FINAL
Site-Specific Work Plan Bravo Area Engineering Evaluation/Cost Analysis Ordnance and Explosives Response Fort McClellan, Alabama

Delivery Order 0001, Modification 02
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Contracting Agency:
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Huntsville, Alabama

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Prepared by:
Foster Wheeler Environmental Corporation
McClellan, Alabama
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LIST OF ACRONYMS

AA	Anti-aircraft
AEDA	Ammunition, Explosives and Other Dangerous Articles
AHAs	Activity Hazard Analyses
AOC	Area of Concern
AR	Army Regulation
ARARs	Applicable and Relevant and Appropriate Requirements
ASCII	American Standard Code for Information Interchange
ASP	Ammunition Supply Point
ASR	Archives Search Report
BATF	Bureau of Alcohol, Tobacco and Firearms
BCT	BRAC Cleanup Team
BEC	BRAC Environmental Coordinator
bgs	below ground surface
BIP	Blow in Place
BRAC	Base Realignment and Closure
CADD	Computer-Aided Design and Drafting
CBR	Chemical, Biological and Radiological
CDAP	Chemical Data Acquisition Plan
CEHNC	United States Army Engineering and Support Center, Huntsville
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
CIH	Certified Industrial Hygienist
CMC	Corporate Medical Consultant
CPR	Cardiopulmonary Resuscitation
CRZ	Contamination Reduction Zone
CWM	Chemical Warfare Materiel
Dbh	diameter at breast height
DCOs	Data Collection Objectives
DDESB	Department of Defense Explosives Safety Board
DERP	Defense Environmental Restoration Program
DID	Data Item Description
DoD	Department of Defense
DQCs	Data Quality Characteristics
DQOs	Data Quality Objectives
DRMS	Defense Reutilization and Marketing Service
EE/CA	Engineering Evaluation/Cost Analysis
EHS	Environmental Health and Safety
EIS	Environmental Impact Statement
EM	Electromagnetic
EOD	Explosive Ordnance Disposal
EPP	Environmental Protection Plan
ER	Engineer Regulation
EZ	Exclusion Zone
FAR	Federal Acquisition Regulations
FFP	Firm Fixed Price
FG	Field Geologist
FID	Flame Ionization Detector
FO	Field Office
FTL	Field Team Leader

FTP	File Transfer Protocol
FUDS	Formerly Used Defense Site
GIS	Geographic Information System
GPS	Global Positioning System
GTM	Geophysical Task Manager
HARC	Historic Archeological and Cultural
HE	High Explosive
HEI	High Explosive Incendiary
HTRW	Hazardous, Toxic, and Radiological Waste
kya	Thousand Years
I.D.	Intraline Distance
IDW	Investigation Derived Wastes
LOP	Level of Protection
M	Model Number
MCE	Maximum Credible Event
MCX	Mandatory Center of Expertise
mm	Millimeter
MOA	Memorandum of Agreement
MPH	Miles per hour
MPH	Miles Per Hour
MPM	Most Probable Munition
MSD	Minimum Safe Distance
MSDS	Material Safety Data Sheet
MSL	Mean Sea Level
mV	Millivolt
NA	Not Applicable
NAD	North American Datum
NAVD	North American Vertical Datum
NCP	National Contingency Plan
NDAI	No DoD Action Indicated
NEW	Net Explosive Weight
NTCRA	Non-Time Critical Removal Action
OE	Ordnance and Explosives
OES	Ordnance and Explosive-Related Scrap
OE-KB	OE Knowledge Base
OJT	On the Job Training
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PA	Preliminary Assessment
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PDF	Portable Document Format
PDOP	Position Dilution of Precision
PEL	Permissible Exposure Limit
PESM	Project Environmental and Safety Manager
PETN	Pentaerythritol Tetranitrate
PID	Photoionization Detector
PM	Project Manager
PMO	Provost Marshal's Office
PPE	Personal Protective Equipment
PRCS	Permit Required Confined Space
PSD	Personnel Separation Distance

PVC	Polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
RAB	Restoration Advisory Board
RCP	Regulatory Compliance Plan
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetrinitramene
RLS	Registered Land Surveyor
RTK	Real time kinematic
SAA	Small Arms Ammunition
SARA	Superfund Amendments and Reauthorization Act
SHPO	State Historic Preservation Office
SI	Site Investigation
SINAs	Special Interest Natural Areas
SOP	Standard Operating Procedure
SSHP	Site Safety and Health Plan
SUXOS	Senior UXO Supervisor
SZ	Support Zone
TBC	To Be Considered
TBD	To Be Determined
TCRA	Time-Critical Removal Action
TDEM	Time Domain Electromagnetics
TFO	Transition Force Operations
TLV	Threshold Limit Value
TM	Technical Manual
TNT	Trinitrotoluene
TRADOC	United States Army Training and Doctrine Command
TSSDS	Tri-Service Spatial Data Standards
ttn	topologically triangulated network
UL	Underwriter's Laboratory
UN	United Nations
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USRADS	Ultrasonic Ranging and Data System
UXO	Unexploded Ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Site Safety and Health Officer
WDCMP	Work, Data and Cost Management Plan
WP	White Phosphorus

1.0 INTRODUCTION

1.1 PROJECT AUTHORIZATION

The United States Army Engineering and Support Center, Huntsville (USAESCH) Ordnance and Explosives Mandatory Center of Expertise (MCX) and 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, Delivery Order 01, Modification 02) to perform an Engineering Evaluation/Cost Analysis (EE/CA) within the Bravo portion of the Redevelopment Area at Fort McClellan. The EE/CA will be prepared in order to recommend and justify appropriate preferred unexploded ordnance (UXO/OE) risk reduction and removal alternatives. 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.

1.1.1 This EE/CA Work Plan is being prepared under the Base Realignment and Closure (BRAC) Program. Federal law requires that government facilities, subject to closure and subsequent reuse, be subject to remediation. Activities conducted in support of this project will be conducted in a manner consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Contingency Plan (NCP). A detailed description of the steps involved in the remediation process is found in Section 1.1.2 of the Final Site-Wide Work Plan dated 18 October 2000. A brief description of the EE/CA phase of the process is described as follows:

1.1.2 The EE/CA includes field geophysical and intrusive investigations to detect surface and subsurface ordnance and define the hazards posed by UXO/OE at the site by establishing the area, depth, and density of UXO/OE. If there is no evidence of UXO/Presence of OE, the site will be recommended for No DoD Action Indicated (NDAI). A risk analysis will be performed that incorporates the results of the investigation. Several feasible alternatives to reduce the risk to UXO/OE are devised, evaluated for effectiveness in risk reduction and cost, and compared. The best alternative is recommended. A summary of data collection activities and findings, details of the risk assessment, and the risk reduction and removal alternatives evaluation are presented in the EE/CA Report. The appropriate environmental agencies, individual stakeholders, and agencies with interests in the property and the public conduct reviews prior to selecting the appropriate alternative. Public involvement is encouraged throughout the life cycle of the project.

1.1.3 This document is designed to serve as the Site-Specific Work Plan for the Bravo Area EE/CA and supplements the Final General Site-Wide Work Plan, which describes Foster Wheeler Environmental's technical approach and management structure

for the completion of the field program. The site-wide plan addresses ordnance and explosives (OE) investigations, assessment activities, removal actions (non-TCRA and TCRA), anomaly avoidance during hazardous toxic and radiologic waste (HTRW) activities, and construction support requirements to be performed within Fort McClellan. This document will incorporate by reference those applicable sections of the site-wide plan that do not require any site-specific modification.

1.2 PURPOSE AND SCOPE

The purpose of the EE/CA is to investigate the nature and extent of UXO/OE presence, to evaluate possible UXO/OE risk reduction and removal action alternatives, and document the decision-making process in recommending the appropriate risk reduction and removal action alternative(s). This is described in the 21 September 2000 Scope of Work (SOW), and in SOW modifications to Tasks 3, 4, and 5 dated 8 November 2000. Much of the information used to develop the SOW for this EE/CA was presented in the "Reconnaissance Findings, Conceptual Plan, and Proposed Scope of Work for EE/CA Sampling" document dated August 2000. Specifically, the tasks involved in completion of this delivery order for the Fort McClellan Bravo Area are based on existing information from the Archives Search Report (ASR), the "Reconnaissance Findings" document, and the Final General Site-Wide Work Plan. The tasks include:

- Preparing a Site-Specific Work Plan for the Bravo Area.
- Performing geophysical and UXO/OE intrusive investigations at the site to support a risk assessment and completion of the EE/CA for the site.
- Developing a Geographic Information System (GIS) database for the site to compile the investigation data.
- Performing a Land Use Control Analysis to support the development and evaluation of this alternative in the EE/CA.
- Developing, evaluating, comparing, and recommending UXO/OE risk reduction and removal action alternatives for the Bravo Area in accordance with applicable regulations.
- Preparing the EE/CA Decision Document to detail the selected risk reduction and removal action alternative method(s) for the Bravo Area of Fort McClellan.

1.2.1 This Work Plan provides information to address the first three bulleted items listed above; the last three bulleted items will be addressed in full during preparation of the EE/CA Report. Note that potential hazardous and toxic waste (HTW) contamination of soil and/or groundwater will not be addressed in this EE/CA. Furthermore, according to the Scope of Work and ASR, this site may contain Chemical Warfare Material (CWM). Another contractor is currently performing an EE/CA for the CWM sites. If CWM are encountered during the course of the EE/CA sampling activities, Foster Wheeler Environmental and subcontractor personnel will immediately withdraw from the work area in an upwind direction and notify the designated USAESCH Safety Specialist and the Fort McClellan BRAC Environmental Coordinator (BEC). Foster Wheeler Environmental UXO/OE personnel will secure the area until relieved by government

personnel. Operations will continue in another location or operations will be suspended until further notice, upon the direction of the designated USAESCH Contracting Officer.

1.2.2 This Work Plan describes Foster Wheeler Environmental's technical approach and management structure for the completion of the EE/CA field investigation and characterization tasks.

2.0 SITE DESCRIPTION

Details regarding the site description and history of Fort McClellan were obtained through previously prepared documents and Foster Wheeler's reconnaissance activities at the site.

