

FINAL
Engineering Evaluation/Cost Analysis
Alpha Area
of the
Redevelopment Area
Fort McClellan, Alabama

Task Order 0001, Modification 13
Contract Number DACA87-99-D-0010



Contracting Agency:
U.S. Army Engineering and Support Center
Huntsville, Alabama

Geographical Corps District:
US Army Engineer District, Mobile

Prepared by:
Foster Wheeler Environmental Corporation
Fort McClellan, Alabama

September 2003

EXECUTIVE SUMMARY

1.0 An Engineering Evaluation/Cost Analysis (EE/CA) of the Alpha Area at Fort McClellan, Alabama was performed to evaluate the presence of ordnance and explosives (OE) that may exist within the Alpha Area, evaluate potential risks to human health and environment due to the presence of OE, and to recommend the most technically feasible and cost-effective approach for reducing the risk of exposure to OE items.

2.0 This EE/CA is specific only to the Alpha Area and thus addresses only a portion of Fort McClellan. The total area covered by the Alpha EE/CA is approximately 930 acres. The Alpha Area EE/CA Work Plan was approved by the Alabama Department of Environmental Management (ADEM) by letter dated February 27, 2001. Other areas of Fort McClellan that may have ordnance contamination are designated as Bravo, Charlie, Area M1.01, Area M2, and the Eastern Bypass Project Area. Investigation and reporting on these areas will be covered under separate documents. Based on information from the Environmental Baseline Survey completed for Fort McClellan (ESE, 1998) as well as the Archives Search Report (USACE, 1999), all areas of Fort McClellan outside of those listed above did not have any evidence to suggest the potential presence of UXO/OE that would require further investigation.

3.0 The activities were performed in a manner consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Section 104 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

4.0 This work was performed by Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) and was authorized by the U.S. Army Engineering and Support Center Huntsville (USAESCH), under Contract DACA87-99-D-0010, Ordnance and Explosives Response Services at Fort McClellan, Task Order 0001, Modification No. 9, dated February 13, 2002. The sampling and risk evaluation approach used for this EE/CA were developed through a series of record searches and site reconnaissance activities. The approach was presented to and approved by the BRAC Cleanup Team (BCT) in a series of meetings throughout the development of the sampling approach and implementation of the sampling activities.

5.0 The nature and extent of OE within the Alpha Area was estimated using site-specific field data that was collected during the EE/CA field effort and also includes information developed by Parsons Engineering Science during a separate investigation (Parsons, 2001). The field data were analyzed and combined with other criteria such as historical information and topography to identify and delineate potential areas of OE contamination. Other criteria such as current and future projected land use were then evaluated along with the interpreted OE distribution in order to assess the potential risk associated with the OE, and to assess and determine appropriate response action alternatives.

6.0 Fort McClellan has been documented as a military training area since 1912, when the Alabama National Guard used it for artillery training. However, portions of the facility may have been used for artillery training as early as 1898 by units stationed at Camp Shipp in the Blue Mountain Area during the Spanish American War. Given the long history of ordnance training, a wide range of small arms ammunition and artillery ordnance types are present in a number of overlapping historical training areas and range firing fans.

7.0 The Alpha area was originally divided into three sectors for the purposes of EE/CA sampling activities. These were designated Sectors M5-1L, M6-1L, and M6-1M. A fourth sampling sector, designated the Smoke Ranges/T-38 Sector, was later incorporated into the EE/CA. This additional sector was based on ordnance sampling results developed by Parsons ES during a Chemical Warfare Materials (CWM) EE/CA completed within and adjacent to the Alpha Area (Parsons, 2001). Sampling activities were performed in the 129 Foster Wheeler Environmental grids and 27 Parson's grids throughout the sampling sectors. Data collection consisted of recording surface ordnance items found in all grids, collecting geophysical data within all grids to identify subsurface geophysical anomalies, and performing intrusive sampling to determine the types of OE, OE Scrap, and non-OE Scrap remaining at the site. Additional geophysical data was also collected over two of the OE-contaminated areas found during grid sampling to further determine the extent of the contamination.

8.0 EE/CA sampling revealed the presence of eight discrete areas of OE contamination within these four sampling sectors. Five of the discrete areas lie within sampling Sector M6-1M, one within sampling sector M6-1L, and two within sampling sector M5-1L. The two most contaminated areas of the five lie within M6-1M and were designated M6-1M Transect Area 1 (South)-Passive Recreation (PR), 66 acres in size, and M6-1M Transect Area 2 (North)-PR, 63 acres in size. These areas contained surface and subsurface OE items and OE Scrap consisting predominantly of 2.36-inch rockets, 60mm Mortars, and 3.5-inch rockets, but also contained a variety of other ordnance types. Three other areas, designated as M6-1M Burn Pit-PR, M6-1M Suspect Area (North)-PR, and M6-1M Suspect Area (South)-PR also lie within Sector M6-1M. The M6-1M Suspect Area (North)-PR contained 3.5-rockets at the surface, M6-1M Suspect Area (South)-PR also contained 75mm shrapnel, and the M6-1M Burn Pit-PR contained OE and OE Scrap from grenades and flares. M6-1L Suspect Area-I/Active Recreation (AR), comprised of 14 acres, is located in the northern portion of Sector M6-1L, and was identified based on the presence of Practice M2 Anti-tank mines and practice hand grenades. The three final sectors, M5-1L (North)-PR, M5-1L (South)-PR, and M5-1L-I are in the southern portion of the Alpha Area. In addition to the OE and OE Scrap, numerous subsurface geophysical anomalies are present within the contaminated areas. These anomalies have signatures consistent with OE items of concern at Fort McClellan, and may represent additional OE items not yet excavated. Three additional areas were designated as remainder areas: M6-1L Remainder-I/AR, M6-1M Remainder-I/AR, and M6-1M Remainder-PR.

9.0 Alternative response actions designed to reduce the risk of human exposure to OE were identified. A baseline assessment of the potential risk thought to exist at each of the areas was performed following USAESCH guidance documents. Because projected land use is a critical element of a human risk assessment separate risks were evaluated for sectors that contained more than one land use within their boundary. Projected land use within the Alpha Area includes industrial, active recreation, and passive recreation. Active Recreation land use is defined as activities associated with the development and use of facilities like golf courses, tennis courts, swimming facilities, or ball fields. In contrast, passive recreation is defined as activities such as hiking, walking, and biking. Furthermore, with passive recreation, no significant construction of recreational facilities or underground facilities is associated with this land use.

10.0 For each sector, the risk was evaluated assuming no action to be taken at the site and then for the five other alternatives, each of which included positive actions to reduce the risk of exposure to OE. This resulted in a qualitative relative ranking of the effectiveness of the

alternatives for reducing the risk of exposure to OE. The alternatives included Alternative 1 (No Action), Alternative 2 (Area-Specific Land Use Controls), Alternative 3 (Construction Support), Alternative 4 (Surface Clearance), Alternative 5 (Clearance to One Foot), and Alternative 6 (Clearance to Depth).

11.0 The six response action alternatives were then evaluated against the National Contingency Plan (NCP) evaluation criteria of effectiveness, implementability and cost. The alternatives were individually evaluated against the criteria and subsequently evaluated comparatively on a sector-specific basis, resulting in a relative ranking of alternatives for each sector.

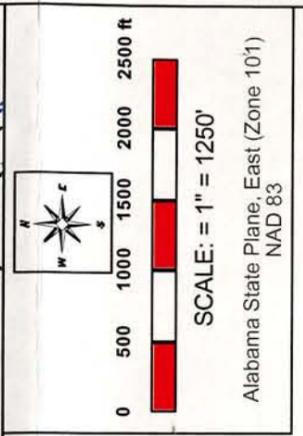
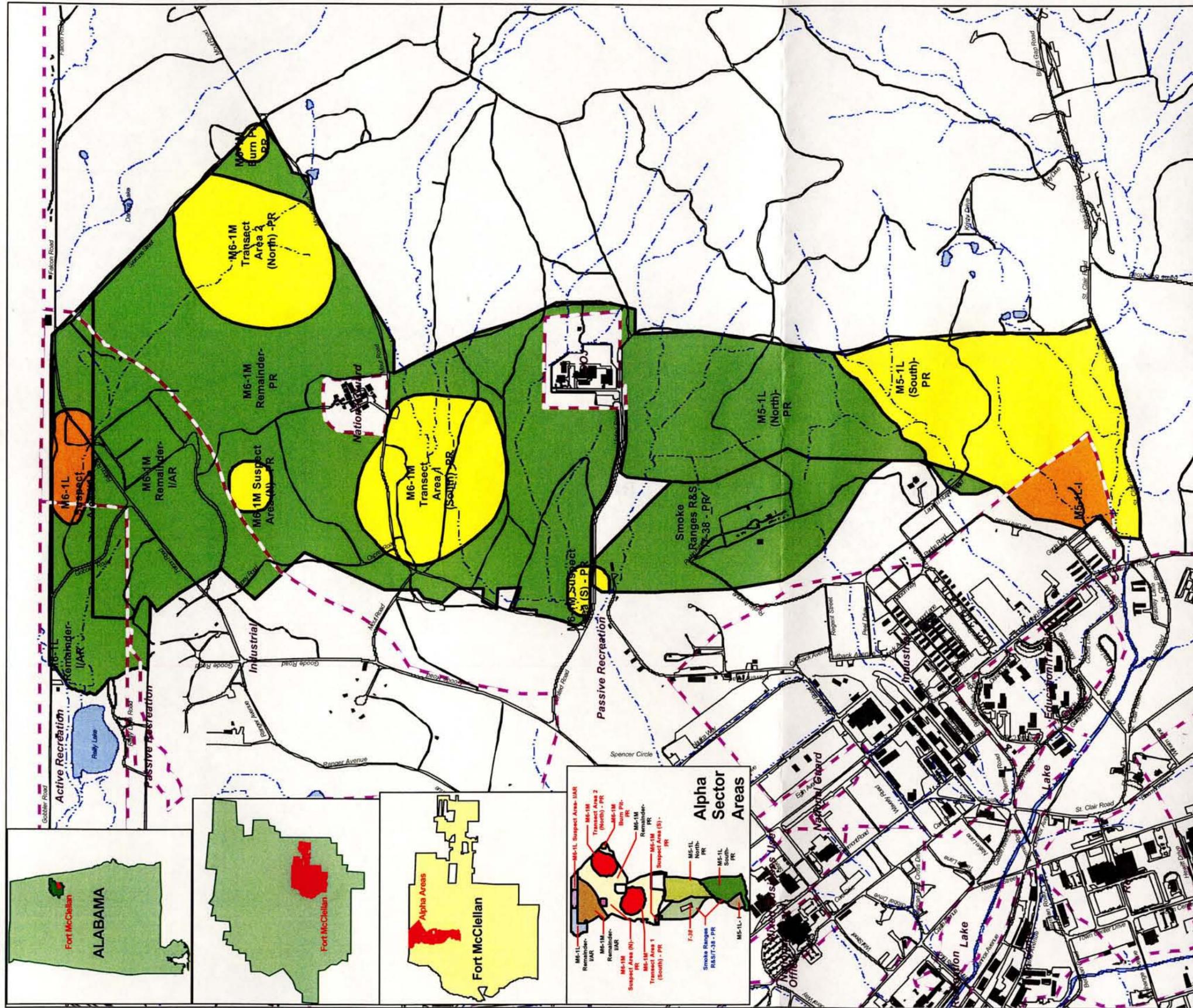
12.0 Based on a consideration of all the information available, including the risk assessments and the comparative analysis of the alternatives, response action alternatives were recommended for each sector (see Figure ES-1) and are listed below. More detailed explanations and supporting rationale for each recommendation are included in Chapter 9.0 of this report.

