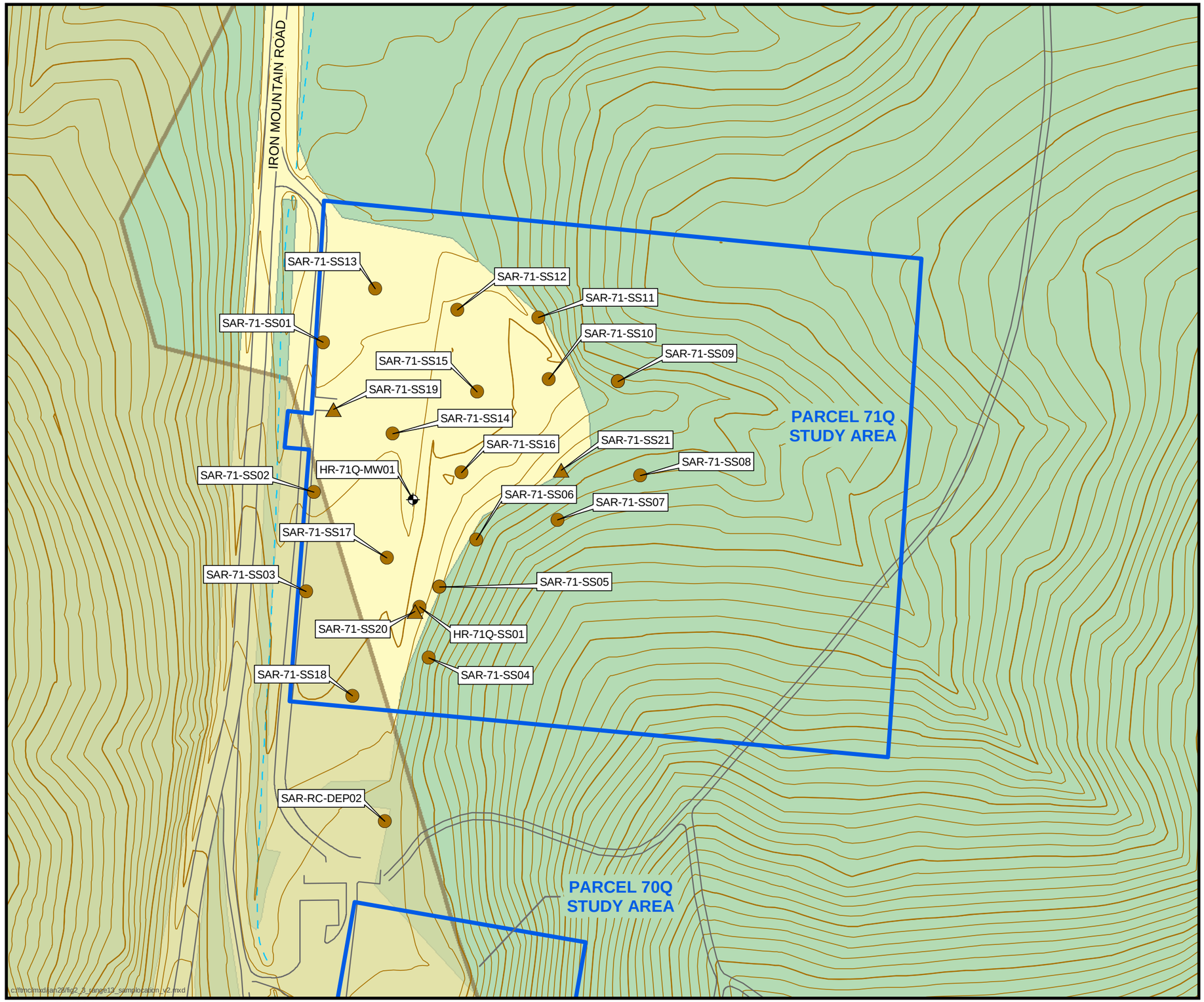
Figure 2-3

Sample Location Map

Range 13, Parcel 71Q
Fort McClellan, Alabama



Legend

- Surface Soil Sample Location
- Surface and Subsurface Soil Sample Location
- Monitoring Well/Groundwater Sample Location
- Study Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Intermittent Surface Drainage Feature
- Topographic Contour (5-foot interval)

150 0 150 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

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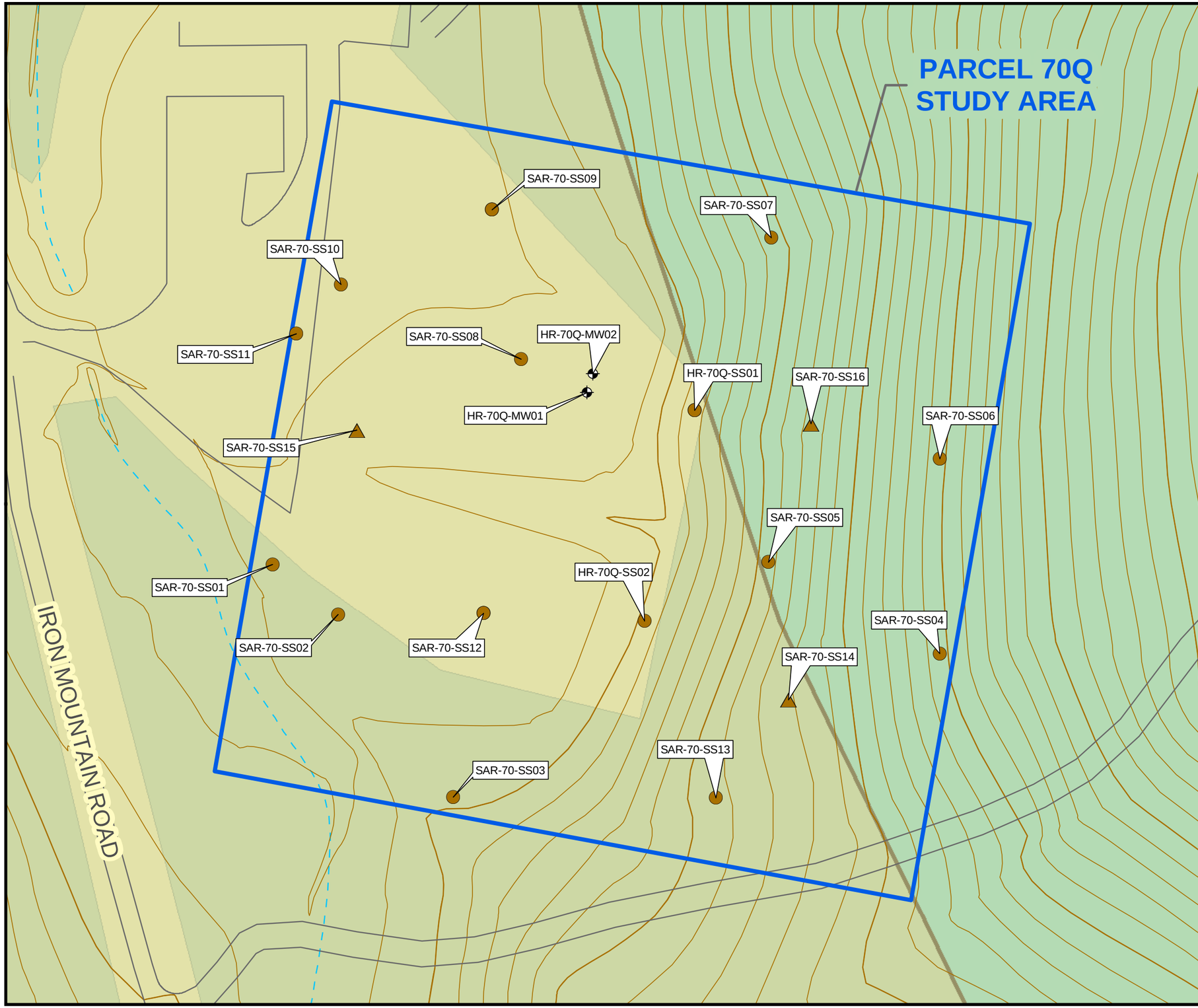
Figure 2-4

Sample Location Map

Range 12, Parcel 70Q
Fort McClellan, Alabama



Legend

- Surface Soil Sample Location
- Surface and Subsurface Soil Sample Location
- Monitoring Well/Groundwater Sample Location (HR-70Q-MW01 - not sampled because well was dry)
- Study Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Intermittent Surface Drainage Feature
- Topographic Contour (5-foot interval)

50 0 50 Feet

NAD83 State Plane Coordinates

N

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Contract No. DACA21-96-D-0018

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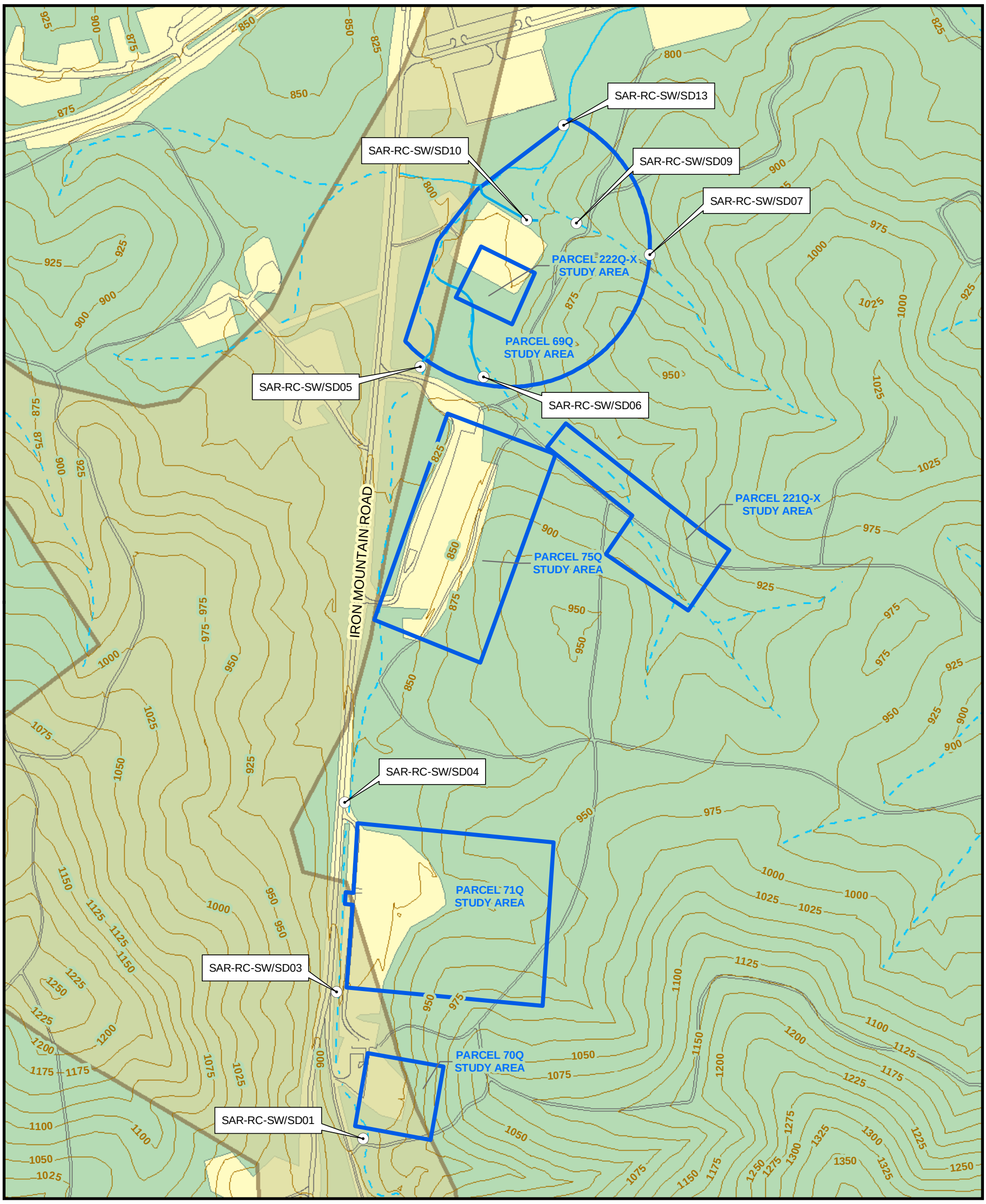

Legend

- Surface Water/Sediment Sample Location
- Study Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (25-foot interval)