2.1 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. 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 Bravo Area, and lies in the south central portion of the facility, immediately south of the main cantonment area. The Bravo Area comprises a part of the southern portion of the Redevelopment Area, the portion of the Fort designated with the highest priority and likelihood for future commercial and residential use, and is adjacent to the southern edge of the Main Cantonment Area of Fort McClellan. The Alpha Area is northeast of the Bravo Area. It comprises the remainder of the Redevelopment Area. The Choccolocco Mountains and the Choccolocco Corridor are east of the Redevelopment Area. The Alpha portion of the Redevelopment Area will be addressed in the Alpha EE/CA and the Choccolocco areas will be addressed in the Charlie EE/CA. Figure 2-1 shows the location of Fort McClellan with Bravo Area highlighted.

2.2 PHYSICAL DESCRIPTION

The Bravo Area of Fort McClellan consists of approximately 3,806 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, which were cleared for various activities during the active operation of the Fort Installation. Numerous paved and unpaved secondary roads are present, but very few structures are located within the Bravo Area.

2.2.1 The topographic gradient at Fort McClellan generally increases toward 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 in the Choccolocco Mountains, which traverse 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, in the vicinity of the Main Cantonment Area, is characterized by flat to gently sloping land.

2.2.2 Topography within the Bravo Area consists of gentle to steeply sloped rolling hills in the eastern portion of the area around the M4 Parcel. The central and western

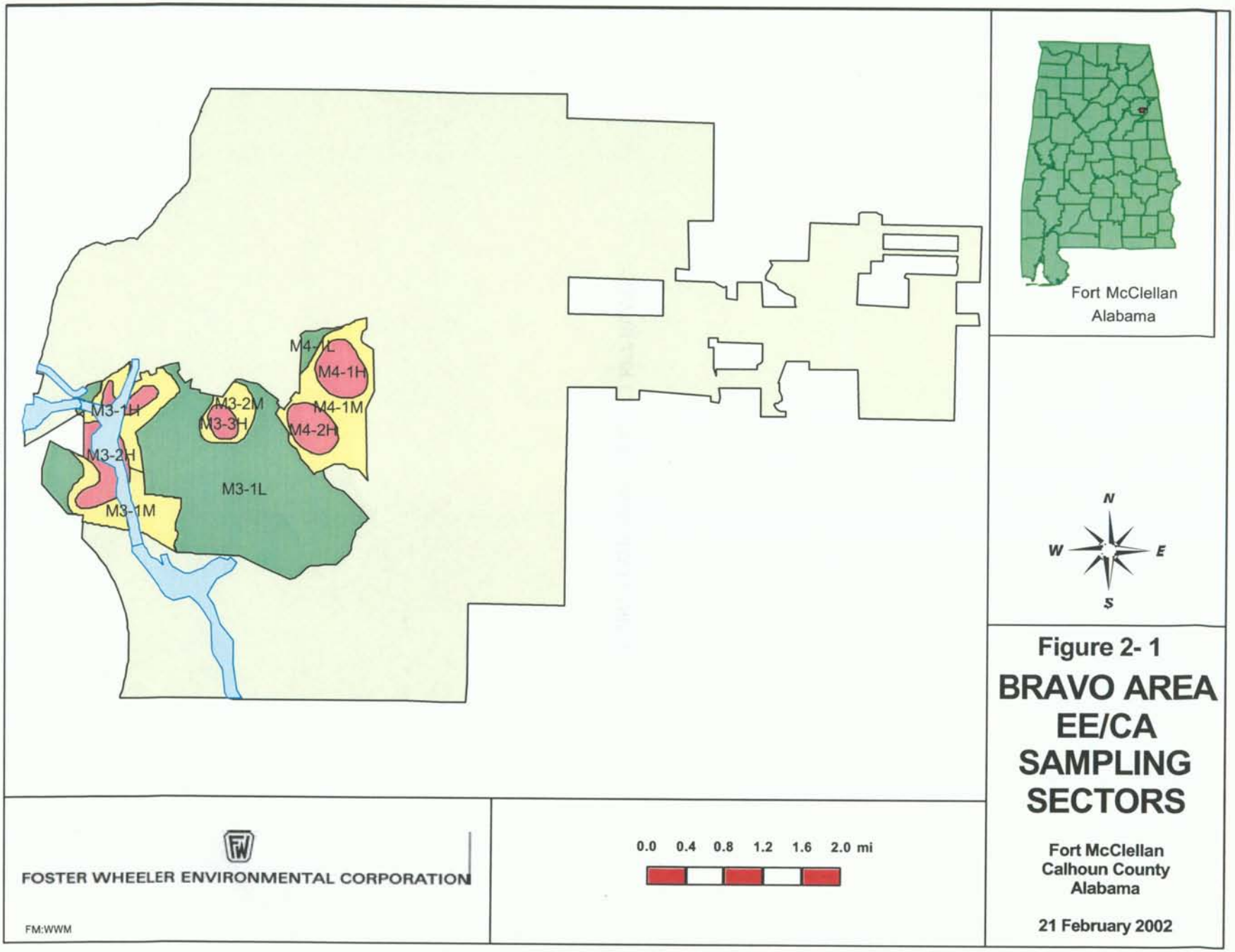


Figure 2- 1

BRAVO AREA EE/CA SAMPLING SECTORS

Fort McClellan
Calhoun County
Alabama

21 February 2002

portions of Bravo, comprising the M3 Parcel, contain the more rugged and steep topography of the southern Choccolocco Mountains, with steep ridges and sharp valleys. Elevations range from approximately 800 feet above msl in places along the northern edge of Bravo to over 1,700 feet above msl at the highest point along the southern edge of the area. Surface drainage is predominantly to the north by way of Remount Creek and the South Branch of Cane Creek, and their tributaries.

2.2.3 Information concerning the climate in this portion of Alabama is located in the approved General Site-Wide Work Plan dated September 2000.

2.3 HISTORY

Fort McClellan has documented use as a military training area since 1912, when the Alabama National Guard used it for artillery training. As early as 1898 the Choccolocco Mountains may have been used for artillery training during the Spanish American War. The 29th Infantry Division used areas of Fort McClellan for training prior to being ordered to France during World War I. 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. After World War II the site was used for National Guard training, and was also selected as the site for the Army's Chemical Corps school.

2.3.1 Fort McClellan was recommended for closure in BRAC 95, and the Base 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 Training and demonstration activities in the Redevelopment Area of Fort McClellan have included artillery training; chemical, biological, and radiological (CBR) ranges; and the Chemical Decontamination Training Facility. Specific training areas and ranges within the Bravo Area, along with associated ordnance items historically used in the Bravo Area, are presented in the Conceptual Site Model (CSM) for each of the EE/CA sampling sectors designated for the Bravo Area (Chapter 6.7 of this document). A summary of historical activities in the area can be found in the 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 in August 2000.

2.4 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 Bravo Area, while others were aimed at OE and other environmental issues on a site-wide basis. The discussion below summarizes those previous investigations that included information specifically pertinent to potential presence of OE within the Bravo Area. Foster Wheeler utilized these documents during the records search phase of the project that led up to the current EE/CA investigation phase.

2.4.1 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 was used as the basis for much of the EE/CA reconnaissance work performed by Foster Wheeler thus far at the site. The ASR described 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. Foster Wheeler has revised the ASR to include more complete information concerning training areas on the Installation.

2.4.2 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 record reviews, interviews, and site inspections, the report documented the status of 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.

2.4.3 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. Portions of the Bravo Area were covered by this study, and fall within the areas designated by ORNL as Range Sites 4,5,6,7,8, and 10. The study included an analysis of photographs from the period 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, skeet and trap range, training areas, bivouac sites, areas of trails and clearings, a trail with no outlet, areas cleared of scrub and ground cover, and a road in a cleared area.

2.4.4 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.

2.4.5 "Reconnaissance Findings, Conceptual Plan, and Proposed Scope of Work", Foster Wheeler Environmental Corp. – 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 also were collected during the reconnaissance to help in planning the OE sampling.

2.5 INITIAL SUMMARY OF OE RISK

Based on a review of records pertaining to the historical activities conducted within the Bravo Area of Fort McClellan and the results of the Site Reconnaissance performed by Foster Wheeler in the Spring of 2000, the site was divided into sectors according to similarity with respect to the probable UXO/presence of OE levels.

2.5.1 Certain areas of Fort McClellan have the highest probability of UXO/OE, based on previous use or discoveries of UXO/OE in these areas, and therefore pose a relatively greater risk. Other areas have lower probability of UXO/OE, and therefore pose generally less risk. Other areas present little or no risk, based on historical information from the Environmental Baseline Survey, Archives Search Report, and historical aerial photography studies that these areas were not used for OE-related activities, or they are fully developed areas (e.g., buildings, pavement, etc.) which pose essentially no risk of UXO/OE exposure, if undisturbed. Based on this information, these areas will not be included. EE/CA investigations to address the entire area of Fort McClellan are not planned. Some paved roads and areas, as well as unpaved roads, fall within the sampling sectors defined for the Alpha EE/CA. If roads or other paved areas lie within the sampling grids defined in this work plan, or if such areas are encountered along transects, geophysical data will be collected over those areas. Geophysical anomalies detected in roadways or other paved areas will be evaluated for possible excavation during the intrusive phase of EE/CA activities.

2.5.2 Though there were no findings in the historical records that water bodies within the installation contain ordnance items, several streams and at least one small lake are located within firing fans. These areas are located within EE/CA sampling sectors and are considered part of the sector for purposes of evaluating response alternatives. If it is determined through risk analysis that a sector containing a stream or lake will require an ordnance removal action, methods for removing underwater ordnance will be evaluated at that time and described in the Site-Specific Work Plan prepared for that removal action.

2.5.3 For performing the risk assessment, Foster Wheeler has divided Fort McClellan into 26 EE/CA sampling sectors that were identified as having a high, medium, or low probable density of UXO/Presence of OE. Figure 2-2 shows a map of the entire facility with the EE/CA sampling sector boundaries. In addition there are some areas where no indication of UXO/Presence of OE was found in the ASR or EBS documents, the historical photographs or in field reconnaissance.