13.0 M5-1L-I (Industrial) (19 Acres) and M6-1L Suspect Area – I/AR (Industrial/Active Recreation) (14 acres): The recommended alternative for these sectors is Clearance to Depth. Components of this alternative will include land surveying and brush clearing operations to prepare the site. Due to the requirement to detect items deeper than one foot, this alternative will be performed using sensitive instruments capable of detecting anomalies at greater depths. Using a suitably sensitive detection system, the entire study area will be surveyed to locate potential OE items. The anomalies will then be investigated to identify them as OE, OE Scrap, or non-OE Scrap. After identification, the items will be disposed of as scrap or OE in accordance with the previously approved OE operations work plan. The estimated cost to implement this alternative is \$697,765.91 for M5-1L-I and \$277,196.27 for M6-1L Suspect Area-I/AR.

14.0 M5-1L (South)-PR (Passive Recreation) (113 acres); M6-1M Burn Pit-PR (Passive Recreation) (3 acres); M6-1M Transect Area 1 (South)-PR (Passive Recreation) (66 acres); M6-1M Transect Area 2 (North)-PR (Passive Recreation) (63 acres); M6-1M Suspect Area (North)-PR (Passive Recreation) (6.3 acres); and M6-1M Suspect Area (South)-PR (Passive Recreation) (4.6 acres): The recommended alternative for these sectors is Clearance to One Foot. Components of this alternative will include land surveying and brush clearing operations to prepare the site. Geophysical detection instruments will be used to locate subsurface anomalies, which subsequently will be investigated down to 12 inches. After identification, the item will be disposed of as scrap or OE in accordance with a previously approved OE operations work plan. The estimated cost to implement this alternative for each sector is:

- M5-1L (South)-PR (Passive Recreation): \$2,300,174.62
- M6-1M Burn Pit-PR (Passive Recreation): \$91,784.06
- M6-1M Transect Area 1 (South)-PR (Passive Recreation): \$1,736,611.93
- M6-1M Transect Area 2 (North)-PR (Passive Recreation): \$2,091,657.22
- M6-1M Suspect Area (North)-PR (Passive Recreation): \$165,065.77
- M6-1M Suspect Area (South)-PR (Passive Recreation): \$127,283.64

15.0 M5-1L (North)-PR (Passive Recreation) (110 acres); M6-1L Remainder -I/AR (Industrial/Active Recreation) (50 acres); M6-1M Remainder-I/AR (Industrial/Active Recreation) (102 acres), M6-1M Remainder-PR (Passive Recreation) (291 acres); and Smoke Ranges R and S/T-38-PR (Passive Recreation) (88 Acres); The recommended alternative for these sectors is No Further Action. The estimated cost to implement this alternative for all of these sectors is \$100,000.



Legend

	Lakes		Alpha Areas by Clearance Action
	Streams (Intermittent)		Clearance to 1ft
	Land Use Area Boundaries		Clearance to Depth
	Alpha Area Sectors		NFA

Figure ES-1
Alpha Area EE/CA
Projected
Clearance Actions

Fort McClellan, Calhoun County
 Anniston, Alabama
 September 2003

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ACRONYMS AND ABBREVIATIONS

1D	One Dimensional
2D	Two Dimensional
ADEM	Alabama Department of Environmental Management
ALDOT	Alabama Department of Transportation
AOC	Area of Concern
AR	Active Recreation
ARARs	Applicable or Relevant and Appropriate Requirements
ASR	Archives Search Report
BCT	BRAC Cleanup Team
bgs	Below ground surface
BRAC	Base Realignment and Closure
CAIS	Chemical Agent Identification Set
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CSM	Conceptual Site Model
CWM	Chemical Warfare Materiel
DA	Department of the Army
DDESB	Department of Defense Explosive Safety Board
DERP	Defense Environmental Restoration Program
DID	Data Item Description
DoD	Department of Defense
EBS	Environmental Baseline Survey
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
ESE	Environmental Science and Engineering, Inc.
ESS	Explosives Safety Submission
FFE	flame field expedients
FMC	Fort McClellan
Foster Wheeler Environmental	Foster Wheeler Environmental Corporation
FUDS	Formerly Used Defense Site
GIS	Geographical Information System
GPS	Geographic Positioning System
H	High OE Density
HE	High Explosive
HH	Hand Held
HTRW	Hazardous Toxic and Radiological Waste
I	Industrial
IAW	In Accordance With
JPA	Anniston-Calhoun County FMC Joint Powers Authority
L	Low OE Density
LUCAP	Land Use Control Assurance Plan

LUCIP	Land Use Control Implementation Plan
LUC	Land Use Control
M	Medium OE Density
MCX	Mandatory Center of Expertise
mm	millimeter
MOA	Memorandum of Record
MPM	Most Probable Munition
msl	Mean Sea Level
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
OA	Ordnance Area
OE	Ordnance and Explosives
OERIA	Ordnance and Explosives Risk Impact Assessment
ORNL	Oak Ridge National Laboratory
ORS	Ordnance Related Scrap
PM	Project Manager
PR	Passive Recreation
RCRA	Resource Conservation and Recovery Act
RMS	Root Mean Squared
ROW	Right-of-Way
SOW	Statement of Work
SR	Stationary Receiver
SUXOS	Senior UXO Supervisor
TBC	To be Considered
TNT	Trinitrol Toluene
TRADOC	United States Army Training and Doctrine Command
USACE	United States Army Corps of Engineers
USAESCH	United States Army Corps of Engineers, Engineering and Support Center, Huntsville
USRADS	Ultra-Sonic Ranging and Data System
UXO	Unexploded Ordnance
WP	White Phosphorous
WWI	World War I
WWII	World War II

DEFINITIONS

Ammunition: A generic term related mainly to articles of military application consisting of all kinds of bombs, grenades, rockets, mines, projectiles, and other similar devices or contrivances. (TB 700-2/NAVSEAINST 8020.8B/TO 11A-1-47/DLAR 8220.1).

Anomaly: Any item that is seen as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and non-ferrous material at the site (i.e., pipes, power lines, etc.). (EP 1110-1-18) (USACE, 2000).

Applicable or Relevant and Appropriate Requirements (ARARS): Applicable requirements are cleanup standards, standards of control, and other substantive environmental protection requirements promulgated under federal or state environmental law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site. Relevant and appropriate requirements are cleanup standards that while not "applicable", address situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the particular site. (USACE, 2000).

Archives Search Report (ASR): A detailed investigation to report on past OE activities conducted on an installation. The principal purpose of the Archives Search is to assemble historical records and available field data, assess potential ordnance presence, and recommend follow-up actions at a DERP-FUDS. There are four general steps in an Archives Search: records search phase, site safety and health plan, site survey, and archives search report including risk assessment. (USACE, 2000).

Chemical Warfare Materiel (CWM): An item configured as a munition containing a chemical substance that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. Also includes V- and G- series nerve agent, H- series blister agent, and lewisite in other- than-munition configurations. Due to their hazards, prevalence, and military-unique application, chemical agent identification sets (CAIS) are also considered CWM. CWM does not include: riot control agents, chemical herbicides; smoke and flame producing items; or soil, water, debris, or other media contaminated with chemical agent. (HQDA Interim Guidance for Biological Warfare Materiel and Non Stockpile Chemical Warfare Materiel Response Activities) (USACE, 2000).

Clearance to Depth: Response action alternative that includes the surface and subsurface clearance of OE items to a depth corresponding to the maximum depth of OE encountered in each sector. Under this alternative, investigation (i.e., excavation) of an anomaly (i.e., suspect OE item) will continue until the source of the anomaly is found, or until it is determined that no OE item is present. This alternative was developed in accordance with DoD 6055.9 Standard, Chapter 12, Paragraph 12.3.4.3 "Site-Specific Remediation Depth Determination".

Clearance to One Foot: Response action alternative that includes the surface and subsurface clearance of OE items to a depth of one foot. The depth of one-foot was selected based on site-specific information, future land use, and type of ordnance items that have been found in the vicinity and that may be present within the study area, and typical penetration depths for the types of OE items that may be present. Implementation of this alternative will require land surveying and brush clearing operations to prepare the site. This alternative will include a deed

restriction that prohibits digging below one foot in the study area without construction support by UXO-Qualified personnel. This alternative was developed in accordance with DoD 6055.9 Standard, Chapter 12, Paragraph 12.3.4.3 "Site-Specific Remediation Depth Determination".