N

Figure 2-5

Surface Water/Sediment Sample Locations Iron Mountain Road Ranges

450 0 450 Feet

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

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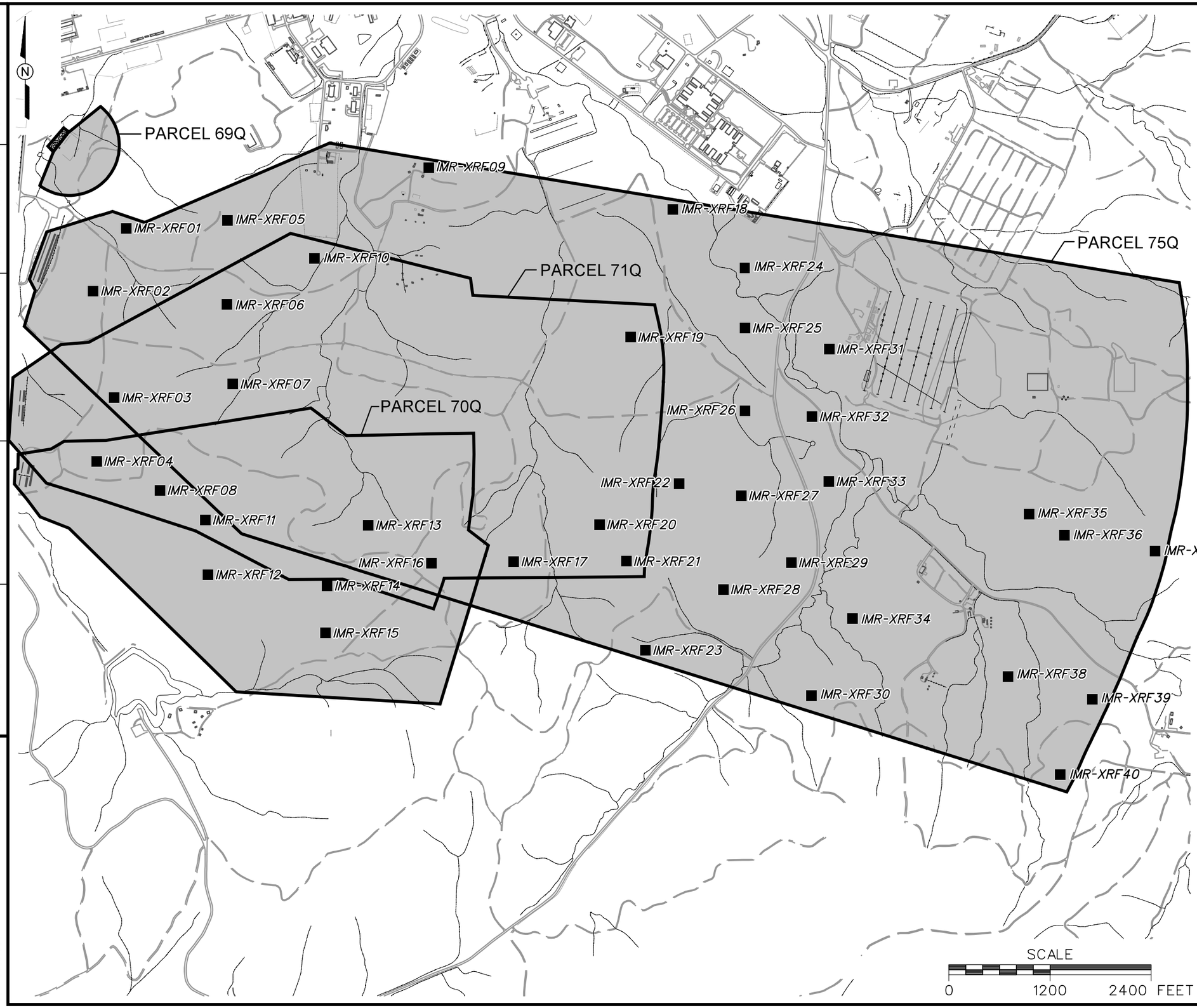


LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- BERM
- XRF SURFACE SOIL SCREENING LOCATION

NOTE

ALL SAMPLES FOR XRF ANALYSIS WERE COLLECTED AT 0-2 INCHES BELOW SURFACE.

FIGURE 2-6
SITE MAP
XRF SURVEY OF RANGE SAFETY FANS
IRON MOUNTAIN ROAD RANGES

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

Shaw® Shaw Environmental, Inc.

DWG. NO.: 800486es.080	PROJ. NO.: 800486
INITIATOR: G. SISCO	PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY:	ENGR. CHCK. BY: S. MORAN
DATE LAST REV.:	DRAWN BY:
STARTING DATE: 01/24/04	DRAWN BY: L. STOUT
4/30/2008 10:57:18 AM	800486es.080
smccawley	

Figure 2-7.
XRF and Laboratory Confirmation Analysis Summary, All Values Measured
Fort McClellan XRF Surveys Combined (2001 - 2008)

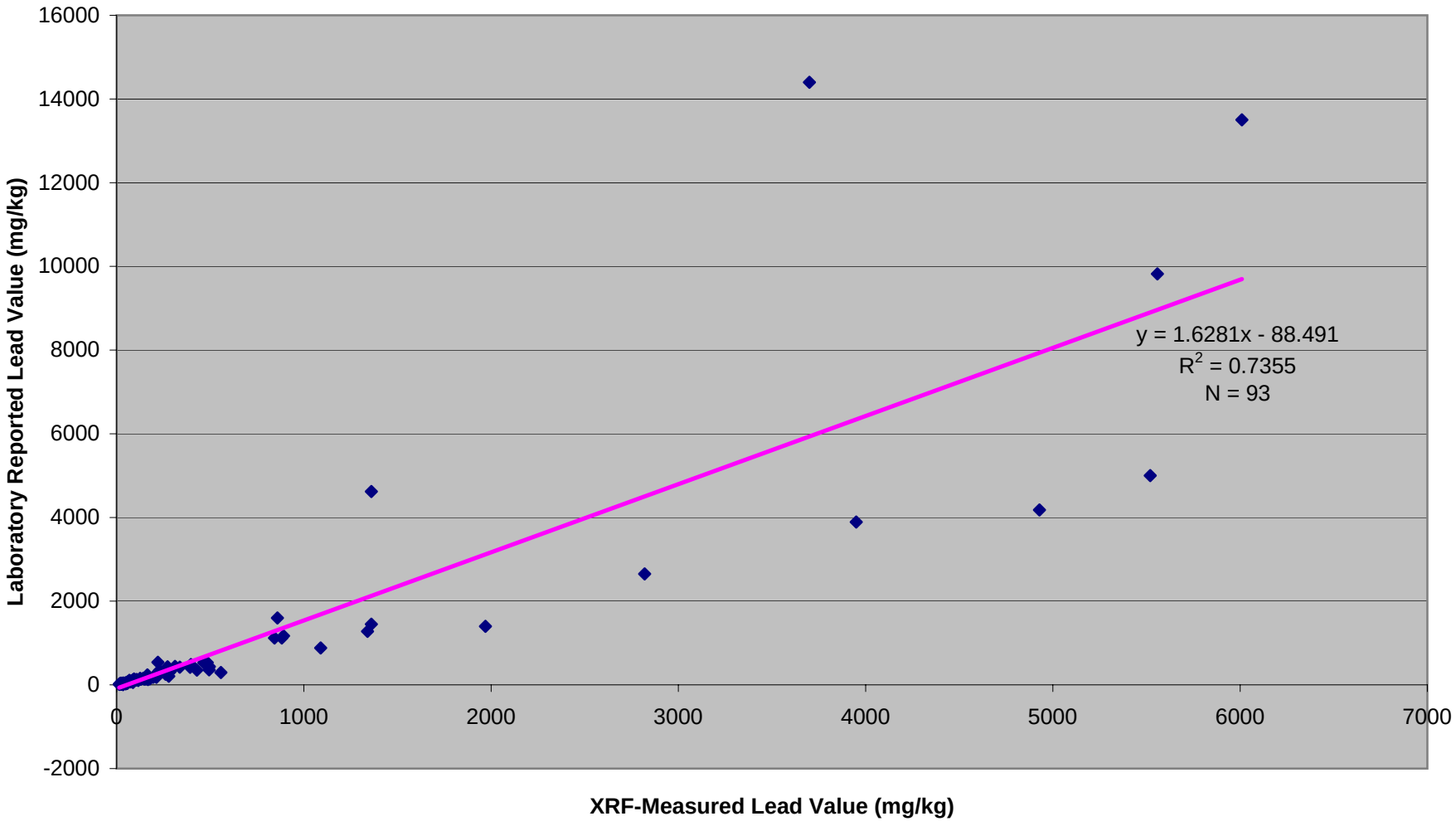
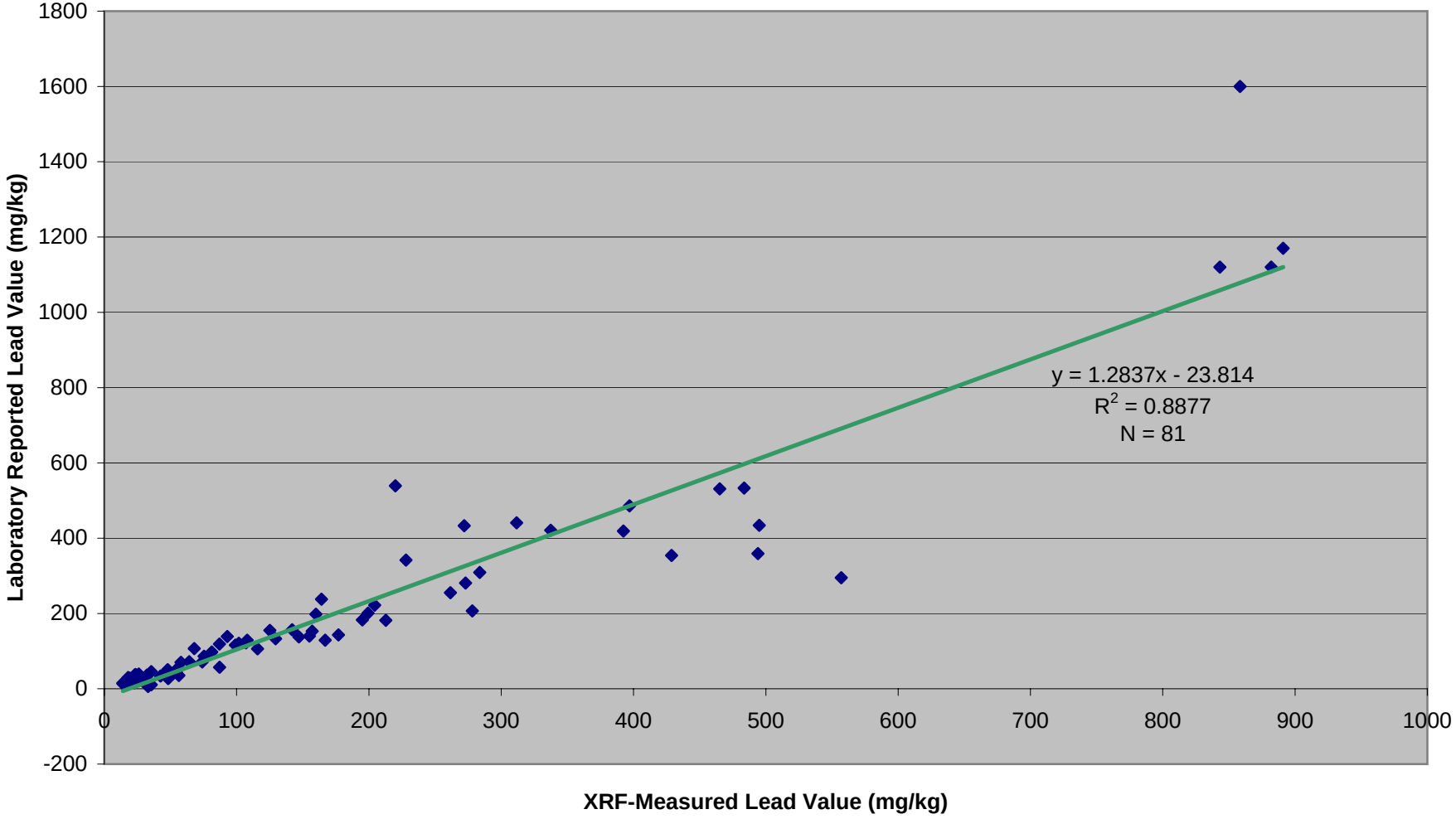