2.5.4 Since the site characterization performed during reconnaissance and concept planning is preliminary and non-quantitative, the designation of areas as high, medium, or low OE or UXO density is based on qualitative criteria and professional judgement of the reconnaissance teams. The general guidelines used are:

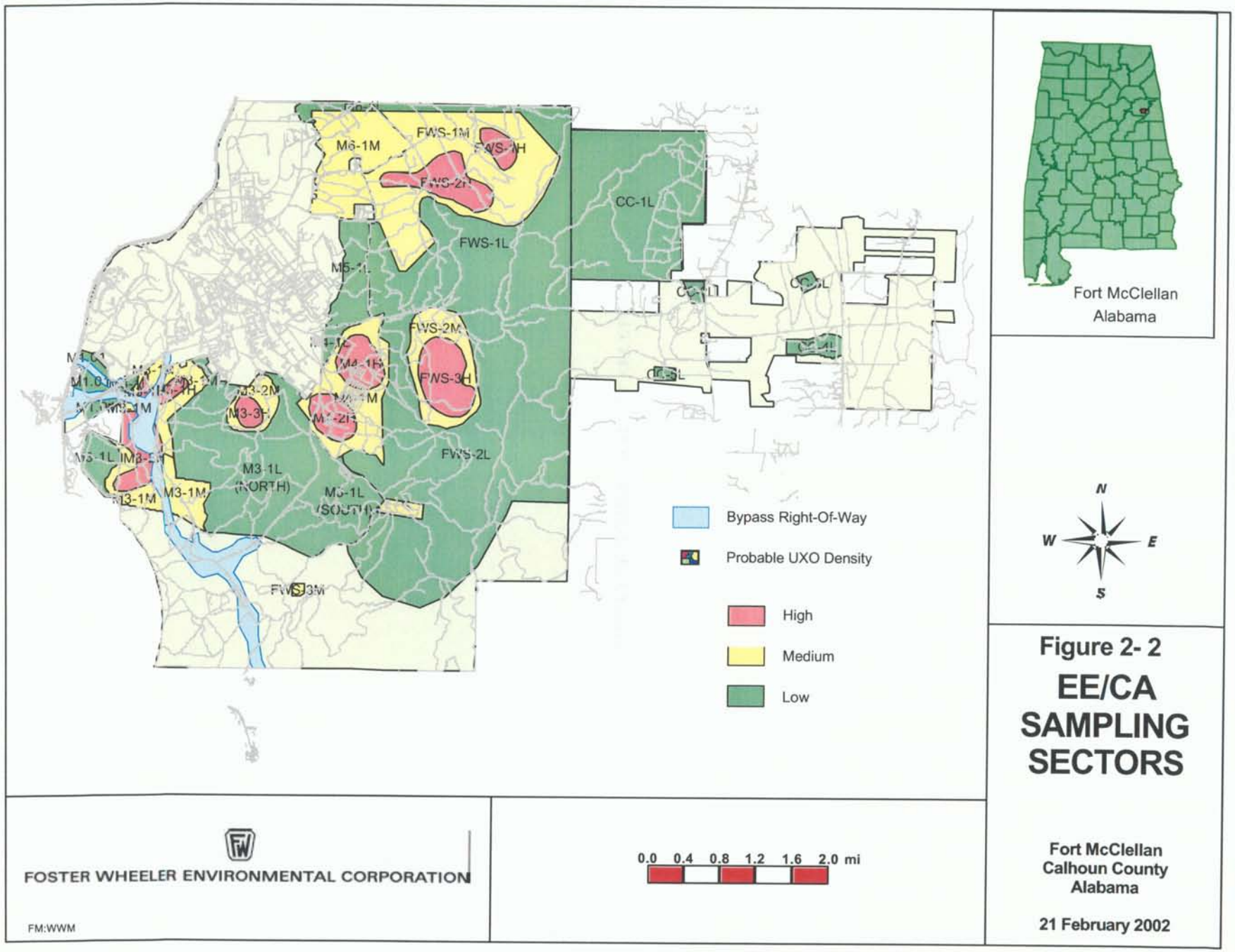


Figure 2- 2

EE/CA SAMPLING SECTORS

Fort McClellan
Calhoun County
Alabama

21 February 2002

- High-density areas are those in which multiple ordnance-related items were found in close proximity to a suspected or known impact or disposal area.
- Low-density areas are those where only sporadic or isolated OE related items were found, or no items were found, usually in the more distal portions of firing ranges or between firing ranges.
- Medium density was assigned to areas where occasional OE related items were found by the reconnaissance teams, or to "buffer" zones around high-density areas.

2.5.5 The above areas served as the basis for designating the EE/CA sampling sectors for collecting geophysical and ordnance data. Other factors considered when delineating sampling sectors were: 1) the anticipated future use of a given sector, 2) terrain and topographical features, and 3) the current parcel boundaries obtained from the Army, showing parcel boundaries to be used for real estate transaction purposes.

2.5.6 The Bravo Area was divided into ten EE/CA sampling sectors. Five sectors (comprising a total of 612 acres) were identified as high UXO/OE density, three sectors (totaling 915 acres) were designated as potentially medium density, and the two remaining sectors (totaling 2,279 acres) were designated as probable low density. The high-density sectors were defined based on historical records of range safety fans in the area, and on the known presence of OE-related items found in multiple locations during Foster Wheeler's field reconnaissance. This assessment was based upon visual reconnaissance and limited to identifying OE visible at the surface. Since this was reconnaissance only, and no intrusive work or handling of OE was performed, it was not conclusively determined if the OE encountered were live or practice rounds. Only a few sporadic OE items were found in the low-density sectors.

2.5.7 The findings of the field reconnaissance and a summary of the individual ranges, training areas, and ordnance types associated with Bravo Area are presented in the *Reconnaissance Findings, Conceptual Plan, and Proposed Scope of Work for EE/CA Sampling* document. Chapter 6.7.3 of this work plan also shows a Conceptual Site Model for each of the ten Bravo sampling sectors, with details of individual ranges and tabulations of ordnance types.

2.5.8 There are no indications in the historical records or in Foster Wheeler's reconnaissance findings that aerial bombing training was ever conducted at Fort McClellan, or that bombing ranges ever existed at this facility. Inert bombs (1000 lb., 750 lb., 500 lb., cluster and concrete practice) and Nike Ajax Missiles were used as part of this sites' chemical decontamination training. As part of the training curriculum, these inert rounds were placed not dropped. The ASR indicates that these inert rounds were decontaminated and disposed.

3.0 PROJECT MANAGEMENT

3.1 PROJECT OBJECTIVES

The objectives of this delivery order are to characterize UXO/OE presence within the Bravo Area at Fort McClellan, to obtain sufficient characterization data to perform a risk assessment, develop and evaluate response alternatives, develop cost estimates for alternatives which can be feasibly implemented at this site, and to prepare an action memorandum describing the preferred alternatives.

3.2 PROJECT ORGANIZATION

The project management organization for all delivery orders under this contract is described in the General Site-Wide Work Plan. Figure 3-1 on the following page shows the project management organization and the specific personnel designated for performance of this delivery order. Appendix A contains résumés of key personnel.

3.3 PROJECT PERSONNEL

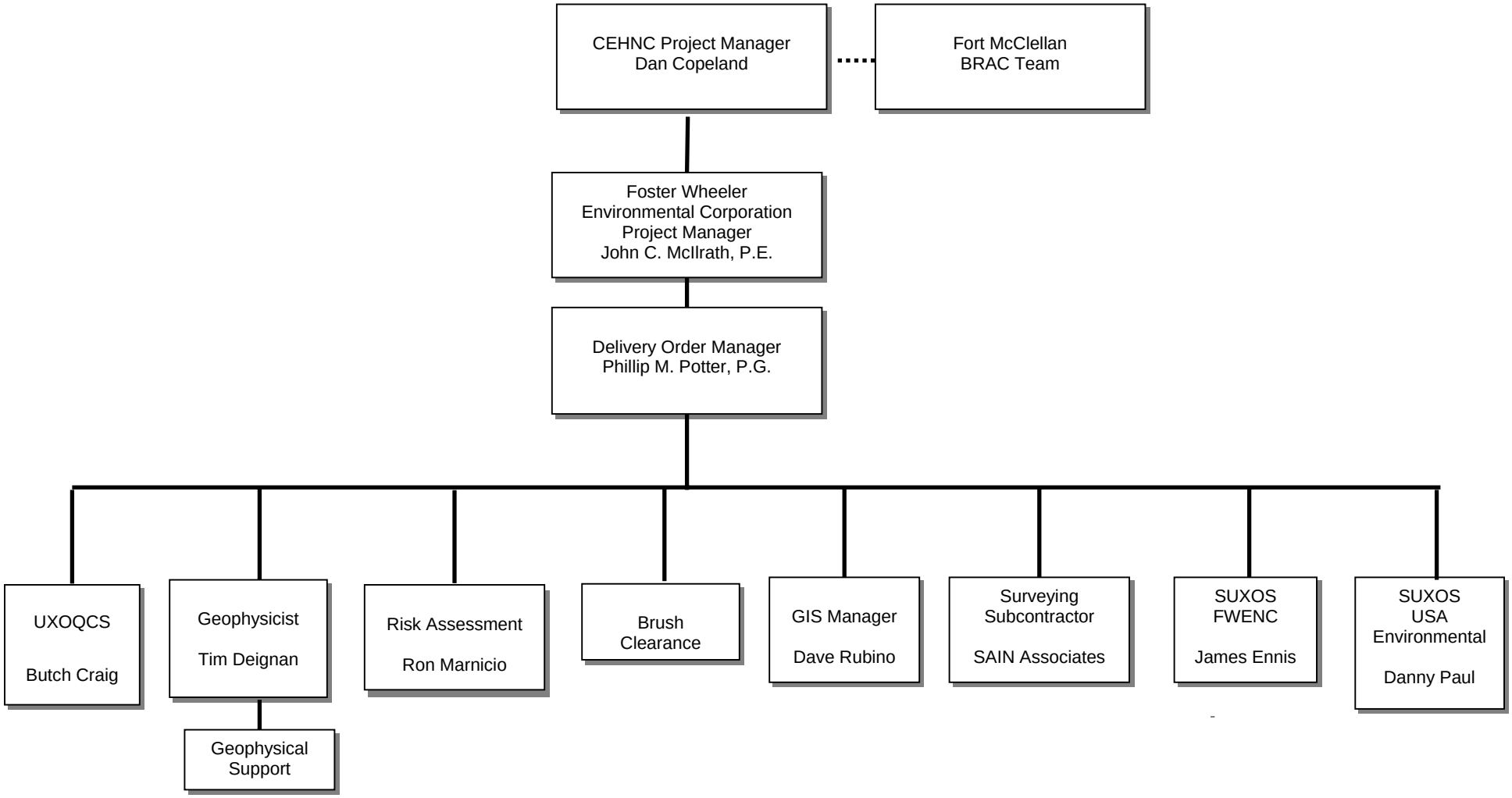
The specific responsibilities associated with the Foster Wheeler Environmental project management personnel shown on the project organizational chart for this delivery order are described in the Chapter 7.9 of this document.

