Final
General Site-Wide Work Plan
Ordnance and Explosives Response

Fort McClellan, Alabama

Delivery Order 0001
Contract Number DACA87-99-D-0010

U.S. Army Corps of Engineers
Engineering and Support Center
Huntsville, Alabama

Prepared by
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GENERAL SITE-WIDE WORK PLAN

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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
FID	Flame Ionization Detector
FO	Field Office

LIST OF ACRONYMS (Cont'd)

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
OEW	Ordnance and Explosive Waste
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	Postion 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

LIST OF ACRONYMS (Cont'd)

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
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) to characterize areas and perform response actions within Fort McClellan suspected of containing ordnance and explosives (OE). 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 Work Plan is being prepared under the Defense Environmental Restoration Program (DERP) for BRAC, which was established as part of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), more widely known as "Superfund." Public law requires that government facilities subject to closure and subsequent reuse be subject to remediation under CERCLA for Non-time Critical Removal Actions (NTCRA). Activities conducted in support of this project will be conducted in a manner consistent with CERCLA and the National Contingency Plan (NCP).

1.1.2 Under the DERP, the remediation of ordnance sites is executed. Examples of the remediation process are as follows:

- ***Preliminary Assessment (PA)/Site Investigation (SI)***. Historical records and documents are reviewed by the USACE and a site visit is conducted. Interviews with local residents and former/current employees of the Defense installation are conducted to supplement the information obtained during the document review process. The information obtained during the PA is compiled into an Archives Search Report (ASR) and recommendations for continued investigation or No DoD Action Indicated (NDAI) are made.

- ***Engineering Evaluation/Cost Analysis (EE/CA) Approval Memorandum.*** If the PA/SI phases determine that a non-time critical removal action is appropriate, an EE/CA Approval Memorandum will be prepared. The EE/CA Approval Memorandum is the decision document that authorizes execution of the EE/CA.

- ***Engineering Evaluation/Cost Analysis (EE/CA)***. Upon completion of the PA/SI, and following preparation of the EE/CA Approval Memorandum, an EE/CA is performed. Conversely, if there is absolutely no evidence of OE contamination, the site will be recommended for NDAI. A risk assessment is performed, incorporating the results of the

EE/CA. Several options to reduce the risk to residual OE are evaluated and compared and the best alternative is recommended. A summary of the PA/SI activities and findings, details of the Risk Assessment, and the Risk Reduction and Removal Alternatives evaluation are presented in the EE/CA Report. Reviews are conducted by the appropriate State/Federal environmental agencies, owners, and the public prior to selecting the appropriate alternative. Public involvement is encouraged throughout the life cycle of the project.

- ***Action Memorandum.*** Once the appropriate alternative is selected, it is presented in the Action Memorandum. The Action Memorandum provides a concise written record of the decision to select the appropriate risk reduction and removal action(s). As the primary decision document, the Action Memorandum substantiates a NDAI or substantiates the need for risk reduction and removal action, identifies the selected action, and explains the rationale for the selection.

- ***Risk Reduction and Removal Action.*** The selected remedy is formally and technically designed and a contract to execute the action is awarded. Following preparation and approval of the Explosive Safety Submission, the risk reduction and removal action is implemented.

- ***Site Close-Out.*** Following the successful completion of the removal action, a Removal Report is prepared for approval and a Certificate of Clearance is issued. The land is then authorized for transfer to the appropriate party.

1.2 PURPOSE AND SCOPE

This document is designed to serve as the General Site-Wide Work Plan and will be supplemented by site-specific work plans prepared for individual delivery orders. It describes Foster Wheeler Environmental's technical approach and management structure for the completion of the field program. The plan addresses OE investigations, 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. Anomaly avoidance/construction support activities will be conducted in accordance with the Engineer Pamphlet "Unexploded Ordnance Support During Hazardous, Toxic, and Radioactive Waste Construction Activities" (EP 75-1-2, 9 October 2000). A copy is included as Attachment 1-1. The overall work plan program objective is to ensure that sufficient data of known, consistent, and acceptable quality are obtained using safe and regulatory compliant approaches. The site-wide plan protocols established herein apply to the entire Fort McClellan OE project, and are defined within so that they may be referenced by subsequent site-specific work plans. This document is designed to expedite the preparation of site-specific work plans, facilitate their review and approval, maintain consistent quality in field programs, and ensure that all requisite information is collected by standardizing field investigation procedures to the extent possible.

1.2.1 The site-specific work plans will be developed as extensions of this site-wide plan, addressing specific investigation/removal action/construction support requirements, QA/QC objectives and referencing appropriate protocols presented within this document. The Data Collection Objective's (DCO's) or reasons for conducting the activities for specific delivery

orders, will be defined within the site-specific work plans. The DCO's will then be used to develop appropriate Data Quality Objectives (DQO's), which will include the type, quality, and quantity of data necessary to support all decisions concerning the site-specific delivery order. The following represents a general outline of "things to consider" when preparing a site-specific work plan:

- Definition of DCOs;
- Development and definition of DQOs;
- Site Characterization Plan;
- Identification of any modifications to the General Site-Wide Work Plan (i.e., this document);
- Removal Design;
- Construction Support/Anomaly Avoidance Plan; and
- Specify how data will be evaluated and for what intended purposes it will serve; this will include discussion of any statistical or risk evaluations, as well as applications for incorporation into EE/CA type documents and Site-Specific Removal Reports.

1.2.2 Ranges and high impact areas with suspected chemical contamination of soil and/or groundwater and areas suspected of chemical warfare materiel (CWM) contamination presently are under investigation by other contractors under separate contract actions, and will not be specifically addressed in this Work Plan. If however, based on visual observation and/or odor, suspected chemical contamination is discovered during the performance of OE investigations and removals, Foster Wheeler Environmental may be required to conduct incidental sampling and analysis. If so, sampling and analysis will be conducted in accordance with the approved "Installation-Wide Sampling and Analysis Plan" prepared by International Technology Corporation (IT) (see sec. 10.0). In addition, upon completion of OE activities, the HTRW contractor (IT) will be provided removal reports for use in determining if additional HTRW investigations are warranted.

1.2.3 If CWM is encountered during the course of the OE investigations (or removal actions) 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 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 Safety Specialist. Any sampling and analysis that may be required for chemical agent contaminated media will be performed in accordance with the CWM Site Safety Submission and site-specific requirements as identified in site-specific amendment(s) to the CWM Site Safety Submission (see sec. 10.0 Sampling and Analysis Plan).

1.2.4 If, following OE response activities at a given site, there remains a reason to believe that residual OE contamination is present, the residual risk will be managed with Land Use Controls (LUCs).

1.2.5 A Land Use Control Assurance Plan or "LUCAP" is the plan assuring the effectiveness of LUCs at FMC. The LUCAP establishes a process for maintaining, inspecting, and/or enforcing LUCs at FMC. The Purpose of the LUCAP is to implement procedures to ensure the long-term effectiveness and viability of LUCs to protect human health and the environment.

1.2.6 The Army may transfer or convey property in an encumbered status to ensure protection of human health and the environment, to protect the interests of the United States, and to facilitate community reuse of the surplus property. Appropriate encumbrances will be determined on a site-specific basis and may be imposed prior to the selection of a CERCLA remedy. Army policy, in accordance with basic principles of real estate law, is to transfer properties with as few encumbrances as possible.

1.2.7 Land use controls, or LUCs, include any restriction or control arising from the need to protect human health and the environment that limits the use of and/or exposure to, environmentally contaminated media (e.g., soils, surface water, groundwater, air) or environmental hazards at any site at Fort McClellan. LUCs may include controls on access (e.g., engineered such as fences and non-engineered such as security guards) as well as mechanisms for ensuring compliance with necessary land use limitations (e.g., public advisories, legal restrictions on land or water usage). Additionally, the term encompasses both affirmative measures to achieve the desired control (e.g., night lighting of an area) and prohibitive directives (e.g., no drilling of drinking water wells). LUCs may be used as part of the selected remedy developed in the EE/CA and may be established prior to or during an investigation.

1.2.8 LUCs, established in source or decision documents such as a ROD to restrict site access and otherwise enhance public safety, are documented in a site-specific Land Use Control Implementation Plan, or LUCIP. A LUCIP will be prepared by the Army, in consultation with the JPA and other third parties, as appropriate. Regulatory agencies, ADEM and EPA Region IV, may review and comment on each proposed LUCIP. Final LUCIPs must effectively implement LUCs specified in a Final ROD or other decision document for the selected remedy. The LUCIP will identify and describe each LUC placed on the site and include specific methods for ensuring that the effectiveness of each LUC is maintained. An Interim LUCIP may be established before the remedy selection process is complete. A LUCIP, either Interim or Final, will be prepared for those sites where LUCs are necessary to be protective of human health and the environment.

1.2.9 OE response activities at Fort McClellan will focus primarily on two major geographical areas:

- Redevelopment Area
- Choccolocco Area.

1.2.10 Conceptual planning documents are under development for each area, that describe and propose approaches and priorities for OE investigations of each area. The objective of this conceptual planning is to design the data collection process to ensure that the right types, quantity and quality of data are collected to perform risk assessments and support the decision making process. This planning is necessary during the early stages of the project in order to obtain feedback from key parties involved in decision making, and to obtain a common understanding among the parties concerning the data to be collected and the decisions which will be based on that data.

1.3 SITE LOCATION

Fort McClellan is located northeast of the City of Anniston, Calhoun County, Alabama. To the west 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 portions of Fort McClellan currently known to be subject to this investigation include the areas of the Main Post known as the Redevelopment Area (excluding the Eastern Bypass Route) and the 4,488 acres of the Choccolocco Corridor. Figure 1-1 shows the location of Fort McClellan.

1.4 SITE 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.

1.4.1 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. Foot troops, and wheeled and tracked vehicles utilized the Choccolocco Area for bivouac maneuvers.

1.4.2 Fort McClellan was recommended for closure in BRAC 95. At this time, local, state, and federal interests are deciding the future use of Fort McClellan.

1.5 TOPOGRAPHY

The topographic gradient at the site 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.

1.6 CLIMATE

1.6.1 Climatology information in this section has been excerpted from the Final Environmental Baseline Survey for Fort McClellan (January, 1998). Climatic data will be used to determine appropriate timeframes for investigations and any future removal actions.

1.6.2 Fort McClellan is situated in a temperate, humid climate. Summers are hot and long, and winters are usually short and mild to moderately cold. The climate is influenced by frontal systems moving from northwest to southeast, and temperatures change rapidly from warm to cool due to the inflow of northern air. The average annual temperature is 63 degrees Fahrenheit (ºF). Summer temperatures usually reach 90ºF or higher about 70 days per year, but temperatures above 100ºF are rare. Freezing temperatures are common but are usually of short duration. The first frost may arrive by late October. At Anniston, the average date of the first 32ºF temperature is November 6, and the last is March 30. This provides a growing season of 221 days. Snowfall averages 0.5 to 1 inch. On rare occasions, several inches of snow accumulate from a single storm (ESE, 1997).

1.6.3 The average annual rainfall is approximately 53 inches and is well distributed throughout the year. The more intense rains usually occur during the warmer months, and some flooding occurs nearly every year. Drought conditions are rare. Approximately 80 percent of the flood-producing storms are of the frontal type and occur in the winter and spring, lasting from 2 to 4 days each. Summer storms are usually thunderstorms with intense precipitation over small areas, and these sometimes result in serious local floods. Occasionally, several wet years or dry years occur in series. Annual rainfall records indicate no characteristic order or pattern (ESE, 1997).

1.6.4 Winds in the Fort McClellan area are seldom strong and frequently blow down the valley from the northeast. However, there is no truly persistent wind direction. Normally, only light breezes or calm prevail, except during passages of cyclonic disturbances, when destructive local wind storms develop, some into tornadoes, with winds of 100 miles per hour or more (ESE, 1997).

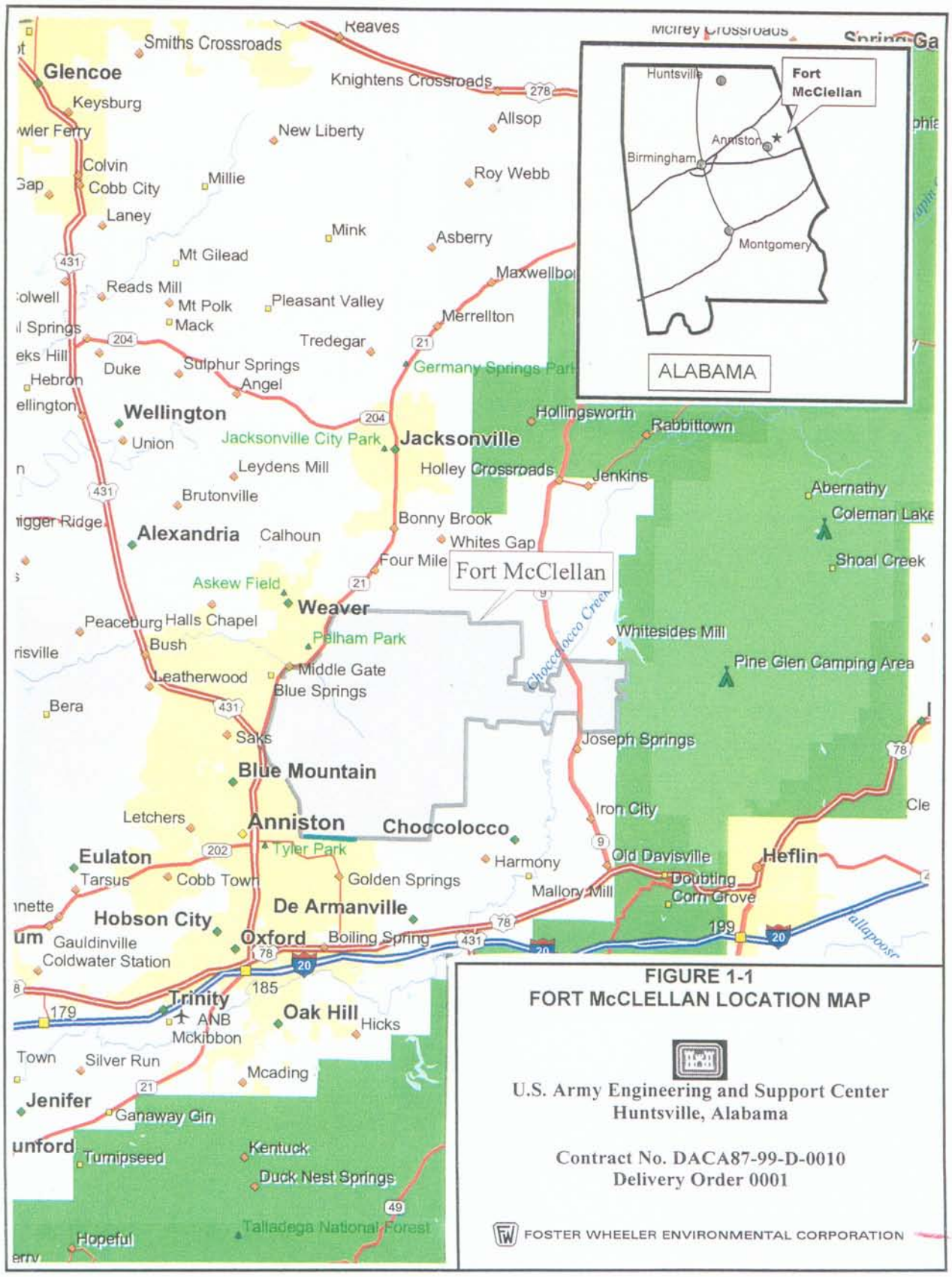

FIGURE 1-1
FORT McCLELLAN LOCATION MAP

U.S. Army Engineering and Support Center
Huntsville, Alabama

Contract No. DACA87-99-D-0010
Delivery Order 0001

FOSTER WHEELER ENVIRONMENTAL CORPORATION

ATTACHMENT 1-1
UNEXPLODED ORDNANCE SUPPORT DURING HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE AND CONSTRUCTION ACTIVITIES

EP 75-1-2
9 October 2000

US Army Corps
of Engineers®

EXPLOSIVES

UNEXPLODED ORDNANCE SUPPORT DURING HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE AND CONSTRUCTION ACTIVITIES

ENGINEER PAMPHLET

"Approved for public release; distribution is unlimited."

AVAILABILITY

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DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

EP 75-1-2

CEMP-RA

Pamphlet
No. 75-1-2

9 October 2000

Explosives
UNEXPLODED ORDNANCE (UXO) SUPPORT DURING
HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND CONSTRUCTION
ACTIVITIES

1. Purpose. This pamphlet provides U.S. Army Corps of Engineers (USACE) personnel with procedural guidance, technical specifications, personnel and training requirements, and health and safety criteria for UXO support during HTRW and construction activities.

2. Applicability. This pamphlet applies to all Headquarters, U.S. Army Corps of Engineers (HQUSACE) elements, USACE Major Subordinate Commands (MSCs), USACE Geographic Districts (districts), and field operating activities having responsibilities for civil works and/or military programs with HTRW-related and construction projects that have the potential for encountering UXO. The UXO support requirements presented in this pamphlet are applicable to anomaly avoidance activities conducted during the investigative/design and remediation/ construction phases of projects on sites with known or suspected UXO. Although the procedures for anomaly avoidance presented in this pamphlet pertain to HTRW-related activities, these procedures may be modified to address other types of activities, as appropriate. Guidance presented in this pamphlet is consistent with policy to be published in ER 385-1-95. Contact the OE MCX for additional information.

3. Distribution Statement. Approved for public release; distribution is unlimited.

4. References. Required and related references are at Appendix A.

5. Explanation of Abbreviations and Terms. Abbreviations/acronyms and special terms used in this pamphlet are explained in the glossary.

FOR THE COMMANDER:

3 Appendices
(See Table of Contents)

RUSSELL L. FUHRMAN
Major General, USA
Chief of Staff

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DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

EP 75-1-2

CEMP-RA

Pamphlet
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Explosives
UNEXPLODED ORDNANCE (UXO) SUPPORT DURING HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND CONSTRUCTION ACTIVITIES

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CHAPTER 1
INTRODUCTION

1-1. General. This Engineer Pamphlet (EP) presents procedures for providing UXO support during HTRW and construction activities. The EP will introduce the different requirements for providing UXO support during the investigative/design phase and remediation/construction phase of projects on sites with known or suspected UXO.

a. During the investigative/design phase of any project on a site with known or suspected UXO, UXO support refers to the anomaly avoidance techniques implemented to avoid any potential surface UXO and any subsurface anomalies. USACE primarily implements anomaly avoidance procedures on HTRW sites. Intrusive anomaly investigation is not authorized during anomaly avoidance activities. Although the examples of anomaly avoidance techniques in this EP pertain to HTRW-related activities, the procedures may be modified to address other types of activities, as appropriate. For additional information on anomaly avoidance techniques, contact the OE MCX.

b. UXO support during construction activities, including the remediation phase of an HTRW project, on a site with known or suspected UXO may include only UXO safety support or may require a complete subsurface clearance response. The level of UXO support required during construction activities is dependent on the probability of encountering UXO.

(1) If the probability of encountering UXO is low (e.g., current or previous land use leads to an initial determination that UXO may be present), only UXO safety support will be required. UXO safety support is discussed in paragraph 6-5 of this document.

(2) When a determination is made that the probability of encountering UXO is moderate to high (e.g., current or previous land use leads to a determination that OE was employed or disposed of in the area of concern), UXO qualified personnel must conduct a subsurface clearance of the known construction footprint and remove all discovered UXO.

(3) The level of effort for construction support is site/task-specific and will be determined on a case-by-case basis by the project team in coordination with the Ordnance and Explosives (OE) Mandatory Center of Expertise (MCX).

c. If UXO is encountered after initiation of an HTRW or construction project, the procedures to be published in ER 385-1-95 may apply. Contact the OE MCX for guidance and assistance.

d. The OE MCX will determine procedures for sampling and cleanup of soils contaminated with primary explosives on a case-by-case basis. The HTRW Design District is responsible for the design and removal or remedial action to clean up soils contaminated with

secondary explosives; however, where military munitions (excluding bulk explosives) are suspected or known to exist, the appropriate OE Design Center is responsible for the design, and the appropriate OE Design Center or the district approved to execute OE removal actions is responsible for the cleanup.

1-2. Responsibilities.

a. It is the responsibility of all USACE personnel involved with the OE Program to safely execute OE response projects, including UXO support during HTRW and construction activities, in accordance with applicable laws, regulations, and policies. A detailed discussion of USACE organizational responsibilities for OE response projects is presented in Engineer Regulation (ER) 1110-1-8153, Ordnance and Explosives Response.

b. All USACE organizations will ensure that all personnel with access to the site for UXO support during HTRW and construction activities are familiar with, and have access to, copies of the accepted Work Plan and Site Safety and Health Plan (SSHP). In addition, each organization will ensure that such personnel receive the appropriate training, medical surveillance, and personal protective equipment (PPE) required by the safety plan, contract specifications, Occupational Safety and Health Administration (OSHA) Standards, USACE regulations, and applicable Department of Defense (DOD) and Department of Army (DA) regulations.

1-3. Functional Roles. The following section provides a description of the functional roles for UXO support activities. A more comprehensive description of the functional roles for the organizations discussed below is also provided in ER 1110-1-8153.

a. Headquarters, US Army Corps of Engineers. If an explosives safety submission (ESS) is required for UXO support activities, it will be reviewed and approved by HQUSACE.

b. Major Subordinate Command. If an ESS is required for UXO support activities, it will be monitored by an MSC in accordance with ER 1110-1-8153.

c. District. A district will:

(1) Execute UXO support activities.

(2) Assign a Project Manager (PM) to lead the project team, coordinate all project activities, serve as a liaison with other stakeholders, and review/approve project documents as required.

(3) Conduct UXO support activities with either in-house resources or by contract.

(4) Coordinate the UXO support project with the OE MCX.

(5) Prepare a project-specific Statement of Work (SOW) and Independent Government Estimate (IGE) for UXO support activities.

(6) Submit plans developed for UXO support activities to the OE MCX. All OE concerns will be addressed before initiating any on-site activities.

(7) If an ESS is required, review and provide comments and written concurrence or nonconcurrence.

(8) Supervise the fieldwork. UXO operations will be supervised by UXO qualified personnel.

(9) Conduct appropriate quality verification activities.

(10) Coordinate requests for support from the 52nd Ordnance Group (EOD) with the OE MCX.

d. OE Design Center. If an ESS is required for planned UXO support activities at a site, the appropriate OE Design Center will ensure its proper planning and preparation.

e. OE MCX. The OE MCX will:

(1) Review and provide comments and written concurrence or non-concurrence on UXO support-related products (e.g., SOW, Work Plan, and ESS) to ensure compliance with federal, DOD, DA, and USACE OE safety and OE environmental regulations.

(2) Provide OE technical support to any USACE office conducting construction and/or HTRW operations in areas where UXO is suspected or known to exist.

(3) Develop and/or approve OE-specific contract requirements, including OE contractor personnel qualifications and work standards, for contract acquisition.

(4) Assimilate and analyze lessons learned from UXO support projects and provide them to the HTRW MCX for inclusion in the USACE lessons learned database.

(5) Coordinate the 52nd Ordnance Group support in accordance with the Memorandum of Agreement (MOA) between the U.S. Army Engineering and Support Center, Huntsville (USAESCH) and 52nd Ordnance group.

f. OE Safety Specialist. If a subsurface clearance response is being conducted in support of construction activities, an OE Safety Specialist will be present to provide safety oversight. Otherwise, an OE Safety Specialist is generally not required on-site. Additional information is available in ER 1110-1-8153.

g. U.S. Army 52nd Ordnance Group. The Group will respond to requests for assistance in accordance with its MOA with USAESCH.

CHAPTER 2
STATEMENT OF WORK/INDEPENDENT GOVERNMENT ESTIMATES

2-1. Introduction. This chapter provides guidance on preparing a SOW and IGE for UXO support during HTRW and construction activities. The district is responsible for executing the SOW and IGE for UXO support activities.

2-2. Statement of Work.

a. General. Project safety and health are overriding parameters of OE project design and execution. The OE MCX safety personnel are points-of-contact (POC) for UXO safety issues and have particular, specialized expertise in identifying, interpreting and implementing applicable safety requirements for OE projects. Each SOW for UXO support activities must be closely coordinated with these personnel.

b. Preparation.

(1) The PM is responsible for preparing the SOW for UXO support activities required in conjunction with HTRW or construction activities. The OE MCX may be consulted to provide the appropriate statements or paragraphs concerning background and authority for the task order or contract award.

(2) Appendix B provides an example SOW for UXO support during HTRW investigative activities on sites with known or suspected UXO. Appendix C provides an example SOW for UXO support during construction activities on sites with known or suspected UXO. The appropriate UXO support SOW may be used as an addendum to a larger SOW for an existing project.

(3) The examples provided in Appendices B and C should be followed to ensure that the applicable requirements (i.e., site visit, Work Plan preparation, UXO support procedures, quality control, reporting, and public affairs assistance) are included. The OE MCX should assist in the drafting of SOW verbiage when UXO support is required for HTRW activities not specifically referenced in Appendix B or when construction activities other than those presented in Appendix C are proposed and UXO support is required.

(4) Neither of these examples contains provisions for a records search by the contractor to determine what types of UXO might be encountered. Districts should consider completing a records search to determine the potential for contact with UXO and the potential types and quantities before using the SOW in Appendix B or C.

c. Review Process. Following the preparation of the SOW, the PM should submit copies to the OE MCX for review. The OE MCX will provide comments and written concurrence or

nonconcurrence for the decision/approval authority. The OE MCX will be allowed 15 calendar days from receipt of the SOW for this review. If no comments are received within this time frame, concurrence may be assumed by the executing agency.

2-3. Preparation of the IGE. Once the SOW is prepared, an IGE for UXO support during HTRW or construction activities is prepared. In preparing cost estimates for UXO support projects, the government cost estimator or project engineer must first consider the intent of the cost estimate in order to select the best cost-estimating tool.

a. If the objective is to estimate an order of magnitude cost for budgetary purposes, then a parametric model is used to provide costs for various phases of the project. The recommended USACE software program is the Remedial Action Cost Engineering and Requirements System (RACER).

b. If the objective is to provide a detailed independent cost estimate to be used as the basis for negotiation for a stand-alone contract or individual task orders under a particular indefinite delivery order (IDO) contract, then a detailed cost estimate is required. The structure of the cost estimate will vary depending on the contract type. The recommended USACE software programs for detailed estimates are Micro Computer-Aided Cost Engineering System (MCACES) Gold Version 5.3, MCACES for Windows, Lotus 123™ spreadsheets, or Excel™ spreadsheets. The cost estimator or project engineer may develop crew and productivity sheets for the various field activities or tasks in the SOW to determine the duration or number of hours for the various labor categories needed to support each task. The labor rates are burdened rates and reflect all contractor mark-ups. Materials and travel and per diem are duration driven and totaled separately from the labor. The materials estimated can be purchased, rented, or allocated to overhead.

CHAPTER 3
PLANNING CONSIDERATIONS FOR UXO SUPPORT

3-1. Introduction. This chapter discusses the requirements that should be addressed prior to initiating UXO support activities during HTRW and construction activities on sites with known or suspected UXO. The objective of UXO support activities is to conduct safe and efficient operations while limiting potential exposure to a minimum number of personnel for a minimum time and to the minimum amount of UXO.

3-2. Planning Documents. Site-specific planning documents should be prepared that will detail the methodologies that will be used during the UXO support project. For anomaly avoidance activities, the planning document is the HTRW Work Plan. For construction activities, the planning documents include the Work Plan and the ESS (if required). For range construction projects, the planning documents include Plans and Specifications. The planning documents should be prepared in accordance with the project SOW and contract requirements. The project team should ensure that these documents are consistent with each other.

3-3. Work Plan.

a. For anomaly avoidance and construction activities, a Work Plan to supplement the prime contractor's or USACE work plan/site plan will be prepared. The Work Plan should be prepared in accordance with the project SOW and contract requirements.

b. Content. The Work Plan does not need to be comprehensive, as it is a supplement to the overall site Work Plan. The Work Plan should detail the management approach and operational procedures that will be used to complete the UXO support activity. The Work Plan should include a SSHP which specifically addresses UXO considerations. The Work Plan should indicate the specific geophysical instrument the UXO team intends to use.

c. The Work Plan should be submitted by the contractor to the PM for review and comment. The PM will then forward one copy to the OE MCX. The OE MCX will review and provide comments and written concurrence or nonconcurrence on the planning documents containing UXO support provisions. The OE MCX will be allocated 15 calendar days from date of receipt for this review. If no comments are received from the OE MCX within this time frame, concurrence may be assumed by the executing agency.

d. The accepted Work Plan will serve as the contractual basis for all subsequent project activities. Current copies of the Work Plan will be kept for reference by the PM, the contractor's senior site representative and safety manager, and the UXO team. The accepted Work Plan will be maintained in the district office.

e. Modifications. Changes may be required to the Work Plan and/or SSHP after approval by the Contracting Officer. A modification that affects any UXO subsurface clearance operational and/or safety procedures may also require a revision to and re-submittal of the Explosives Siting Plan.

3-4. Explosives Siting Plan.

a. General.

(1) An Explosives Siting Plan (ESP), a component of the Work Plan, is prepared for UXO support during construction activities. The ESP discusses the proposed minimum separation distances for unintentional detonations, intentional detonations, and siting of critical project components. The ESP should describe the basis of design, all design calculations, and proposed hazard mitigation measures to be implemented to protect the public, non-project personnel, and site workers from explosive hazards. The ESP will be reviewed by the project team to ensure that the appropriate minimum separation distance criteria have been applied.

(2) The ESP will discuss the following explosives operations: OE areas, explosives storage magazines, and planned or established demolition areas. The location of these explosives operations will be sited on a map with a minimum scale of 1 inch equals 400 feet. The minimum separation distances calculated for the operation should be discussed in the text of the plan and Quantity-Distance (Q-D) arcs for the above-listed project elements drawn on the map.

(3) Quantity-Distance. Explosives safety distance tables prescribe the necessary separations and specify the maximum quantities for various classes of explosives permitted in any one location. The Q-D tables provided in DOD 6055.9-STD, DOD Ammunition and Explosives Standards, reflect the acceptable minimum criteria for the storage and handling of various classes and amounts of explosives. These distances will be used for siting storage locations. The project should site Open Burn/Open Detonation (OB/OD) areas in accordance with EP 1110-1-17, Establishing a Temporary Open Burn and Open Detonation Site for Conventional Ordnance and Explosives Projects.

b. OE Areas. During intrusive operations, safe separation distances will be determined using two sets of minimum separation distance criteria. The first set of criteria has been established for unintentional detonations (i.e., not planned in advance) and the second set of criteria has been established for intentional detonations (i.e., planned, controlled detonations). Details on calculating minimum separation distances are published in Engineer Manual (EM) 1110-1-4009, Ordnance and Explosives Response.

(1) Unintentional detonations. For an unintentional detonation, the applicable minimum separation distances are the minimum separation distances for unintentional detonations and the team separation distance (TSD). The minimum separation distance for unintentional detonations

is the safe separation distance for non-project personnel from intrusive operations. The TSD is the distance that UXO teams must be separated during intrusive operations.

(2) Intentional Detonations. The minimum separation distance for intentional detonations is the distance that both project personnel and the public must be from the intentional detonation.

c. Explosives Storage Magazines.

(1) The ESP should provide the following information on explosives storage magazines:

(a) Type(s) of magazines used (e.g., Bureau of Alcohol, Tobacco and Firearms Classification [Type 1-5], portable commercial, above ground, shed, earth covered, etc.).

(b) Net Explosive Weight (NEW) and hazard division to be stored in each magazine. Generally, recovered OE is considered Hazard Division (HD) 1.1.

(c) Q-D criteria used to site the magazine.

(d) Design criteria for any proposed engineering controls to be used to mitigate exposures to the public when Q-D criteria cannot be met.

(2) Magazines must also be properly placarded and the property must be secured. DOD magazines storing commercial explosives must have the appropriate fire fighting symbol or locally required DOD Hazard Classification and Storage Compatibility Group assigned.

d. Planned or Established Demolition Areas. The safe separation distance for these areas will be based on the minimum separation distance criteria for intentional detonations.

e. Footprint Areas. The following footprint areas should be discussed in the ESP: blow-in-place, collection points, and in-grid consolidated shots. These areas, however, do not have to be shown on the site map. The safe separation distances for these footprint areas are described in the following paragraphs.

(1) Blow-in-Place. Blow-in-place is the preferred method for disposal of UXO. Blow-in-place occurs when a UXO item is prepared and detonated in-place. The safe separation distances for blow-in-place areas will be determined using the minimum separation distance criteria for intentional detonations.

(2) Collection Points. Collection points are areas where recovered UXO that is safe to move is temporarily accumulated within a search grid pending relocation to another area for storage or destruction. Collection points should be limited to the amount of explosives such that the K50 total of the rounds to be destroyed will not exceed safe separation distances. The safe

separation distances for collection points will be determined using the minimum separation distance criteria for unintentional detonations.

(3) In-Grid Consolidated Shots. In-grid consolidated shots occur when recovered UXO that is safe to relocate is collected and destroyed within a search grid. In contrast to an established demolition ground, consolidated shots occur within a search grid rather than in a separate area. The procedures for in-grid consolidated shots are presented in the USAESCH document "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites", dated August 1998. USAESCH documents are available on the OE MCX website at http://www.hnd.usace.army.mil/oew.

f. Exceptions. The calculated minimum separation distances for unintentional detonations specified above are considered minimums for safe execution of normal operations. When site conditions exist that make it impossible or impractical to comply with these minimums, the PM may request consideration of a possible reduction. Any request for a reduction of these minimum separation distances will be funded and staffed through the Huntsville Center's Engineering Directorate, Structural Branch for calculations and the Huntsville Center's OE Safety Group for approval. For any requested reduction to the specified minimum separation distances for unintentional detonations, a detailed risk analysis must be documented explaining why these reductions are necessary and acceptable.

3-5. Explosives Safety Submission.

a. Construction activities involving the removal and disposition of UXO may require submittal and approval of an ESS. The requirement for an ESS will be determined on a case-by-case basis by the project team in consultation with the OE MCX. The purpose of the ESS is to ensure that all applicable DOD and Army regulations regarding safe and secure handling of ordnance are followed. Detailed information on the content, review and approval procedures, and modification process for the ESS is available in EP 1110-1-18.

b. UXO removal operations may not begin on construction projects requiring an ESS until the ESS is approved by the U.S. Army Technical Center for Explosives Safety (USATCES) or Department of Defense Explosives Safety Board (DDESB) and the contractor has been directed to incorporate the accepted ESS into the Work Plan. A copy of the accepted ESS will be maintained at the project site. All operations will be executed in accordance with the accepted ESS.

c. When an element of the accepted ESS changes, the ESS must be amended. The contractor will prepare the proposed change and forward it to the PM, who will forward it to the OE MCX for review. The OE MCX will forward the proposed changes to the appropriate agency for approval. For a change that specifies less restrictive requirements (e.g., reduction in exclusion zone), the contractor will comply with the accepted ESS until the change is approved.

When changes would be more restrictive (e.g., increase in exclusion zone), the contractor will apply the more restrictive measures until the ESS change is approved.

d. Once the ESS, Work Plan and all other prerequisite planning documents are accepted, a Notice-to-Proceed with the removal operations will be issued.

3-6. Personnel Qualifications and Work Standards. The OE MCX has set forth personnel standards applicable to all USACE OE Safety Specialists and UXO contractor personnel working for the USACE. These qualifications and standards detail the prerequisites for education and experience required for UXO personnel and are available on the OE MCX website at http://www.hnd.usace.army.mil/oew.

3-7. Training. USACE and contractor personnel will be in compliance with training requirements prior to conducting UXO support activities. Training requirements are published in EP 1110-1-18. The training topics included in EP 1110-1-18 pertain to 29 Code of Federal Regulations (CFR) 1910, 29 CFR 1926, cardiopulmonary resuscitation (CPR)/First Aid, Medical Surveillance, and Visitor Training.

3-8. Explosives Safety. There are no "safe" methods for dealing with UXO, merely procedures and process controls that are designed to reduce potential hazards. Maximum safety in any UXO response can be achieved through adherence to applicable safety precautions, a planned approach, and intensive supervision and UXO safety oversight. UXO qualified personnel will conduct a UXO-related site safety briefing prior to commencing operational activities each workday. All activities with potential exposure to ordnance and explosives will be reviewed to identify the associated risks and proposed mitigation procedures. Operations within areas suspected of containing UXO must be conducted in a manner that exposes the minimum number of people to the smallest quantity of explosives for the shortest period of time. During UXO subsurface clearance actions, all non-essential project personnel will withdraw to a location outside of the exclusion zone.

a. General Safety Considerations. General safety considerations applicable to personnel, both essential and non-essential, at project sites where UXO may be encountered include:

(1) Do not carry fire or spark-producing devices.

(2) Do not conduct explosive or explosive-related operations without approved procedures and proper supervision and UXO safety support.

(3) Do not become careless by reason of familiarity with UXO or the reported probability level of UXO contamination.

(4) Do not conduct explosive or potentially explosive operations during inclement weather.

(5) Avoid contact with UXO except during UXO clearance conducted during construction activities.

(6) Conduct UXO-related operations during daylight hours only.

(7) Employ the "buddy system" at all times.

b. Hazard Analysis.

(1) Hazard analyses will be conducted by personnel that are knowledgeable in UXO and explosives safety standards and requirements. These personnel should understand the specific operational requirement and hazard analysis methodologies. A hazard analysis will be performed for each activity to determine the significance of any potential explosive-related hazards. For example, residual explosives from ordnance fillers may be exposed during an HTRW sampling activity. Explosive residues may be in the form of powder or various granular and powder based pellets. These contaminants can enter the body through the skin or by ingestion if proper personal hygiene practices are not followed. Explosive fillers such as white phosphorus are dangerously reactive in air and acute exposure can result in serious injury to the skin, eyes, and mucous membranes. They are also a fire hazard.

(2) Safety requirements (or alternatives) that will either eliminate the identified hazards or control them to reduce the associated risks to an acceptable level will be developed. The adequacy of the operational and support procedures that will be implemented to eliminate, control, or abate identified hazards or risks will then be evaluated and a second risk assessment completed to verify that a satisfactory safety level has been achieved.

c. Hazards of Electromagnetic Radiation to Ordnance (HERO).

(1) Some ordnance items and other electroexplosive devices (EEDs) are particularly susceptible to electromagnetic radiation (EMR) in the radio frequency range (RF) originating from devices such as radio, radar, and television transmitters. The presence of antennas, communication and radar devices should be noted on initial site visits and/or preliminary assessments of eligibility. In addition, active and passive subsurface detection devices emit EMR/RF. Each type of equipment producing EMR/RF must be reviewed and a hazard analysis completed. The level of EMR/RF susceptibility and potential hazard is a result of the design and type of ordnance item or EED that may be present. Therefore, a knowledge of what ordnance is normally unsafe in the presence of EMR/RF is important so preventive steps can be taken if the ordnance is encountered. The OE MCX should be consulted when geophysical investigations are planned in areas potentially containing electric-fuzed ordnance.

(2) As part of the hazard analysis, the minimum separation distance between an EMR/RF emitting device and potential EEDs will be calculated. This calculation is based on the

characteristics of the transmitting device and the potential EEDs. The important characteristics of the EMR/RF source device are:

(a) The transmitter frequency (f, in MHz).

(b) The peak envelope transmitting power (Pt, in W).

(c) The transmitter gain (GdB).

(3) Minimum safe distances from EMR/RF sources are listed in Tables 2-2, 2-3, and 2-4 of Technical Manual (TM) 9-1375-213-12, Operator's and Organizational Maintenance Manual, Demolition Materials.

3-9. Personal Protective Equipment.

a. All UXO team members should be trained in the use of, medically qualified for, and physically able to wear, the prescribed PPE. PPE for UXO support operations will be determined by site-specific and task-specific analyses, documented in the site-specific SSHP, and worn as indicated in the plans. Specific requirements for PPE are described in the following paragraphs.

(1) PPE will comply with the more stringent requirements of EM 385-1-1, USACE Safety and Health Requirements Manual, and the applicable portions of 29 CFR 1910 Subpart I or 29 CFR 1926 Subpart E.

(2) Footwear. In addition to the applicable requirements in the references cited above, shoes or boots with high traction soles and ankle protection will be used. During geophysical detection activities, UXO support personnel will not wear safety shoes or other footwear that would cause interference with instrument operations.

(3) Clothing. Short sleeve shirts and long pants are considered the minimum clothing suitable for UXO support work and will be worn at all work sites, unless variations are described, analyzed and documented in the accepted SSHP.

(4) Head Protection. Personnel working in or visiting designated hard hat areas will be required to wear head protection meeting American National Standards Institute (ANSI) Z89.1 standards. Hard hat areas for UXO support activities should not be designated unless the activity hazard analysis shows a possible overhead hazard.

b. UXO support personnel using PPE will be knowledgeable of the limitations of the selected PPE as well as the reduced performance levels the equipment might pose while conducting assigned tasks.

3-10. Fire Prevention.

a. Fire prevention awareness is especially important in areas suspected of being contaminated with UXO. Smoking should only be permitted in controlled areas where all combustibles (e.g., vegetation, fuel cans, sampling supplies) have been removed or sufficient firebreaks have been established. Personnel may attempt to extinguish minor fires with fire extinguishers if they are trained to do so safely without endangering themselves or others within the vicinity of the fire.

b. If a fire becomes uncontrollable or extends into areas with unknown UXO contamination, all personnel must immediately suspend any fire fighting efforts and retreat to a safe distance, which is at least the maximum fragment distance of the most probable munition (MPM). Personnel should retreat upwind of the fire. The senior UXO qualified person present should then lead an immediate evacuation of the area using available resources to ensure the safety of all personnel.

3-11. Emergency Procedures. UXO support activities may result in accidents or incidents, regardless of the safeguards implemented. The SSHP will describe site-specific emergency response procedures, including identification of all appropriate POCs. All personnel must be briefed on the emergency response procedures and protocols discussed in the SSHP.

a. Emergency Response. In the event of a UXO-related emergency on-site during anomaly avoidance, the senior UXO qualified person present will direct the course of action until the local POC designated in the Work Plan has been notified. In the event of a UXO-related emergency on-site during construction support, the Senior UXO Supervisor (SUXOS) will direct the course of action until the local POC designated in the Work Plan has been notified. It may be necessary for other on-site personnel to provide assistance. If an emergency response rescue operation is required, no one will reenter the accident area until the hazards of the situation have been assessed by the responsible person (see above), and all required resources are on-hand to complete the rescue without jeopardizing the safety of rescue personnel.

b. Emergency Rescue.

(1) The senior UXO qualified person or the local POC, as applicable, will direct any UXO-related emergency response rescue operation. Response considerations include the following elements:

(a) Designation of an emergency response vehicle(s) to remain on-site during rescue operations.

(b) Determination of existing hazards, as well as the potential for additional hazards.

(c) Coordination with USACE in the review of the need to alert the local community.

(d) Assessment of the situation and condition of any victims.

(e) Determination of the resources needed for victim stabilization and transport and additional emergency support.

(f) Enforcement of the Buddy System. No one will be permitted to enter a rescue area alone.

(g) Oversight of the removal of injured personnel from the area.

(h) Consultation with on-site safety officers to establish decontamination protocols. Decontamination of injured parties will be accomplished after stabilization of their medical conditions. This action need not be accomplished if their condition poses immediate threat to the victim's life or may cause additional injury. If contamination is suspected, the victim will be wrapped in material to prevent the spread of contamination during extrication and transport. Emergency medical personnel will be advised on potential injuries, as well as potential contamination, of the patient as early as possible. The patient will not be transported to a medical facility without prior notification of, and coordination with, the receiving facility regarding potential contamination.

c. Mishap Reporting and Investigation Requirements. The following information provides guidelines to be followed for reporting mishaps involving ammunition and explosives on UXO support projects. Site-specific reporting and investigation procedures, including identification of appropriate POCs, will be included in the SSHP.

(1) Reporting Requirements. All mishaps will be investigated by the contractor and reported to the Contracting Officer and OE Safety Specialist or to the government authority cited in the SOW. Notification and reporting of mishaps will be in accordance with USACE Supplement to Army Regulation (AR) 385-40, USAESCH Safety Concepts and Basic Considerations for UXO Operations, and EM 385-1-1. Any mishap will be reported on ENG FORM 3394, Accident Investigation Report.

(a) For anomaly avoidance and safety support projects on Formerly Used Defense Sites (FUDS), the senior UXO-qualified person on-site is responsible for mishap reporting. For subsurface clearance projects in support of construction activities at FUDS, the contractor's UXO Safety Officer (UXOSO) is responsible for mishap reporting. For contracts under the supervision of the district, mishaps will be reported to the district safety office. An information copy of the accident report will be forwarded to the OE MCX. USACE district personnel will report through Command channels to the HQUSACE Safety and Occupational Health Office.

(b) On active installations, the installation safety officer is responsible for reporting any explosive mishaps.

(c) Non-Stockpile Chemical Warfare Materiel (CWM) Incidents. Incidents involving CWM will be reported in accordance with USACE Supplement to AR 385-40. A site-specific POC will be identified and documented in accordance with the reporting requirements in paragraph 3-11c(1).

(2) Investigation Requirements. In the event of a mishap, the contractor will implement emergency procedures and secure the scene to keep unauthorized persons away for their protection and to preserve the evidence for subsequent mishap investigation. On active installations, the U.S. Army Safety Center (USASC) maintains the prerogative to investigate Class A or Class B explosive mishaps (as defined in AR 385-40). If USASC chooses to investigate, it is the lead agency. If USASC chooses not to investigate, then the district is the lead agency.

CHAPTER 4
GEOPHYSICAL DETECTION EQUIPMENT

4-1. Introduction. This chapter presents an overview of available geophysical detection systems, their capabilities and limitations. There are many techniques beyond those mentioned in this chapter that have application to the detection of surface and subsurface UXO. No single detection system can effectively detect all types of munitions at all locations and depths.

4-2. Factors to Consider.

a. When selecting a geophysical survey instrument for detection of subsurface UXO, it is necessary to consider the maximum possible depth of UXO. If UXO is intentionally buried, factors affecting burial depth may include type of soil, mechanical vs. hand-excavation, depth of water table, etc. If the munition was fired or dropped, then the depth of penetration can be estimated by considering soil type, munition type and weight, and impact velocity. There are many cases where UXO can penetrate deeper than geophysical instruments can currently reliably detect. On such sites, it is possible that undetected UXO remains deeper than it can be detected.

b. Geophysical detection equipment used to locate subsurface UXO for avoidance or removal is seldom 100 percent effective. In many cases, a UXO may simply be located too deep, may be too small to be detected, or may be constructed of a material difficult to detect. Since the total number of subsurface UXO at a site is almost never known, complete detection cannot be documented. In addition, most commonly used geophysical survey systems will not detect subsurface bulk explosives. These factors must be considered when designing and implementing a UXO support response. If subsurface bulk explosives are anticipated based on archival data, then special avoidance techniques must be developed and increased safety precautions employed. Contact the OE MCX for additional information. The limitations of detection capabilities must be conveyed to all on-site personnel so that there is a common understanding of expectations.

4-3. Types of Instrumentation. The most successful UXO detection systems rely on one of two technologies: magnetometry or electromagnetics. Magnetometers are limited to detecting ferrous items. Electromagnetic detectors can detect any conductive metal.

a. Magnetometry.

(1) Magnetometers were one of the first tools used for locating buried munitions and remain one of the best. Most bombs and gun shells contain iron that causes a disturbance in the Earth's geomagnetic field. As the munitions are illuminated by the Earth's primary magnetic field, a secondary magnetic field results which magnetometers detect. Some magnetometers, which are called gradiometers, use two magnetic sensors configured to measure the slope (difference over a fixed distance) of the magnetic field, rather than the absolute magnetic field. Magnetometers are extremely sensitive and capable of identifying small anomalies. They

respond only to ferro-magnetic metals. In addition, magnetometers are sensitive to many iron-bearing minerals and "hot-rocks".

(2) Magnetometry will not detect subsurface bulk explosives. If subsurface bulk explosives are anticipated based on the site history, increased safety precautions and special techniques will be employed. Contact the OE MCX for additional information.

(3) Two types of magnetometers and gradiometers are most often used to detect buried munitions: fluxgate magnetometers and optically pumped atomic magnetometers.

(a) Fluxgate Magnetometers. Fluxgate magnetometers measure the magnitude and direction of a magnetic field. They are inexpensive, reliable, rugged, and have low energy consumption. Fluxgate magnetometers have long been a standard tool of EOD teams used for a quick, inexpensive field reconnaissance of a site containing ferrous munitions. However, most fluxgate magnetometers provide analog rather than digital output that makes it difficult to apply computer enhancement techniques.

(b) Optically Pumped Atomic Magnetometers. Optically pumped atomic magnetometers (also called atomic magnetometers or cesium-vapor magnetometers), also measure the magnitude and direction of a magnetic field. They utilize digital technology and are more expensive to purchase than fluxgate instruments. However, their high sensitivity, speed of operation, and high quality digital signal output make them a good choice for situations where data or digital post-processing is required.

b. Electromagnetic Detectors.

(1) Electromagnetic induction geophysical instruments are also extensively used to detect buried munitions. They differ from magnetometers in that they are not limited to detecting ferrous items; they can detect any conductive metal. In addition, electromagnetic detectors are not affected by most of the iron-bearing "hot rocks" that adversely affect magnetometers.

(2) There are numerous types of conductivity meters available. However, two types are most commonly used in the search for UXO: frequency-domain electromagnetics and time domain electromagnetic conductivity.

(a) Frequency Domain Electromagnetics. Frequency domain electromagnetic (FDEM) instruments can be useful for detecting large buried caches of munitions and detecting disturbed earth associated with pits and trenches. In addition, some types of FDEM instruments are the best geophysical tools available for detecting very small, very close objects such as the metal firing pins in plastic land mines buried just beneath the ground surface. However, since the resolution ability decreases dramatically with depth, frequency domain conductivity meters are not optimum for detecting individual, deeply buried munitions. Most commercial coin detectors are frequency domain conductivity meters.

(b) Time Domain Conductivity Electromagnetics. Time domain conductivity electromagnetic (TDEM) instruments provide an excellent compromise between detection depth and resolution. These instruments provide a capability to locate all types of metallic munitions and will see typical intact munitions to depths of one to two meters.

4-4. Geophysical Investigation Performance.

a. General. The performance of UXO detection instruments varies as a result of different site characteristics such as soil type, moisture content, depth to groundwater, vegetation, and type of UXO. The number of environmental and UXO factors affecting the performance of UXO detection instruments are so numerous that a test of various potential UXO detection instruments should be performed on the site to determine which instrument performs the best.

b. Performance Goals. Geophysical investigation performance goals will be included in the contractor's SOW. The most current contract requirements for geophysical investigation planning are found in the OE MCX Data Item Description "Geophysical Investigation Plan", which can be found on the OE MCX website at http://www.hnd.usace.army.mil/oew. If the contractor believes that these performance goals cannot be achieved at the site, then the contractor shall propose and document alternative goals for the Contracting Officer's consideration.

c. Horizontal Accuracy. Horizontally, 95 percent of all excavated items must lie within a 10 centimeter radius of their mapped surface location as marked in the field after reacquisition; 98 percent of all excavated items must lie within a 20 centimeter radius.

d. False Positives. There will be no more than 15 percent "false positives" where anomalies reacquired by the contractor result in no detectable, metallic material during excavations.

4-5. Test Plot. The Contracting Officer may require that the contractor demonstrate and document the capabilities of the proposed geophysical equipment. When the Contracting Officer requires a site-specific geophysical prove-out, a Work Plan that includes the test plot design will be prepared and implemented.

4-6. Calibration. Prior to use in the field each day, geophysical instrumentation will be checked for operational reliability and calibration against an item with a known response. Copies of instrument checkout and calibration verification will be maintained on-site. If calibration checks indicate that the instrument is not operating within an acceptable range and field adjustments do not resolve the discrepancy, the instrument will be immediately tagged and removed from service.

4-7. Maintenance. Preventative maintenance will be performed on a regularly scheduled basis. If an equipment problem is encountered, maintenance will be performed as soon as possible and records of the unscheduled maintenance and corrective action will be maintained and will indicate equipment identification, problem description, corrective action, the person performing the maintenance, and associated costs.

CHAPTER 5
ANOMALY AVOIDANCE PROCEDURES DURING HTRW ACTIVITIES

5-1. Introduction.

a. This chapter discusses anomaly avoidance procedures during the investigative/design phase of any project on a site with known or suspected UXO. USACE primarily implements anomaly avoidance procedures on HTRW sites with the potential to encounter UXO. HTRW-related activities during the investigative/design phases with the potential for encountering UXO include, but are not limited to, surveying and mapping, environmental and natural resource assessments, surface and subsurface sampling, boring and drilling, and groundwater monitoring

b. The purpose of anomaly avoidance during HTRW activities is to avoid any potential surface UXO and subsurface anomalies during sampling activities. Intrusive anomaly investigation is not authorized during anomaly avoidance operations. Procedures for addressing explosives contaminated soils are addressed in paragraph 1-1d of this pamphlet.

5-2. Team Composition. For anomaly avoidance on an HTRW site with known or suspected UXO, the contractor will provide a team consisting of a minimum of two personnel, one of whom must be a qualified UXO Technician II or above. This individual will be the team leader. The team must be on-site during all sampling activities. The team may include additional UXO qualified personnel, depending on site and task specific conditions/requirements. A description of the qualifications for contractor UXO personnel is provided on the OE MCX website at http://www.hnd.usace.army.mil/oew.

5-3. Responsibilities. The team members have the following responsibilities for anomaly avoidance procedures during an HTRW investigation project on a site with known or suspected UXO:

a. Prepare a Work Plan to supplement the prime contractor's or USACE Work Plan/Site Plan as described in Chapter 3.

b. Provide the explosive ordnance recognition, location, and safety functions for the prime contractor during HTRW sampling activities.

c. Conduct UXO safety briefings for all site personnel and visitors.

5-4. Authority. The senior UXO qualified person has final on-site authority on OE matters.

5-5. Access Surveys. The team must conduct a surface access survey and a subsurface survey for anomalies before any type of activities commence, including foot and vehicular traffic.

a. HTRW sampling personnel must be escorted by UXO qualified personnel at all times in areas potentially contaminated with UXO until the team has completed the access surveys and the cleared areas are marked. Escorted HTRW personnel will follow behind the UXO escort. If anomalies or UXO are detected, the UXO escort will halt escorted personnel in place, select a course around the item, and instruct escorted personnel to follow.

b. The team will conduct an access survey of the footpath and/or vehicular lanes approaching and leaving HTRW sampling areas with known or suspected UXO contamination. The access route shall be at least twice as wide as the widest vehicle that will use the route.

c. The Team must also complete an access survey of an area around the proposed investigation site that is large enough to support all planned operations. The size of the surveyed area will be site-specific and will take into account, for example, maneuverability of required equipment (e.g., drill rigs, excavation equipment, etc.), parking of support vehicles, and establishment of decontamination stations. As a minimum, the surveyed area should have a dimension in all directions equal to twice the length of the longest vehicle or piece of equipment to be brought on-site.

d. Geophysical instrumentation capable of detecting the smallest known or anticipated UXO will be used to locate anomalies just below the surface that may be encountered through erosion from rain or continual vehicular traffic. The various types of geophysical detection equipment are presented in Chapter 4.

e. If anomalies or surface UXO are encountered, they will be marked with flagging and the investigation area will be relocated to avoid contact. The team will clearly mark the boundaries of the surveyed area using survey flagging and pin flags. The team will establish a system of flagging colors that will distinguish anomalies, surface UXO, and route boundaries from each other as well as from any utility markings that have been used at the site.

f. If surface UXO is encountered, the team will assess the condition of the UXO to determine if disposal action is required. UXO disposition will follow the procedures in paragraph 5-12.

g. No personnel will be allowed outside of the surveyed areas.

5-6. Surface Soil Sampling. Surface soil samples are normally collected at depths from zero to six inches below ground surface. The following paragraphs describe anomaly avoidance procedures for soil sampling between zero and six inches below ground surface on an HTRW site with known or suspected UXO. Soil sampling at depths greater than six inches below ground surface on an HTRW site with known or suspected UXO will follow the procedures in paragraph 5-9.

a. The team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 5-5.

b. The team must visually survey the surface of each proposed surface soil sampling site for any indication of UXO or UXO-related contamination. In addition, the team must conduct a survey of the proposed sample locations using geophysical instrumentation capable of detecting the smallest known or anticipated UXO to a depth of one foot. The various types of geophysical detection equipment are presented in Chapter 4.

c. If anomalies are detected at a proposed sampling location or too many anomalies are detected in a general area of interest, the HTRW personnel will select an alternate location for collection of surface soil samples. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance during HTRW sampling activities.