Figure 2-8.
XRF and Laboratory Confirmation Analysis Summary, All XRF Values Less Than 1,000 mg/kg
Fort McClellan XRF Surveys Combined (2001 - 2008)



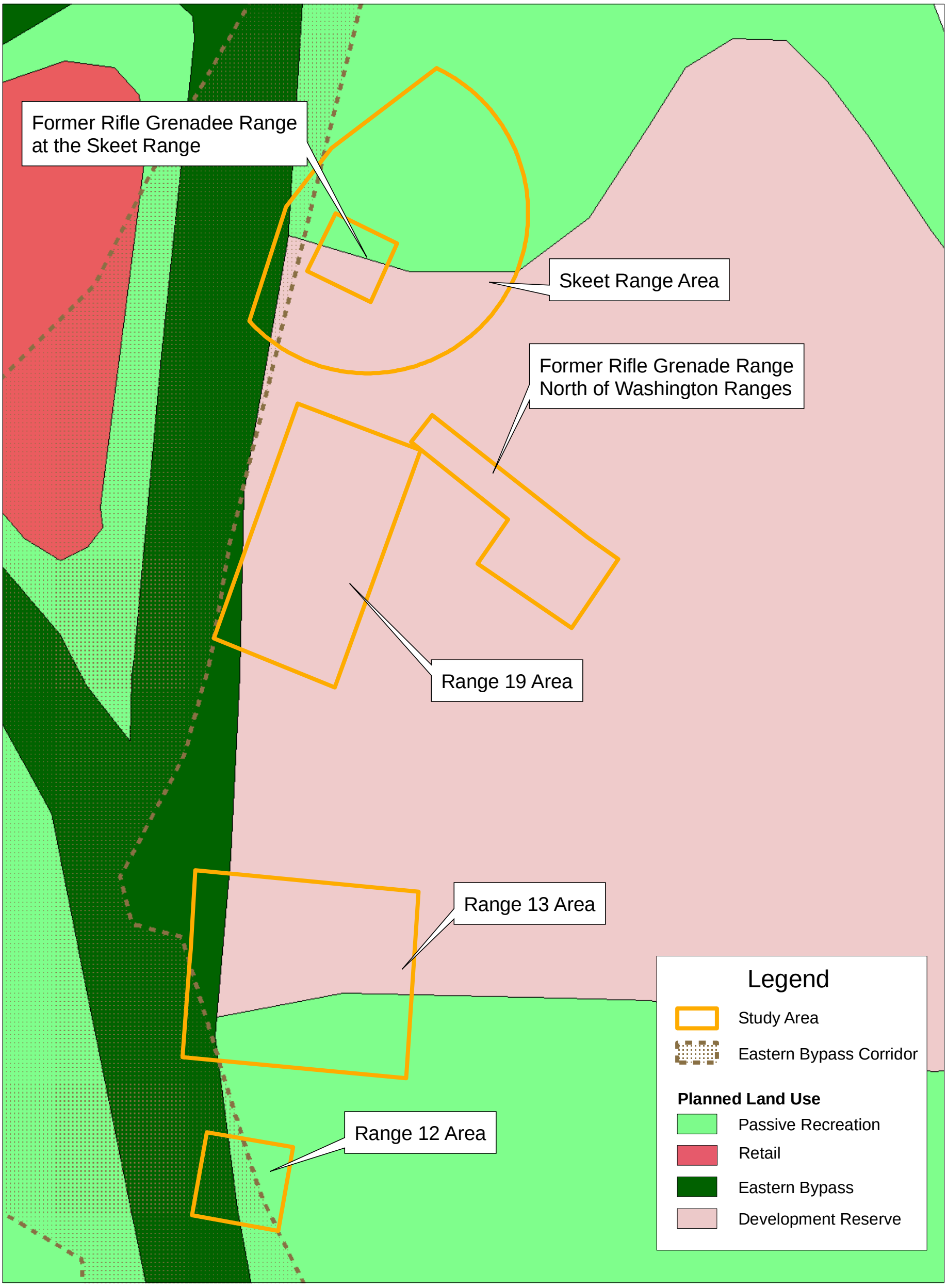


Figure 3-1

Land Reuse Map
Iron Mountain Road Ranges

Shaw™ Shaw Environmental, Inc.

Contract No. DACA21-96-D-0018

N

400 0 400 Feet

NAD83 State Plane Coordinates

U.S. Army Corps of Engineers Mobile District

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Legend

- Study Area
- Building
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (25-foot interval)

Figure 3-2

Topographic and Surface Water Features
Iron Mountain Road Ranges

N

450 0 450 Feet

NAD83 State Plane Coordinates

Shaw Environmental, Inc.

Contract No. DACA21-96-D-0018

U.S. Army Corps of Engineers
Mobile District

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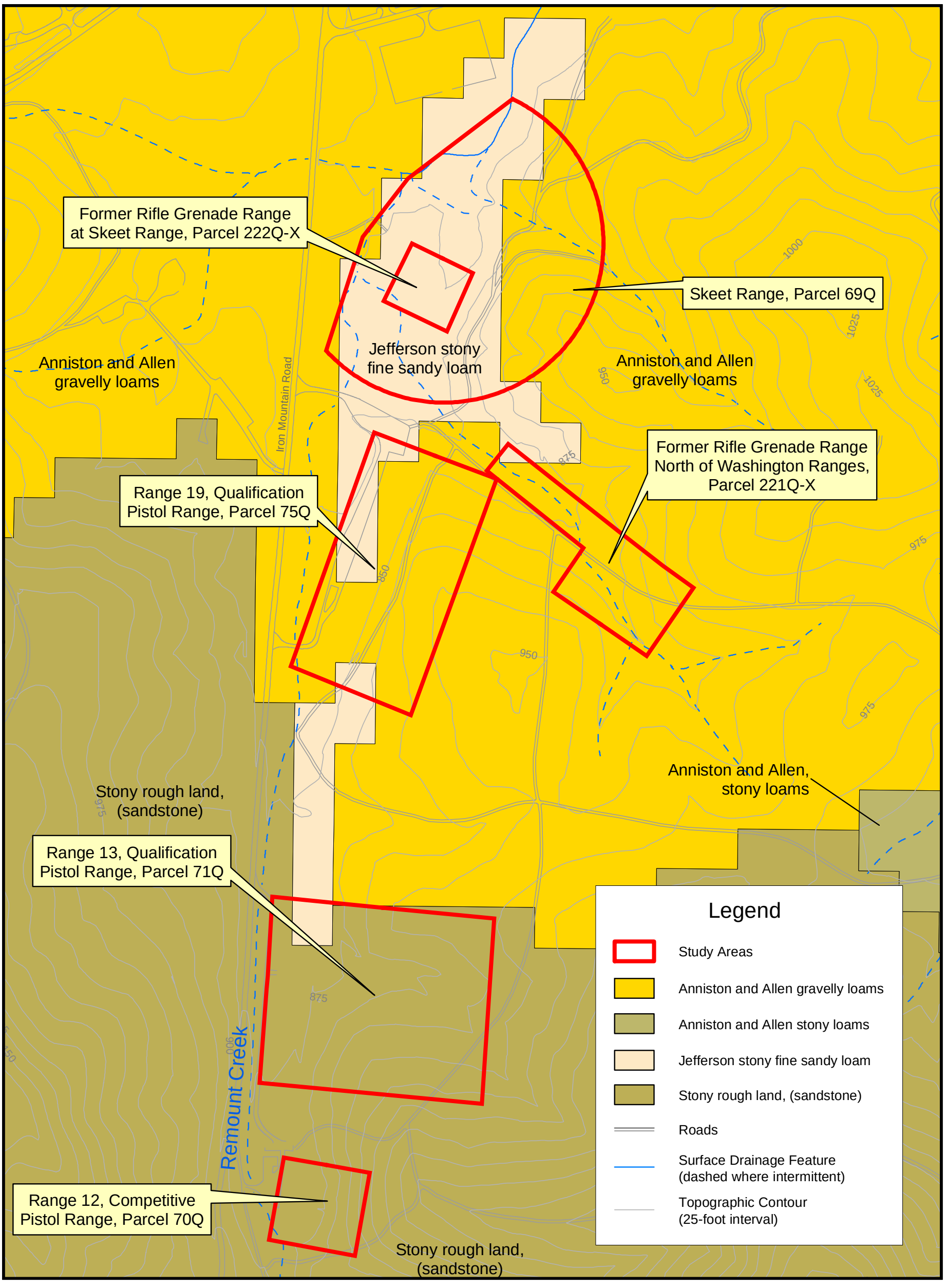

Figure 3-3

Soil Map
Iron Mountain Road Ranges

Shaw Environmental, Inc.

Contract No. DACA21-96-D-0018

N

400 0 400 Feet

NAD83 State Plane Coordinates

U.S. Army Corps of Engineers Mobile District

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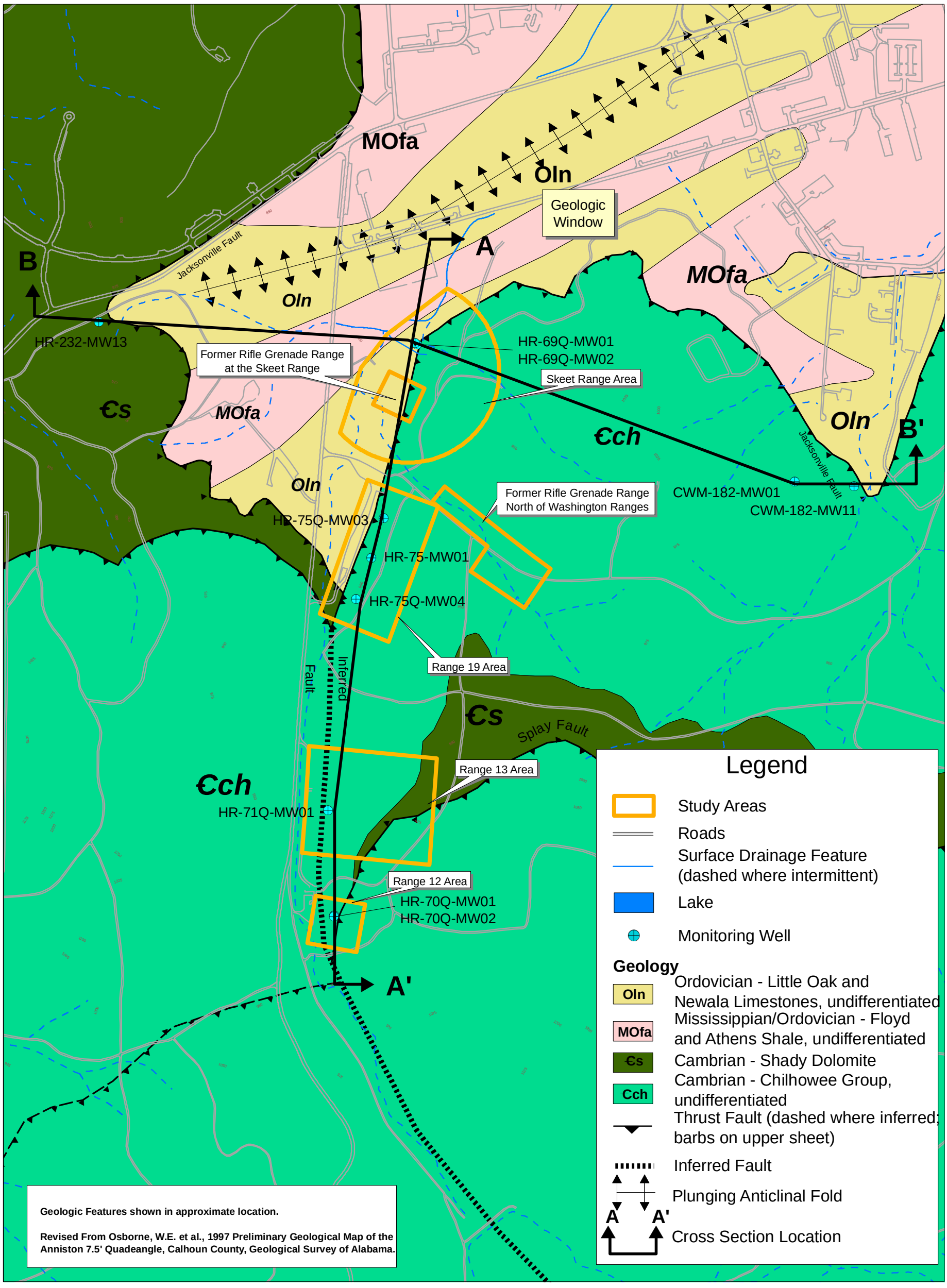

Figure 3-4

Geologic Map - Iron Mountain Road Ranges

N

760 380 0 760 Feet

NAD83 State Plane Coordinates

Shaw Environmental, Inc.