3.4 PROJECT COMMUNICATIONS AND REPORTING

The Foster Wheeler Environmental Project Manager and Delivery Order Manager will work in close communication with the United States Army Engineering and Support Center, Huntsville (CEHNC) Project Manager and the designated CEHNC Safety Specialist to ensure that all of CEHNC's project requirements are met, and to keep the CEHNC Project Manager informed of any technical or administrative issues that may impact the project schedule or budget. Any communication that has the potential to impact the project scope of work, schedule, or budget will be confirmed via written correspondence between the Foster Wheeler Delivery Order Manager and the CEHNC Project Manager.

3.4.1 Foster Wheeler Environmental will provide monthly progress reports to CEHNC for the delivery order. These reports will document activities completed during the previous month, activities in progress, and activities scheduled for the upcoming month. Work Breakdown Structure, Cost Account, and Manpower Spread Reports will also be included in the monthly progress report. These reports will reveal any actual or potential variances in the project schedule or budget. The monthly progress report will also discuss what actions, if any, will be needed to correct or address such variations.

Figure
3-1
Bravo Area EE/CA
Management Team



3.5 PROJECT DELIVERABLES

The major project deliverables for the Fort McClellan Bravo Area EE/CA include the following:

- Draft and Final Project Work Plan
- Weekly geophysical data
- OE Dig Sheets
- Location Maps, Geophysical Maps
- Field Books, Sketches, Computation Sheets, Tabulation Sheets
- Electronic copy of GIS files related to this project
- Draft, Draft-Final, and Final EE/CA Report
- Draft and Final Action Memorandum
- Monthly, Weekly, Daily Reports
- Meeting Minutes

3.6 PROJECT SCHEDULE

The Foster Wheeler Environmental approach to project control includes the use of multi-level schedules and establishment of targets or milestones to measure progress. An overall project schedule is presented in Figure 3-2. Additional detailed subtask schedules will be prepared throughout the project for use in management of individual tasks.

3.6.1 The attached schedule depicts the anticipated tasks and milestones for the Bravo Area tasks included in this Delivery Order. The schedule identifies the individual activities associated with the delivery order, their duration, and the sequence in which the work will be performed. The schedule will be used to track the work progress on the delivery order and to identify individual tasks that have, or have the potential to, impact the delivery order and/or overall project schedule. Schedule impacts will be immediately discussed with the CEHNC Project Manager along with proposed resolutions, which may include additional staffing or reduction in scope. This schedule is based on a forty-hour workweek, consisting of four 10-hour days.

3.7 PERIODIC REPORTING

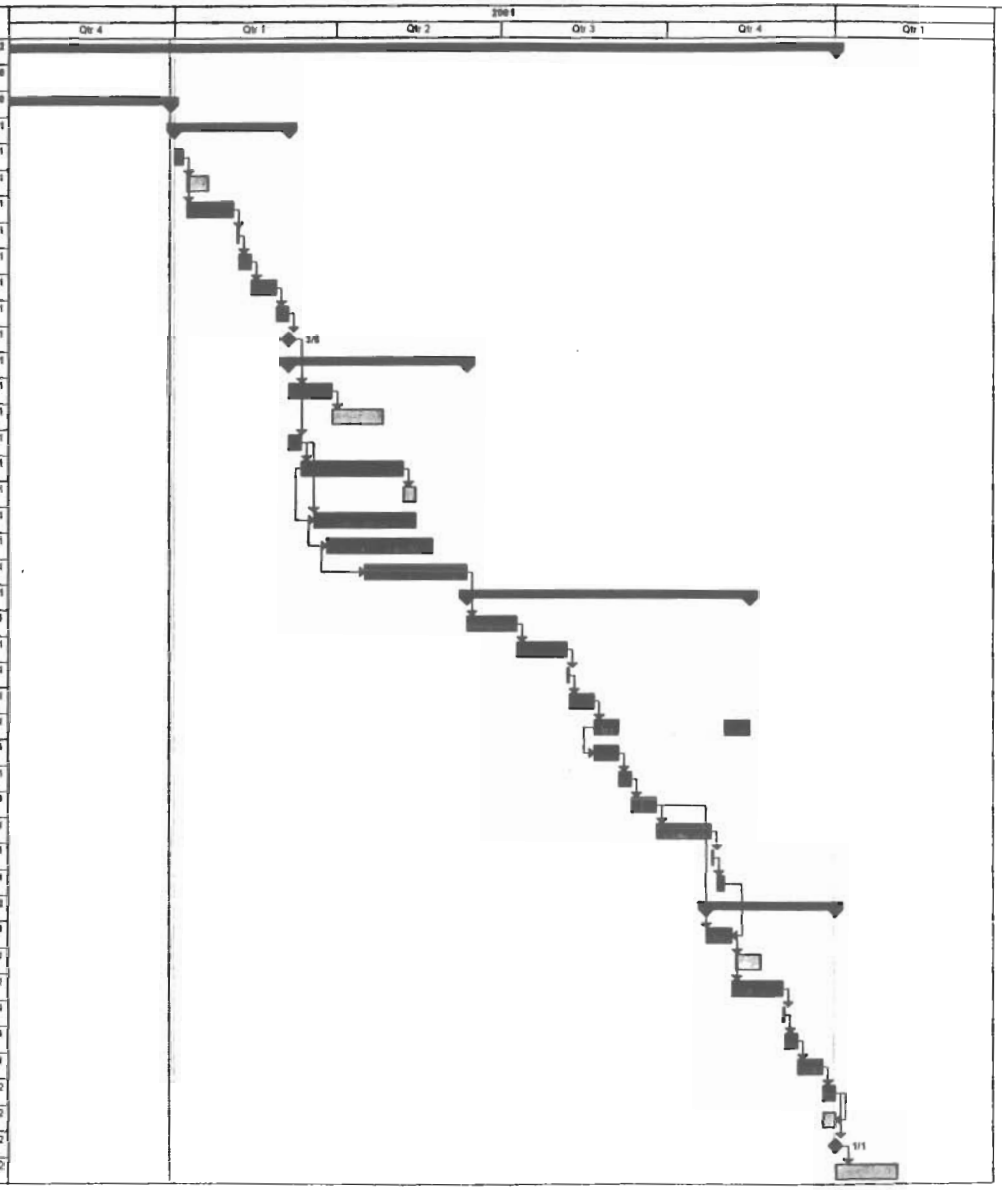
Section 8.5 of the General Site Wide Work Plan describes the details of the Monthly, Weekly, and Daily Reports to be delivered during the execution of individual Delivery Orders at Fort McClellan.

3.8 COSTING AND BILLING

The Delivery Order specific schedule discussed in Chapter 3.6 will be prepared using Microsoft Project or similar cost-schedule software that is capable of tracking both cost and schedule. Upon completion of negotiation of each delivery order, the schedule is developed and the Final budget entered into the software for tracking purposes.

Figure 3-2. Schedule for Redevelopment Area EE/CA - Bravo Area (Conventional OE)

ID	Task Name	Duration	Start	Finish
1	Redevelopment Area B EE/CA	831 days	Tue 12/21/99	Tue 1/1/02
2	Concept Plan	162 days	Tue 12/21/99	Wed 7/19/00
14	EE/CA Scope	98 days	Fri 9/1/00	Fri 12/29/00
21	EE/CA Work Plans	48 days	Mon 1/1/01	Mon 3/5/01
22	Draft Work Plans	5 days	Mon 1/1/01	Fri 1/5/01
23	Draft Work Plans	10 days	Mon 1/8/01	Fri 1/19/01
24	EPA/ADEM/FMC/SAM/HNC Review	20 days	Mon 1/8/01	Fri 2/2/01
25	Review Meeting	1 day	Mon 2/5/01	Mon 2/5/01
26	Final Work Plans	5 days	Tue 2/6/01	Mon 2/12/01
27	Backcheck Work Plans (EPA/ADEM/FMC)	10 days	Tue 2/13/01	Mon 2/26/01
28	Revise Work Plans	5 days	Tue 2/27/01	Mon 3/5/01
29	Work Plan Approval	0 days	Mon 3/5/01	Mon 3/5/01
30	Data Collection	70 days	Tue 3/6/01	Mon 6/11/01
31	Brush/Surface Clearance	18 days	Tue 3/6/01	Thu 3/29/01
32	Brush/Surface Clearance	20 days	Fri 3/30/01	Thu 4/26/01
33	Geophysics Calibr.	5 days	Tue 3/6/01	Mon 3/12/01
34	Geophysical Mapping	40 days	Tue 3/13/01	Mon 5/7/01
35	Geophysics Calibr	5 days	Tue 5/8/01	Mon 5/14/01
36	Analysis of Data	40 days	Tue 3/20/01	Mon 5/14/01
37	HNC Review	42 days	Tue 3/27/01	Wed 5/23/01
38	UXO Sampling/Data Validation	40 days	Tue 4/17/01	Mon 6/11/01
39	EE/CA Report	113 days	Tue 6/12/01	Thu 11/15/01
40	Draft Report	20 days	Tue 6/12/01	Mon 7/9/01
41	EPA/ADEM/FMC/SAM/HNC Review	20 days	Tue 7/10/01	Mon 8/6/01
42	Review Meeting	1 day	Tue 8/7/01	Tue 8/7/01
43	Final Report	10 days	Wed 8/8/01	Tue 8/21/01
44	HNC CX Review	20 days	Wed 8/22/01	Thu 11/15/01
45	Backcheck EE/CA Report (EPA/ADEM/FMC)	10 days	Wed 8/22/01	Tue 9/4/01
46	Revise EE/CA Report (FW)	5 days	Wed 9/5/01	Tue 9/11/01
47	Revisions to EE/CA	10 days	Wed 9/12/01	Tue 9/25/01
48	Public Review	22 days	Wed 9/26/01	Thu 10/25/01
49	Public Meeting	1 day	Fri 10/26/01	Fri 10/26/01
50	Incorporate Public Cmnts	4 days	Mon 10/29/01	Thu 11/1/01
51	Action Memorandum	61 days	Tue 10/23/01	Tue 1/1/02
52	Draft Action Memo.	10 days	Tue 10/23/01	Mon 11/5/01
53	Draft SOW/IGE	10 days	Thu 11/8/01	Wed 11/21/01
54	EPA/ADEM/FMC/SAM/HNC Review	20 days	Tue 11/6/01	Mon 12/3/01
55	Review Meeting	1 day	Tue 12/4/01	Tue 12/4/01
56	Final Action Memo.	5 days	Wed 12/5/01	Tue 12/11/01
57	Backcheck Action Memorandum (EPA/ADEM/FMC)	10 days	Wed 12/12/01	Tue 12/25/01
58	Revise Action Memorandum (FW)	5 days	Wed 12/26/01	Tue 1/1/02
59	Final SOW	5 days	Wed 12/26/01	Tue 1/1/02
60	Sign Action Memo	0 days	Tue 1/1/02	Tue 1/1/02
61	Award	25 days	Wed 1/2/02	Tue 2/5/02