5-7. Passive Soil Gas Sampling. Passive soil gas sampling typically involves excavation of holes to a depth of less than five feet and the installation and subsequent removal of sampling canisters. The following paragraphs describe anomaly avoidance procedures for passive soil gas sampling on an HTRW site with known or suspected UXO.

a. The team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 5-5.

b. The team must visually survey the surface of the proposed passive soil gas sampling sites for any indication of UXO or UXO-related contamination. In addition, the team must conduct a survey of the proposed sample locations using geophysical instrumentation capable of detecting the smallest known or anticipated UXO to the specified emplacement depth for the sampling canister. The various types of geophysical detection equipment are presented in Chapter 4.

c. If the emplacement depth is greater than the geophysical instrumentation detection capabilities, then the team must incrementally complete the geophysical survey every two feet while excavating for emplacement of the sampling canisters. Non-essential project personnel should withdraw to a distance of not less than the fragmentation distance of the MPM established for the site during excavation for the incremental geophysical survey.

d. If anomalies are detected at a proposed sampling location or too many anomalies are detected in a general area of interest, the HTRW personnel will select an alternate location for collection of passive soil gas samples. If an anomaly is detected during an incremental geophysical survey, the hole will be backfilled in accordance with site-specific procedures. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance.

e. Unless a path is clearly marked, the HTRW sampling personnel must be escorted by UXO qualified personnel when they subsequently return to each soil gas sampling site to retrieve the sampling canisters.

5-8. Active Soil Gas Sampling and Direct Push Technology. Active soil gas sampling typically involves manual or mechanical penetration at the desired location followed by withdrawal and collection of a soil gas sample. Direct push technology (DPT) is a common method for mechanical penetration during active soil gas sampling. The following paragraphs describe anomaly avoidance procedures for active soil gas sampling and use of DPT on an HTRW site with known or suspected UXO.

a. The team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 5-5.

b. Active soil gas sampling and DPT installations will follow the same anomaly avoidance procedures as outlined below for soil boring and monitoring well installations. The actual sampling will occur through the pilot hole or a boring located within a two-foot radius of the pilot hole installed by the team. If the pilot hole cannot be used to obtain a representative soil gas sample, it must be backfilled in accordance with site-specific procedures prior to installation and sampling of the soil gas sampling point. The backfilling of the pilot hole should be performed to prevent the soil gas sampling from being diluted by atmospheric air that may be drawn in through the pilot hole. Following collection of the soil gas sample, the sampling location must be backfilled in accordance with site-specific procedures.

5-9. Subsurface Soil Sampling and Monitoring Well Installation. Subsurface soil sampling is defined as the collection of samples below a nominal depth of approximately six inches from a split-spoon, Shelby tube, or bucket auger soil sampler using drilling techniques. Drilling techniques are also used to install groundwater monitoring wells for HTRW investigative sampling. The following paragraphs describe anomaly avoidance procedures for subsurface soil sampling and monitoring well installations on an HTRW site with known or suspected UXO.

a. The team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 5-5.

b. The team must complete a subsurface geophysical survey of the proposed drill hole location(s). If an anomaly is detected, HTRW sampling personnel must select a new drill hole location. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance. If the subsurface sampling or well installation depth is greater than the geophysical instrumentation detection capabilities, the team must incrementally complete the geophysical survey as outlined below.

(1) Underground Utilities. Utility clearance and/or excavation permits, if required, must be obtained prior to the commencement of any incremental subsurface geophysical survey activities by the team. The team is responsible for verifying that all necessary excavation permits are on-site prior to commencing operations. The prime contractor is responsible for contacting the appropriate agency(ies) or company(ies) to mark the location of all subsurface utilities in the construction area. All located utilities should be marked by paint, pin flags, or other appropriate means to visually delineate their approximate subsurface routing. The color shall not conflict with the colors used in UXO activities. In the event subsurface utilities are suspected in an excavation area, the team must attempt to verify their location. The team should be aware that not all utility lines will be detectable with geophysical equipment (i.e., not all utility lines are constructed of ferrous material).

(2) Pilot Hole/Incremental Geophysical Survey. Once an access survey has been completed, the team will install a pilot hole at each proposed drill hole location. During installation of the pilot hole, non-UXO qualified personnel should withdraw to a distance of not less than the fragmentation distance of the MPM established for the site.

(a) The pilot hole will be installed using a manual or mechanical portable auger. During installation of the pilot hole, a geophysical instrument configured for down-hole utilization will be used to inspect for anomalies every two feet.

(b) If an anomaly is detected, the pilot hole will be backfilled in accordance with site-specific procedures and HTRW sampling personnel must select a new drill hole location. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance.

(c) As long as no anomalies are detected, the pilot hole will be advanced to the maximum reach of the auger or to the maximum depth of the proposed drill hole, whichever is less. The pilot hole will also be inspected upon reaching the final depth, providing a total clearance depth equal to the pilot hole depth plus two feet. If no anomalies are detected to the total depth of the proposed drill hole, the drill rig may be brought on-site and utilized.

(d) In cases where the pilot hole does not reach the full depth of the proposed boring (e.g., the proposed depth of the drill hole is more than the maximum depth of the auger or the team cannot penetrate the soils using the auger), the drill rig may be brought on-site and advanced in two-foot increments beyond the clearance depth of the pilot hole. At the end of each two-foot increment, the drill rig's augers must be withdrawn from the hole so that the team may screen for anomalies as described above. As necessary with loose soils, a polyvinyl chloride (PVC) pipe (minimum 3 inches inner diameter) may be inserted to keep the hole open and to allow for incremental geophysical screening.

(e) Incremental screening may be discontinued once the drilling has extended to depths greater than 30 feet below ground surface, a geologist determines that virgin soil is found, or the

depth of penetration is exceeded, whichever is greater. All pilot holes will be backfilled in accordance with site-specific procedures.

(3) Monitoring of Drilling by Others. Once the team determines that a proposed drill hole location is free of anomalies using the procedures described above, the drilling contractor will be notified that the site is available for subsurface sampling or monitoring well installation.

(a) The drilling contractor's actual drill hole must be located within a two-foot radius of the pilot hole installed by the team. While this proximity to the pilot hole may affect the accuracy of "blow counts" for the HTRW team, anomaly avoidance takes precedence.

(b) Any drilling beyond the clearance depth of the pilot hole will be conducted in two-foot increments to allow the team to screen for anomalies. In order to avoid magnetic interference from the augers, the drill rig must withdraw its augers from the hole for the geophysical survey. As necessary with loose soils, a PVC pipe (minimum 3 inches inner diameter) may be inserted to keep the hole open and to allow for incremental geophysical screening. Drilling equipment and/or metallic support materials (e.g., drill rig, augers, drill rods, casings, etc.) may create an interference affecting the operation of the geophysical survey instrumentation during the incremental inspection process. In such an event, the item(s) creating the interference must be relocated outside the interference range of the geophysical instrument during each incremental inspection of the drill hole. If an anomaly is detected, the drill hole will be backfilled in accordance with site-specific procedures and HTRW sampling personnel must select a new drill hole location.

(c) Incremental screening may be discontinued once the drilling has extended to depths greater than 30 feet below ground surface, a geologist determines that virgin soil is found, or the depth of penetration is exceeded, whichever is greater.

5-10. Test Pit and Trench Excavations. Test pits and trench excavations are used to identify and characterize large subsurface HTRW areas of concern. The following paragraphs describe anomaly avoidance procedures for test pit and trench excavations on an HTRW site with known or suspected UXO.

a. The team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site as described in paragraph 5-5.

b. The team must complete a subsurface geophysical survey of the proposed excavation locations. If an anomaly is detected, HTRW sampling personnel must select a new excavation location. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance. If the proposed excavation depth is greater than the geophysical instrumentation detection capabilities, the team must incrementally complete the geophysical survey as outlined below.

(1) Underground Utilities. The procedures outlined in paragraph 5-9b(1) will be followed.

(2) Excavation Procedures. Once an access survey has been completed, HTRW personnel may begin excavation in two-foot increments. During excavation, personnel not directly involved in the excavation activities should withdraw to a distance of not less than the fragmentation distance of the MPM established for the site.

(a) At the end of each two-foot increment, the team will screen for anomalies. If an anomaly is detected, HTRW sampling personnel must modify the excavation location to avoid the anomaly. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance.

(b) If UXO is uncovered in an excavation, all operations will cease. The team will assess the condition of the UXO to determine if disposal action is required. UXO disposition will follow the procedures in paragraph 5-12. Once UXO has been encountered in an excavation, no further excavation is allowed at that location until EOD has removed the UXO item. Once the item is removed, excavation may continue using anomaly avoidance techniques. The After Action Report will indicate that UXO was encountered and summarize resulting activities.

c. Waste and/or Other Materials Encountered. In the event potentially hazardous waste, debris, or drums are encountered during test pit or trenching operations, excavation activities will cease. The HTRW Site Safety and Health Officer (SSHO) will assess the situation and may direct a change to the PPE for site workers. The SSHO will notify the appropriate personnel in accordance with the site-specific work plan. Wastes will be handled in accordance with the site-specific investigation-derived waste (IDW) management plan.

5-11. Groundwater Monitoring/Aquifer Characterization. Groundwater monitoring activities include measurement of groundwater elevations, measurement of free product thickness, and collection of analytical samples. Groundwater monitoring wells may also be used for aquifer characterization activities (e.g., slug tests). Unless a path is clearly marked, the HTRW sampling personnel must be escorted by UXO qualified personnel as described in paragraph 5-5a when they subsequently return to conduct groundwater monitoring/aquifer characterization activities.

5-12. UXO/OE Disposition. Since the purpose of UXO support during HTRW activities is anomaly avoidance, the team is not tasked to perform UXO/OE disposition. UXO/OE disposition will not be covered in the planning documents for the project, and therefore the team is not capable or equipped to perform UXO/OE disposition. In the event that ordnance is encountered that cannot be avoided or, based on its fuzing or current condition, presents an imminent hazard requiring immediate attention, the team will notify the local POC designated in the Work Plan. The team will not destroy any of the UXO encountered. The local POC will notify the appropriate authority of the UXO discovery and the team will safeguard the site pending arrival of the appropriate authority.

a. On active installations, UXO disposition requests will normally require reporting to the Range Control Officer, Facility Engineer, Post Headquarters or POC designated in the Work Plan.

b. On FUDS, the local POC will facilitate EOD response. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery. The local POC will also contact the USAESCH Safety Manager.

5-13. Quality Management. HTRW Design Districts should include anomaly avoidance capability in all applicable indefinite delivery order contracts for HTRW reports, designs, or remedial actions on FUDS or active military sites. UXO/OE concerns must be addressed before initiating any HTRW field investigation activities. Prior to initiation of on-site activities, items developed for UXO support of HTRW activities (i.e., SOW and Work Plan) must be submitted to the appropriate OE Design Center and the OE MCX for review in accordance with the roles and responsibilities set forth in Chapter 1. The executing district is responsible for supervising the fieldwork and ensuring compliance with all approved plans by all USACE and contractor personnel. The OE MCX may also conduct random inspections to verify conformance. A separate on-site, full-time UXO Quality Control Specialist (UXOQCS) is not required for UXO support activities. However, the UXO support contractor must perform quality control reviews of all field activities. Upon completion of the UXO support activities, the PM will ensure an After Action Report is submitted to the OE MCX.

CHAPTER 6
UXO SUPPORT DURING CONSTRUCTION ACTIVITIES

6-1. Introduction.

a. This chapter discusses procedures for UXO support during construction activities (including construction activities related to remedial actions) on sites with known or suspected UXO. The purpose of UXO support during construction activities is to reduce the potential for exposure to UXO.

b. UXO support during construction activities may require only UXO safety support or a complete UXO subsurface clearance response, depending on an assessment of the probability of encountering UXO and the level of confidence associated with the determination.

(1) If the probability of encountering UXO is low (e.g., current or previous land use leads to an initial determination that UXO may be present), only UXO safety support will be required. UXO safety support is discussed in paragraph 6-5.

(2) When a determination is made that the probability of encountering UXO is moderate to high (e.g., current or previous land use leads to a determination that OE was employed or disposed of in the area of concern), UXO qualified personnel must conduct a subsurface clearance of the known construction footprint and remove all discovered UXO.

(3) The level of effort for construction support is site/task-specific and will be determined on a case-by-case basis by the project team in coordination with the OE MCX.

c. When a determination is made that the probability of encountering UXO on a construction site is moderate to high (i.e., a subsurface clearance of the known construction footprint will be conducted), an OE Safety Specialist will be on-site to provide safety oversight. When a determination is made that the probability of encountering UXO on a construction site is low, (i.e., only UXO safety support is required), an OE Safety Specialist is generally not required on-site. Additional details are available in ER 1110-1-8153.

6-2. UXO Team Composition.

a. General. For construction activities on sites with known or suspected UXO, the contractor will provide a UXO team consisting of a minimum of two qualified UXO personnel (one UXO Technician III and one UXO Technician II). The UXO team may include additional UXO qualified personnel, depending on site and task specific conditions/requirements. The number of UXO teams will vary depending upon the total level of effort. A description of the qualifications for contractor UXO personnel is provided on the OE MCX website at http://www.hnd.usace.army.mil/oew.

b. If subsurface clearance is required in support of construction activities (i.e., there is a moderate to high probability of encountering UXO), the UXO team(s) must also meet the following standards:

(1) Each UXO team will not include more than six team members in addition to the UXO Technician III.

(2) A Senior UXO Supervisor (SUXOS) will be on-site and will not supervise more than 10 UXO Technician IIIs. There will not be more than one SUXOS per project without prior approval from the Contracting Officer.

(3) The position of UXOSO will be required on all subsurface clearance projects in support of construction activities; however, the positions of UXOSO and UXOQCS may be dual-hatted when there are less than 15 personnel on site.

(4) A UXOQCS may not be required full-time on-site. However, quality control functions will be performed for all field activities.

6-3. Responsibilities. The UXO team members have the following responsibilities for UXO support during construction on a site with known or suspected UXO:

a. Prepare a Work Plan and ESS (if required) to supplement the prime contractor's or USACE Work Plan/site plan as described in Chapter 3.

b. Provide the explosive ordnance recognition, location, and safety functions for the prime contractor during HTRW sampling activities.

c. Conduct UXO safety briefings for all site personnel and visitors.

6-4. Authority. The OE Safety Specialist has final on-site authority on OE safety matters. If an OE Safety Specialist is not present on-site, the UXO supervisor has final on-site authority for OE matters.

6-5. Safety Support.

a. Safety support is required for construction activities on sites with known or suspected UXO if the probability of encountering UXO is low.

b. The UXO team should review any archival information available regarding the area of the proposed construction activities. If possible, the UXO team should determine the probable types of UXO that may be encountered and specific safety considerations. The UXO team should meet with on-site management and construction personnel and conduct a general work and safety briefing, including:

(1) Probable site hazards and site-specific safety considerations.

(2) UXO safety support procedures.

(3) Responsibilities and lines of authority for any UXO-related response.

(4) Emergency response procedures.

c. The UXO team should physically preview the actual construction footprint with the on-site management of the construction contractor and discuss visual observations and potential areas of concern. In the event surface UXO is discovered, the UXO team will place flagging adjacent to the discovery for subsequent visual reference, select a course around the item, and lead any on-site personnel out of the area. The UXO team will assess the condition of the UXO to determine if disposal action is required.

d. The UXO team should monitor all excavation activities in areas potentially contaminated with UXO. One member of the team should be positioned to the rear and upwind of the excavation equipment for continuous visual observation of activities. If the construction contractor unearths or otherwise encounters suspect UXO, all excavation activities will cease. The UXO team will assess the condition of the UXO to determine if disposal action is required. Once UXO has been encountered in an excavation, no further excavation is allowed at that location until EOD has removed the UXO item. Once the item is removed, excavation may continue. The After Action Report will indicate that UXO was encountered and will summarize resulting activities.

e. The UXO team is generally not tasked to perform UXO/OE disposition activities during safety support of construction activities. If UXO is encountered that requires disposal, the procedures outlined in paragraph 5-12 of this pamphlet will be followed.

6-6. Subsurface Clearance in Support of Construction Activities.

a. A subsurface clearance of the identified construction footprint is required when the probability of encountering UXO during construction-related excavation activities is moderate to high.

b. The subsurface clearance process requires close coordination among on-site management personnel of the USACE, construction contractor, and UXO contractor. The UXO team should physically preview the actual construction footprint with other on-site management personnel and discuss visual observations and potential areas of concern.

c. A surface clearance may be required to remove any existing UXO from the surface of the work area prior to proceeding with subsurface clearance activities. All UXO-related remnants, target materials, and non-UXO related materials which may interfere with a subsurface

geophysical survey should also be removed from the surface of the work area and staged for later disposition. Surface clearance activities will be performed by the UXO team.

d. Safety Considerations.

(1) Subsurface clearance actions must be accomplished in strict accordance with the accepted Work Plan, SSHP, ESP, and ESS (if required). The UXO team should review any archival information available regarding the area of the proposed construction activities and, if possible, determine the probable types of UXO that may be encountered and specific safety considerations. Prior to commencing subsurface clearance activities, the UXO team should provide a general work and safety briefing to all on-site personnel. This briefing should address the following:

(a) Probable site hazards and site-specific safety considerations.

(b) UXO safety support procedures.

(c) Responsibilities and lines of authority for any UXO-related response.

(d) Emergency response procedures.

(2) Underground Utilities. Utility clearance and/or excavation permits, if required, must be obtained prior to the commencement of any intrusive activities. The UXO team is responsible for verifying that all necessary excavation permits are on-site prior to commencing operations. The prime contractor is responsible for contacting the appropriate agency(ies) or company(ies) to mark the location of all subsurface utilities in the construction area. All located utilities should be marked by paint, pin flags, or other appropriate means to visually delineate their approximate subsurface routing. The color shall not conflict with the colors used in UXO activities. In the event subsurface utilities are suspected in an excavation area, the UXO team must attempt to verify their location. The UXO team should be aware that not all utility lines will be detectable with geophysical equipment (i.e., not all utility lines are constructed of ferrous material).

(3) Exclusion Zones. Exclusion zones must be established in accordance with Chapter 3 for all UXO clearance procedures (i.e., anomaly excavation, access and identification of UXO, UXO recovery, and UXO/OE destruction). During these operations, personnel not directly involved in the specific UXO subsurface clearance task will withdraw to a location outside the exclusion zone.

e. Area Preparation.

(1) Area preparation includes reduction and/or removal of vegetation that may impede or limit the effectiveness of subsurface clearance actions. Vegetation reduction/removal may be accomplished through manual removal, mechanical removal, controlled burning, or defoliation.

Selection of the appropriate land clearing strategy should be based on the type and concentration of vegetation, topography, drainage patterns, terrain and soil conditions, and the level of required environmental and natural resource protection.

(2) Area preparation is not considered a UXO clearance procedure. The UXO escort and anomaly avoidance procedures for access surveys presented in paragraph 5-5 of this pamphlet should be followed.

f. Geophysical Mapping/Analysis.

(1) A subsurface geophysical survey will be conducted to identify and locate all anomalies in the identified construction footprint. The various types of geophysical detection equipment are presented in Chapter 4. Subsurface geophysical surveys may be completed using detection instrumentation with real time or post-processing identification and discrimination techniques. All anomalies should be prominently marked with survey flagging or pin flags for subsequent intrusive investigation.

(2) Subsurface geophysical surveys are not considered a UXO clearance procedure. The UXO escort and anomaly avoidance procedures for access surveys presented in paragraph 5-5 of this pamphlet should be followed.

g. Anomaly Excavation.

(1) Anomaly excavation operations are required to intrusively investigate and identify the source of all anomalies located during completion of the subsurface geophysical survey. During excavation operations, only essential project personnel should be within the exclusion zone. All anomaly excavation operations will comply with the provisions of 29 CFR 1926, Subpart P.

(2) Normally, UXO qualified personnel will manually complete anomaly excavations of less than one foot. If an anomaly is deeper than one foot, earth-moving machinery (EMM) should be used to assist in excavation efforts unless site constraints or accessibility restrict or prohibit use. EMM will not be used to excavate within 12 inches of an anomaly. When an anomaly excavation gets within approximately 12 inches of an anomaly, manual excavation must be used to complete the excavation.

(3) Only UXO qualified members of a UXO team may conduct manual excavation operations. A non-UXO qualified member of the UXO team may operate EMM used to assist in anomaly excavations. If more than one EMM will be used within the same work area, the team separation distances described in Chapter 3 will apply to the EMMs.

(4) After the probable source of the anomaly is identified and removed, an approved geophysical instrument should be used to validate the process. If the geophysical instrument

does not continue to detect an anomaly, then the excavation may be back-filled and restored in accordance with contract requirements.

6-7. UXO Destruction.

a. The Work Plan should include procedures for destruction of UXO recovered during construction activities. Destruction of recovered UXO can take one of three forms: in-place, on-site, and off-site. The decision regarding which technique to use is based on the risk involved in employing the disposal operation based on site-specific characteristics and the nature of the UXO recovered as determined by the UXO team. Additional information on UXO disposal operations can be found in TM 60A-1-1-31, Explosive Ordnance Disposal Procedures.

(1) In-Place Destruction. In-place destruction (blow-in-place) is a technique used when a UXO item cannot be safely moved to an alternate location for destruction. This technique is preferred because it exposes the minimum number of personnel. All in-place destructions will be conducted in a manner that ensures maximum control of the site. When this technique is employed, engineering controls are often used to minimize the blast effects.

(2) On-Site Destruction. If UXO is recovered in close proximity to occupied buildings, it may not be possible to safely destroy the item in place. In this instance, the item may be moved to a remote part of the project site where destruction and disposal can safely take place. When a UXO item is destroyed on-site, engineering controls are often used to minimize the blast effect. Guidance for the on-site destruction of UXO is found in EP 1110-1-17.

(3) Off-Site Destruction. If transported off-site for destruction, the UXO will be transported by either military vehicles or by a qualified UXO contractor. The UXO is typically transported to an active military installation where it can be safely destroyed.

b. Safety. The following safety considerations for UXO destruction should be addressed in the Work Plan.

(1) The UXO team conducting destruction activities will have at least three personnel with a minimum of two UXO qualified personnel: one UXO Technician III and one UXO Technician II. One member of the UXO team must always be located outside the minimum separation distance for intentional detonations to give warning and assist in rescue activities in the event of an accident.

(2) Explosives or accessory equipment that is obviously deteriorated or damaged will not be used.

(3) Blasting caps will be at least a commercial No. 8 or equivalent and, for destruction activities requiring multiple caps, be from the same manufacturer.

(4) Blasting caps must be transported in approved containers and not exposed to direct sunlight.

(5) The explosive end of blasting caps, detonators, and explosive devices will be pointed away from the body during handling.

(6) Blasting caps will not be buried. Detonating cord will be used to position blasting caps above the ground.

(7) Electric blasting caps must be tested for continuity prior to connecting them to the firing circuit. Upon completion of testing, the lead wires will be short-circuited by twisting the bare ends of the wires together.

(8) In the event of an electric misfire or non-detonation, the UXO destruction site must not be approached for at least 30 minutes. The wait time for nonelectric procedures will be 60 minutes plus the burn time for the fuse. A post-search of the detonation site must be conducted to ensure complete UXO destruction and to ensure that no fires have started.

c. Transport.

(1) Existing site conditions may require that UXO that has been certified as safe-to-ship in accordance with Technical Bulletin (TB) 700-2, DOD Ammunition and Explosives Hazard Classification Procedures be transported to a designated UXO destruction location either on or off the project site.

(2) A Transportation Plan detailing the route and procedures to be used during the transportation of the UXO must be prepared and accepted prior to engaging in any transport activities to ensure that all safety aspects of the movement have been addressed. The transport of UXO off-site must be performed in accordance with the provisions of 49 CFR Part 172; DA Pamphlet (DA Pam) 385-64, Ammunition and Explosives Safety Standards; and applicable state and local laws. Contractor personnel who, by contract requirement, are tasked with the responsibility of transporting or preparing shipments of OE over public roads must meet all training requirements of 49 CFR Part 172 and applicable state requirements.

(3) Safety. UXO items should only be transported from the discovery location to an alternate destruction location as a last option. Armed fuzes must only be transported when absolutely necessary and when all other avenues for in-place disposal have been exhausted. Safety considerations for the transport of UXO include the following:

(a) UXO packaging designs must provide an appropriate container with appropriate blocking and bracing to prevent migration of the hazardous filler. Padding should also be added to protect any exposed filler from heat, shock, and friction.

(b) Base-ejection type projectiles must be transported with the base oriented to the rear of the vehicle and the projectile secured.

(c) Incendiary loaded munitions should be placed on a bed of sand and covered with sand.

(d) Loose pyrotechnic, tracer, flare, and similar mixtures should be placed in #10 mineral oil or equivalent.

(e) White phosphorus filled munitions should be immersed in water, mud, or wet sand.

(4) Manifest. A Hazardous Waste Manifest (Environmental Protection Agency [EPA] Form 8700-22) is required when transporting OE over public roads in non-emergency situations. In emergency situations, military EOD will respond. For informational guidance on the Hazardous Waste Manifest, refer to 49 CFR 172.205 and 40 CFR 262.20. For the purposes of transportation and storage, OE will be hazard classified in accordance with TB 700-2. Government personnel who are tasked to sign shipping papers (including the Hazardous Waste Manifest, if required), must be trained and be given signature authority by their agency in accordance with the requirements of DOD 4500.9-R, Defense Transportation Regulation, Part II, Cargo Movement.

d. Explosives Management.

(1) Explosives used for the destruction of UXO must be acquired and managed in accordance with applicable federal, state, and local laws and regulations including, but not limited to, the following:

(a) Bureau of Alcohol, Tobacco, and Firearms Publication (ATF P) 5400.7, Alcohol, Tobacco, and Firearms Explosives Laws and Regulations, and 27 CFR.

(b) DOD 6055.9-STD.

(c) 49 CFR.

(d) 29 CFR 1910 and 1926.

(2) Acquisition. Explosives may only be purchased under a User of High Explosives License issued by the ATF. The license holder must provide written authorization designating the individuals authorized to purchase, store, or utilize explosives. This letter must specify the name, home address, date and place of birth, and the social security number of the designated individual(s). A copy of the letter must be maintained at the project office. In addition, the designated individual purchasing explosives may also be required to have a Blaster's License issued by the state in which the project is located. Explosives must be purchased from an ATF

licensed commercial distributor. The license holder must provide the distributor a certified statement of the intended use of the explosive material.

e. Temporary Explosives Storage Facilities on FUDS.

(1) When the contractor must establish temporary storage for explosives on FUDS, type 2 magazines conforming to the standards set forth in Section 55.206 of ATF P 5400.7 must be used. The location of the proposed magazines and the Q-D arcs must be shown on a site map attached to the ESP. The Q-D arcs must be based on the NEW established for each magazine and are derived using Table C9.T1, DOD 6055.9-STD. In the event that existing site conditions prohibit the siting of the magazines in conformance with derived Q-D arcs and the NEW cannot be reduced to achieve conformance, the PM must request assistance in the design of engineering controls or structural modifications necessary to bring the magazine within Q-D stated criteria.

(2) Explosives and initiators must be stored separately. If magazines are also used to temporarily store safe-to-ship UXO, each UXO item must be stored in accordance with its appropriate HD and the storage compatibility group criteria listed in Chapter 3, DOD 6055.9-STD. Each magazine must display the placards required by Department of Transportation (DOT) regulations 49 CFR Part 172, Subpart F for the HD of UXO or explosives stored in the magazine.

(3) Lightning protection is not required for magazines to be located on FUDS if all of the following criteria are met:

(a) The magazine is constructed of 3/16-inch thick steel or greater.

(b) The magazine is properly grounded.

(c) The magazine is located at least 6.5 feet from the nearest fence.

f. Temporary Storage Facilities on Base Realignment and Closure (BRAC) Sites/Active Installations.

(1) Temporary storage facilities for projects on BRAC sites or active installations must be determined using the installation's criteria.

(2) Lightning protection for temporary storage facilities to be located on BRAC sites or active installations must meet the provisions of DOD 6055.9-STD.

g. Security.

(1) The Work Plan should describe the inventory control system to be implemented for explosives management. Magazine Data Cards documenting explosive transfers for each

magazine must be completed with a copy maintained within the associated magazine. Explosives issued and unexpended must be returned to the magazine at the end of each workday.

(2) The inventory control system must include provisions for the physical inventory of the stored UXO and explosives at least weekly. Actual quantities must be reconciled with the quantities annotated on the corresponding Magazine Data Cards. Any discrepancies must be immediately reported to the USACE representative and an audit initiated to determine the source of the discrepancy.

(3) A physical security survey should be conducted to determine if fencing or guards are required when temporary storage facilities must be established. Generally, a fence around the magazines is needed, but the contractor is responsible for determining the degree of protection required to deter the theft of UXO or explosives stored in the magazines.

(4) Locks used on magazines at a FUDS will meet the standards listed in Section 55.208 (a) (4), ATF P 5400.7. BRAC and Installation Restoration site requirements must be determined using the installation's service criteria. A key control system should be documented in the Work Plan.

h. Fire Prevention. A Fire Prevention Plan should be prepared and coordinated with the appropriate fire department with primary response responsibility. Fire extinguishers of an appropriate size and type must be located at all temporary explosives storage facilities.

i. Records. Records must be maintained for all transactions and expenditures of explosive materials for a period of five years from the date of transaction in compliance with ATF regulations. These records must be maintained at the project office during on-site operations and subsequently at the business office of the ATF license holder.

j. Debris/Remnant Management. The Work Plan must include operational and quality control procedures for the processing, demilitarization, and disposition of inert ordnance, target materials, and UXO-related remnants which fall within the classification of Ammunition, Explosives, and Dangerous Articles (AEDA). Contact the OE MCX for the requirements on AEDA processing and disposition.

6-8. Quality Management.

a. Quality Control.

(1) The UXO team is responsible for the quality control (QC) of all surface and subsurface clearance activities and ensuring that only those procedures and processes conforming to contractual requirements and accepted project plans are implemented. The UXO team will develop a Quality Control Plan (QCP) outlining the quality activities to be used for continually assessing the implementation, effectiveness, compliance, and adequacy of operations.

(2) A separate UXOQCS is not required on-site full-time for UXO support activities. However, the UXO support contractor must perform QC reviews of all field activities in accordance with the accepted QCP.

(3) The QCP should provide procedures for validation of the following:

(a) Surface clearance and related activities are conducted in accordance with accepted project plans.

(b) Subsurface clearance and related activities are conducted in accordance with accepted project plans.

(c) Actual probabilities of detection are consistent with clearance reliability levels and USACE and DDESB requirements.

(d) Subsurface clearance operations provide for an adequate level of confidence of UXO detection and removal to specified depths.

(e) Disposition of UXO and materials classified as AEDA has been completed and documented. Procedures are available from the OE MCX.

b. Quality Assurance (QA).

(1) Districts should include UXO support capability in all applicable contracts for construction activities on FUDS or active military sites. UXO/OE concerns must be addressed before initiating any construction activities. Items developed for UXO support of construction activities (i.e., SOW, Work Plan, SSHP, ESP, and ESS, if required) must be submitted to the OE MCX for review and approval in accordance with the roles and responsibilities set forth in Chapter 1 of this pamphlet prior to initiation of on-site activities.

(2) The district is responsible for supervising the field work and ensuring contractor compliance with all accepted plans. The OE MCX may also conduct random inspections to verify conformance. Upon completion of the UXO support activities, the PM will ensure an After Action Report is submitted to the OE MCX.

CHAPTER 7
PROCEDURES WHEN SUSPECT CHEMICAL WARFARE MATERIEL IS ENCOUNTERED

7-1. Introduction.

a. This chapter discusses UXO support procedures to be followed when suspect chemical warfare materiel (CWM) is encountered on a project site. Contact the OE MCX for detailed procedures for planning and executing CWM response actions.

b. 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 is considered CWM. CWM 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.

c. Soil, water, debris, and other media contaminated with chemical agent is not considered CWM. The procedures described in ER 1110-1-8153 will be followed.

7-2. Response Procedures.

a. Any time suspect CWM is encountered, all work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel will secure the area to prevent unauthorized access. Personnel should position themselves as far upwind as possible while still maintaining security of the area.

b. Notification.

(1) On FUDS project sites, the UXO team will notify the local POC designated in the Work Plan. The local POC will facilitiate EOD response and two personnel will secure the site until EOD's arrival. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery. The EOD unit will notify the Technical Escort Unit (TEU) and secure the area until TEU's arrival. After notifying the local law enforcement agencies, the local POC will notify the USAESCH Safety Office to inform them of the actions taken.

(2) On active installations, the UXO team will normally notify the Range Control Officer, Facility Engineer, Post Headquarters or POC designated in the Work Plan.

c. Reporting. Incident reports will be prepared and forwarded in accordance with USACE Supplement to AR 385-40. A POC will be identified in the SSHP to prepare and forward the report.

(1) At FUDS, support for others (SFO), or other support provided for non-DA agencies or internal to USACE, the incident report will be prepared and forwarded by the district. Incident reports will be numbered USACE-UUU-YY-X where "UUU" is the district three letter identifier, "YY" is the last two digits of the fiscal year, and "XX" is the sequence number of the incident.

(2) At BRAC sites, Installation Restoration Program (IRP) sites, SFO, or other project support for DA agencies (outside USACE), the incident report will be prepared and forwarded by the agency supported.

APPENDIX A
REFERENCES

A-1. Section I
Required Publications

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, Public Law (PL) 96-510, 94 Stat 2767, 42 USC 9601

Defense Environmental Restoration Program, PL 99-499, Section 211, 100 Stat 1719, 10 USC 2701 et seq.

Resource Conservation and Recovery Act (RCRA) of 1976, PL 94-580, 90 Stat 2796, 42 USC 6901, et seq., as amended

Superfund Amendment and Reauthorization Act (SARA) of 1986, PL 99-499, 100 Stat 1613, amending CERCLA, 42 USC 9601et seq., and miscellaneous other sections

27 CFR
Alcohol, Tobacco Products and Firearms

29 CFR 1910
Occupational Health and Safety Standards

29 CFR 1926
Safety and Health Regulations for Construction

40 CFR Part 260, et al
U. S. Environmental Protection Agency (EPA) Military Munitions Rule

40 CFR 262.20
Standards Applicable to Generators of Hazardous Waste, Subpart B – The Manifest

49 CFR Part 172
Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information and Training Requirements

DOD 4500.9-R
Defense Transportation Regulations, Part II, Cargo Movement

DOD 6055.9-STD
DOD Ammunition and Explosives Safety Standards

AR 75-14
Interservice Responsibilities for Explosive Ordnance Disposal

USACE Supplement to AR 385-40
USAESCH Safety Concepts and Basic Considerations for UXO Operations

DA Pam 385-64
Ammunition and Explosives Safety Standards

ER 5-1-10
Corps-Wide Areas of Work Responsibility

ER 5-1-11
Program and Project Management

ER 385-1-92
Safety and Occupational Health Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) Activities

ER 1110-1-12
Quality Management

ER 1110-1-8153
Ordnance and Explosives Response

EP 1110-1-17
Establishing a Temporary Open Burn/Open Detonation Site for Conventional Ordnance and Explosives

EP 1110-1-18
Ordnance and Explosives Response

EM 385-1-1
Safety and Health Requirements Manual

HNC-ED-CS-S-98-1
Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives. January 1998. This document is available on the Internet at http://www.hnd.usace.army.mil/OEW.

HNC-ED-CS-S-98-2
Method for Calculating Range to No More Than One Hazardous Fragment per 600 Square Feet

Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites, August 1998. This document is available on the Internet at http://www.hnd.usace.army.mil/OEW.

TB 700-2
Department of Defense Ammunition and Explosives Hazard Classification Procedures

TM 9-1375-213-12
Operator's and Unit Maintenance Manual: Demolition Materials

TM 60A-1-1-31
Explosive Ordnance Disposal Procedures

FM 9-15
Explosive Ordnance Disposal Service and Operations

ATF P 5400.7
ATF Explosives Laws and Regulations, June 1990. This document is available on the Internet at http://www.hnd.usace.army.mil/OEW.

A-2. Section II
Related Publications

A related publication is merely a source of additional information. The user does not have to read it to understand this regulation.

AR 75-15
Responsibilities and Procedures for Explosive Ordnance Disposal

AR 200-2
Environmental Effects of Army Actions

AR 210-21
Ranges and Training Areas

DA Pam 40-8
Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX

DA Pam 40-173
Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT

DA Pam 50-6
Chemical Accident or Incident Response and Assistance (CAIRA) Operations

ER 210-3-2
Army Range Programs

APPENDIX B
STATEMENT OF WORK
ANOMALY AVOIDANCE ACTIVITIES
[PROJECT NAME]
[PROJECT LOCATION (CITY, STATE)]

1.0 GENERAL

1.1 The work required under this Statement of Work (SOW) involves avoidance of potential unexploded ordnance (UXO) contamination during performance of Hazardous, Toxic, and Radioactive Waste (HTRW) investigation and remedial design activities on property currently or previously owned, leased, or otherwise possessed by the United States Department of Defense. This SOW only pertains to anomaly avoidance activities. If an anomaly is detected it must be avoided, including relocation of proposed HTRW activities. If the intrusive investigation of anomalies is deemed necessary, the SOW for UXO support during construction activities should be used.

1.2 The Contractor, operating as an independent contractor and not as an agent of the Government, shall provide all labor, materials, and equipment necessary to perform anomaly avoidance support for HTRW investigation and remedial design activities in accordance with EP 75-1-2, UXO Support During HTRW and Construction Activities. The Contractor shall furnish the required UXO qualified personnel, equipment, instruments, and transportation, as necessary, to accomplish the required services and furnish to the government reports and other data, together with supporting material developed while providing UXO support services. During the implementation of anomaly avoidance procedures, the Contractor shall provide adequate professional supervision and quality control to ensure the quality, safety, and completeness of the work.

2.0 BACKGROUND

2.1 UXO is a safety hazard that may constitute an imminent and substantial danger to the personnel performing HTRW investigation and remedial design activities, other nearby site personnel, and the public in general. UXO contamination must be considered a possibility on all formerly used defense sites (FUDS) and active military installations. The surface danger zone of a range (active or inactive), the target area, impact area, ricochet area, and the secondary danger zones may be contaminated with UXO. UXO may be found on the surface and/or subsurface. The varying types of ammunition, angle of fire, and soil types preclude the accurate estimation of the depth of any subsurface UXO.

2.2 Location of Work.

[Insert general and specific descriptions of project location]

2.3 Site History.

[Insert history of site utilization with special emphasis on types of ordnance items that may be encountered]

2.4 Non-Stockpile Chemical Warfare Materiel. During a comprehensive review of archival records, [no evidence] [evidence] of the potential existence of chemical warfare materiel (CWM) or CWM byproducts on [Site Location] was discovered. In the event suspect CWM is encountered, all work will immediately cease and project personnel will be evacuated along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel shall immediately secure the area to prevent unauthorized access. Reporting procedures will be in accordance with paragraph 6.4.

3.0 REGULATORY AND TECHNICAL REQUIREMENTS

3.1 UXO support activities shall be conducted in full compliance with United States Army Corps of Engineers (USACE), Department of Army (DA), and Department of Defense (DOD) requirements regarding personnel, equipment, and procedures. (All UXO operations shall emphasize anomaly avoidance whenever possible, and be performed in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] and the National Contingency Plan [NCP]. Therefore, the administrative requirements of Federal, state, or local permits are not required for implementation of any UXO procedures, including on-site destruction of UXO, if required, but the substantive permit requirements must be fulfilled.)

3.2 The provisions of 29 CFR 1910.120 shall apply to all UXO-related actions taken at this site. In addition, UXO personnel involved in performing UXO tasks will be limited to a 10-hour workday and a 40-hour workweek. Two consecutive workweeks shall be separated by a minimum of 48 hours of rest.

4.0 SPECIFIC REQUIREMENTS

4.1 The work elements to be performed under this [contract] [delivery order] are listed below.

[Use only those paragraphs listed below that are applicable to the specific task]

4.2 Site Visit/Records Review. The Contractor shall conduct a site visit, review pertinent records, and interview personnel knowledgeable of site conditions to collect sufficient

information to develop a Work Plan and a Site Safety and Health Plan (SSHP) for the planned activities. This task is not intended to be an expanded archival search where new information is located or developed. Prior to conducting a site visit, an Abbreviated Site Safety and Health Plan (ASSHP) must be prepared and submitted to the Contracting Officer for review and approval. Site visit personnel must be accompanied by a qualified technician UXO Technician II or higher in areas potentially contaminated with UXO. The Contractor shall ensure that the site visit is fully coordinated and that all members of the site visit team comply with the accepted ASSHP.

4.3 Work Plan/Site Safety and Health Plan. The Contractor may not commence HTRW investigation or remedial design activities on sites with known or potential UXO until a site-specific Work Plan describing proposed UXO support procedures and the equipment that will be used is prepared and accepted by the Contracting Officer. The Work Plan shall also include an SSHP specifically addressing UXO considerations. The Work Plan and SSHP shall promote safe and efficient operations while limiting potential exposure to a minimum number of personnel for a minimum time and to the minimum amount of UXO. The Work Plan shall require a team made up of a minimum of two personnel, one of whom must be a qualified UXO Technician II or above, to be on-site during all UXO support activities. HTRW investigation and remedial design activities shall only be accomplished using anomaly avoidance procedures defined in the accepted Work Plan.

4.4 Escort. UXO qualified personnel shall provide safety support for HTRW investigation personnel traversing an active or inactive range (including target areas, impact areas, ricochet areas, or any secondary danger zones) with a probability of UXO contamination. The UXO qualified personnel shall review any archival information available regarding the area to be covered and determine, if possible, the level of risk associated with traversing the area and any specific safety considerations. The UXO qualified personnel shall meet the party to be escorted, ascertain their specific requirements and objectives, and conduct a general work and safety briefing prior to commencing a transit of an area with potential UXO contamination.

4.4.1 The UXO qualified personnel shall precede the escorted personnel and visually search the surface of the proposed pathway for items of concern. The UXO qualified personnel shall communicate visual observations to escorted personnel and avoid contact with any discovered UXO or UXO-related items by leading the group around them. The UXO qualified personnel shall place flagging adjacent to any discovered UXO for subsequent visual reference.

4.5 Access Survey. An access survey must precede any type of HTRW-related investigation and remedial design activities or ingress/egress within an area identified or suspected of being contaminated with UXO. The team shall locate an access route and investigation site that is free of anomalies using an appropriate geophysical detection instrument. The access route shall be at least twice as wide as the widest vehicle that will use the route. If anomalies or surface UXO are encountered, they will be marked with flagging and the access route or investigation site will be

diverted/relocated to avoid contact. The boundary of each access route and investigation site shall be marked using survey flagging and pin flags.

4.5.1 The team shall establish a system of flagging colors that will distinguish anomalies, surface UXO, and route boundaries from each other as well as from any utility markings at the site. No personnel will be allowed outside of the surveyed areas.

4.5.2 If surface UXO is encountered, the team will assess the condition of the UXO to determine if disposal action is required. UXO disposition will follow the procedures in paragraph 4.11.

4.6 Surface Soil Sampling. Surface soil samples are normally collected at depths from zero to six inches below ground surface. The team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 4.5. The team must visually survey the surface of each proposed surface soil sampling site for any indication of UXO or UXO-related contamination. In addition, the team must conduct a survey of the proposed sample locations using geophysical instrumentation capable of detecting the smallest known or anticipated UXO to a depth of one foot. If anomalies are detected at a proposed sampling location or too many anomalies are detected in a general area of interest, the HTRW personnel will select an alternate location for collection of surface soil samples. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance during HTRW sampling activities.

4.7 Passive Soil Gas Sampling. Passive soil gas sampling typically involves excavation of holes to a depth of less than five feet and the installation and subsequent removal of sampling canisters. The team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site as described in paragraph 4.5. The team must visually survey the surface of the proposed passive soil gas sampling sites for any indication of UXO or UXO-related contamination. In addition, the team must conduct a survey of the proposed sample locations using geophysical instrumentation capable of detecting the smallest known or anticipated UXO to the specified emplacement depth for the sampling canister.

4.7.1 If the emplacement depth is greater than the geophysical instrumentation detection capabilities, then the team must incrementally complete the geophysical survey every two feet while excavating for emplacement of the sampling canisters. Non-essential project personnel should withdraw to a distance of not less than the fragmentation distance of the most probable munition (MPM) established for the site during excavation for the incremental geophysical survey.

4.7.2 If anomalies are detected at a proposed sampling location or too many anomalies are detected in a general area of interest, the HTRW personnel will select an alternate location for

collection of passive soil gas samples. If an anomaly is detected during an incremental geophysical survey, the hole will be backfilled in accordance with site-specific procedures. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance.

4.7.3 Unless a path is clearly marked, the HTRW sampling personnel must be escorted by team personnel when they subsequently return to each soil gas sampling site to retrieve the sampling canisters.

4.8 Active Soil Gas Sampling and Direct Push Technology. Active soil gas sampling typically involves manual or mechanical penetration at the desired location followed by withdrawal and collection of a soil gas sample. Direct push technology (DPT) is a common method for mechanical penetration during active soil gas sampling. The team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 4.5.

4.8.1 Active soil gas sampling and DPT installations will follow the same anomaly avoidance procedures as outlined in paragraph 4.9 for soil boring and monitoring well installations. The actual sampling will occur through the pilot hole or a boring located within a two-foot radius of the pilot hole installed by the team. If the pilot hole cannot be used to obtain a representative soil gas sample, it must be backfilled in accordance with site-specific procedures prior to installation and sampling of the soil gas sampling point. The backfilling of the pilot hole should be performed to prevent the soil gas sample from being diluted by atmospheric air that may be drawn in through the pilot hole. Following collection of the soil gas sample, the sampling location must be backfilled in accordance with site-specific procedures.

4.9 Subsurface Soil Sampling and Monitoring Well Installations. Subsurface soil sampling is considered to be the collection of samples below a nominal depth of approximately six inches from a split-spoon, Shelby tube, or bucket auger soil sampler using drilling techniques. Drilling techniques are also used to install groundwater monitoring wells for HTRW investigative sampling. The team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 4.5.

4.9.1 The team must complete a subsurface geophysical survey of the proposed drill hole location(s). If the subsurface sampling or well installation depth is greater than the geophysical instrumentation detection capabilities, the team must incrementally complete the geophysical survey following the procedures established in EP 75-1-2. If an anomaly is detected at a proposed sampling location, the hole must be backfilled in accordance with site-specific procedures and the HTRW sampling team must select a new sampling location. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance.

4.10 Test Pit and Trench Excavations. Test pits and trench excavations are used to identify and characterize large subsurface HTRW areas of concern. The team must conduct an access

survey of the routes to and from the proposed investigation site as well as an area around the investigation site as described in paragraph 4.5.

4.10.1 The team must complete a subsurface geophysical survey of the proposed excavation locations. If the proposed excavation depth is greater than the geophysical instrumentation detection capabilities, the team must incrementally complete the geophysical survey following procedures established in EP 75-1-2. If an anomaly is detected at a proposed test pit/trench excavation location, the HTRW sampling personnel must select an alternate test pit/trench location or configuration. If UXO is uncovered during an excavation, all operations will cease. The team will assess the condition of the UXO to determine if disposal action is required. If disposition is required, the procedures in paragraph 4.11 will be followed. The site will be safeguarded pending arrival of the Explosives Ordnance Disposal (EOD) team. Once UXO has been encountered in an excavation, no further excavation is allowed at that location until EOD has removed the UXO item. Once the item is removed, excavation may continue. The After Action Report will indicate that UXO was encountered and summarize resulting activities.

4.11 UXO/OE Disposition. Since the purpose of UXO support during HTRW activities is anomaly avoidance, the team is not tasked to perform UXO/OE disposition. UXO/OE disposition will not be covered in the planning documents for the project, and therefore the team is not capable or equipped to perform UXO/OE disposition. In the event that ordnance is encountered that cannot be avoided or, based on its fuzing or current condition, presents an imminent hazard requiring immediate attention, the team will notify the local Point of Contact (POC) designated in the Work Plan. The team will not destroy any of the UXO encountered. The local POC will notify the appropriate authority of the UXO discovery and the team will safeguard the site pending arrival of the appropriate authority.

4.11.1 On active installations, UXO disposition requests will normally require reporting to the Range Control Officer, Facility Engineer, Post Headquarters or POC designated in the Work Plan.

4.11.2 On FUDS, the local POC will facilitate EOD response. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery. The local POC will also contact the U.S. Army Engineering and Support Center, Huntsville (USAESCH) Safety Manager.

4.12 Quality Control. A separate UXO Quality Control Specialist is not required on-site full-time for UXO support activities. However, the UXO support contractor must perform quality control reviews of all field activities.

5.0 SUBMITTAL REQUIREMENTS

5.1 Format and Content. All plans and reports shall be typewritten on standard size white paper. A front cover sheet shall be provided which includes the contractor's name and address, contract number, [delivery order number], name of the project, date of the plan, and title of the plan.

5.1.1 Chapters shall be numbered sequentially. Within each chapter, a decimal paragraphing system shall be used with each paragraph numbered sequentially, starting with the specific chapter number. Within each chapter any figures, tables, and charts shall be numbered sequentially starting with the chapter number. Appendices shall be lettered alphabetically. Within each appendix, each page shall be numbered sequentially starting with the appendix letter. Drawings larger than 8.5 inches by 11 inches shall be folded to this size.

5.1.2 Every page of the plan shall be numbered sequentially starting with the specific chapter number and contain a footer containing the plan date, [and contract number.] [contract number, and delivery order number]. When revisions are required, a revision date and amendment number shall be included in the footer.

5.2 Schedule. The Contractor shall prepare and submit a project schedule of planned activities, including plan preparation, submittal, and review; field operations; and reporting. The schedule should identify all critical-path milestones.

5.3 Addressees and Quantities. The following addresses and number of required copies shall be used for all submittals:

ADDRESSEE	QUANTITY
[To Be Completed]	[xx]

6.0 REPORTS

6.1 Minutes of Meetings. The Contractor shall prepare minutes of all meetings attended and submit them to the Contracting Officer within seven calendar days after the meeting.

6.2 Correspondence. The Contractor shall keep a record of each phone conversation and written correspondence affecting decisions relating to the performance of this [contract] [delivery order]. A summary of the phone conversations and written correspondence shall be submitted monthly to the Contracting Officer.

6.3 After Action Report. Upon completion of the UXO activities, the Contractor must prepare an After Action Report describing the activities completed, significant findings, and

lessons learned that may assist development of future project plans. The After Action Report shall be submitted to the district Project Manager (PM) with a copy forwarded to the OE MCX.

6.4 Report of Suspect CWM. If suspect CWM is encountered, the following procedures will be followed. All work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel will secure the area to prevent unauthorized access. Personnel should position themselves as far upwind as possible while still maintaining security of the area.

6.4.1 On FUDS project sites, the team will notify the local POC designated in the Work Plan. The local POC will facilitate EOD response and two personnel will secure the site until EOD's arrival. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery. The EOD unit will notify the Technical Escort Unit (TEU) and secure the area until TEU's arrival. After notifying the local law enforcement agencies, the local POC will notify the USAESCH Safety Office to inform them of the actions taken.

6.4.2 On active installations, the team will normally notify the Range Control Officer, Facility Engineer, Post Headquarters or POC designated in the Work Plan.

6.4.3 The team will prepare a Report of Suspect CWM for the designated POC.

6.5 Mishap Reporting. All mishaps associated with execution of project activities shall be investigated and analyzed. Information reflected on the report forms provides the basis to investigate the accident, analyze the cause, and identify what corrective actions may be implemented to prevent similar occurrences.

6.5.1 All mishaps will be reported in accordance with USACE Supplement to AR 385-40, USAESCH Safety Concepts and Basic Considerations for UXO Operations, and EM 385-1-1, Safety and Health Requirements Manual. Any mishap will be reported on ENG FORM 3394, Accident Investigation Report.

6.5.2 On FUDS, the contractor's UXO Safety Officer is responsible for mishap reporting. For contracts under the supervision of the district, mishaps will be reported to the district safety office. An information copy of the accident report will be forwarded to the OE MCX. USACE district personnel will report through Command channels to the Headquarters, USACE (HQUSACE) Safety and Occupational Health Office.

6.5.3 On active installations, the installation safety officer is responsible for reporting any explosives mishaps.

6.5.4 Incidents involving CWM will be reported in accordance with USACE Supplement to AR 385-40. A site-specific POC will be identified and documented in accordance with the reporting requirements in paragraph 6.5.1.

6.6 Investigations. The US Army Safety Center (USASC) maintains the prerogative to investigate Class A or Class B explosive mishaps (as defined in AR 385-40) on active installations. If USASC chooses to investigate, it is the lead agency. If USASC chooses not to investigate, the district is the lead agency.

7.0 PUBLIC AFFAIRS

7.1 The Contractor shall not publicly disclose any data generated or reviewed under this [contract] [delivery order]. The contractor shall refer all requests for information concerning site conditions to the local USACE district Public Affairs Office, with a copy to the OE MCX. Reports and data generated under this [contract] [delivery order] are the property of the DOD and distribution to any other source by the Contractor is prohibited unless authorized by the Contracting Officer.

APPENDIX C
STATEMENT OF WORK
UXO SUPPORT DURING CONSTRUCTION ACTIVITIES
[PROJECT NAME]
[PROJECT LOCATION (CITY, STATE)]

1.0 GENERAL

1.1 The work required under this Statement of Work (SOW) involves [safety support and avoidance of potential unexploded ordnance (UXO) contamination during performance of construction activities] [subsurface clearance of potential unexploded ordnance (UXO) contamination in support of construction activities] (UXO support) on property currently or previously owned, leased, or otherwise possessed by the United States Department of Defense.

1.2 The Contractor, operating as an independent contractor and not as an agent of the Government, shall provide all labor, materials, and equipment necessary to perform [safety support during] [subsurface clearance in support of] construction activities in accordance with EP 75-1-2, UXO Support During HTRW and Construction Activities. The Contractor shall furnish the required UXO qualified personnel, equipment, instruments, and transportation, as necessary, to accomplish the required services and furnish to the government reports and other data, together with supporting material developed while providing UXO support services. During the implementation of UXO support activities, the Contractor shall provide adequate professional supervision and quality control to ensure the quality, safety, and completeness of the work.

2.0 BACKGROUND

2.1 UXO is a safety hazard that may constitute an imminent and substantial danger to the personnel performing construction activities, other nearby site personnel, and the public in general. UXO contamination must be considered a possibility on all formerly used defense sites (FUDS) and active military installations. The surface danger zone of a range (active or inactive), the target area, impact area, ricochet area and the secondary danger zones may be contaminated with UXO. UXO may be found on the surface and/or subsurface. The varying types of ammunition, angle of fire, and soil types preclude the accurate estimation of the depth of any subsurface UXO.

2.2 Location of Work.

[Insert general and specific descriptions of project location]

2.3 Site History.

[Insert history of site utilization with special emphasis on types of ordnance items that may be encountered]

2.4 Chemical Warfare Materiel. During a comprehensive review of archival records, [no evidence] [evidence] of the potential existence of chemical warfare materiel (CWM) or CWM byproducts on [Site Location] was discovered. In the event suspect CWM is encountered, all work will immediately cease and project personnel will be evacuated along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel shall immediately secure the area to prevent unauthorized access. Reporting procedures will be in accordance with paragraph 6.4.

3.0 REGULATORY AND TECHNICAL REQUIREMENTS

3.1 UXO support activities shall be conducted in full compliance with United States Army Corps of Engineers (USACE), Department of Army (DA), and Department of Defense (DOD) requirements regarding personnel, equipment, and procedures. (All UXO operations shall emphasize anomaly avoidance, whenever possible, and be performed in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] and the National Contingency Plan [NCP]. Therefore, the administrative requirements of Federal, state, or local permits are not required for implementation of any UXO procedures, including on-site destruction of UXO, if required, but the substantive permit requirements must be fulfilled.)

3.2 The provisions of 29 CFR 1910.120 shall apply to all UXO-related actions taken at this site. In addition, UXO personnel involved in performing UXO tasks will be limited to a 10-hour workday and a 40-hour workweek. Two consecutive workweeks shall be separated by a minimum of 48 hours of rest.

4.0 SPECIFIC REQUIREMENTS

4.1 UXO support during construction activities may require only UXO safety support or a complete UXO subsurface clearance response, depending on an assessment of the probability of encountering UXO and the level of confidence associated with the determination. If the probability of encountering UXO is low (e.g., current or previous land use leads to an initial determination that UXO may be present), only UXO safety support will be required. When a determination is made that the probability of encountering UXO is moderate to high (e.g., current or previous land use leads to a determination that OE was employed or disposed of in the area of concern), UXO qualified personnel must conduct a subsurface clearance of the known construction footprint and remove all discovered UXO. The level of effort for construction

support is site/task-specific and will be determined on a case-by-case basis by the project team in coordination with the OE Mandatory Center of Expertise (MCX).

4.2 The work elements to be performed under this [contract] [delivery order] are listed below.

[Use only those paragraphs listed below that are applicable to the specific task]

4.3 Site Visit/Records Review. The Contractor shall conduct a site visit, review pertinent records, and interview personnel knowledgeable of site conditions to collect sufficient information to develop a Work Plan and a Site Safety and Health Plan (SSHP) for the planned activities. This task is not intended to be an expanded archival search where new information is located or developed. Prior to conducting a site visit, an Abbreviated Site Safety and Health Plan (ASSHP) must be prepared and submitted to the Contracting Officer for review and approval. Site visit personnel must be accompanied by a UXO qualified technician (UXO Technician II) in areas potentially contaminated with UXO. The Contractor shall ensure that the site visit is fully coordinated and that all members of the site visit team comply with the accepted ASSHP.