Construction Support: Support provided by qualified UXO personnel during construction activities at potential OE sites to ensure the safety of construction personnel from the harmful effects of UXO. When a determination is made that the probability of encountering UXO is low (e.g., current or previous land use leads to an initial determination that OE may be present), a minimum of a two person UXO team will stand by in case the construction contractor encounters a suspected UXO. When a determination is made that the probability of encountering a UXO is moderate to high (current or previous land use leads to a determination that OE was employed or disposed of in the parcel of concern, e.g., open burn and open detonation areas, maneuver areas, etc.), UXO teams are required to conduct subsurface UXO clearance for the known construction footprint either in conjunction with the construction contractor or prior to construction intrusive activities. The level of effort will be determined on a case-by-case basis in coordination with the OE MCX. (ER 1110-1-8153) (USACE, 2000).

Conventional Ordnance and Explosives: The term "conventional OE refers to ordnance and explosives (see definition) other than CWM, BWM, and nuclear ordnance. (ER 1110-1-8153) (USACE, 2000).

Detonator: A device capable of inducing a high-order detonation in high explosives. (TM60A-1-1-31).

Delineation Transects: A transect for the purpose of further delineating OE contamination. Delineation Transects are basically straight segments approximately 3.5 feet wide and of varying lengths. Several would be established in a north-south and east-west grid-like pattern and then walked for data collection.

Explosive: A material, either a pure single substance or mixture of substances, which is capable of producing an explosive by its own energy. (TM 60A-1-1-9).

Explosive Ordnance Disposal (EOD): The detection, identification, field evaluation, rendering safe, recovery, and final disposal of unexploded ordnance or munitions. (EP 1110-1-18) (USACE, 2000).

Explosives Safety Submission (ESS): The document which serves as the specifications for conducting work activities at the project. The ESS details the scope of the project, the planned work activities, and potential hazards (including the maximum credible event) and the methods for their control. (EP 1110-1-18) (USACE, 2000).

Fragment: A piece of an exploding or exploded munition. Fragments may be complete items, subassemblies, pieces thereof, or pieces of equipment or buildings containing the items. (DA PAM 385-64).

Fuze: A mechanical, electrical, or electromechanical device used to function an explosive device such as a bomb or projectile. (TM 60A-1-1-31).

Geophysical Sampling: The use of geophysical instruments to detect anomalies that will be further investigated to determine the presence of OE.

High Explosive: An explosive, which once initiated, normally produces a detonation. (TM-60A-1-1-9).

Intrusive Investigation: The act of excavating suspected UXO items or plotted anomalies.

No Further Action: The No Further Action alternative requires no action at the site. This alternative was evaluated for each sector as a baseline.

Non-intrusive Investigation: The process of locating subsurface UXO by use of magnetometers or geophysical survey equipment without digging or otherwise disturbing the medium being surveyed.

Ordnance and Explosives (OE): Ammunition, ammunition components, chemical or biological warfare materiel or explosives that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried, or fired. Such ammunition, ammunition components, and explosives are no longer under accountable record control of any DOD organization or activity. (HQDA Policy Memorandum "Explosives Safety Policy for Real Property Containing Conventional OE"). (ER 1110-1-8153) (USACE, 2000).

OE Density: The OE Density is the number of OE items per acre.

Practice Ammunition: Ammunition or ammunition components used for training. Practice ammunition simulates a service item in weight, design, and ballistic properties. A practice round may be inert or have a small quantity of explosive filler used as a spotting charge. (DA PAM 385-64).

Small Arms Ammunition: Ammunition items up to and including a 20 mm. (DA PAM 385-64).

Surface Clearance: Response action alternative that involves the removal of surface OE from the site. The area is divided into investigation grids and a visual search (aided by hand held metal detection instruments) conducted by UXO personnel walking through each grid, visually scanning the surface for OE. This alternative will include a deed restriction that prohibits digging in the study area without construction support by UXO-qualified personnel.

Unexploded Ordnance (UXO): Military munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material and remain unexploded either by malfunction, design, or any other cause. (40 CFR 266.20 1) (USACE, 2000).

UXO Personnel: Contractor personnel who have completed specialized military training in EOD methods and have satisfactorily performed the EOD function while serving in the military. Various grades and contract positions are established based on skills and experience. Check with the OE MCX for current ratings. (ER 1110-1-8153) (USACE, 2000).

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1.0 INTRODUCTION

1.1 BACKGROUND

This Engineering Evaluation/Cost Analysis (EE/CA) for the Alpha portion of the Redevelopment Area at Fort McClellan was performed under the Base Realignment and Closure (BRAC) Program. This EE/CA is specific only to the Alpha Area and thus addresses only a portion of Fort McClellan. Other areas of Fort McClellan that may have ordnance contamination are designated as Bravo, Charlie, Area M1.01, Area M2, and the Eastern Bypass Project. See Figure 1-1 for other areas investigated at Fort McClellan. The Alpha Area EE/CA Work Plan was approved by the Alabama Department of Environmental Management (ADEM) by letter dated February 27, 2001 (See Appendix A). Federal law requires that government facilities, subject to closure and subsequent reuse, be investigated in order to make decisions regarding response actions. Activities conducted in support of this project will be conducted in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

1.2 PROJECT AUTHORIZATION

The United States Army Engineering and Support Center, Huntsville (USAESCH) Ordnance and Explosives Design Center has a mission "to safely eliminate or reduce risks from ordnance, explosives and recovered chemical warfare materiel at current or formerly used defense sites." As part of its effort to fulfill this mission, USAESCH has contracted Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) under Contract DACA 87-99-D-0010, Task Order 0001, Modification 13 dated July 15, 2003 to perform an Engineering Evaluation/Cost Analysis (EE/CA) within the Alpha portion of the Redevelopment Area at Fort McClellan. Appendix A contains the Scope of Work.

1.3 PURPOSE AND SCOPE

Fort McClellan is a United States Army Training and Doctrine Command (TRADOC) facility that was closed in September 1999 under the Base Realignment and Closure (BRAC) Act. The primary use of Fort McClellan has been for troop training (artillery, small arms, chemical warfare training, etc.) and mobilization activities.

1.3.1 The purpose of this EE/CA is to recommend and justify appropriate response actions for reducing risk due to ordnance and explosives. For the ordnance expected at Fort McClellan, impact areas are composed of target zones, firing miss zones and fragmentation zones. The size of the target zone is dependent upon the type of ordnance and the delivery mechanism. As shown in Army Regulation 385-63, target zones are surrounded by firing miss zones that are typically larger in the direction of fire (up to several hundred feet) and lesser to the sides. Further, a fragmentation zone exists beyond the target and firing miss zones that can extend over 1000 feet beyond the edge of the target zone depending upon the fragmentation distance of the munition. For the purposes of this EE/CA we have concentrated on locating, evaluating, and recommending appropriate response actions for the target and firing miss zones of the ranges. These areas carry the most significant likelihood of containing UXO. Within the fragmentation zone, various parts and fragments of the munitions have been used as indicators that the target zone is somewhere in the vicinity. Since the fragments pose no hazard to the public, they have

not influenced the evaluation of or recommended response actions for the areas. The areas that are recommended for clearance should include the target and firing miss zones. Because the fragments pose no hazards to the public, the fragmentation zones have been excluded from the areas identified for clearance. The provisions in the recommended alternatives for clearance of these areas will include a 200-foot buffer area clear of UXO to ensure that the complete target and firing miss zones have been identified and cleared.

1.3.2 Within the target and firing miss zones, there will be a large number of fragments found from the impact and detonation of munitions from training exercises. Within the fragmentation zones, the number of fragments will become more sparse. For example, the detonation of one 81mm M43 produces 3,186 fragments within 1,097 feet of the detonation. Eighty percent of these (2,549 fragments) will be within 616 feet of the detonation. As shown in Figure 1-2, the detonation of this mortar results in 155 fragments/acre within 218 feet of the detonation, 82 fragments/acre between 218 feet and 371 feet from the detonation, 67 fragments/acre between 371 feet and 616 feet from the detonation, 28 fragments/acre between 616 feet and 895 feet from the detonation, and 1.3 fragments/acre between 895 feet and 1,097 feet from the detonation. These values are from the detonation of a single item. A target is fired upon multiple times. As part of routine training, a crew would typically fire no less than 18 rounds per day. Therefore, these values (fragments/acre) would be larger from multiple detonations. Applying this data to this EE/CA, the M6-1M Transect Area 1 target and firing miss zone have been identified by sampling and are shown in pink on the Alpha Area EE/CA Overview Map. Sampling in grids outside the pink area in the M6-1M Transect Area 1 resulted in a low number of fragments in each grid (half acre grids were used). For example, Grid 59 is approximately 700 ft from the edge of the identified target and firing miss zone and had 2 fragments (4 fragments/acre) within it. In comparison with the method discussed above, for a single detonation there would be 28 fragments/acre at this distance from the detonation. Therefore, this grid is outside the target and firing miss zone.

1.3.3 EE/CA sampling results in some instances revealed isolated ordnance items not located within a target area, firing miss zones, or training area. These items appear sporadically in various locations within the Alpha Area and cannot be related to any target or training area. It is not possible to locate individual ordnance items on Fort McClellan without clearing 100% of the land. Individual ordnance finds within the Alpha Area that could not be related to a target or training area were disposed of during sampling activities. The areas that contained those items have not been recommended for further action. Figure 1-3, located at the end of this chapter, presents a Conceptual Impact Area for an 81mm.