Project: RDVEA MPP
Date: Fri 12/29/00

Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress | External Tasks | Project Summary | Split | Rolled Up Split

3.8.1 The Delivery Order Manager will approve all hours charged to the project by all field and office personnel to ensure no unauthorized hours are charged. Foster Wheeler Environmental's accounting system provides weekly updates of all charges posted to a specific Delivery Order. The on-site management team will use these data to compare cost and schedule performance to the baseline cost-schedule data at least once weekly. Any significant variation will immediately be brought to the attention of the Foster Wheeler Environmental Project Manager and, if appropriate, the CEHNC Project Manager. On a weekly basis, within the weekly report to CEHNC, Foster Wheeler Environmental will report cost (for time and materials tasks only) and schedule performance, identifying any actual or anticipated variances and proposing corrective action.

3.8.2 Billing for services provided during the performance of the Bravo Area EE/CA will be done in accordance with the provisions contained in Contract DACA 87-99-D-0010.

3.9 PROJECT PUBLIC RELATIONS SUPPORT

Foster Wheeler Environmental will provide public relations support by attending public meetings with DoD, regulatory agencies, civilian agencies, other stakeholders, and members of the general public as directed by the USAESCH Contracting Officer. Additional public relations support will be provided by assisting the USAESCH Public Affairs Office (PAO) and the Corps of Engineers with executing a Public Affairs program, including preparation and distribution of Fact Sheets or other informational and presentation materials for meetings as needed.

3.10 SUBCONTRACTOR MANAGEMENT

This chapter describes Foster Wheeler Environmental's methods and procedures for management of subcontractors performing work in support of the Bravo Area EE/CA.

3.10.1 The following subcontractors will perform activities for this project:

USA Environmental (UXO Removal) 5802 Benjamin Center Drive Suite 100 Tampa, FL 33634 Contact Name: John Q. Adams Phone: (813) 884-5722	Sain Associates, Inc. (Surveying) 244 West Valley Avenue Suite 200 Birmingham, AL 35209 Contact Name: Rob Black Phone: (205) 940-6420
The Kevric Company, Inc. (Logistics Support) Suite 610 8401 Colesville Road Silver Spring, MD 20910 Phone: (301) 588-6000	Brush Cutters To Be Determined

3.10.2 Activities in the Scope of Work for this project not specifically listed in this chapter will be performed by Foster Wheeler Environmental. Sain will provide surveying services in support of the Bravo Area EE/CA. USA Environmental will perform ordnance excavation activities within sampling grids designated in this Work Plan. Kevric will provide logistics support, and a local firm, to be selected at a later time, will provide brush clearance.

3.10.3 A Scope of Work was submitted by Foster Wheeler Environmental to the subcontractors with a quantitative description of activities for performance of the work, along with key technical requirements. Subcontracts will be issued to the selected contractors with lump sum values.

3.10.4 All on-site subcontractor activities will be performed under the direct oversight of Foster Wheeler Environmental, with the exception of some escort duties assigned to USA Environmental. Foster Wheeler Environmental will provide health and safety support in accordance with the Site Safety and Health Plan (SSHP), Section 6 of the General Site Wide Work Plan. Other technical personnel will provide oversight on an as needed basis for on-site activities to ensure the activities are completed in accordance with the Scopes of Work.

3.10.5 All intermediate and final submittals from subcontractors will be reviewed by appropriate Foster Wheeler Environmental technical and management personnel to ensure that the submittal meets all of the technical and contractual requirements set forth in the subcontractor's Scope of Work. Any subcontractor effort that does not meet the requirements of the Scope of Work, as determined by the Foster Wheeler Environmental technical and management personnel, shall be corrected by the subcontractor.

3.10.6 If, during the performance of work by a subcontractor, it is determined by either the subcontractor or Foster Wheeler Environmental, that the effort will not meet the requirements of the CEHNC Scope of Work, or will not be technically adequate to support the needs of the project, a change in scope will be negotiated with the subcontractor. If the change in scope is required to meet the technical requirements of the project, but will exceed the requirements of the CEHNC Scope of Work, the Foster Wheeler Environmental Project Manager will immediately contact the CEHNC Contracting Officer and Project Manager. If the Contracting Officer determines that a change in scope is required, a request for proposal will be issued and negotiations conducted. Similarly, if any requests or instructions from CEHNC are considered by Foster Wheeler Environmental to be beyond the scope of the CEHNC Scope of Work, Foster Wheeler Environmental will notify the Contracting Officer and CEHNC Project Manager and request issuance of a change in scope.

3.10.7 For short-term subcontractor efforts (e.g., 3 months or less), payment will be made upon conclusion of the work and acceptance of the work by Foster Wheeler Environmental. At the current time, it is not expected that any subcontractor effort will take an extended period of time (e.g., more than 3 months). However, in the event that a subcontractor effort is expected to last for an extended period of time, periodic progress

payments will be made based on the effort expended and acceptance of the work completed by Foster Wheeler Environmental. Under no circumstances will the full contract amount be paid to a subcontractor prior to completion of the entire Scope of Work and acceptance by Foster Wheeler Environmental.

3.11 MANAGEMENT OF FIELD OPERATIONS

This chapter describes the management of field operations during the geophysical and OE investigation activities for the Bravo Area of Fort McClellan, including site access and control; traffic control and parking; field team organization and responsibilities; and scheduling.

3.11.1 Site Access and Control

Fort McClellan is open to the public. Areas with ongoing work are closed to the public and all other personnel not essential to the task being conducted in that area. All personnel engaged in off road activities are required to attend a safety briefing by the Fort McClellan Safety Officer. All Foster Wheeler Environmental personnel will also undergo site specific training. Unescorted access is restricted to several areas of the site. Personnel must have approval from Transition Force Operations (TFO) prior to entering undeveloped areas. During the geophysical and OE investigations, only minimal changes to the current accessibility of the site will be required. Sampling areas under investigation will need to have access restricted through use of caution tape so that the investigation activities are not disturbed.

3.11.1.1 Any areas determined to pose an immediate risk of OE exposure as a result of the investigation will have access restricted using temporary barricades until the immediate risk has been eliminated.

3.11.1.2 The exclusion zone may restrict access to other areas of the site. If this should occur, security measures may have to be established to keep pedestrians out of the affected areas.

3.11.1.2.1 Exclusion zones will also be established based on the largest fragmentation range of OE expected to be present in the sampling sector, measured from the edge of sampling areas when UXO operations are in progress. Establishment of exclusion zones will be coordinated through the TFO. It will be necessary to restrict traffic on roads that are within the exclusion zone of a sampling area, as well as coordinate building occupancy or evacuations, when UXO intrusive investigations are in progress, and may result in the extension of exclusion zones during demolition operations. Foster Wheeler Environmental UXO personnel will erect tape barricades and close roads as required. All road closures will be coordinated through TFO. All barricades will be removed immediately after completion of UXO operations. Caution tape that is not considered usable will be disposed of through normal trash disposal. Exclusion zones for the Bravo Area are presented in Chapter 6.5.4.

3.11.2 Field Office/Command Post

Foster Wheeler Environmental will maintain a modular office complex and a storage facility on site outside any potential exclusion zone for the duration of the field investigation.

3.11.3 Traffic Control/Parking

Vehicle traffic and parking will generally be limited to existing roads and parking areas on the site. In addition, there will be a designated parking area near the office complex. Only existing parking areas will be utilized. As needed, vehicles may need to travel off existing roads to move equipment and/or personnel to the investigation areas.

3.11.4 Field Personnel Organization and Responsibilities

The proposed project organization for the field investigation effort is presented in Figure 3-1. Detailed descriptions of field personnel responsibilities are contained within the OE Planning and Operations Chapter (7.9) and in the Site Safety and Health Plan, Chapter 8.0.

3.11.5 Communications

Telephone, fax, and Internet services are available at the Foster Wheeler Environmental modular office complex. Field communication systems include; cellular telephones, Nextel cellular telephones and radios. One radio is also available that is part of the Fort McClellan TFO radio network.