4.4 Work Plan/Site Safety and Health Plan. The Contractor may not commence construction activities on sites with known or potential UXO until a site-specific Work Plan describing proposed UXO support procedures and the equipment to be used is prepared and accepted by the Contracting Officer. The Work Plan shall also include a SSHP specifically addressing UXO considerations. The Work Plan should discuss UXO team composition in accordance with EP 75-1-2. The Work Plan and SSHP shall promote safe and efficient operations while limiting potential exposure to a minimum number of personnel for a minimum time and to the minimum amount of UXO. Construction activities shall only be accomplished following UXO support procedures defined in the accepted Work Plan.

4.4.1 Explosives Siting Plan (If Required). An Explosives Siting Plan (ESP) is required for UXO support during construction activities. The ESP discusses the proposed minimum separation distances for unintentional detonations, intentional detonations, and siting of critical project components. The ESP should describe the basis of design, all design calculations, and proposed hazard mitigation measures to be implemented to protect the public, non-project personnel, and site workers from explosive hazards. The ESP will be reviewed by the project team to ensure that the appropriate minimum separation distance criteria have been applied.

4.4.2 Explosives Safety Submission. Construction activities involving the removal and disposition of UXO may require submittal and approval of an Explosives Safety Submission (ESS). The requirement for an ESS will be determined on a case-by-case basis by the project team in consultation with the OE MCX. The purpose of the ESS is to ensure that all applicable DOD and Army regulations regarding safe and secure handling of ordnance are followed.

Detailed information on the content, review and approval procedures, and modification process for the ESS is available in EP 1110-1-18, OE Response.

4.4.2.1 UXO removal operations may not begin on construction projects requiring an ESS until the ESS is approved by the U.S. Army Technical Center for Explosives Safety (USATCES) or the Department of Defense Explosives Safety Board (DDESB) and the contractor has been directed to incorporate the accepted ESS into the Work Plan. A copy of the accepted ESS will be maintained at the project site. All operations will be executed in accordance with the accepted ESS.

4.4.2.2 When an element of the accepted ESS changes, it must be amended. The contractor will prepare the proposed change and forward it to the Project Manager (PM), who will forward it to the OE MCX for review. The OE MCX will forward the proposed changes to the appropriate agency for approval. For a change that specifies less restrictive requirements (e.g., reduction in exclusion zone), the contractor will comply with the accepted ESS until the change is approved. When changes would be more restrictive (e.g., increase in exclusion zone), the contractor will immediately implement the more restrictive measures.

4.5 Safety Support. If the probability of encountering UXO is low (e.g., current or previous land use leads to an initial determination that UXO may be present), only UXO safety support will be required.

4.5.1 A UXO team consisting of a minimum of two qualified UXO personnel (one UXO Technician III and one UXO Technician II) shall be used to provide safety support during construction activities in areas potentially contaminated with UXO. The UXO team should review any archival information available regarding the area of the proposed construction activities. If possible, the UXO team should determine the probable types of UXO that may be encountered and specific safety considerations. The UXO team should meet with on-site management and construction personnel and conduct a general work and safety briefing prior to commencement of any on-site activities.

4.5.2 The UXO team should physically preview the actual construction footprint with the on-site management of the construction contractor and discuss visual observations and potential areas of concern. In the event UXO is discovered, the UXO team shall place flagging adjacent to the discovery for subsequent visual reference, select a course around the item, and lead project personnel out of the area.

4.5.3 The UXO team should monitor all excavation activities in areas potentially contaminated with UXO. One member of the team should be positioned to the rear and upwind of the excavation equipment for continuous visual observation of activities. If the construction contractor unearths or otherwise encounters suspect UXO, all excavation activities will cease. The UXO team will assess the condition of the UXO to determine if disposal action is required.

Once UXO has been encountered in an excavation, no further excavation is allowed at that location until EOD has removed the UXO item. Once the item is removed, excavation may continue.

4.5.4 UXO/OE Disposition. The UXO team is generally not tasked to perform UXO/OE disposition during safety support of construction activities. In the event that ordnance is encountered that cannot be avoided or, based on its fuzing or current condition, presents an imminent hazard requiring immediate attention, the UXO team will notify the local POC designated in the Work Plan. The UXO team will not destroy any of the UXO encountered. The local POC will notify the appropriate authority of the UXO discovery and the UXO team will safeguard the site pending arrival of the appropriate authority.

4.5.4.1 On active installations, UXO disposition requests will normally require reporting to the Range Control Officer, Facility Engineer, Post Headquarters or POC designated in the Work Plan.

4.5.4.2 On FUDS, the local POC will facilitate EOD response. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery. The local POC will also contact the USAESCH Safety Manager.

4.6 Subsurface Clearance in Support of Construction Activities. A subsurface clearance of the identified construction footprint is required when the probability of encountering UXO during construction-related excavation activities is moderate to high (e.g., current or previous land use leads to a determination that OE was employed or disposed of in the area of concern). The subsurface clearance process requires close coordination among on-site management personnel of the USACE, construction contractor, and UXO contractor. The UXO team should physically preview the actual construction footprint with other on-site management personnel and discuss visual observations and potential areas of concern. Subsurface clearance actions must be accomplished in strict accordance with the accepted Work Plan, SSHP, ESP, and ESS (if required).

4.6.1 The UXO team should be familiar with these plans and should review any archival information available regarding the area of the proposed construction activities. If possible, the UXO team should determine the probable types of UXO that may be encountered and specific safety considerations. Prior to commencing subsurface clearance activities, the UXO team should provide a general work and safety briefing to all on-site personnel.

4.6.2 Underground Utilities. Utility clearance and/or excavation permits, if required, must be obtained prior to the commencement of any intrusive activities. The UXO team is responsible for verifying that all necessary excavation permits are on-site prior to commencing operations. The prime contractor is responsible for contacting the appropriate agency(ies) or company(ies) to

mark the location of all subsurface utilities in the construction area. In the event subsurface utilities are suspected in an excavation area, the UXO team must attempt to verify their location. All located utilities should be marked by paint, pin flags, or other appropriate means to visually delineate their approximate subsurface routing.

4.6.3 Area Preparation. Area preparation includes reduction and/or removal of vegetation that may impede or limit the effectiveness of subsurface clearance actions. Vegetation reduction/removal may be accomplished through manual removal, mechanical removal, controlled burning, or defoliation. Selection of the appropriate land clearing strategy should be based on the type and concentration of vegetation, topography, drainage patterns, terrain and soil conditions, and the level of required environmental and natural resource protection.

4.6.3.1 Area preparation is not considered a UXO clearance procedure; anomaly avoidance procedures should be followed. The area preparation teams working in areas not previously surveyed for the presence and avoidance of UXO must be accompanied by UXO qualified personnel following procedures described in EP 75-1-2.

4.6.4 Surface Clearance. A surface clearance may be required to remove any existing UXO from the surface of the work area. The disposition of recovered UXO is discussed in paragraph 4.6.7. In addition, all UXO-related remnants, target materials, and non-UXO related materials which may interfere with a subsurface geophysical survey should be removed from the surface of the work area and staged for later disposition. UXO teams must complete all surface clearance activities.

4.6.5 Geophysical Mapping/Analysis. A subsurface geophysical survey shall be conducted to identify and locate all anomalies. The various types of geophysical detection equipment are presented in EP 75-1-2. Subsurface geophysical surveys may be completed using detection instrumentation with real time or post-processing identification and discrimination techniques.

4.6.5.1 Subsurface geophysical surveys are not considered a UXO clearance procedure; anomaly avoidance procedures should be followed. The geophysical mapping teams working in areas not previously surveyed for the presence and avoidance of UXO must be accompanied by UXO qualified personnel following procedures described in EP 75-1-2. All anomalies should be prominently marked with survey flagging or pin flags for subsequent intrusive investigation.

4.6.6 Anomaly Excavation. Anomaly excavation operations are required to intrusively investigate and identify the source of all anomalies located during completion of the subsurface geophysical survey. During excavation operations, only those personnel absolutely necessary for the operation shall be within the exclusion zone. All anomaly excavation operations shall comply with the provisions of 29 CFR 1926 subpart P.

4.6.6.1 Normally, UXO qualified personnel will manually complete anomaly excavations of less than one foot. If an anomaly is deeper than one foot, earth-moving machinery (EMM) should be used to assist in excavation efforts unless site constraints or accessibility restrict or prohibit use. EMM shall not be used to excavate within 12 inches of an anomaly. When an anomaly excavation gets within approximately 12 inches of an anomaly, the excavation must be completed manually.

4.6.6.2 Only UXO qualified members of a UXO team may conduct manual excavation operations. A non-UXO qualified member of the UXO team may operate EMM used to assist in anomaly excavations. If more than one EMM will be used within the same work area, the team separation distances required for multiple teams as described in EP 75-1-2 must be used.

4.6.6.3 After the probable source of the anomaly is identified and removed, an approved geophysical instrument should be used to validate the process. If the geophysical instrument does not continue to detect an anomaly, then the excavation may be back-filled and restored in accordance with contract requirements.

4.6.7 UXO Destruction. The Work Plan shall include procedures for destruction of UXO recovered during construction activities. Destruction of UXO can be accomplished at one of three locations: in-place, on-site, or off-site. The decision regarding which technique to use is based on the risk involved in employing the disposal operation as determined by site-specific characteristics and the nature of the UXO recovered. Additional information on UXO disposal operations can be found in TM60A-1-1-31, Explosive Ordnance Disposal Procedures.

4.6.7.1 In-place. As a general rule, in-place demolition (blow-in-place) is the preferred technique unless site conditions warrant transport of safe-to-move UXO to an alternate location. Information on recommended destruction procedures for individual UXO items can be found in TM 60A-1-1-31, Explosive Ordnance Disposal Procedures. All detonation-in-place operations shall be conducted by electrical means to ensure maximum control of the site, except in situations where static electricity or electromagnetic radiation (EMR) hazards are present. Non-electrical means may be used when the situation dictates.

4.6.7.2 Off-Site Transport. UXO that has been certified as safe-to-ship in accordance with TB 700-2, DOD Ammunition and Explosives Hazard Classification Procedures, may be transported to an off-site UXO destruction location.

4.6.7.2.1 A Transportation Plan detailing the route and procedures to be used during the transportation of the UXO must be prepared and accepted prior to engaging in any transport activities to ensure all safety aspects of the movement have been addressed. The transport of UXO off-site must be performed in accordance with the provisions of 49 CFR Part 172, DOD 4500.9-R Part 2, and applicable state and local laws. Contractor personnel who, by contract requirement, are tasked with the responsibility of transporting or preparing shipments of OE over

public roads, must meet all training requirements of 49 CFR Part 172 and applicable state requirements.

4.6.7.3 Manifest. A Hazardous Waste Manifest (EPA Form 8700-22) is required when transporting OE over public roads in non-emergency situations. In emergency situations, military EOD will respond. For informational guidance on the Hazardous Waste Manifest, refer to 49 CFR 172.205 and 40 CFR 262.20. For the purposes of transportation and storage, OE will be hazard classified in accordance with TB 700-2, DOD Ammunition and Explosives Hazard Classification Procedures. Government personnel who are tasked to sign shipping papers (including the Hazardous Waste Manifest, if required), must be trained and given signature authority by their agency, in accordance with the requirements of DOD 4500.9-R, Defense Transportation Regulation, Part II, Cargo Movement.

4.6.7.4 Explosives Management. Explosives used for the destruction of UXO must be acquired and managed in accordance with EP 75-1-2 and applicable federal, state, and local laws and regulations including, but not limited to, the following:

- Bureau of Alcohol, Tobacco, and Firearms Publication (ATF P) 5400.7, Alcohol, Tobacco, and Firearms Explosives Laws and Regulations, and 27 CFR.
- DOD 6055.9-STD.
- 49 CFR.
- 29 CFR 1910 and 1926.

4.6.7.5 Debris/Remnant Management. The Work Plan must include operational and quality control procedures for the processing, demilitarization, and disposition of inert ordnance, target materials, and UXO-related remnants which fall within the classification of Ammunition, Explosives, and Dangerous Articles (AEDA). Contact the OE MCX for requirements of AEDA processing and disposition.

4.7 Quality Control.

4.7.1 The UXO contractor is responsible for the quality control of all surface and subsurface clearance activities and for ensuring that only those procedures and processes conforming to contractual requirements and accepted project plans are implemented. The UXO contractor shall develop a Quality Control Plan (QCP) outlining the quality activities to be used for continually assessing the implementation, effectiveness, compliance, and adequacy of operations.

4.7.2 A separate UXO Quality Control Specialist is not required on-site full-time for UXO support activities. However, the UXO support contractor must perform quality control reviews of all field activities in accordance with the accepted QCP.

5.0 SUBMITTAL REQUIREMENTS

5.1 Format and Content. All plans and reports shall be typewritten on standard size white paper. A front cover sheet shall be provided which includes the contractor's name and address, contract number, [delivery order number], name of the project, date of the plan, and title of the plan.

5.1.1 Chapters shall be numbered sequentially. Within each chapter, a decimal paragraphing system shall be used with each paragraph numbered sequentially, starting with the specific chapter number. Within each chapter any figures, tables, and charts shall be numbered sequentially starting with the chapter number. Appendices shall be lettered alphabetically. Within each appendix, each page shall be numbered sequentially starting with the appendix letter. Drawings larger than 8.5 inches by 11 inches shall be folded to this size.

5.1.2 Every page of the plan shall be numbered sequentially starting with the specific chapter number and contain a footer containing the plan date, [and contract number.] [contract number, and delivery order number.] When revisions to the plan are required, a revision date and amendment number shall be included in the footer.

5.2 Schedule. The Contractor shall prepare and submit a project schedule of planned activities including plan preparation, submittal, and review; field operations; and reporting. The schedule should identify all critical-path milestones.

5.3 Addressees and Quantities. The following addresses and number of required copies shall be used for all submittals:

ADDRESSEE	QUANTITY
[To Be Completed]	[xx]

6.0 REPORTS

6.1 Minutes of Meetings. The Contractor shall prepare minutes of all meetings attended and submit them to the Contracting Officer within seven calendar days after the meeting.

6.2 Correspondence. The Contractor shall keep a record of each phone conversation and written correspondence affecting decisions relating to the performance of this [contract] [delivery order]. A summary of the phone conversations and written correspondence shall be submitted monthly to the Contracting Officer.

6.3 After Action Report. Upon completion of the UXO activities, the Contractor must prepare an After Action Report describing the activities completed, significant findings, and lessons

learned that may assist development of future project plans. The After Action Report shall be submitted to the district PM with a copy forwarded to the OE MCX.

6.4 Report of Suspect CWM. If suspect CWM is encountered, the following procedures will be followed. All work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel will secure the area to prevent unauthorized access. Personnel should position themselves as far upwind as possible while still maintaining security of the area.

6.4.1 On FUDS project sites, the UXO team will notify the local POC designated in the Work Plan. The local POC will facilitate EOD response and two personnel will secure the site until EOD's arrival. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery. The EOD unit will notify the Technical Escort Unit (TEU) and secure the area until TEU's arrival. After notifying the local law enforcement agencies, the local POC will notify the USAESCH Safety Office to inform them of the actions taken.

6.4.2 On active installations, the UXO team will normally notify the Range Control Officer, Facility Engineer, Post Headquarters or POC designated in the Work Plan.

6.4.3 The UXO team will prepare a Report of Suspect CWM for the designated POC.

6.5 Mishap Reporting. All mishaps associated with execution of project activities shall be investigated and analyzed. Information reflected on the report forms are the basis to investigate the accident, analyze the cause, and identify what corrective actions may be implemented to prevent similar occurrences.

6.5.1 All mishaps will be reported in accordance with AR 385-40 Accident Reporting and Records; USACE Supplement, Safety-Accident Reporting and Records, and EM 385-1-1, Safety and Health Requirements Manual. Any mishap will be reported on ENG FORM 3394, Accident Investigation Report.

6.5.2 On FUDS, the Contractor's UXO Safety Officer is responsible for mishap reporting. For contracts under the supervision of the district, mishaps will be reported to the district safety office. An information copy of the accident report will be forwarded to the OE MCX. USACE district personnel will report through Command channels to the Headquarters, USACE (HQUSACE) Safety and Occupational Health Office.

6.5.3 On active installations, the installation safety officer is responsible for reporting any explosives mishaps.

6.5.4 Incidents involving CWM will be reported in accordance with USACE Supplement to AR 385-40. A site-specific POC will be identified and documented in accordance with the reporting requirements in paragraph 6.5.1.

6.6 Investigations. The U.S. Army Safety Center (USASC) maintains the prerogative to investigate Class A or Class B explosive mishaps (as defined in AR 385-40) on active installations. If USASC chooses to investigate, it is the lead agency. If USASC chooses not to investigate, the district is the lead agency.

7.0 PUBLIC AFFAIRS

7.1 The Contractor shall not publicly disclose any data generated or reviewed under this [contract] [delivery order]. The contractor shall refer all requests for information concerning site conditions to the local USACE district Public Affairs Office, with a copy to USAESCH. Reports and data generated under this [contract] [delivery order] are the property of the DOD and distribution to any other source by the Contractor is prohibited unless authorized by the Contracting Officer.

GLOSSARY

Section I
Abbreviations

AEDA ..... Ammunition, Explosives, and Dangerous Articles
ANSI ..... American National Standards Institute
AR ..... Army Regulation
ASSHP ..... Abbreviated Site Safety and Health Plan
ATF ..... Alcohol, Tobacco, and Firearms
BRAC ..... Base Realignment and Closure
CAIS ..... Chemical Agent Identification Set
CEMP-RA ..... Directorate of Military Programs, Executive Office, Program Resources Branch
CERCLA ..... Comprehensive Environmental Response, Compensation, and Liability Act
CFR ..... Code of Federal Regulations
CPR ..... Cardiopulmonary Resuscitation
CWM ..... Chemical Warfare Materiel
DA ..... Department of the Army
DA Pam ..... Department of Army Pamphlet
DDESB ..... Department of Defense Explosives Safety Board
DOD ..... Department of Defense
DOT ..... Department of Transportation
DPT ..... Direct Push Technology
EED ..... Electroexplosive Device
EM ..... Engineer Manual
EMM ..... Earth-Moving Machinery
EMR ..... Electromagnetic Radiation
EOD ..... Explosives Ordnance Disposal
EP ..... Engineer Pamphlet
EPA ..... Environmental Protection Agency
ER ..... Engineer Regulation
ESP ..... Explosives Siting Plan
ESS ..... Explosives Safety Submission
FDEM ..... Frequency Domain Electromagnetics
FUDS ..... Formerly Used Defense Site
HD ..... Hazard Division
HERO ..... Hazards of Electromagnetic Radiation to Ordnance
HQUSACE ..... Headquarters, U.S. Army Corps of Engineers
HTRW ..... Hazardous, Toxic, and Radioactive Waste
IDO ..... Indefinite Delivery Order
IDW ..... Investigation Derived Waste
IGE ..... Independent Government Estimate

IRP ..... Installation Restoration Program
MCACES ..... Micro Computer-Aided Cost Engineering System
MCX ..... Mandatory Center of Expertise
MOA ..... Memorandum of Agreement
MPM ..... Most Probable Munition
MSC ..... Major Subordinate Command
NCP ..... National Contingency Plan
NEW ..... Net Explosive Weight
OB/OD ..... Open Burn/Open Detonation
OE ..... Ordnance and Explosives
OSHA ..... Occupational Safety and Health Administration
PM ..... Project Manager
POC ..... Point of Contact
PPE ..... Personal Protective Equipment
PVC ..... Polyvinyl Chloride
QA ..... Quality Assurance
QC ..... Quality Control
Q-D ..... Quantity-Distance
QCP ..... Quality Control Plan
RACER ..... Remedial Action Cost Engineering and Requirements System
RF ..... Radio Frequency Range
SFO ..... Support for Others
SOW ..... Statement of Work
SSHO ..... Site Safety and Health Officer
SSHP ..... Site Safety and Health Plan
SUXOS ..... Senior UXO Supervisor
TB ..... Technical Bulletin
TDEM ..... Time Domain Conductivity Electromagnetics
TEU ..... Technical Escort Unit
TM ..... Technical Manual
TSD ..... Team Separation Distance
USACE ..... U.S. Army Corps of Engineers
USAESCH ..... U.S. Army Engineering and Support Center, Huntsville
USASC ..... U.S. Army Safety Center
USATCES ..... U.S. Army Technical Center for Explosives Safety
UXO ..... Unexploded Ordnance
UXOSO ..... UXO Safety Officer
UXOQCS ..... UXO Quality Control Specialist

Section II
Terms

Active Installations
Installations under the custody and control of DOD. Includes operating installations, installations in a standby or layaway status, and installations awaiting closure under the Base Realignment and Closure (BRAC) legislation. (EP 1110-1-18)

Active Range
A military range that is currently in service and is being regularly used for range activities. (40 CFR 266.201)

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 a site (i.e., pipes, power lines, etc.). (EP 1110-1-18)

Anomaly Avoidance
Techniques employed by EOD or UXO personnel at sites with known or suspected OE to avoid any potential surface UXO and any subsurface anomalies. This usually occurs at mixed hazard sites when HTRW investigations must occur prior to execution of an OE removal action. Intrusive anomaly investigation is not authorized during ordnance avoidance operations. (ER 1110-1-8153)

Chemical Warfare Materiel
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)

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
CERCLA authorizes federal action to respond to the release or threatened release of hazardous substances into the environment or a release or threat of release of a pollutant or contaminant into the environment that may present an imminent or substantial danger to public health or welfare. (EP 1110-1-18)

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 (current or previous land

use leads to an initial determination that UXO may be present), 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), 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. The level of effort will be determined on a case-by-case basis in coordination with the OE MCX. (ER 1110-1-8153)

Conventional Ordnance and Explosives
Ordnance and explosives (see definition) other than CWM, BWM, and nuclear ordnance. (ER 1110-1-8153)

Design Center
A specified USACE field office assigned a singular technical mission that is permanent and USACE-wide in scope. The designated office is to be considered the "lead activity" in a specialized area where capability needs to be concentrated for maximum effectiveness, economy, and efficiency. The OE Design Center (in coordination with the PM) will execute all phases of the OE response project after the approval of the INPR unless the removal action is transferred to an approved district. Only the USAESCH OE Design Center is authorized to execute any phase of a Non-Stockpile CWM response. (ER 1110-1-8153)

Districts Approved to Execute OE Removal Actions
These districts are selected and approved by the MSC Commander with concurrence from the OE MCX, trained, and assigned the mission of conducting OE removal actions. The districts are responsible for final removal action execution. (ER 1110-1-8153)

Exclusion Zone
A safety zone established around an OE work area. Only project personnel and authorized, escorted visitors are allowed within the exclusion zone. Examples of exclusion zones are safety zones around OE intrusive activities and safety zones where OE is intentionally detonated. (DDESB-KO, 27 January 1990)

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

EOD Personnel
Active duty military personnel who perform EOD operations.

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)

Explosive Soil
Explosive soil refers to mixtures of explosives in soil, sand, clay, or other solid media at concentrations such that the mixture itself is explosive.

(a) The concentration of a particular explosive in soil necessary to present an explosion hazard depends on whether the particular explosive is classified as "primary" or "secondary." Guidance on whether an explosive is classified as "primary" or "secondary" can be obtained from the OE MCX or Chapters 7 and 8 of TM 9-1300-214, Military Explosives.

(b) Primary explosives are those extremely sensitive explosives (or mixtures thereof) that are used in primers, detonators, and blasting caps. They are easily detonated by heat, sparks, impact, or friction. Examples of primary explosives include Lead Azide, Lead Styphnate, and Mercury Fulminate.

(c) Secondary explosives are bursting and boostering explosives (i.e., they are used as the main bursting charge or as the booster that sets off the main bursting charge). Secondary explosives are much less sensitive than primary explosives. They are less likely to detonate if struck or when exposed to friction or to electrical sparks. Examples of secondary explosives include Trinitrotoluene (TNT), Composition B, and Ammonium Picrate (Explosive D).

(d) Soil containing 10 percent or more by weight of any secondary explosive or mixture of secondary explosives is considered "explosive soil." This determination was based on information provided by the USAEC as a result of studies conducted and reported in USAEC Report AMXTH-TE-CR 86096.

(e) Soil containing propellants (as opposed to primary or secondary high explosives) may also present explosion hazards. (ER 1110-1-8153)

Formerly Used Defense Sites (FUDS)
FUDS include those properties previously owned, leased, or otherwise possessed by the U.S. and under the jurisdiction of the Secretary of Defense; or manufacturing facilities for which real property accountability rested with DOD but were operated by contractors (Government owned - contractor operated) and which were later legally disposed of. FUDS is a subprogram of the DERP. Restoration of military land was extended to formerly used sites in 1983 under Public Law 98-212 (DOD Appropriations Act of FY84).

Geophysical Techniques
Techniques utilized for the detection and measurement of buried anomalies (e.g., ferromagnetic indicators and ground penetrating radar) to investigate the presence of munitions. (EP 1110-1-18)

Hazardous, Toxic and Radioactive Waste (HTRW) Activities
HTRW activities include those activities undertaken for the Environmental Protection Agency's Superfund program, the Defense Environmental Restoration Program (DERP), including Formerly Used Defense Sites (FUDS), and Installation Restoration Program (IRP) sites at active

DOD facilities, HTRW actions associated with Civil Works projects, and any other mission or non-mission work performed for others at HTRW sites. (EP 1110-1-18) For the purposes of UXO support, HTRW activities during the investigative/design phase of a HTRW project on a site with known or suspected UXO require anomaly avoidance procedures. HTRW activities during the remedial action phase (construction) of a HTRW project on a site with known or suspected UXO may require either safety support or subsurface clearance.

Intrusive Activity
An activity which involves or results in the penetration of the ground surface at an area known or suspected to contain OE. Intrusive activities can be of an investigative or removal action nature. (EP 1110-1-18)

Inactive Range
A military range that is not currently being used, but that is still under military control and considered by the military to be a potential range area, and that has not been put to a new use that is incompatible with range activities. (40 CFR 266.201)

Mandatory Center of Expertise
An MCX is a USACE organization approved by HQUSACE as having a unique or exceptional technical capability in a specialized subject area that is critical to other USACE commands. Specific mandatory services to be rendered by an MCX are identified on the MCX's homepage. These services may be reimbursable or centrally funded. The USAESCH is the OE MCX for the USACE. The OE MCX webpage address is http://www.hnd.usace.army.mil/oew. (ER 1110-1-8153)

Military Munitions
All ammunition products and components produced or used by or for the U.S. DOD or the U.S. Armed Services for national defense and security, including military munitions under the control of the DOD, the US Coast Guard, the US DOE, and National Guard personnel. The term military munitions includes: confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries used by DOD components, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof. Military munitions do not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components there-of. However, the term does include non-nuclear components of nuclear devices, managed under DOE's nuclear weapons program after all required sanitization operations under the Atomic Energy Act of 1954, as amended, have been completed. (40 CFR 260.10)

Military Range
Designated land and water areas set aside, managed, and used to conduct research on, develop, test, and evaluate military munitions and explosives, other ordnance or weapons systems, or to train military personnel in their use and handling. Ranges include firing lines and positions,

maneuver areas, firing lanes, test pads, detonation pads, impact areas, and buffer zones with restricted access and exclusionary areas. (40 CFR 266.201)

Non-Stockpile Chemical Warfare Materiel
CWM (defined above) that is not included in the chemical stockpile. Non-stockpile CWM is divided into five categories: buried CWM, recovered chemical weapons (items recovered during range clearing operations, from chemical burial sites, and from research and development testing), former chemical weapon production facilities, binary chemical weapons, and miscellaneous CWM (unfilled munitions and devices and equipment specially designed for use directly in connection with employment of chemical weapons). (HQDA Interim Guidance for Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activities)

Ordnance and Explosives
OE consists of either (1) or (2) below:
(1) 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)
(2) Explosive Soil. See definition under "Explosive Soil." (ER 1110-1-8153)

OE Project Team
The OE Project Team consists of the customer(s), the PM, and multi-disciplined representatives from the technical/functional elements necessary to execute the project. (EP 1110-1-18)

OE Safety Specialist
USACE Personnel, classified as a GS-018 Safety Specialist, and who is UXO qualified. OE Safety Specialists perform safety, quality assurance and UXO subject matter expert functions for the Government. The Safety Specialist may reside in and report to the construction field office or may reside in the engineering/construction office within the OE Design Center. (ER 1110-1-8153)

Quantity-Distance (Q-D)
The quantity of explosives material and distance separation relationships that provide defined types of protection. These relationships are based on levels of risk considered acceptable for the stipulated exposures and are tabulated in the appropriate Q-D tables provided in DOD 6055.9-STD. Separation distances are not absolute safe distances but are relative protective safe distances. Greater distances than those shown in the Q-D tables shall be used whenever possible. (DOD 6055.9-STD)

Removal Action
The cleanup or removal of OE from the environment to include the disposal of removed materiel. The term includes, in addition, without being limited to, security fencing or other measures to prevent, minimize, or mitigate damage to the public health or welfare or to the environment. (ER 1110-1-8153)

Response Action
Action taken instead of or in addition to a removal action to prevent or minimize the release of OE so it does not cause substantial danger to present or future public health or welfare or the environment. (ER 1110-1-8153)

Senior UXO Supervisor
Supervises all contractor on-site UXO activities. This individual will be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD or the U.S. Naval Explosive Ordnance Disposal School, Indian Head, MD. This individual will have combined active duty military EOD and contractor UXO experience, including experience in supervisory positions. Experience in active duty in military EOD units is required. This individual will have documented experience with or specialized training in the type of OE expected to be encountered on the site. (USAESCH OE MCX Personnel and Work Standards for Ordnance Response, 30 July 1996)

Small Arms
Caliber 0.5 and smaller ordnance items. These items rarely contain explosive projectiles and present a very low hazard.

Technical Escort Unit (TEU)
Military chemical agent response unit.

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 266.201)

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)

UXO Quality Control Specialist
This individual will have the same minimum qualifications as a UXO Technician III. In addition, this individual will have documented Quality Control Training. This individual must be able to fully perform all functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. This individual must have the specific training, knowledge, and experience necessary to implement the contractor's QC plans. In addition, the UXOQCS must have the ability to implement the UXO specific sections of the Quality Control Program for all OE related evolutions; conduct quality control inspections of all UXO and explosives operations for compliance with established procedures; and direct and approve all corrective actions to ensure all OE related work complies with contractual requirements. (EP 1110-1-18)

UXO Qualified Personnel
UXO Personnel that meet the requirements for the positions of UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, and Senior UXO Supervisor.

UXO Safety Officer (UXOSO)
Contractor personnel with the responsibility of enforcing the contractor's SSHP. This individual must therefore be in the field whenever possible to observe operations. This individual will have the same minimum qualifications as the UXO Supervisor. In addition, this individual will have the specific training, knowledge, and experience necessary to implement the SSHP and verify compliance with applicable safety and health requirements. (EP 1110-1-18)

UXO Safety Support
UXO safety support is the level of UXO support required, based on the activities to be performed, when the probability of encountering UXO is low. A minimum of a two-person UXO team will stand by in case the construction contractor encounters suspected UXO. (ER 1110-1-8153)

UXO Technician I
This individual will be a graduate of the EOD Assistant's Course at Redstone Arsenal, AL; Eglin AFB, FL or a DOD certified equivalent course. A UXO Assistant may advance to a UXO Specialist category after obtaining active duty military EOD and contractor UXO experience. A UXO Assistant will not perform UXO procedures without the direct supervision of a UXO Specialist, UXO Supervisor, or Senior UXO Supervisor. (EP 1110-1-18)

UXO Technician II
This individual will be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD or U.S. Naval EOD School, Indian Head, MD. The UXO Specialist may be a UXO Assistant with combined military EOD and contractor UXO experience. (EP 1110-1-18)

UXO Technician III
Supervises a UXO team. This individual will be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD or the U.S. Naval Explosive Ordnance Disposal School, Indian Head, MD. This individual will have combined active duty military EOD and contractor UXO experience. This individual will have experience in OE clearance operations and supervising personnel. (EP 1110-1-18)

2.0 TECHNICAL MANAGEMENT PLAN

This plan details the approach, methods, and operational procedures to be implemented at Fort McClellan by Foster Wheeler Environmental and subcontractor personnel.

2.1 REGULATORY COMPLIANCE

2.1.1 Introduction

The purpose of this Regulatory Compliance Plan (RCP) is to identify the potential Applicable and Relevant and Appropriate Requirements (ARARs) and requirements To Be Considered (TBCs) for the investigation and management of OE waste at Fort McClellan. This RCP also outlines environmental compliance activities to be undertaken during the implementation of field investigations by Foster Wheeler Environmental and subcontractor personnel.

2.1.2 Regulatory Approach

2.1.2.1 OE response actions must be conducted in compliance with current environmental regulations implemented by Federal, state, and local governments. Applicable Federal statutes and regulations include the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Defense Environmental Restoration Program (DERP), and the Resource Conservation and Recovery Act (RCRA). Environmental standards promulgated by the state (i.e., Alabama) must also be considered as potentially applicable to OE response at Fort McClellan.

2.1.2.2 OE response activities at Fort McClellan are part of a NTCRA to be conducted in a manner consistent with the CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), the NCP and CERCLA guidance entitled "Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA." In accordance with CERCLA Section 121, actual permits will not be required for on-site work. Rather, substantive compliance with the selected ARARs/TBCs must be achieved. It should be noted that the selection of ARARs/TBCs is an iterative process that will evolve throughout the various phases of the project.

2.1.3 Applicable or Relevant and Appropriate Requirements (ARARs) and Requirements To Be Considered (TBCs)

Pursuant to CERCLA and the NCP, removal actions shall comply with and upon completion attain ARARs to the extent practicable considering the exigencies of the situation. Applicable requirements are defined by the NCP (40 CFR 300.5) as those cleanup standards, standards of control and other substantive requirements, criteria or limitations promulgated under federal or

state environmental and facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site. Relevant and appropriate requirements are defined (40 CFR 300.5) as those cleanup standards, standards of control and other substantive requirements, criteria or limitations promulgated under federal or state environmental and facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site, address problems or situations sufficiently similar to those encountered at CERCLA sites that their use is well suited to a particular site. A requirement that is relevant and appropriate must be complied with to the same degree as if it were applicable. In addition to ARARs, the lead agency may, as appropriate, identify other advisories, criteria or guidance "to be considered." It is important to note that only those state standards which are identified by the state in a timely manner and that are more stringent than the federal requirements may be considered ARARs (40 CFR 300.400(g)(4)).

2.1.3.1 ARARs may be categorized as contaminant-, location-, or action-specific:

- Contaminant-specific ARARs set health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants or contaminants.

- Location-specific ARARs set restrictions on activities within specific locations, such as wetlands and floodplains and depend on the characteristics of a site and its immediate environs.

- Action-specific ARARs set controls or restrictions on particular kinds of remedial activities that may be selected to accomplish a remedy. These ARARs may specify particular performance levels, actions or technologies to be used to manage hazardous substances, pollutants or contaminants.

2.1.3.2 Activities conducted entirely "on-site" need only comply with the substantive aspects of ARARs and not the administrative aspects such as permitting (specifically exempted under CERCLA Section 121(e)) or administrative reviews. Administrative procedures are not considered ARARs and, therefore, need not be pursued during the planning or implementation of removal actions.

2.1.3.3 Although no activities are planned to occur outside of the boundary of Fort McClellan, it should be noted that off-site activities are not controlled by ARARs, but rather must comply with all necessary federal, state and local requirements. OSHA requirements are also not considered ARARs pursuant to the United States Environmental Protection Agency (USEPA) adopted final rule on the NCP. However, the NCP identified certain OSHA requirements which must be complied with during all CERCLA response actions (i.e., 29 CFR 1910 and 1926).

2.1.3.4 The Army may waive ARARs if it is determined that they present an unacceptable danger to human safety. Potential ARARs/TBCs for investigation work at Fort McClellan are presented in Table 2-1.

Table 2-1
List of Potential Applicable or Relevant and Appropriate Requirements (ARARs) and Requirements To Be Considered (TBCs)

ARAR/TBC TYPE	CITATION	DESCRIPTION	COMMENTS
LOCATION-SPECIFIC			
FEDERAL			
Clean Water Act, Section 404 (B)(1) Guidelines	40 CFR 230.10	Establishes criteria for evaluating impacts to waters of the US (including wetlands) and sets factors for considering mitigation measures	Potential ARAR for material stockpiling, placement of equipment, OE detonation and any site excavation work within wetland areas
Protection of Wetlands	Executive Order 11990	Requires consideration of impacts to wetlands in order to minimize their destruction, loss or degradation and to preserve/ enhance wetland values	Potential TBC for material stockpiling, placement of equipment, OE detonation and any site excavation work within wetlands
Endangered Species Act	16 USC 1531	Establishes requirements for the pro-tection of federally listed threatened and endangered species and their habitat	Potential ARAR for activities impacting threatened or endangered species and their habitat
Archeological Resources Protection Act	16 USC 470aa	Provides for the protection of archeological resources located on public lands	Potential ARAR for the management of any archeological resources encountered on-site
Protection of Historic Resources	36 CFR 800	Requires consideration of impacts to historic and cultural resources	Potential ARAR for site activities which could impact historic and cultural resources
ALABAMA			
Soil Erosion Standards	880-X-3A-.06	Standards for stabilizing and revegetating disturbed surface soils at surface mining sites	Although not applicable, these standards are potentially relevant and appropriate to surface soil disturbance activities.
ACTION-SPECIFIC			
FEDERAL			
Air Pollution Control	40 CFR 50.7	National Ambient Air Quality Standard for Particulate Matter	Potential ARAR for detonation activities which generate particulate matter emissions
Military Munitions- Identification	40 CFR 266.202	Criteria for determining when a military munition is classified as a solid waste	Potential ARAR for the identification of military munitions as a solid waste, and potentially a reactive (D003) or ignitable (D001) hazardous waste
Military Munitions- Transportation	40 CFR 266.203	Requirements for the transportation of military munitions classified as a hazardous waste	Potential ARAR for the on-site transportation of military munitions

Table 2-1
List of Potential Applicable or Relevant and Appropriate Requirements (ARARs) and Requirements To Be Considered (TBCs)

ARAR/TBC TYPE	CITATION	DESCRIPTION	COMMENTS
Military Munitions- Storage	40 CFR 266.205	Requirements applicable to the storage of military munitions classified as a hazardous waste	Potential ARAR for the interim on-site storage of military munitions
Hazardous Waste Generation	40 CFR 261	Requirements for the identification of hazardous waste	Potential ARAR for the identification of potentially contaminated materials, including OE as a potentially reactive (D003) or ignitable (D001) hazardous waste
	40 CFR 262	Requirements for generators of hazardous waste	Potential ARAR for the generation, storage and packaging of contaminated material, including OE as a potentially reactive (D003) or ignitable (D001) hazardous waste
Treatment of Hazardous Waste	40 CFR 265.370	Specifies requirements for the thermal treatment of hazardous waste, including waste explosives	Potential ARAR for the detonation of OE/UXO as hazardous waste
	40 CFR 264 Subparts S and EE 40 CFR 265	Provides requirements for handling waste at the following facility types: - Temporary Units (TUs) - Staging Piles Hazardous Waste Munitions and Explosive Storage	Potential ly applicable for_ the storage and treatment of soils contaminated with munitions residues from remediation activities.
Off-Site Disposal of Hazardous Waste	40 CFR 268 Subparts A through E	Identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise restricted waste may continue to be land disposed.	Potentially applicable if soils/sediments and media containing munitions residues are disposed of off site in a landfill as hazardous waste.
USDOT Hazardous Materials Transportation Regulations	49 CFR 172.101 Hazardous Materials Table	Provides information on regulated hazardous materials, including hazard classes, packing and labeling standards	Potential ARAR for the classification of hazardous materials and hazardous wastes generated on-site for transportation purposes
	49 CFR 172.700-704	Requirements for USDOT training	Potential ARAR for on-site workers engaged in a USDOT function
	49 CFR 173	Packaging requirements for USDOT regulated hazardous materials and hazardous wastes	Potential ARAR for on-site packaging of USDOT hazardous materials
Munitions Storage Standards	DOD 6055.9-STD	DoD Ammunition and Explosive Safety Standards	Potential TBC for storage and handling of military munitions
Environmental Protection and Enhancement	AR 200-1	Requires compliance with environmental statutes and regulations and consultation with federal, state and local regulatory agencies for activities at Army installations	ARAR for all phases of field work

Table 2-1
List of Potential Applicable or Relevant and Appropriate Requirements (ARARs) and Requirements To Be Considered (TBCs)

ARAR/TBC TYPE	CITATION	DESCRIPTION	COMMENTS
ALABAMA			
Hazardous Waste Munitions and Explosives Storage	ADEM 335-14-5-.31 Military Munitions: ADEM 335-14-7-.13	Provides State of Alabama requirements and standards for design and operation of munitions and explosives storage facilities. Describes procedures for inventories, inspections, and packaging.	ARAR Relevant and appropriate to the on-site storage of media contaminated with munitions residues.
Off-Site Disposal of Hazardous Waste	335-14-9	Identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise restricted waste may continue to be land disposed.	Potentially applicable if soils/sediments and media containing munitions residues are disposed of off site in a landfill as hazardous waste
Military Munitions- Identification	335-14-7-.13(3)	Criteria for determining when a military munition is classified as a solid waste	Potential ARAR for the identification of military munitions as a solid waste, and potentially a reactive (D003) or ignitable (D001) hazardous waste
Military Munitions- Transportation	335-14-7-.13(4)	Requirements for the transportation of military munitions classified as a hazardous waste	Potential ARAR for the on-site transportation of military munitions
Military Munitions- Storage	335-14-7-.13(6)	Requirements applicable to the storage of military munitions classified as a hazardous waste	Potential ARAR for the interim on-site storage of military munitions
Hazardous Waste Generation	335-14-2	Requirements for the identification of hazardous waste	Potential ARAR for the identification of potentially contaminated materials, including OE as a potentially reactive (D003) or ignitable (D001) hazardous waste
	335-1-3	Requirements for generators of hazardous waste	Potential ARAR for the generation, storage and packaging of potentially contaminated materials, including OE as a potentially reactive (D003) or ignitable (D001) hazardous waste
Storage and Treatment of Hazardous Waste	335-14-6	Specifies requirements for the design and operation of hazardous waste stockpile/storage areas and for the thermal treatment of hazardous waste	Potential ARAR for the stockpiling of contaminated materials and detonation of OE/UXO
Air Quality Standards	335-3-1-.03	Sets standards for ambient levels of air pollutants	Potential ARAR for site activities resulting in the emission of air pollutants
	335-3-4-.02	Particulate emission standards for fugitive dust	Potential ARAR for on-site detonation of OE resulting in particulate emissions

2.1.4 Discussion of Potential ARARs/TBCs

2.1.4.1 Chemical-Specific ARARs/TBCs

There are no chemical-specific ARARs or TBCs for this site.

2.1.4.2 Location-Specific ARARs/TBCs

Throughout Fort McClellan, various sensitive environmental resources (e.g., wetlands, streams, rivers, floodplains, etc.) exist which may be impacted during investigation activities. These impacts may trigger a variety of location-specific ARARs/TBCs.

2.1.4.2.1 Federal ARARs/TBCs

Wetlands located within the boundary of the Fort may contain OE. Federal wetland requirements, contained in Section 404 of the Clean Water Act, are considered potential ARARs for impacts to these resources. Executive Order 11990 requires that impacts occur only when no practicable alternative exists, requires consideration of impacts to wetlands such that impacts are minimized and provides for the preservation/enhancement of wetland values. The USEPA has previously characterized Executive Orders as TBCs although federal agencies must comply with them. Clean Water Act Section 404(b)(1) Guidelines, expressed in 40 CFR 230.10, set out criteria for evaluating impacts to wetlands based on impact avoidance, impact minimization and compensatory mitigation.

2.1.4.2.1.1 To achieve these substantive requirements, Foster Wheeler Environmental will seek to avoid direct impacts to site wetlands. Where avoidance is not feasible, disturbances to wetlands will be minimized. Any OE or debris (including removed vegetation) recovered from these wetlands will be staged/stockpiled outside of the wetland. Where erosion of stockpiled soils from excavation activities is possible, temporary erosion control measures (e.g., hay bales around the perimeter of the stockpile) will be employed. To the extent practical, clean stockpiled soils will be returned to the excavation area within the same day. Where same day placement of excavated soils is not possible, the soil will be covered during non-working periods. Equipment used to perform the excavation will be moved to upland portions of the site when not in use.

2.1.4.2.1.2 Facility documentation or identified historic and cultural resources will be reviewed prior to field mobilization where impacts cannot be avoided, mitigation measures will be identified and reviewed with facility staff.

2.1.4.2.1.3 Finally, intrusive impacts will be timed so as to avoid impacts to any identified threatened and endangered species (see Section 12, Environmental Protection Plan, for details).

2.1.4.2.2 Alabama ARARs/TBCs

Impacts to wetlands, floodplains and other sensitive environmental receptors will be managed pursuant to federal ARARs/TBCs.

2.1.4.3 Action-Specific ARARs/TBCs

Potential action-specific ARARs/TBCs focus primarily on the management of OE as a potential solid waste.

2.1.4.3.1 Federal ARARs/TBCs

The military munitions rule (40 CFR 266, Subpart M) specifies when military munitions are classified as solid wastes for RCRA purposes. Military munitions (including UXO and munitions fragments) are not solid wastes (and therefore not hazardous wastes) when they are recovered, collected and destroyed on-range during range clearance activities at both active and inactive ranges. If, however, a used or fired munition is transported off-range or from the site of use (where the site of use is not a range), the munition is classified as a solid waste, and potentially a reactive (D003) or ignitable (D001) hazardous waste. If so classified, management of the munition must comply with RCRA hazardous waste transportation/storage requirements unless the following standards are met:

Transportation

- The waste munitions are not chemical agents or chemical munitions;
- The waste military munitions must be transported in accordance with the Department of Defense shipping controls applicable to the transport of military munitions;
- The waste military munitions must be transported from a military-owned or operated installation to a military-owned or operated treatment, storage, or disposal facility;
- The transporter of the waste must provide oral notice to the USEPA/Department within 24 hours from the time the transporter becomes aware of any loss or theft of the waste military munitions that may endanger health or the environment. In addition, a written submission describing the circumstances shall be provided within 5 days from the time the transporter becomes aware of any loss or theft of the waste military munitions;
- If any waste military munitions are not received by the receiving facility within 45 days of the day the waste was shipped, the owner or operator of the receiving facility must report this non-receipt to the USEPA/Department within 5 days; and

- United States Department of Transportation (USDOT) requirements at 40 CFR 171-180, including classification, packaging and labeling requirements, would potentially apply to the on-site transportation of hazardous materials on any public roadway.

Storage

- The waste military munitions are not chemical agents or chemical munitions;
- The waste military munitions must be subject to the jurisdiction of the Department of Defense Explosives Safety Board (DDESB);
- The waste military munitions must be stored in accordance with the DDESB storage standards applicable to waste military munitions;
- Within 90 days of when a storage unit is first used to store waste military munitions, the owner or operator must notify the USEPA/Department of the location of any waste storage unit used to store waste military munitions;
- The owner or operator must provide oral notice to the USEPA/Department within 24 hours from the time the owner or operator becomes aware of any loss or theft of the waste military munitions that may endanger health or the environment. In addition, a written submission describing the circumstances shall be provided within 5 days from the time the owner or operator becomes aware of any loss or theft of the waste military munitions;
- The owner or operator must inventory the waste military munitions at least annually, must inspect the waste military munitions at least three years and must maintain records of the findings of these inventories and inspections for at least three years; and
- Access to the stored waste military munitions must be limited to appropriately trained and authorized personnel.

2.1.4.3.2 Alabama ARARs/TBCs

The Alabama Department of Environmental Management (ADEM) has adopted the federal standards for military munitions management. Refer to the federal ARARs/TBCs for a discussion of these requirements.

2.1.4.3.2.1 Finally, although not applicable to OE investigation work, the soil erosion standards of the Surface Mining Program will be referenced and implemented to the extent practical during soil disturbance activities.

2.1.5 Compliance Procedures

2.1.5.1 Regulatory Agency Notification

Regulatory agency contacts and notification requirements are presented in the corresponding Delivery Order Specific Work Plan.

2.1.5.2 Procedure for Reporting Spills and Releases

Any spills and releases resulting from on-site activities (e.g., oil, gasoline, cleaning fluids, etc.) must be reported in accordance with the Foster Wheeler Environmental Environmental Health and Safety (EHS) Procedure 1-7 (Incident Reporting and Investigation).

2.1.6 Inadvertent CWM Discovery Procedures

Prior to the initiation of OE activities, a thorough search of available historical information will be conducted to identify all suspect hazards. Operations will not be scheduled for an area suspected of containing CWM.

2.1.6.1 In the event that CWM is located or suspected, Foster Wheeler Environmental personnel will evacuate the area immediately in an upwind direction.

The UXO Team Leader will:

- Notify the SUXOS;
- Ensure that all personnel are clear of the area; and
- Maintain security of the area until relieved by response elements.

The SUXOS will:

- Notify Foster Wheeler Environmental Command Center; and
- Notify the CEHNC on-site Safety Representative.

The CEHNC Safety Representative will:

- Verify that a suspect CWM has been located;
- Notify Transition Force Operations and request assistance as required;

- Notify the local military EOD unit and request assistance as required; and
- Notify Army Technical Unit and request assistance as required.

Foster Wheeler Command Center:

- Stop all field operations- assemble at designated assembly points;
- Standby to provide assistance as required; and
- Notify the Project Manager.

2.1.7 Procedures for Off-site OE Disposal and Unidentified OE Recoveries

The safest procedure for personnel when encountering OE is to destroy the OE in place using explosives (Blow in Place BIP). Standard procedures will be to dispose of all located OE items daily between 1400 and 1700 hours. All located OE will be disposed of in the position/location found. In the event an area cannot withstand a high order detonation, items that can be safely moved, will be disposed of in an area that can withstand a high order detonation. If an item is located that is considered unsafe to move and the area cannot withstand a high order detonation, engineering controls will be used to reduce the blast and fragmentation effect of a detonation, and the item will be disposed of in place. If the area cannot withstand a high order detonation, with the application of engineering controls, the SUXOS will notify the CEHNC Safety Representative that the item is not safe to move and that the item cannot be disposed of in place, and request additional assistance.

2.1.7.1 The following procedures will be initiated when potential OE items are located:

- UXO team locating potential OE:
  - Notify Senior UXO Supervisor and the Foster Wheeler Environmental command center of the anomaly where potential OE is located.
  - Evacuate personnel a minimum of 2,500 feet from the potential OE or the actual fragmentation distance of the item encountered per EODB 60A-1-1-4.
  - Identify item, measure length, width and determine condition. Complete OE Acquisition and Accountability Log.
- Senior UXO Supervisor:
  - Verify OE item identification
  - Document anomaly number and location
  - Photograph OE item
  - Schedule disposal of the item as required
  - Arrange transportation of UXO to storage area if required

- Notify CEHNC Safety Representative and request military EOD assistance if the area cannot with stand s high order detonation and the suspect OE item is unsafe to move.

- Foster Wheeler Environmental command center:
  - Notify CEHNC and Fort McClellan Transition Force Operations; and
  - Request fire, medical, and security teams to be located as necessary for transportation

2.1.7.2 **Unidentified OE-**OE identification will be made by trained UXO personnel. Identification will be made based on personal experience and by using appropriate ordnance publications. The SUXOS will verify all OE items. In the event that site UXO personnel are unable to identify a suspect OE item, the SUXOS will request assistance from the CEHNC Safety Representative. If site personnel are not able to fully identify a suspect UXO the item will be photographed with a digital camera and electronically transmitted to CEHNC, Huntsville for assistance.

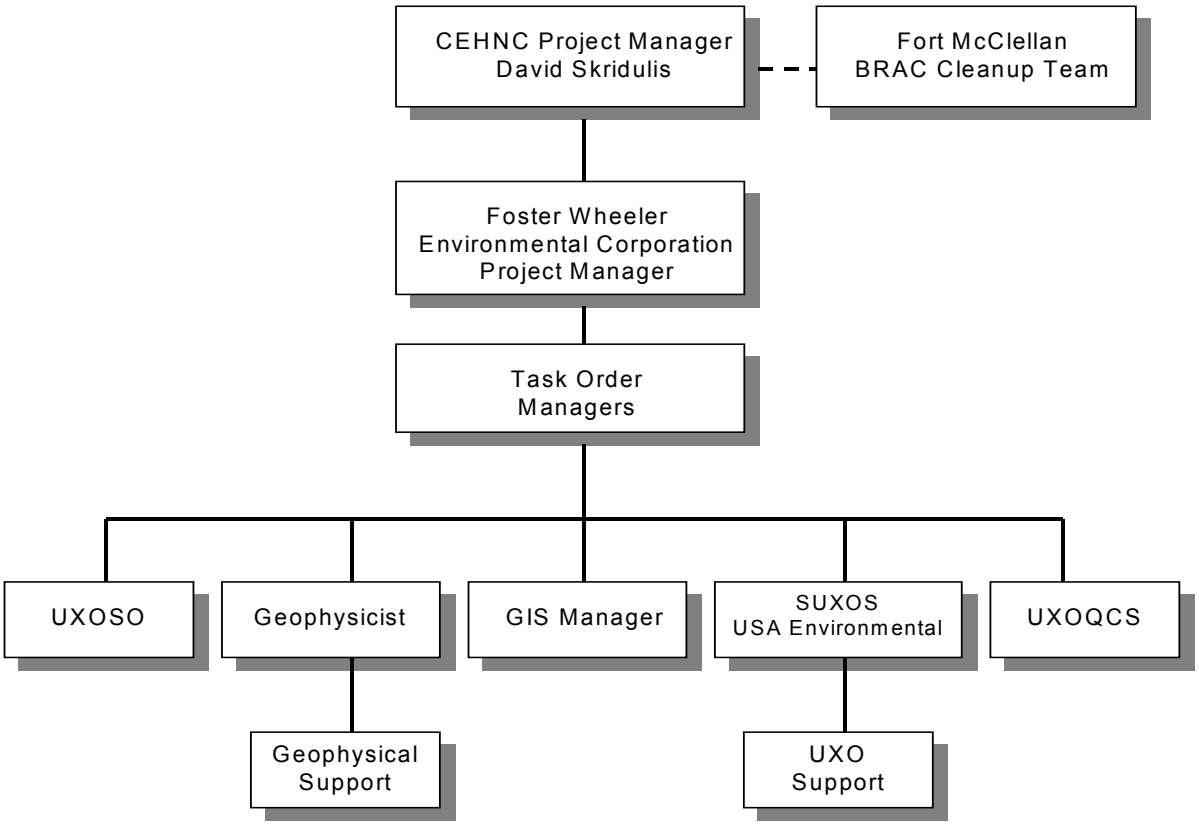
2.2 PROJECT ORGANIZATION

The project management organization consists of the CEHNC Project Manager (David Skridulis), the Fort McClellan BRAC Cleanup Team (BCT) and the Foster Wheeler Environmental project management team. Figure 2-1 depicts the project management organization. Project organization charts identifying additional support personnel required for effective completion of each individual delivery order will be provided in the Delivery Order Specific Work Plans.

2.2.1 Personnel Responsibilities

The following paragraphs describe the specific responsibilities associated with the Foster Wheeler Environmental project management personnel shown on the project organizational chart. All personnel that will be assigned to this project meet the CEHNC training and experience requirements for the position to which they are assigned. The key personnel will be supported by technical resources throughout the Foster Wheeler Environmental organization on an as-needed basis for individual delivery orders. Resumes for key personnel will be provided in the Delivery Order Specific Work Plans.

Figure 2-1
Fort McClellan Management Team



2.2.1.1 Foster Wheeler Environmental Project Manager

The Foster Wheeler Environmental Project Manager for the Fort McClellan contract is responsible for the overall implementation of all delivery orders assigned under this contract. The Project Manager (PM) will be responsible for the management of all Foster Wheeler Environmental resources needed for the successful implementation of site operations. Delivery Order managers will be assigned as new Delivery Orders are awarded. All Delivery Order management personnel will report directly to the PM, and all support personnel will report to the Delivery Order Manager through these personnel.

2.2.1.2 Senior UXO Supervisor (SUXOS)

The Senior UXO Supervisor (SUXOS) will assist in the development of Delivery Order Specific Work Plans, identify personnel and equipment requirements, and supervise all daily activities of the field teams, with responsibility for the successful performance of the field teams, the early detection and identification of potential problem areas and institution of corrective measures. The SUXOS is also responsible for overall coordination of on-site OE activities and for keeping the Program Manager informed of staffing, resource or other issues that could impact the overall performance under the Fort McClellan contract.

2.2.1.3 UXO Site Safety and Health Officer

The UXO Site Safety and Health Officer (UXOSO) position will exist for all Delivery Orders under this contract. The UXOSO is UXO qualified and is responsible for ensuring that all site activities are conducted in accordance with this Work Plan, Delivery Order Specific Work Plans, Site-wide and Delivery Order Specific SSHPs, CEHNC and Fort McClellan policies and procedures, and relevant federal, state and local regulations. The UXOSO is also responsible for implementing on-site training requirements and recommending changes to level of PPE to the Foster Wheeler Environmental certified industrial hygienist (CIH) as site conditions warrant.