Contract No. DACA21-96-D-0018

U.S. Army Corps of Engineers Mobile District

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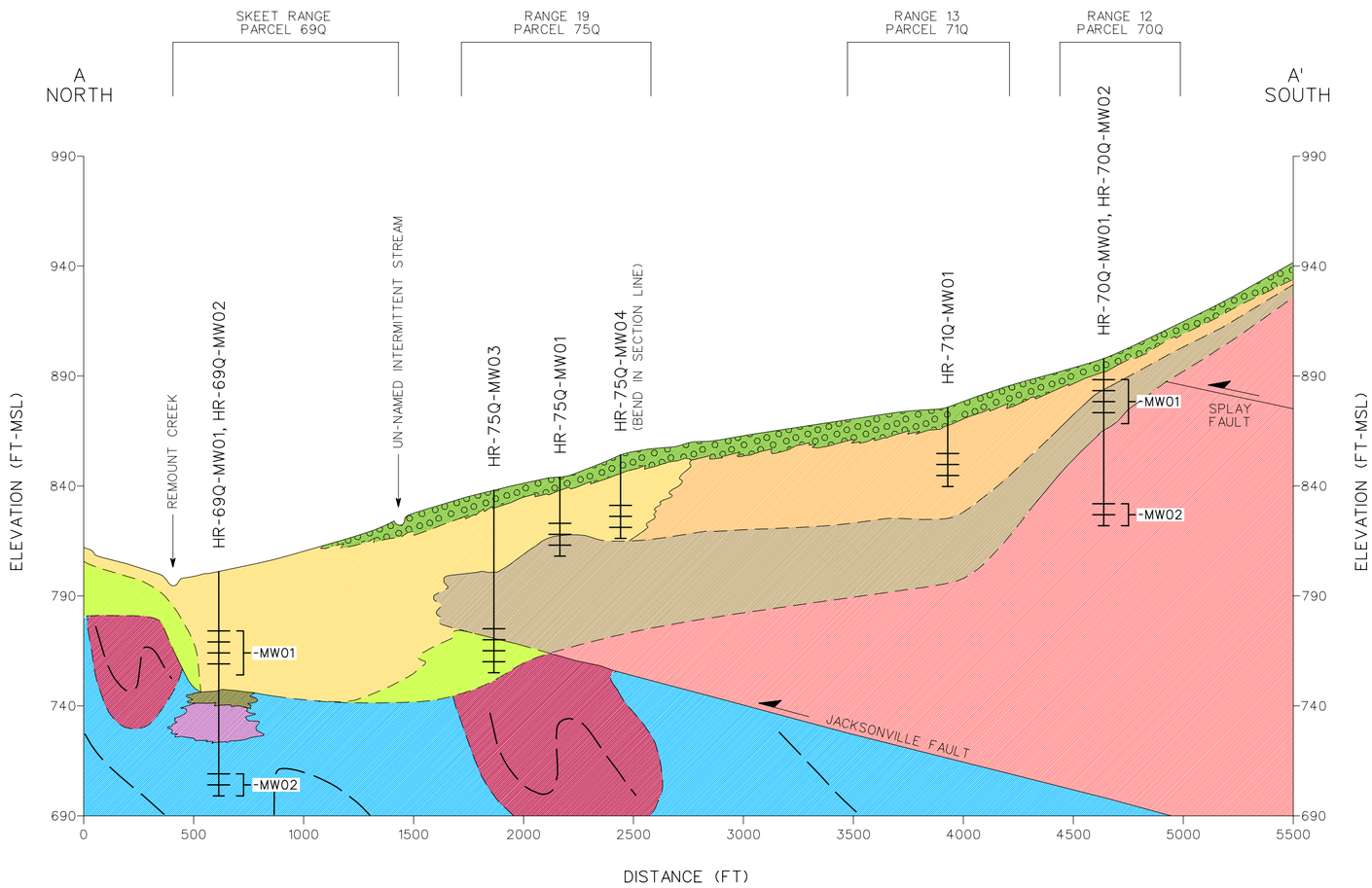

LEGEND

- SCREEN INTERVAL
- GEOLOGIC CONTACT DASHED WHERE INFERRED
- INFERRED BEDDING
- INFERRED FAULT
- GRAVELLY, SANDY, SILTS, AND CLAY
- HARD, LAMINATED, SILTY CLAY W/ LITTLE SAND AND GRAVEL
- GRAVELLY SAND AND CLAY
- LAMINATED SAND, SILT, AND CLAY
- SILTY CLAY
- WEATHERED SANDSTONE
- CLAY-FILLED VOID
- MISSISSIPPIAN / ORDOVICIAN - FLOYD AND ATHENS SHALE UNDIFFERENTIATED
- ORDOVICIAN - LITTLE OAK AND NEWALA LIMESTONES UNDIFFERENTIATED
- CAMBRIAN - CHILHOWEE GROUP UNDIFFERENTIATED

NOTE:

1. CROSS SECTION LOCATION SHOWN ON FIGURE 3-4.

HORIZONTAL
0 500 1000 FEET

VERTICAL
0 50 100 FEET

FIGURE 3-5
GEOLOGIC CROSS SECTION A-A'
IRON MOUNTAIN ROAD
PARCELS 69Q, 70Q, 71Q, 221Q-X
AND 222Q

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

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DRAWN BY: L. STOUT | DRAWN BY: | ENGR. CHCK. BY: B. HEDBERG | PROJ. MGR.: J. YACOUB | PROJ. NO.: 800486

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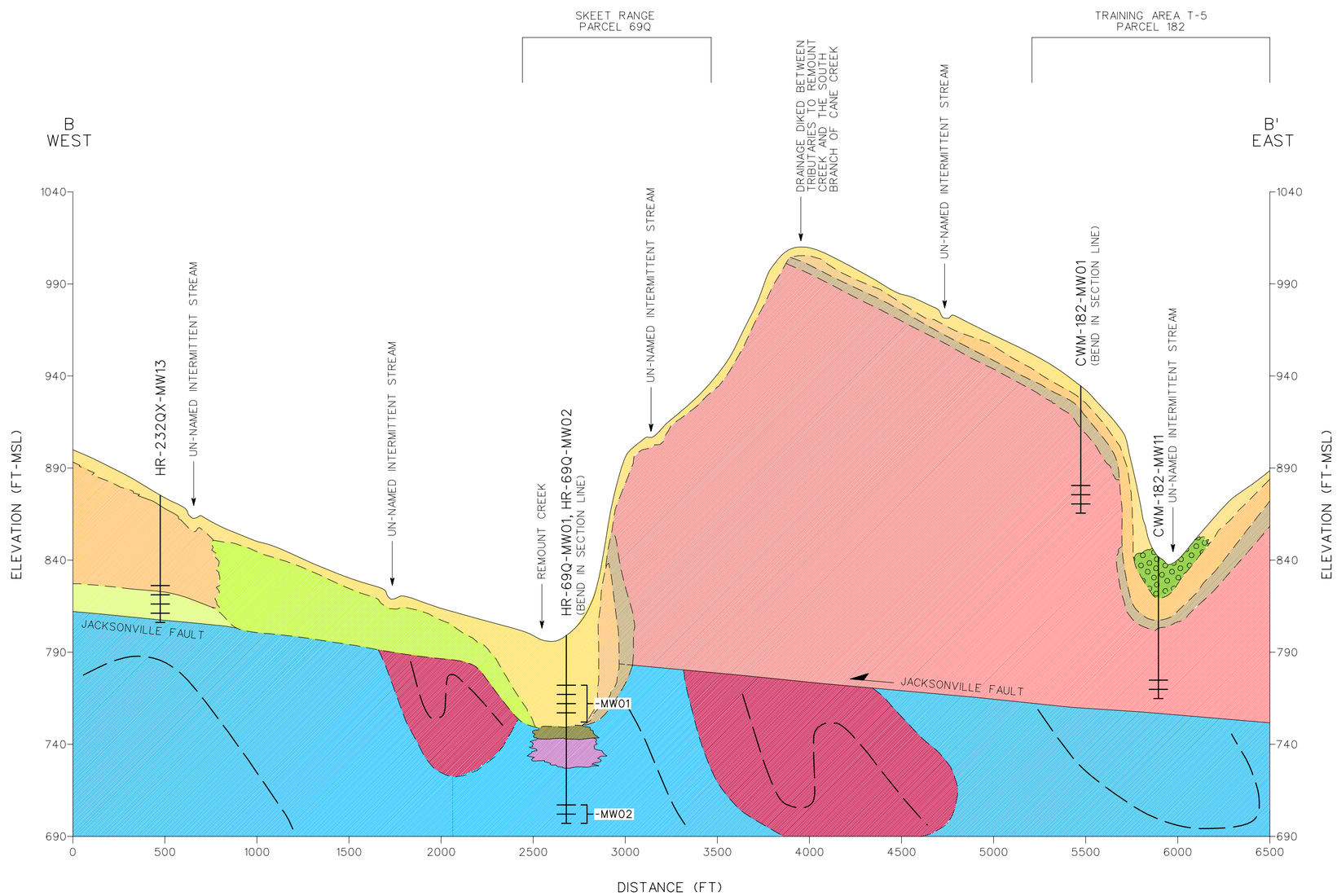

LEGEND

- SCREEN INTERVAL
- GEOLOGIC CONTACT DASHED WHERE INFERRED
- INFERRED BEDDING
- INFERRED FAULT
- GRAVELLY, SANDY, SILTS, AND CLAY
- HARD, LAMINATED, SILTY CLAY W/ LITTLE SAND AND GRAVEL
- GRAVELLY SAND AND CLAY
- LAMINATED SAND, SILT, AND CLAY
- SILTY CLAY
- WEATHERED SANDSTONE
- CLAY-FILLED VOID
- MISSISSIPPIAN / ORDOVICIAN - FLOYD AND ATHENS SHALE UNDIFFERENTIATED
- ORDOVICIAN - LITTLE OAK AND NEWALA LIMESTONES UNDIFFERENTIATED
- CAMBRIAN - CHILHOWEE GROUP UNDIFFERENTIATED
- CAMBRIAN SHADY DOLOMITE

NOTE:

1. CROSS SECTION LOCATION SHOWN ON FIGURE 3-4.

HORIZONTAL
0 500 1000 FEET

VERTICAL
0 50 100 FEET

FIGURE 3-6
GEOLOGIC CROSS SECTION B-B'
IRON MOUNTAIN ROAD
PARCELS 69Q, 70Q, 71Q, 221Q-X
AND 222Q

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Contract No. DACA21-96-D-0018