1.3.4 The areas not assessed during this characterization include the Chemical Defense Training Facility (CDTF) and the Military Operations in an Urban Terrain (MOUT) training area. The CDTF has been transferred to another federal agency. The MOUT is still in use as a training area for urban warfare. The Alabama National Guard currently owns the area. It is anticipated that because of the high level of human activity historically associated with these facilities, there is a low probability that they were used as impact areas. In addition to the acreage characterized by Foster Wheeler Environmental, sampling data collected by Parsons ES during their performance of the Chemical Warfare Materials (CWM) EE/CA has been incorporated into this EE/CA. Also, OE items discovered by IT corporation and reported to

Foster Wheeler Environmental on data sheets were integrated into the database used for assessing Alpha sectors.

1.3.5 EE/CA Process

The EE/CA process includes evaluating all archival data; conducting initial visual field reconnaissance, geophysical mapping, and intrusive field investigations to characterize the type, distribution, and extent of OE items within the boundaries of the site; and analysis of the field investigation data to determine the risks associated with the current and proposed future uses of the property. Foster Wheeler Environmental characterized the area designated as the Alpha portion through grid and delineation transect sampling activities. Grids are typically 100 foot by 100 foot areas that are walked for data collection. Grids are spaced throughout a sector for characterization. Delineation transects were used to further define areas of high OE concentration. Delineation transects are basically straight segments approximately 3.5 feet wide with varying lengths. Several delineation transects were established in a particular area in a north-south and east-west grid-like pattern and walked for data collection. The depth limit of the Foster Wheeler Environmental conventional ordnance EE/CA investigation was four feet. This depth selection was based on expected ordnance types from historical data in the Archives Search Report (ASR) conducted by the U.S. Army Corps of Engineers, St. Louis District. CWM sampling activities conducted by Parsons ES were as deep as nine feet to investigate burial areas.

1.3.6 Following field investigation activities, response action alternatives were developed and evaluated. Response action alternatives were developed according to DoD 6055.9 Standard, Chapter 12, Paragraph 12.3.4.3 "Site-Specific Remediation Depth Determination". This process requires consideration of types and distribution of OE and UXO, depths of UXO, and proposed land reuse in making final remedy selections. Six alternatives were developed for the Alpha Area EE/CA: Alternative 1 – No Further Action; Alternative 2 – Area-Specific Land Use Controls; Alternative 3 – Construction Support; Alternative 4 – Surface Clearance; Alternative 5 – Clearance to One Foot; Alternative 6 – Clearance to Depth (See "Acronyms and Abbreviations" for a description of these alternatives. This EE/CA report is prepared and processed through a series of drafts. A public meeting and public review period were included as part of the overall review process.

1.3.6 When the EE/CA report has addressed any comments generated during the public review period and is been approved, an Action Memorandum is then prepared. The Action Memorandum is the decision document of-record that provides the authority and direction to conduct the approved removal action response action. The Action Memorandum is based on the information provided by the EE/CA. The Action Memorandum is the equivalent to the Record of Decision used for NPL sites. Following this decision process, Removal Alternatives are performed in accordance with the recommendations from the Action Memorandum. Removal Action is the set of processes and activities to accomplish the on site response actions necessary to complete the removal of the OE/UXO from the site, with a final report of all actions completed during the removal process to include quality control and quality assurance of the processes and the data. Removal actions cover all acreage designated for a removal to include the areas previously investigated during the EE/CA process. A removal action may entail destruction of the individual ordnance item(s) in place, when the danger of moving the item is greater than destruction on site. Removals may also entail instituting other protective measures

such as fencing, land use restrictions, and public education programs. If, during implementation of the alternative(s) in accordance with the Action Memorandum, unanticipated items are discovered that are not adequately addressed by the response action, additional response action alternatives and/or land use controls may be required. Post-removal Actions include Recurring Reviews, Long-Term Monitoring of the site, continuing public education about the former military use of the site and the potential for OE and UXO to still occur in the area, deed notices about the former military use of the land, and Land Use Restrictions to prohibit digging below a specified depth in a former OE area without qualified UXO technician support where necessary. These are required to continue after the removal response phase has been completed.

1.4 PROJECT OBJECTIVES

The objective of the EE/CA is to determine the amount and type of ordnance and explosives (OE) within the Alpha Area of the Redevelopment Area; to evaluate the potential risks to human health and the environment due to the presence of OE; and to assess and recommend the most technically feasible and cost-effective approach for reducing the risk of exposure to OE.

1.5 PROJECT TEAM MEMBERS

1.5.1 U.S. Army Engineering and Support Center, Huntsville (USAESCH)

The USAESCH is the implementing agency responsible for the execution of this project. Responsibilities include procurement of services, providing direction to the prime contractor, approving the budget and schedule, review of documents, and coordination of document reviews by other agencies.

1.5.2 U.S. Army Engineer District, Mobile

The U.S. Army Corps of Engineers, Mobile District, is the Project Manager for this project.

1.5.3 Foster Wheeler Environmental Corporation

Foster Wheeler Environmental Corporation is the prime contractor to the USAESCH and provides all engineering support and services for the project. Foster Wheeler Environmental Corporation is responsible for performance of the activities detailed in the Statement of Work (SOW) as well as control of the project schedule and budget.

1.5.4 Base Realignment and Closure (BRAC) Cleanup Team (BCT)

The BCT is comprised of stakeholders of former Fort McClellan, including the Transition Force Environmental Office, Alabama Department of Environmental Management (ADEM), the U.S. Environmental Protection Agency (EPA), and the United States Army Corps of Engineers (USACE). The purpose of the BCT is to reach mutually acceptable solutions to environmental problems at Fort McClellan for all stakeholders and to provide direction for remediation of any such environmental problems.

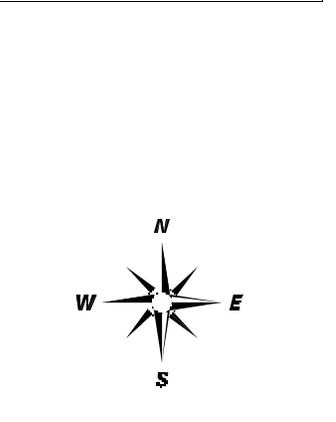
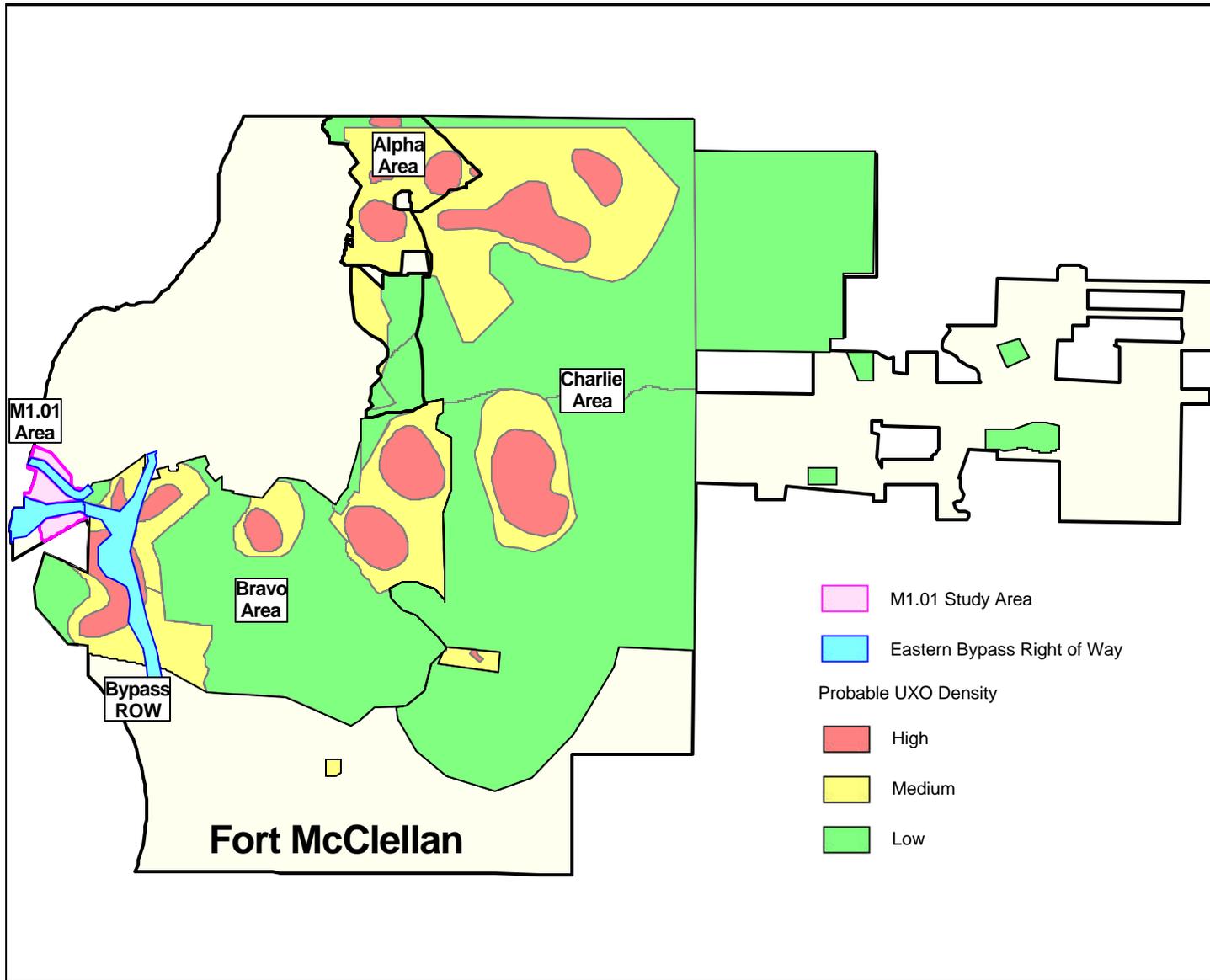