2.2.1.3.1 The UXOSO has Stop Work authority for safety conditions. The UXOSO evaluates and analyzes any potential safety problems, implements safety-related corrective actions, and maintains a daily safety log.

2.2.1.4 UXO Quality Control Specialist (UXOQCS)

The UXO Quality Control Specialist (UXOQCS) is responsible for ensuring that all site operations are conducted in accordance with recognized performance criteria and for performing QC checks of all field work prior to CEHNC Quality Assurance (QA) inspections. Section 11 of this Work Plan contains additional UXOQCS responsibilities and the performance criteria which will be met during this project.

2.2.1.5 Geophysicist

The geophysicist is responsible for preparation of sections of the Generic Work Plan and Delivery Order Specific Work Plans that discuss geophysical investigations and geophysical QC. The geophysicist is also responsible for the overall implementation of these plans, geophysical QC, data analysis, interface with CEHNC geophysicists for data evaluation and with the GIS manager for incorporation of geophysical data into the site-wide GIS. The geophysicist is also responsible for providing dig sheets to the OE teams and coordinating QC efforts with the OE teams during the intrusive investigation.

2.2.1.6 GIS Manager

The GIS Manager is responsible for development, operation and maintenance of the site-specific GIS for the site. Geophysical and intrusive data collected during the performance of all delivery orders under this contract will be incorporated into a single GIS for the site. The GIS Manager will also be responsible for transferring all data to the CEHNC GIS System.

2.3 MOBILIZATION PLAN

This section describes activities currently taking place and future activities currently being planned for mobilization of personnel and equipment to the site for performance of the work required under the Fort McClellan contract.

2.3.1 Pre-Mobilization

During the development of this Work Plan, Foster Wheeler Environmental has assessed general equipment, personnel and subcontractor requirements for the overall project; additional assessments will be made based on delivery order specific requirements.

2.3.1.1 Foster Wheeler Environmental's field office will include a field data processing center for data entry and preliminary analysis of geophysical data and appropriate links for transfer of these data to appropriate office personnel (for complete geophysical data analysis) located at Foster Wheeler Environmental's Denver and Livingston locations. The field office will also be equipped with telephones, fax machine, computers with printers, and miscellaneous office supplies and materials.

2.3.1.2 Storage space (both inside and outside) will also be made available to Foster Wheeler Environmental in the same general vicinity as the field office for storage of geophysical equipment, brush clearing equipment, OE activity related equipment, health and safety

equipment, and any other field equipment required for the performance of the individual delivery orders.

2.3.2 Mobilization

Foster Wheeler Environmental will schedule the arrival of the work force in a manner that is most effective and designed to allow for immediate productivity. All Foster Wheeler Environmental and subcontractor personnel mobilized to the site will meet OSHA hazardous waste operations training and medical surveillance requirements as specified in the SSHP. As part of the mobilization process, Foster Wheeler Environmental will perform site-specific training for all on-site personnel assigned to this project. The purpose of this training is to ensure that all on-site personnel fully understand the operational procedures and methods to be used by Foster Wheeler Environmental at Fort McClellan, to include individual duties and responsibilities, and all safety and environmental concerns associated with operations. Any personnel arriving at the site after this initial training session will be trained as they arrive. Training will be conducted by the SUXOS/UXOQCS and the UXOSO, and will include the topics identified below.

1. Field equipment operation, to include the safety and health precautions and field inspection and maintenance procedures that will be used.

2. Relevant sections of this Work Plan and the SSHP, as they relate to the tasks being performed.

3. Site-, task-, and hazard-specific training to ensure personnel are aware of potential site and operational hazards.

4. Conduct public relations training, ensuring that personnel will not make any public statements to the media without prior coordination with and approval of the CEHNC Public Affairs Office and Fort McClellan.

5. Environmental concerns and sensitivity, to include endangered/threatened species and historic, archeological and cultural (HARC) issues.

6. Additional OSHA or CEHNC required training, as required by the SSHP.

7. OE refresher training designed to address the ordnance that may be encountered on site, including identification features, hazards, and disposal methods.

2.3.2.1 Project equipment will come from Foster Wheeler Environmental sources and local leases/ purchases. All equipment, regardless of source, will be checked to ensure its completeness and operational readiness. Any equipment found damaged or defective will be returned to the point of origin and a replacement will be secured. All instruments and equipment that require routine maintenance and/or calibration will be checked initially upon arrival and then prior to use each day. This system of checks ensures that the equipment is functioning properly. If an equipment check indicates that any piece of equipment is not operating correctly, and field repair cannot be made, the equipment will be tagged and removed from service and a request for replacement equipment will be placed immediately. Replacement equipment will meet the same specifications for accuracy and precision as the equipment removed from service. As part of the initial equipment set-up and testing, Foster Wheeler Environmental will also install and test its communication equipment, to include:

- Hand-held portable radios, with a range of five-to-eight miles that will be used to maintain communications between the SUXOS and the field teams. A Foster Wheeler Environmental radio with charger will also be provided to the CEHNC Safety Representative.

- Foster Wheeler Environmental will use a cellular telephone, acquired through a local cellular service (very high frequency band 150-174 MHz), as back up communications between the SUXOS and the field teams.

2.3.3 Coordination with Local Agencies

During mobilization, the SUXOS and UXOSO/QCS will coordinate with local services and agencies to ensure the availability of resources that may be needed during the course of the project. At a minimum, coordination will be made with the following agencies and services:

- CEHNC, to reconfirm priorities/schedules, and to identify any changes in the Scope of Work;

- Local vendors and suppliers;

- The Fort McClellan Transition Force Operations Officer;

- Fort McClellan Ammunition Supply Point (ASP) and Provost Marshal's Office (PMO);

- Fort McClellan fire, and police agencies;

- Fort McClellan BEC; and

- Prior to conducting any field operations or entering range areas Foster Wheeler Environmental will notify the CEHNC Safety Representative Thursday of each week of the following weeks operations. The CEHNC will coordinate all field activities with Fort McClellan Transition Force Operations. Field personnel will log in and out of areas on a daily basis

2.4 SITE PREPARATION ACTIVITIES

Upon completion of mobilization activities, Foster Wheeler Environmental will commence the site preparation required for the OE activities specified in the Scope of Work. The sections below describe the general work practices that Foster Wheeler Environmental will employ during all non-intrusive operations that have the potential for personnel exposure to OE hazards.

2.4.1 Surface Sweeps

Prior to conducting activities related to the geophysical investigation of the survey grids, OE teams will perform a visual reconnaissance of the proposed survey areas to remove metallic debris and any potentially dangerous ordnance and explosives waste from the ground surface. This will assure the safety of the geophysical field personnel as well as reduce the potential for cultural interference in the geophysical data. Schoenstedt GA-52CX fluxgate gradiometers, Vallon 1614/1620 metal detectors or other approved detectors will be used in conjunction with the visual inspection if foliage is too thick to effectively see surface objects. The removal and disposal of surficial metal will be in accordance with standard procedures developed for this type of work by OE personnel. The debris will be moved from each survey grid and temporarily stored for subsequent disposal.

2.4.2 Vegetation Clearing Activities

Clearing of wooded areas as necessary to satisfy line of site survey requirements will occur after each grid has been swept by OE personnel. Obstructive vegetative cover will be removed from within each geophysical survey grid to a height of not greater than four inches above ground surface. Vegetation clearing will be performed in accordance with the Environmental Protection Plan (Section 12) after the flora and fauna survey has been completed. Any additional OE encountered during vegetation removal will be marked with pin flags and reported to the SUXOS.

- ***Tree Pruning***. Trees will be pruned on a case-by-case basis and only as required to accomplish the tasks outlined in this Work Plan. If tree pruning is required, the tree will be pruned using gas-powered hand tools (e.g., chain saws). Disposal of tree branches will be coordinated with the Fort McClellan BEC.

- ***Brush and Grass Trimming***. The primary method for brush trimming will be gas-powered hand tools such as chain saws, weed eaters, or hedge trimmers. To prevent damage to sensitive root systems, the brush will be cut to a height of 4 inches. A visual sweep of the designated area for surface OE, will be made prior to the start of brush trimming operation. A UXO Specialist will oversee brush clearing and will be responsible for sweeping newly cleared areas for UXO/OE potentially uncovered by brush clearing operations. Disposal of vegetation will be coordinated with the Fort McClellan BEC.

- ***Location Surveys Support Methodology***. During all field activities, the land survey crew shall be accompanied by a UXO Specialist. In all areas suspected of having possible OE contamination, the UXO Specialist will visually inspect the areas where personnel may transit. At all points where wooden stakes or posts are to be driven into the soil or where survey corners are to be located, a magnetometer check of that point will be accomplished prior to their emplacement. If at any time the magnetometer indicates a positive reading, another location free of anomalies shall be selected for placement of the marker. Survey and boundary stake installation are the only intrusive activities (subsurface) authorized during surveying activities.

2.4.2.1 As an alternative to vegetative clearance using hand tools, upon consultation and agreement with the Fort McClellan BEC, mechanical clearing tools (i.e., chippers, slash busters, etc.) and controlled burning may be used to remove brush from specific areas. This approach will be discussed further in the Delivery Order Specific Work Plans if appropriate.

2.4.3 Prove-Out Procedures

A geophysical test plot was established by CEHNC during the selection of contractors for the Fort McClellan contract, at which time Foster Wheeler Environmental proved-out time domain electromagnetic induction (TDEMI) geophysical instrumentation (specifically the EM61) and Ultrasonic Ranging and Data System (USRADS) navigation instruments. Foster Wheeler Environmental does not anticipate any additional test plots to be established or tested during the performance of work using the EM61 and USRADS at Fort McClellan. However, if new technology or a different data collection/processing approach is proposed to investigate areas of Fort McClellan, a new test plot will be established to prove-out the proposed technologies and processes. Should additional test plots be required by CEHNC within the Scope of Work for a specific Delivery Order or to prove-out other technology proposed by Foster Wheeler Environmental, the parameters of the test plot will be discussed within the Delivery Order Specific Work Plan.

2.5 STATISTICAL SAMPLING PROCEDURES

2.5.1 Geophysical investigations may be conducted to detect, locate, and map subsurface target anomalies potentially related to subsurface OE within each Area of Concern (AOC). Potential AOCs are areas that were originally identified as suspect ranges, target areas, or burial sites based primarily on archive or records reviews and/or anecdotal evidence. They become AOCs after site inspections or reconnaissance activities indicate the need for further investigation. AOCs will first be evaluated on the basis of available historical information (e.g., that contained within the Archive Search Report) and readily discernible physical and geographic characteristics, to the boundaries of the areas to be characterized and evaluated during the EE/CA. Criteria that will be used for definition of these areas are discussed below.

2.5.2 Sectors are the divisions of an AOC that can be demonstrated to be sufficiently uniform and self-consistent with regard to a set of specified characteristics (based on the available records and data). The presumed homogeneity of an area for purposes of justifying its designation as a sector must be based on such factors as the potential distribution of the OE within the area, physical variables, geographic variables, and the type of activities that currently take place or are anticipated within the area. Two types of sectors will be defined for characterization purposes: characterization sectors and risk sectors. A characterization sector is an area where the same mechanism for placement of OE has operated (i.e., firing, dropping, mishandling loss). A risk sector is an area with the same potential for exposure to OE and requires that the land be contiguous, have the same physical characteristics (such as are associated with a characterization sector), and have the same current and/or future use. Efforts are made during the design of the sampling program to determine if the characterization sectors may also serve as risk sectors for subsequent evaluations (provided the required criteria are met). Upon completion of the field investigation, the characterization sectors will be regrouped and/or further subdivided into risk sectors (as necessary) to perform the risk assessment. Criteria used to define the two types of sectors include the following:

- A sector may be characterized as either "dispersed," or "localized," with respect to the manner in which the OE were placed or came to be in the area. "Dispersed" sectors are considered to be contaminated with OE that have been dropped, thrown, propelled, or placed in such a manner that the items may have become armed and have the potential to detonate. Examples of areas that are typically characterized as dispersed are bomb targets and firing ranges. "Localized" sectors are considered to be areas or regions of the site where OE are confined to relatively small, delineated areas. Examples of areas that are typically characterized as localized are storage bunkers or burial sites.

- Physical variables, including anticipated OE density, types of OE, type of fuzing, OE condition and orientation, whether the OE are expected to be located at the surface or beneath the surface of the ground, and the depth distribution of any subsurface OE.

- Geographic variables, including the type of terrain (or predominant slope or physical features), the type and density of vegetation present, and the type of soil.

- Recreational activities (e.g., hiking, picnicking, short cuts or camping) or occupational activities (e.g., construction, surveying, or archeology) that are known to occur or would be reasonably expected to occur in the future.

- Past OE discoveries and the history of OE activity (type of OE used and mechanism of deposition/placement).

2.5.3 The types of activities currently taking place and those anticipated in the future will be considered in conceptual site models to be developed and provided in the site specific EE/CA sampling work plans. The basis of information that will be used to develop the conceptual site models include records reviews and field reconnaissance activities. In the records review, Foster Wheeler Environmental reviewed existing documents to gather information on historical range fan locations, firing points and impact areas within the fans, and types of ordnance reportedly

used at Fort McClellan. The Archives Search Report (St. Louis District COE, 1997) was the primary source of historical information, but other documents reviewed include: Historical Aerial Photograph Investigation (Oak Ridge National Laboratory, 1999); Environmental Baseline Survey (ESE, 1997); and the EPIC aerial photograph investigation (EPA, 1990).

2.5.4 The main focus of the field reconnaissance was to identify, based on surface inspection only, areas of relative high, medium, or low OE contamination prior to design of the EE/CA sampling plan. Information collected by the two reconnaissance teams included locations and types of ordnance found, locations of suspected craters related to ordnance impact, and locations of targets. Foster Wheeler Environmental also collected other information important to the sampling design, including slope of terrain, thickness of undergrowth, and locations of accessible roads or trails. Each team carried a GPS unit to record the location of pertinent observations.

2.5.5 Using information obtained during reconnaissance, Foster Wheeler Environmental identified and delineated homogeneous areas of high, medium, and low OE density. 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 density is based on qualitative criteria and professional judgement of the reconnaissance teams. The general guidelines used are: High density areas are those in which multiple ordnance-related items were found in close proximity to a suspected or known impact 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. These areas served as the basis for designating the sampling sectors in which to obtain geophysical and ordnance data for the EE/CA. Other factors considered when delineating sampling sectors were: 1) the anticipated future use of a given sector, and 2) the current parcel boundaries obtained from the Army, showing parcel boundaries to be used for real estate transaction purposes.

2.6 SITE CHARACTERIZATION PROGRAM

Investigation programs for Fort McClellan will focus on providing the information needed to support the EE/CA process at a level of quality sufficient to justify the recommendations included in the EE/CAs. The criteria that will be used to judge the validity of the characterization processes employed and the quality of the data produced will be the data quality objectives (DQOs). DQOs are developed based on a systematic 7 step EPA process aimed at identifying how to obtain appropriate data needed to make informed risk management decisions. The Interim Range Rule Risk Methodology (IR3M) Planning Process has adopted these steps with very minor modification, as follows:

- What is the situation?
- What decisions are being made?

- What data will be used in making the decisions?
- What are the limits to collecting data?
- How will decisions be made?
- What are the tolerable limits of decision error?
- What is the optimal sampling approach for collecting data?

2.6.1 The DIDs specified in the contract under which this characterization work will be performed at Fort McClellan are the minimum set of DQOs (see Attachment 11-1). Additional DQOs will be developed on an as needed basis to ensure the collection of high-quality area-specific data in a defensible manner consistently across the site. Topics for which additional DQOs may be developed for Fort McClellan include:

- Geophysical Equipment Performance
- Survey/Location Equipment Performance
- Data Collection
- Ordnance Identification
- Data Management
- Operational Verification Of Equipment
- Geophysical Search/Detection System Selection

2.6.2 Any additional DQOs developed to meet area-specific needs will be published in a central repository so that they may be retrieved and applied at other areas as appropriate.

2.6.3 The objectives of a characterization program for any particular area potentially containing OE will be defined on a site-by-site basis in the site-specific work plans. In general, however, the characterization objectives for each area will include one or more of the following:

- Confirming or revising the initial or working version of the CSM for that area (relative to the OE types present, OE distribution patterns, and likely quantities);
- Achieving footprint reduction (relative to the accuracy and precision of the area boundaries);

- Balancing redevelopment and site management issues with estimated response action costs and potential implementation constraints;

- Estimating OE characteristics to determine if the area warrants an immediate response, further evaluation, or no further action; and

- Satisfying objective or subjective criteria regarding sampling area representativeness.

2.6.4 In many cases, especially for the latter two objectives listed above, no consensus quantitative or qualitative regulatory criteria have yet been established for application to all ordnance-contaminated sites. Operable quantitative and qualitative criteria of this nature have been developed for some other ordnance-contaminated sites under somewhat similar circumstances. Still other criteria based on professional judgement have been used in the past to established baseline and supplemental sampling quantities needed to support various engineering and risk assessment evaluations. Many of these have been rule-of-thumb percentages or statistically based sampling quantities defined to demonstrate that specified OE densities are either exceeded or not exceeded with a specified level of confidence. In consideration of these various approaches for specifying sampling quantities, the following have been observed:

- Typically 1 to 2.5% of an area needs to be sampled to determine if the area exceeds a specified "contaminated" target OE density with a specified high confidence level (e.g., to determine if a live item target density of # items per acre or an OE item target density of # items per acre is exceeded with ##% confidence).

- Typically 2 to 5% of an area needs to be sampled to effectively establish the characteristics of the area for purposes of supporting an EE/CA;

- Typically from <1 to >35% of an area needs to be sampled to demonstrate that an the area does not exceed a specified "clean" target OE density with a specified high confidence level (e.g., to determine if a live item target density of # items per acre or an OE item target density of # items per acre is not exceeded with ##% confidence). These "clean" target OE densities would typically be linked to the projected future land use and potential OE exposure scenario for the area being characterized.

2.6.5 The amount of area required to be sampled and investigated in an area depends on:

- The precision and strength of the justification for the delineation of the area boundary,

- The OE pattern associated with the past ordnance activity assumed in the area-specific CSM,

- The target OE item densities to be enforced, and

- The minimum specified level of confidence associated with the statistical / quantitative demonstrations that define the sampling specification.

2.6.6 Once these characterization objectives have been considered on a site-by-site basis, the sampling program may be further prioritized to explicitly reflect the context of the characterization relative to:

- Future use of the area (accounting for differences in the potential for public exposure);
- Property ownership, as applicable (accounting for the CEHNC's ability to manage risk throughout the clean-up operations);
- Redevelopment opportunities (accounting for schedule constraints and the desirability of reuse of the area); and
- Resource availability (accounting for the available budget on an annual and cumulative project basis).

2.6.7 The following characteristics will be needed to support an EE/CA relative to both the assessment of risk associated with the current or future use of the area and the identification and evaluation of alternatives for reducing and managing risk to acceptable levels:

Principal Data Needs for Risk Assessment:

- The locations where OE items were found (relative to areas of potential human interaction); and
- Evidence of current or reasonably anticipated future activities in the area.

Principal Data Needs for Alternatives Identification and Evaluation:

- The characteristic pattern of the OE items;
- The average density of geophysical anomalies per acre in the area that could be OE items; and
- The depth distribution of the anomalies that could be OE items.

Data needs for Both Risk Assessment and Alternatives Identification and Evaluation:

- The spatial extent of the area containing OE items;
- The average density of OE items;
- The depth distribution of the OE items; and
- The types of OE items found (relative to size and sensitivity).

2.6.8 The information about the anomalies is used to conceptually design, evaluate, and estimate the cost of potential clearance and removal options. The information about the OE items is used to conceptually specify and cost out potential OE disposal requirements. The OE characteristics feed into the framework for assessing the potential risks associated with current or future activities in the sectors. Each of these information types has a minimum level of data quality associated with it relative to the needs of the investigation. The quality of the data regarding the presence or absence of OE, and the quantitative measure of the relative amount of OE present (if it is present), depends on both the procedures and equipment used to investigate the sector and how much of the sector is investigated. For specified procedures and equipment, improvements in data quality or increases in the level of confidence associated with the data collected are achieved by investigating a greater amount of area within the sector. How much area must be investigated within a given sector depends, in part, on whether OE are found in the sector during the investigation and whether more data of high quality is generally required. The field investigation results must be used to support a demonstration that the sector is relatively free of OE and hazardous items. Often less data of suitable quality is needed to evaluate risk management options when the area is known or suspected to contain OE.

2.6.9 Based on the archival records review and the field reconnaissance information conceptual site models (CSM) will be developed. A CSM for an area in which ordnance-related activity has been conducted identifies the nature of the source of the ordnance items (e.g., impact area, firing point, bivoac area) and the corresponding mechanism of release or deposition of ordnance items associated with that activity (e.g., firing, dropping, abandonment). Together, this information in conjunction with the characteristics of the weapons system, provide an initial projection of where within each area OE items may most likely be found, and what the relative density and distribution patterns of ordnance may be. The CSM also includes an assessment of the potential for OE to migrate or become exposed by natural or man-made processes, and an identification on how human or ecological contact with the OE could occur. The CSM will show the relationship between the:

- Primary sources of OE;
- Primary release or deposition mechanisms;
- Secondary sources;
- Potential transport and migration mechanisms;
- Exposure media;
- Exposure routes; and
- Receptors potentially exposed to OE.

2.6.10 As CSMs should be tailored to each area, site-specific CSMs will be developed and included in the site-specific EE/CA work plans for each area.

2.6.11 If OE are found in the sector, an evaluation of potential clearance actions and an assessment of the level of potential exposure and risk associated with any OE projected to be present must be performed. Estimates of the OE density in the sector and the characteristic ratio of OE-to-anomalies become important to specifying and evaluating possible clearance options. In addition, it is important to ensure that the sector is sufficiently uniform and self-consistent with respect to OE and anomaly characteristics to enable the estimated densities to adequately represent the sector. This uniformity can be evaluated graphically using a weight-of-evidence approach once the actual sector characteristics are obtained during the field investigation. The overall amount of area that must be investigated to evaluate whether this uniformity and self-consistency exists may be estimated statistically. However, the appropriateness of performing this test will depend on the history of ordnance related activity in the area and the resulting implied patterns of distribution of OE or ordnance items known or suspected of being present in the area. The condition of homogeneity of OE and ordnance items within a sector can be tested statistically only with an actual data set. However, analysis of a large number of observations has enabled an empirical "Predictor Equation" to be developed that provides a rough indication of the area that may need to be investigated before uniformity and self-consistency can be demonstrated or disproved for a given sector. This relationship was developed based on an investigation approach of investigation grids being placed randomly within the overall sector. The sufficiency of this projected amount of investigation coverage relative to assessing the uniformity and self-consistency of the sector relative to OE will be checked by graphically plotting the results of the investigation. This relationship has been found to be a function of the area of the sector and the size of the grids or sample areas used in the investigation. The Predictor Equation for the expected minimum number of grids is as follows:

$$N_{inv}(\min) = 3.28(N_s)^{0.217}$$

Where:

N_{inv} = number of grids to be investigated;

N_s = number of grids in the sector.

2.6.12 If OE are not found during the investigation, there may be a greater likelihood that no OE are actually present in the sector. However, finding no OE during an investigation does not necessarily confirm with 100-percent confidence that no OE are present in the sector. When no OE are found during an investigation, statistical techniques can be used to relate the level of confidence that exists that the actual residual OE density does not exceed a specified target OE density given assumptions about the potential distribution of OE and ordnance within the sector consistent with the archival record. This relationship identifies how confident one can be that the residual OE density is less than a specified target density given the results of the characterization program within the sector. If a certain amount of a sector is investigated and no OE are found, there is a corresponding level of confidence that the OE density in the area is less than a given target density. If the target density is lowered and no additional area is investigated, the level of confidence that the characteristic OE density in the area is less than that lower target density value also is reduced.

2.6.13 The estimation of residual risk becomes the principal objective and a key input to the EE/CA especially if OE are not found in the sector. Estimates of the OE density in the sector and the depth distribution of the residual OE become very important for projecting potential OE exposures and hazards. It is still important, however, to ensure that the sector is sufficiently uniform and self-consistent with respect to OE characteristics to enable the estimated densities to adequately represent the entire sector in the projection of exposures and potential risk resulting from various specified activities in the sector.

2.6.14 Risk associated with residual OE items depends on both the number and distribution of OE or energetic ordnance items present in the sector, the range of activities assumed to be plausible for that sector in the future, and how many people may participate in those activities. As such, projected risk to residual OE depends directly on assumptions about land use and the way in which the sector may be used in the future. Future use assumptions involving large numbers of people using an area will, if all sector OE characteristics are equal, result in larger numbers of potential exposures and greater hazard potential than scenarios in which fewer people are involved. Activities that disturb the soil to some depth, in addition to just the surface, will result in larger numbers of potential exposures than scenarios that involve activities that occur only on the surface.

2.6.15 Consequently, unrestricted future land use or a future scenario characterized by intensive soil disturbance by large numbers of people will require lower residual OE densities to offset the higher population usage/exposure patterns and maintain a specified level of potential risk. This is due to the direct influence of both OE density and receptor exposure parameters (relating to frequency and intensity) on the number of projected OE exposures and level of hazard. Similarly, scenarios associated with more limited future land use and less intensive soil disturbance by smaller numbers of people will not require as low (as stringent) a residual OE density to maintain a specified level of potential risk.

2.6.16 In consideration of this inherent trade-off, a range of target OE densities are typically considered to reflect a common level of potential risk given differences in future land use and potential receptor exposure scenarios. These target densities are often in the range of 1.0 OE/acre down to 0.1 OE/acre. The lower target OE density, 0.1 OE/acre, is more commonly associated with unrestricted future land use, whereas the higher density is more often associated with less intensive soil interactions and smaller exposed populations.

2.6.17 The minimum conceptual or theoretical fraction of a sector requiring geophysical investigation to evaluate the sector's degree of uniformity and self-consistency may be estimated with the Predictor Equation. This initial investigation area may also be modified on the basis of professional judgement. However, the condition of homogeneity within a sector can be tested statistically only with an actual data set. Therefore, graphical analysis and testing using SiteStats/GridStats may be used interactively as a given field investigation progresses to ensure random grid location within the sector (depending on the nature of activities performed in the sector) and, in the event that OE are found, to determine when sufficient data have been collected to evaluate homogeneity. UXO Calculator (statistical software package developed by CEHNC)

will then be used to calculate the inferred 90-percent confidence interval for the estimated OE density in the sector, based on the field results. This 90-percent confidence interval will then be used for subsequent engineering evaluation and cost analysis.

2.6.18 UXO Calculator also will be used to determine the fractional area to be investigated if no OE are found within a given sector. In this case, UXO Calculator will be used to determine the sampled area required to achieve a sufficiently high level of confidence (e.g., 90-percent) that the OE density is less than or equal to the specified target density for the intended land use. If no OE are found, sampling will continue until 90-percent confidence is achieved that the inferred OE density does not exceed the target density. The specification of a 90-percent confidence level provides a conservative estimate of this key risk management parameter.

2.6.19 If, during the course of the investigation, obvious heterogeneities or patterns of ordnance-related items are observed within a sector, (e.g., distinct geographic groupings of OE), the sector may require subdivision so that the requirement of uniformity is satisfied and/or an appropriate non-random sampling approach can be identified and applied. Each newly created sector will then be evaluated separately, with the minimum fractional area requiring investigation within each estimated graphical analysis using the Predictor Equation along with professional judgement, and the results evaluated using SiteStats/GridStats and/or UXO Calculator.

2.6.20 In the event that the uniformity criteria of SiteStats/GridStats is satisfied after a relatively small number of OE are found, the 90-percent confidence level on OE density for the sector may be high due to statistical uncertainty, even when the mean measured density is well below the target density. Use of such an unrealistically high OE density in the subsequent risk evaluation could then result in the recommendation of unnecessary actions to reduce risks that may not exist. Therefore, a decision may be made on the basis of professional judgement to collect additional data to reduce the uncertainty in the density estimate. Data collected during the OE investigation will be evaluated in the field to develop estimates of densities and confidence levels to allow the field investigation to be cost-effectively modified, if necessary.

2.6.21 A general decision process will be applied to guide the field effort to meet all data quality objectives necessary for OE work and ensure that information of sufficient quality is produced. The general steps of the investigation process are as follows:

Step 1 Layout the minimum number of sample areas (grids) in each sector as determined by the Predictor Equation and professional judgement. Approximately 20-percent of the initial grids should be non-randomly located to areas with the greatest potential to contain ordnance based on the archived records or site reconnaissance activity. The remaining 80-percent will be randomly located using SiteStats/GridStats or an equivalent randomization tool.

Step 2 Perform geophysical surveys on the established sample areas and transmit the collected data to the Foster Wheeler Environmental Command Center for processing and evaluation. The investigation is to be performed on the sectors with the greatest potential to find OE first (i.e., work from "dirty" to "clean").

Step 3 Process the data using software appropriate for the geophysical instrumentation used and run the automatic anomaly picking program.

Step 4 Qualify the anomalies selected for the baseline plan to filter out the anomalies with a very high likelihood of not being produced by OE. For the purposes of this investigation, OE-like anomalies are anomalies with estimated sizes that fall within a certain range (33% to 50%, depending on QA results) of the actual size of the expected OE target. Non-OE-like anomalies are anomalies with shapes that are obviously not related to OE (e.g., pipelines, geologic heterogeneity, etc.), or anomalies outside of the size range. In order to better evaluate the OE discrimination process/results a small number of anomalies with a low likelihood of being OE will be selected for excavation and incorporated into the discrimination database. Develop the sample area Dig Sheets containing a prioritized list of the remaining anomalies to intrusively investigate (dig).

Step 5. Investigate qualified anomalies (as discriminated per Step 4 above) on the Dig Sheets. Record the numbers of anomalies and OE found in each grid sample area, the depth at which they were found, and other specified data items.

2.6.22 At this point, the results of the initial phase of the investigation will be evaluated on a sector-by-sector basis. Uniformity and sector self-consistency relative to ordnance will be evaluated graphically in real-time as data are collected (as part of Steps 1 through 5) to identify situations that are clearly not homogenous and to initiate the resectoring and investigation modification process. If OE are found in the sector, the following additional steps will be taken (Note: F designates that OE were found during the field investigation):

Step 6-F. Perform the real-time homogeneity testing and self-consistency evaluation for the sector using the dig results.

Step 7-F. If the sector is demonstrated to be homogeneous, use the UXO Calculator to calculate the upper 90-percent confidence limit on OE density. Then:

a) If the OE density is less than or equal to the target density at a 90-percent level of confidence, stop investigating in that sector.

b) If the actual number of OE found demonstrates an OE density greater than or equal to the target, stop investigating that sector.

c) If the 90-percent confidence limit exceeds the target density, but the actual number of OE found represents a density less than the target, use professional judgement to determine whether additional investigation is likely to reduce the statistical uncertainty such that the upper 90-percent confidence level will be less than or equal to the target density.

If the sector is not demonstrated to be homogeneous, see if obvious patterns of inhomogeneity are apparent. Evaluate whether there may be a localized grouping of buried OE or whether the sector should be subdivided into smaller sectors consistent with the data currently in hand.

Step 8-F. If no obvious patterns of ordnance groupings or deposition are apparent, additional sample areas may be investigated to evaluate sector characteristics pursuant to Step 6-F. If re-sectoring is indicated, redesign and conduct the investigation for the new sectors. Sample areas investigated prior to re-sectoring will be included in the new minimum number of grids to be investigated in each sector pursuant to Step 1.

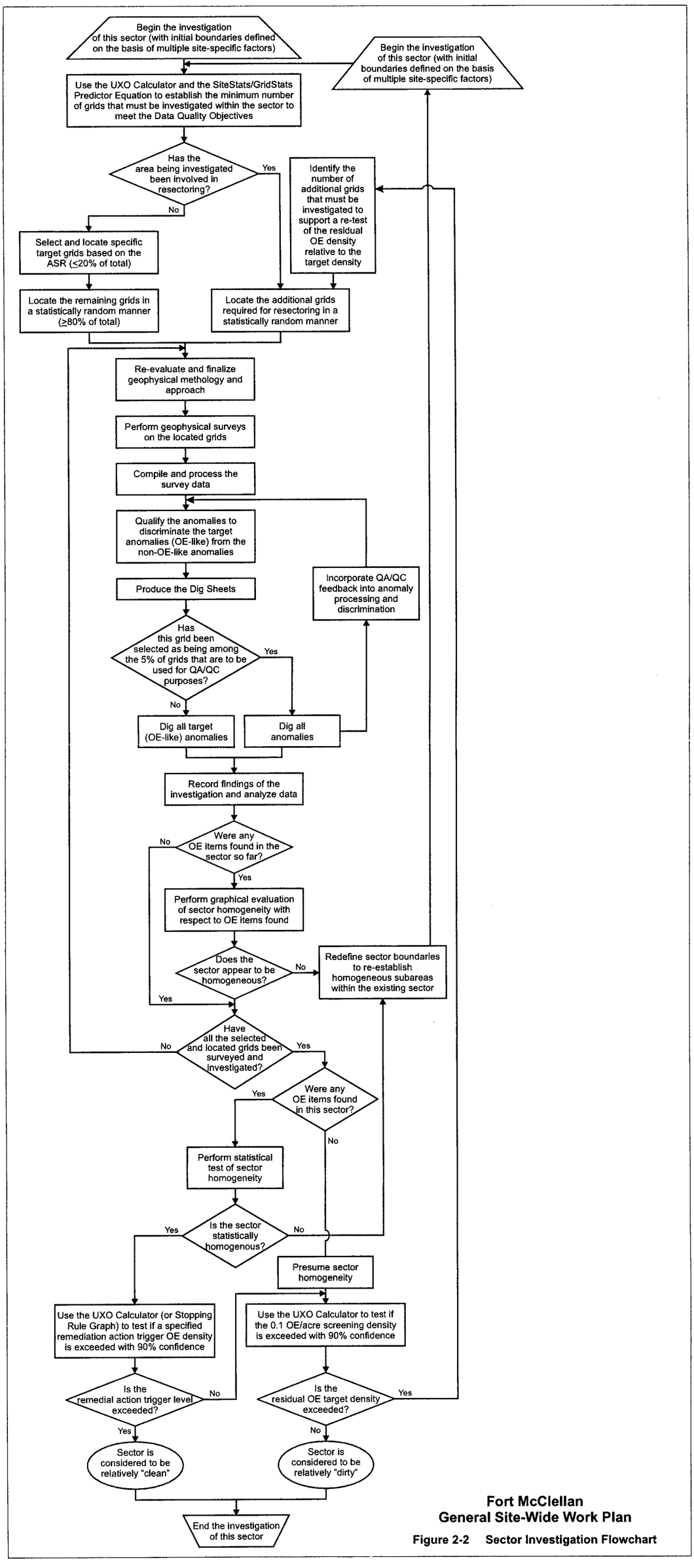
If OE are not found in the sector, the following additional steps will be taken (Note: NF designates OE were not found during the field investigation):

Step 6-NF. Lay out additional randomly located sample areas in each sector to bring the total up to the number calculated using the UXO Calculator to achieve a 90-percent level of confidence at the target density.

Step 7-NF. Repeat Step 2 through Step 5 above for these sample areas to demonstrate OE density less than or equal to the target density at a 90-percent level of confidence. (Note that this assumes no OE are found during Steps 6-NF and 7-NF).

Step 8-NF. If at some point during Step 7-NF, OE are discovered in a sector, revert to Step 6-F.

A graphical representation of these steps is presented in Figure 2-2.



Fort McClellan
General Site-Wide Work Plan

Figure 2-2 Sector Investigation Flowchart

2.7 ORDNANCE AND EXPLOSIVES RISK ASSESSMENT

2.7.1 Role of Risk Assessment

A baseline risk assessment should be performed for all sites being addressed at Fort McClellan. The baseline risk assessment is an analysis of the potential adverse health effects (current or future) attributable to OE and OE-related constituents at a site in the absence of any actions to control or mitigate these releases. The baseline risk assessment is performed as part of the EE/CA, and is a critical part of the analysis of the site characterization results. The findings of the baseline risk assessment also focus the subsequent development, evaluation, and selection of appropriate response action alternatives for areas where the projected level of risk is not judged to be acceptable. The Unexploded Ordnance (UXO) Management Principles recently released jointly by the U.S. EPA and the Department of Defense (DoD) restates this role and specifies that the selection of site-specific response actions should consider risk.

2.7.1.1 Baseline risk assessments are site-specific and may vary in both detail and the extent to which qualitative and quantitative inputs and analyses are used. The characteristics of the baseline risk assessment depend on: the complexity and particular circumstances of the site; the availability of applicable or relevant and appropriate requirements (ARARs) and other criteria, advisories and guidance; and the specific concerns of the site's stakeholders. The baseline risk assessment should consider the potential risk associated with current land use and activities, as well as reasonably anticipated future land use. At Fort McClellan, this will include consideration of the potential impact to individuals participating in wildlife management activities, as well as residents and workers following plausible reuse or redevelopment efforts.

2.7.1.2 Land use controls (LUCs) should not be considered in the baseline risk assessment, as the baseline risk assessment summarizes site risks in the absence of any proposed action or land use control. LUCs serve to minimize exposure and are not considered as part of the "No Action" alternative. It is also not generally appropriate to consider the presence of fences or any other engineered barriers in the baseline risk assessment. However, it is appropriate to consider LUCs in conjunction with other response actions if residual OE contamination is expected to remain at a site following OE response. Furthermore, LUCs will be applied at Fort McClellan at sites where residual contamination and thus residual risk are believed to remain. LUCs will be determined on a site-specific basis and will be implemented through a LUC Implementation Plan (LUCIP).

2.7.1.3 Subsequent to the baseline risk assessment, an assessment is typically made of the projected reduction in the level of risk associated with the remedial alternatives that are identified for a particular area during the performance of the EE/CA. This assessment is part of the development and evaluation of response alternatives typically using the nine criteria established under CERCLA in the National Oil and Hazardous Substances Contingency Plan (NCP). Aspects of risk reduction are a direct consideration relative to the following NCP criteria:

- Overall Protection of Human Health and the Environment (Threshold Criterion);
- Long Term Effectiveness and Permanence (Balancing Criterion);

- Reduction in Toxicity, Mobility and Volume (Balancing Criterion);
- Short Term Effectiveness (Balancing Criterion);
- Acceptance by Appropriate Regulatory Agencies or Agencies with Jurisdiction over Affected Resources (Modifying Criterion); and
- Community Acceptance (Modifying Criterion).

2.7.1.4 At a site such as Fort McClellan, the potential adverse health effects that should be considered include both explosive hazards (such as would be associated with potential exposures to any energetic ordnance items present) and the "conventional" risk due to potential exposures to the chemical components and residues that may be associated with these items and their casings. While the explosive and physical hazards of the ordnance items and ordnance-related debris present at Fort McClellan may represent a potentially greater concern (relative to the chemical constituents), each type of potential impact to the people and the environment should be assessed and considered.

2.7.1.5 At the present time, federal risk assessment guidelines and procedures have no special provisions for dealing with ordnance, and the processes that have been developed and applied for many years for chemical contaminants do not all lend themselves directly to this type of contamination. Ordnance has unique properties that influence their release and transport mechanisms, the potential for contact and exposure, and the effects of that exposure. No risk assessment guidance or consensus as to an acceptable risk or hazard range has been established for ordnance.

2.7.2 Emergence of the Interim Range Rule Risk Methodology (IR3M)

A range of hazard evaluation and risk assessment tools have been developed and applied to qualitatively or quantitatively assess OE related risk under various circumstances.

2.7.2.1 The most current approach for assessing the potential risks associated with ordnance and ordnance-related materials is the March 2000 working draft of the Interim Range Rule Risk Methodology (IR^3M).

2.7.3 Overview of the IR3M

The IR^3M is being developed in response to the DOD's proposed Range Rule. The proposed Range Rule defines a comprehensive process for managing, assessing and communicating risk at former ranges located within the United States. Under the proposed Range Rule, the DOD (along with the U.S. EPA, state and tribal regulatory authorities, and a wide variety of stakeholders) are developing the IR^3M as a process for effectively managing risks posed by unexploded ordnance (UXO) and other constituents that may be found on former military

training areas. The IR^3M process includes steps to ensure the safety of people and the environment by providing the decision-maker with the tools and information necessary to:

- Gather sufficient, accurate data to make informed decisions;
- Weigh factors to make informed decisions concerning response actions;
- Keep stakeholders involved in the risk management process; and
- Begin taking proactive action immediately to reduce risk associated with ordnance and other constituents.

2.7.3.1 The IR^3M is being developed to be a systematic, logical process for ensuring that risk reduction actions are:

- effective in protecting human health and the environment;
- technically feasible;
- financially responsible; and
- consistent with the intended land use.

2.7.3.2 This approach applies the principles of U.S. EPA's data quality objective (DQO) process, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and CERCLA together with DOD's explosive safety requirements and other applicable Federal, State and Local laws and regulations. The recently issued Unexploded Ordnance Management Principles explicitly restate DoD's commitment to promulgating the Range Rule as a framework for response actions at closed, transferred or transferring (CTT) ranges, and U.S. EPA's commitment to assist in the development of this rule.

2.7.3.3 The March 2000 Draft IR^3M explosives safety risk assessment process is based on three primary risk factors: (1) Accessibility; (2) Overall Hazard; and (3) Exposure. Each of these three risk factors is defined by considering a particular set of risk subfactors, as follows:

1)	Accessibility	←	Depth (of UXO) Below Surface
		←	Migration / Erosion
		←	Intrusion Level of Activity (Current and/or Future)
2)	Overall Hazard	←	UXO Hazard Type
		←	Fuzing
		←	Amount of Energetic Material

3) Exposure
- ← Frequency of Entry
- ← UXO Density
- ← Intensity of Activity (Current and/or Future)
- ← Portability (Facilitated Migration)

2.7.3.4 A series of scoring rules and weighting factors is presented for combining the subfactor characteristics into a composite score for each of the three primary risk factors. Another set of scoring rules and weighting factors is then used to combine the three primary risk factors to obtain a relative explosives safety risk score (i.e., defined on a five-step scale from low risk to high risk). The March 2000 Draft IR^3M does not include criteria for specifying the "acceptability" of the relative risk categories that are defined. This draft also does not identify which of the five final risk scores reflect conditions in an area that warrant "no further action" and which scores should trigger further evaluation in an Engineering Evaluation/Cost Analysis (EE/CA).

2.7.4 Adoption of the IR3M as Risk Methodology for Explosives Safety

While the March 2000 Draft of the IR^3M is a working document subject to further development, review, and revision, it reflects over three years of refinement and evolution in concepts and approach. A number of groups within the DoD and the U.S. EPA have been direct contributors to the development of the March 2000 Draft IR^3M, including representatives of the CEHNC. In consideration of these and other factors, the CEHNC decided to adopt the basic approach and framework of the March 2000 Draft IR^3M explosives safety risk assessment process for application to the OE clean-up work to be performed at Fort McClellan.

2.7.5 Intention to use Fort McClellan as an IR3M Test Site

Prior discussions between the CEHNC and the lead IR^3M developers at the U.S. EPA have led to a tentative agreement to utilize the required hazard and risk assessments required for the OE clean-up activities at Fort McClellan as tests of the IR^3M under actual site circumstances and applications. The intent is to test the current draft of the IR^3M explosives safety risk assessment process (or a version to be specified at a later point in time) relative to both the assessment of the baseline levels of risk (assuming the No Action alternative) and relative to the projection of the risk reduction associated with various response action alternatives.

2.8 PROCEDURES FOR REPORTING AND DISPOSITION OF UXO

All UXO Disposal Operations will be conducted IAW in this Plan and the SOP for UXO Disposal is Attachment 2-1.

2.8.1 Responsibilities of Personnel

All personnel assignments, qualifications and positions will be in accordance with Data Item Description OT-025.

2.8.1.1 The Senior UXO Supervisor is responsible for planning, directing and executing all explosive disposal operations and ensuring the safety of all personnel. He will ensure the range or exclusion zone is clear of all unauthorized personnel before commencing explosive handling operations. He will be in charge of all explosive disposal activities.

2.8.1.2 A minimum of three UXO Specialists will be used in conducting explosive disposal operations, one member in charge, The UXO Supervisor/Demolition Team Leader, his assistant, and a third member who will act as safety observer. The safety observer will be located in the safe area and will maintain visual contact with the down range team as well as maintaining communications with the Foster Wheeler Environmental command center. For small projects the Senior UXO Supervisor may act as the third UXO specialist in the safe area. The SSHO/QC will ensure that all work within the range or exclusion zone is performed in accordance with the approved Site-Specific Work Plan.

2.8.2 Training Requirements

All personnel assigned to the Disposal Team and other site personnel involved with the disposal process will attend a site-specific orientation. The purpose of this orientation will be to review site-specific and emergency response procedures. Course attendance sheets with attached curriculums will be used to document completion of each orientation session. The topics to be covered during the orientation are listed below:

- Project summary
- Site-Specific Health and Safety Plan (SHSP) review
- Review SOP
- Equipment training
  - Radio Controlled Firing Device
  - Selected donor explosives
- Emergency procedures
  - Review emergency response equipment
  - Talk/walk through of emergency procedures
  - Emergency drill

2.8.2.1 Overall Safety Precautions

The following specific safety precautions for disposal operations will be observed:

- The two-man rule will be in effect in all disposal operations. In addition, a third person (safety) shall be available near the disposal site to act as a safety observer and communications watch in the event of an accident.
- Loose initiating explosives include lead azide, mercury fulminate, lead styphnate, and tetracene. These explosives manifest extreme sensitivity to friction, heat, and impact. Extra precautions may be required when handling these types of explosives. Keep initiating explosives in a water-wet condition at all times until ready for final preparation for detonation. The sensitivity of these explosives is greatly increased when dry.
- Demolition operations will not be conducted during dust, wind, rain, snow, electrical storms or when cloud cover is less than 200 meters.
- Only condition code "A" or "C" military explosive items, or commercial explosives within their shelf life limit, shall be used as donor explosives for disposal operations.
- Exercise extreme care in handling and preparing high explosives for detonation. They are subject to detonation by heat, shock, or friction.
- Do not pack bomb fuze wells with explosives unless it can be positively confirmed that the fuze well does not contain any fuze components.
- Photo flash bombs must be handled with the same care as black powder filled munitions.
- OE containing white phosphorous shall not be detonated into the ground. The OE shall be counter-charged on the bottom center line (CCBC) when possible.
- Carry blasting caps in approved containers and keep them out of the direct rays of the sun, and located at least 25 feet from other explosives, until they are needed for priming.
- Do not handle, use, or remain near explosives during the approach or progress of an electrical storm. All persons should retire to a place of safety.
- Do not use explosives or accessory equipment that are obviously deteriorated or damaged. They may cause a premature detonation or fail completely.
- Always point the explosive end of blasting caps, detonators, and explosive devices away from the body during handling.
- Use only standard blasting caps of at least the equivalent of a commercial No. 8 blasting cap.

- Use electric blasting caps of the same manufacturer for each demolition shot involving more than one cap.

- Do not bury blasting caps. Use detonating cord to position blasting caps above the ground. Buried blasting caps are subject to unobserved pressures and movement, which could lead to premature firing or misfires.

- Test electric blasting caps for continuity at least 50 feet from any other explosives prior to connecting them to the firing circuit. Upon completion of testing, the lead wires will be short-circuited by twisting the bare ends of the wires together. The wires will remain shunted until ready to be connected to the firing circuit.

- In the event of a misfire when disposing of explosives by detonation, do not approach the disposal site for at least 30 minutes after the expected detonation time when firing electrically. When conducting non-electric procedures, the wait time shall be one hour from the expected time of detonation.

- A post-search of the detonation site shall be conducted to assure complete disposal was accomplished.

- If the situation dictates, protective measures to reduce shock, blast, and fragmentation shall be taken. Army Technical Manual TM 5-855-1, Fundamentals of Protective Design for Conventional Weapons, DOD standard 6055.9 and EODB 60A-1-1-4, Protection of Personnel and Property, contain data on blast effects, ground shock, cratering, ejection, and fragmentation. The following distances shall be used unless protective measures are implemented:

  – All exclusion zones for UXO operations will be based on the Most Probable Munition (MPM) expected to be encountered in accordance with DOD 6055.9 or as calculated by the USACE CEHNC Engineering Branch. If specific distances are not specified the following general distances will apply;

  – For non-fragmenting explosive materials, evacuation distance should be a minimum of 1250 feet.

  – For fragmenting explosive materials, evacuation should be a minimum of 2500 feet. For bombs and projectiles with caliber 5 inches or greater, use a minimum evacuation distance of 4000 feet.

  – Items with lugs, strong backs, tail plate sections, etc., should be oriented away from personnel locations as fragmentation from these items tends to travel farther than normal. Consideration should be given to tamping the UXO to control fragments, if the situation warrants. Fragments shall be minimized not only to protect personnel but also property, such as buildings, trees, etc.

  – Open burning of explosives and smokeless powder or chemical decomposition of explosives shall not be accomplished without approval of the contracting officer.

- Do not inhale the smoke or fumes of burning pyrotechnic or incendiary materials. The fumes and dust from many of these materials are irritating and/or toxic if inhaled.

- Do not use water on incendiary fires. Water may induce a violent reaction or be completely ineffective, depending on the mixture.

- Anticipate a high order detonation when burning pyrotechnic or incendiary-loaded UXO. Safety measures for personnel and property must be based upon this possibility.

- Inert ordnance will not be disposed of or sold for scrap until the internal fillers have been exposed and unconfined. Heat generated during a reclamation operation can cause the inert filler, moisture, or air to expand and burst the sealed casings. Venting or exposure may be accomplished in any way necessary to preclude rupture due to pressure from being confined.

2.8.3 OE Identification

OE identification will be made by trained OE personnel. Identification will be made based on personal experience and by using appropriate ordnance publications. The SUXOS will verify all OE items. In the event that site OE personnel are unable to identify a suspect OE item, the SUXOS will request assistance from the CEHNC Safety Representative. If site personnel are not able to fully identify a suspect OE the item will be photographed with a digital camera and electronically transmitted to CEHNC, Huntsville for assistance.

2.8.4 OE Transportation

2.8.4.1 Handling, Transportation, and Storage

All handling of OE and donor explosives will be in accordance with accepted safety precautions found in AR 385-64, ETL-385-1-1, TM 60A-1-1-31, TM 60A-1-1-22 and state requirements. It is anticipated that all located OE items will be disposed of in the position found. OE items considered safe to move may be transported within the grid for purposes of consolidating shots if desired. Prior to the actual handling operations, the exclusion zone will be adjusted for the actual fragmentation range of the OE encountered.

2.8.4.1.1 For BIP operations donor explosives will be transported from the magazine area to the BIP site via motor vehicle. All motor vehicle transportation of explosive materials will be in accordance with the provisions of 49 CFR Parts 100 to 199, state and local requirements. Blasting caps and/or detonators will not be transported in the same vehicle as class/div 1.1 explosives. Prior to transporting explosives to the demolition site and upon completion of

demolition operations, the Foster Wheeler Environmental command center will notify the Fire Department and Security/Police of the expected transport time and route of travel.

2.8.5 Safe Holding Areas

Storage of recovered OE is covered in Section 3 of this Work Plan. Magazine storage for the donor explosives will be required until the Foster Wheeler Environmental UXO personnel perform disposal of the recovered OE. The storage of the donor explosives and any recovered OE will be in the Alabama National Guard Ammunition Supply Point. The storage area will meet the requirements of AR 385-64, and will be approved by the state. In order to comply with state directives the state approved OE custodian will have sole custody and access to these magazines. Two magazines are required to preclude any compatibility conflicts. Under no circumstances will the rated capacity of these magazines be exceeded.

2.8.6 Operations in Populated/Sensitive Areas

Coordination of all personnel assigned to the Fort McClellan Project will be vital to the safe and efficient disposal process. The ongoing OE investigation effort by Foster Wheeler Environmental and its subcontractors will ensure that the property will continue to be a safe place. Assistance of all contractors and activity personnel is encouraged to ensure that the disposal operations will be completed in the safest possible manner.

2.8.6.1 Coordination activities will begin with a series of meetings with U.S. Army Engineering and Support Center, Huntsville, Fort McClellan Transition Force Operations and local activities to identify shared and individual responsibilities of each organization. The community will be informed of the project schedule and the expected impacts through a public meeting presentation. The coordination, notification, and verification activities are outlined in the SOP for UXO Disposal Operations (Attachment 2-1).

2.8.7 Demolition and Post Demolition Operations

All personnel engaged either directly or indirectly in operations in which ammunition, explosives, and hazardous materials are involved shall be thoroughly trained in explosive safety. They shall be capable of recognizing hazardous situations and of taking prompt and effective corrective action.

2.8.7.01 For the purposes of this Work Plan only one method of disposal will be utilized, Open Detonation (OD). This method uses a donor explosive charge placed in contact with the ordnance, and when detonated results in a detonation of the energetic material. Under no circumstances shall ammunition and explosives be disposed of by detonation unless they are

specifically identified and their characteristics are known. Specific guidance on donor charge placement for the specific ordnance type encountered is contained in TM 60A-1-1-31.

2.8.7.02 If ordnance is discovered that contains white phosphorous (WP), and conditions permit, it shall be countercharged on the bottom centerline (CCBC) to disperse the WP in the air and complete combustion. Care must be taken when returning to the disposal site after detonation to ensure that all WP was consumed. Do not approach the area until all smoke has cleared and the Senior UXO Supervisor has declared the area safe.

2.8.7.03 Protective equipment including face shield, leather gloves and flame retardant clothing such as the type worn by welders will be available and worn when handling suspect WP ordnance. Water and sand will be readily available when handling suspect WP ordnance.

2.8.7.1 Disposal Operations

All located OE will be disposed of in the position/location found. In the event an area cannot withstand a high order detonation, items that can be safely moved, will be disposed of in an area that can withstand a high order detonation. If an item is located that is considered unsafe to move and the area cannot withstand a high order detonation, engineering controls will be used to reduce the blast and fragmentation effect of a detonation, and the item will be disposed of in place. If the area can not with stand a high order detonation, with the application of engineering controls, the SUXOS will notify the CEHNC Safety Representative that the item is not safe to move and that the item can not be disposed of in place, and request additional assistance.

2.8.7.2 Posting of Prescribed Procedures

Prescribed procedures specific to the disposal of OE by detonation, emergency procedures, and communications protocol will be posted on site.

2.8.7.3 Communications

Communications equipment consisting of cellular phone and hand held radios will be available for emergency communications with fire and medical support activities. Radio and cellular phone transmissions will be secured whenever electric blasting caps are exposed.

2.8.7.4 Safety Signals

Explosive disposal procedures shall not be initiated until the Bravo Flag (RED Flag) is prominently displayed from a position that is visible from all approaches to the range, and the following audible warning signals are sounded:

- Warning Signal - A one minute series of long audible signals 5 minutes prior to blast signal.
- Blast Signal - A series of short audible signals 1 minute prior to the detonation.
- All Clear Signal - A prolonged audible signal following the inspection of the blast area.

2.8.7.4.1 These warning signals will be prominently displayed on the security barricades at all access points.

- The SUXOS will also communicate a five minute warning, a one minute warning and the fire command on the hand held radio to all project personnel

2.8.7.5 Range Vehicles

There shall be a sufficient number of vehicles on the range to provide seating equipped with seat belts for each member of the Disposal Team. The vehicles will be parked in a protected area free of vegetation, facing away from the detonation site with the keys left in the ignition. The vehicles designated to transport explosives shall not be used to transport passengers when explosives are on board and must comply with the provisions of 49 CFR 177.835 (e) and (f). Smoking, or flame producing devices are not permitted within 50 feet of the vehicle transporting explosives. The vehicle operator will avoid driving in areas of dry vegetation that could possibly be ignited by the heat generated from the catalytic converter.

2.8.7.6 Weather and Environmental Considerations

Disposal operations will only be conducted during daylight hours. All vegetation including dry grass, leaves, and other combustible materials shall be removed within a radius of 500 feet or the firebrand distance, whichever is greater around the disposal site.

2.8.7.6.1 Prior to commencing disposal operations the Senior UXO Supervisor will obtain a local weather report. Disposal operations will not commence during periods of heavy, low total overcast, or during electrical storms.

2.8.7.7 Emergency Medical Support

Stringfellow Hospital will provide first responder emergency medical support. They can be contacted by dialing (256-235-8572). A complete first aid kit will be maintained on site by a person trained in CPR, and first aid procedures.

2.8.7.8 Fire Support

The Anniston/Fort McClellan Fire Department will be notified when disposal operations are to be performed. When the fire hazard is high due to dry conditions, disposal operations will not commence unless mobile fire-fighting equipment is standing by in a safe location, or Fire Department support can reach the range within 5 minutes. Upon completion of disposal operations the range will not be secured if any probability of fire exists.

2.8.7.9 Two-Man Rule

The Two-Man Rule is a concept of failsafe, where two knowledgeable individuals perform potentially hazardous operations where each is the safety for the other. The Two-Man Rule shall apply whenever explosives are handled, transported or during disposal operations on or off the range. No one will handle or assemble explosive components alone.

2.8.7.10 Personal Protective Equipment

All operations under this SOP will be conducted in Level "D" Personal Protective Clothing. To include non-static producing clothing, gloves, and safety glasses.