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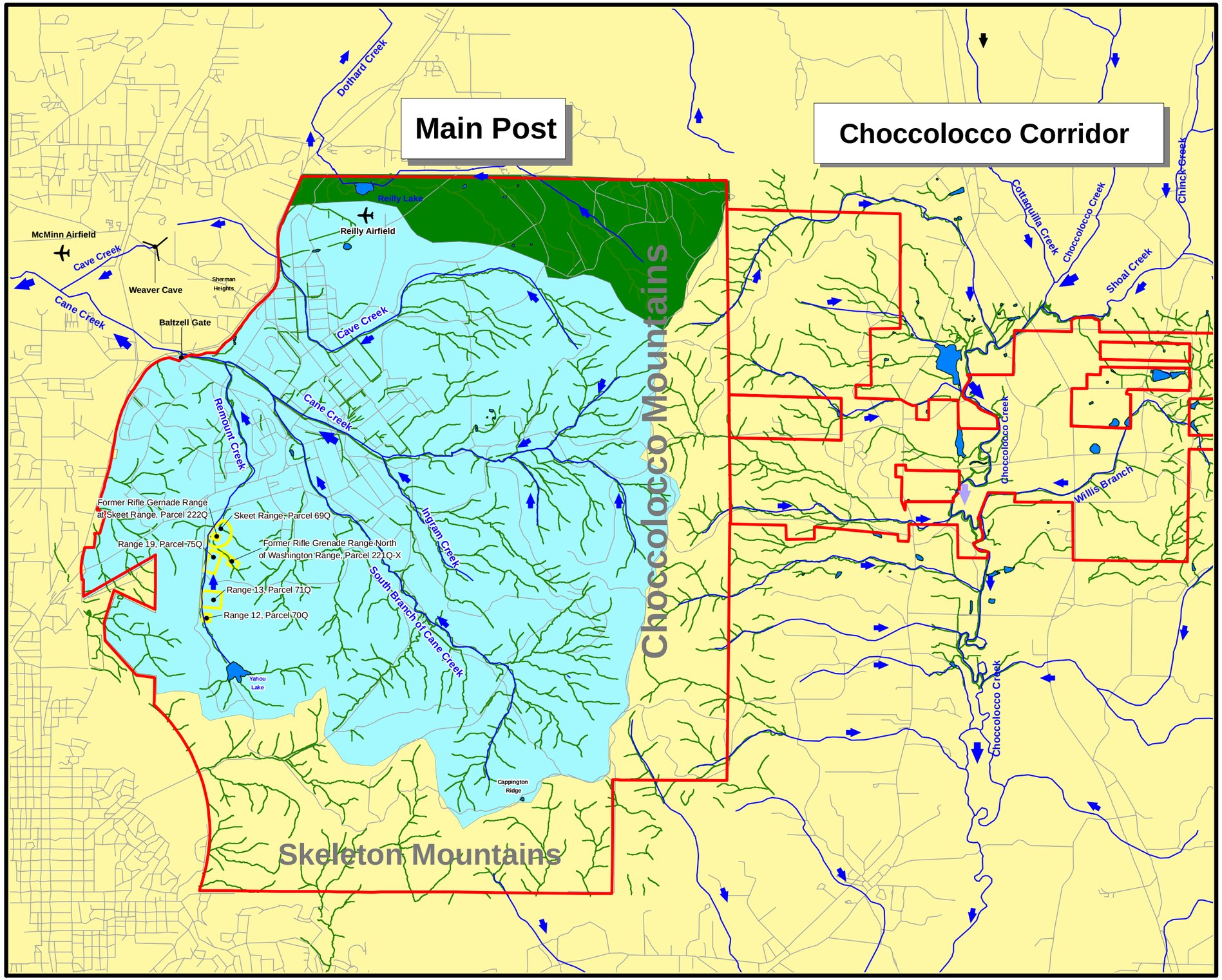

Figure 3-7

Drainage Basin Map

Iron Mountain Road Ranges
Fort McClellan, Alabama

Legend

- Main Post and Choccolocco Corridor Boundries
- Roads
- Major Streams (may be intermittent)
- Surface Water Feature (may be ephemeral)
- Surface Water Flow Direction
- Airfields
- Cave
- IMR Study Areas
- Cane Creek Drainage Basin
- Tallasseehatchee Creek Drainage Basin
- Choccolocco Creek Drainage Basin

4,500 0 4,500 Feet

NAD83 State Plane Coordinates

N

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U.S. Army Corps of Engineers Mobile District

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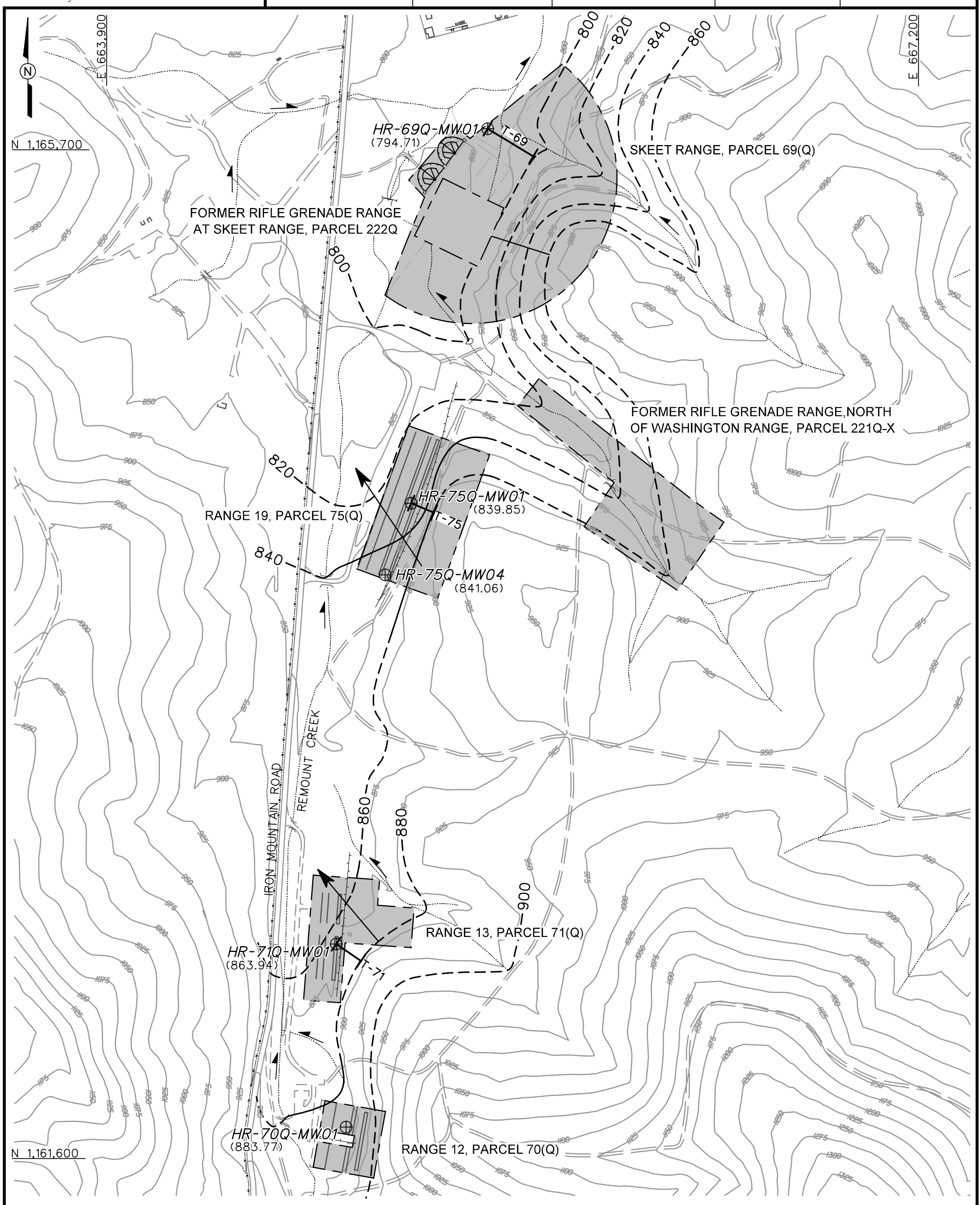

LEGEND:

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAHPIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- GROUNDWATER ELEVATION COUTOURS (DASHED WHERE INFERRED)
- (794.71) GROUNDWATER ELEVATION (FT MSL) (JUNE 26, 2003)
- GROUNDWATER FLOW DIRECTION
- TREES / TREELINE
- STUDY AREA
- PARCEL BOUNDARY
- BRIDGE
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK W/FLOW DIRECTION
- MANMADE SURFACE DRAINAGE FEATURE
- BERM
- T-75 HORIZONTAL HYDRAULIC GRADIENT TRANSECT
- MONITORING WELL LOCATION

SCALE

0 400 800 FEET

FIGURE 3-8
POTENTIOMETRIC SURFACE MAP
SHALLOW WATER-BEARING ZONE
IRON MOUNTAIN ROAD RANGES
PARCELS 69Q, 70Q, 71Q, 221Q-X
AND 222Q

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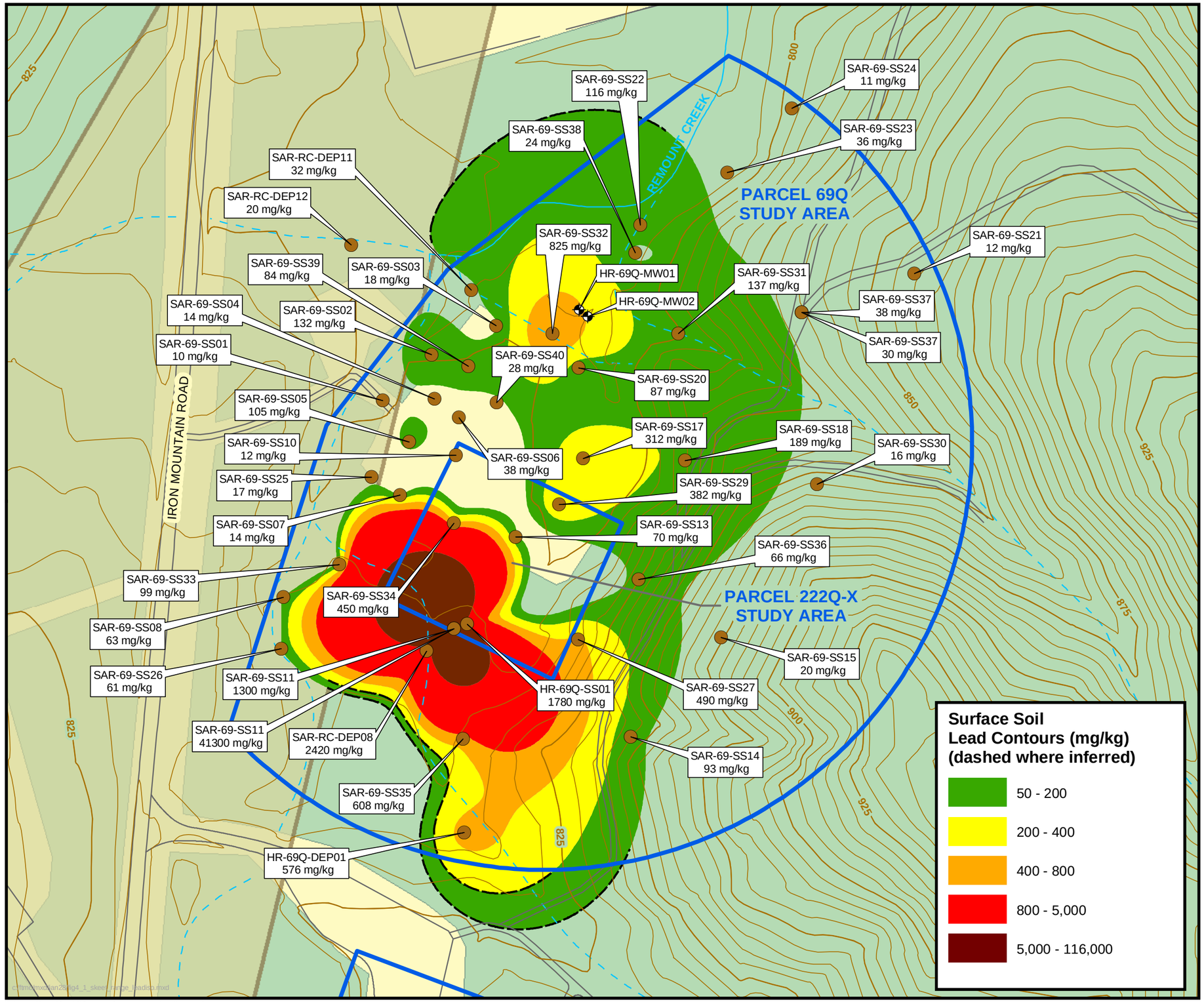
Figure 4-1

Lead in Surface Soil Isocontour Map

Skeet Range, Parcel 69Q and
Former Rifle Grenade Range,
Parcel 222Q-X
Fort McClellan, Alabama



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Legend

- Surface Soil Sample Location
- Monitoring Well (No Soil Sample Collected)
- Study Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (5-foot interval)