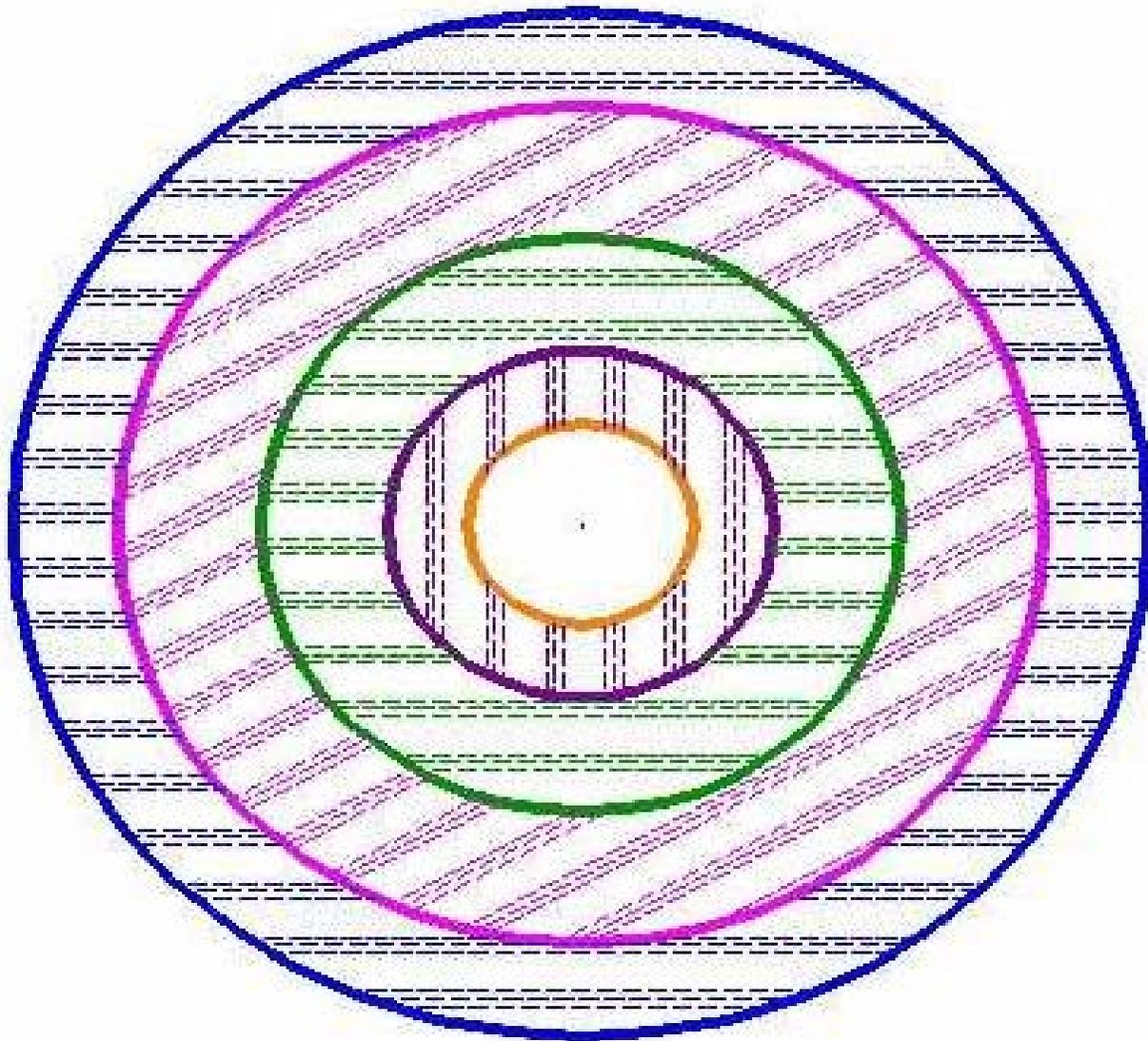
Figure 1-1
EE/CA
STUDY
AREAS

Fort McClellan
Calhoun County
Alabama

September 2003



Figure 1-2 Fragmentation Zones for an 81mm



FRAGMENT DISTRIBUTION FROM DETONATION
OF A SINGLE 81mm M43 MORTAR

AREA	DISTANCE FROM DETONATION	NO. OF FRAGMENTS	FRAGMENTS/ACRE
	218 FT	531	155
	371 FT	531	82
	516 FT	1168	87
	899 FT	650	28
	1097 FT	106	1.3

SOURCE: PREPARED AND PROVIDED BY US ARMY ENGINEERING & SUPPORT CENTER, HUNTSVILLE

Figure 1-3
Conceptual Impact Area for an 81mm



FIRING POINT

**IMPACT AREA FOR 81mm M43
CHARGES 1 & 2**

MAXIMUM FRAGMENTATION RANGE = 1097 FT

SOURCE: PREPARED AND PROVIDED BY US ARMY ENGINEERING & SUPPORT CENTER, HUNTSVILLE

2.0 SITE DESCRIPTION AND HISTORY

2.1 SITE LOCATION

Fort McClellan is located northeast of the City of Anniston, Calhoun County, Alabama. To the west of the Fort are the areas known as Weaver and Blue Mountain and to the north is the City of Jacksonville. The Talladega Forest is located east of the Fort. Fort McClellan occupies 18,929 acres adjacent to the city of Anniston, Alabama. The portion of Fort McClellan to be addressed in this EE/CA has been designated the Alpha Area, and lies in the north central portion of the base, immediately northeast of the main cantonment area. The Alpha Area comprises a part of the northern portion of the Redevelopment Area and is adjacent to the northern boundary of Fort McClellan. It extends from the northern boundary of Fort McClellan near Reilly Airfield and Anniston Beach south to Bains Gap Road. The Bravo Area is south and west of the Alpha Area. It comprises the remainder of the Redevelopment Area. The Choccolocco Mountains and the Choccolocco Corridor, which comprise the Charlie Area, are east of the Redevelopment Area. The Bravo portion of the Redevelopment Area as well as the Charlie Area within the Choccolocco Mountains and Choccolocco Corridor are areas of OE concern and will be addressed in subsequent EE/CAs. Figure 2-1 shows the location of the Alpha Area within Fort McClellan.

2.2 PHYSICAL DESCRIPTION

The four Alpha Area Sectors of Fort McClellan that were assessed during the site characterization consist of approximately 930 acres located in the north central portion of the facility. The area is predominantly heavily to moderately wooded with mixed pines and hardwoods, with some open areas that were cleared for various activities during the active operation of the installation. Numerous paved and unpaved secondary roads are present, along with occasional structures, many of which are no longer used. Two active facilities are located within the Alpha Area, the Chemical Decontamination Training Facility (CDTF) and a training area for urban warfare. The Alpha Area was divided into four sectors: M5-1L, M6-1L, M6-1M, and Smoke Ranges/T-38.

2.2.1 Geology

Fort McClellan is situated near the southern terminus of the Appalachian Mountain chain. All but the easternmost portion of the Main Post lie within the Valley and Ridge Province of the Appalachian Highlands. The portion of Fort McClellan east of Choccolocco Creek lies within the Piedmont Province. The age of the consolidated sedimentary and metamorphic rocks range from Precambrian to Pennsylvanian. On a large scale, most of the rocks have been intensely folded into an aggregate of northeast-southwest trending anticlines and synclines with associated thrust faults. The shallow geology in the area is characterized by colluvial deposits. Table 2-1 summarizes the major stratigraphic units underlying Fort McClellan. The presence of metamorphic rocks, as well as iron-bearing cements within the sedimentary rocks, increases the potential for minerals such as magnetite and other associated magnetic minerals. If the presence of magnetic minerals were identified, they were noted during the surveying and/or data interpretation activities. Figure 2-2 presents the geology in the Alpha Area.

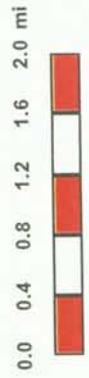
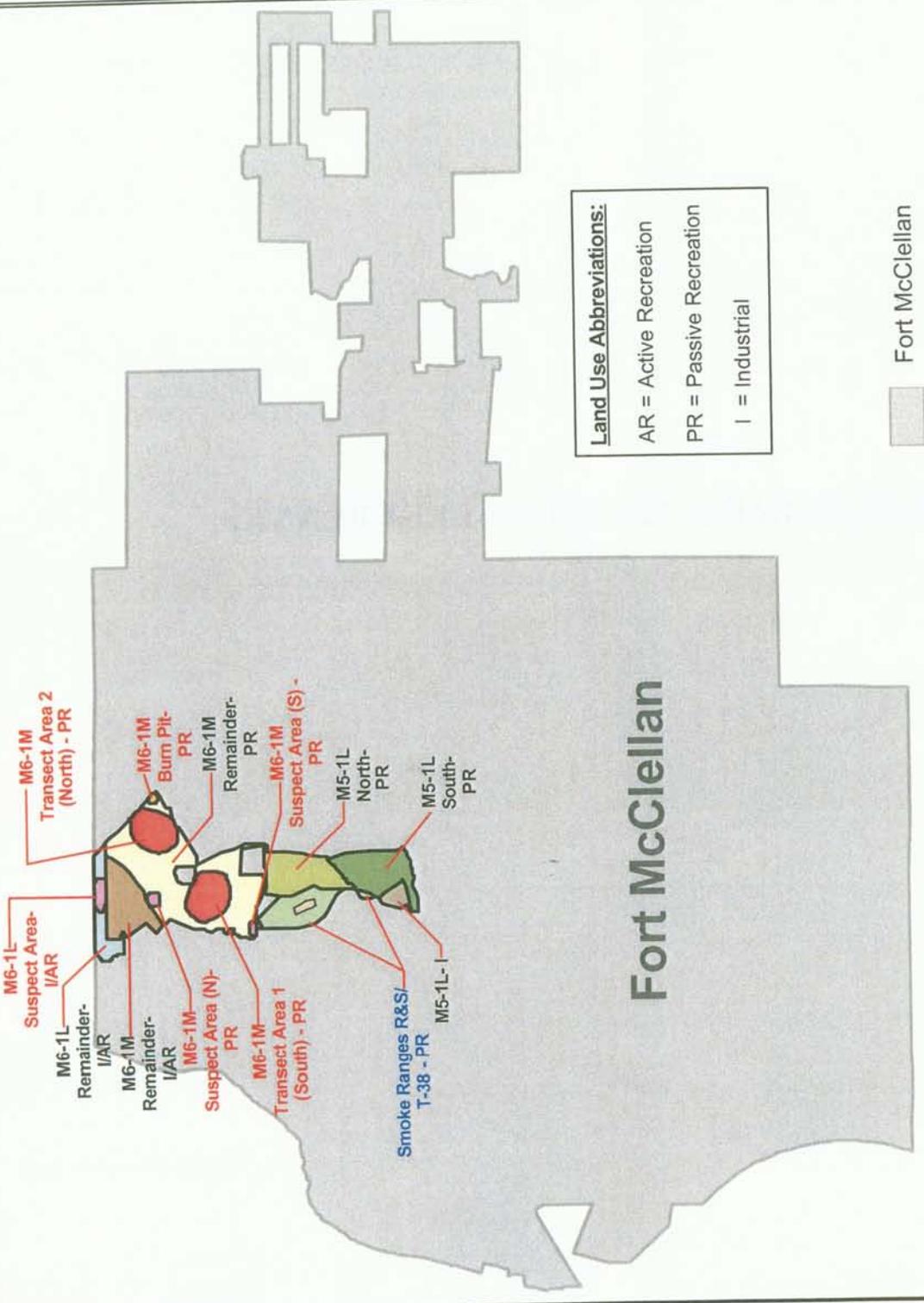