2.8.7.11 Blow in Place (BIP) operations

When UXO is discovered that can not be safely moved, and the area can withstand a high order detonation, then the item will be blown in place. Demolition procedures will be the same for BIP operations as for demolition operations conducted on approved demolition ranges. After verification that authorization has been granted by the Fort McClellan CEHNC Safety Representative and Fort McClellan Transition Force Operations to conduct disposal operations the following actions will be performed/verified:

- An appropriate exclusion zone for the UXO encountered has been established and evacuation of the area has been confirmed.

- Emergency support services; fire, security, and medical have been notified and are standing by.

- Adequate protective works/engineering controls to reduce the damage caused by the detonation are in place, if required.

2.8.7.11.1 Every effort should be made to establish the firing point in a location where the Senior UXO Supervisor can visually observe the entire hazard area. It is preferred that all detonations be fired by electric initiation so positive control can be maintained up to the point of detonation. The primary firing system will be the radio control firing system. The standard electrical firing system will be available as a back up system. For use in high electro magnetic radiation areas and during high fire periods the Nonel system using shock tubes for instantaneous firing will also be used. Both systems are covered in Attachment 2-1.

2.8.7.12 Exclusion Zone

An exclusion zone will be established for the ordnance to be blown in place in accordance with DOD Standard 6055.9 or as calculated by USACE CEHNC Engineering. Closure and evacuation of exclusion zones will be performed by Foster Wheeler Environmental personnel after coordination with Fort McClellan Transition Force Operations and CEHNC on site representative.

2.8.7.13 Electrical Firing Demolition Procedures

Preparation of donor explosives. The primary donor explosives for use in disposing OE items will be the one pound pentolite booster, Jet Perforators, detonating cord and electrical blasting caps.

2.8.7.13.1 One Pound Pentolite Booster-Insert 80 grain detonating cord into the detonator well all the way through and back through other hole and tie a over hand knot to secure it from coming out. When using more than one booster insert detonating cord through each of the boosters detonator well and secure to keep them from sliding along the detonating cord.

2.8.7.13.2 Jet Perforator-Using the detonating cord clip secure detonating cord to the Jet Perforator. Place the Jet Perforator on the OE item using tape or other suitable methods to prevent Jet perforator from moving.

2.8.7.14 Preparation and Priming, Electrical Firing System

An electric firing system consist of two electric blasting caps, firing wire and a remote controlled firing device. The methods and sequence of operations of electric priming are described below.

2.8.7.14.1 Telephone or radio communications will be established with emergency response personnel. No radio transmissions will take place during positioning or connecting of electrical initiating devices.

2.8.7.14.2 Control of the site must be maintained during disposal operations. All personnel who are not essential to disposal operations must evacuate to a safe area. Access roads which enter the blast area will be blocked during explosive disposal operations to ensure that unsuspecting individuals are not placed in jeopardy by the explosion. The Senior UXO Supervisor will assure the area is clear of personnel and equipment prior to permitting attachment of the initiation devices to the priming charge.

2.8.7.14.3 The Senior UXO Supervisor will conduct a 360 degree visual search for aircraft, boats or personnel near the exclusion before initiating any explosives.

2.8.7.14.4 Prior to conducting an On-site disposal operations, safety briefings will be conducted which will include, as a minimum, phases of the operation, review of explosive handling and EMR precautions, location of safe area, emergency notification procedures, site specific characteristics, type of OE being destroyed, placement and quantity of counter charge, misfire procedures, post clean up of site, care and handling of explosive materials, personal hygiene, two man rule, potential trip/fall hazards, location of On-Site vehicle, wind direction, location of first aid kit and fire extinguisher.

2.8.7.14.5 A minimum of two qualified personnel, one of which will be the assigned UXO Supervisor/Demolition Team Leader, will conduct disposal operations. Control initiation devices will remain with the supervisor until attachment to the firing circuit.

2.8.7.14.6 Positive control is required, initiation devices will be limited to those requiring electrical current.

2.8.7.14.7 In the event of a fire on the range evacuate to the fragmentation distance until the fire is extinguished.

- Prepare and place all explosive charges as prescribed above.
- Locate a safe position for receiver, cut off a length of wire (less than 100 feet) that will reach receiver and charges.
- Conduct a continuity check of the wire with a galvanometer. Twist free ends of wire together to prevent an electric charge from building up in firing wire.
- Test each blasting cap with a galvanometer and twist free ends of cap lead wires together to prevent electric charge build-up in lead wires.
- Connect blasting caps in a parallel circuit and connect to extension wires.

- Connect extension wires to receiver.
- Secure caps onto detonating cord.
- Retreat to safe area ,
- Senior UXO Supervisor verify that exclusion zone is clear,
- Warning Signal - A one minute series of long audible signals 5 minutes prior to blast signal.
- The SUXOS will give a five minute warning on the hand held radio
- Blast Signal - A series of short audible signals 1 minute prior to the detonation.
- The SUXOS will give a one minute warning on the hand held radio.
- Arm command firing device,
- UXO Demolition Team Leader give three loud fire in the hole,
- Sound siren
- SUXOS give fire command on the hand held radio
- SUXOSUS gives permission to fire shot,
- Demolition Team Leader fire demolition shot.

2.8.7.15 Electric Misfire Procedures

A thorough check of all equipment, firing wire and detonators will prevent most misfire situations. In order to prevent electric misfires, one technician must be responsible for all electrical wiring in the circuit. If a misfire does occur, it must be cleared with extreme caution. Two personnel will investigate the misfire and correct the situation.

- Check connections and make a second attempt to initiate charge.
- If unsuccessful, disconnect and connect to another blasting machine (if available) and attempt to initiate charge.

- If unsuccessful, disconnect power source and shunt the firing wires.
- Wait 1hour from the last initiation attempt.
- After the wait time has expired a designated technician will proceed down range to inspect the firing system; a safety observer must watch from a safe area.
- Connect a new electric firing system and prime the charge without disturbing the original firing system.
- Follow normal procedures for initiating charges.

2.8.7.16 NONEL Firing Procedures

The Nonel Firing System utilized at Fort McClellan by Foster Wheeler Environmental and sub-contractors will be the Shock Tube Firing System. The shock tube is a thin plastic tube of extruded polymer with a layer of special explosive material deposited on its interior surface. This special explosive, which is normally contained within the plastic tubing dust propagates a detonation wave from the initiating end (safe zone) to the demo area.

2.8.7.16.1 Shock tube provides the instantaneous action of electric initiation without the risk of accidental initiation of an electrical blasting cap (and the charge) by radio transmitters in the area. The system also reduces the amount of detonating cord required which helps reduce range fires caused by the detonating cord. The Nonel system can be initiated electrically if desired.

- Lay out required length of shock tube to reach from demo site to initiating area
- At UXO, place perforator or booster attached to 2-3’ detonating cord in position- secure with sand bags
- At UXO attach detonating cord to shock tube lead line with cap on end and tape connection.
- NOTE!!! The lead line could run straight to the safe area or to a bunch block if multiple shots are being fired. If multiple shots are being fired the shock tube lead line would run from the safe area to a bunch block to additional lead lines to additional shots. The procedure is illustrated in the SOP for UXO Disposal Operations.
- Check system when complete and depart for safe area (firing point)
- Attach shock tube to firing device.
- Ensure area is clear, give verbal warning and activate firing device.

2.8.7.17 NONEL Misfire Procedures

- The most common cause of a misfire in a shock tube firing system is the initiating element (igniter)

- If two or three retries with the igniter does not initiate the shock tube, cut the shock tube, replace the igniter with a new one and repeat the firing procedure.

- If the igniter appears to have fired (primer pops and smokes) but the charge did not fire, cut a one foot section from the shock tube lead in starting 6" from the igniter. Hold the one foot piece of shock tube so that one end is over the palm of your hand and gently blow through the other end. If a fine powder is blown from the shock tube, it has not fired. In this case install a new igniter and repeat the firing procedure.

- If the igniter functioned properly and no fine powder was blown from the shock tube, then the suspect cause would be the non-electric blasting cap at the OE side of the shock tube.

- Wait one hour.

- After the one hour waiting period has passed go to the OE end of the shock tube. Check each component in the train until the cause of the failure is identified. Replace the component that failed. Lay out another firing system and repeat the firing procedure.

2.8.7.18 Post Demolition Procedures

At the conclusion of detonation and after a five minute wait time, the UXO Supervisor/Demolition Team Leader will inspect the site prior to allowing other personnel to enter the blast area. UXO Specialists will conduct a shoulder to shoulder sweep of the detonation site to gather fragments and explosive residue if present. Intact ordnance items that failed to detonate will be counter-charged and blown in place. Explosive residue will be collected and detonated. Metal fragments will be examined to ensure complete detonation of explosive material. All Clear Signal - A prolonged audible signal following the inspection of the blast area

2.8.7.19 Demobilization

Following explosive disposal operations, all signs and barricades will be removed and the craters will be back-filled. Backfill material will consist of native soil from the range.

2.8.7.20 Quality Control

Quality control is performed to ensure that the ordnance was completely destroyed in the detonation process. The SSHO/QC Representative will ensure that the procedures are implemented and are being followed as defined in the Site-Specific Work Plan and listed below.

- Perform follow-up QC on disposal procedures.
- Ensure proper exclusion zone controls.
- Ensure proper disposal procedures are performed in accordance with Attachment 2-1.
- Ensure the proper use of explosives per TM 60A-1-1-31 for ordnance encountered.
- Complete data entry on intrusive investigation anomaly form (Attachment (Insert Attachment Number) included in Section (Insert Section Number) of the *Site-Specific Work Plan*).
- Perform QC checks on 10% of all disposal craters prior to backfill operations.
- Escort designated QA representatives to perform QA checks prior to backfill operations, if required.

2.9 OE AND NON-OE SCRAP PROCEDURES

2.9.1 Purpose and Scope

This plan describes the methods and procedures to be used for collection, inspection, segregation, marking, transportation, processing and disposal of materials located during the Ordnance and Explosive Response at Fort McClellan, Alabama. The objectives for this plan are to perform these tasks in a safe and environmentally sound way. Some of the materials have no inherent value and therefore are waste, others are recyclable property of the Department of Defense, and will be processed for sale as scrap. The principal categories of materials will be metal parts associated with military munitions, including practice munitions, targets, and components of munitions systems; concrete , bricks and construction rubble; and tires used for marking targets.

2.9.2 Applicable Regulations

Disposal of recoverable and recyclable materials which are the property of the Department of Defense is generally governed by the Defense Reutilization and Marketing Service (DRMS). DOD 4160.21M provides guidelines on the classification, and procedures for the disposal of AEDA material. Where the disposal of materials with limited or minimal value is most economically and practically performed by other than sale through DRMS, such as the disposal

of many waste materials, the disposal may be included as part of the service provided by the contractor collecting and processing the material. One such procedure is for contractors to sell or dispose of marginal materials as an offset to the cost of the contract. DoD has instituted requirements that all waste materials which are gleaned from ranges, must be examined and certified as safe when there is no danger of detonation or explosive reaction. The certification must be performed by individual who have defined training and experience, and are therefore qualified to determine that the items are safe. Disposal of waste is governed by the Resource Conservation and Recover Act and the applicable local regulations. Special restrictions relate to the disposal of tires and of tanks and piping associated with storage and dispensing of petroleum fuels. Disposal of tires is restricted to landfills permitted for this purpose.

2.9.3 DRMS Restrictions

As a result of a fatal incident involving scrap materials from a military range in California, the DRMS has developed special procedures to limit the possibility that ammunition and dangerous articles can be contained in other materials sold by the DRMS to the general public, and the Department of Defense is preparing new regulations to regulate the inspection, transportation and disposal of military munitions related scrap materials. The procedures described herein will fulfill the intent of those restrictions. The procedures outlined below used to certify that disposed materials do not contain hazardous substances, including explosives, are equivalent to those required by DRMS.

2.9.4 Procedures

Field Collection, Segregation and Inspection of Ordnance Related Waste Materials. Procedures to assure that all located waste is accounted for will include subdividing the survey area into grids, and systematically inspecting those grids to locate, identify, classify, process and remove items discovered.

2.9.4.01 **Grid Clearance Operations.** The areas to be surveyed will be clearly divided and marked into grids. Each grid will be assigned to one of the UXO Teams for performance of clearance operations. The designated UXO Team will locate, identify and mark ordnance-related materials where they are located. Clearly identifiable inert materials will be consolidated in designated locations on each marked grid. Tires and other waste materials not associated with ordnance will be collected in a separate location for appropriate disposal. Suspected dangerous items will be inspected and classified as safe to move or not safe to move by a qualified unexploded ordnance (UXO) Specialist. These items will be handled in accordance with appropriate, approved procedures to assure the safety of workers. As described in Attachment 2-1, items which are not safe to move will be marked for later explosive detonation in place (Blow in Place). Items which are safe to move will be relocated by a UXO Specialist using approved procedures to a designated area for explosive detonation to assure that no explosive materials remain.

2.9.4.02 **Consolidation Operations.** The leader of the UXO Team will re-inspect the clearly inert items and mark each item in accordance with approved general marking procedures. These items will be separated into categories of like items, loaded into movable containers, and transported to the Waste Disposal Staging Area.

2.9.4.03 **Inerting Operations.** Items which are not safe to move will be Blown in Place. This is an explosive procedure conducted at the location where the item is found. In this procedure, controlled explosive devices are used to initiate a detonation of any residual explosive materials in the item. These operations are conducted by trained UXO Specialists, with special equipment and under special access and control procedures to assure that no one is placed at risk from the detonation. Items which are safe to move will be consolidated in a designated area for processing. Appropriate mechanical or explosive procedures are used to explode any contained materials or to verify that no such materials remain. Residual materials from Blow in Place and consolidated operations are inspected, and if found to be free of explosive contamination are packaged for removal to the Waste Disposal Staging Area for re-inspection, certification, packaging and disposal.

2.9.4.04 **Waste Disposal Staging Area Operations.** In the Staging Area, the Waste Disposal Manager will remove the items from the containers transported from the grids. He will re-inspect each item to assure that inert items are certifiably inert, and then place the item in lockable inert material containers. The Waste Disposal Manager will maintain sole custody of the locked inert material containers. Items which are not certifiable as inert will be returned to the field operations to be processed until they can be reliably determined to be inert. The Waste Disposal Manager will control access to the inspection and classification area to assure that no items other than those that are clearly inert will be added to these inert containers. Prior to sealing the containers the Foster Wheeler Quality Control Representative will inspect the contents of each container in the presence of the Waste Disposal Manager. The Waste Disposal Manager and the Quality Control representative will close, seal and mark the containers, prepare a certification of inspection and sign this certification. An example of a certificate is attached as Exhibit 1. Sealed and certified containers will be stored separately from other containers.

2.9.4.05 All containerized wastes will be stored in U.S. DOT UN specification containers, conforming to 49 CFR 178 performance-oriented packaging requirements (e.g., IA2 drums.

2.9.4.06 **Transportation/Storage.** Materials scheduled for disposal will be detonated in place or in the general area found. If the UXO item is safe to move and the SUXOS desires to consolidate demolition shots, safe to move items may be transported within the grid. Demolition operations will be conducted between 1600 and 1700 daily. All demolition operations will be in accordance with the Standard Operating Procedure for Disposal Operations. When appropriate quantities of inert materials are available, scrap, building demolition debris and related waste materials will be transported to an approved disposal facility for disposal.

2.9.4.1 Disposal and Processing

Range Related Materials. The DRMS has developed special procedures to limit the possibility that ammunition and dangerous articles can be contained in other materials sold by the DRMS to the general public, and the Department of Defense is preparing new regulations to regulate the inspection, transportation and disposal of military munitions related scrap materials. The procedures used to certify that disposed materials do not contain hazardous substances, including explosives, are equivalent to those required by DRMS. Certified lots of range related materials will be transported to a waste processor/disposer. A copy of the certification will be attached to the container, and will be provided to the CEHNC Safety Representative and the waste treater. All metal containing range residual materials will be certified and processed for sale (or waste disposal fee) thorough the waste processor.

2.9.4.1.1 **Certifying Officials.** Highly qualified UXO personnel will be designated as the Certifying Official. The individuals so designated will be graduates of the U.S. Naval School, Explosive Ordnance Disposal, Indian Head, Maryland and must have served in EOD billets and assignments while on active military duty. Copies of the designated individual's certificate of graduation and summary of experience will be maintained by the Project Office. Specimen of the signatures of certifying officials will also be maintained in these records.

2.9.4.1.2 **Certification Forms.** A certification form as shown in Figure 2-3 will be completed for each container of material proposed for sale or disposal. The form will be completed as a container is filled, and as items are individually inspected to assure that no danger of detonation or explosion remains. Copies of the form will be attached to the container, provided with the bill of lading for shipment, and in the project files. The forms will be used as the principal tool for maintaining accountability for materials and for inspection to assure that the items are in fact safe for unlimited release to the public.

2.9.4.1.3 **Material Storage.** Range residue will be maintained in a secure area until sale can be completed. Containers of materials will be locked and sealed to assure that no uninspected items are added to the containers.

2.9.4.1.4 **Sale.** Offers for sale will include the "Dangerous Property" Clause stipulated by DoD Memorandum dated 15 May 1998.

2.9.4.1.5 **Post Sale Activities.** Foster Wheeler Environmental Corporation will provide, when required, escorts for vehicles transporting materials to the salvage location. UXO personnel will brief the purchasers personnel on the hazards of unexploded ordnance and actions to be taken if unexploded ordnance items are discovered.

Figure 2-3
Blank Certificate

Sequence Number	**RANGE RESIDUE CERTIFICATION**
Description of Container (Type, Size, Cover/Security System)	
Description of Contents (Quantity, Type, Description, Nomenclature and Condition)	
Statement: I hereby certify that I have inspected the items described above and have determined that they do not contain explosives, propellants, or other materials which could result in an explosion.	
Certifying Official:	Typed or Printed Name: _____ Signature DATE:
Quality Control Official:	Typed or Printed Name: _____ Signature: Date:

For further information call John C. McIlrath, Foster Wheeler Environmental Corporation, at (256) 820-7904

Release for Disposal	
To (Printed Name):	Location:
Signature:	Date:

Transfer of Custody	
To (Printed Name):	Location:
Signature:	Date:

Transfer of Custody	
To (Printed Name):	Location:
Signature:	Date:

2.9.4.1.6 **Construction Debris.** Containers of construction debris will be transported to a State approved construction debris landfill.

2.9.4.1.7 **Tires.** Containers of tires used to mark targets will be transported to a State approved construction debris landfill.

2.9.4.1.8 **Trash and Garbage.** Trash and garbage generated during work will be disposed of by a local trash service.

ATTACHMENT 2-1
UXO DEMOLITION PROCEDURES

ATTACHMENT 2-1

UXO DEMOLITION PROCEDURES

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1.0 PURPOSE

This document provides basic demolition procedures that are applicable to all non-nuclear explosive ordnance, explosive main charge fillers, explosive initiating components and UXO operations.

2.0 SCOPE

This document contains guidance for UXO demolition procedures applicable to disposal of explosive ordnance, but is limited to procedures that are basic or general in nature. The following assumptions are considered:

These procedures are intended for personnel involved in UXO disposal operations.

- UXO personnel do not perform rendering safe procedures except when specifically authorized in writing for a specific task.
- Ordnance items 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 will be considered armed.

UXO items that are considered armed will not be moved.

3.0 MAINTENANCE

The Foster Wheeler, Fort McClellan Project Manager is responsible for updating this procedure. Approval authority rests with Foster Wheeler's Director of UXO Services.

4.0 DEFINITIONS

- ***Exclusion Zone -*** Areas where contamination (hazards) are known or likely to be present, or because of activity, have the potential to cause harm to personnel. The exclusion zone shall be large enough to protect other personnel from the blast and fragmentation hazards of accidental detonation. The exclusion zone for UXO operations will be in accordance with DOD Standard 6055.9 or calculated by the USACE CEHNC Engineering Branch.

- ***Expended Ordnance-*** Ordnance that has functioned as designed, leaving the shell or container behind. This shell of container may or may not contain explosive/pyrotechnic/toxic residue. This material would not be considered inert, and could not be salvaged as scrap without appropriate visual inspection, sampling, and/or treatment.

- ***Explosive Ordnance Disposal Personnel -*** Active duty military personnel who have completed the training course at the U.S. Naval School, Explosive Ordnance Disposal (EOD), Eglin AFB, Florida and are currently assigned to a military EOD unit.

- ***Foster Wheeler Environmental Command Center*** - A designated location staffed by personnel to relay and control all communications/activities of field personnel and other units.

- ***Inert Ordnance -*** Ordnance that never contained explosives, or ordnance that have had all explosive components removed and certified safe.

- ***Intrusive Investigation -*** Excavating for suspected UXO items or for plotted anomalies. Excavation will be by hand, or utilizing mechanical equipment as deemed appropriate.

- ***Non-Intrusive Investigation -*** Locating/investigating UXO on the surface of the ground where excavation is not required.

- ***Non-Ordnance and Explosive Metal Debris*** – Metal debris recovered during operations which is not ordnance related, such as metal rebar, angle iron, sheet metal and bar stock, etc.

- ***Ordnance and Explosives -*** Bombs, guided and ballistic missiles, artillery, mortars, rocket ammunition, small arms ammunition, antipersonnel and antitank mines, demolition charges, pyrotechnics, grenades, sea mines, torpedoes, depth charges, containerized and non-containerized high explosives and propellants, depleted uranium rounds, military chemical agents, and all similar components related to munitions that were designed to cause damage to personnel or material through explosive force, incendiary action, or toxic effects. Non-containerized high explosives, propellants, or soils contaminated with explosive constituents are considered explosives if the concentration of explosive material is 10-percent or higher.

- ***Ordnance and Explosive Metal Debris*** - Ordnance materials which have not been in direct contact with the energetic materials of the ordnance, such as bomb fins, grenade spoons, shipping containers, etc.

- ***Ordnance and Explosive Waste*** - Ordnance materials which have been in direct contact with the energetic materials of the ordnance, such as, expended rocket motors, shell casings, warhead fragments, powder containers, etc.

- ***Practice Ordnance -*** Munitions that demonstrate similar characteristics as their high explosive counterparts, and may or may not contain pyrotechnic, explosive, or chemical (e.g., titanium tetrachloride) spotting charges.

- ***Unexploded Ordnance -*** 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. For the purpose of this project, the definition of UXO is limited to items larger than 50-caliber.

- ***UXO Personnel*** **– Personnel qualified in accordance with Data Item Description OT-025** and is currently working as a civilian specialist with UXO items/materials.

- ***Open Detonation (OD)*** - A method of disposal for explosive ordnance where a donor explosive charge is detonated in contact with the ordnance to achieve a high order detonation of the energetic materials contained within the ordnance.

ACRONYMS AND ABBREVIATIONS

BIP	Blow in Place
CCC	Counter Charge the Cone
CCBC	Counter Charge Bottom Center
CCMC	Counter Charge the Main Charge
CFR	Code of Federal Regulation
CQC	Contractor Quality Control
EOD	Explosive Ordnance Disposal
HS	Health and safety
ID	Identification
OE	Ordnance and explosives
PPE	Personal protective equipment
QC	Quality control
SCBA	Self-contained breathing apparatus
SSHO	Site Safety and Health Officer
SSHP	Site-Safety and Health Plan
SOP	Standard Operating Procedure
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded ordnance
WP	White Phosphorous

5.0 DISCUSSION

Coordination of all personnel assigned to a project will be vital to the safe and efficient disposal process. The UXO investigation effort by Foster Wheeler Environmental and its subcontractors will ensure that the property will continue to be a safe place. Assistance of all contractors and activity personnel is encouraged to ensure that the disposal operations will be completed in the safest possible manner.

Coordination activities will begin with a series of meetings with the client to identify shared and individual responsibilities of each organization. The community will be informed of the project schedule and the expected impacts through a public meeting presentation. The coordination, notification, and verification activities are outlined below.

Coordination Meeting - Before explosive disposal operations are scheduled to begin, a coordination meeting will be conducted to establish roles and responsibilities. The meeting will address specific elements of planning and responsibilities. Topics will include:

◊ Explosive handling and transportation;
◊ Required support services, fire, medical, security, etc.;
◊ Notifications;
◊ Maintenance of exclusion zone; and
◊ Community impact.

Public Meeting - A public meeting will be held, if required, prior to commencing activities. A Foster Wheeler Environmental representative will present a brief detailing the sequential steps involved with the scheduled activities. Topics will include:

◊ Daily hours of operation;
◊ Requirements for evacuation and road closures;
◊ Exclusion zone procedures; and
◊ Emergency procedures.

Notifications - The Foster Wheeler Environmental command center will notify Transition Force Operations on Thursday of each week of the following weeks scheduled disposal activities to facilitate timely coordination arrangements for the evacuation of designated areas and closure of required roads. Foster Wheeler Environmental will ensure that the following agencies are informed of the schedule and prepared to respond as necessary for emergency assistance:

◊ Medical Facility;
◊ Fire Department - (emergency); (non-emergency) ; and
◊ Security /Police Department -

Exclusion Zone Information - Foster Wheeler Environmental will provide the client one copy of the required exclusion zone if the detonation is to be conducted on-site, blow in place. Maps with EZ arcs

based on the fragmentation range for the most probable munition to be encountered for each grid/sector will be provided.

- ◊ TFO will coordinate evacuations and road closures with all personnel in the affected areas.
- ◊ Foster Wheeler Environmental will erect exclusion zones and be responsible for road closures during disposal activities.
- ◊ Special access to the exclusion zone will be coordinated through Foster Wheeler Environmental on-site personnel. Field logbook entries will be used for personnel accountability.
- ◊ Exclusion zones will remain in effect until proper notification by the Foster Wheeler Environmental command center.

Daily Verification - Prior to each day's activities, the Foster Wheeler Environmental command center will verify daily that the following have been performed:

- ◊ Emergency response activities have been notified and are available
- ◊ Exclusion zones have been evacuated as required.

5.1 PERSONNEL REQUIREMENTS

All personnel assignments, qualifications and positions will be in accordance with USACEH OT-025.

The Senior UXO Supervisor is responsible for planning, directing and executing all explosive disposal operations and ensuring the safety of all personnel. He will ensure the range or exclusion zone is clear of all unauthorized personnel before commencing explosive handling operations. He will be in charge of all explosive disposal activities.

A minimum of three UXO Specialists will be used in conducting explosive disposal operations, one member in charge, The UXO Supervisor/Demolition Team Leader, his assistant, and a third member who will act as safety observer. The safety observer will be located in the safe area and will maintain visual contact with the down range team as well as maintaining communications with the Foster Wheeler Command Center. For Small projects the Senior UXO Supervisor may act as the third UXO specialist in the safe area.

The SSHO/QC will ensure that all work within the range or exclusion zone is performed in accordance with the approved *Site-Specific Work Plan.*

5.2 TRAINING REQUIREMENTS

All personnel assigned to the Disposal Team and other site personnel involved with the disposal process will attend a site-specific orientation. The purpose of this orientation will be to review site-specific and emergency response procedures. Course attendance sheets with attached curriculums will be used to

document completion of each orientation session. The topics to be covered during the orientation are listed below:

A. Introduction
   1. Project summary
B. Presentation
   1. *Site-Specific Health and Safety Plan* (SHSP) review
   2. Review SOP
   3. Equipment training
      a. Radio Controlled Firing Device
      b. Selected donor explosives
   4. Emergency procedures
      a. Review emergency response equipment
      b. Talk/walk through of emergency procedures
      c. Emergency drill

5.3 EQUIPMENT/MATERIAL REQUIREMENTS

Each UXO Supervisor will inspect health and safety and disposal equipment prior to commencing operations. An equipment checklist is included as Attachment 1. A checklist of health and safety equipment is included as Attachment 2. It is anticipated that all tasks will be performed in Level D personal protective equipment (PPE).

The following publications are required to be on-site during disposal operations:

- Approved Work Plans;
- DOD Standard 6055.9
- TM 60A-1-1-4, Protection of Personnel and Property;
- TM 60A-1-1-31, General Information on EOD Disposal Procedures; and
- EM 385-1-1, Safety and Health Requirements Manual.
- State and local directives.
- USACEH OT-025
- ATFP- 5400.7 Explosive Laws and Regulations
- Foster Wheeler Environmental UXO Safety Precautions and Demolition Procedures

5.4 UXO EXPLOSIVE DISPOSAL OPERATIONS

This section provides guidance for the safe disposal of recovered OE/UXO.

5.4.1 General Safety Precautions-The following precautions/procedures apply to all UXO Disposal Operations conducted by Foster Wheeler Environmental Corporation.

- Disposal operations will be in accordance with all local, state and federal regulations pertaining to use, transporting, storage and disposal of explosive materials.

- All plans for disposal of explosives will be reviewed by Foster Wheeler Environmental Compliance to ensure compliance with federal, state, and local regulations pertaining to use, transporting, storage, and disposal of explosive materials

- All exclusion zones for UXO operations will be in accordance with DOD 6055.9 or as calculated by the USACE CEHNC Engineering Branch. If specific computed distances are not available for the munitions being disposed of the following general distances will apply;
  - For non-fragmenting explosive materials, evacuation distance should be a minimum of 1250 feet.
  - For fragmenting explosive materials, evacuation should be a minimum of 2500 feet.
  - For bombs and projectiles with caliber 5 inches or greater, use a minimum evacuation distance of 4000 feet.
  - Items with lugs, strong backs, tail plate sections, etc., should be oriented away from personnel locations as fragmentation from these items tends to travel farther than normal. Consideration should be given to tamping the UXO to control fragments, if the situation warrants. Fragments shall be minimized not only to protect personnel but also property, such as buildings, trees, etc.
  - Open burning of explosives and smokeless powder or chemical decomposition of explosives shall not be accomplished without approval of the contracting officer.
  - Do not inhale the smoke or fumes of burning pyrotechnic or incendiary materials. The fumes and dust from many of these materials are irritating and/or toxic if inhaled.
  - Do not use water on incendiary fires. Water may induce a violent reaction or be completely ineffective, depending on the mixture.
  - Anticipate a high order detonation when burning pyrotechnic or incendiary-loaded UXO. Safety measures for personnel and property must be based upon this possibility.
  - Inert ordnance will not be disposed of or sold for scrap until the internal fillers have been exposed and unconfined. Heat generated during a reclamation operation can cause the inert filler, moisture, or air to expand and burst the sealed casings. Venting or exposure may be accomplished in any way necessary to preclude rupture due to pressure from being confined.

- If the situation dictates, protective measures to reduce shock, blast, and fragmentation shall be taken. Army Technical Manual TM 5-855-1, Fundamentals of Protective Design for Conventional Weapons, DOD standard 6055.9 and EODB 60A-1-1-4, Protection of Personnel and Property, contain data on blast effects, ground shock, cratering, ejection, and fragmentation.

- Maintain minimum safe distances between electromagnetic-radiating sources and electro-explosive devices in accordance with EODB/TM-TO 60A Series

- Do not conduct blasting or demolition operations during an electrical, dust, sand, or snowstorm of a severity great enough to produce atmospheric static electrical charges, or when such a storm is

nearby (approximately 5 miles). Under such conditions, all operations will be suspended, cap and lead wires short-circuited, and personnel removed from the demolition area. Demolition operations will also be terminated if visibility becomes less than 600 feet.

- The two-man rule will be in effect in all disposal operations. In addition, a third person (UXO Safety Officer) shall be available near the disposal site to act as a safety observer and communications watch in the event of an accident. On small sites the SUXOS may serve as the UXO Safety Officer.

- Loose initiating explosives include lead azide, mercury fulminate, lead styphnate, and tetracene. These explosives manifest extreme sensitivity to friction, heat, and impact. Extra precautions may be required when handling these types of explosives. Keep initiating explosives in a water-wet condition at all times until ready for final preparation for detonation. The sensitivity of these explosives is greatly increased when dry.

- Only condition code "A" or "C" military explosive items, or commercial explosives within their shelf life limit, shall be used as donor explosives for disposal operations.

- Exercise extreme care in handling and preparing high explosives for detonation. They are subject to detonation by heat, shock, or friction.

- Do not pack bomb fuze wells with explosives unless it can be positively confirmed that the fuze well does not contain any fuze components.

- Photo flash bombs must be handled with the same care as black powder filled munitions.

- UXO containing white phosphorous shall not be detonated into the ground. White phosphorous munitions shall be counter-charged on the bottom centerline (CCBC) when possible.

- Carry blasting caps in approved containers and keep them out of the direct rays of the sun, and located at least 25 feet from other explosives, until they are needed for priming.

- Do not work with electric blasting caps or other electro-explosive devices while wearing static-electricity producing clothing (nylon, silk, synthetic hair, etc.).

- Do not use explosives or accessory equipment that are obviously deteriorated or damaged. They may cause a premature detonation or fail completely.

- Always point the explosive end of blasting caps, detonators, and explosive devices away from the body during handling.

- Use only standard blasting caps of at least the equivalent of a commercial No. 8 blasting cap.

- Use electric blasting caps of the same manufacturer for each demolition shot involving more than one cap.

- Do not bury blasting caps. Use detonating cord to transmit the shock wave from the blasting caps on the surface to a buried/tamped explosive charge. Buried blasting caps are subject to unobserved pressures and movement, which could lead to premature firing or misfires.

- Test electric-blasting caps for continuity at least 50 feet from any other explosives prior to connecting them to the firing circuit. Upon completion of testing, the lead wires will be short-circuited by twisting the bare ends of the wires together. The wires will remain shunted until ready to be connected to the firing circuit.

- In the event of a misfire when disposing of explosives by detonation, do not approach the disposal site for at least one hour after the expected detonation time when firing electrically. When conducting non-electric procedures, the wait time shall be one hour from the expected time of detonation.

- A post-search of the detonation site shall be conducted to assure complete disposal was accomplished.

- Do not abandon any explosives

- Do not leave explosives, empty cartridges, boxes, liners, or other materials used in the packing of explosives lying around where children or unauthorized persons or livestock can get at them.

- Do not allow any wood, paper, or other materials used in packing explosives to be burned in a stove, fireplace, or other confined space, or to be used for any purpose. Such materials should be destroyed by burning at an isolated location out of doors, and no person should be allowed within 100 feet of the burning operation.

- Do not fight fires involving explosive material. Remove all personnel to a safe location and secure the area.

5.4.1 Transporting, Storing, and Handling Demolition Materials

- Know and observe federal, state, and local laws and regulations, which apply to the transportation, storage, and use of explosives.

- Do not permit metal, except approved metal truck bodies, to contact explosive containers. Do not transport metal, flammable, or corrosive substances with explosives.

- Do not allow smoking, or the presence of unauthorized personnel, in vehicles transporting explosives.

- Carefully load and unload explosives from vehicles. Never throw or drop explosives from the vehicle.

- Assure the load is blocked and prevented from movement and displacement.

- Do not drive vehicles containing explosives over public highways until all permits and certifications have been obtained from the state enforcement agencies. All routes must be approved in writing prior to transporting explosive materials over public highways. Shipment of explosive materials over public highways will be by licensed commercial carriers unless Foster Wheeler UXO personnel have been specifically licensed and certified to make the shipment.

- Never leave an explosive loaded vehicle unattended.

- Do not store blasting caps, detonators, or other items containing initiating explosives in the same box, container, or magazine with other explosives.

- Store explosives materials in military or ATF approved magazines only. Ensure that magazines used for the storage of explosive materials comply, with quantity distance requirements, for the class of explosive material they contain. Reference documents include AFM 127-100, OP-5, TM 9-1300-206, AMCR 385-100 and ATF-Explosives Law and Regulation, ATF P 5400.7

- Do not store spark-producing metal/tools in an explosive magazine.

- Do not permit smoking, matches or any source of fire or flame within 100 feet of an explosive magazine.

- Do not allow leave, grass, brush or debris to accumulate within 50 feet of an explosive magazine.

- Do not permit the discharge of firearms within 300 feet of an explosive magazine.

- Do not use any alkaline material such as lye, washing soda, or soap to remove TNT exudate. Alkaline materials will react with the TNT to render it more sensitive.

- Do not permit smoking, matches, or other sources of fire or flame within 100 feet of an area in which explosives are being handled.

- Do not expose explosives or devices containing explosive to prolonged exposure to direct sun light. Such exposure increases sensitivity and deterioration.

- Ensure that all unused explosives are returned to their proper containers and the container closed after use.

- Do not carry explosives or explosive components in pockets or on the body.

- Do not insert anything but time fuse or detonating cord into the open end of a blasting cap.

- Do not strike, tamper with, or attempt to remove or investigate the contents of, a blasting cap (electric or non-electric), detonator, or other explosive initiating device. A detonation will most likely occur.

- Do not pull on the electrical lead wires of electric blasting caps, detonators, or their electro-explosive devices. A detonation is likely to occur.

- Do not attempt to remove an unfired or misfired primer or blasting cap from a base coupling. There is a high risk of an explosion.

- Do not allow unauthorized or unnecessary personnel to be present when explosives are being handled.

- Always point the explosive end of blasting caps, detonators, and other explosive devices away from the body.

- Do not use pull rings or safety pins to lift or handle explosive devices.

5.4.2 OE/OEW Disposal Procedures

Thinking safety and working safely must become a firmly established habit when working with or in the vicinity of items, which are potentially dangerous by reason of their explosive, flammable or toxic characteristics. All personnel engaged either directly or indirectly in operations in which ammunition, explosives, and hazardous materials are involved shall be thoroughly trained in explosive safety. They shall be capable of recognizing hazardous situations and of taking prompt and effective corrective action.

For the purposes of this procedure only one method of disposal will be utilized, Open Detonation (OD). This method uses a donor explosive charge placed in contact with the ordnance, and when detonated results in a sympathetic detonation of the energetic material. Under no circumstances shall ammunition and explosives be disposed of by detonation unless they are specifically identified and their characteristics are known. Specific guidance on donor charge placement for the specific ordnance type encountered is contained in TM 60A-1-1-31.

If ordnance is discovered which contains white phosphorous (WP), and conditions permit, it shall be countercharged on the bottom centerline (CCBC) to disperse the WP in the air and complete combustion. Care must be taken when returning to the disposal site after detonation to ensure that all WP was consumed. Do not approach the area until all smoke has cleared and the Senior UXO Supervisor has declared the area safe.

Protective equipment including face shield, leather gloves and flame retardant clothing such as the type worn by welders will be available and worn when handling suspect WP ordnance. Water and sand will be readily available when handling suspect WP ordnance.

5.5 RANGE OPERATIONS

The safest procedure for personnel when encountering UXO/OE is to destroy the UXO/OE in place using explosives (Blow in Place BIP). Standard procedures will be to dispose of all located UXO/OE items daily between 1400 and 1700 hours. All located OE/UXO will be disposed of in the position/location found. In the event an area cannot withstand a high order detonation ,items that can be safely moved, will be disposed of in an area that can withstand a high order detonation. If an item is located that is considered unsafe to move and the area can not withstand a high order detonation, engineering controls will be used to reduce the blast and fragmentation effect of a detonation, and the item will be disposed of in place. If the area can not with stand a high order detonation, with the application of engineering controls, the SUXOS will notify the CEHNC Safety Representative that the item is not safe to move and that the item can not be disposed of in place, and request additional assistance.

5.5.1 Posting of Prescribed Procedures

Prescribed procedures specific to the disposal of OE/UXO by detonation, emergency procedures, and communications protocol will be posted on site.

5.5.2 Communications

Communications equipment consisting of cellular phone and a hand held transceiver will be available for emergency communications with fire and medical support activities. Radio and cellular phone transmissions will be secured whenever electric blasting caps are exposed.

5.5.3 Safety Signals

Explosive disposal procedures shall not be initiated until the Bravo Flag (RED Flag) is prominently displayed from a position that is visible from all approaches to the range, and the following audible warning signals are sounded:

- Warning Signal - A one minute series of long audible signals 5 minutes prior to blast signal.
- Blast Signal - A series of short audible signals 1 minute prior to the detonation.
- All Clear Signal - A prolonged audible signal following the inspection of the blast area.

These warning signals will be prominently displayed on the security barricades at all access points.

- The SUXOS will also communicate a five minute warning, a one minute warning and the fire command on the hand held radio to all project personnel

5.5.4 Range Vehicles

There shall be a sufficient number of vehicles on the range to provide seating equipped with seat belts for each member of the Disposal Team. The vehicles will be parked in a protected area free of vegetation, facing away from the detonation site with the keys left in the ignition. The vehicles designated to transport explosives shall not be used to transport passengers when explosives are on board and must comply with the provisions of 49 CFR 177.835 (e) and (f). Smoking, or flame producing devices are not permitted within 50 feet of the vehicle transporting explosives. The vehicle operator will avoid driving in areas of dry vegetation that could possibly be ignited by the heat generated from the catalytic converter.

5.5.5 Weather and Environmental Considerations

Disposal operations will only be conducted during daylight hours. All vegetation including dry grass, leaves, and other combustible materials shall be removed within a radius of 500 feet or the firebrand distance, whichever is greater around the disposal site.

Prior to commencing disposal operations the Senior UXO Supervisor will obtain a local weather report. Disposal operations will not commence during periods of heavy, low total overcast, or during electrical storms.

5.5.6 Emergency Medical Support

An agreement will be made with a local Medical Facility to provide first responder emergency medical support service. The telephone number of the responding medical facility will be posted in plain sight of project personnel. A complete first aid kit will be maintained on site by a person trained in CPR, and first aid procedures.

5.5.7 Fire Support

The designated Fire Department will be notified when disposal operations are to be performed. When the fire hazard is high due to dry conditions, disposal operations will not commence unless mobile fire-fighting equipment is standing by in a safe location, or Fire Department support can reach the range within 5 minutes. UXO personnel will have shovels and fire flappers on site to aid in putting out small grass fires. Upon completion of disposal operations the range will not be secured if any probability of fire exists.

5.5.8 Two-Man Rule

The Two-Man Rule is a concept of failsafe, where two knowledgeable individuals perform potentially hazardous operations where each is the safety for the other. The Two-Man Rule shall apply whenever explosives are handled, transported or during disposal operations on or off the range. No one will handle or assemble explosive components alone.

5.5.9 Personnel Protective Equipment

All operations under this SOP will be conducted in Level "D" Personnel Protective Clothing. To include non-static producing clothing, gloves, and safety glasses.

5.6 BLOW IN PLACE (BIP) OPERATIONS

When UXO is discovered and the area can withstand a high order detonation, then the item will be blown in place. Demolition procedures will be the same for BIP operations as for demolition operations conducted on approved demolition ranges after verification of the following; Authorization has been granted by the client to conduct the disposal operation.

- An appropriate exclusion zone for the UXO encountered has been established and evacuation of the area has been confirmed.
- Emergency support services; fire, security, and medical have been notified and are standing by.

- Adequate protective works/engineering controls to reduce the damage caused by the detonation are in place, if required.

Every effort should be made to establish the firing point in a location where the Senior UXO Supervisor can visually observe the entire hazard area. All detonations will be fired by electric initiation so positive control can be maintained up to the point of detonation. The primary firing system will be the radio control firing system. The standard electrical firing system will be available as a back up system. In areas of increased electromagnetic radiation or where the area has a high fire index the use of a Nonel system may be used. Four Nonel initiating systems are currently in use. Foster Wheeler Environmental will use the Shock Tube system.

5.6.1 Exclusion Zone

An exclusion zone will be established for the ordnance to be blown in place in accordance with DOD Standard 6055.9 or as calculated by the CEHNC Engineering Branch. Closure and evacuation of exclusion zones will be performed by Foster Wheeler Environmental personnel after coordination with the client on site representative.

5.6.2 Engineering Controls

Engineering controls or protective works are measures to reduce the probable effects of the UXO creating the hazard in the event of a detonation. These engineering controls will be employed where required to minimize the damage from blow in place operations. These controls may consist of earthen works, sandbags, trenching, buttressing, taping of glass, mounding, flooding, and venting to reduce the effects of detonations.

5.7 SCRAP PROCEDURES

An inspection of the detonation crater and surrounding area will be conducted after each disposal operation. All metal fragments will be policed and containerized for later disposal.

5.8 RECORDKEEPING

The Senior UXO Supervisor, or his delegate the UXO Disposal Supervisor/Demolition Team Leader, will complete the Explosive Disposal Activities Checklist (Attachment 3), Explosive Disposal Log (Attachment 4), and the UXO Acquisition and Accountability Log (Attachment 5), which tracks the OE/UXO from cradle to grave.

5.9 PREPARATION FOR UXO DISPOSAL OPERATIONS

- Bring only sufficient explosives to meet requirements of the operation to the disposal site.

- Do not use improvised methods for initiating blasting caps.

- Use standard blasting caps with at least the equivalent of a commercial No. 8 blasting cap.
- Use electric blasting caps, other than M6, of the same manufacture for each demolition shot involving more than one cap.
- The preparation of initiators will be performed at least 25 feet from other explosives.

5.9.1 Conventional Non-Electric Priming

- The primary method of initiating all demolition shots will be electrical by use of the remote control firing device. Non-electric firing procedures are covered only for situations where High Electro Magnetic Radiation (EMR) or some other reason prohibits the use of an electrical firing system.
- Each new or partially used roll of safety fuse shall be test burned prior to each day's disposal operation. When testing the burn rate of safety fuse, cut off and dispose of the first six inches of the roll to prevent misfires caused by absorbed moisture. Next, cut off a six-foot length of safety fuse and test the burn rate. This test will be conducted at least 25 feet downwind from any explosives.
- Ignite safety fuse only by approved methods. Weatherproof fuse igniters are recommended.
- Keep blasting caps in approved, compartment containers. These containers shall be located at least 25 feet from other explosives.
- Handle non-electric blasting caps only by their open end except during attachment to safety fuse and/or detonating cord.
- Handle primed safety fuse with care to avoid contact between blasting caps and other hard objects.
- Maintain a minimum distance of 25 feet between the priming site for non-electric components and accessories and any supply of explosives, blasting caps or other positioned or primed charges.
- Do not prime more than the required number of charges. Any primed charges, which are not used, shall be expended; they shall not be returned to explosive storage locations.
- Do not force safety fuse into a blasting cap. If it does not enter easily, reject the cap and/or fuse.
- Handle safety fuse with care to avoid damage to the covering. In cold weather, warm the fuse slightly before use to avoid cracking.
- Do not force a blasting cap into explosives. Insert the cap into a suitable hole made by a punch.
- Do not crimp blasting caps by any means except an approved crimper. A crimp to close to the explosive can cause a detonation
- Do not insert anything into a cap to remove dirt or foreign material. Do not tap against a hard object or blow into the cap. Blasting caps are sensitive and may be exploded by such actions.

- Do not mold plastic explosives around blasting caps. Use a suitable punch to make a hole in the plastic.
- Do not bury blasting caps. Position the blasting cap above ground and run detonating cord to the buried shot.
- Handle any percussion detonator with the same precautions as a blasting cap.
- Do not confuse detonating cord with safety fuse.

5.9.2 Shock Tube Firing System Priming

a. ***Shock Tube.*** The shock tube is a thin plastic tube of extruded polymer with a layer of special explosive material deposited on its interior surface. This special explosive dust propagates a detonation wave, which is normally contained within the plastic tubing.

Shock tube offers the instantaneous action of electric initiation without the risk of accidental initiation of the blasting cap (and the charge) by radio transmitters in the area, 0r by static electricity discharge. The shock tube medium is extremely reliable.

> **WARNING**
>
> Although the detonation along the shock tube is normally contained within the plastic tubing, burns may occur if the shock tube is held.

Complete replacement of electrical initiation systems will result in a nil requirement for blasting machines and associated demolition equipment.

Detonation Procedures/Shock Tube Priming

Disposal activities are inherently hazardous and require strict adherence to approved safety and operational procedures. During disposal operations the SUXOS will insure that:

- The area is clear and remains clear of personnel;
- Disposal shots are configured in a manner that precludes fragments from entering inhabited areas;
- Positive control over the detonation is maintained.

Splicing Shock Tube

The high reliability of shock tube blasting cap is the fact that all of the components are sealed and unlike standard non-electric priming components, cannot be easily degraded by moisture. Cutting the shock tube makes the open end vulnerable to moisture. Care will be taken to keep moisture from the cut end of the shock tube. In general:

- When cutting a piece of shock tube, immediately tie a tight overhand knot in both cut ends (unless it will be spliced immediately).
- Always use a sharp knife or razor blade to cut shock tube so the opening in the tubing will be unobstructed.
- Always cut shock tube squarely across and make sure the cut is clean.
- Use only the splicing tubes provided to make splices. Taping two cut ends of shock tube together does not make a reliable splice.
- Every splice in shock tube reduces the reliability of the priming system. Keep the number of splices in a shock tube line to as few as practicable.

The following is the proper splicing procedure for shock tube:

1. Use a sharp knife or razor blade to cut approximately 18 inches from the previously cut off end of left over shock tube, whether or not it was knotted in accordance with the above guidance. Dispose of the 18-inch piece of shock tube in accordance with local regulations on such flammable items.
2. Cut off the free, sealed shock tube end of the cap to be extended with a sharp knife or razor blade.
3. Loosely tie the two shock tube ends to be sliced together in a **SQUARE KNOT**. Leave at least a two inch free end of each shock tube beyond the knot. Push the shock tube lightly to tighten the knot, but not so tight as to significantly deform the shock tube in the knot.
4. Push one of the free shock tube to be spliced firmly into one of the pre-cut splicing tubes at least ¼ inch. Push the other shock tube end firmly into the other end of the splicing tube at least ¼ inch.
5. Spool out the desired length of shock tube and cut it off with a sharp knife or razor blade.
6. Immediately seal off the shock tube remaining on the spool by tying a tight overhand knot in the cut off end.
7. Attach an initiator to the cut end of the shock tube spliced to the blasting cap in accordance with standard operating procedures or tie a tight overhand knot in this end if it is to be actuated by another blasting cap or detonating cord.

Set up

1. Lay out required length of shock tube from demo area out to firing point (see splicing NOTE).
2. Attach EZTL 30 using splicing tube supplied (or equivalent) bunch block, to lead line at demo site. <u>Secure cap (block) with sand bags.</u>

3. Run additional lead line from bunch block to UXO (see Figure 1)

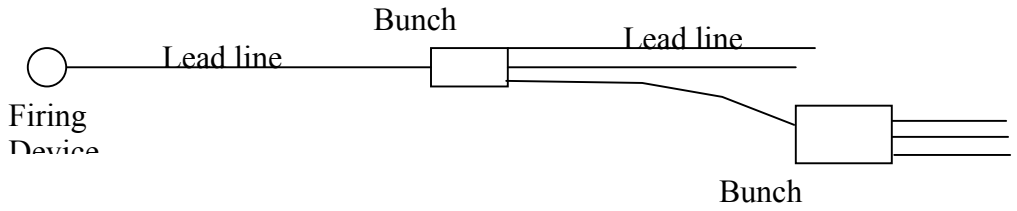

Figure 1

a) 6 additional leads only from bunch block
b) use additional bunch block if required

4. At UXO, place perforator and 2-3' length of det cord – secure with sand bags. (see Figure 2)

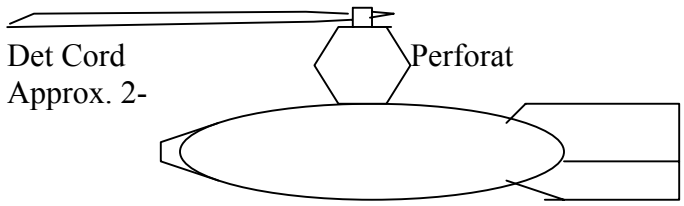

Figure 2

5. At UXO using splicing tube, attach detonator assembly to lead tube then secure detonator to det cord (see Figure 3)

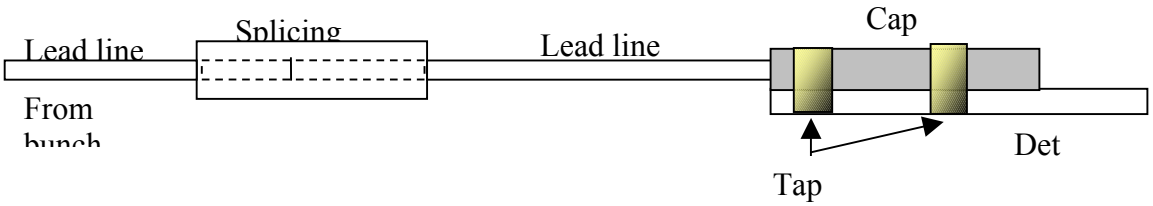

Figure 3

6. Check when complete and depart area for firing point
7. Attach shock tube to firing device, lead primer into firing device.
8. Request permission to fire, give verbal warning, activate firing device.
9. Two personnel depart down range to check shot. When "all clear" is given , team returns to demo area for check and clean up.

Misfire with Shock Tube

The following steps should be performed in the advent of a misfire to rectify the situation:

1. The most common cause of a misfire in a shock tube priming system is the initiating element. The most failure with this system is the primer not firing.
2. If two or three retries with the igniter does not result in it firing, cut the shock tube, replace the igniter with a new one and repeat firing procedure.

3. Another misfire mode with the igniter is that the primer fires, but blows the shock tube out of its securing mechanism without firing it. The corrective action is to cut approximately six inches from the end of the shock tube, replace the igniter, and repeat firing procedure.
4. If the igniter appears to have functioned properly (primer pops and smokes), but the charge did not fire, cut a one foot section from the shock tube starting approximately six inches from the igniter. Hold the one foot piece of shock tube so that one end is over the palm of your hand and gently blow through the other end. If a fine powder is blown from the shock tube, it has not fired. If this is the case, install a new igniter on the freshly cut end of the priming shock tube.
5. If the igniter/initiating element functioned properly and no fine powder was blown from the shock tube in the previous step, or the shock tube was heard to fire or its flash was seen, observe the standard one hour waiting time before going downrange to check the next element(s) in the priming train. Shock tube blasting caps are non-electric blasting caps and the standard rules apply in the event of a misfire.
6. After the one hour waiting time has passed, proceed downrange and check the detonator of the first component in the priming train. If the detonator has not fired, attach an identical component to the shock tube (or detonating cord) of the uninitiated second component close to the unfired detonator of the failed component. Lay out the shock tube of the replacement component back to the site from which the shot is to be initiated and repeat the standard initiator attachment and fire when it is safe to do so.
7. If the first component of the firing train was not the one which failed, check out each succeeding component until the failed one is found and replace the failed or fired relay components back to the initiating site as in step 6. To determine if the shock tube has fired at a particular point, step 4 may be done with a one foot section of shock tube cut from the suspect area.
8. Never yank or pull hard on the shock tube, it may actuate the detonator.

5.9.3 Electric Priming

- The electrical firing system with the remote controlled firing device is the preferred method for initiating explosive charges. The command control system provides more positive control of the shot than a time delay (non-electric) system.

- Test electric blasting caps for continuity prior to connecting them to the firing circuit. Upon completion of testing, the lead wires will be short-circuited by twisting the bare ends of the wire together. The wires will remain short circuited until ready to connect to the firing circuit.

- Place the blasting cap in a hole, behind a barricade, or under a sand bag before removing the shunt and testing the continuity. Unfold the legs so that the cap is as far as possible from the UXO specialist and pointing away from him. Secure leg wires to prevent the cap from moving during the test.

- Use only the special silver-chloride dry cell battery in the testing galvanometer. Other type cells may provide sufficient voltage to fire the blasting cap.

- Do not connect the blasting cap into the firing circuit until all pre-firing tests have been completed and it is time to arm the system.

5.9.4 Priming with Detonating Cord

- Preparation of donor explosives. The primary donor explosives for use in disposing OE items will be the one pound pentolite booster, plastic explosives, jet perforators, detonating cord and electrical blasting caps.

- One Pound Pentolite Booster-Insert 80 grain detonating cord into the detonator well all the way through and back through other hole and tie a over hand knot to secure it from coming out. When using more than one booster insert detonating cord through each of the boosters detonator well and secure to keep them from sliding along the detonating cord.

- Plastic explosive- Insert knotted detonating cord into the plastic explosive- run detonating cord to the initiating point

- Jet Perforator-Using the detonating cord clip secures detonating cord to the Jet Perforator. Place the Jet Perforator on the OE item using tape or other suitable methods to prevent Jet perforator from moving. For tamped shots use a box or other suitable material to make a stand off to prevent soil from getting between the perforator and OE item.

5.9.5 Preparation and Priming, Electrical Firing System

- An electric firing system consists of two electric blasting caps, firing wire and a remote controlled firing device. The methods and sequence of operations of electric priming are described below.

- Telephone or radio communications will be established with emergency response personnel. No radio transmissions will take place during positioning or connecting of electrical initiating devices.

- Control of the site must be maintained during disposal operations. All personnel who are not essential to disposal operations must evacuate to a safe area. Access roads, which enter the blast area, will be blocked during explosive disposal operations to ensure that unsuspecting individuals are not placed in jeopardy by the explosion.

- The Senior UXO Supervisor will assure the area is clear of personnel and equipment prior to permitting attachment of the initiation devices to the priming charge.

- The Senior UXO Supervisor will conduct a 360-degree visual search for aircraft, boats or personnel near the exclusion before initiating any explosives.

- Prior to conducting an On-site disposal operations, safety briefings will be conducted which will include, as a minimum, phases of the operation, review of explosive handling and EMR precautions, location of safe area, emergency notification procedures, site specific characteristics, type of OEW/UXO being destroyed, placement and quantity of counter charge, misfire procedures, post clean up of site, care and handling of explosive materials, personal hygiene, two man rule, potential trip/fall hazards, location of On-Site vehicle, wind direction, location of first aid kit and fire extinguisher.