150 0 150 Feet

NAD83 State Plane Coordinates

N

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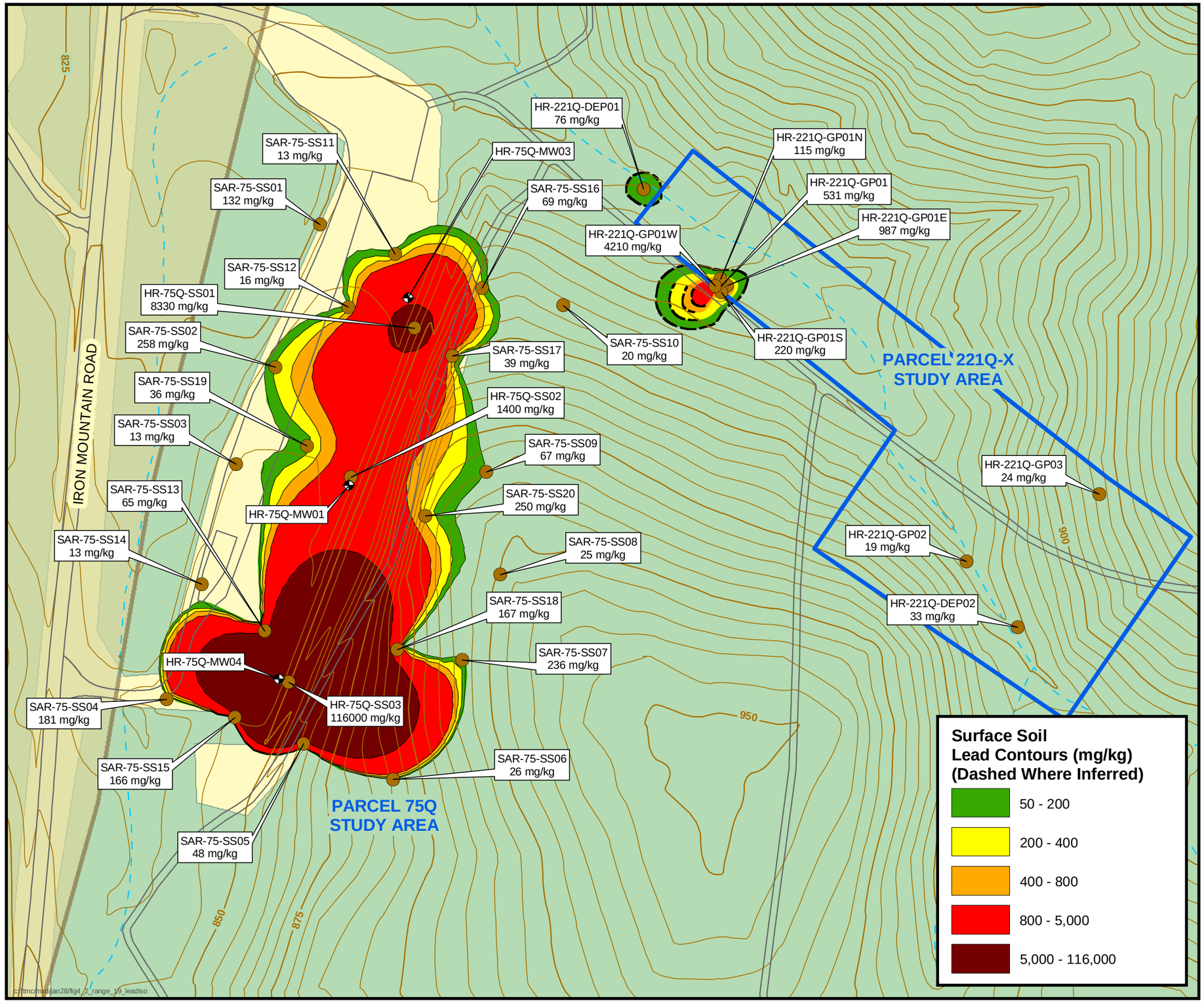

Figure 4-2

Lead in Surface Soil Isocontour Map

Range 19, Parcel 75Q and Former Rifle Grenade Range North of Washington Ranges, Parcel 221Q-X Fort McClellan, Alabama

Legend

- Surface Soil Sample Location
- Monitoring Well (No Soil Sample Collected)
- Study Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Intermittent Surface Drainage Feature
- Topographic Contour (5-foot interval)

150 0 150 Feet

NAD83 State Plane Coordinates

N

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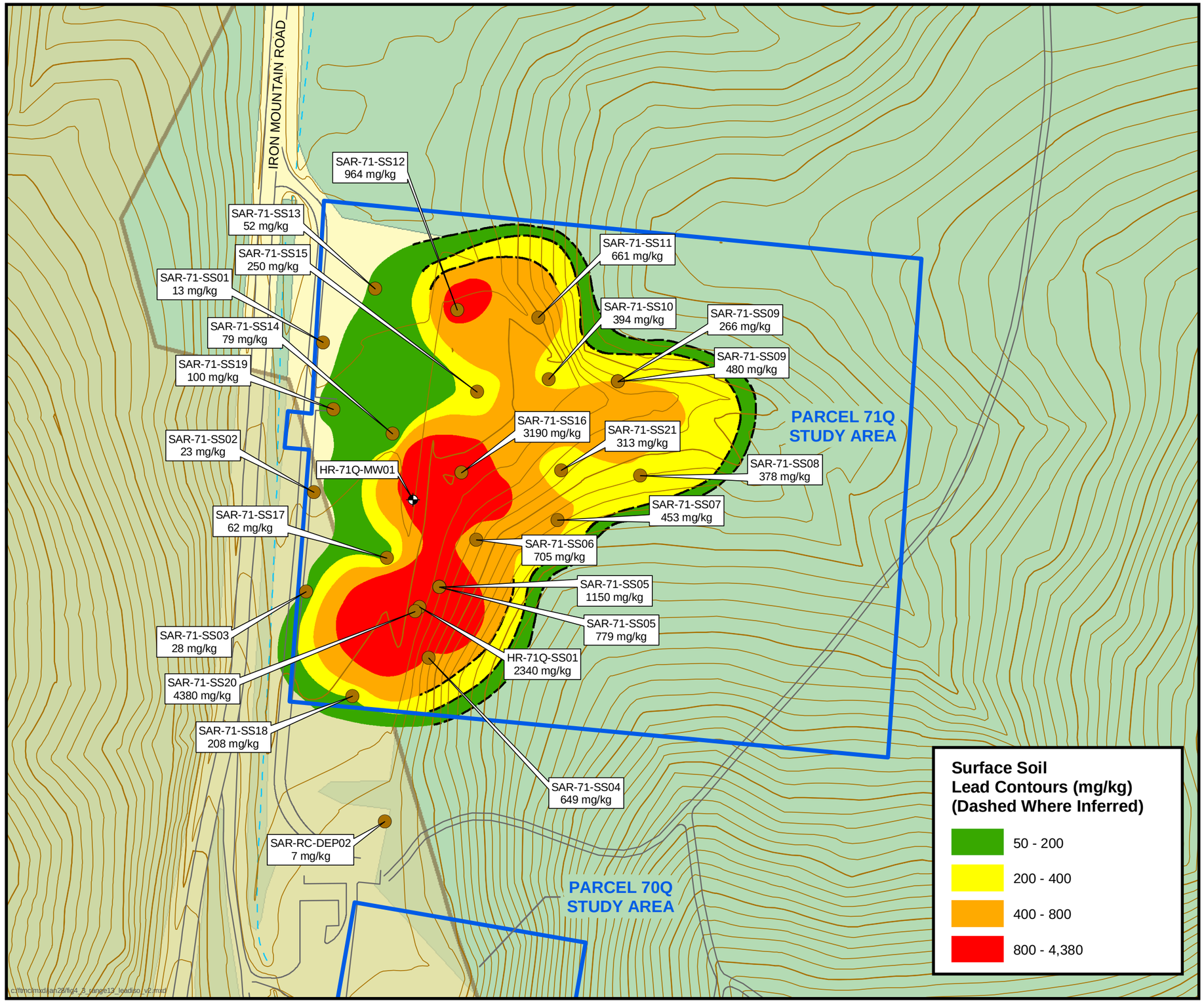

Figure 4-3

Lead in Surface Soil Isocontour Map

Range 13, Parcel 71Q
Fort McClellan, Alabama

Legend

- Surface Soil Sample Location
- Monitoring Well (No Soil Sample Collected)
- Study Area
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Intermittent Surface Drainage Feature
- Topographic Contour (5-foot interval)

150 0 150 Feet

NAD83 State Plane Coordinates

N

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Contract No. DACA21-96-D-0018

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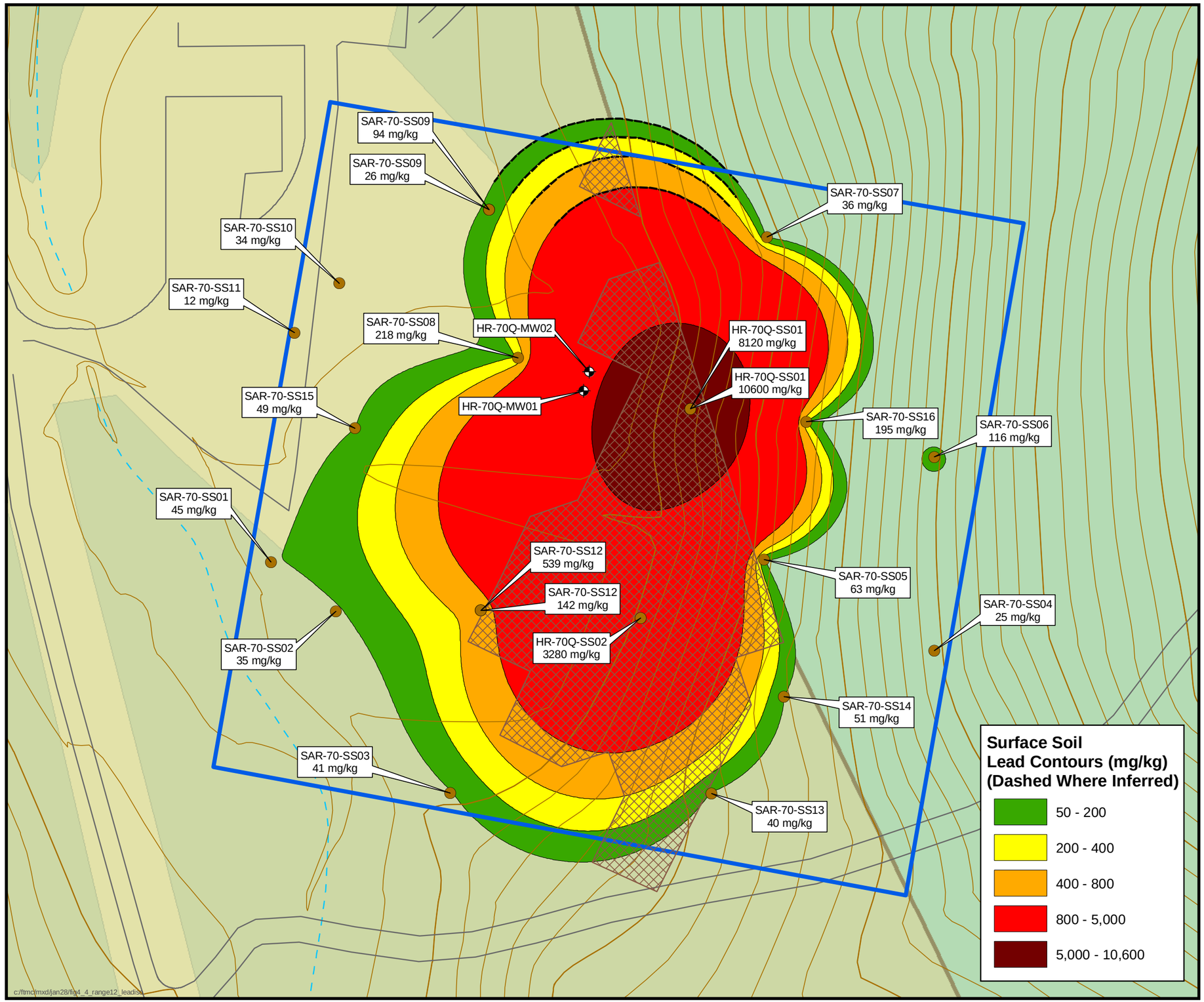
Figure 4-4

Lead in Surface Soil Isocontour Map

Range 12, Parcel 70Q
Fort McClellan, Alabama



Legend

- Surface Soil Sample Location
- Monitoring Well (No Soil Sample Collected)
- Study Area
- Excavation Area from the 2004-2006 Soil Removal Action (Reference report section 1.2.2.4)
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Intermittent Surface Drainage Feature
- Topographic Contour (5-foot interval)