Fort McClellan
Alabama

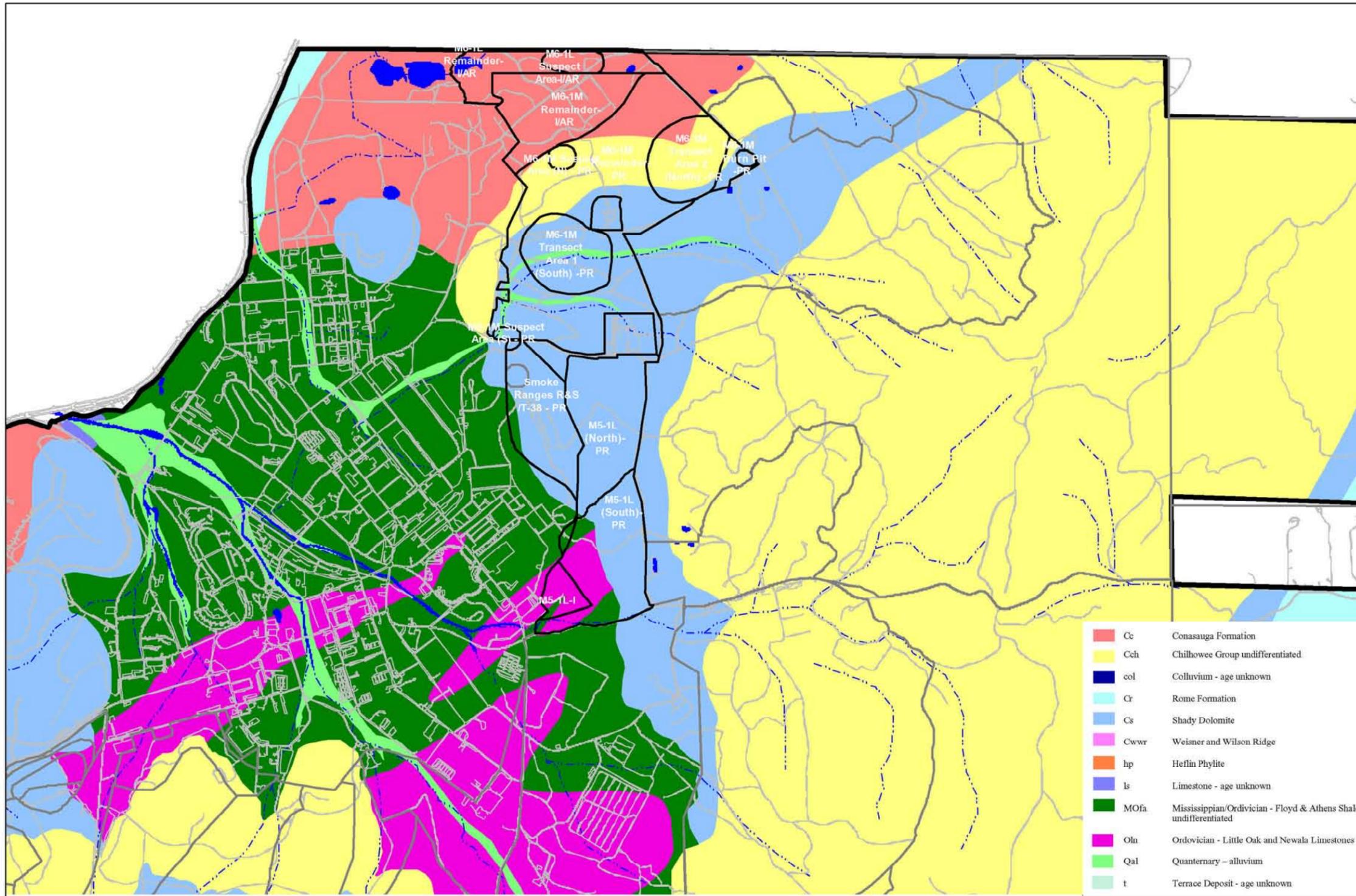


Figure 2-1 Alpha Area EE/CA Overview

Fort McClellan
Calhoun County
Alabama
September 2003



FOSTER WHEELER ENVIRONMENTAL CORPORATION



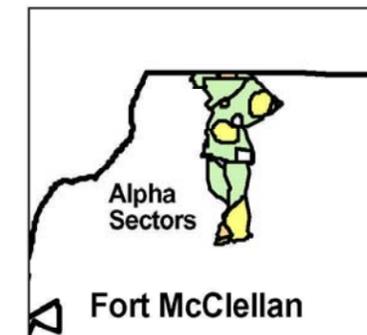
Cc	Conasauga Formation
Cch	Chilhowee Group undifferentiated
col	Colluvium - age unknown
Cr	Rome Formation
Cs	Shady Dolomite
Cwvr	Weisner and Wilson Ridge
hp	Heflin Phyllite
ls	Limestone - age unknown
MOfa	Mississippian/Ordovician - Floyd & Athens Shale, undifferentiated
Oln	Ordovician - Little Oak and Newala Limestones
Qal	Quaternary - alluvium
t	Terrace Deposit - age unknown

0.0 0.4 0.8 1.2 1.6 2.0 mi



FOSTER WHEELER ENVIRONMENTAL CORPORATION

	Roads		Alpha Sectors
	Streams		McClellan Study Areas
	Lakes		Fort McClellan



**Figure 2-2
ALPHA AREA
Geology**

Fort McClellan,
Calhoun County,
Alabama

September 2003

**Table 2-1
Summary of Major Stratigraphic Units**

Period	Formation	Thickness (feet)	Lithology
Quaternary	Alluvium, colluvium, and undifferentiated deposits	--	Alluvium, sandy to clayey; slope wash, gravel, and sand.
Tertiary	Deposits of Paleocene or early Eocene age	10-100	Clay, sand, and gravel.
Pennsylvanian	Pottsville Formation	300?	Sandstone, gray and brown with interbedded gray and brown shale.
Mississippian	Parkwood Formation	350	Sandstone, gray, feldspathic, silica - cemented, fossiliferous; and gray clayey shale.
	Floyd Shale	2,000	Shale, black to greenish-black, fissile; interbedded with minor thick to thin, greenish-gray sandstone and clayey limestone beds.
	Fort Payne Chert	100-350	Chert, finely broken; includes some dark flint in basal part; highly fossiliferous.
	Maury Formation	2-3	Claystone, green, locally red, and phosphate nodules; locally interbedded with red shale.
Devonian	Frog Mountain Sandstone	50	Sandstone, brown, coarse-grained, siliceous cement; locally includes dark, hard, siliceous shale or gray very coarse-grained, thick-bedded with light-brown shale.
Silurian	Red Mountain Formation	50	Sandstone, light-gray to white, thick-bedded to massive, 30 feet thick; overlain by 20 feet of light- brown, thin-bedded sandstone interbedded with light- brown shale.
Ordovician	Sequatchie Formation	100	Siltstone and shale, calcareous, maroon and greenish-gray mottled, locally fossiliferous.
	Chickamauga Limestone	275-325	Sandstone, white to light-gray, thick- to thin-bedded orthoquartzitic; well-sorted medium to coarse, rounded to well-rounded grains; locally conglomeratic; bentonitic beds in upper part of formation; maroon and orange-brown variegated shale and siltstone, with irregular lenses of thinly laminated, gray to gray-green and maroon sandstone; limestone and calcareous mudstone in lower part; locally fossiliferous.
	Little Oak Limestone	15	Limestone, gray crystalline, medium- to thick- bedded, fossiliferous; black, fissile shale interbedded with dark shaley limestone.
	Athens Shale	200	Limestone, gray, crystalline, medium- to thick-bedded, fossiliferous; black, fissile shale interbedded with dark shaley limestone.
	Lenoir Limestone	15	Limestone, gray, crystalline, medium- to thick-bedded, fossiliferous; black fissile shale interbedded with dark shaley limestone.
	Newala Limestone and Longview Limestone undifferentiated	400-600	Limestone, pearl-gray, dark-gray, and bluish-gray, dense, medium- to thick-bedded; thin beds of coarse-grained dolomite; fine-grained chert common in the Longview.
	Ordovician and Cambrian	Chepultepec Dolomite, Copper Ridge Dolomite, and Ketona Dolomite, undifferentiated	2,000

Table 2-1 (Continued)			
Summary of Major Stratigraphic Units			
Cambrian	Conasauga Formation	500	Limestone, dolomitic limestone, and crystalline gray dolomite; thin beds of gray shale that weathers green. Shale is dominant facies to the north and northwest.
	Rome Formation	1,000	Shale and siltstone, red; green shale and red and light-gray sandstone; locally includes lenticular beds of light-gray limestone or dolomite.
	Shady Dolomite	1,000	Limestone and dolomite, yellowish- to light- to dark-gray, crystalline, medium- to thick-bedded; Variegated clayey shales in lower part.
	Weisner Formation	2,500	Shale, siltstone, sandstone, quartzite, and Conglomerate; forms mountains. Local deposits of bauxite, hematite, and limonite.