TABLE 3.1
Potential OE in the Vicinity of
Bravo Area

ORDNANCE/COMPONENT	***HAZARD***	***BRAVO EE/CA SAMPLING SECTOR***	***AREA(S)***	***RANGE(S)***
Small Arms (Various Caliber)	Propellants (Small Amounts)	M3-1H/1M, M3-1M,M3-2M, M3-1L, M3-2H, M3-3H, M4-1M, M4-2H	WA	R19, Machine Gun, R15, R12, R13, R18, R26, R16, Washington Tank Range
Small Arms (Various Caliber)	Propellants (Small Amounts)	M4-1H, M4-1H/1M, M4-2H, M4-1M	BA	Close Combat, R25, R23, R29, R20, Old R21, R26
Projectile, 37mm	Cast TNT /0.8 oz	M3-1M, M3-2H	WA	Washington Tank Range
Projectile, 37mm	Cast TNT /0.8 oz	M4-2H, M4-1M	BA	Combat Range #1
Projectile, 75mm	AMATOL/1.49 lbs.	M3-1M	WA	Washington Tank Range
Projectile, 75mm	AMATOL/1.49 lbs.	M4-2H, M4-1M	BA	R29, B23, B25, R20, Combat Range #1
Projectile, 3"	Cast TNT/0.91 lbs.	M4-1H/1M	BA	R28
Projectile, Livins	FM Smoke/30 lbs	M4-1H, M4-1M	BA	R26, R28
Rocket, 2.36"	Pentolite/0.5 lbs.	M3-1H/1M,M3-1M, M3-1L, M3-3H/2M, M3-2H, M4-2H	WA	R19, Rocket Range, R12, 1950 Rocket Range, R16
Rocket, 2.36"	Pentolite/0.5 lbs.	M4-1M	BA	R12
Rocket, 3.5"	Comp B/1.93 lbs.	M3-2M, M3-3H/2M, M4-2H	WA	R19, R12, R16, R13
Rocket, 3.5"	Comp B/1.93 lbs.	M4-1M	BA	R12, R28
Mortar, Stokes, 3"	TNT/2 lbs. 6 oz	M4-1H/1M	BA	R25
Mortar, 81mm (New Style)	TNT or Comp B/2.1 lbs.	M4-1H/1M, M4-1M	BA	R28, B25, R23
Mortar, 60mm (New Style)	TNT or Comp B/ 0.79 lbs.	M3-1H, M3-1L, M3-1M, M3-2H, M4-2H	WA	R12, 60mm Mortar Range, Combat Range #1
Mortar, 60mm (New Style)	TNT or Comp B/ 0.79 lbs.	M4-1H/1M	BA	R28, R12
LAW (M72A2)	60/40 OCTOL/0.67 lbs.	M3-1H/1M, M3-1M, M3-1L, M3-2M, M3-3H, M4-1M, M4-2H	WA	R19, R15, R12, R13

TABLE 3.1
Potential OE in the Vicinity of
Bravo Area

ORDNANCE/COMPONENT	***HAZARD***	***BRAVO EE/CA SAMPLING SECTOR***	***AREA(S)***	***RANGE(S)***
LAW (M72A2)	60/40 OCTOL/0.67 lbs.	M4-2H	BA	R29
Grenade, Rifle (M9)	TNT/0.4oz	M3-1H/1M, M3-1H, M3-1M, M3-3H/2M,	WA	Rifle Grenade Range, Skeet Range, R12, R17,
Grenade, Rifle (M9)	TNT/0.4oz	M4-1H, M4-1H/1M	BA	R26, R25,
Grenade, Rifle 40mm	RDX & Comp A/54.5gm Propellant M2/4.64gm	M3-2M, M3-1L, M3-3H	WA	R18, R16(R17)
Grenade, Rifle 40mm	RDX & Comp A/54.5gm Propellant M2/4.64gm	M4-2H, M4-1M	BA	Combat Range #1, R29
Grenade, Rifle, Heat	Comp B/9.92 oz	M3-1H/1M, M3-1H	WA	Machine Gun Range, R16, R17
Grenade, Rifle, Smoke (M18)	Smoke Composition/11.5 oz	M3-1M	WA	R15
Grenade, Rifle, Smoke (M18)	Smoke Composition/11.5 oz	M4-1M, M4-1H	BA	B23, R28
Grenade, Hand, Practice	Black Powder/2.5 oz	M4-1H	BA	R26
Flare, SLAP	Black Powder/40 gm	M4-1H, M4-1M	BA	R26, B23

NOTE: ORDNANCE ITEMS FOR THIS TABLE WERE OBTAINED FROM FT MCCLELLAN ASR, RECONNAISSANCE FINDINGS AND CONCEPTUAL SITE MODELS.
WA = WASHINGTON RANGE AREAS; BA = BANDHOLTZ RANGE AREAS

4.0 OVERALL APPROACH to OE EE/CA

The EE/CA for the Fort McClellan Bravo Area will be conducted in accordance with the CEHNC Scope of Work. In addition, EE/CA activities will be executed consistent with the requirements of CERCLA and the National Contingency Plan (NCP) as well as requirements of CEHNC, USACE, and DoD for EE/CA activities at BRAC sites. The purpose of the EE/CA includes the following:

- Identifying the nature and extent of UXO contamination within each sector;
- Evaluating the effectiveness of various risk reduction and removal action alternatives;
- Assessing the ability to implement various risk reduction and removal action alternatives;
- Determining the cost to implement the applicable risk reduction and removal action alternatives;
- Evaluating and determining the most appropriate and preferred alternative.

- 4.0.1 This chapter describes the overall approach for performance of the EE/CA for the Fort McClellan Bravo Area, including:

- Identification of the preliminary removal action goals;
- Description of data quality objectives, data needs, and evaluation of data; and
- Description and the incorporation and use of the data in the EE/CA.

4.0.2 Detailed descriptions of the geophysical and UXO investigations are presented in Chapters 6.6 and 7.0, respectively.

4.1 PRELIMINARY REMOVAL ACTION GOALS

Preliminary removal action goals were developed for the Bravo Area site taking into consideration the past use of the site, historical findings of UXO items, and NCP evaluation criteria, including: 1) overall protection of human health and the environment; 2) compliance with ARARs; 3) long-term effectiveness and permanence; 4) short-term effectiveness; and 5) implementability. Based on these factors, the following Preliminary Removal Action Goals have been developed:

- Reduce the explosive threat posed by UXO items that potentially remain within the Bravo Area;
- Minimize the potential for exposure to UXO by current and future property users;
- Minimize the potential for exposure to UXO by workers developing previously undeveloped areas of the site; and
- Minimize impacts to sensitive environments and valuable ecological resources resulting from the implementation of removal actions.

4.1.1 To attain the goal of reducing the explosive threat posed by UXO that may be present within the Bravo Area, the alternatives identified must be effective, implementable, and economical. The NCP criteria will be used to screen potential risk reduction and removal action alternatives under the three broad categories of Effectiveness, Implementability, and Cost. The preliminary removal action objectives established for this EE/CA will guide the development of sector-specific alternatives and streamline a comparative analysis of acceptable risk reduction and removal action alternatives.

4.2 IDENTIFICATION OF DATA QUALITY OBJECTIVES

The purpose of data quality assurance and quality control (QA/QC), as presented in Chapters 6.6 and 11.0 of this Work Plan, are to plan and implement a comprehensive set of controls and systematic procedures to ensure that the data acquired are of a quality necessary to fulfill Data Quality Objectives (DQOs) defined for the project. The data collected during the geophysical and UXO field investigations, as well as data collected for the land use controls analysis, will be used to support the evaluation of risk reduction and removal action alternatives for the site. Therefore, the field and institutional data shall be of sufficient quality and quantity to: 1) evaluate the risk of UXO exposure in each of the investigated sectors; 2) make decisions regarding appropriate risk reduction and removal actions to mitigate those risks; and 3) implement the selected actions.

4.2.1 Data Quality Objective Process

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions during evaluation of risk reduction and removal action alternatives. The DQO process provides a logical basis for linking the QA/QC procedures to the intended use of the data, primarily through the decision-maker's acceptable limits on decision error. DQOs can be defined as what the end user expects to obtain from the analysis results, and are developed through a seven-step process:

- Step 1 State the problem
- Step 2 Identify the decision
- Step 3 Identify inputs to the decision
- Step 4 Define the study boundaries
- Step 5 Develop a decision rule
- Step 6 Specify limits on decision errors
- Step 7 Optimize the decision for obtaining data

4.2.1.1 For the Bravo Area EE/CA at Fort McClellan, screening data generated by geophysical mapping will achieve a data use level for UXO site characterization. Definitive UXO data generated during the intrusive field investigation will achieve a data use level to adequately characterize the sectors and support a UXO risk assessment. Specifically, these data will be used to:

- Confirm and further define the nature and extent of surface and subsurface UXO contamination, through the excavation of geophysical anomalies and identification of excavated material as scrap, ordnance scrap, inert ordnance, or live UXO;
- Obtain sufficient data for the performance of a UXO risk assessment; and
- Obtain sufficient data for the screening and detailed evaluation of appropriate risk reduction and removal action alternatives during the EE/CA.

4.2.2 Data Quality Characteristics

The overall QA/QC objective for the field investigation is to develop and implement procedures that will provide data of known and documented quality. DQOs are composed of written expectations for data quality characteristics (DQCs), which include precision, accuracy, representativeness, completeness, and comparability (PARCC). DQOs for each of these parameters are determined based on the level of data required. Descriptions of these characteristics, and specific QA objectives for both screening (i.e., geophysical mapping) and definitive (i.e., anomaly excavation) data, are provided below.

4.2.3 The following parameters are considered when planning and implementing a geophysical and UXO investigation program:

- Precision – A measure of the agreement between repetitive measurements of the same property. Precision for most geophysical measurement processes can be performed in the laboratory and under field conditions. For most field measurement processes, analysis of the precision parameter can provide excellent quantitative information regarding the error in location (x,y coordinates) when using continuous (i.e., time-based) geophysical instrumentation. It can also provide information on the error(s) associated with the actual measurement process (i.e., the repeatability of the measurements). General performance goals specifying the required minimum detection depths for various ferrous objects, as established by CEHNC, were demonstrated by Foster Wheeler Environmental on the Fort McClellan test plot in 1999. For specific performance goals, the expected criteria is established based on the following functions:

  - Function 1 (Magnetometry): $\text{Log}(d) = 1.354 \log(\text{dia}) - 2.655$

  - Function 2 (Electromagnetics): $\text{Log}(d) = 1.002 \log(\text{dia}) - 1.961$

  Where: d = depth to the top of the buried UXO, in meters

  dia = diameter of the minor axis of UXO, in millimeters

  These functions have been demonstrated for diameters greater than or equal to 40 mm.

- Accuracy – A measure of the agreement of a measurement with a pre-defined (or accepted) value. Usually, geophysical instruments are "calibrated" for accuracy at the specific manufacturer's laboratory under controlled test conditions. As defined in this document, accuracy is an instrument-dependent parameter. The respective instrument manuals provide achieved measurement accuracies under ideal laboratory

conditions. However, in field operations this equipment response can vary with the skill and knowledge of the operator. Instrument calibration and testing procedures, outlined in the manuals for the instrumentation proposed and in this Work Plan, will be followed and thus provide a greater degree of confidence associated with the measurements. Performance goals for the accuracy are as follows:

- ➔ Horizontally, 98 percent of all excavated items must lie within a 20-cm radius of their mapped surface location as marked in the field after reacquisition.