50 0 50 Feet

NAD83 State Plane Coordinates

N

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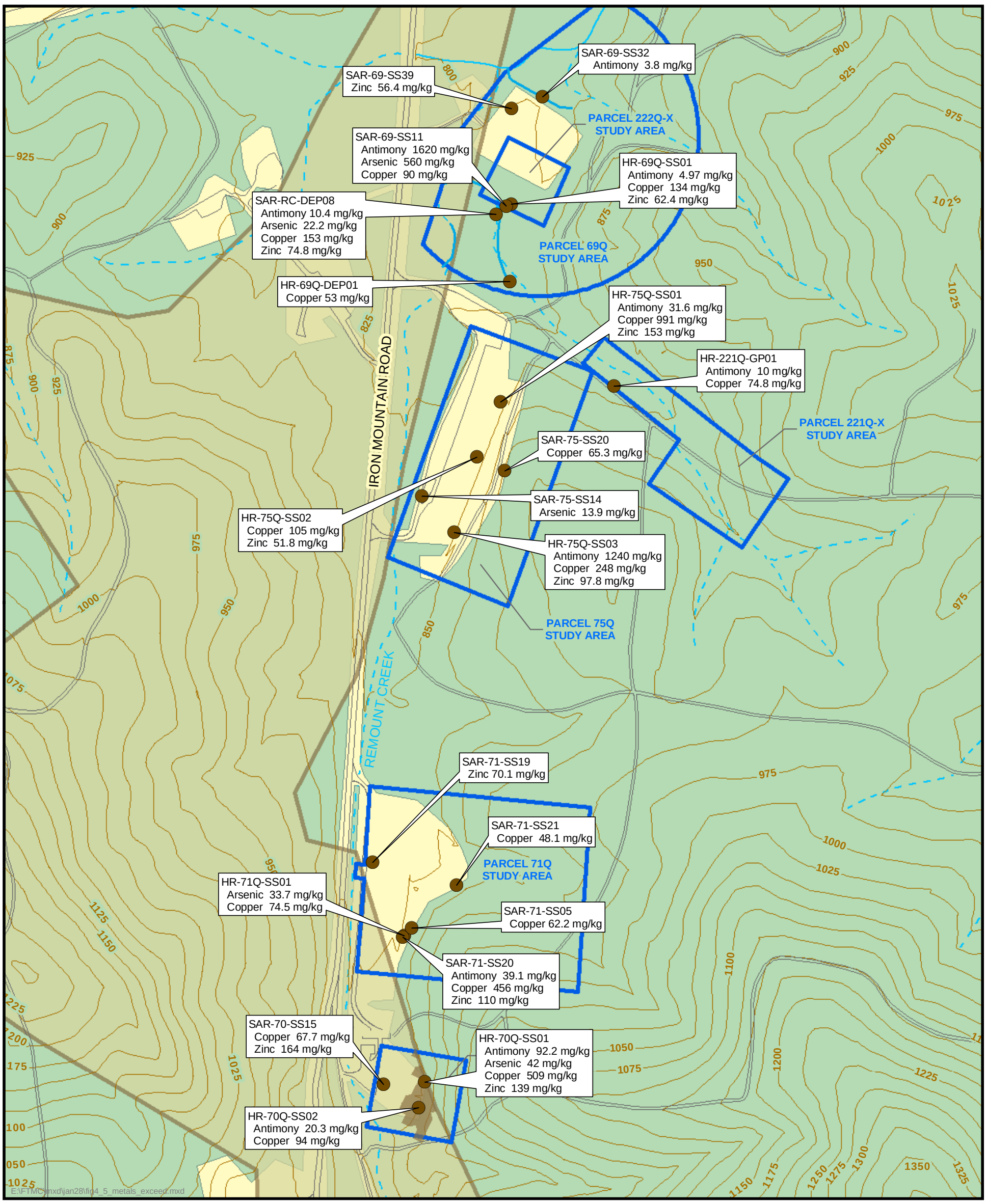

Legend

- Surface Soil Sample Location
- Study Area
- Excavation Area from the 2004-2006 Soil Removal Action (Reference report section 1.2.2.4)
- Eastern Bypass Corridor
- Wooded
- Not Wooded
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (25-foot interval)

N

Figure 4-5

Select Metals (Excluding Lead) Exceeding ESVs and Background in Surface Soil Iron Mountain Road Ranges

400 0 400 Feet

NAD83 State Plane Coordinates

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Contract No. DACA21-96-D-0018

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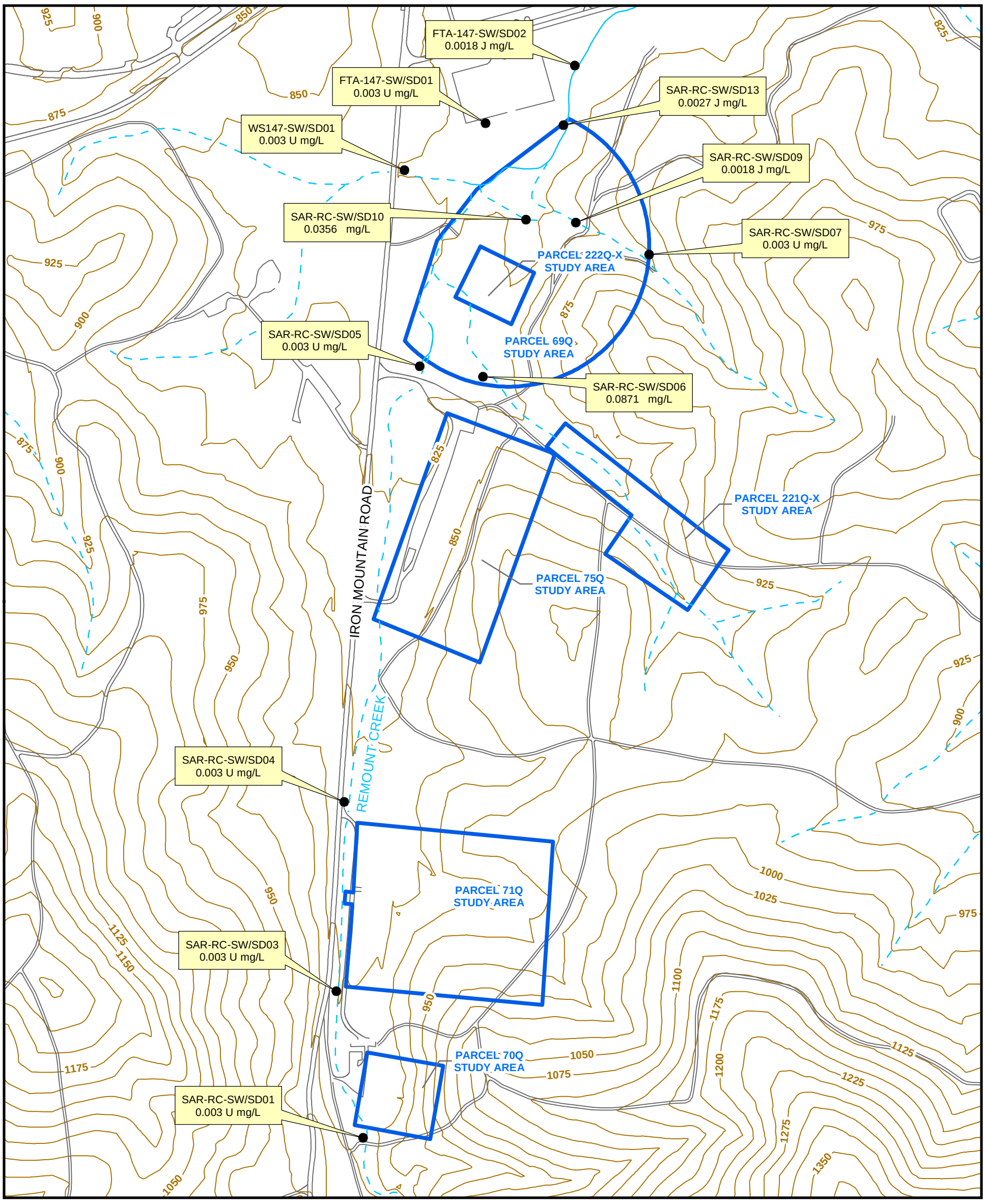

Legend

- Surface Water/Sediment Sample Location
- Study Area
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (25-foot interval)

Note: "U" result qualifier indicates Lead was not detected in the sample above the method detection limit

N

Figure 4-6

Lead in Surface Water
Iron Mountain Road Ranges

450 0 450 Feet

NAD83 State Plane Coordinates

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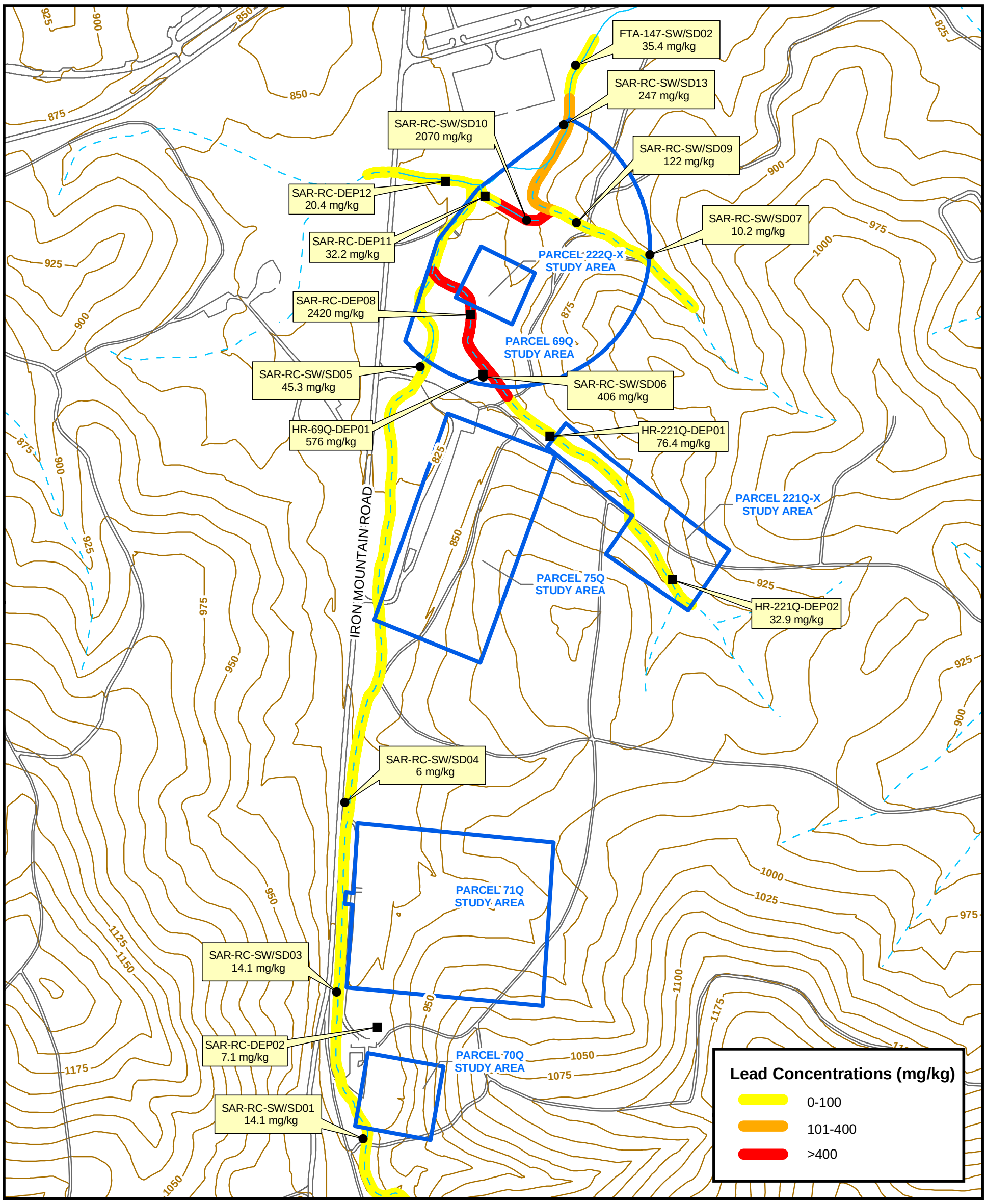

Legend

- Surface Water/Sediment Sample Location
- Depositional Soil Sample
- Study Area
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (25-foot interval)

N

Figure 4-7

Lead in Sediment
Iron Mountain Road Ranges

450 0 450 Feet

NAD83 State Plane Coordinates

Shaw Environmental, Inc.