2.2.2 Hydrogeology

Few hydrogeological assessments of regional groundwater flow patterns have been conducted in the area surrounding former Fort McClellan. Aquifers in the area are developed in residual soil derived from weathering of bedrock, within fractured bedrock, along fault lines and within karstic units. Groundwater flow is generally toward major surface-water features. However, because of differential weathering, variable fracturing and the potential for conduit flow, topography as an indicator of groundwater flow direction must be used with caution. Groundwater intersecting the ground surface has resulted in numerous springs, which act as important sources of discharge and water supply in the area (SAIC, 1999). Precipitation is the primary source of recharge to groundwater in Calhoun County and thrust fault-zones form conduits for groundwater movement. Points of discharge are springs, effluent streams and lakes. Shallow groundwater on former Fort McClellan occurs principally in the residuum developed from Cambrian sedimentary bedrock units of the Weisner Formation, part of the Chilhowee Group and locally in Ordovician carbonates. Bedrock permeability may be locally enhanced by fracture zones associated with thrust faults and by solution of limestones. Surface-water movement into sinkholes provides another source of groundwater recharge and locally has facilitated the formation of caves (SAIC, 1999).

2.2.3 Topography

The topographic gradient at Fort McClellan generally increases towards the south and east of the main installation. Local relief on Fort McClellan is in excess of 1,320 feet. The lower elevations (700 feet above mean sea level [msl]) occur along Cane Creek, near Baltzell Gate Road, while the maximum elevations (2,063 feet above msl) occur on Choccolocco Mountain, which traverses the area in a north/south direction, with the steep easterly slopes grading abruptly into Choccolocco Valley. The western slopes are more continuous with the southern extension maintaining elevations up to 900 feet above msl near the western reservation boundary. The northern extension decreases in elevation in the vicinity of Reilly Airfield. The central portion of Fort McClellan is characterized by flat to gently sloping land. Topography within the Alpha Area consists of gentle to moderately sloped rolling hills, with intervening, relatively flat-lying

valleys. Elevations range from approximately 800 feet above msl along the western edge of the Alpha Area to 1,088 feet above msl at the highest point. Surface drainage is predominantly to the west by way of Cave Creek and Cane Creek and their tributaries.

2.2.3.1 Sector M5-1L covers 242 acres and is rectangular in shape and it trends north-south. The parcel is a narrow section of land roughly 0.38 miles wide and 1 mile in length. It is located east of Reservoir Ridge. The sector has a topographic gradient that gently increases to the east.

2.2.3.2 Sector M6-1L covers 64 acres and is roughly rectangular in shape and trends east-west. It is a narrow sliver of land approximately 0.75 miles in length by 0.12 mi. in width whose western boundary abuts Reilly Airfield, and northern boundary is the Ft. McClellan property boundary. The eastern boundary includes a section of the POW Compound Training Area. The topographic gradient within the parcel gently increases to the east.

2.2.3.3 Sector M6-1M covers 535 acres and is asymmetrical in shape and includes the POW Compound Training Area to the northeast and the CDTF to the southeast. The topographic gradient of the sector gently increases to the east. The area is characterized by a relatively significant hill in the northwest of the parcel. The parcel is just east of Cemetery Hill.

2.2.3.4 The Smoke Ranges/T-38 Sector covers approximately 89 acres immediately to the west of sector M5-1L. The center of the area is predominately high ridge around the T-38 compound. The area drops rapidly to the west and northwest. The area to the east and southeast slopes less steeply. The area is covered by heavy growth of pine trees with scrub brush. The sector consists of two parts. The main portion of the sector (~86 acres) is asymmetrical in shape, approximately 0.7 miles long from north to south, and approximately 0.3 miles wide east to west. This area contains the former training area T-38, located at the top of Reservoir Ridge. This ridge lies largely within the sector boundaries. A much smaller portion of Sector Smoke Ranges/T-38 (~3 acres) lies just south of the main portion. Both portions of this sector lie between the Main Cantonment area of Fort McClellan just to the west, and Sector M5-1L to the east.

2.3 SITE HISTORY

Fort McClellan has documented use as a military training area since 1912, when the Alabama National Guard used it for artillery training. However, the Choccolocco Mountains may have been used for artillery training by the units stationed at Camp Shipp in the Blue Mountain Area during the Spanish American War as early as 1898. The 29th Infantry Division used areas of Fort McClellan for training prior to being ordered to France during World War I. In 1917, Congress authorized the establishment of Camp McClellan and in 1929, the camp was officially designated as Fort McClellan. Prior to World War II, the 27th Infantry Division assembled at Fort McClellan for training and during the war many other units used the site for various training purposes. Following World War II, in June 1947, the Fort was put in to an inactive status. The Fort was reactivated in January 1950 and the site was used for National Guard training and was selected as the site for the Army's Chemical Corps school.

2.3.1 Fort McClellan was recommended for closure under the BRAC Program, and the Fort was closed in September 1999. At this time, local, state, and federal interests are deciding the

future use of Fort McClellan. A Transition Team is now in place to facilitate disposition of Fort McClellan properties to private ownership and/or transfer to other government entities.

2.3.2 The history of Fort McClellan, as described in the Archives Search Report (ASR) Findings (USACE, 1999a) and Archives Search Report Conclusions and Recommendations (USACE, 1999b) includes training activities and demonstrations that used conventional weapons (i.e., mortars, anti-tank guns and artillery pieces). Chemical warfare training occurred during several periods of time that included the use of such items as chemical agent identification sets, smoke pots, flame field expedients (FFE), rifle and smoke grenades. A review of the ASR Conclusions and Recommendations indicates that the majority of the chemical inventory was transferred from Fort McClellan in 1976. In 1987, the Chemical Decontamination Training Facility located in the Alpha Area of Fort McClellan became operational. Specific training areas and ranges within the Alpha Area, along with associated ordnance items historically used in the Alpha Area, are presented in the Conceptual Site Model (CSM) for each of the EE/CA sampling sectors designated for the Alpha Area (Chapter 4.0 of this document). A summary of historical activities in the area can be found in the Archives Search Report (ASR) for Fort McClellan, and in the Reconnaissance Findings, Conceptual Plan, and Proposed Scope of Work for EE/CA Sampling document prepared by Foster Wheeler Environmental in August 2000.

2.4 DEMOGRAPHIC PROFILE

Former Fort McClellan is located in Calhoun County at the foothills of the Appalachian Mountains. The surrounding communities including Weaver, Pelham Range and Anniston (the county seat) offer multiple centers of activity such as Oxford Lake and Civic Center, Cheaha State Park, Jacksonville State University, Anniston Museum of Natural History, Northeast Alabama Regional Medical Center and several theaters, park facilities and golf courses.

2.4.1 According to the 2000 Census of Population and Housing, Calhoun County is home to approximately 112,249 people within a 608 square-mile area, averaging 184.6 people per square mile. The percentage of individuals under age 19 is 26.8 percent; the percentage over age 65 is 14.2 percent. The median age is 37.2. Approximately 79.7 percent of the population is white, 18.8 percent African American, 0.8 percent American Indian or Alaska Native, 0.8 percent Asian, 0.1 percent Native Hawaiian or Pacific Islander, and 0.8 percent other races.

2.4.2 Housing in Calhoun County is composed of 51,322 multiple and single family dwellings. Approximately 72.5 percent of the households are owner occupied and 27.5 percent of the households are rental units.

2.4.3 The total population for the City of Anniston is 24,276. The percentage of individuals under the age of 19 is 26.3 percent and over the age of 65 is 18.7 percent. The median age is 39.3. Approximately 46.7 percent of the population is white, 48.7 percent is African American, 0.3 percent is American Indian and Alaska Native, 0.8 percent is Asian, and 0.7 percent other races. The City of Anniston has approximately 10,447 occupied housing units of which 59.5 percent are owner occupied and 40.5 percent are rented.

2.4.4 Calhoun County's medical facilities serve as the medical center and the court system serves as the legal and accounting center of northeast Alabama. Retail, entertainment and recreational establishments also thrive in this area.

2.4.5 A variety of industries including federal and civilian government, services, durable goods manufacturing, and the area's agricultural industry are strong contributors to the local economy. Mead Ink, Hager (hinges), Parker Hannifin (valves), Bear (knives), Springs Industries (comforters), and Allied Signal (aircraft systems) are just a few of the more than 150 industries located in Calhoun County. Honda recently chose Lincoln, Alabama, 14 miles southeast of Anniston, as the site for their new automotive facility scheduled to open in 2002.

2.5 CURRENT AND FUTURE SITE USE

Currently, the Alpha Area is abandoned and not in use by any agency or group. Future use of the parcel is anticipated as passive and active recreational activities or industrial property.

2.6 ANALYSIS OF HISTORICAL RECORDS

2.6.1 M5-1L Sector

Previous investigations in and around Sector M5-1L indicate that it was used primarily as a training area. Ranges impacting Sector M5-1L include the north half of a World War I Artillery Range, Bivouac Site B-40, Bandholtz Rifle Range (Range 25), World War II Machine Gun Range, Smoke Range R and S, and 37mm Anti-Tank Range (T-31). Ordnance and Explosives associated with these areas are listed in Table 2-2.

2.6.2 M6-1L Sector

Previous investigations conducted in and around Sector M6-1L did not indicate the presence of historical impact areas. The ranges that may have impacted Sector M6-1L are the Tank Combat Range, Tank Range #1, the World War II Machine Gun Range, Grenade Court, Defendum Rifle Range, and Bivouac Site B-30. Ordnance and Explosives historically associated with these areas are listed in Table 2-2. Reilly Airfield is adjacent and located to the west of the parcel and was used as an active training area from post WWII until base closure. The airfield was used to demonstrate evasive driving, helicopter operations, and radiological surveys. The POW Compound is located to the south of the parcel and was used to demonstrate the handling of enemy prisoners of war.