- A minimum of two qualified personnel, one of which will be the assigned UXO Supervisor/Demolition Team Leader, will conduct disposal operations. Control initiation devices will remain with the supervisor until attachment to the firing circuit.
- Positive control is required; initiation devices will be limited to those requiring electrical current.
- In the event of a fire on the range evacuate to the fragmentation distance until the fire is extinguished.
- Prepare and place all explosive charges as prescribed above.
- Locate a safe position for receiver, cut off a length of wire (less than 100 feet) that will reach receiver and charges.
- Conduct a continuity check of the wire with a galvanometer. Twist free ends of wire together to prevent an electric charge from building up in firing wire.
- Test each blasting cap with a galvanometer and twist free ends of cap lead wires together to prevent electric charge build-up in lead wires.
- Connect blasting caps in a parallel circuit and connect to extension wires.
- Connect extension wires to receiver.
- Secure caps onto detonating cord.
- Retreat to safe area ,
- Senior UXO Supervisor verify that exclusion zone is clear,
- Warning Signal - A one-minute series of long audible signals 5 minutes prior to blast signal.
- The SUXOS will give a five minute warning on the hand held radio
- Blast Signal - A series of short audible signals 1 minute prior to the detonation.
- The SUXOS will give a one-minute warning on the hand held radio.
- Arm command firing device,
- UXO Demolition Team Leader give three loud fire in the hole,
- Sound siren
- SUXOS give fire command on the hand held radio
- SUXOSUS gives permission to fire shot,
- Demolition Team Leader fire demolition shot.

5.9.6 Electric Misfire Procedures

A thorough check of all equipment, firing wire and detonators will prevent most misfire situations. In order to prevent electric misfires, one technician must be responsible for all electrical wiring in the circuit. If a misfire does occur, it must be cleared with extreme caution. Two personnel will investigate the misfire and correct the situation.

- Check connections and make a second attempt to initiate charge.
- If unsuccessful, disconnect and connect to another blasting machine (if available) and attempt to initiate charge.
- If unsuccessful, disconnect power source and shunt the firing wires.
- Wait 30 minutes from the last initiation attempt.
- After the wait time has expired a designated technician will proceed down range to inspect the firing system; a safety observer must watch from a safe area.
- Connect a new electric firing system and prime the charge without disturbing the original firing system.
- Follow normal procedures for initiating charges.

5.9.7 Non-Electric Firing Procedures

- After all shots have been set up and tamped with a detonating cord lead in the SUXOS will have all personnel leave the area except the designated arming teams.
- The SUXOS will verify that the area is clear.
- The SUXOS will designate the arming team when to arm the shots.
- The SUXOS will designate to each arming team when to pull the fuse lighters and start the time fuse burning.
- The arming team will give a loud fire in the hole and pull the fuse lighters and walk out of the area to a safe area.
- The SUXOS will give a fire in the hole over the radio when the safety fuse starts burning to let all site personnel know that the firing sequence has been initiated.
- After all arming teams have initiated their shots and departed the area; the SUXOS will depart with the last team to the safe area.

5.9.8 Non –Electric Misfire Procedures

- Wait 1-hour.
- UXO team leader and one UXO specialist will investigate the shot. The team leader will approach the shot while the second team member remains a safe distance from the shot.
- The team leader will cut the detonating cord forward of the misfired cap.
- The team leader will tape a new non-electric firing assembly to the detonating cord lead in or a new counter charge to the OE item if the shot did not have a detonating cord lead in.
- The team leader will standby to pull the fuse lighter.
- The above procedures for non-electric firing will be followed.

5.9.9 Post Demolition Procedures

- At the conclusion of detonation and after a five minute wait time, the UXO Supervisor/Demolition Team Leader will inspect the site prior to allowing other personnel to enter the blast area.
- UXO Specialists will conduct a shoulder to shoulder sweep of the detonation site to gather fragments and explosive residue if present.
- Intact ordnance items that failed to detonate will be counter-charged and blown in place.
- Explosive residue will be collected and detonated. Metal fragments will be examined to ensure complete detonation of explosive material
- All Clear Signal – A prolonged audible signal following the inspection of the blast area

5.9.10 Priming Commercial Blasting Agents

- The term “primer” as used in commercial blasting means a cartridge of explosives in combination with a non-electric or electric blasting cap used to detonate certain insensitive commercial blasting agents.
- Do not make up primers in the vicinity of other explosives.
- Do not prepare more primers than required for immediate use. Unused primers shall not be disassembled. They will be destroyed by detonation.
- Ensure that the blasting cap is completely encased in the dynamite or booster and secured so that during loading, tension will not be placed on the wires or fuse at the point of entry of the cap. When side priming a heavy-wall or a heavy weight cartridge wrap adhesive tape around the hole punched in the cartridge so that the blasting cap cannot come out.

5.9.11 Placement of charges

- Use detonating cord on charges, which are to be buried, or used in boreholes requiring tamping.
- Carefully examine the surface or face before drilling to determine the possible presence of unfired explosives. Never drill into explosives.
- Check the borehole carefully with a wooden tamping pole or measuring tape to determine its condition before loading.
- Cut the line of detonating cord, which will extend into a borehole, from the spool before loading the charge.
- Do not load a borehole with explosives after springing (enlarging a hole with explosives) or upon completion of drilling without ensuring that it is cool and that it does not contain any hot metal, or burning or smoldering materials. Temperatures in excess of 150 degrees Fahrenheit are dangerous.
- Do not spring another borehole near a borehole loaded with explosives.
- Do not force explosives into a borehole or through an obstruction in a borehole. Such action is especially dangerous in dry holes and when using primed charges.
- Do not slit, crop, deform, or abuse a primer. Do not drop a large, heavy cartridge directly onto a primer. A premature detonation may result.
- Do not place the body directly over a borehole during or subsequent to loading.
- Do not load boreholes near electric power lines or other sources of electrical power unless the firing line, including the blasting cap lead wires, are of insufficient length to reach any part of the electrical power source.
- Do not tamp dynamite that has been removed from its cartridge.
- Do not use metallic devices for tamping. Use wooden tamping tools with no exposed metal parts, except non-sparking metal connectors for jointed poles.
- Do not use excessive force when tamping.
- Do not tamp the primer.
- Confine the explosive in the borehole with sand, earth, clay, or other suitable material.
- Take particular precautions not to kink or damage fuse, detonating cord, or electric blasting wires when tamping.
- The two-man rule will be in effect in all disposal operations. In addition, a third person (safety) shall be available near the disposal site to act as a safety observer and communications watch in the event of an accident.

5.9.12 Arming and firing

Arming and firing shots with commercial explosives will be in accordance with above procedures for arming and firing electrical or non electrical firing systems.

5.10 QUALITY CONTROL

Quality control is performed to ensure that the ordnance was completely destroyed in the detonation process. The SSHO/QC Representative will ensure that the procedures are implemented and are being followed as defined in the *Site-Specific Work Plan* and listed below.

- Perform follow-up QC on disposal procedures.
- Ensure proper exclusion zone controls.
- Ensure proper disposal procedures are performed in accordance with this procedure.
- Ensure disposal procedures are conducted in accordance with federal, state and local laws and regulations for the use, handling, storing, and transporting of explosive materials.
- Ensure the proper use of explosives per TM 60A-1-1-31 for ordnance encountered.
- Complete data entry on intrusive investigation anomaly form (Attachment (Insert Attachment Number) included in Section (Insert Section Number) of the *Site-Specific Work Plan*).
- Perform QC checks on 10% of all disposal craters prior to backfill operations.
- Escort designated QA representatives to perform QA checks prior to backfill operations, if required.

6.0 References

Department of Defense. 1997. DOD Ammunition and Explosives Safety Standards. DOD 6055.9-STD, July 1997. The Office of the Under Secretary of Defense, Washington, D.C.

U.S. Army. 1987. Ammunition and Explosives Safety Standards. Army Regulation 385-64, 22 May 1987. Headquarters Department of the Army, Washington, D.C.

Navy Explosive Ordnance Disposal. 1990. Explosive Ordnance Disposal Procedures, Protection of Personnel and Property. Bulletin 60A-1-1-4, Revision 2, 24 September 1990. Naval Explosive Ordnance Disposal Technology Division. Indian Head, Maryland.

Navy Explosive Ordnance Disposal. 1994. Explosive Ordnance Disposal Procedures, General Information on EOD Disposal Procedures. Bulletin 60A-1-1-31, Revision 0, 31 May 1994. Naval Explosive Ordnance Disposal Technology Division, Indian Head, Maryland.

1) U.S. Army Corps of Engineers. 1996. Safety and Health Requirements Manual. EM 385-1-1, September 1996. Department of the Army, Washington, D.C.

U.S. Army Corps of Engineers Huntsville, Personnel Qualifications Standard OT-025

- ORD DATA — ORDNANCE IDENTIFICATION GUIDE
- TM9-1300-200 — AMMUNITION GENERAL
- TM9-1300-214 — MILITARY EXPLOSIVES
- TM9-1901 — ARTILLERY AMMUNITION
- TM9-1904 — AMMUNITION INSPECTION GUIDE
- EODB 1385-1 — EOD DISPOSAL
- TM9-1325-200 — BOMBS AND BOMB COMPONENTS
- TM9-1330-200 — GRENADES, HAND AND RIFLE
- TM9-1345-200 — LAND MINES
- OP-1664 — AIRCRAFT BOMBS
- OP-2213 — MILITARY PYROTECHNICS
- OP-4 — AMMUNITION AFLOAT
- OP-5 — AMMUNITION ASHORE
- OP-3703 — SAFETY PRECAUTIONS
- SWO60-AA-MMA-010 — DEMOLITION SAFETY PRECAUTIONS
- TM9-1375-213-12
- TM9-1300-206
- FM5-25 — EXPLOSIVES AND DEMOLITION
- AMCR385-11
- EM 385-1 — SAFETY AND HEALTH REQUIREMENTS MANUAL
- TO 11A1-42
- AFR-127-100
- EODB/TM/TO 60A SERIES — EOD PROCEDURES
- ATF-P-5400.7 — EXPLOSIVE LAWS AND REGULATIONS
- — FEDERAL, STATE, AND LOCAL REGULATIONS
- 49 CFR 171/178 — MOTOR CARRIER SAFETY REGULATIONS

ATTACHMENT 1
DAILY DISPOSAL EQUIPMENT CHECKLIST

Date_____ Disposal Supervisor_____

EQUIPMENT	QUANTITY	COMMENTS
Explosive Vehicle	3/	
Personnel Vehicle	1/	
Camcorder/digital camera	1/	
Siren	1/	
Air Horn	4/	
Bravo Flag (Red)	2/	
Handheld Radios	2/	
Cellular Telephone	1/	
Radio Controlled Firing Device	1/	
Ruler, 24-inch	1/	
Schonstedt locator	1/	
Shovel, round point, long handle	3/	
Shovel, round point, short handle	1/	
Blasting Machine	1/	
Tape, duct	6/	
Tape, measuring, 50- or 100-meter	3/	
Tape, plastic	6/	
Toolbox, general hand tools	1/	
Galvanometer	2/	
Firing Wire	1 roll/	
Knife	1/	

ATTACHMENT 2
DAILY HEALTH AND SAFETY EQUIPMENT CHECKLIST

Date_____ Disposal Supervisor_____

EQUIPMENT	QUANTITY	COMMENTS
Air horn, emergency	1/	
Burn Blanket	1/	
Burn kit	1/	
Emergency eye wash	1/	
Fire blanket	1/	
Fire extinguisher, 10-pound ABC	1/	
First aid kit	1/	
Gloves, leather	3/	
Goggles	3/	
Face Shield	2/	
Welders Gloves	2/	
Welders Apron	2/	
Rain suit	3/	
Safety vest	3/	
Stretcher	1/	
Water, 5-gal bottle (emergency shower)	1/	
Water, drinking- 1 liter per person	3/	

ATTACHMENT 3
EXPLOSIVE DISPOSAL ACTIVITIES CHECKLIST

Date_____ Team_____

FUNCTION	DATE/TIME	SIGNATURE
Senior UXO Supervisor		
Assign Disposal Team		
Brief Disposal Team Review emergency procedures Discuss OE/UXO to be disposed Describe Disposal procedures		
Inspect Range/Exclusion zone upon completion of operations		
Disposal Supervisor		
Verify Bravo Flag is hoisted		
Verify roads are closed		
Verify exclusion zone boundaries in place		
Complete health and safety and equipment checklists		
Ensure command center has completed the verification checklist CEHNC Safety Representative Fort McClellan Transition Force Operations Medical Facility Fire Department Security/Police Department		
Disposal Supervisor tailgate safety brief: Designate emergency vehicles Designate emergency evacuation route Review emergency response procedures		
Verify daily equipment inspection		
Verify that detonators are separated from explosives		
Verify that area has been evacuated		
Notify command center that operations are commencing		
Start Disposal activities		
Inspect shot after 5 min wait time		
Collect all metal fragments for later disposal		
QC check performed		
Stop disposal activities		
QA check by CEHNC (if required)		
Foster Wheeler command center notify upon completion: CEHNC Safety Representative Fort McClellan Transition Force Operations Medical Facility Fire Department Security/Police Department		
Complete OE/UXO Accountability Log		
Demobilize		
Record data in Explosive Disposal Log		

ATTACHMENT 4
EXPLOSIVE DISPOSAL LOG

Start Time: _____ **Stop Time:** _____

Disposal Supervisor Signature: _____ **Date:** _____

OE/UXO DISPOSED (list item and quantity of each item):

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
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_____

DONOR EXPLOSIVES USED:

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_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

REMARKS (note any problems and resolutions, such as misfires, low order, etc.):

_____
_____
_____
_____
_____
_____
_____

ATTACHMENT 5
UXO ACQUISITION AND ACCOUNTABILITY LOG

Delivery Order No._____ Report No._____
UXO TEAM_____ DATE_____

ACQUISITION DATA

Sample Area Number	
Ordnance Length (inches)	
Ordnance Diameter (inches)	
Weight (lb./oz)	
Ordnance Type (bomb, rocket, projectile, hand grenade, mortar, rifle grenade, pyrotechnics, small arms, etc.)	
Photo roll number/disk number	
Photo exposure number/digital file number	
Video Marker – Start	
Video Marker – Stop	
Ordnance description	

UXO DISPOSITION

SAFE HOLDING AREA	DATE	INITIAL	TRANSFERRED TO	DATE	SIGNATURE

DESTROYED BY	DATE	SIGNATURE

Comments:_____
_____
_____
_____

Senior UXO Supervisor_____

3.0 EXPLOSIVES MANAGEMENT PLAN

This plan outlines the procedures that will be used to manage explosives used to perform OE response activities at Fort McClellan. The procedures are in accordance with the following:

Federal Acquisition Regulation (FAR) 45.5
ATFP 5400.7
DoD 6055.9-STD
Army Regulation (AR) 190-11
DOT Regulations
Alabama Explosive Safety Act of 1993

3.1 ACQUISITION

Foster Wheeler Environmental Corporation has a Bureau of Alcohol, Tobacco and Firearms (BATF) permit to purchase and use explosives and will supply commercial demolition material for disposal operations at Fort McClellan. This permit will be posted on site and will be available for local, state, or federal inspection. Accountability and use of the explosives will remain with Foster Wheeler Environmental Corporation unless custody is transferred to the government or another contractor with a current BATF explosive license.

3.1.1 Description and Estimated Quantity of Explosives

Foster Wheeler Environmental Corporation will order and stock an estimated initial quantity of 100 pounds net explosive weight (NEW) of commercial counter charges, initiating explosives, and venting charges for disposal operations. Based on usage and demand the quantity in stock may increase, but at no time will storage quantities exceed the Explosive Limits and License of the Magazine.

3.1.2 Acquisition Source

Foster Wheeler Environmental Corporation will purchase explosives from a licensed commercial supplier. The SUXOS will be authorized to request and receive explosives from the commercial supplier.

3.1.3 Listing of Proposed Explosives

The types of explosives that will be used are:

- ¾ lb. Cast booster - Trinitrotoluene (TNT) and Pentaerythritol Tetranitrate (PETN);
- Jet Perforator- 19.5 gram shape charge, Cyclotrimethylene trinitramene (RDX);

- NONEL- Lead-In Line
- NONEL- Detonator Assembly, NE, SE-14
- NONEL- Firing Device #209 Primers
- Detonating cord - 80 grain per foot, PETN;
- Blasting caps - electric, 12-15 foot lead, Lead Azide, Lead Styphnate, PETN.

3.2 INITIAL RECEIPT

Shipments of explosives will be by commercial carrier from the explosives supplier. The explosive supplier is responsible for all permits and documentation required by federal, state, and local regulations.

3.2.1 Procedures for Receipt of Explosives

On receipt, the type, quantity, and lot number of each explosive item will be checked against the manifest and recorded on the magazine data card (Figure 3-1). The original receipt documents and an inventory will be maintained on file by the SUXOS. The magazine data card will remain in the magazine with the explosive items and be annotated and updated for each issue and receipt.

3.3 STORAGE

Foster Wheeler Environmental Corporation will use government-supplied explosives storage facilities at Fort McClellan. Fort McClellan will maintain the keys and control access to explosive magazines. During all entries to explosive magazines contractor personnel will be accompanied by Foster Wheeler personnel.

3.3.1 Establishment of Storage Facilities

The USACE currently has explosive magazines in the Fort McClellan Ammunition Supply Point (ASP). Foster Wheeler Environmental Corporation will use the existing magazines for explosive storage. Foster Wheeler Environmental Corporation will comply with local storage and compatibility criteria and procedures when using Government facilities. If Foster Wheeler Environmental Corporation is required to establish additional explosive storage and no magazines are available in the Fort McClellan ASP Foster Wheeler Environmental Corporation will:

- Use portable approved BATF Type 2 structures;
- Locate, install, and maintain the magazines to comply with the magazine criteria and quantity distance requirements established in DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards;
- Install sufficient magazines to comply with explosive compatibility requirements, (i.e., bulk explosives, initiating explosives); and
- Establish security, such as fencing and/or guards, to prevent unauthorized access and/or theft, as required.

3.3.2 Physical Security of Storage Facilities

Physical security of the Fort McClellan ASP will be provided by the installation.

3.4 TRANSPORTATION

Transportation of OE and donor explosives will comply with all federal, state, and local regulations. Permits are not required under CERCLA for on-site or on federal installations for transportation of explosives or conventional OE.

3.4.1 Procedures for Transportation from Storage to Disposal Location

For transportation of OE and explosives to disposal site, Foster Wheeler Environmental Corporation will comply with the following:

- Initiating explosives, such as blasting caps, will remain separated at all times. Blasting caps or detonators may be transported in the same vehicle as long as they are packed in a MK 663 MOD 0 container or equivalent container (DA PAM 385-64 Ammunition and Explosives Safety Standards) and secured away from other items;
- Compatibility requirements will be observed;
- Only UXO Technicians designated by the SUXOS may be issued and transport explosive materials. The receiving party will sign the receipt documents for accountability;
- Operators transporting explosives will have a valid drivers license;
- Drivers will comply with posted speed limits but will not exceed a safe and reasonable speed for conditions. Vehicles transporting explosives off-road will not exceed 25 MPH;
- Personnel will not ride in the cargo compartment with explosives or OE.

3.4.2 Explosive Transportation Vehicle Requirements

Explosives will be transported in closed vehicles whenever possible. The load shall be well braced and, except when in closed vehicles, covered with a fire-resistant tarpaulin or in an appropriate shipping container.

- Vehicles transporting donor explosives or OE will be inspected daily using DD Form 626, and will be properly placarded;
- Vehicle engine will not be running when loading/unloading explosives;
- Beds of vehicles will have either a wooden bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings; and
- Vehicles transporting explosives will have a first aid kit, two 10 BC rated fire extinguishers, and communications capability.

3.5 RECEIPT PROCEDURES

The SUXOS will strictly control access to all explosives. All issues, turn-ins, and inventories of explosives will be properly documented and verified, through physical count, by the UXOQCS.

3.5.1 Records Management and Accountability

Upon receipt, the type, quantity, and lot number of each explosive item will be checked against the manifest and recorded on the magazine data card. The original receipt documents and an inventory will be maintained on file by the SUXOS. The magazine data card will remain in the magazine with the explosive items and be annotated and updated for each issue and receipt. All original explosive records will be forwarded to Foster Wheeler Environmental Corporation, for archive in accordance with BATF regulations and requirements. BATF requires Foster Wheeler Environmental Corporation to maintain explosive records for commercial purchases for a period of 15 years. Copies of all records will be maintained on site by the SUXOS and be available for inspection by authorized agencies. Explosive items will be tracked by lot number until the item is expended or transferred to Government control and accountability.

3.5.2 Authorized Individuals

Foster Wheeler Environmental Corporation is required to provide commercial suppliers with documentation of individuals authorized to request and receipt for explosives. The individual authorized to receive and issue explosives is the Foster Wheeler Environmental Corporation SUXOS and in some cases, if the SUXOS is not available, a Foster Wheeler Environmental

Corporation UXO Technician III. Onsite, the SUXOS will designate in writing the UXO Technicians who are authorized to transport and use explosives.

3.5.3 Certification

The SUXOS and UXO Technician III team leader performing demolition will sign and date the explosives usage form (see Figure 3-2) certifying that the explosives were used for their intended purpose.

3.5.4 Procedures for Reconciling Receipt Documents

The SUXOS will reconcile the delivery shipping documentation with the requested amounts ordered and received. Any shortages or overages will be reported to Foster Wheeler Environmental Corporation who will contact the explosives supplier and reconcile any differences.

3.6 INVENTORY

The SUXOS will strictly control access to all explosives. The SUXOS will review all requests for explosives from the individual operating sites. Only sufficient explosives for the day's operations will be requested and issued.

3.6.1 Storage Facility Inventory Procedures

Access to explosive magazines will require a Foster Wheeler Environmental Corporation UXO escort for non-Foster Wheeler Environmental Corporation employees. This is required to maintain accountability and meet BATF inspection requirements. Issues of explosives are recorded on Explosive Usage Records and deducted from the Magazine Data Card(s) and annotated in the daily journal. This procedure will ensure that the issued explosives are accounted for while they are in the possession of individual users. The end user of explosives will certify on the explosives usage record that the explosives were used for their intended purpose.

3.6.1.1 Entries made on the Explosive Usage Records and Magazine data Cards will be verified through physical count by the Demolition Team UXO Technician III when drawing or turning-in the explosives and the SUXOS will verify the record.

3.6.2 Procedures for Reconciling Inventory Discrepancies

The SUXOS and UXOQCS will be responsible for performing a weekly inventory of the explosives within the magazine. If there is a discrepancy between the inventory and the volume of explosives within the magazine, then they will review the magazine Data Card and Explosives Use Record to see if the inventory records are current.

3.6.3 Inventory Scheduling

Explosives will be inventoried at least weekly. Weekly inventories will be conducted by the SUXOS and UXOQCS and the results provided to the project manager. Complete inventories will also be conducted daily at the end of the day after any issues/turn-ins.

3.7 REPORTING LOSS OR THEFT OF EXPLOSIVE MATERIALS

If it is confirmed that ordnance or explosives are missing, then the Foster Wheeler Environmental Project Manager and the USACE Site Safety Specialist will be notified. Foster Wheeler Environmental Corporation, will notify BATF and immediately begin an investigation. Foster Wheeler Environmental will contact the CEHNC contract officer within 24 hours of discovery. Local authorities will be notified and a written report will be issued within 24 hours.

3.8 PROCEDURES FOR RETURN TO STORAGE OF EXPLOSIVES NOT EXPENDED

The Fort McClellan ASP closes at 1530 hours daily. Most demolition shots will be scheduled for late in the day. Therefore only the amount of explosives required for the day's demolition activities will drawn from the ASP. All explosives drawn will be expended that day thereby there are no requirements for return to storage procedures.

3.9 DISPOSAL OF REMAINING EXPLOSIVES

Foster Wheeler Environmental Corporation is required by BATF to account for all explosives purchased and used. At project completion all unused explosives will either be disposed of by detonation or custody and accountability transferred to an incoming contractor or the Government. An economic analysis for different alternatives is not required since this requirement does not apply to firm fixed price (FFP) delivery orders.

3.10 FORMS

Foster Wheeler Environmental Corporation will use internal forms for explosives receipt, issue, inventory (Figures 3-1 and 3-2) and DD Form 626 for vehicle inspections.

Figure 3-1
Magazine Data Card

Nomenclature:

Lot Number: Unit of Issue:

Date	Name	Received	Issued	Balance	Checkers Initials

Figure 3-2
Explosives Usage Record

Explosives Usage Record

Contract Number:

Team Number: Date: Project Name:

Team Leader: Work Areas & Grid Numbers:

Explosives Issued Signature Of Team Leader:

Item	Quantity	Lot Number	Checkers Initials

Explosives Expended Signature Of Team Leader

Item	Quantity	Lot Number	Checkers Initials

Explosives Returned Signature Of SUXOS:

Item	Quantity	Lot Number	Checkers Initials

The signatures in each section of this document indicate that the items listed in that section were in fact issued, expended, or returned to storage and that the quantities listed were verified through a physical count.

4.0 EXPLOSIVES SITING PLAN

This plan outlines the procedures Foster Wheeler Environmental Corporation will use to perform OE identification and disposal operations at Fort McClellan and describes the safety criteria to be employed.

4.1 EXPLOSIVES STORAGE MAGAZINES

Foster Wheeler Environmental Corporation will use Government-supplied explosives storage facilities at Fort McClellan. If the storage magazines are not available or Foster Wheeler Environmental Corporation is required to install additional magazines, commercial Type 2 magazines will be leased.

4.1.1 Types(s) of Magazines

The Fort McClellan ASP has standard earth covered and above ground magazines for storage of explosives. If commercial magazines are required, Foster Wheeler Environmental Corporation will use portable approved BATF Type 2, outdoor, box magazines. Foster Wheeler Environmental Corporation will:

- Locate, install, and maintain the magazines to comply with the magazine criteria and quantity distance requirements established in DoD 6055.9-STD, Department of Defense Ammunition and Explosives Safety Standards;
- Install magazines in order to comply with explosive compatibility requirements, (i.e., bulk explosives and initiating explosives;
- Establish security, such as fencing and/or guards, to prevent unauthorized access and/or theft;
- Magazines will be bullet-resistant, fire-resistant, weather-resistant, theft-resistant, and ventilated. They will be supported to prevent direct contact with the ground. The ground around them will slope away for drainage or other adequate drainage will be provided.
- Hinges and hasps will be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps will be installed so they cannot be removed when the doors are closed and locked. Each door will be equipped with two padlocks fastened in separate hasps and staples. Padlocks will have at least five tumblers and a casehardened shackle of at least 3/8-inch diameter. Padlocks will be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

4.1.2 Net Explosives Weight (NEW) and Hazard Division

The contents, NEW, and Hazard Division are presented in Table 4-1.

Table 4-1
Net Explosive Weight

Mag. Type	Contents	Hazard Div.	Amount	Net Exp. Wt. (Lbs)	Distance (in feet) From	
					Inhabited Bldgs. *	Public Traffic Rt. *
High Explosive	Booster, 3/4 Lb.	1.1	80 ea.	60		
	Detonating Cord, 80 grain	1.1	500 ft.	3		
	Perforator, 19.5 gram	1.1	600 ea.	29.4		
			Total NEW	92.4	670	402
Initiating Explosives	Blasting Cap, Elect.	1.1	100	5		
			Total NEW	5	670	402
* From DoD 6055.9-STD, Table C.T.1, notes 3 & 7						

4.1.3 Quantity Distance Criteria for Siting

The quantity distance criteria for siting is included in Table 4-2.

Table 4-2
Safe Separation Distances

UXO Operation	Minimum Distance Between	
	UXO Teams	UXO Teams and Other Personnel
For Unintentional Explosive Detonations		
Surface Sweeps	200'	(*See Note 2)
Mag/Flag	200'	(*See Note 2)
Intrusive Investigation	200'	(*See Note 2)
For Intentional Disposal Operations		
Non-Fragmenting Ordnance	(*See Note 1)1250'	(*See Note 2)
Fragmenting Ordnance	(*See Note 1)2500'	(*See Note 2)
Projectiles 5" or Larger	(*See Note 1)4000'	(*See Note 2)
Bombs	(*See Note 1)4000'	(*See Note 2)

1. Minimum exclusion zone (EZ) in accordance with CEHNC Safety Concepts unless reduced in accordance with HNC-ED-CS-S-98-2, January 1998 and CEHNC Site Safety Specialist concurrence.
2. The minimum distance between UXO Teams and other personnel is the MSD based on the Most Probable Munition (MPM).

4.1.4 Engineering Controls

In areas where an acceptable fragmentation distance cannot be achieved, items safe to move/transport may be moved to another area (with the concurrance of the CEHNC Safety Specialist) as long as the movement does not require transportation on public roads. If movement to another area is not possible, other methods of mitigation, such as berms, tamping, or sandbag barricades (in accordance with HNC-ED-CS-S-98-7), will be employed to reduce the fragmentation hazard. If these methods of disposal are determined to be impractical, Foster Wheeler Environmental Corporation will notify the on-site CEHNC Safety Specialist.

4.2 ORDNANCE AND EXPLOSIVES AREAS

Ordnance and explosive areas will change as locations for investigation change. The work plan will be updated and designate new areas prior to beginning any intrusive operations.

4.2.1 Safe Separation Distances

The safe separation distances for the public during intrusive operations will be the default distances in DoD 6055.9 STD. Chapter 5, paragraph C5.5.4 if the type of OE is unknown; the maximum fragmentation distance for the Most Probable Munition (MPM), as calculated by CEHNC's Engineering Directorate, Structural Branch; or when conditions and OE hazards permit, the Minimum Separation Distance (MSD) may be reduced to fit the situation, but in no case will the distance be less than $1/600ft^2$, or the Intraline Distance (I.D.) based on overpressure, whichever is greater. The information on which distance to be used will be furnished by the CEHNC Project Manager along with the calculation sheet determining the fragmentation distance.

4.2.2 Demolition Areas

OE will be disposed of in the areas where the item(s) are encountered. A safe separation distance for all personnel will be established. If the OE is unknown the distances will be: 1,250 feet for non-fragmenting explosive material, 2,500 feet for bombs and projectiles with a diameter less than 5 inches (127mm), 4,000 feet for bombs and projectiles with a diameter greater than (127mm) or more, and 2,500 feet for all other ammunition. If the OE is known the distance will be the maximum fragmentation distance for the MPM, as calculated by CEHNC's Engineering Directorate, Structural Branch.

4.3 FOOTPRINT AREAS

Footprint areas for intrusive and demolition operations will be established and the Work Plan updated on a Delivery Order by Delivery Order basis.

4.3.1 Blow-in Place

Prior to initiation of demolition operations all non-essential personnel are evacuated from the MSD. Prior to priming the demolition charges all avenues of ingress will be physically blocked by guard personnel. Radio communications are maintained between all involved parties at all times. Avenues of ingress are not to be opened without the express permission of the SUXOS. A constant state of vigilance will be maintained by all personnel to detect any intrusion into the fragmentation zone or over flights of aircraft. Upon completion of disposal operations, the Disposal Team's UXO Technician III and one UXO Technician will visually inspect each disposal shot. One of these personnel will perform a visual inspection of the disposal site(s). The second person will standby at a safe distance and be prepared to render assistance in the event of an emergency. Upon completion of this inspection and providing that there are no residual hazards, the SUXOS will authorize the resumption of site operations.

4.3.2 Collection Points

OE collection points will not be used as items will be disposed of in the location where they are encountered. Suspect items that can be safely moved and items requiring demilitarization may be relocated within the grid to be added to other planned demolition shots. All items will be disposed of or demilitarized on a daily basis. Items will not be returned to any magazine for storage.

4.3.3 In-Grid Consolidated Shots

Items that are safe to move/transport (unfuzed or unfired) may be consolidated to one location within that day's survey area to reduce the number of demolition shots and fragmentation contamination. All movement of OE/UXO will be coordinated with and approved by the on-site USACE OE Safety Specialist. Consolidated shots will be in accordance with the CEHNC report "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites, August 98 (Terminology Update March 2000)". A copy of the report will be available on-site for reference.

4.3.4 Fire Protection

The risk of starting a fire is increased during demolition operations. Several methods may be implemented during demolition operations such as:

- Items for disposal/demil will be tamped with sufficient earth to reduce the possibility of hot metal fragments causing fires. For items that preclude tamping (such as white phosphorus) the area will be wetted down and the fire department on site;
- Demolition cord used for lead-in for buried shots will either be wetted down or suspended from wooden stakes to preclude contact with the ground or vegetation;
- If feasible, a 25 feet radius area around the shot will be cleared and/or wetted;
- In areas where the vegetation is extremely dry and dense a NON-EL firing system may be used. The decision to possibly use NON-EL will be coordinated early on with the CEHNC Safety Specialist to allow time for purchase and delivery of the material.

4.4 SITE MAP

Site maps will be added to the Work Plan on a specific delivery order basis when OE investigation areas are identified.

5.0 GEOPHYSICAL INVESTIGATION PLAN

5.1 PRE-SURVEY SURFACE INSPECTION AND SWEEP (UXO SAFETY)

During all initial fieldwork and all intrusive activities, a UXO Technician II shall accompany the geophysical crew. The UXO Technician II shall conduct visual surveys for surface ordnance prior to the survey crew entering an area potentially containing OE, and a magnetometer or electromagnetic survey of each intrusive activity site to ensure the site is anomaly free prior to the crew setting monuments or driving stakes. The UXO Technician II will not be required on a full time basis for most of the project, for non-intrusive activities in areas not identified as ranges or impact areas.

5.2 PERSONNEL QUALIFICATIONS

All geophysical investigations shall be managed by a qualified geophysicist meeting the qualification requirements listed in DID OE-025.

5.3 SITE DESCRIPTION

5.3.1 Geophysical Investigation Program Objectives

The overall objective of the Fort McClellan geophysical program is to detect, accurately locate, and select anomalies that have the highest potential to be OE. The high variability of environmental features (terrain, vegetation, geology) and types and densities of OE materials present at the site, as well as the specific objectives that may differ for each site investigated require that the design of the geophysical program be as flexible as possible. In addition, the advancement of the equipment technology and interpretation software used for these investigations will most likely increase considerably over the performance period of the contract. Therefore, the geophysical sensor systems, navigation techniques, data acquisition methodologies, and analysis methods proposed for a particular area will be selected after a thorough review of the site characteristics, specific objectives, and proven technology at the time of the investigation. The selection of the optimum approach for a specific site will be determined in concert with the client.

5.3.1.1 Based on the proveout test performed in the summer of 1999, it is anticipated that the primary geophysical sensor technology that will be used to meet the program objectives is time domain electromagnetics (TDEM). Navigation technologies used to accurately locate the geophysical sensor systems will most likely include Ultrasonic Ranging and Data System (USRADS), and where applicable Global Positioning System (GPS) and Differential Global Positioning System (DGPS) technology. The most common data acquisition methodologies that will be employed are two-dimensional grids (i.e., closely spaced parallel transects) and ribbon-

walks (one-dimensional data transects). In general, the grid-based acquisition methodology will be applied over contiguous areas ranging in size from less than one acre to approximately one acre in size. Ribbon walks may be utilized to define smaller locales within larger areas (e.g., several hundreds of acres) that exhibit specific OE characteristics (e.g., boundaries of an impact area).

5.3.2 Areas of Investigation

Areas of Investigation will be identified in the Delivery Order Specific Work Plan.

5.3.3 Past, Current, and Future Use

The current Fort McClellan has documented use as a 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 the site 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.

5.3.3.1 Fort McClellan was closed in September 1999 under the Base Realignment and Closure (BRAC) Act. As the property is determined environmentally safe for release to the public, it will be transferred to the Anniston-Calhoun County FMC Development Joint Powers Authority (JPA) for sale. Potential future uses of the transferred property include residential, commercial, industrial, institutional, and recreation.

5.3.4 Anticipated OE Type, Composition, and Quantity

According to the ASR (July 1999), the following conventional ordnance or related items may be encountered during the EE/CA investigation since the items were historically used at Fort McClellan:

- Anti-aircraft (AA) machine guns;
- Bazooka rounds;
- Hand grenades;
- Rifle grenades;
- 40mm grenades;
- 2.36-inch rockets;
- 37mm Infantry Guns;
- 75mm Howitzers;
- 4.7-inch Howitzers;
- 155mm Howitzers;
- 3-inch Stokes Mortars;
- 6-inch Newton Stokes Mortars;
- 60mm mortars;
- 81mm mortars;
- 37mm anti-tank guns;

- 57mm anti-tank guns;
- Time fuzes;
- Livens Projector;
- 4.2" Mortars (HE and Smoke);
- 3.2" Shrapnel Projectiles;
- 3.8" Shrapnel Projectiles;
- Smoke Pots;
- Smoke Grenades;
- 3.8" Howitzers;
- 6" Guns;
- 3" Guns;
- 75 mm guns;
- 3.8 Guns; and
- 155 mm Guns.

5.3.4.1 Detailed information on UXO types, composition, penetration depths, etc. will be considered in the development of site specific conceptual site models and included in the site specific EE/CA work plans.

5.3.4.2 CWM and related items were also historically used at Fort McClellan. Operations involving CWM are discussed in detail in the ASR (July 1999). Details regarding the composition and quantity of the anticipated ordnance items will be presented for each specific area to be investigated on a Delivery Order basis.

5.3.5 Anticipated Depth of OE

These data will be presented for each specific area to be investigated on a Delivery Order basis.

5.3.6 Topography

The topographic gradient at the site generally increases towards the south and east of the main installation, and varies from approximately 700 to 2063 feet above mean sea level (msl). The topography is characterized by numerous hills and small ridges that are isolated from their neighbors by steeply sloping ravines and well-vegetated valleys. One of the major topographic features at the site is the Choccolocco Mountains, a northeast-southwest trending ridge located directly east of the main installation.

5.3.7 Vegetation

Specific types of vegetation are discussed in Section 12 (Environmental Protection Plan) of this Work Plan.

5.3.8 Geologic Conditions

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 west 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 5-1 summarizes the major stratigraphic units underlying Fort McClellan.

5.3.8.1 The presence of metamorphic rocks increases the potential for minerals such as magnetite and other associated magnetic minerals. In investigation areas where metamorphic rocks are expected, additional information will be gathered on the relative magnetic susceptibilities of the rocks and soils prior to data acquisition activities.

5.3.9 Soil Conditions

According to the US Department of Agriculture (1961), three soil associations are found at Fort McClellan. Generally, the soils are acidic to very strongly acidic and are described as follows:

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

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

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

5.3.9.1 The presence of metamorphic rocks increases the potential for minerals such as magnetite and other associated magnetic minerals. In investigation areas where metamorphic rocks are expected, additional information will be gathered on the relative magnetic susceptibilities of the rocks and soils prior to data acquisition activities.

Table 5-1
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.
Ordovian	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 orthoquartizitic; 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 calcarious mudstone in lower part; locally fossiliferous.
Ordovian (Continued)	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	Dolomite, siliceous; abundant chert except in the Ketona.
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.

Source: Science Applications International (SAIC), 1993, Site Investigation Report, Fort McClellan, Alabama

5.3.10 Soil Conditions

According to the US Department of Agriculture (1961), three soil associations are found at Fort McClellan. Generally, the soils are acidic to very strongly acidic and are described as follows:

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

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

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

5.3.11 Shallow Groundwater Conditions

Shallow groundwater beneath Fort McClellan occurs principally in the residuum developed from Cambrian sedimentary and carbonate bedrock units of the Weisner Formation in the Choccolocco Mountains and locally in the lower Ordovician carbonates (ESE, 1997)

5.3.11.1 Groundwater flow generally occurs in a northwesterly direction under a hydraulic gradient of 0.02 feet per foot, based on average groundwater elevation measurements from spatially clustered and widely spaced monitoring wells. Variability in the groundwater flow direction is likely to occur in localized areas of the Main Post, depending upon local topography, proximity to surface water bodies, and subsurface geology and structure. The measured groundwater elevations ranged between 677.1 feet above msl and 1,043.2 feet above msl on the Main Post (IT, 1999).

5.3.12 Site Utilities

Utilities, especially those of metallic origin, will be identified for each area surveyed using historical and current information. The location, approximate depth, and type of utility will be posted on the color-coded geophysical map of the area, if applicable, to ensure that intrusive activities occur in the safest manner possible.

5.3.13 Man-made Features Potentially Affecting Geophysical Investigations

Man-made features such as power lines, buildings/foundations, storage tanks (above and below ground), fences, landfills/disposal areas, roads, and any other features that may influence the geophysical investigation will be documented with specific information on the location, extent, and nature of the feature. This documentation may be in the form of a site features map, or noted in logbooks. The information may also be stored in digital format by a GPS system where GPS measurements are applicable. This process will allow the information to be transcribed onto a map in the most cost-effective manner.

5.3.14 Site-Specific Dynamic Events

Dynamic events that may affect geophysical investigations include weather (precipitation, wind, extreme temperatures), noise (when the USRADS system is employed), radio and other electromagnetic spectrum transmissions, and solar activity (e.g., if a single sensor magnetometer is employed). It is the responsibility of the team leader and data acquisition specialist to evaluate these events/conditions during acquisition to determine their effect, if any, on the geophysical data quality. If it is determined that these events/conditions are adversely affecting the data quality, data acquisition will cease until the event/condition ceases. If necessary, engineering controls may be implemented to reduce the effect of the disturbance.

5.3.15 Overall Site Accessibility and Impediments

This information will be provided for each specific site investigated.

5.3.16 Potential Worker Hazards

Potential worker hazards specific to geophysical investigations include slips, trips, and falls (especially on steep/wet slopes or heavily vegetated areas), heat/cold stress, biological hazards (e.g., insects, snakes, poisonous biota), OE hazards, vehicle operation, heavy lifting, severe weather (e.g., tornadoes, floods), and cuts/punctures from tree branches. Measures will be in-place and implemented prior to data acquisition to reduce/eliminate exposure to these hazards. The SSHP provides more specific information on hazards and control measures.

5.4 GEOPHYSICAL INVESTIGATION METHODS

5.4.1 Equipment

Based on the results of the 1999 proveout test (see Attachment 5-1), the EM61 TDEM instrument exhibited the best potential to meet the overall program objectives. In general, the EM61 utilizes two coaxial receiver coils to measure the residual magnetic field generated by conductive and/or magnetic materials. The EM61's employed by Foster Wheeler Environmental are designed to measure the residual magnetic field at a time when the response from conductive and/or magnetic objects is maximized compared to the response from most earth materials. The use of two receiver coils also makes it possible to differentiate, in a simplistic fashion, shallow versus deeper objects. An additional benefit of the specific design of the EM61 system is that it permits a more focused observation of the subsurface in areas of cultural interference, as well as areas characterized by a high spatial density of subsurface objects. This is due to both the mechanical design and operational parameters of the instrument, as well as the inherent nature of active EM fields, which diminish in magnitude at a much higher rate than other sensor technologies such as magnetometry.

5.4.1.1 The primary factors that affect the detectabilitiy of objects or features with TDEM methods include volumetric size and orientation, distance from the sensor, and the material properties contrast between the object or feature and the surrounding materials.

5.4.1.2 The EM61 is relatively insensitive to nearby surface cultural interference such as buildings, power lines, and fences, and has the ability to record digital data at 0.10 second intervals (using USRADS recording system), which translates to a spatial sample density of approximately 0.25 to 0.75 feet along the ground surface.

5.4.2 Procedures

The specific procedures used to acquire data with the EM61 are somewhat dependent upon the specific objective at each site or area surveyed. It is anticipated that geophysical survey grids and ribbon walks will be the primary data acquisition methodologies used during the project. The primary navigation technology to be used in heavily wooded areas will be USRADS. DGPS may be used in real time kinematic (RTK) or post-processed mode in areas void of tall, dense vegetation. Other navigation technologies that may be used to achieve specific objectives in special circumstances include single frequency GPS (non-differential mode), compass orientation and pacing (orienteering), and conventional modes of navigating a pre-defined area using a transit, measuring tape, and non-metallic pin flags as "waypoints". Regardless of the objective or navigation technology utilized for a specific task, the data form the geophysical sensor will be digitally recorded. Positioning information from USRADS, GPS, and DGPS will also be recorded in a digital format.

5.4.2.1 Where geophysical survey grids are proposed in densely wooded areas, a modified approach to traditional "grid" surveying will be implemented. In order to survey these areas in the most efficient and cost-effective manner, portions of a one-acre site will be selectively cleared of vegetation and metallic items residing on the surface. Areas within the one-acre parcel that will be cleared will be those that require a minimum amount of time and use of ancillary equipment (e.g., chain saws, etc.). Priority for the removal of vegetation in the selected areas of the one-acre parcel will be based on the potential to degrade the quality of the geophysical data and/or adversely affect the safety of the equipment operators (e.g., tripping hazards). Metallic items residing on the surface will also be removed by qualified personnel. Within the one-acre parcel that has been selectively cleared, the equivalent of 0.5 acres of geophysical data will be digitally collected using an EM61 coupled to an USRADS navigation and data recording system. The data acquired may not be contiguous in all areas due to obstructions and other natural features that may adversely effect the data acquisition process. However, the transect geometry (distance between adjacent acquisition paths) will be designed to ensure that the spatial sample density is adequate to meet the specific objectives for that area. The proposed method of site vegetation removal, surface metal clearance, and geophysical survey permits the acquisition of the highest quality data to ensure the most accurate determination of the OE contamination, or lack thereof, in a specific area.

5.4.2.2 In areas void of tall, dense vegetation, grid surveys may be performed with the EM61 coupled to a DGPS or USRADS system. The determination of the navigation system to employ will be based on several factors. The most important selection criteria will be the number of grids that require examination and the existence of nearby sources of "noise" (e.g., vehicles, wind, rain, etc.) that may adversely effect the USRADS positioning data at certain time periods. Where applicable, DGPS positioning will be used in open areas to increase the cost effectiveness of the project.

5.4.2.3 Where geophysical survey grids of 0.5 acres (or larger) are proposed in open areas generally void of tall, dense vegetation, the procedure for EM61 data acquisition using USRADS is very similar to that proposed for densely wooded areas. The major difference is that in wooded areas, more transponders are required within a smaller area to achieve accurate positioning data. To effectively use the USRADS positioning and data recording system, a minimum of two transponders will be located at positions with known coordinates (relative or absolute). The remaining transponders (minimum of eight) will be positioned over the area with a geometry that enables the instrument location to be accurately determined. The number of transponders necessary in each “survey grid” will be based upon the cultural features and obstructions present. A portable computer located near each “survey grid” will be used to record the instrument data and coordinate position information. These data will be viewed on the computer screen in real-time.

5.4.2.4 Surveys performed with the EM61 coupled to a DGPS system may be performed in open areas void of tall, dense vegetation. A base station will be positioned on a known location point a maximum of 5-6 miles from the area being investigated. The rover unit will be positioned on a PVC frame directly above the central axis of the EM61 coils. It is anticipated

that the position data will be post processed to provide the most accurate position solution, however, position data recorded in real time can also be used to determine the sensor location.

5.4.2.5 "Conventional" modes of data acquisition and navigation may be necessary in some specific areas to meet the project goals. This method will employ a transit (or other appropriate survey instrument), tape measures, and non-metallic pin flags used as "waypoints" within a survey plot to accurately locate the sensor system. Geophysical data acquisition will be initiated at a marked corner of the survey plot and proceed along parallel data acquisition lines. Fiducials (i.e., event markers) will be recorded concurrently with the digital EM61 data at locations corresponding to survey flags (i.e., "waypoints") placed along pre-marked data acquisition lines.

5.4.2.6 One of the primary uses of the ribbon walk method of data acquisition is to define smaller locales within larger areas (e.g., several tens or hundreds of acres) that exhibit specific OE characteristics (e.g., boundaries of an impact area). Using this method, the instrument operator follows pre-defined GPS waypoints or a random, meandering path through the area of investigation. For a single sensor system (e.g., one EM61) the interpreted position and characteristics of targets located outside of the coil area are more difficult to determine with as high a degree of confidence when compared to a “standard” two-dimensional grid survey. Therefore, when a target is reacquired for excavation, it may be necessary to search a small rectangular area around the potential target location. Another survey variation entails marking the location of the target in real-time as accurately as possible while conducting the ribbon walk. Based on our past experience, this variation can be applied in areas where the targets are isolated and their density is low. For areas characterized by higher target densities the method becomes much more subjective and complex (e.g., similar surveying in a landfill).

5.4.2.7 It is advantageous to utilize subscription GPS or high-resolution DGPS navigation for ribbon walks. However, if the characteristics of the area to be surveyed preclude the optimum use of these methods then it may be necessary to implement alternative "specialized" navigation and position methods for the geophysical data acquisition phase. Navigation methods applicable may include fluorescent hip chain used to identify the path of the instrument operator in concert with non-metallic pin flags placed in real-time at potential target locations. The accurate positioning of the targets detected can be achieved by using a modified version of the target reacquisition practice discussed in Section 5.7**.** Delivery Orders that require specialized applications with regard to sensor position, target detection and identification, and target reacquisition practices will be discussed in detail in the respective Work Plans for these areas.

5.4.3 Personnel

The geophysical survey staff will consist of a Geophysical Task Manager (GTM), data manager/QC technician, USRADS/DGPS technician, geophysical survey crews, data processors/interpreters, and GIS specialists. All of these individuals will have a combination of science, engineering, and computer science backgrounds, or will be trained in the specific use of the instrumentation employed. The USRADS/DGPS technician will have experience and

training in USRADS/DGPS equipment operation, maintenance, and supporting software. It is anticipated that each geophysical survey team will include one geophysical survey specialist, one USRADS specialist, and one data acquisition specialist. If necessary, a UXO specialist will perform OE avoidance for the geophysical personnel in lieu of a complete surface clearance of the sampling area. The geophysical and navigation data will be processed by trained computer specialists and checked and interpreted by a degreed geophysicist. For most planned activities, the geophysical data interpretation will result in anomalies selected for intrusive excavation.

5.4.3.1 The Foster Wheeler Environmental GTM is responsible for overall coordination of data acquisition, data analysis, technical content, and technical review of data. The Foster Wheeler Environmental GTM reports to the Foster Wheeler Environmental Delivery Order Manager. The specific responsibilities of the Foster Wheeler Environmental GTM include the following:

- Staffing and maintaining geophysical staff throughout the project. Providing recommendations for implementation should the task require additional staffing or a change to staffing requirements.
- Coordinating field teams and support personnel to ensure consistency of performance and maintenance of established schedules.
- Providing technical leadership in the discipline of geophysics, statistics, and the quality control and assurance of the geophysical data. Using experienced personnel to assess the quality of the USRADS/DGPS data.
- Establishing a list of all equipment, computers, materials, and supplies necessary to perform a task.
- Coordinating subcontractors for field activities.
- Monitoring technical performance of team members and subcontractors.
- Technically reviewing all deliverables of the study.
- Approving contributions to any technical deliverable for any work element.
- Communicating with CEHNC in areas of technical expertise.

5.4.3.2 The Foster Wheeler Senior UXO Supervisor (SUXO) is responsible for the administration of all field activities and personnel. The SUXO works as an integrated team with the GTM to ensure the success of the data acquisition phase of the project. The specific responsibilities of the SUXO includes the following:

- Scheduling field crew activities in concert with the GTM.
- Establishing and maintaining communications with team personnel.

- Establishing control of site access with the Foster Wheeler Environmental GTM.
- Maintaining data acquisition-related paperwork and ensuring its accuracy.
- Coordinating and directing activities of all personnel on the geophysical field team, including setting and enforcing schedules that are necessary to achieve the goals for each day's activities.
- Supervising geophysical field operations and related surveying activities, including directing field team activities.
- Logging all activities at the geophysical survey site in the field logbook and maintaining relevant files.
- Ensuring that all materials needed at the survey site are in stock (e.g., geophysical equipment, writing materials, tape, diskettes, markers, etc.).
- Planning field data acquisition schedule for the next day with the GTM.
- Checking sites to be surveyed and access routes in advance of data acquisition activities.
- Reporting level of effort expended to the GTM on a daily basis.
- Uploading data to the processing center on a daily basis.
- Performing repeatability checks necessary for geophysical instrumentation.
- Creative thinking to improve the efficiency and/or quality of the data based on site- specific survey conditions.
- Assessing, on a daily basis, satellite coverage and estimated DGPS Position Dilution of Precision (PDOP) conditions for the next day's survey (if necessary).

5.4.3.3 The authority of the SUXO includes the following:

- Shutting down operations on a site to prevent compromising technical quality.
- Shutting down operations on a site to prevent compromising health and safety.

5.4.3.4 The Foster Wheeler Environmental Data Acquisition Specialists are responsible for the acquisition of geophysical data and will work in conjunction with the SUXO. Their responsibilities include:

- Following the designed geophysical survey protocol in a consistent manner.
- Transfer of data from the data recording devices to PCMCIA (or equivalent) media.

- Maintaining geophysical and related equipment and supplies in excellent condition.

5.4.4 Production Rates

Production rates will vary depending on site-specific conditions. Factors affecting production rates include topography, near-surface vegetation and tree density, accessibility, geophysical methodology (USRADS versus DGPS, grid versus ribbon walk), data density and resolution requirements (line spacing), and dynamic events. This information will be provided for each specific site to be investigated.

5.4.5 Data Resolution, or Line/Grid Width Requirements

The spatial sample density required to detect a target at a specific depth is one of the most important considerations in survey planning. In general, our past experience has shown that to detect small, shallow targets (e.g., 20mm) with the EM61 requires a line spacing of 1.5 to 2 feet and instrument recording interval of 6 to 8 times per second. If necessary, a simplistic test can be performed prior to specific Delivery Orders to determine the line spacing and spatial sample density necessary to detect an OE item(s) of interest. The testing involves the analysis of the signal intensity as the sensor is moved laterally away from the item(s) of interest. The baseline data necessary for the test requires that a repeatability test be performed. This is accomplished by the operator performing a short transect with the instrumentation where no item of interest is present (i.e., it represents "background"). These data are used to determine an appropriate “noise” level (i.e., standard deviation of the readings) for the instrument while it is in motion.

5.4.5.1 The signal intensity data can be represented as x – y graphical images with the x-axis representing distance (lateral distance at a specific depth of burial) from target and the y-axis representing the respective instrument intensity at that distance. A horizontal line can be drawn that intersects the y-axis and represents the standard deviation of the instrument readings while the instrument is in motion. When the response of the instrument (target present) decreases to the level of the line representing the standard deviation, in theory, the natural variation of the instrument is equal to or greater than the target response and thus does not represent the most optimum environment for target selection.

5.4.6 Data Density

The amount of data acquired over a particular grid or transect will ensure that the following CEHNC EM61 performance goals for detection are achieved:

$$\log(d) = 1.002 \log(dia) - 1.961, \text{ where}$$

dia = diameter of minor axis of OE, in millimeters.
d = required depth of detection to top of buried OE, in meters.

5.4.6.1 If requested for a specific Delivery Order, Foster Wheeler Environmental will demonstrate and document the capabilities of the proposed geophysical system (sensor platform, navigation equipment, data analysis, data management and associated equipment and personnel) to operate as an integrated system capable of meeting the stated project performance goal. If a task specific geophysical prove-out is required, a separate Work Plan will be generated that includes pertinent information on the goals of the test program and the specifics of how they will be achieved.

5.4.6.2 The amount of data collected within a certain investigation area (e.g., Sector with homogeneous characteristics) to provide data for risk analysis purposes will be determined with methods such as SiteStats, the UXO Calculator, or other statistical sampling strategies developed during the contract (see Section 2.5 of this Work Plan).

5.4.7 Data Processing

A Foster Wheeler Environmental geophysicist will perform preliminary geophysical and navigation data processing and Quality Control (QC) checks on a daily basis at the on-site processing center. The final analysis and interpretation of the data will be performed at a centralized processing center located at the Foster Wheeler Environmental Lakewood, Colorado office. Processing, QC, and analysis and interpretation of the data are performed with internally developed software that has been specifically produced to integrate and interpret digital geophysical data acquired with USRADS or DGPS positioning systems. Several steps are performed to process the geophysical data prior to analysis. An example of the EM61 and USRADS or DGPS navigation processing flow is similar to the following:

- GPS or USRADS data are processed and transformed into the requested coordinate system. For USRADS, if the data is acquired in a relative coordinate system, these x-y locations are also included in the file output. GPS or USRADS data are concatenated with the EM61 data and the data acquisition geometry and sample interval are checked. EM61 instrument bias is removed, signal drift is corrected, and minor instrument positioning corrections are applied.

- Positioning and EM61 signal statistics are calculated for each data acquisition session; erroneous measurements are identified and archived to a designated location.

- Data may be interpreted using two independent modes of target prediction (profile data and color-coded image data) to provide x, y, and z location information for each target, as well as the target's approximate size. As necessary, color-coded images are generated to assist intrusive excavation personnel with digsheet information.