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Contract No. DACA21-96-D-0018

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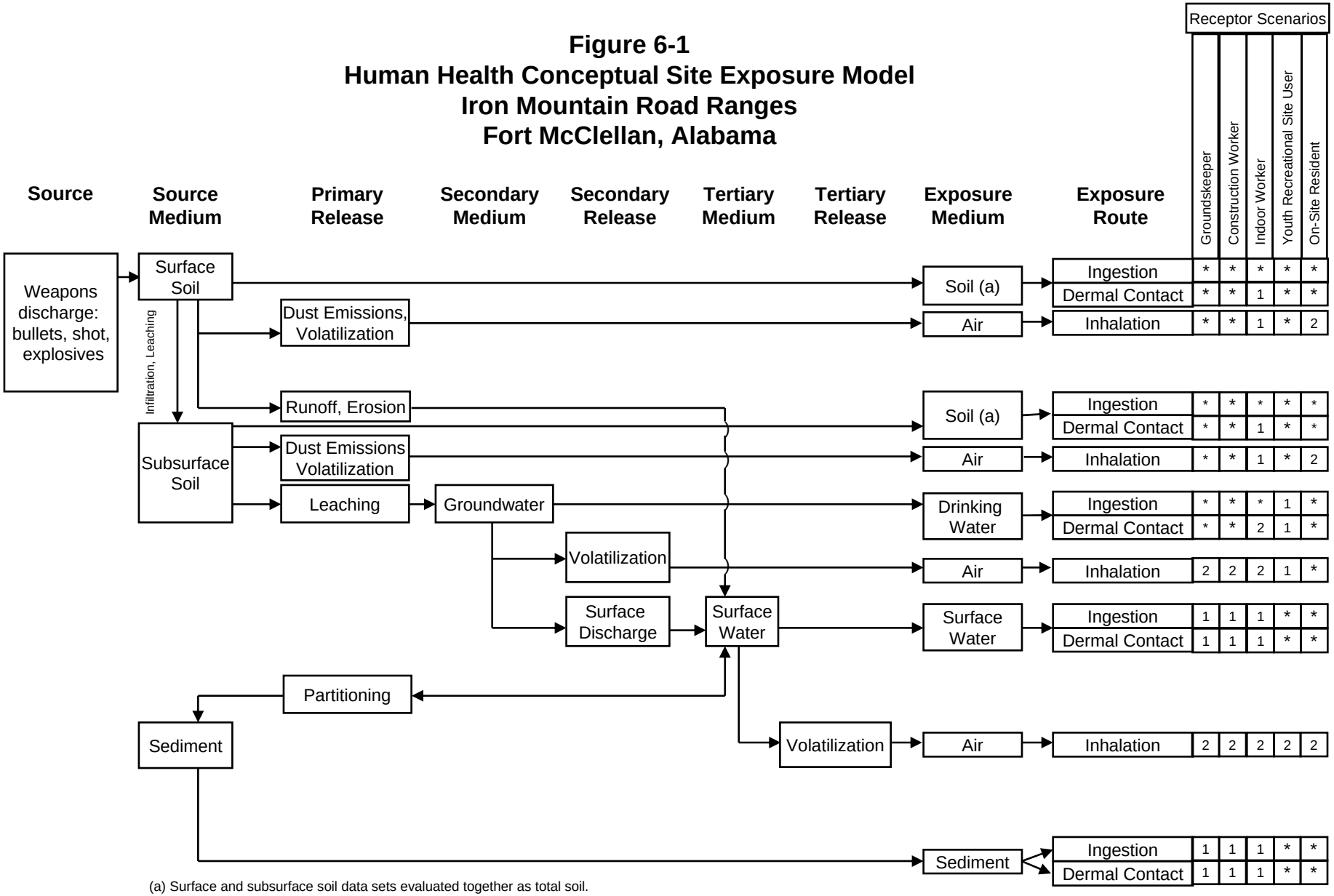
Figure 6-1
Human Health Conceptual Site Exposure Model
Iron Mountain Road Ranges
Fort McClellan, Alabama

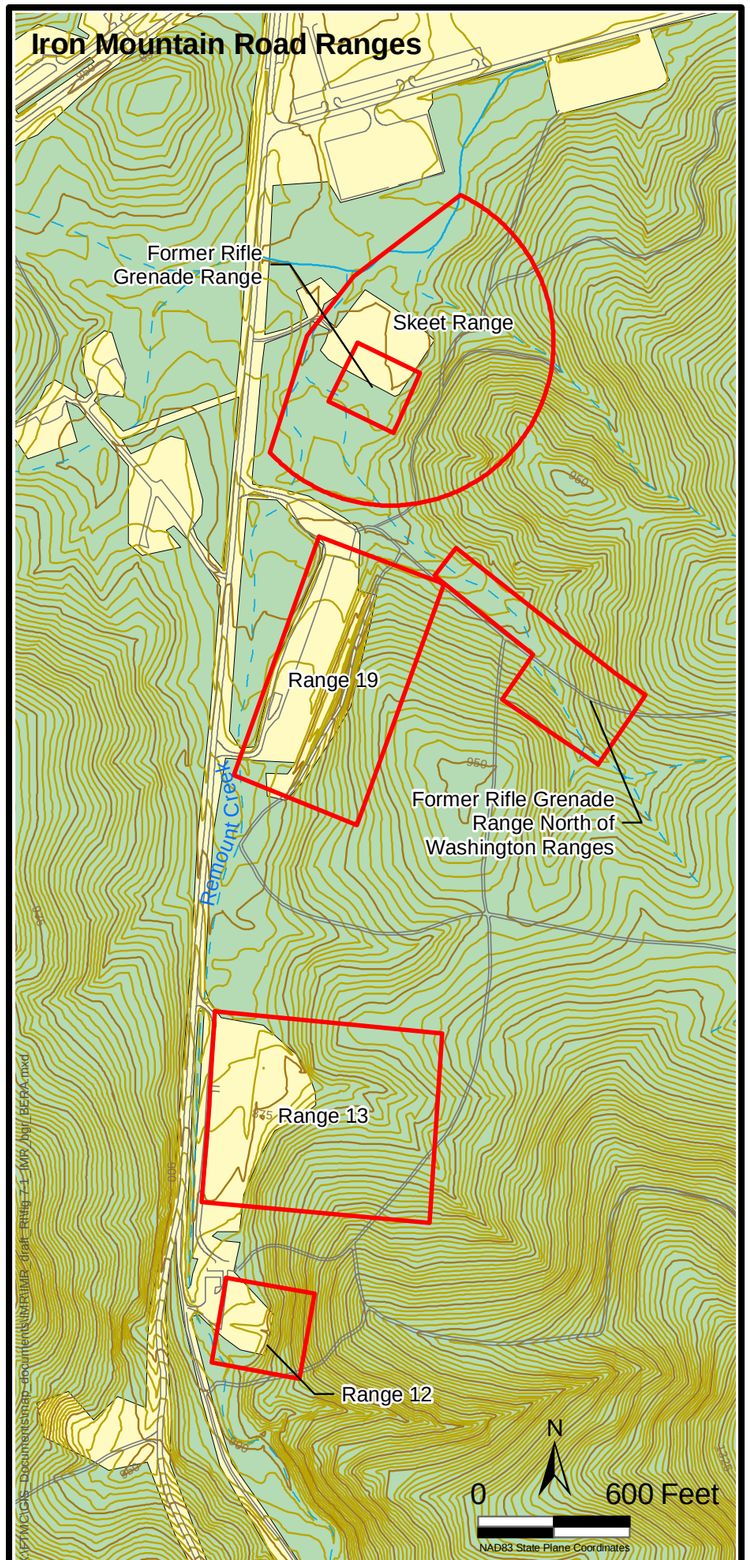


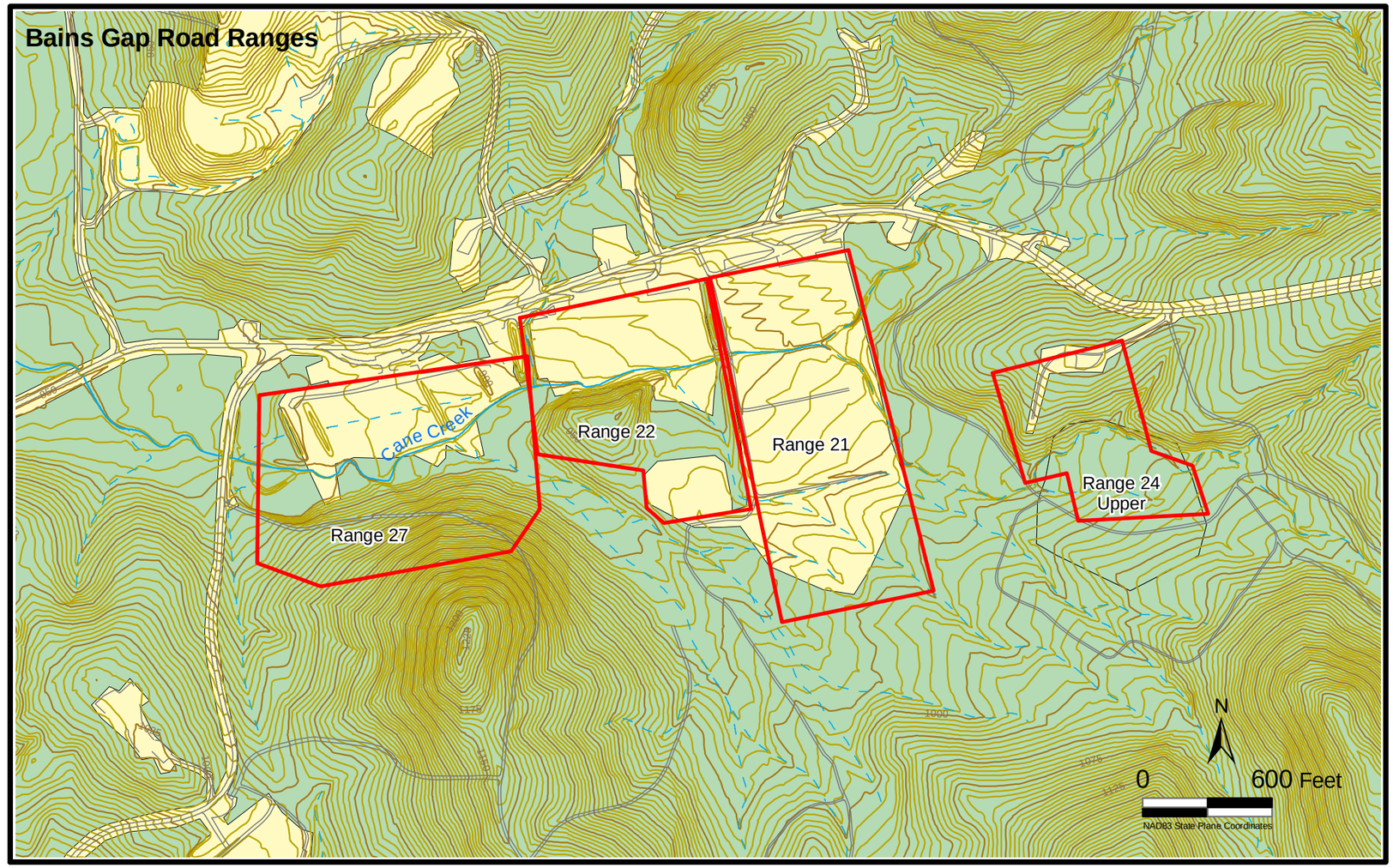
(a) Surface and subsurface soil data sets evaluated together as total soil.

* = Complete exposure pathway evaluated in the streamlined risk assessment.

1 = Incomplete exposure pathway.

2 = Although theoretically complete, this pathway is judged to be insignificant and is not evaluated in the streamlined risk assessment.





Legend

- Study Area
- Roads
- Streams (dashed where intermittent)
- Topographic Contours (5-foot interval)
- Wooded Area
- Non-Wooded Area

Figure 7-1

BERA Sites

Iron Mountain Road and Bains Gap Road Ranges, Fort McClellan, Alabama

Shaw Environmental, Inc.

Contract No. DACA21-96-D-0018

U.S. Army Corps of Engineers Mobile District