**Table 2-2
Ordnance and Explosives Historically Associated with the Alpha Area**

Area	Ordnance and Explosives Associated with Area
Sector M5-1L	
World War I Artillery Range (North Half)	Artillery; Mortar
Bandholtz Rifle Range (Range 25)	Small Arms
World War II Machine Gun Range	Small Arms; Smoke Grenades; Pyrotechnics; Slap Fares
Bivouac Site B-40	Training Debris (Rifle Blanks); Pyrotechnic Devices (Smoke Grenades)
37mm Anti-Tank Range (T-31)	Small Arms 37mm Anti-Tank
Smoke Ranges R & S	Livens Round
Sector M6-1L	
Tank Combat Range	Tank Artillery
Tank Range #1	
World War II Machine Gun (Rifle) Range	Small Arms
Grenade Court	Hand Grenades
Bivouac Site B-30	Training Debris (Rifle Blanks); Pyrotechnic Devices (Smoke Grenades)
Defendum Rifle Range (1950 Sub-Caliber Tank Range; R-32, R-34; Range 30; Defendum Known Distance Range)	Small Arms
POW Compound	Not Indicated
Sector M6-1M	
World War I Machine Gun Range	Small Arms
Excavated Trench	Artillery Propellant Charge
Tank Combat Range	Tank Artillery
Defendum Rifle Range (1950 Sub-Caliber Tank Range; R-32, R-34; Range 30; Defendum Known Distance Range)	Small Arms
Grenade Court	Hand Grenades
World War II Machine Gun Range	Small Arms
Range 31	40 mm grenades; Fougasse; Smoke; Flame Thrower; LAW; Incendiary Rockets; Small Arms; Other Explosive Devices
37 mm Anti-Tank Range (T-31)	37mm Anti-Tank
Bandholtz Rifle Range (Range 25)	Small Arms
Tank Range #1	Unknown
Tank Range #2	Unknown
Range	Unknown
Bivouac Site 31	Small Arms
Training Area 31 (Part of Range 30)	Chemical decon training (Mustard, lewisite, GB, & VX)
POW Compound	Not Indicated
Rifle Transistion Range	Not Indicated
1967 Defendum Grenade Range	Not Indicated
Sector Smoke Ranges/ T-38	
Smoke Range	Smoke
T-38 (Site)	Toxic Agents (removed)
Source: Archives Search Report (USACE, 2001)	

2.6.3 M6-1M Sector

Investigations in and around M6-1M and surrounding areas indicate that it was primarily used as a training area. Ranges impacting Sector M6-1M include the World War I Machine Gun Range, Tank Combat Range, Defendum Rifle Range, Grenade Court, World War II Machine Gun Range, Range 31, 37mm Anti-Tank Range (T-31), an unnamed Range, Tank Range #1, Tank Range #2, Bandholtz Rifle Range (Range 25), Training Area 31 (part of Range 30), Bivouac Site 31, Rifle Transition Range, and 1967 Defendum Grenade Range. Ordnance and Explosives historically associated with these areas are listed in Table 2-2. The POW Compound was also located in the M6-1M Sector.

2.6.4 Smoke Ranges/ T-38 Sector

The primary features within this sector are Site T-38, also called the Technical Escort Reaction Area, and historic Smoke Ranges. The T-38 site is located along the top of a ridgeline with the smoke ranges surrounding the T-38 area. The northern part of T-38 was referred to as the Toxic Agent Yard or Toxic Gas Yard. The T-38 Site was used for training Technical Escort Unit personnel in techniques for eliminating toxic hazards caused by mishaps to chemical munitions during transportation. The site was also reportedly used for storage of toxic agents and munitions. The Smoke Ranges were used for training on smoke generating equipment and fog oil. All CWM issues associated with site are addressed in the CWM EE/CA being prepared by Parsons ES. This EE/CA report only addresses conventional ordnance issues associated with this sector.

2.7 PREVIOUS INVESTIGATIONS

A number of previous investigations have been conducted at Fort McClellan that provide useful information regarding the potential presence of OE at the site. Several studies specifically addressed OE at the site, including the Alpha Area, while others were aimed at OE and other environmental issues on a site-wide basis. The discussion below includes those previous investigations that included information specifically pertinent to potential OE contamination within the Alpha Area. Copies of these documents are available in the repository located at the Anniston-Calhoun Public Library and the Houston Cole Library, Jacksonville State University. Foster Wheeler Environmental utilized these documents during the records search phase of the project that led up to the current EE/CA investigation phase.

2.7.1 Archives Search Report (ASR), US Army Corps of Engineers - An ASR was prepared by the US Army Corps of Engineers, St. Louis District in 1997, and revised in 2000 and 2001 based on additional information. This document was used as the basis for much of the EE/CA reconnaissance work performed by Foster Wheeler Environmental thus far at the site. The ASR was prepared by reviewing available records and reports documenting the history of the site. Historical information pertaining to site operations, including a listing of site investigations conducted before 1996 is contained within the ASR. The ASR describes known historical OE-related activities at Fort McClellan. The document includes maps with the locations of known range safety fans, as well as ordnance firing points, types of ordnance reportedly used at the various ranges, and dates of operation of ranges, firing fans, and training

areas. The Army has revised the ASR to include more complete information concerning training areas on the Installation.

2.7.2 Environmental Baseline Survey (EBS), Environmental Science and Engineering, Inc. (ESE) - The EBS for Fort McClellan was completed by ESE in January 1998. Through the use of records reviews, interviews, and site inspections, the report documented the status of Hazardous Toxic and Radiological Wastes (HTRW) and OE issues at Fort McClellan and Pelham Range. The report provides a summary of known OE sites at Fort McClellan, and was useful in confirming and/or supplementing the information contained in the ASR.

2.7.3 Historical Aerial Photograph Investigation, Oak Ridge National Laboratories (ORNL)- This investigation was completed in August 1999 by ORNL for USAESCH. The purpose of the study was to conduct digital photographic interpretation of historical photographs, and anomaly resolution and tracking of ten sites within Fort McClellan. A portion of the Alpha Area was covered by this study, and falls within the area designated by ORNL as Range Site 2. The study included an analysis of photographs ranging from 1937 to 1994, and a number of anomalies were identified which are associated with known ranges in the area. Anomalies were classified as unidentified objects, unidentified structures, ammunition ranges, training areas, bivouac sites, areas of trails and clearings, a trail with no outlet, and areas cleared of scrub and ground cover.

2.7.4 Environmental Photographic Interpretation Center (EPIC) aerial photograph investigation, US Environmental Protection Agency - This study was conducted by the EPA in 1990 to help determine the history and locations of potential environmental issues at Fort McClellan. Numerous photographic anomalies were identified. The study was useful as a separate source for locating potential OE related sites within the EE/CA study area, and supplemented the other documents containing historical information and photographs.

2.7.5 Reconnaissance Findings, Conceptual Plan, and Proposed Scope of Work, Foster Wheeler Environmental Corporation - This report was submitted in August 2000 following the site reconnaissance phase of the EE/CA process at Fort McClellan. The report includes a tabular summary of historical ordnance use at the various ranges, a description of the site reconnaissance activities performed in the field, a summary of the ordnance related and non-ordnance related findings, and a map showing proposed homogeneous OE sampling sectors to be used in the EE/CA sampling. A detailed description of the proposed scope of work was presented, along with the rationale used to define sampling sectors and the proposed sampling acreage for each sector. Non-ordnance related data such as terrain type and vegetation cover were also collected during the reconnaissance to help in planning the OE sampling. This document is included as Attachment 6-1 to the approved Site-Specific Work Plan for the Alpha Area.

2.7.6 Three previous investigations at the site were specifically aimed at Chemical Warfare Materials characterization of the T-38 area, which include areas covered in this EE/CA. Information concerning conventional ordnance contained in these documents is used in the characterization of Sector M5-1L and Sector T-38 in this document. The following excerpts were taken from the Parsons ES study described below.

2.7.7 A Site Investigation (SI) performed by SAIC (SAIC, 1993) included a site visit to the T-38 area, followed by limited geophysical surveys and soil sampling. Four "High Probability" areas for CWM were identified and sampled. Two areas were down gradient from an identified storage pad area, one was near a possible disposal sump, and one was near the southern end of the site.

2.7.8 A Remedial Investigation (RI) performed by SAIC (SAIC, 1999) included additional geophysical surveys at T-38, a soil boring into the disposal pit area, and the installation of monitoring wells. Areas of the site that were surveyed included the possible location of the sump, the southern portion of the site believed to contain a buried drum, and the area over a gravel pad in the southwest portion of the site. In addition, towed-array magnetometer surveys were conducted over most of the open areas of the site.

2.7.9 Parsons ES conducted a CWM EE/CA for the Smoke Ranges and T-38 area at Fort McClellan. The field sampling activities for that EE/CA included sampling within two of the sectors covered by the Alpha EE/CA. Parsons conducted geophysical surveys and intrusive sampling associated with both the Smoke Ranges and the T-38 Area, and this sampling falls within the M5-1L Sector of the Alpha EE/CA, as well as the Smoke ranges/ T-38 Sector. The sampling in the T-38 Sector was geared toward CWM characterization, but the results provide data that can be used in the characterization of conventional ordnance as well. The Parsons data has been incorporated into the Alpha EE/CA as it pertains to conventional OE contamination issues. See Table 3-2, located in Chapter 3, for a listing of conventional OE items from the Parson's data used in this report. Findings included 75-mm empty projectiles, several dummy grenades, a grenade base, 7.62 metal clips, a smoke grenade, and a slap flare (See Appendix D).

2.8 PREVIOUS REMOVAL ACTIONS

Records do not indicate any previous removal actions in the Alpha Area.

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