- ➔ There shall be no more than 15 percent "false positives" where anomalies reacquired by the Contractor result in no detectable, metallic material during excavations. There may be specific site conditions and/or specialized acquisition/reacquisition methodologies employed that may result in these performance goals not being achieved. The proposed false positive and horizontal accuracy criteria for this specific task are provided in Chapter 6.6.9.1.

- Representativeness – A measure of the degree to which the results of the investigation accurately and precisely represent the characteristics of a sector. In this case, representativeness describes evidence demonstrating that placement of the investigation grids and data acquisition line, and selection of the proper instrumentation will result in data representative of the sectors to be measured. Often, this parameter is directly related to the experience of the personnel who design the geophysical survey. The representativeness of geophysical measurements is an applicable parameter when personnel knowledgeable with the methods and survey design compare the result with respect to the objectives of the geophysical program. Strictly defined, it assumes that at each measurement location the data are acquired with accepted measurement standards, and all measurement standards are applied uniformly among sampling locations.

- Completeness – The amount of valid data acquired compared to the amount of valid data expected. This parameter can be controlled by ensuring that qualified individuals who have requisite expertise with the proposed equipment plan and perform the geophysical survey. Completeness is entirely dependent upon the success of the geophysical program in meeting the objectives of the overall investigative program. Assuming the methods are successful in the detection of target UXO for each sector, the amount of data necessary to achieve the objectives will be collected. Comparability of the geophysical data can be evaluated with data derived from other sources (e.g., excavation results). If an anomaly that is consistent with the geophysical measurement characteristics is not recovered within a 3.5 foot radius of the mapped location at the estimated depth, the interpreting geophysicist will confirm the anomaly location and size by reevaluating the survey and/or processing of the data. Continuous communication and feedback between the UXO field team and the interpreting geophysicist is required.

- Comparability – Describes the degree of confidence in comparing one data set with another (e.g., two EM-61 surveys over the same area at two different time periods or reacquisition of State Plane Coordinates with different Digital Global Positioning System (DGPS) units). In geophysical applications, it can also be interpreted as the comparison of the geophysical data with other geoscience data acquired within the same area. Geophysical instruments can be very precise and accurate measuring devices. However, geophysical techniques depend on the detection of contrasting physical properties between subsurface materials. In most circumstances, the relative contrast in physical properties is more important than the absolute contrast. Based on the test plot results and Foster Wheeler Environmental's previous geophysical investigations at sites similar to Fort McClellan, there appears to exist a sufficient contrast in physical properties to meet the program objectives. The probability of detection is dependent upon the data acquisition parameters, target characteristics, and the surficial and subsurface cultural "noise" at the site, which may adversely affect the geophysical measurement process. The QC representative will check the excavation results and compare the data (actual depth, size, location) obtained for all anomalies with the estimates calculated by the geophysicists. The project geophysicist will subsequently review the final dig sheets and excavation results, compare the data, and perform any necessary corrective actions.

4.3 REQUIRED DATA

The data required to effectively characterize UXO contamination and evaluate risk reduction and removal action alternatives (i.e., completion of the EE/CA) will be generated by geophysical and UXO field investigations, collection of data, and completion of an Land Use Controls Analysis. The required data includes the following:

- Survey data (i.e., State Plane Coordinates) as collected by Foster Wheeler Environmental geophysicists using portable precision DGPS instruments or by a Professional Land Surveyor using conventional surveying techniques. These data will be used to locate the position of geophysical grids and anomalies, and aid in any future reacquisition efforts;

- Geophysical investigation data to identify and map the detected subsurface anomalies. Required data includes the precise location and approximate depth and size of all anomalies within each of the surveyed grids. An interpretation of the geophysical anomalies detected will be made to discern anomalies that have similar characteristics to the most probable UXO existing within the survey area. The interpretation and selection of anomalies will be validated through intrusive methods.

- Intrusive investigation data to determine the nature of the anomalies. Data includes detailed accountability records of UXO/OE and non-UXO encountered, their depths, and records of UXO detonation and disposition.

- GIS data files to establish the Bravo Area EE/CA database;

- Additional data to support the risk assessment. This includes terrain, slope, vegetation, accessibility, and future use of each sector investigated.

- Required data for the Land Use Controls Analysis includes: the name of each agency considered, origin of institution, basis of authority, sunset provisions, geographic jurisdiction, public safety function, land use control function, financial capability, and constraints of institutional effectiveness.

4.3.1 All data will be compiled and presented in the EE/CA Report. The data will also be incorporated into the site-specific GIS. This data use is discussed further in Chapter 6.0.

4.4 DATA REDUCTION AND EVALUATION

Geophysical data processing will be accomplished at the Foster Wheeler Environmental field office at Fort McClellan. Preliminary data reduction and evaluation activities will be completed on a daily basis to verify that the investigation objectives are being met and to aid in the planning of upcoming field activities. The on-site geophysicists will be responsible for the management and operation of the geophysical data processing center. Specific geophysical data reduction procedures are discussed in detail in Chapter 6.6.

4.4.1 Following the geophysical investigation, the UXO intrusive investigation will be performed. The project geophysicist will guide the investigation and select anomalies to be excavated in order to determine if UXO are present. During the intrusive investigation, the excavated anomalies will be inspected by a QC geophysicist in the field office to assess UXO discrimination capabilities and alter the sampling effort as necessary.

4.4.2 Upon completion of the EE/CA field investigation, a risk analysis will be performed that incorporates the results of the investigation. The risk analysis is further discussed in Chapter 6.7 of this work plan.

4.5 DATA INCORPORATION INTO THE EE/CA REPORT

For each grid subject to geophysical and UXO investigations, the following information will be compiled for incorporation into the EE/CA Report:

- A final interpretation map of the completed grids;
- A tabulation of surface UXO/OE location and size;
- A tabulation of subsurface UXO/OE location, depth, and size;
- A brief narrative which describes field activities performed at each grid and the results of the analyses of the data acquired within each grid;
- An evaluation of found UXO/OE items (i.e., fuzed/unfuzed, empty or containing explosives); and

- An assessment of compliance with DQOs and characteristics, and any non-conformances in data collection and associated corrective actions.

4.5.1 The compiled geophysical and UXO intrusive investigation results, the results from the risk assessment and the results of the land use controls analysis will be presented in the EE/CA Report and used to develop, evaluate, and recommend appropriate non-time critical risk reduction and removal action alternatives for the Bravo Area.

4.6 OE EXPLOSIVE ANALYSIS

A summary of munitions types potentially present in the vicinity of the Bravo Area, along with the explosive/incendiary hazard posed by each, is presented in Table 3.1 of this document. Explosive types that are anticipated in the Bravo Area are also summarized in the Conceptual Site Models prepared for each of the ten Bravo Area sampling sectors. These models and the methods that will be used to analyze potential exposure to these OE items are presented in Chapter 6.7 of this work plan.

4.7 ALTERNATIVES IDENTIFICATION AND ANALYSIS

Alternatives to be considered for evaluation in the Bravo Area EE/CA will include but not be limited to one or a combination of the following:

- No DoD Action Indicated;
- Land Use Controls;
- Surface Clearance; and
- Clearance to Depth.

Each of the above listed alternatives will be evaluated based on the following criteria:

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Short-term effectiveness;
- Implementability; and
- Cost.

The results of the evaluation will be reported in the EE/CA Report, and this information will be utilized, along with other issues such as stakeholders' concerns, regulatory acceptance, and community acceptance, to determine the response action to be taken at the site.

4.8 EE/CA REPORT

Foster Wheeler Environmental will prepare and submit the EE/CA Report in accordance with DID OE-010. The report will contain conclusions as to the nature and extent of Presence of OE, a risk assessment using the March 2000 Draft IR3M Risk Tool, and will

provide recommendations for future work at Fort McClellan within the Bravo Area. The text portions of the Report will be supported with maps generated in GIS, along with tables to describe and document all conclusions and recommendations presented.

4.9 EE/CA ACTION MEMORANDUM

Following evaluation and incorporation of appropriate comments from USAESCH, other stakeholders and the public into the Final EE/CA Report, Foster Wheeler Environmental will prepare an EE/CA Action Memorandum to detail the selected risk reduction alternative method(s) and the rationale for selection for the Bravo Area at Fort McClellan.

4.10 EE/CA COMPLETION AND CLOSE-OUT

Upon completion of all tasks in the Scope of Work (see Chapter 5.0), all raw data and copies of all draft and final deliverables will be archived by Foster Wheeler Environmental as directed by CEHNC. Archived files may be maintained by Foster Wheeler Environmental or delivered to CEHNC, as requested.

4.11 USE OF TIME CRITICAL REMOVAL ACTIONS DURING THE EE/CA PROCESS

No time-critical removal actions are anticipated for the Bravo Area. If such a need arises, this will constitute a change to the Scope of Work, and will be addressed in accordance with established procedures.

5.0 SCOPE OF WORK

The Scope of Work for the Bravo Area portion of this delivery order includes performance of the following tasks identified in the Scope of Work dated 10 September 2000, and in the revised Scope of Work dated October 9, 2001. The original scope is described in detail in the Basis of Estimate prepared to accompany the original proposal for this Delivery Order. The original Basis of Estimate is provided in Appendix B, and revisions to the scope of work are described in the following sections and chapters of this plan.

5.1 SITE VISIT (TASK 1)

This task included a visit to the site by key Foster Wheeler Environmental and subcontract personnel to gain information concerning site contacts, data sources, site terrain, and general site conditions. This was completed in October 1999.