5.4.7.1 It is anticipated that approximately two to four data acquisition sessions will occur per day for each acquisition crew. Each acquisition session will have a unique identifier and consist of position and EM61 signal data over an area of approximately 0.25 - 1 acre. The EM61 signal and position data from each acquisition session will be appended to a master project database, which can be used to create color-coded data images of the EM61 data on a daily basis and track the progress of the survey in each area (e.g., Sector). Each data acquisition session will

also be interpreted and appended to the master project database on a daily basis. A digital master target file will be generated that contains a unique identifier for each target, as well as it's easting and northing coordinates (absolute or relative), approximate depth and size, and the digital signal values for the EM61 data. The digital target file will be compatible with existing protocols for the OEDig software so that the intrusive excavation proceeds in the most cost-effective manner.

5.4.7.2 The Foster Wheeler Environmental computer workstation at the centralized processing center will be used to store all finalized project data for the geophysical survey. Digital processing/interpretation portfolios will be maintained for the survey so that the processing/interpretation sequence can be reproduced at a future date, if necessary. The format of the digital geophysical data, as well as the graphics produced, will be compatible with the existing project database protocols (CEHNC ASCII ADF space delimited x,y,z file format). Foster Wheeler Environmental shall preserve the integrity of the raw, positionally corrected data and ensure that these data are provided to a CEHNC representative.

5.4.7.3 The geophysical and navigation data supplied to CEHNC will allow for corrections such as navigation, instrument bias, and diurnal magnetic shift (if applicable) but there will be no filtering or normalization of this data. All corrections to the data and pertinent field activities will be documented in a Microsoft Word file that will be delivered to CEHNC with the numerical data. No individual data file will be more than 4 megabytes in size and no more than 60,000 lines long. Each grid of data shall be logically and sequentially named so that the file name can be easily correlated with the grid name used by other project personnel. No later than 36 hours after data collection, Foster Wheeler Environmental will deliver each day's data to CEHNC via Internet, FTP, or other reliable method for inspection. Within 14 days of completion of survey activity, Foster Wheeler Environmental will provide CEHNC all final geophysical maps, digital dig-sheets and supporting geophysical interpretations.

5.4.7.4 All pertinent geophysical data will be transferred to a CDROM or other computer media (e.g., Iomega zip media) on a daily basis, and stored in a fireproof safe at the onsite and centralized processing center. Reference information that may be recorded and stored for each survey area include:

- Installation
- Site identification (file name and survey coordinates)
- Survey area conditions
- Acquisition personnel
- EM61 data value(s)
- Elapsed and sample to sample distance

- GPS quality
- Coordinate system
- Weather conditions
- Instrument serial number.

5.5 LOCATION SURVEYING, MAPPING & NAVIGATION

5.5.1 System Description

Geophysical data may be acquired using grids, ribbon walks, or other specialized acquisition methodologies. It is anticipated that geophysical survey grids will be the primary mode of data acquisition. The size of each survey grid will be approximately 1 acre in size. A minimum of three locations on the perimeter of each grid will be established and their position recorded by a registered surveyor or by the use of precision DGPS, where applicable. If DGPS is used by Foster Wheeler Environmental, the base station will be located on a first order monument, and work/rest periods for the geophysical survey crews will be correlated with satellite availability.

5.5.1.1 USRADS is a positioning and data acquisition system that automates the measurement and mapping of data collected for site investigations. This system can determine the instrument operator's x-y location and transmit this data along with the instrument response to an in-field computer, where the data is digitally recorded and displayed. USRADS includes software to check transponder operation and calibrate the location system based on the geometric arrangement of the transponders. The system uses ultrasonic technology to measure travel times and compute coordinate positions between a mobile instrument(s) and numerous stationary units (receivers or transponders). The instrument is fitted with a transmitter that emits acoustic signals to numerous stationary receivers where positions are known or calculated by the instrument setup software. The system also uses radio frequency pulses at 1 time per second to transfer instrument data to a portable field computer.

5.5.1.2 A standard USRADS consists of a data acquisition backpack, approximately 15 transponders (receivers), and a portable computer with a customized computer interface. The setup of the system is automated, whereby the ultrasonic signal travel times between all of the receivers are measured. These travel times are used, along with information gathered on the velocity of sound for a particular area to compute the x-y coordinate position of all of the receivers. The geophysical instrumentation is linked to the USRADS data acquisition backpack, which uses radio frequencies to transfer the instrument measurement(s) and position to the portable field computer, where the data is displayed.

5.5.1.3 Where applicable, a Leica SR530 GPS/DGPS (or equivalent) system will be used for navigation and positioning purposes. One unit will be positioned over a surface location with

known coordinates (base station), and the other unit will be positioned over the center of the EM61 instrument (rover) during data acquisition activities. Positional data acquired in this manner can be post-processed to provide the location of the rover GPS antenna. The Leica SR530 is a dual frequency system that can provide the highest location accuracy under some of the conditions anticipated at the site under investigation. An additional benefit is that the GPS antenna is small and can be mounted on personnel or polyvinyl chloride (PVC) tubing above the EM61 coils without interfering with the EM signal.

5.6 INSTRUMENT STANDARDIZATION

5.6.1 Instrument Drift (DC offset)

For the EM61 instrumentation, the DC offset is not adjusted in the field, but analyzed and corrected in the processing sequence. In general, the drift is corrected for each data acquisition session. It should be mentioned that a small amount of drift is common, and has no bearing on the ability of the interpreter to select targets for excavation.

5.6.2 Standardization Procedures

No calibration or standardization will be made to the instrument since it is calibrated prior to leaving the factory. However, measurements will be recorded over a portion of a data acquisition data line prior to commencement of each data acquisition session to provide information on the precision and repeatability of the measurement process.

5.6.3 Abbreviated Standardization Checks

When no metal is present, the standard deviation of the readings for the top and bottom coils should not be in excess of 1 millivolt (mV) when the instrument is not in motion. These repeatability data are collected prior to each data acquisition session and analyzed during processing.

5.6.3.1 Foster Wheeler Environmental has Standard Operating Procedures (SOP's) for EM61 surveys coupled to USRADS or DGPS positioning systems. These SOP's can be provided in the site-specific Work Plan for each area investigated, if necessary.

5.6.4 Instrument Response to a Known Standard

Prior to data acquisition activities at each grid a metallic target will be placed on the ground surface (e.g., Schonstedt, 2 to 3 foot length of rebar). Data is acquired over the target at least

three times in an alternate direction. This procedure ensures that the timing differences between the DGPS clock (if used) and EM61 clock can be accounted for in data processing. These data can also be analyzed to provide information on the characteristic response of the instrumentation in an area with specific characteristics (i.e., topography, geology, vegetation, etc).

5.7 DATA PROCESSING, CORRECTION AND ANALYSIS

5.7.1 Instrument Drift Correction

This information is provided in Section 5.4.1.

5.7.2 Diurnal Drift Correction

This effect is not applicable to EM61 instrumentation. If magnetometry is used at the site then a base station magnetometer will acquire data at approximately the same rate as the field magnetometer to allow the daily variations of the earth's geomagnetic field to be removed from the data.

5.7.3 Digital Filtering and Enhancement

If digital filtering and other data enhancement algorithms are applied to the data they will be referenced in the data processing portfolio for each grid surveyed. No filtering or data enhancement routines will be applied to the data delivered to CEHNC for QC purposes unless specifically noted in the Microsoft Word document that will accompany each data transmittal.

5.7.4 Correlation With Ground Truth

This topic is discussed in Sections 5.7 and 5.8.

5.8 QUANTITATIVE INTERPRETATION AND DIG SHEET DEVELOPMENT

Each processed set of data will be evaluated with respect to anomaly characteristics (e.g., amplitude, size, shape), "noise", positional data, edge effects (grid data), and the ability to discriminate and identify OE-like items for a particular area. After the geophysical data have been processed, Foster Wheeler Environmental will interpret the data using internally developed software.

5.8.1 Two primary modes of interpretation are possible; 1D profile interpretation and 2D interpretation using color-coded measurement data. For the profile interpretation, EM61 data are graphically displayed on the computer screen for review by the interpreter. Data are displayed with EM61 amplitudes along the y-axis versus distance or sample points along the x-axis. The geographic positions of the displayed data are also graphically displayed on the computer screen along with any comments entered into the positioning system (e.g. surface metal, etc.). Geophysical anomalies can be automatically selected by the computer, or selected interactively by the interpreter, or both. Computer selected anomalies are based on peak amplitudes above background values and/or the percentage of points above a local background value. The user selects the minimum amplitude and percentage above background for automatic picking. Background values are determined using the mode of a specified number of points in the data acquisition session or by taking the mode value of the data within a user defined number of samples around the anomaly.

5.8.2 For 2D color-coded interpretation, the interpreter plots the target selection results of the 1D process on a mathematically gridded color-coded map. The interpreter can modify targets based on evaluation of the spatial relationships within the data (e.g., pick a single target location for several 1D interpretation points that are closely –spaced), as well as deselect targets and features that appear to be utilities and large, above-ground features. Based on our past experience, the 1D/2D interpretation methodology reduces the subjectivity of the interpretation process, and provides target data that is more accurate and representative.

5.8.3 Concurrent with target selection, estimates of depth and relative size are determined for each anomaly, and a preliminary dig list is generated. Preliminary dig list anomalies with estimated sizes and other characteristics that fall within the size ranges for the ordnance types anticipated at each site will be identified as potential OE on the final dig list. Anomalies that fall outside of these ranges will be reviewed to ensure that background shifts and other processing steps were as accurate as possible. At this time, some of these anomalies may be reclassified as OE for inclusion on the final dig list. Anomalies that fall outside of the objective range will be labeled as non-OE based on the available historic data. The dig list will be formulated so that it is compatible with existing OEDig software standards.

5.9 ANOMALY REACQUISITION

Based on the site characteristics, it is anticipated that USRADS will be the primary method used to provide navigation assistance to relocate the x-y grid coordinates of interpreted targets. Based on some of the results from the 1999 Fort McClellan proveout test, the USRADS transponders will be positioned within the survey grid at the same x-y locations used during data acquisition. Small non-metallic markers will be used to mark the location of all transponders during the data acquisition process so that this objective can be achieved. This procedure should ensure that anomalies selected for excavation can be reacquired within approximately 2 feet of their actual location. At this stage, an EM61, EM61 HH, Schonstedt, Vallon VMX 1, or other suitable instrument used by properly trained personnel will be used to pinpoint the target(s) location

within approximately 20 cm. This location will be flagged and a unique identification number written on the flag.

5.9.1 Target reacquisition activities for a particular grid will be performed concurrently with other site activities and will be completed no later than 14 days after the field investigation is completed for that grid. During intrusive investigation operations, Foster Wheeler Environmental will report on all discrepancies between the interpreted and actual locations of the excavated target(s). Foster Wheeler Environmental will also report any anomalies that could not be reacquired and the reason(s) for the occurrence.

5.9.2 Personnel selected to perform target reacquisition will first be certified by Foster Wheeler Environmental in the procedures and use of the selected navigation and detection instruments. The process will certify the team's ability to pinpoint target anomalies of known, documented, locations, and within the accuracy as required by CEHNC DID OE-005-05 (Geophysical Investigation plan). The certification will document the names of the personnel, the instruments used, and the team's ability to locate the targets within the DID specified criteria.

5.9.3 Foster Wheeler Environmental has Standard Operating Procedures (SOP's) for target reacquisition practices with USRADS or DGPS positioning systems. These SOP's can be provided in the site-specific Work Plan for each area investigated, if necessary.

5.10 FEED-BACK PROCESS (COMPARISON OF DIG-SHEET PREDICTIONS WITH GROUND-TRUTH)

Intrusive investigation results will be constantly evaluated and compared against interpretation data to ensure that the interpretation is as repeatable and accurate as possible for the specific site conditions. Should intrusive results diverge significantly from interpretation data, CEHNC will be notified and a procedure implemented to evaluate the components of the relevant processes involved. This procedure will ensure that the disparity between the results is minimized for subsequent investigations. If necessary, geophysical investigation components will be evaluated including data acquisition (coverage, density, quality, noise levels, positioning), data processing (merging of EM data and position data, filtering, background shifts), and data interpretation (anomaly analysis, computer calculations for locations, sizes, and depths). The procedures for target reacquisition will also be evaluated. Corrective measures will be implemented, as necessary, to ensure that subsequent interpretive data and/or reacquisition procedures are modified to more accurately reflect ground-truth results.

5.10.1 There may be specific site conditions and/or specialized acquisition/reacquisition methodologies employed for a particular Delivery Order that may result in the following performance goals not being achieved:

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

- False Positives. There shall be no more than 15% "false positives" where anomalies reacquired by the Contractor result in no detectable, metallic material during excavations.

5.10.2 Based on the results of the evaluation procedure discussed above or other relevant, documented information, Foster Wheeler Environmental may propose that the stated goals cannot be achieved for a particular Delivery Order. Under these circumstances, Foster Wheeler Environmental will propose alternative goals for CEHNC.

5.11 QUALITY CONTROL

Quality control mechanisms will be implemented to ensure the data acquisition, processing and interpretation, and target reacquisition practices are monitored to a sufficient level to meet the overall program objectives for a particular area.

5.11.1 Each EM61, USRADS, and GPS used during the project will be listed according to make, model, and serial number in the field logbooks and/or in the digital data logger for the respective instruments. Instrument functional tests for the EM61, USRADS, and GPS will be digitally recorded and available for review by quality assurance (QA) personnel. Instrument-specific functional and testing procedures are described below.

5.11.2 At the beginning of each EM61 data acquisition session, prior to the commencement of coil movement, data will acquired for approximately 30 seconds to ensure the repeatability of the data measurements. At the commencement of coil movement, the instrument operator will traverse over a elongated metallic object (Schonstedt, rebar, etc.) a minimum of three times in opposite directions to ensure the detection capability of the EM61. This procedure also provides timing information used to concatenate the GPS (if used) or USRADS and EM61 data during data processing.

5.11.3 One of the most important USRADS functional checks includes the analysis of the velocity matrix in the data acquisition software. This matrix exhibits the relative distances between pairs of USRADS transponders, and calculates an apparent velocity of sound for the setup geometry. The velocity of sound in air is approximately equal to 1100 feet per second, and the calculated velocity for each USRADS setup should not deviate significantly from this value. This value will be monitored prior to data acquisition activities to ensure that the system is functioning properly.

5.11.4 When used, the proper operation of the Leica GPS systems will be ensured by relocating a small percentage of interpreted targets derived from specific data acquisition sessions (e.g., above-ground features, large, isolated targets) and positioning the system over a known location

(benchmark) on a weekly basis. The accuracy and repeatability results will be recorded in digital format and transferred to CEHNC, as required.

5.11.5 Prior to data acquisition activities for each Delivery Order or on a weekly basis, each EM61 and positioning system used for current data acquisition activities will be tested to ensure the specific objectives of the Delivery Order are being achieved. An offset/instrument sensitivity test (discussed in Section 5.2.5) or a more simplistic test may be performed to exhibit that the instrument has the required sensitivity to meet the program objectives. A more simplistic test may consist of acquiring data over several targets whose x-y location is known with an USRADS or DGPS positioning system. The data from the test can be evaluated with respect to the interpreted x – y location of each target.

5.11.6 In addition to the EM61 functional and repeatability tests performed, several other informative trial procedures can be performed to provide useful information for the data interpreters. These trials will evaluate the complex EM61 signal responses resulting from the geometric relationship between the data acquisition path, coil orientation and height above ground surface, and the test target items. In general, these trials may consist of simulating different coil orientations and heights above the ground surface ("noise") while traversing an area with known target locations. These data can be used to provide quantitative and qualitative information on the detectability of the target items as a function of different levels of noise present during the acquisition process.

5.11.7 No calibration will be made to the EM61, USRADS, or GPS instrumentation since they are calibrated prior to leaving the factory. However, EM61 and positioning measurements will be recorded over a portion of an existing data acquisition for each data acquisition session or at a designated location to provide information on the precision and repeatability of the entire data acquisition process.

5.11.8 QC mechanisms will also be applied to the analysis and interpretation of the geophysical data. Some targets interpreted to be the result of "noise" or above or below ground cultural features (e.g., metallic monitoring wells, underground metallic pipelines, etc.) will be archived by the interpretation software for further analysis. These targets are formally termed "discarded targets" and are stored for each data acquisition session (if applicable) in the project database. During the initial intrusive investigation activities for the project, a certain percentage of the discarded targets can be excavated to provide relevant information on the accuracy and integrity of the data interpretation.

5.12 CORRECTIVE MEASURES

This information is provided in Section 5.8.

5.13 RECORDS MANAGEMENT

A data processing center will be established at a centrally located facility at Fort McClellan. At this center data reduction and interpretation activities can be completed on a daily basis in order to verify that the project objectives are being met and to aid in the planning, or modification, if necessary, of the next day's field activities.

5.13.1 A database will be maintained on field laptop computers and desktop computers at the processing center. Data will be backed-up on tape cartridge daily and a file naming convention and subdirectory structure will be established.

5.13.2 Upon completion of geophysical surveys, digitally recorded survey data along with sensor position information will be downloaded from the data logging systems to a field computer for minor editing and preprocessing prior to analyses via PC-based target characterization software. The interpolated data are then formatted for input into a commercially available mapping system which has the ability to map the interpolated data to an image of the subsurface signal response and provide image enhancement capabilities to aid in the detection of the more subtle anomalies present in the image.

5.14 INTERIM REPORTING

This information is presented for the geophysical data in Section 5.2.7.

5.15 FINAL REPORTS AND MAPS

Final Reports and Mapping will be performed in accordance with the specifications of CEHNC DID OE-005-05 Geophysical Investigation Plan (reference Attachment 11-1).

ATTACHMENT 5-1
SYNOPSIS OF FORT MCCLELLAN PROVEOUT TEST, JULY, 1999

Synopsis of Fort McClellan Proveout Test, July, 1999

General Discussion

General Description of Activities. Fieldwork on the test site was performed on two days, July 13 and 14, 1999. During the first day, detailed time-domain electromagnetic induction (TDEMI) data were collected over the entire test grid. On the second day, processed geophysical data were used to identify targets of interest, pinpoint locations of target centers, verify coordinates of known survey points and collect supplemental data on target size and electromagnetic signature.

Site Description. The test area was an irregularly shaped, five sided area of approximately 1.1 acres. The test area was in a moderately wooded region, with three distinct regimes: a relatively flat area, a marshy bottomland, and a moderately sloping hillside. Hardwood trees approximately 40 feet in height dominate the site. Brush had been extensively cleared from the area so that 95 - 98% of the surface was accessible for geophysical measurements. The remaining 2 - 5 % were dense brush piles, trees and deadfall. The soil was rocky and well drained except in the marshy bottomland.

Weather Conditions. The weather was mild for Alabama in July. No significant rain events occurred during the operations on the test plot, although moderately heavy rains had been experienced in the area on July 11. Daily temperatures ranged from a low of 65 ^{o}F to a high of 80 ^{o}F on 13 July and from 67 ^{o}F to 85 ^{o}F on 14 July. The skies were partly cloudy on July 13 and clear on July 14.

Soil Conditions. From observations of existing excavations, the soil appeared to be a clay-humus mix. Cobble and boulder-sized rocks were visibly present on the surface of the site (predominantly on the hill), as were significant numbers of small, inert, ordnance-related metallic items.

General Data Gathering Procedures. Position-correlated, geophysical data were gathered over the entire site to prepare detailed geophysical maps of metallic anomalies. The geophysical maps were created to assist in identifying locations of suspect anomalies and to provide information for initial discrimination of objects below the objective size. which was determined by the client. The test area was divided into two roughly equal sized data collection areas: The flat area / marshy bottomland; and the moderately sloping hillside / bottomland. Data were collected by walking approximately parallel lines with 2 feet line separation over the test area. The completeness of the data for the intended purpose was monitored in real time by the USRADS computer operator. PVC shaft pinflags were placed every four feet at the ends of each data collection area to assist the instrument operator in assuring complete coverage and maintaining the transect width. EM61 data were collected at a rate of 10 samples per second. This correlates to a station spacing of approximately 0.25 ft along the ground surface based on an average walking pace of 3-4 ft/second. Positional data were recorded by the USRADS system at a rate of 1 sample per second. Supplemental, position-correlated data were collected from selected targets using the Geonics EM61 Hand Held detector. Target locations were reacquired by using the USRADS navigation system, set up in exactly the same position as during data collection, and by defining the center of mass using the EM61 Hand Held detector, Vallon VMX1 Locator, and Schonstedt Model GA-52CX Ordnance Locator.

Instrument Functional Checks. The EM61 is calibrated at the factory. It is not necessary to perform further calibrations at the site. However, both top and bottom coil responses were "zeroed-out" over an anomaly-free area prior to each data acquisition session using the control knobs located on the EM61 backpack. In addition, data were collected over a Schonstedt ordnance locator three to five

times before and after each data acquisition session to ensure that the EM61 coil responses remained consistent.

For each data acquisition session, seven of the 15 USRADS receivers were positioned over survey control points. Positional data were checked for accuracy by comparing the calculated positions of stationary receiver locations at these control points against the state planar coordinates provided by CEHNC.

Completeness. Geophysical data were collected over 95 - 98% of the test area. Data were collected on 100% of the area that was accessible and not covered by trees, deadfalls and impenetrable brush piles. Government officials instructed Foster Wheeler Environmental Corporation to not collect data under deadfalls and in brush piles.

Raw Data

The raw data for the EM61 and EM61 HH instrumentation are archived on CD-ROM. These data files are ASCII, space delimited files as output by the USRADS data acquisition software. The data fields include Alabama State planar easting, northing, bottom (or top) channel, and time. Data are unfiltered, and uncorrected for position shifts due to the time delay inherent in the acquisition system. The file names, size, and description of each file are provided on the CD-ROM.

Data Processing/Analysis Methodology

Several steps were taken to process the EM61 data prior to analysis. These steps include proper geometric positioning of EM61 sensor data, shifting of sensor data to a common, relative background, filtering of the data to remove extraneous noise spikes, and filtering of data to remove cyclic noise induced by instrument cabling.

Positional Processing. USRADS software was used to record EM61 data. Geophysical data were recorded at 10 times per second, and positional data were recorded at 1 time per second. EM61 sensor data is merged with positional USRADS data in the USRADS software. Positional data is determined during data acquisition, however, because USRAD transponder velocities, positions, and interval times are also recorded, positional data can be reprocessed after data acquisition, if necessary.

Additional positional errors result from variable topography. The USRADS calculates position within the plane defined by its stationary receivers. On sloping terrain, this plane is not parallel to the State Plane, therefore actual positions are different than the USRADS predicts in sloped areas. These errors in location data were corrected by warping (shifting) the incorrect EM61 positions to correct, known positions. This process stretches other data points and corrects the erroneous positions.

EM61 Background Corrections. The EM61 has control knobs to null the instrument (set the sensor values to zero) prior to data acquisition. This procedure was performed prior to each data acquisition session at the test plot. As a further step to ensure EM61 sensor data collected during different sessions has the same background, each data set is shifted to a background of zero using software developed by Foster Wheeler Environmental Corporation. During anomaly analysis, additional background corrections are made to ensure more accurate estimates of target size and depth.

Filtering. Upon completion of data acquisition, EM61 sensor data were imported to Geosoft's Oasis Montaj geophysical mapping/processing/analysis software. It was noted during analysis that noise spikes were present in the data (primarily channel 2). These noise spikes occurred approximately

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every 12 seconds, had a duration of three to five samples, alternated polarity, and had amplitudes ranging from approximately 4 to 11 millivolts (mv). The noise spike appears to be generated by the USRADS system (the noise was not present with the EM61 in stand-alone mode), however, the exact cause has yet to be determined and is currently under investigation. A non-linear de-spiking filter was applied to remove the noise spikes.

Upon completion of filtering, the data is gridded using Geosoft's Oasis Montaj software for color contouring, mapping, and further analysis.

Final Processed Data

Final processed digital data files for each sensor in native formats as analyzed are archived on CD-ROM. These files are ASCII, space delimited, and represent data were used to generate the digsheet. The data fields are Alabama State planar easting, northing, and top (or bottom) channel.

Anomaly Analysis and Target Criteria

Anomaly Analysis. After the EM61 data has been processed, Foster Wheeler Environmental Corporation's proprietary software, in conjunction with Geosoft's Oasis Montaj, is used to identify and analyze anomalies. Foster Wheeler Environmental Corporation's proprietary software is first used to identify anomalies based on their amplitude above local background values, as well as the shape of the anomaly. A geophysicist then compares these picks against the mapped data and selects targets for further analysis. Sensor data from both coils of the EM61 (channel 1 and channel 2) are used during this process to ensure that an anomaly is legitimate (and not instrument noise). The geophysicist may apply amplitude shifts to the data at this time to ensure compensation for localized variations in the background values. After anomalies have been selected for further analysis, estimates of depth and size (equivalent spherical diameter) are determined for each anomaly using proprietary software. A preliminary dig list is generated at this time.

OE Criteria. The Statement of Work states the target anomalies for the test grid vary from 40 mm practice grenades to 155 mm projectiles, and the objective range for target anomalies will be 0.5 to 100 pounds, and 3.89 inches to 27 inches. Recent communications from the Contracting Officer confirmed that both conditions must exist for an anomaly to be considered a true target for this demonstration. Preliminary dig list anomalies with estimated sizes that fall within these ranges are identified as ordnance on the final dig list. Anomalies that fall outside of these ranges are reviewed to ensure that background shifts were applied correctly and size calculations are legitimate. At this time, some of these anomalies may be reclassified as ordnance for inclusion on the final dig list. Anomalies that fall outside of the objective range are labeled as "Non-UXO".

Prioritized Dig List

A color-coded image of the Channel 2 EM61 data with the target picks is provided as Figure 1.

Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal.

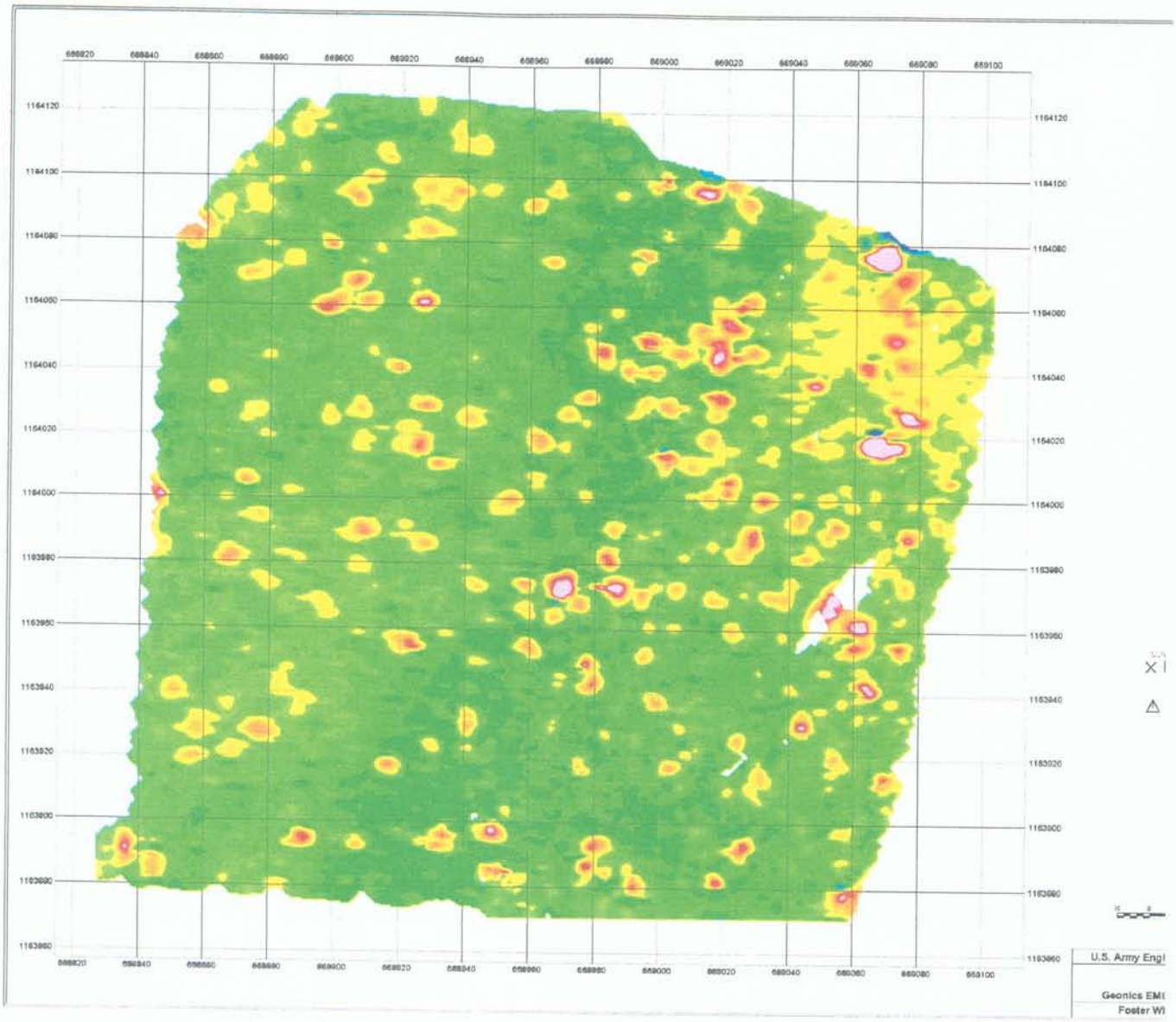

Figure 1

Recommendations

The instrumentation selected for the initial actual task order includes the Geonics EM61 TDEMI System for geophysical data acquisition, the Chemrad Model 2200 UltraSonic Ranging And Data System (USRADS) system for positioning and data recording, and the Vallon VMX1 Mine Detector for reacquisition. In addition, a Leica SR530 survey quality differential global positioning system would be used to bring in control points for the USRADS system. Oasis Montaj software and Foster Wheeler Environmental Corporation proprietary software will be used to process and analyze geophysical data.

Data acquisition line spacing should be no greater than 2 feet to ensure that data coverage is sufficient (no less than 100 percent in surveyed areas) to detect and characterize smaller UXO (40 mm or less). A sample rate of 10 readings per second will be used. In addition, a minimum of 15 USRADS stationary receivers should be utilized for positioning on a 0.75 - 1.0 acre survey plot.

Projected Effectiveness

The projected effectiveness of the proposed system as demonstrated at the test plot can not be ascertained based on the results of the test plot survey at this time as the depths and sizes of the buried items are unknown.

Post Mortem July 2000

The 1999 Field Demonstration results were used to evaluate the effectiveness of the navigation, detection, and data processing technologies/methodologies proposed for the M2 Parcel. For the evaluation, the Pd criteria was based on a navigational error of less than 2 meters, the ability to detect items to a depth of 4 feet, the ability to discriminate between multiple targets greater than 3 feet apart, and the ability to discriminate between target anomalies and items too small to be target anomalies (i.e. a target anomaly was defined as an item with a mass greater than 0.5 pounds and a dimension greater than 3.89 inches). A false positive was defined as any target selected that was less than the size or mass criteria specified, had a navigational error greater than 2 meters, and could not be distinguished from another target which was outside a critical radius of 3 feet from the first target. The criteria-specific results for the Proveout were a 98 % Pd with a false alarm rate of 2.1:1.

A more in-depth review of the Proveout Test results indicates that implementation of certain procedures may improve the performance achieved during the Proveout Test. In order to achieve this level of detection and associated size discrimination, the following procedures will be implemented during future geophysical programs at Fort McClellan:

1) UXO personnel will excavate all metallic contacts within a 1 m radius of the interpreted target location. Target locations likely to contain multiple targets that could possibly be outside the critical radius of 1 meter will be identified as such on the digsheet in the comment column (e.g., "multiple targets probable") and the radius will be increased accordingly.

2) USRADS will be used to re-acquire the target locations selected for excavation. The same survey control (i.e., fixed points) will be used during anomaly acquisition as those used

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for data acquisition. This procedure will minimize position errors resulting from differences between the state plane coordinates and the USRADS position, which is based on slope (not planar) distance.

3) The target selection threshold will be adjusted in the interpretation software based on the "learning curve" associated with the Proveout Test and through data validation during excavation of anomalies identified in future investigations. This procedure will ensure the data interpretation will be consistent with those attained in the Proveout Test.

6.0 SITE SAFETY AND HEALTH PLAN

6.1 Introduction

This Site Safety and Health Plan (SSHP) has been prepared to address the general hazards associated with work activities at Fort McClellan and will be used in conjunction with site specific health and safety plans prepared for individual delivery orders. By their signatures, the undersigned certify that this SSHP will be utilized for the protection of the health and safety of workers during work activities at Fort McClellan.

APPROVALS:

Arthur B. Holcomb, P.E., CIH Project Manager	2/5/02 Date
Gerry Delaney, CIH Certified Industrial Hygienist	2/4/02 Date
Mark Fletcher Project Environmental and Safety Manager	2/3/02 Date
Steve Neill Site Manager	2/4/02 Date

6.1.1 Scope and Applicability

This SSHP has been prepared in conformance with the Foster Wheeler Environmental, Health and Safety programs, policies and procedures; the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1; and the U.S. Army Corps of Engineers Safety and Occupational Health Document Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OEW) Activities, ER 385-1-92. This SSHP contains the general requirements for protection of site personnel and the general public during work activities at Fort McClellan and will be implemented by the UXO Site Safety and Health Officer (UXOSO) or his designee during site work. The content of this SSHP may change or undergo revision based upon additional information made available to safety and health personnel, monitoring results, or changes in the technical scope of work. Any changes proposed must be reviewed by the Foster Wheeler Environmental UXOSO and are subject to the approval of the Foster Wheeler Environmental Project Environmental and Safety Manager (PESM). Changes are also subject to the approval of CEHNC. The Field Change Request Form provided in Attachment 6-1 will be used to initiate such changes.

6.1.1.1 The protection of site workers and environmental safety and health are major concerns during site operations. The purpose of this plan is to ensure safe and healthful working conditions at the site. The safety and health organization and procedures contained in this SSHP have been established based upon an analysis of the potential hazards, and personnel protection measures have been chosen based on these risks.

6.1.1.2 Compliance with this SSHP is required by all Foster Wheeler Environmental employees and their contractors, subcontractors and visitors who may participate in activities at Fort McClellan. Refusal or failure to comply with the SSHP or violation of any safety procedures by field personnel and/or subcontractors may result in their immediate removal from the site following consultation with the Foster Wheeler Environmental PESM and the Project Manager (PM).

6.2 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

The responsibilities of the health and safety staff are described in the following sections.

6.2.1 Project Manager (PM)

- Ensures implementation of this program through coordination with the Project Environmental and Safety Manager (PESM);
- Conducts monthly inspections jointly with the UXOSO;
- Participates in major incident investigations;
- Ensures the SSHP has all the required approvals before any site work is conducted;
- Ensures that the PESM and UXOSO are informed of project scope changes which require modifications of the SSHP;
- Has overall project responsibility for health and safety; and
- Ensures that adequate resources are provided to the field staff to carry out their responsibilities as outlined below.

6.2.2 Project Environmental and Safety Manager (PESM)

- Provides for the development and approval of the SSHP;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves revised or new safety protocols for field operations;
- Approves individuals who are assigned UXOSO responsibilities;

- Approves the UXOSO to fulfill other project roles;
- Coordinates revisions of this SSHP with field personnel;
- Coordinates upgrading or downgrading of personal protective equipment with the UXOSO;
- Assists in the investigation of major accidents, and
- Conducts quarterly inspections for compliance with the SSHP.

6.2.3 Senior UXO Supervisor (SUXOS)

- Directs the surface inspection and sweep using a magnetometer;
- Has overall supervisory responsibility for specific OE procedures;
- Coordinates with the UXOSO on matters regarding OE;
- Halts or modifies any work conditions or removes personnel from the task site if the conditions are unsafe;
- Ensures that all task site personnel understand and comply with all OE safety requirements;
- Monitors team leader and team member performance including safety and quality control;
- Responsible for overall direction of on-site intrusive activities;
- Has direct supervision of specific OE procedures;
- Responsible for the day-to-day OE-related work at the site;
- Responsible for implementing and enforcing all work plans related to UXO operations;
- Conducts daily activities such as: supervising employees in site-specific UXO operations, overseeing the implementation of specified levels of personal protective equipment, identifying potential problem areas and making corrective action recommendations to the PM, implementing all corrective actions, and maintaining a daily log of work activities including noting any extraordinary occurrences;
- Initiates corrective actions for observed safety violations;
- Assists the UXOSO with the daily safety meeting.
- Responsible for conducting weekly EHS inspections.

6.2.4 UXO Site Safety and Health Officer (UXOSO)

- Works as a member of the project team to ensure implementation of this SSHP;
- Ensures that all health and safety activities identified in this SSHP is conducted and/or implemented;
- Identifies operational changes which require modifications to health and safety procedures and the SSHP, and ensures that the procedure modifications are implemented and documented through changes to the SSHP;
- Directs and coordinates health and safety monitoring activities;
- Ensures that proper personal protective equipment is utilized by field teams;
- Assists in conducting daily safety briefings;
- Monitors compliance with this SSHP;
- Notifies the PESM and the CEHNC Safety Specialist of all accidents/incidents;
- Coordinates with the Foster Wheeler Environmental PM and CEHNC Safety Specialist in any incident investigation;
- Maintains Accident/Incident Report Forms;
- Determines upgrades or downgrades of personal protective equipment (PPE) based on site conditions and/or real-time monitoring results;
- Ensures that monitoring instruments are calibrated;
- Reports to the PESM to provide summaries of field operations and progress; and
- Maintains health and safety field log books.

6.2.5 Field Crew Personnel

- Report any unsafe or potentially hazardous conditions to the UXOSO;
- Maintain knowledge of the information, instructions, and emergency response actions contained in this SSHP;
- Comply with rules, regulations and procedures set forth in this SSHP, and any revisions that are instituted;

- Prevents admittance to work sites by unauthorized personnel. If the unauthorized persons refuse to leave, the field crew personnel shall cease operations and notify the local police department who will remove these individuals; and

- Inspect all tools and equipment, including PPE, daily prior to use.

6.3 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

The site description and characterization of the potential contamination for each area of investigation will be included in the SSHP addendum to be developed for each project.

6.4 HAZARD ANALYSIS AND RISK ASSESSMENT

The potential hazards associated with the site activities include chemical hazards [CWM (Chemical Warfare Materiels), OE (Ordnance and Explosives)], physical hazards, and biological hazards. The potential for encountering various hazards will depend on the work being conducted and the location of the work area. The potential for encountering physical hazards is dependent upon the work activity being performed (intrusive or non-intrusive) and the location of that activity. Physical hazards such as heat stress, noise and other physical hazards due to motor vehicle operation, the use of heavy equipment, power tools, and etc. will be present depending upon the work being performed. Biological hazards may be present depending on time of year.

6.4.1 Chemical Hazards

Foster Wheeler Environmental personnel will not enter any area containing or suspected of containing CWM materials. Areas suspected of containing CWM materials will be investigated by the CWM EE/CA contractor. Once an area has been certified free of CWM material, Foster Wheeler Environmental personnel could investigate for potential OE contamination. In the event of CWM material discovery all personnel will evacuate the area immediately in an upwind direction. The SUXOS will notify Foster Wheeler Environmental Command Center and the CEHNC Safety Representative. Foster Wheeler Environmental UXO personnel will standby the area until response elements arrive on scene or until directed by the CEHNC safety representative. The Foster Wheeler Environmental Command Center will notify the Fort McClellan Transition Force Operations and other personnel listed on Table 6-1 as required.

6.4.2 Physical Hazards

6.4.2.1 Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE, in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke.

6.4.2.2 OE/Explosives

The areas where work will be conducted may contain OE; there also is a possibility that personnel may encounter ordnance-related items (small arms, cartridges, etc.). Only UXO trained personnel are authorized to handle OE material.

6.4.2.2.1 The hazards presented by OE have the potential to kill or cause serious injury if improperly handled. Operations involving OE are inherently dangerous and require strict adherence to safe practices, safety procedures, and positive control of personnel. Due to the variety of ordnance items that may be encountered all site workers must be vigilant in identifying hazards in the work place and bringing them to the attention of supervisory personnel. As additional hazards are identified, protective measures will be implemented. For the geophysical investigation, surface inspection and sweep using a magnetometer will be performed at each of the investigation grids by the SUXOS prior to the investigation to be conducted by the geophysicists. For the surface/subsurface investigation, the field personnel shall follow the field procedures and safety concepts/considerations specified in the UXO Safety Precautions (Attachment 6-10).

6.4.2.3 Cold Stress

Workers may be exposed to the hazard of working in a cold environment. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia, as well as slippery surfaces, brittle equipment, poor judgment, and unauthorized procedural changes.

6.4.2.4 Equipment Safety

The work activities planned for this project present physical hazards that are inherent to working around heavy equipment (e.g., potential for “struck by,” “caught between,” noise). Various types of heavy equipment will be utilized during work conducted at Fort McClellan. Working with and near heavy equipment poses many potential hazards that can result in serious physical harm. Prior to the start of on-site equipment operations, all personnel will be briefed on the

potential hazards posed by these operations. Good, common-sense safety practices and personal awareness will be necessary to reduce the possibilities for injuries.

6.4.2.5 Hand and Power Tools

In order to complete the various tasks for the project, personnel may utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution.

6.4.2.6 Noise

Noise is a potential hazard associated with the operation of heavy equipment, detonations, power tools, pumps and generators. Excessive noise presents two potential problems at the site. First, it hinders communication between workers. Second, excessive noise exposures (to both continuous and impact noise) can have adverse effects on a person's hearing. These adverse effects include both temporary and permanent hearing damage.

6.4.2.7 Traffic/Public

When working in a traffic area, orange traffic vests will be worn if the area is not zoned off with cones and tape. Also, due to the general curiosity of the public, Foster Wheeler Environmental personnel shall be diligent in their efforts to prevent the public from entering any zone by maintaining alertness and by verbal warnings. In addition, barricades and caution tape will be utilized in each grid. Air horns may also be used as a first alert followed by person to person communication. If any unauthorized individual does enter a zone, then work shall cease until the person has been escorted out of the zone.

6.4.2.8 Fire and Explosion

In most cases involving ordnance, accidental ignition and explosions are caused by some type of movement. It is imperative to positively identify ordnance by type and function prior to any movement. Ordnance should also be isolated from ignition sources to reduce the possibility of an explosion or fire. Also, when conducting heavy equipment operations, the potential of encountering fire and explosion hazards exists from underground/overhead utilities and gases. Additionally, the use of the engine on the heavy equipment could present the possibility of encountering fire and explosion hazards.

6.4.2.9 Slips, Trips and Falls

Working in and around the site will pose slip, trip and fall hazards due to slippery surfaces that may be covered, or from surfaces that are wet from rain, steam cleaning fluids, or water. Slips, trips and falls are a leading cause of injuries in field-related work settings, therefore, a concerted effort to identify, control, and eliminate these hazards and the measures needed to reduce or eliminate the possibility of injury will be communicated to all site personnel. Potential adverse health effects include falling to the ground and becoming injured or twisting an ankle.

6.4.2.10 Manual Lifting

Manual lifting of heavy objects may be required. Failure to follow proper lifting technique (see Section 6.15.10) can result in back injuries and strains. Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

6.4.2.11 Electrical Hazards

Overhead power lines and downed electrical wires all pose a danger of shock or electrocution if workers contact or sever them during site operations. Electrical equipment and extension cords used on-site may also pose a hazard to workers. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

6.4.2.12 Excavation Operations

The UXOSO and a competent person will be present on site during excavation operations and will provide oversight to ensure that appropriate levels of protection and safety procedures are utilized. This UXOSO must be an UXO-trained person. The existence and/or proximity of chemical, water, sewer, and electrical lines will be established prior to the commencement of any intrusive activities. An excavation checklist is provided in Attachment 6-2. No excavations will be greater than ten feet deep. All excavation operations will be conducted in accordance with the requirements of 29 CFR 1926, Subpart P; EM 385-1-1, Section 25; and Foster Wheeler Environmental Procedure EHS 6-3. The selection and design of personal protective system to be used will be done by the designated competent person.

6.4.2.13 Steam, Heat, Splashing

Exposure to steam/heat/splashing hazards can occur during steam cleaning operations, decontamination or sampling activities. Contact with steam/heat/splashing hazards can cause scalding/burns, eye injury, and puncture wounds.

6.4.3 Biological Hazards

The following may be present at the site. The UXOSO will instruct the field crew in the recognition and procedures for encountering biological hazards at the site.

6.4.3.1 Insect Bites and Stings

Insects, including bees, wasps, hornets, and spiders, will be present at this site making the chance of a bite very possible. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition; any individuals should notify the UXOSO who have been bitten or stung by an insect. The following is a list of preventive measures:

- Apply insect repellent prior to fieldwork and or as often as needed throughout the work shift. Apply deet (vapor-active repellent) to any exposed skin surface (except eyes and lips), and apply the permethrin repellent spray to field clothing. Note: Allow the permethrin to dry before using the treated clothing.
- Wear proper protective clothing (work boots, socks and light colored pants).
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible.
- Field personnel who may have insect allergies should provide this information to the UXOSO prior to commencing work, and shall have allergy medication on site.

6.4.3.1.1 The UXOSO will instruct the field crew in the recognition and procedures for encountering poisonous insects at the site.

6.4.3.2 Lyme Disease

Lyme disease is caused by infection from a deer tick that carries a spirochete. During the painless tick bite, the spirochete may be transmitted into the bloodstream, which could lead to the worker contracting Lyme disease.

6.4.3.2.1 Lyme disease may cause a variety of medical conditions including arthritis, which can be treated successfully if the symptoms are recognized early and medical attention is received. Treatment with antibodies has been successful in preventing more serious symptoms from developing. Early signs may include a flu-like illness, an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve or heart problems as well as a disabling type of arthritis.

6.4.3.2.2 Symptoms can include a stiff neck, chills, fever, sore throat, headache, fatigue and joint pain. This flu-like illness is out of season, commonly happening between May and October when ticks are most active. A large expanding skin rash usually develops around the area of the bite. More than one rash may occur. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. It's easy to miss the rash and the connection between the rash and a tick bite. The rash develops from three days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash.

6.4.3.2.3 Joint or muscle pain may be an early sign of Lyme disease. These aches and pains may be easy to confuse with the pain that comes with other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

6.4.3.2.4 Lyme disease can affect the nervous system. Symptoms include stiff neck, severe headache, and fatigue usually linked to meningitis. Symptoms may also include pain and drooping of the muscles on the face, called Bell's Palsy. Lyme disease may also mimic symptoms of multiple sclerosis or other types of paralysis.

6.4.3.2.5 The disease can also cause serious but reversible heart problems, such as irregular heartbeat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Often, the effects of Lyme disease may be confused with other medical problems.

6.4.3.2.6 It is recommended that personnel check themselves when in areas that could harbor deer ticks, wear light color clothing and visually check themselves and their buddy when coming from wooded or vegetated areas. If a tick is found biting an individual, the UXOSO should be contacted immediately. The tick can be removed by pulling gently at the head with tweezers. The affected area should then be disinfected with an antiseptic wipe. The employee will be offered the option for medical treatment by a physician, which typically involves prophylactic antibiotics. If personnel feel sick or have signs similar to those above, they should notify the UXOSO immediately.

6.4.3.3 Wild Animals

During the conduct of site operations, wild animals such as stray dogs or cats, raccoons, and mice may be encountered. Workers shall use discretion and avoid all contact with wild animals. If these animals present a problem, efforts will be made to remove these animals from the site by contacting a licensed animal control technician.

6.4.3.4 Snake Bites

Various reptiles, including poisonous snakes, may potentially be encountered at Fort McClellan. Various species of rattlesnake, along with copperheads and cottonmouths (water moccasins) may be encountered. Cottonmouths are semi-aquatic and typically found only near or in bodies of water (swamps, lakes, ponds, streams and/or rivers). All other of the species mentioned are typically found in more upland areas.

6.4.3.4.1 If bitten by a snake, try to remain calm, keep the affected area below the level of the heart and walk (do not run) to the nearest support zone for assistance. The UXOSO will immediately transport the victim to the closest medical facility for treatment or send for appropriate medical assistance, whichever is faster.

6.4.3.4.2 The following precautions should be used when working in areas potentially containing snakes:

- Wear appropriate protective equipment (work boots, snake chaps, etc.);
- Be alert and aware of your surrounding;
- Avoid walking in wooded areas, heavy brush, or tall grass if possible;
- If a snake is encountered, do not attempt to catch or kill it.

6.4.3.5 Plants

The potential for contact with poisonous plants exists when performing fieldwork in undeveloped and wooded areas. Poison ivy, sumac, and oak may be present on site. Poison ivy can be found as vines on tree trunks or as upright bushes. Poison ivy consists of three leaflets with notched edges. Two leaflets form a pair on opposite sides of the stalk, and the third leaflet stands by itself at the tip. Poison ivy is red in the early spring and turns shiny green later in the spring. Poison sumac can be present in the form of a flat-topped shrub or tree. It has fern-like leaves, which are velvety dark green on top and pale underneath. The branches of immature trees have a velvety "down." Poison sumac has white, "hairy" berry clusters. Poison oak can be present as a sparingly branched shrub. Poison oak is similar to poison ivy in that it has the same leaflet configuration, however, the leaves have slightly deeper notches.

6.4.3.5.1 Contact with poison ivy, oak, or sumac may lead to a skin rash in susceptible individuals. Rashes result from a toxin found in the sap which is extruded from the leaves and contained in the stems and roots. The rash is characterized by reddened, itchy, blistering skin which needs first aid treatment. If you believe you have contacted one of these plants, immediately wash skin through with soap and water, taking care not to touch your face or other body parts.

6.4.3.5.2 Employees will be trained in the identification of these species and will be advised to wear protective clothing such as gloves and long sleeve shirts where working conditions permit. Employees should also consider applying barrier lotions to the skin that has potential to contact these species.

6.4.4 Activity Hazard Analysis

Activity Hazard Analyses (AHAs) will be developed for each major phase of work planned to take place at Fort McClellan. The AHAs take into account the hazards discussed in Section 6.4 and their control measures. AHAs will be developed and included in the SSHP addenda. Additional AHAs will be developed by the UXOSO, or designee, for all unanticipated phases of work and shall be approved by the PESM prior to working on a new task. The AHAs will be used to instruct crews on the hazards of the associated activities during a phase preparatory meeting prior to commencement. Standard AHAs (mobilization, surface sweeps, geophysics, intrusive, etc.) are provided in Attachment 6-11.

6.5 TRAINING

Written certification of completion of the required training and medical surveillance will be provided to the Foster Wheeler Project Manager and CEHNC prior to field mobilization. The Project Manager has the responsibility of ensuring that personnel assigned to this project comply with these requirements.

6.5.1 Basic Health and Safety Training

Pursuant to 29 CFR 1910.120(e), hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise noted in the above reference. As a minimum, the training shall have consisted of instruction in the topics outlined in the above reference. Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to chemical or physical hazards.

6.5.1.01 In addition to the required initial training, each employee shall receive three days of directly supervised on-the-job training (i.e., close supervision during the first three days on the job in the field). This training will address the duties the employees are expected to perform.

6.5.1.1 Hazard Communication Training

Hazard communication training will be provided in accordance with the requirements contained in the Foster Wheeler Environmental, Health and Safety Procedure EHS 4-2.

6.5.2 Manager/Supervisor Training

In accordance with 29 CFR 1910.120(e), on-site managers and supervisors who will be directly responsible for, or who supervise employees engaged in hazardous waste operations shall receive at least eight additional hours of specialized training on managing such operations at the time of job assignment. This course shall include eight hours of training on topics such as the FWENC EHS program and procedures, health and safety training requirements, personal protective equipment, emergency preparedness programs/procedures, and health hazard monitoring procedures and techniques.

6.5.3 Annual 8-Hour Refresher Training

Annual eight-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 1910.120 requirements and related company programs and procedures.

6.5.4 Site Health and Safety Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and emergency services at the site and will highlight all provisions contained within this SSHP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity. During this training, the Project Rules Handbook will be reviewed by all site personnel. All site personnel will sign the acknowledgement page, and have the signed page placed in their training files.

6.5.4.1 Off-Road Vehicle Training

Prior to operating Off-Road Vehicles operators will attend a training class on the safe operation and maintenance of the vehicle. The class will include the Do's and Don'ts for operating vehicles in rough terrain areas.

6.5.5 Daily Safety Briefings

Project personnel and visitors will be given on-site health and safety briefings by the SUXOs or UXOSO to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements

and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity for the UXOSO to periodically update the crews on monitoring results. Prior to starting any new activity, a training session using the Activity Hazard Analysis will be held for crew members involved in the activity.

6.5.6 First Aid and CPR

The UXOSO will identify those individuals requiring first aid and CPR training in order to ensure that emergency medical treatment is available during field activities. A minimum of two field personnel on-site at Fort McClellan at any one time will have first aid and CPR training. The training will be consistent with the requirements of the American Red Cross Association.

6.5.7 Bloodborne Pathogens Training

Individuals on-site who have First Aid and CPR certification and who may provide emergency medical treatment, shall have completed training in accordance with the Foster Wheeler Environmental Bloodborne Pathogens Program and OSHA Bloodborne Pathogen Standard, 29 CFR 1910.1030. The Hepatitis B Vaccine Declination (mandatory) will be one of the topics covered in the training in accordance with 29 CFR 1910.1030 Appendix A.

6.5.8 Fire Extinguisher Training

Fire extinguisher education and training will be conducted in accordance with 29 CFR 1910.157 (g).

6.5.9 Subcontractor Training

Subcontractor personnel working on site only occasionally, for a specific limited task (such as land surveying) and who are unlikely to be exposed beyond permissible exposure limits, may be exempted from the initial 40-hour training requirement. The PESM will determine if this exemption is allowed. If subcontractor personnel are exempted from the 40-hour training requirements, they shall have completed a minimum of 24 hours of off-site instruction and one day of actual field training under the direct supervision of a trained, experienced supervisor.

6.5.10 UXO Training

In accordance with CEHNC DID OE-25 Personnel/Work Standards, UXO personnel assigned to the positions of UXO Technician I, UXO Technician II, UXO Technician III, UXO Safety

Officer (UXOSO), UXO Quality Control Specialist (UXOQCS), and Senior UXO Supervisor (SUXOS), shall be U.S. Citizens and graduates of one of the following schools or courses:

a. US Army Bomb Disposal School, Aberdeen Proving Ground, MD
b. US Naval Explosive Ordnance Disposal (EOD) School, Indian Head, MD
c. EOD Assistants Course, Redstone Arsenal, AL; EOD Assistants Course, Eglin AFB, FL; or a DoD certified equivalent course.

6.5.10.1 Senior UXO Supervisor (SUXOS)

The SUXOS shall be a graduate of a school listed in paragraph 6.5.10a or b. This individual shall have at least 15 years UXO experience, which may be a combination of active duty military EOD and contractor UXO experience; and shall include 10 years in supervisory positions. A SUXOS must be able to fully perform all of the functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. In addition, the ability to perform the following functions is a requirement for the SUXOS: Planning, coordinating, and supervising all contractor on-site UXO activities; preparation of standard operating procedures (SOPs) for UXO operations ensuring compliance with DoD directives as well as local, state, and federal statues and codes; and certification of Ammunition, Explosives, and Dangerous Articles (AEDA) and/or range scrap as ready for turn-in or disposal in accordance with current policies. The SUXOS must also be fully capable of supervising multiple project teams which may be performing UXO and UXO-related activities; e.g., vegetation clearance; land surveying; reconnaissance and classification of UXO, pyrotechnic items, and military explosives and demolition materials; locating surface and subsurface UXO; destroying UXO and OE by burning or detonation; and/or transporting and storing UXO and explosives material.

6.5.10.2 UXO Technician III

This individual, who supervises a project team, shall be a graduate of a school listed in paragraph 6.5.10a or b. This individual shall have experience in OE clearance operations and supervising personnel, and shall have at least ten years combined active duty military EOD and contractor UXO experience. This individual must be able to fully perform all functions enumerated for UXO Sweep Personnel, UXO Technicians I and II. In addition, the ability to perform the following functions is a requirement for the UXO Technician III: Supervising and performing on-site disposal of Ordnance and Explosives; preparing explosives storage plans in accordance with all applicable guidance; preparing required OE administrative reports; preparing SOPs for on-site OE operations; performing risk hazard analyses; conducting daily site safety briefings; and supervising the conduct of all on-site evolutions directly related to OE operations.

6.5.10.3 UXO Technician II

This individual shall be a graduate of a school listed in paragraph 6.5.10a or b. As an exception, a UXO Technician II may be a UXO Technician I with at least five years combined military EOD and contractor UXO experience. This individual must be able to fully perform all functions enumerated for UXO Sweep Personnel and UXO Technician I. In addition, the ability to perform the following functions is a requirement of the UXO Technician II: Properly storing OE material in accordance with applicable guidance; identifying fuzes and determining fuze condition; determining a magnetic azimuth using current navigational/locating equipment; performing field expedient identification procedures to identify explosives.

6.5.10.4 UXO Technician I

This individual shall be a graduate of a course listed in paragraph 6.5.10c. A UXO Technician I can advance to the UXO Technician II category after five years combined active duty military EOD and contractor UXO experience. This individual assists fully qualified personnel (UXO Technician II and above) in the following functions: Conducting reconnaissance and classification of UXO and other OE materials; identifying all munitions including bombs and bomb fuzes, guided missiles, projectiles and projectiles fuzes, rockets and rocket fuzes, land mines and associated components, pyrotechnics items, military explosives and demolition materials, grenades and grenade fuzes, and submunitions; locating subsurface UXO using military and civilian magnetometers and related equipment; performing excavation procedures on subsurface UXO; locating surface UXO by visual means; transporting UXO and demolition materials; preparing firing systems, both electric and non-electric, for destruction operations; operating Personnel Decontamination Stations (PDS); inspecting salvaged OE related material and erection of UXO related protective works; and donning and doffing personal protective equipment.