5.2 PREPARE PROJECT WORK PLAN (TASK 2)

This includes preparation of this Work Plan for the Bravo Area. The plan follows the requirements of the appropriate Data Item Descriptions included in the basic contract, and references the existing General Site-Wide Work Plan where appropriate. This plan includes the following supporting plans:

- OE Planning and Operations Plan that describes all OE operations including equipment, procedures, personnel, and safety aspects of surface sweeps and intrusive investigations;

- Geophysical Plan that describes the methods, equipment, personnel, data collection procedures, and data quality control procedures associated with the geophysical investigation of sampling grids;

- Site Safety and Health Plan (SSHP), to describe the site-specific safety and health procedures, practices and equipment to be used to protect affected personnel from the potential hazards associated with the site and tasks to be performed;

- Environmental Protection Plan to describe site-specific measures that will be taken as necessary to protect sensitive areas during the EE/CA investigation activities;

- Data Management Plan to describe the proper management of the large quantities of data that will be generated during the investigation including geophysical data, navigation data, intrusive sampling data, and QC data;

- UXO Quality Control Plan describes QC inspections and audits that will be performed to insure that the UXO/OE handling and data collection procedures are properly controlled and valid.

5.3 PHASE I SITE CHARACTERIZATION (TASK 3)

Based on FWENC's review of historical information and the field reconnaissance performed by FWENC at the ten sampling sectors in the Bravo area during March and April 2000, a field program consisting of geophysical and intrusive UXO investigations will be conducted at the site to characterize the UXO density and distribution in accordance with the specifications contained within this Work Plan. The sampling sectors contain varying expected concentrations of Presence of OE (designated high, medium or low. Within the Bravo area, FWENC will perform geophysical sampling over areas totaling up to 169 acres throughout the 3,806-acre investigation area contained within the 10 sampling sectors delineated. This task also includes limited intrusive activities associated with data validation. Data validation will be conducted at 5 low-density grids covering 2.5 acres, with the excavation of up to 250 geophysical anomalies. This represents 10 % of the low-density grids in the Bravo Area. The remaining intrusive activities are included in subsequent tasks. A detailed description of the Phase I Site Characterization of the Bravo Area is contained in the Basis of Estimate, Attachment 5-1b of this Work Plan.

5.4 DATA VALIDATION (TASK 4)

5.4.1 Includes evaluation of geophysical anomalies to distinguish OE items from other anomalies, excavation by UXO personnel of a subset of anomalies detected with the EM-61, and comparison of excavated items to geophysical signature in order to validate methods used for identification of OE items using geophysics. Data validation in this task will address grids where medium or high OE density is expected, since data validation for low-density grids was performed in Task 3. In the Bravo Area, anomalies within 28 high-density grids (7 acres, 700 anomalies) and 8 medium density grids (4 acres, 400 anomalies), and 8 low-density grids (80 anomalies) will be intrusively sampled in this task.. This represents 50% of the expected high-density grids, and 10% of the expected medium-density grids. The 8 low-density grids to be intrusively investigated in this represent 10 % of the grids in sector M3-1L. These are in addition to the 10% of expected low-density grids in other sectors already intrusively sampled in Task 3. In addition, 33 acres of transects will be intrusively investigated. In the areas covered by the transect approach, an alternate intrusive investigation approach will be used.

5.4.2 As stated above, Foster Wheeler Environmental has proposed that all of the anomalies (up to a limit of 100/acre) in 10% of the low- and medium-density grids in Bravo Area be intrusively investigated. Fifty percent of the high-density grids will be intrusively sampled. This effort would lead to a positive identification of subsurface items producing the observed electromagnetic responses. The effort also would provide the interpreting geophysicist with feedback regarding his/her performance relative to characterizing anomalies as being:

(1) very unlikely to be ordnance or ordnance-related;
(2) very likely to be ordnance or ordnance-related; or
(3) uncertain as to whether the item causing the anomaly is ordnance or ordnance-related.

5.4.3 The selection of 10% intrusive follow-up for low- and medium-density grids in Bravo Area was based on criteria used in other, similar circumstances and in consideration of the reliability of the application of the electromagnetic surveying process in the context of Bravo Area. Conceptually, the use of electromagnetic survey and the follow-up intrusive investigation is an example of two independent methodologies for identifying which anomalies may be ordnance or ordnance-related. In the first case, the methodology involves the electromagnetic survey and the interpretive and discriminating capabilities of the process (including the software and the experience of the geophysicist). In the second case, the methodology involves reacquiring the anomaly, digging it up, and positively identifying it and its characteristics. As can be seen, aspects of both methodologies may be influenced by site-specific factors and the experience of the personnel involved at that site and under those field conditions. EM data and data validation data gathered during the Alpha area EE/CA will also be used to support anomaly identification during the Bravo area EE/CA.

5.4.4 Two analogous circumstances were considered. The first analogy is from a quality control (QC) perspective. To comply with USEPA QC requirements (as defined in USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Contaminant, OLM04.2, May 1999), duplicates and other QC samples (i.e., matrix spikes, matrix spike duplicates, rinse blanks) must be tested or analyzed at a frequency of no less than 1 in 20 samples (i.e., 5% of the field samples from a similar matrix). This baseline level of testing has been judged to provide sufficient data to judge whether two applications of <u>the same</u> methodology by different personnel using a different analytical apparatus will generate essentially the same characterization result. However, this percentage would typically be judged to be too small if the initial and the follow-up methodologies were not the same.

5.4.5 The second analogy that was considered is the characterization of an area using a field screening methodology, with some percentage of the samples being also sent off-site for laboratory analysis using a more rigorous, conventional methodology. In this circumstance, between 10% and 20% of the field screened locations are also sampled for off-site analysis. Whether the most appropriate split is 10% or 20% generally depends on a number of considerations:

- If the field screening methodology is relatively “tried and true” under the conditions associated with the area being characterized or there are well-defined methodological procedures and techniques, a percentage toward the lower end of the range would be more appropriate. In this case, a degree of reliability and a level of confidence in the process and its results may have been previously demonstrated. 10%, or a value close to 10%, may be appropriate if there has been prior electromagnetic surveying at a site under similar or less “complex” conditions (e.g., hot rocks, confounding cultural metallic scrap).

- If the field screening methodology is relatively new or has not been applied under the conditions associated with the area being characterized, a greater

amount of feedback may be warranted to establish the same approximate level of confidence. In this case, a degree of reliability and a level of confidence in the process and its results may not have been previously demonstrated. 20%, or a value close to 20%, would be more appropriate if there has not been prior electromagnetic surveying at the site using this technique or if potentially confounding conditions are present in this area, which were not been encountered at the site previously.

5.4.6 Bravo Area is expected to be relatively free of the conditions that complicate an electromagnetic survey. In addition, the surveying process to be used in Bravo Area grids has been previously tested in a rigorous manner at Ft. McClellan during the CONUS/OCONUS procurement competition, and has been recently applied at the M2 Parcel under more difficult interpretive conditions. Consequently, follow-up intrusive sampling of 10% of the surveyed anomalies (as denoted by the number of grids) is judged to be most appropriate for Bravo Area. It should be noted that since 50% of the high-density grids in the Bravo Area will be intrusively sampled, the grids intrusively sampled over the entire Bravo Area will be greater than 10%.

5.4.7 Foster Wheeler Environmental has acknowledged that 10% may ultimately be determined not to be enough to provide the level of confidence needed in the survey results. This uncertainty arises from the factors noted above. Accordingly, Foster Wheeler Environmental identified additional intrusive investigation as a potentially necessary separate effort depending on what is learned from the initially specified 10% and the expected marginal benefit associated with more intrusive investigation. It should be noted that feedback on the interpretation of the geophysicist and his/her data processing process is most needed with respect to category (3) above: instances where he/she is uncertain as to whether or not an anomaly item is ordnance or ordnance-related. It is this "gray area" of anomalies where the follow-up intrusive investigation is most beneficial to producing better subsequent characterization results. As such, whether the most appropriate percentage of anomalies to dig up and identify is closer to 10% or 20% depends a great deal on how many of the anomalies in a grid are in the "gray area". If a relatively large proportion of the anomalies in a grid is associated with the "gray area" of signals, much can be learned from each grid. On the other hand, if only a small number of the anomalies in a grid are associated with the "gray area", more grids (and a larger percentage of the total number of grids) would then be required to be investigated to provide the same level of information for enhancing the discrimination process. At some point, the marginal benefit of further intrusive follow-up becomes insignificant relative to subsequent characterization.

5.5 PHASE II SITE CHARACTERIZATION (TASK 5)

Consists of excavation and removal of additional subsurface geophysical anomalies identified during Phase I of the assessment. Qualified UXO personnel will perform the task. The SOW provides assumptions that 100 anomalies per acre will be excavated, up to 4 feet in depth, and that 5 items per acre are assumed to be UXO that will require disposal. Task 5 is an optional time and materials task to be exercised at the discretion of

the CEHNC Contracting Officer once the need for additional sampling data has been assessed. Information obtained in Tasks 3, 4, and 5 shall be sufficient to identify target anomalies, prepare the risk assessments, evaluate and recommend response alternatives, and prepare cost estimates for response alternatives.

5.6 DATA MANAGEMENT (TASK 6)

Requires data management in accordance with the appropriate Data Item Description. Applies to all reports, drawings, and data generated. This task will be performed using Geographical Information Systems (GIS) applications and a Data Base Management System.

5.7 PREPARE EE/CA REPORT (TASK 7)

The EE/CA Report will be prepared and submitted to detail the field investigation, as well as evaluate and recommend appropriate risk reduction and removal action alternatives. The document will be prepared in accordance with DID OE-010. Foster Wheeler Environmental will perform a risk assessment using the Ordnance and Explosives Risk Impact Assessment (OERIA) model and will evaluate the risk that the site represents to human health and the environment. A Land Use Control Analysis will be performed as part of the EE/CA Report. The objective of the Land Use Control Analysis is to identify the stakeholders, document which government agencies have jurisdiction (i.e., exercise control through regulatory endorsement, professional advice, federal support of lending institutions) over UXO contaminated lands, and to assess their capability and willingness to assert control which could protect the public at large from explosive hazards.

5.8 PREPARE THE EE/CA DECISION DOCUMENT (TASK 8)

Following an evaluation of public comments on the EE/CA Report, the EE/CA Action Memorandum document will be prepared to detail the selected risk reduction alternative method(s) for the Bravo Area at Fort McClellan.

5.9 MEETINGS (TASK 9)

Key personnel will attend and participate in nine meetings with DoD, regulatory, and civilian personnel to support the project. In addition, Foster Wheeler will support the preparation of briefings, graphics, and presentations for three public meetings as directed by the Contracting Officer in support of public relations activities for the project.