6.5.10.5 Quality Control Specialist (UXOQCS)

This individual shall have the same minimum qualifications as a UXO Technician III. In addition, this individual shall have documented Quality Control Training. This individual must be able to fully perform all functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. This individual must have the specific training, knowledge, and experience necessary to fully implement the contractor's QC plans. In addition, the UXOQCS must have the ability to implement the UXO specific sections of the Quality Control Program for all OE related evolutions; conduct quality control inspections of all UXO and explosives operations for compliance with established procedures; and direct and approve all corrective actions to ensure all OE related work complies with contractual requirements.

6.5.10.6 UXO Site Safety and Health Officer (UXOSO)

This individual shall have the same minimum qualifications as a UXO Technician III. In addition, this individual shall have the specific training, knowledge, and experience necessary to implement the SSHP and verify compliance with applicable safety and health requirements. This individual must be able to perform all functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. In addition, the UXOSO must have the ability to implement the approved UXO and explosives safety program in compliance with all DoD, federal, state, and local statutes and codes; analyze UXO and explosives operational risks, hazards, and safety requirements; establish and ensure compliance with all site-specific safety requirements for UXO and explosives operations; enforce personnel limits and safety exclusion zones for UXO clearance operations, UXO and explosives transportation, storage, and destruction; conduct safety inspections to ensure compliance with UXO and explosives safety codes; and operate and maintain air monitoring equipment required at site for airborne contaminants.

6.5.10.7 **UXO Sweep Personnel.** This position requires site and job specific contractor training (which may include ordnance recognition, safety precautions, donning and doffing personnel protective equipment, etc.) but does not require UXO technician qualifications. UXO Sweep personnel assist UXO technicians and supervisory personnel in the clearance of UXO, operating only under the direct supervision of qualified UXO technicians and/or UXO supervisors.. UXO Sweep Personnel conduct visual and/or instrumented UXO search activities in the field; perform field maintenance on military and civilian magnetometers; operate ordnance detection instruments and other similar equipment to include digital geophysical mapping instruments; and remove OE scrap after such items have been certified/verified safe for handling by a qualified UXO technician. UXO sweep personnel are not involved in the execution of explosives operations.

6.5.11 Medical Surveillance Procedures

All contractor and subcontractor personnel performing field work at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f), DA PAM 40-8, and DA PAM 40-173 (Exceptions to this requirement will only be made on a case-specific basis and then only after approval of CEHNC and the PESM). A physician's medical release for work will be confirmed by the UXOSO before an employee can begin site activities. At a minimum, the exam must be taken annually and upon termination employment with Foster Wheeler Environmental. Additional medical testing may be required by the Foster Wheeler Environmental PESM in consultation with the company physician and the UXOSO if an overt exposure or accident occurs, or if other site conditions warrant further medical surveillance.

6.5.11.1 A medical data sheet is provided in Attachment 6-3. This medical data sheet will be completed by all on-site personnel and kept at the site. Whenever possible, this medical data sheet will accompany the personnel needing medical assistance or transport to hospital facilities.

6.5.12 Documentation

Documentation of training requirements is the responsibility of each employer. Written documentation verifying compliance of training and medical requirements must be submitted to the UXOSO before entering the exclusion or reduction zones and will be kept on site. Subcontractors will provide the required copies of training certificates and clearances prior to beginning fieldwork. No one will be allowed to work in an exclusion zone without the appropriate training and medical clearances. Access to these records will be afforded government personnel to confirm training status.

6.5.13 Visitors

All visitors to the site, even if escorted, must review the SSHP and receive a safety briefing. Visitors will not be permitted in the restricted work areas unless they comply with site-specific requirements. Visitors not complying with the above requirements shall not enter the restricted work areas; however, they may observe site conditions from a safe distance. In addition, during intrusive activities, only essential UXO-qualified personnel shall be in the exclusion zone. If visitors, or unexpected intruders, enter the exclusion zone, all intrusive activities shall cease until they are removed from the EZ.

6.6 PERSONAL PROTECTIVE EQUIPMENT

Task and site-specific PPE selections will be made in the task and site-specific health and safety plans. The PPE specified in those plans represents the hazard analysis and PPE selection required by 29 CFR 1910.132. Specific information on the selection rationale for each activity can be found under the Hazard Analyses of the specific plans. For the purposes of PPE selection, the PESM and UXOSO are considered competent persons. The signatures on the approval page of this SSHP constitute certification of the hazard assessment. For activities not covered, the UXOSO will conduct the hazard assessment and select the PPE using the form provided in Attachment 6-4. This shall be attached to a field change request form and the PESM shall certify the assessment by signing the form. PPE selection will be made in consultation with the PESM.

6.6.1 Modifications for initial PPE selection may also be made by the UXOSO in consultation with the PESM using the same form. A written justification for major downgrades will be provided to the PESM for approval on a field change request form. All changes to the PPE, once approved, must also be approved by CEHNC.

6.6.2 It should be noted that this SSHP makes provisions for adjustment of protection levels. The type of equipment used and the overall level of protection should be reevaluated periodically as the amount of information about the work activity increases, and as workers are required to perform different tasks. The level of protection appropriate for the tasks and working conditions

will be determined for each specific project site by the PESM. Protection levels may be upgraded or downgraded based on physical conditions (e.g., generation of dust) on-site. Changes in protection levels will be made in accordance with the following criteria:

- Reasons to Upgrade:
  - Known or suspected presence of dermal hazards.
  - Occurrence or likely occurrence of gas or vapor emission.
  - Change in work task that will increase contact or potential contact with hazardous materials.
  - Request of the individual performing the task.
- Reasons to Downgrade:
  - New information indicating that the situation is less hazardous than originally thought.
  - Change in site conditions that decrease the hazard.
  - Change in work task that will reduce contact with hazardous materials.

6.7 MEDICAL SURVEILLANCE PROCEDURES

All employees and subcontractor personnel performing field work where potential exposure to contaminants exist at the site are required to have passed a medical surveillance examination in accordance with 29 CFR 1910.120(f) and, where applicable, expanded health standards (Exceptions to this requirement will only be made on a case-specific basis and then only after approval of CEHNC and the PESM).

6.7.01 The Foster Wheeler Environmental Corporate Medical Surveillance Program is described in detail in Section 4.5 of the EHS Program. The Corporate Medical Consultant (CMC) is Greaney Medical Group in California. Dr. Peter Greaney is Board certified in occupational medicine.

6.7.1 Medical Surveillance Requirements

A physician's medical release for work will be confirmed by the UXOSO before an employee can work in the exclusion zone. The examination must be current within one (1) year (up to two (2) years if appropriate documentation from the physician is received). An approved medical examination must also be offered upon termination of hazardous waste site-related work if the last examination was not taken within the previous six months. Additional medical testing may be required by the PESM in consultation with the Corporate Medical Consultant and the UXOSO if an over-exposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance.

6.7.2 Medical Data Sheet

A medical data sheet is provided in Attachment 6-3. It is intended to provide basic information that would be useful to professional medical personnel if medical treatment or transport to emergency medical facilities is required. Where possible, this medical data sheet will accompany the personnel needing medical assistance. The medical data sheet will be maintained in a secure location, treated as confidential, and used only on a need-to-know basis.

6.8 ENVIRONMENTAL AND PERSONAL MONITORING

The UXOSO will monitor wind direction and temperature during field activities and periodically record the data in a logbook.

6.8.1 Real-Time Air Monitoring

The following instruments may be used for real-time air monitoring:

- Photoionization Detector (PID), 10.2 or 10.6 eV, or
- Flameionization Detector (FID); and
- Combustible Gas Indicator (CGI) with an Oxygen (O2) sensor

6.8.1.1 Real-time air monitoring for oxygen and combustible gases will be conducted when personnel have to enter an excavation that is 4 feet in depth or greater. Air monitoring will be conducted in the workers breathing zone and will be conducted prior to entry into the excavation and subsequently, every 15 to 30 minutes. Air monitoring action levels for specific chemical compounds that may present an occupational exposure during site activities, will be developed for the SSHP addendum as needed. The guidelines in EM 385-1-1, Section 06.1 for permit-required confined spaces (PRCSs) will be followed.

6.8.2 Integrated Air Monitoring

Assessment and evaluation of field personnel exposures to airborne contaminants through integrated air monitoring shall be performed by the UXOSO concurrent with activities which may generate the exposures in excess of OSHA PELs.

6.8.2.1 Generally, those employees with the greatest risk of exposure will be monitored. Other areas or employees may be monitored if the UXOSO suspects potential exposures above the

capabilities of the PPE being worn. Personnel exposure results will be tabulated and posted on site.

6.8.2.2 Specific procedures and analytical methods shall be specified in the SSHP addendum. Only analytical laboratories accredited by the American Industrial Hygiene Association shall perform analysis of samples collected for assessment of employee exposures. The laboratory analysis will include field blanks, as required by the individual method or laboratory. Duplicate samples or splits with other laboratories may be used during the project. The laboratory shall also be a successful participant in the PAT program for the category of material for which they are analyzing project samples.

6.8.3 Data Quality Assurance

6.8.3.1 Calibration

Instrument calibration shall be documented and included in a dedicated safety and health logbook or on separate calibration pages. All real-time air monitoring instruments shall be calibrated before and after each shift in accordance with manufacturer specifications/procedures. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

6.8.3.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the UXOSO for reference.

6.8.3.3 Data Review

The UXOSO will interpret all air monitoring data based on the real-time air monitoring action levels and his/her professional judgment. The UXOSO shall review the data with the PESM to evaluate the potential for worker exposure, upgrades/downgrades in Level of Protection (LOP), comparison to direct reading instrumentation and changes to the integrated monitoring strategy. The UXOSO will immediately report all integrated sampling results above the PEL/TLV (one half of PEL/TLV where no respirators are worn) to the PESM. Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PESM.

6.8.4 Noise Monitoring

Work areas or tasks that pose an exposure risk greater than 85 dBA will require hearing protection. If there is a reasonable possibility that workers may be exposed to an 8-hour time-weighted average exceeding 85 dBA, noise monitoring will be conducted in accordance with Foster Wheeler Environmental Health and Safety Program for Hearing Conservation EHS 4-4 which is found in Attachment 6-5.

6.9 SITE CONTROL

Site zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. A three-zone approach will be used when chemical contamination is encountered. It shall include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). When chemical contamination is not encountered the two-zone (EZ, SZ) approach is employed (see Section 2.7, Procedures for Reporting and Disposition of UXO in the General Site-Wide WP). Specific zones shall be established on the work site when operations begin. The following shall be used for guidance in revising these preliminary zone designations, if necessary.

6.9.1 Site Zonation

Support Zone - The SZ is an uncontaminated area (trailers, offices, etc.) that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

6.9.1.1 The SZ is a designated safe area outside the EZ. The SZ will contain provisions for team communications and emergency response. Safety equipment to include emergency eyewash, fire extinguishers, first aid kit, air horn and other appropriate equipment will be located at the SZ and transported to work locales as necessary. The majority of site operations will be controlled from this location as well as site access of authorized persons. The support facility can be used as a potential evacuation point. No potentially contaminated personnel or materials are allowed in this zone except appropriately packaged/decontaminated and labeled samples.

6.9.1.2 ***Contamination Reduction Zone -*** The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides for an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. All equipment requiring decontamination will be decontaminated in the CRZ to prevent transfer of contamination to clean areas. A personnel decontamination area will be prepared at each

exclusion zone. The CRZ will be used for Exclusion Zone entry and egress in addition to access for heavy equipment and emergency support services.

6.9.1.3 ***Exclusion Zone*** **-** All areas where activities are performed that may involve exposure to site contaminants, hazardous materials and/or conditions should be considered an EZ. This zone will be clearly delineated by cones, tapes or other means. The UXOSO may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the site UXOSO allowing adequate space for the activity to be completed, field members and emergency equipment.

6.9.1.4 The initial size of the EZ zone will cover an area based on the considerations of calculated safe fragmentation distance and engineering control (to be established in Delivery Order specific plans). However, the size of this zone may be increased if an unanticipated UXO item is encountered during surface/subsurface investigation. The necessary increase in EZ size will be determined by joint decision of the UXOSO, SUXOs, CEHNC Safety Specialist, and local EOD (as needed). No personnel are allowed in the EZ without: a buddy; the proper personal protective equipment; medical authorization; and training certification. In addition, during intrusive activities, only essential UXO-qualified personnel shall be in the exclusion zone.

6.9.2 Communications

Routine site communications will take place face-to-face and/or via two-way radios. Each team will be supplied with portable radios for communication with support facilities.

6.9.2.1 ***Radios*** **-** Hand-held two-way radios will be utilized as appropriate by field teams for communication.

6.9.2.2 ***Telephones*** - Cellular telephones or the closest site telephone for emergency use will be available. The location of the nearest phone will be given to all workers and posted prior to commencing work. Emergency numbers will be maintained by the UXOSO and posted in the SZ.

6.9.2.3 ***Air horns*** - These will be maintained at the Support Zone for initiation of emergency evacuation procedures. Emergency evacuation will be communicated by three blows on airhorn or vehicle horn.

6.9.2.4 ***Hand signals*** - These will be employed by downrange field teams along with utilizing the buddy system. These signals are also very important when working with heavy equipment. The entire field team will know them before operations commence and their use will be covered during site-specific training. Typical hand signs are the following:

SIGNAL	MEANING
Hand gripping throat	Out of air, can't breathe
Grip on a partner's wrist or placement of both hands around a partner's wrist	Leave the area immediately, no debate.
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand.
Thumbs down	No, negative.

6.10 PERSONNEL AND EQUIPMENT DECONTAMINATION

6.10.1 Contamination Avoidance

One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. During completion of all site activities, personnel should attempt to minimize the degree of contact with contaminated materials. This involves a conscientious effort to keep "clean" during site activities. All personnel should minimize kneeling, splash generation, and other physical contact with contamination. This may ultimately minimize the degree of decontamination required and the generation of waste materials from site operations.

6.10.1.1 Procedures for contamination avoidance are presented in the following sections. These are applicable when chemical contamination has been encountered:

6.10.2 Sampling/Monitoring Equipment

- When required by the UXOSO, cover the instruments with clear plastic, leaving openings for sampling ports; and
- Bag sample containers prior to placement of sample material.

6.10.3 Personnel

- Do not walk through areas of obvious or known contamination;
- Do not directly handle or touch contaminated materials;
- Make sure that there are no cuts or tears on PPE;

- Fasten all closures in suits, covering with tape, if necessary;
- Particular care should be taken to protect any skin injuries;
- Stay upwind of airborne sources; and
- Do not carry cigarettes, cosmetics, gum, etc., into contaminated areas.

6.10.4 Personnel Decontamination Sequence

Consideration will be given to prevailing wind directions so that the decontamination line, the SZ, and contamination reduction zone exit is upwind from the EZ and the first stations of the decontamination line.

6.10.4.1 Personnel and equipment leaving the EZ shall be thoroughly decontaminated. The following protocol shall be used for the decontamination stations according to levels of protection:

Level D	Level D+	Level C	Level B
1. Equipment drop	1. Equipment drop	1. Equipment drop	1. Equipment drop
2. Hand/Face wash	2. Outer boot & glove wash	2. Outer boot & glove wash	2. Outer boot & glove wash
	3. Outer boot & glove rinse	3. Outer boot & glove rinse	3. Outer boot & glove rinse
	4. Tape removal - boot & glove	4. Tape removal - boot & glove	4. Tape removal - boot & glove
	5. Outer boot & glove removal/disposal	5. Outer boot & glove removal/disposal	5. Outer boot & glove removal/disposal
	6. Coverall removal/ disposal	6. Coverall removal/ disposal	6. SCBA or escape tank removal
	7. Inner glove removal/ disposal	7. Respirator removal	7. Coverall removal/ disposal
	8. Hand/Face wash	8. Inner glove removal/ disposal	8. SCBA or ALR face shield removal
		9. Inner clothing removal	9. Inner glove removal/ disposal
		10. Hand/Face wash	10.Inner clothing removal
		11.Respiratory cleaning/sanitizing	11. Hand/Face wash
			12. Respiratory cleaning/sanitizing

Note: At a minimum, all personnel will thoroughly wash their arms, face, and hands upon exiting the EZ or CRZ prior to eating, drinking, smoking, applying cosmetics, or any other actions that would increase the risk of hand to mouth transfer of contaminants.

6.10.4.2 The following decontamination equipment is required for work that requires a wet decon for level D+ and higher protection levels:

- Four small tubs (two sets of wash and rinse water), scrub brush, towels, contaminated clothing disposal bag or drum, and, respiratory protective equipment cleaning solution.
- Non-phosphate detergent (i.e., Dove) and water should be sufficient for use as the decontamination solution. All receptacles for contaminated protective clothing will be equipped with lids that can be closed to prevent the release of contaminants and the collection of rainfall. The decontamination liquids and clothing will be contained and disposed according to federal, state and local regulations.

6.10.5 Emergency Decontamination

Emergency decontamination will include the following stations.*

Level D	Level D+	Level C	Level B
1, 2 as referenced above	1, 4, 5, 6, 7, 8 as referenced above	1, 4, 5, 6, 7, 8, 9, 10 as referenced above	1, 4, 5, 6, 7, 8, 9, 11 as referenced above

Note: If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination, wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment.

6.10.5.1 If the injured person can be moved, he/she will be moved to the exclusion zone boundary and deconned by site personnel as described above before emergency responders handle the victim. If the person can not be moved because of the extent of the injury (a back or neck injury) then polyethylene will be laid down over the work surface and around the victim to allow a clean pathway for response personnel to access the victim. If the potential for inhalation hazards exist, such as with open excavation, this area will be covered with poly to eliminate any potential inhalation hazards.

6.10.5.2 All emergency personnel are to be immediately informed of the injured person's condition, potential contaminants, and provided with all pertinent chemical data.

6.10.6 Protection Required for Decontamination Personnel

Personnel assisting with decontamination will wear the same level of protection as those they are decontaminating, or one level below, depending on the stage of decontamination that they are assisting. Assistants who are stationed at the first stages of decontamination will be in the same level of protection as those being assisted. At stages where the outer garments are already

removed and containerized, the decontamination assistants will wear the lower level of protection.

6.10.7 Hand Held Equipment Decontamination

Hand held equipment includes all monitoring instruments, samples, hand tools, and notebooks. The hand held equipment is dropped at the first decontamination station to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

6.10.7.1 To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident.

6.10.8 Heavy Equipment Decontamination

Decontamination of chemically contaminated heavy equipment will be accomplished using high-pressure steam or dry decon with brushes and shovels. Decontamination shall take place on a decon pad and all liquids used in the decontamination procedure and solids generated will be collected. Vehicles or equipment which are brought into an exclusion zone will be treated as contaminated, and will be decontaminated prior to removal. All liquids used in the decontamination procedure will be collected, stored and disposed in accordance with federal, state and local regulations.

6.10.8.1 A designated decontamination pad will be established on the site during mobilization to decontaminate all heavy equipment. All heavy equipment will be decontaminated at the decontamination pad following the completion of the trench excavation and prior to leaving the site for demobilization. The decontamination pad will consist of a framed enclosure constructed from wood and plastic sheeting and constructed in such a way as to contain all decontamination fluids and solids, and sloped in such a way as to make the liquid portion flow to a low point to facilitate collection and disposal.

6.11 WASTE DISPOSAL PROCEDURES

All discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site. All potentially contaminated materials (e.g., clothing, gloves, etc.) will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials shall be collected and bagged for appropriate disposal as non-hazardous solid waste.

6.11.1 Soils removed from the trench excavation will be staged for subsequent monitoring and characterization prior to proper containerization for storage and transportation for disposal. Solids and liquids from decontamination will be segregated by type and placed into separate drums. Plastic from the decontamination pad will be placed into a separate drum. All drums will be labeled with the following information:

- Date of waste generation;
- Type of waste contained in the drum;
- Specific source of the waste;
- The words "Non-hazardous waste - Awaiting analysis"; and
- Emergency contact with telephone number.

6.11.2 Waste management is addressed in Section 13, Investigation Derived Waste Management Plan, of the General Site-Wide WP.

6.12 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES (ON-SITE AND OFF-SITE)

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff are essential. An emergency plan is required by OSHA (29 CFR 1910.120) and EM 385-1-1 to be available for use and is included below. A copy of this plan shall be posted in the SZ at each work site. Careful consideration has been given to the relative possibility of fire, explosion, or release of vapors, dusts, or gases that may impinge on nearby facilities.

6.12.1 Responsibilities

6.12.1.1 PESM

The PESM oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The PESM acts as a liaison to applicable regulatory agencies and notifies OSHA of reportable accidents and fatalities.

6.12.1.2 UXOSO

The UXOSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The UXOSO is required to immediately notify the PESM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the PESM can notify OSHA within the required time frame. The PESM will be notified of all OSHA recordable injuries, fires, spills, releases or equipment damage in excess of $500 within 24 hours. The UXOSO also serves as the Emergency Coordinator (see below).

6.12.1.3 Emergency Coordinator

The emergency coordinator shall make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the emergency coordinator will inform interested parties about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants. The emergency coordinator shall locate emergency phone numbers and identify hospital routes prior to beginning work on site. The emergency coordinator shall make necessary arrangements to be prepared for any emergencies that could occur. The UXOSO is the emergency coordinator. The SUXOS will serve as the Alternate Emergency Coordinator.

6.12.1.3.1 The Emergency Coordinator shall implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action. The coordinator will be responsible for prior coordination of the emergency treatment and emergency transport of site personnel as necessary, and notification of emergency response units and the appropriate management staff.

6.12.1.4 Site Personnel

The contents and requirements of the project-specific Emergency Response/Contingency plan will be reviewed, at a minimum, with all on-site personnel during their initial briefing and during daily briefings as necessary. Site personnel are responsible for knowing how to initiate emergency response actions and their respective responsibilities in the event the Emergency Response/Contingency Plan must be implemented. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency or result in the occurrence of a site emergency.

6.12.2 Communication

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

6.12.2.1 Telephone Communication

A telephone will be maintained in the field team support vehicle. The location of a site telephone at the facility will be identified and the location will be communicated to all members of the field team.

6.12.2.2 Hand Signals

Hand signals will be employed by downrange field teams where necessary for communication during emergency situations. Hand signals are found in Section 6.9.2, Communications.

6.12.2.3 Audio Signals

Audio signals will be utilized in the event of an emergency or a need to evacuate the site. Three blasts will be sounded on an air horn or vehicle horn to obtain the attention of site personnel. Site personnel should then follow the procedures listed in Section 6.12.6, Emergency Site Evacuation Routes and Procedures.

6.12.3 Local Emergency Support Units

In order to be able to deal with any emergency that might occur during activities at the site, Table 6-1 will be posted prominently in the field office and in all places where telephone service is available. A hospital route map will be provided in the SSHP addendum for non-emergency trips to the hospital. This map will be posted adjacent to the above emergency telephone numbers in the field office and in all places where telephone service is available. It should also be placed in all on-site vehicles.

6.12.4 Pre-emergency Planning

Foster Wheeler Environmental will communicate directly with administrative personnel from the emergency room at the hospital in order to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from exposure to any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

6.12.4.1 Before field activities begin, the local emergency response personnel will be notified of the schedule for field activities and about the materials that are thought to exist on the site so that they will be able to respond quickly and effectively in the event of a fire, explosion, or other emergency.

Table 6-1
Emergency Telephone Numbers

Contact	Firm or Agency	Telephone Number
Police	Anniston Police Dept.	(256) 238-1800
Fire	Anniston Fire Dept.	(256) 237-3541
Ambulance	Anniston Rescue Squad	(256) 237-8572
Hospital	Stringfellow Memorial	(256) 235-8900
HAZMAT Response	Anniston Police Dept.	To be included in SSHP addendum
BRAC Environmental Coordinator, Mr. Ronald Levy	Fort McClellan	(256) 848-6853
Project Manager, Mr. John McIlrath	Foster Wheeler Environmental Corporation	(256) 830-4100
PESM, Cheryl Polios	Foster Wheeler Environmental Corporation	215-702-4123
Project Manager, Mr. David Skridulis	CEHNC	To be included in SSHP addendum
Poison Control Center	Poison Control Center	(800) 462-0800
Chemtrec	CHEMTRAC	(800) 424-9300
National Response Center	National Response Center	(800) 424-8802
Fort McClellan Transition Force Operations	Transition Force Operations	(256) 848-5178

6.12.4.2 Before fieldwork on the site commences, each person who will be working at the project site or observing the operations will complete a medical data sheet. These data sheets will be filled out during initial site-specific training and will be kept on the site.

6.12.4.3 In the event of an incident where a team member becomes exposed or suffers from an acute symptom of exposure to site materials and has to be taken to a hospital, a copy of his/her medical data sheet will be presented to the attending physician.

6.12.5 Emergency Medical Treatment

The procedures and rules in this SSHP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the UXOSO immediately. First-aid equipment will be available on site at the following locations:

First Aid Kit: SZ/Field Team Vehicle

ANSI Approved Emergency Eye Wash: SZ/Field Team Vehicle

6.12.5.1 During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that

can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

6.12.5.2 At a minimum, two (2) individuals holding current certification in First Aid/Cardiopulmonary Resuscitation (CPR) must be present on site.

6.12.5.3 When personnel are transported to the hospital, the UXOSO will provide a copy of the Medical Data Sheet to the paramedics and treating physician.

6.12.5.4 Only in **non-emergency** situations will an injured person be transported to the hospital by means other than an ambulance.

6.12.5.5 Route to Stringfellow Hospital (see Attachment 6-12): Depart Fort McClellan through Baltzell Gate, turn south on State Highway 21, follow Highway 21 approximately 5 miles to 19th Street, turn left on 19th Street and then right onto Leighton. Stringfellow Hospital is on the immediate right. A route map with printed instructions is included in Attachment 6-12.

6.12.6 Emergency Site Evacuation Routes and Procedures

In order to mobilize the manpower resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority will be established. The Emergency Coordinator will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The Emergency Coordinator will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. At his/her discretion, the Emergency Coordinator also may order the closure of the site for an indefinite period.

6.12.6.01 All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including, but not limited to fire, explosion or significant release of toxic gas into the atmosphere, an air or automobile horn will be sounded on the site. The horn will sound for three blasts, signaling that immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the designated rally point that shall be determined upon arrival at the site.

6.12.6.02 The Emergency Coordinator will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during an emergency. He/she will attend the site telephone specified by the Emergency Coordinator from the time the alarm sounds until the emergency has ended.

6.12.6.03 After sounding the alarm and initiating emergency response procedures, the Emergency Coordinator will check and verify that access roads are not obstructed. If traffic control is necessary, as in the event of a fire or explosion, a project team member, who has been trained in these procedures and designated at the site safety meeting, will take over these duties until local police and fire fighters arrive.

6.12.6.04 The Emergency Coordinator will remain at the site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation. Evacuation routes, meeting places, and location of emergency equipment and first aid supplies shall be discussed during the site-specific briefing.

6.12.6.1 Evacuation

In the event of an emergency situation, such as fire, explosion, significant release of particulates, etc., an air horn will be sounded by the UXOSO for three 5-second intervals indicating the initiation of evacuation procedures. All personnel in both the restricted and nonrestricted areas will evacuate and assemble near the SZ or other safe area as identified by the Emergency Coordinator. The Emergency Coordinator will have authority to initiate proper action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The UXOSO must see that access for emergency equipment is provided and that all combustion apparatus has been shut down once the alarm has been sounded. Once the safety of all personnel is established, the Fire Department and other emergency response groups will be notified by telephone of the emergency. If applicable, an emergency involving chemical contamination requires that the emergency response groups as well as the hospital be notified. Then, other personnel listed in Table 6-1 shall be notified.

6.12.6.2 Evacuation Drills

Evacuation drills will be conducted and critiqued in accordance with Foster Wheeler Environmental Procedure EHS 2-1.

6.12.7 Overt Personnel Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet or recommended by the Corporate Medical Consultant will be followed, when necessary.

SKIN AND EYE CONTACT:	Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs.
INHALATION:	Move to fresh air. Decontaminate and transport to hospital or local medical provider.
INGESTION:	Decontaminate and transport to emergency medical facility.
PUNCTURE WOUND OR LACERATION:	Decontaminate and transport to emergency medical facility.

6.12.8 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or delayed. The UXOSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on-site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

6.12.9 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

1. John McIlrath, Project Manager
2. PESM
3. The employer of any injured worker who is <u>not</u> a Foster Wheeler Environmental employee

6.12.9.1 Written confirmation of verbal reports are to be submitted within 24 hours. The accident/incident report is found in the Foster Wheeler Environmental Corporate Health and

Safety Program EHS 1-7. If the employee involved is not a Foster Wheeler Environmental employee, his employer shall receive a copy of the report. All accidents on U.S. Army Corps of Engineers projects are reportable, though not all are recordable.

6.12.10 In Event of Personnel Injury

Apply emergency first aid as necessary. Decontaminate and call medical personnel to transport the individual to nearest medical facility if needed. In life-threatening situations, decontaminate only to the extent necessary to protect those providing aid. For major medical emergencies, medical personnel will be called to transport individuals to the medical facilities. The UXOSO will supply medical data sheets to appropriate medical personnel as requested and complete all accident reports and give to PESM. The hospital will be notified prior to any work commencing.

6.12.10.1 The Medical Data Sheet shown in Attachment 6-3 is to be completed by on-site personnel and will be kept in the SZ during the conduct of site operations. It is in no way a substitute for the Medical Surveillance Program requirements consistent with the Foster Wheeler Environmental program requirements. This data sheet will accompany any personnel when medical assistance is required or if transport to hospital facilities is required.

6.12.10.2 The nearest hospital will be used for medical services, a hospital route map and written directions will be developed for each SSHP addendum. If the UXOSO determines that emergency transport is not necessary, a designated field worker may transport the patient by car to the hospital. The UXOSO will identify and drive the route to the hospital before field activities at each sampling plot are begun. The selected route to the hospital shall be made known to the field personnel by the UXOSO.

6.12.11 In Event of Potential or Actual CWM Encountered

If CWM is encountered, work activity in that area will cease, the Fort McClellan BEC, the CEHNC OE Safety Group and the Fort McClellan Transition Force Operations Section will be notified. Security shall be immediately established and maintained until military authorities arrive and assume custody.

6.12.12 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for three 5-second intervals), and notification of local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

6.12.12.1 Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials;
- Storage of flammable liquids and gases away from oxidizers;
- No smoking in the exclusion zone or any work area;
- No hot work without a properly executed hot work permit;
- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of UL approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities; and
- Monthly inspections of all fire extinguishers.

6.12.12.2 The person responsible for the maintenance of fire prevention and control equipment is the UXOSO.

6.12.12.3 The person responsible for the control of fuel source hazards is the SUXOs.

6.12.13 In Event of Potential or Actual Fire or Explosion

In the event of a fire or explosion in the work zone, personnel shall immediately evacuate the site, then sound an air horn for three 5-second intervals. The Fort McClellan BEC, the CEHNC Safety Group, and the Fort McClellan Transition Force Operations Section will be notified. If appropriate, the fire and police departments and other appropriate response groups shall be notified. The local fire and police department telephone numbers are in Table 6-1.

6.12.14 Spill Control and Response (spread of contamination outside work site)

All small hazardous spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the Material Safety Data Sheet (MSDS) will be consulted to assist in determining the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading

edge of the spills. Drains or drainage areas should be blocked. All spill containment materials will be properly disposed of as hazardous waste. An EZ of 50 to 100 feet around the spill area should be established depending on the size of the spill.

6.12.14.1 The following steps should be taken by the Emergency Coordinator:

- Determine the nature, identity and amounts of major spill components;
- Make sure all unnecessary persons are removed from the spill area;
- Notify appropriate response teams and authorities;
- Use proper PPE in consultation with the UXOSO;
- If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc.);
- If possible, try to stop the leak with appropriate material; and,
- Remove all surrounding materials that can react or compound with the spill.
- Contact, Joseph Walsh, Foster Wheeler Environmental Regulatory Compliance

6.12.15 Spill/Release Reporting

Reporting of all spills or releases to be conducted in accordance with the Foster Wheeler Environmental Compliance Procedure for Reporting Spills and Releases. The project Emergency Coordinator is responsible for implementing this procedure. As part of the SSHP review process, the Project Manager is to review Foster Wheeler Environmental's spill/release reporting procedure and inform the client of its requirements to ensure consistency with the client's spill/release reporting protocols.

6.12.15.1 Following these emergency calls, the remaining personnel listed below shall be notified.

Fort McClellan BEC - Ron Levy	(256) 848-6853
Fort McClellan Transition Force Operations	(256) 848-5178
CEHNC Project Manager - David Skridulis	(256) 895-1468
CEHNC OE Safety Group	(256) 895-1598 or 1582
USEPA Region IV Hotline	(800) 424-8802
Foster Wheeler Environmental	
Project Manager - John McIlrath	(256) 830-4100/(256) 820-7904

Foster Wheeler Environmental	
PESM – Cheryl Polios	(215) 702-4123
Foster Wheeler Environmental	
Regulatory Affairs - Joseph Walsh	(973) 630-8376

6.12.16 Adverse Weather Conditions

In the event of adverse weather conditions, the UXOSO or designee will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries;
- Potential for cold stress and cold-related injuries;
- Treacherous weather-related working conditions (hail, rain, high winds);
- Limited visibility (fog);
- Potential for electrical storms;
- Earthquakes; and
- Other major incident.

6.12.16.1 Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The UXOSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

6.12.17 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on-site:

- Industrial first aid kit;
- Bloodborne pathogens kit;
- Portable one liter eye washes (one per field team);
- 15-minute eye wash (stored in the office trailer);
- Air horns (one per field team);

- Fire extinguishers, rated for at least ten pounds (one per trailer/vehicle, trailers and located at hot work stations); and
- Spill control equipment to include, but not be limited to, absorbent material and disposal container.

6.12.18 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies, and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers;
- Refilling medical supplies;
- Replacing/Recharging eye washes; and
- Replacing used air horns.

6.13 CONFINED SPACE ENTRY

Activities requiring confined space entries are not anticipated at this time. If confined space entry is required, the work will be conducted in accordance with 29 CFR 1910.146 and the Foster Wheeler EHS References. Site/task specific procedures will be included in the SSHP addendum.

6.14 HEAT/COLD STRESS MONITORING

6.14.1.1 Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke. Heat stress monitoring will be implemented when ambient temperatures exceed 70°F. A heat stress prevention program will be implemented when ambient temperatures exceed 70°F for personnel wearing impermeable clothing and for other personnel when the wet bulb globe temperature (WBGT) index exceeds the ACGIH threshold limit values (TLVs). The procedures to be followed are found in the Foster Wheeler Environmental Health and Safety Program EHS 4-6: Temperature Extremes, which is located in Attachment 6-6.

6.14.1.2 Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, poor judgment and unauthorized procedural changes. The procedures to be followed are found in the Foster Wheeler Environmental Health and Safety Program EHS 4-6: Temperatures Extremes, which is located in Attachment 6-6.

6.15 STANDING OPERATING PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

Hazards due to normal site activities can be reduced by using common sense and following safe practices. Running and horseplay are expressly forbidden.

6.15.1 Forbidden Practices

The forbidden practices listed below are applicable to all work areas. In addition, no worker may engage in any activity for which the consequences of these actions are unclear without the approval of the UXOSO. If such activities become necessary to complete any phase of the work, the necessary safety and health requirements will be prepared by the UXOSO as an addition to the SSHP.

6.15.1.1 The following practices will all be strictly forbidden during any work in restricted access areas:

- Horseplay;
- Fighting;
- Eating;
- Drinking;
- Smoking;
- Chewing gum, tobacco, or any other substances;
- Use of facial cosmetics;
- Climbing on or over obstacles;

- Starting or maintaining an open flame of any type unless authorized by the UXOSO;
- Entering the work site, under any circumstances, by any employee or visitor without prior approval; and
- Work while under the influence of intoxicants, narcotics, or controlled substances is prohibited.

6.15.1.2 In addition to the forbidden practices, the UXOSO may impose other prohibitions for safe operation. Hazards due to normal site activities can be reduced by using common sense and following the safe practices listed below:

- All equipment will be used only by authorized personnel familiar with its use;
- Safety devices on equipment will be left intact and used as designed;
- Equipment and tools will be kept clean and in good repair and used only for their intended purpose;
- Good housekeeping practices will be followed; and
- Use of chemicals will be limited to authorized personnel familiar with their use and associated hazards.

6.15.1.3 Additional safe work rules are listed in Attachment 6-7.

6.15.2 Heavy Equipment Operation

Heavy equipment will be operated under the following conditions:

- The operation of heavy equipment will be limited to authorized personnel specifically trained in its operation.
- The operator will use the safety devices provided with the equipment, including seat belts. Backup warning indicators and horns will be operable at all times.
- While in operation, all personnel not directly required in the area will keep a safe distance from the equipment.
- Personnel directly involved in activity will avoid moving in the path of operating equipment or any portion thereof. Areas blinded from the operator's vision will be avoided. Spotters will be used when personnel may be in areas where the operator’s view is obstructed.

- Additional riders will not be allowed on equipment unless it is specifically designed for that purpose.

6.15.3 Excavations

The safety requirements for each excavation must be determined by a competent person who is capable of identifying existing and predictable hazards and work conditions that are unsanitary, hazardous, or dangerous to employees. The competent person must also have the authorization to take prompt corrective measures to eliminate unsatisfactory conditions. The Foster Wheeler Environmental Excavation and Trenching Program is found in Attachment 6-8.

6.15.3.01 The following are general requirements for work activities in and around excavations.

- Prior to initiation of any excavation activity, the location of underground installations will be determined.
- All excavations will be inspected daily by the competent person prior to commencement of work activities. Evidence of cave-ins, slides, sloughing, or surface cracks or excavations will be cause for work to cease until necessary precautions are taken to safeguard employees. The excavation checklist will be utilized by the competent person for inspections.
- Excavated and other materials or equipment that could fall or roll into the excavation shall be placed at least 3 feet from the edge of the excavation.
- Al heavy equipment activities will be conducted at least 10 feet from overhead energized electrical lines.
- Surfaces surrounding open trenches and excavations shall have all surface hazards removed.
- Where structural ramps are used for egress they shall be installed in accordance with 29 CFR 1926.651(c)(1).
- Stairways, ladders, or ramps shall be provided as means of egress in all trenches 4 feet or more in depth. Travel distance shall be no more than 25 feet between means of exit.
- When vehicles and machinery are operating adjacent to excavations warning systems such as stop logs or barricades shall be utilized to prevent vehicles from entering the excavation or trench.
- Barriers shall be provided to prevent personnel from inadvertently falling into an excavation.

6.15.3.1 Protective Systems

Protective systems are required on all excavations over 5 feet in depth or in excavations less than 5 feet when examination of the ground by a competent person reveals conditions that may result in cave-ins.

6.15.3.1.1 Selection and installation of protective systems shall be done in accordance with 29 CFR 1926.652, Appendices C & D, or manufacturers data for shoring and shielding systems. Selection of a protective system shall be made based upon soil classification and job requirements by a competent person. Protective systems and specifications shall be listed on the daily inspection checklist.

6.15.3.2 Hazardous Atmospheres

- The guidelines in EM385-1-1, Section 0.61 for PKCSs will be followed.
- Atmospheric testing will be done prior to employees entering excavations 4 feet or greater in depth.
- Testing methods will be listed on the daily inspection checklist and results documented daily in field logs.
- Control measures such as ventilation and PPE will be used to control employee exposure to hazardous atmospheres below published exposure limits.
- Ventilation will be used to control flammable and combustible vapors to below 10 percent of their lower explosive limit.
- Testing will be repeated as often as necessary to ensure safe levels of airborne contaminants.
- Emergency equipment will be provided and attended when the potential for a hazardous atmosphere exists. Required equipment will be listed on the daily inspection checklist and reviewed daily.

6.15.4 Housekeeping

Housekeeping procedures contained herein pertain to uncontaminated trash, debris, and rubbish. The following housekeeping rules will apply at the job site:

- Work areas must be kept clean and free from trash and debris. Trash containers must be located throughout the job site.
- Excess scrap material and rubbish must be removed from the work area.

- All surplus materials must be returned to a designated area of the site at the completion of a job.
- Tools and materials must be put in toolboxes or returned to the tool room after use to avoid creation of a hazard for others.
- Oily rags must be placed in approved non-combustible type metal containers.
- Toilets, wash up facilities, and drinking fountains (if needed) must be kept clean and sanitary; problems must be reported to the supervisor.
- PPE will be returned to the designated area at the end of the work period and will be placed in designated receptacles.
- Eating, drinking, use of tobacco products, chewing gum, etc., is permitted only in designated break areas. These activities are not permitted in change or shower areas, toilet facilities, etc.

6.15.5 Sanitation

6.15.5.1 Water

Sources of potable and non-potable water shall be isolated from each other to prevent cross-contamination.

6.15.5.1.1 Potable Water

An adequate supply of potable water shall be provided at the site on a daily basis. Containers used to dispense potable water shall be closed tightly when not in use, shall be equipped with a tap, and shall be labeled with the words "potable water."

6.15.5.1.2 Non-Potable Water

Sources of non-potable water, such as water for fire-fighting purposes, shall be clearly identified and shall indicate that the water is unsafe and is not to be used for drinking, washing, or cooking purposes.

6.15.5.2 Toilet Facilities

At least one toilet facility shall be provided for use in the field. The toilet facility shall be provided with entrance locks controlled from the inside. The type of toilet facility will most likely be a chemical toilet.

6.15.6 Illumination

All study areas included in this work plan are located outdoors. Illumination requirements shall be met on a daily basis by beginning work no earlier than one-half hour after sunrise and ending work no later than one-half hour before sunset. No work will be performed at night or during inclement weather.

6.15.7 Fire Prevention and Protection

6.15.7.1 Fire Prevention

The following rules will be enforced to prevent fires:

- Good housekeeping and storage of materials;
- Storage of flammable liquids and gases away from oxidizers;
- No smoking in the exclusion zone or any work area;
- No hot work without a properly executed hot work permit;
- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of Underwriters Laboratory (UL) approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities;
- Monthly inspections of all fire extinguishers.

6.15.7.2 Fire Protection

The following measures will be used to protect against fires:

- All heavy equipment will be equipped with a fire extinguisher of 10 ABC units or higher.
- Temporary offices will be equipped with a fire extinguisher of 10 ABC units or higher.

6.15.8 The Buddy System

The buddy system is a safety practice in which each individual is concerned with the health and well being of coworkers. The buddy system will be implemented during all on-site activities and will be incorporated whenever workers may be isolated or as determined by the UXOSO. Two-way radio communication will be established when deemed necessary by the UXOSO.

6.15.9 Hand and Power Tools

Hand and power tools can present many hazards including: flying objects and particles, cuts and punctures, having a body part caught in or between, electrocution, noise, fire and explosion, and exposure to vapors, aerosols, and dusts from exhaust. The following protective measures will be implemented to minimize exposure to the hazards presented by the use of hand and power tools:

- Daily inspections of each tool prior to use;
- Remove broken or damaged tools;
- Use of personal protective equipment;
- Use in accordance with the Operator's Manual;
- Use the tool for its intended purpose;
- No throwing tools;
- Ensure proper guards are in place and not removed or bypassed;
- Turn off tools while fueling;
- All electrical tools UL listed or double insulated;
- Inspect all cords for frays or worn sections;
- Do not use electric cords to lower or hoist tools;
- Protect cords from traffic areas and water; and
- Use a ground fault circuit interrupter outside at all times.

6.15.10 Safe Lifting Practices

As back injuries are the most common type of injury, it is important for employees to follow safe lifting practices. Foster Wheeler Environmental's Corporate Health and Safety policy states that

individual employees are not to lift loads greater than 50 pounds. The following procedure should be used to lift anything, particularly heavier loads, safely:

- Size up the load as to its weight, size and shape;
- Place the feet about a foot apart and close to the object for good balance;
- Bend the knees to a comfortable position and get a good handhold;
- Using both leg and back muscles, lift the load straight up, smoothly and evenly. Pushing with the legs, keep the load close to the body;
- Lift the object into carrying position, avoiding twisting movements until the lift is completed;
- Turn the body with changes of foot position, making sure the path of travel is clear; and
- Using both leg and back muscles, comfortably lower the load by bending the knees. When the load is securely in place, release the grip. Setting down the load is just as important as picking it up.

6.15.10.1 The same steps apply to team lifting, with the emphasis on coordination. All should start and finish the lift action at the same time and perform turning movements together.

6.16 LOGS, REPORTS, AND RECORD KEEPING

The following is a summary of required health and safety logs, reports and recordkeeping.

6.16.1 Field Change Request

The Field Change Request Form is to be completed for initiating a change to the SSHP. The PESM and Project Manager or designee approval is required. The original will be kept in the project file. Approved changes will be reviewed with affected field personnel at a safety briefing. Copies will be distributed to CEHNC. A field change request form is provided in Attachment 6-1.

6.16.2 Medical and Training Records

Copies or verification of training (40 hour, 8 hour, supervisor, site specific training and documentation of three day OJT) and medical clearance for hazardous waste site work and respirator use will be maintained onsite. Records for all subcontractor employees will also be kept onsite. All employee medical records will be maintained by the Corporate Medical Consultant - Greaney Medical Group in accordance with Foster Wheeler Environmental EHS Program, Section EHS 1-8.

6.16.3 On-site Log

A log of personnel on-site each day will be kept by the Project Superintendent or designee and personnel shall sign in/out of the EZ daily.

6.16.4 Weekly and Monthly Safety Reports

The UXOSO shall complete and submit weekly and monthly health and safety reports to the PESM. The reports are provided in Attachment 6-7.

6.16.5 Exposure Records

All personal air monitoring results, laboratory reports, calculations and air sampling data sheets are part of an employee exposure record. These records will be maintained by the UXOSO during site work. At the end of the project they will be maintained according to 29 CFR 1910.20 and Foster Wheeler Environmental Corporation Program.

6.16.6 Accident/Incident Reports

6.16.6.1 Incident Investigation and Reporting

Upon receiving a report of incident occurrence on this site, the UXOSO will investigate the circumstances surrounding the incident. The PESM may also participate in the investigation of serious incidents. The Standard Incident Report and Follow-up Form in Attachment 6-9 may be used to assist in the investigation.

6.16.1.1 All accidents or incidents will be investigated, as appropriate, and an accident report will be completed. The Contracting Officer will be notified by telephone as soon as first aid and/or emergency response needs have been met. A written report will be provided within 30 calendar days on ENG. Form 3394 to the Contracting Officer. For reporting purposes, the term accident refers to fatalities, lost time injuries, spill or exposure to hazardous materials (radioactive materials, toxic materials, explosive or flammable materials), fire, explosion, property damage, or potential occurrence of the above. Any information released from the health care provider, which is not deemed confidential patient information is to be attached to the appropriate form. Any medical information that is released by patient consent is to be filed in the individuals medical records and treated as confidential.

6.16.1.2 All accidents must be reported on ENG 3394 and submitted within 30 calendar days to the Contracting Officer. Should an accident occur which results in a fatality, $10,000 or more in

property damage, three or more persons hospitalized or any adverse publicity for the USACE, it must be reported immediately to the *Contracting Officer ((256) 895-1387)* by telephone and reported on ENG 3394 as stated above.

6.16.1.3 In addition to the USACE incident form, the accident/incident report found in the Foster Wheeler Environmental Corporate Health and Safety Program EHS 1-7, Incident Reporting and Investigation, shall be completed, and is included in Attachment 6-9. Written confirmation of verbal reports are to be submitted to the PESM within 24 hours. Incident analysis reports are to be submitted to the PESM within 72 hours.

6.16.7 OSHA Form 200

An OSHA Form 200 will be kept at the project site. All recordable injuries or illness will be recorded on this form. At the end of the project, the original will be sent to the PESM for maintenance. Subcontractor employers must also meet the requirements of maintaining an OSHA 200 Form. The Foster Wheeler Environmental incident reporting and investigation form referenced in Section 6.16.6.1 meets the requirements of the OSHA Form 101(supplemental record) and must be maintained with the OSHA Form 200 for all recordable injuries or illness.

6.16.8 Health and Safety Logbooks

The UXOSO will maintain logbooks during site work. The daily site conditions, personnel air monitoring results and significant events will be recorded. The original logbooks will become part of the exposure records file.

6.16.9 Hazard Communication Program/MSDS

The hazard communication program will be maintained on site and training on the program information and requirements will be provided in accordance with 29 CFR 1910.1200 and 1926.59, *Hazard Communication,* 1910.1201, *Retention of DOT Markings, Placards and Labels,* and Foster Wheeler Environmental Corporation Health and Safety Program.

6.16.9.1 Material Safety Data Sheets (MSDS) will be obtained for applicable substances and included in the site hazard communication file. A copy of the MSDS will be obtained and maintained in the file for all chemicals to which the requirements apply; this will apply to both Foster Wheeler Environmental personnel and any subcontractors for which Foster Wheeler Environmental has responsibility and/or oversight responsibilities. All chemical containers will be properly labeled in accordance with the requirements of the applicable standards.

6.16.10 Work Permits

All work permits, including confined space entry, hot work, lockout/tagout, and excavation and trenching permits will be maintained by the UXOSO in the project files.

6.16.11 EHS Inspections

Weekly and monthly project inspections will be conducted in accordance with the Foster Wheeler Environmental Program, EHS 3-3. Weekly inspections are to be conducted by the UXOSO. Monthly inspections are to be conducted by the Project Manager.

6.16.11.1 The PESM shall conduct quarterly inspections. The PESM inspection shall include:

- A visual inspection of the site. Areas of the project site that may be accessed and inspected, including but not limited to, exclusion zones, buildings, and waste storage areas;
- Completion of applicable and selected portions of the PESM Inspection Checklists or equivalent documentation;
- A review of on-site records (e.g., permits, agency approvals, waste analyses, waste profiles, waste manifests, discharge monitoring reports, training records, etc.);
- Positive recognition of conformance;
- Non-conformances noted by the PESM that can be remedied during the conduct of the inspection will be corrected. Conformance and non-conformance shall be documented on the PESM Inspection Checklists;
- Training of project personnel, when possible, to address non-conformances; and
- Identification of any observed best practices.

6.16.11.2 The PESM will stop work if any conditions or work practices are identified which pose imminent danger to the environment or to the safety and health of personnel.

6.17 UXO Safety Considerations for Site Operations

See Attachment 6-10.

6.18 RADIOLOGICAL AND CHEMICAL WARFARE MATERIEL (CWM)

No CWM operations are expected at this time. If future operations are planned in areas where CWM is expected, additional plans will be prepared and included in this document.

6.18.1 In the event of CWM material discovery all personnel will evacuate the area immediately in an upwind direction. The SUXOS will notify the Foster Wheeler Environmental Command Center and the CEHNC Safety Representative. Foster Wheeler Environmental UXO personnel will standby the area until response elements arrive on scene or until directed otherwise by the CEHNC Safety Representative. The Foster Wheeler Environmental Command Center will notify Fort McClellan Transition Force Operations Center and other personnel listed on Table 6-1 as required.

ATTACHMENT 6-1
FIELD CHANGE REQUEST FORM

FOSTER WHEELER ENVIRONMENTAL
FIELD CHANGE REQUEST FORM

PROJECT:

CHANGE NUMBER:

PROJECT LOCATION:

DESCRIPTION OF CHANGE:

REASON FOR CHANGE:

RECOMMENDED DISPOSITION:

SITE SAFETY AND HEALTH OFFICER _____ _____
Signature Date

PROJECT MANAGER: _____ _____
Signature Date

PROGRAM HEALTH AND SAFETY MANAGER:

_____ _____
Signature Date

CEHNC OE SAFETY GROUP

_____ _____
Signature Date

DISTRIBUTION:

Project Environmental and Safety Manager	_____
Site Health and Safety Officer	_____
Quality Assurance Representative	_____
Field Investigation Lead	_____
CEHNC	_____

SSHP FIELD CHANGE

Field Change Number: _____ **Date Effective:** _____

Pen and Ink changes to be made in the SSHP to alert the reader of this change:

Reason for the change to be incorporated into the SSHP:

TEXT OF CHANGE TO BE INCORPORATED:

FIELD CHANGE RECORDS

Record of Field Changes:

Initial for attaching any Field changes to this SSHP. Enter the Field Change Number and Date Issued. File the completed field changes to this SSHP at the end as attachments. Make PEN and INK changes in the text to alert the reader to the changes that are required in the Field Change.

FIELD CHANGE NUMBER	DATE ENTERED	SYNOPSIS OF CHANGE	INITIAL

ATTACHMENT 6-2
EXCAVATION CHECKLIST

FOSTER WHEELER ENVIRONMENTAL CORPORATION

DAILY EXCAVATION INSPECTION CHECKLIST

To be completed by a "Competent Person"

Site location _____

Date _____ Time _____ Competent Person _____

Soil Type(s) _____

Soil Classification(s) _____ Excavation depth _____ Excavation width _____

Type of protective system used _____

Indicate for each item by circling: Y (Yes), N (No), - Address in Comments, Not Applicable (N/A.)

I. General Inspection of Job Site

A. Surface encumbrances removed or supported	Y	N	N/A
B. Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation	Y	N	N/A
C. Hard hats worn by all employees	Y	N	N/A
D. Spoils, materials, and equipment set back at least 2 feet from the edge of the excavation	Y	N	N/A
E. Barriers provided at all remotely located excavations, wells, pits, shafts, etc.	Y	N	N/A
F. Walkways and bridges over excavations 4 feet or more in depth are equipped with standard guardrails	Y	N	N/A
G. Warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic	Y	N	N/A
H. Warning system established and utilized when mobile equipment is operated near the edge of the excavation	Y	N	N/A
I. Employees prohibited from working on the faces of sloped or benched excavations above other employees	Y	N	N/A

II. Utilities

A. Utility companies contacted and/or utilities located	Y	N	N/A
B. Exact location of utilities marked when approaching the utilities	Y	N	N/A
C. Underground installations protected, supported or removed when excavation is open	Y	N	N/A

III. Means of Access and Egress

A. Lateral travel to means of egress no greater than 25 feet in excavations 4 feet or more in depth	Y	N	N/A
B. Ladders used in excavations secured and extended 3 feet above the edge of the trench	Y	N	N/A
C. Structural ramps used by employees designed by a competent person	Y	N	N/A
D. Structural ramps used for equipment designed by a registered professional engineer (RPE)	Y	N	N/A
E. Ramps constructed of materials of uniform thickness, cleated together on the bottom, equipped with a no-slip surface	Y	N	N/A
F. Employees protected from cave-ins when entering or exiting the excavation	Y	N	N/A

EHS 6-3 ATTACHMENT A
DAILY EXCAVATION INSPECTION CHECKLIST

IV. Wet Conditions

A.	Precautions taken to protect employees from the accumulation of water	Y	N	N/A
B.	Water removal equipment monitored by a competent person	Y	N	N/A
C.	Surface water or runoff diverted or controlled to prevent accumulation in the excavation	Y	N	N/A
D.	Inspections made after every rainstorm or other hazard increasing occurrence	Y	N	N/A

V. Hazardous Atmospheres

A.	Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible or other harmful contaminant exposing employees to a hazard	Y	N	N/A
B.	Ventilation	Y	N	N/A
C.	Testing conducted often to ensure that the atmosphere remains safe	Y	N	N/A
D.	Emergency equipment, such as breathing apparatus, safety harness and line, and basket stretcher readily available where hazardous atmospheres could or do exist	Y	N	N/A
E.	Safety harness and life line used and individually attended when entering deep confined excavations	Y	N	N/A

VI. Support Systems

A.	Materials and/or equipment for support systems selected based on soil analysis, trench depth and expected loads	Y	N	N/A
B.	Materials and equipment used for protective systems inspected and in good condition	Y	N	N/A
C.	Materials and equipment not in good condition have been removed from service	Y	N	N/A
D.	Damaged materials and equipment used for protective systems inspected by a RPE after repairs and before being placed back into service	Y	N	N/A
E.	Protective systems installed without exposing employees to the hazards of cave-ins, collapses or from being struck by materials or equipment	Y	N	N/A
F.	Members of support system securely fastened to prevent failure	Y	N	N/A
G.	Support systems provided to insure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.	Y	N	N/A
H.	Excavations below the level of the base or footing approved by an RPE	Y	N	N/A
I.	Removal of support systems progresses from the bottom and members are released slowly as to note any indication of possible failure	Y	N	N/A
J.	Backfilling progresses with removal of support system	Y	N	N/A
K.	Excavation of material to a level no greater than 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth	Y	N	N/A
L.	Shield system placed to prevent lateral movement	Y	N	N/A
M.	Employees are prohibited from remaining in shield system during vertical movement	Y	N	N/A

VII. Comments

_____

_____

_____

_____

_____

_____

_____

_____

ATTACHMENT 6-3
MEDICAL DATA SHEET

Foster Wheeler Environmental Corporation

MEDICAL DATA SHEET

The brief medical data sheet shall be completed by all on-site personnel and will be kept in the Support Zone by the SSHO as a project record during the conduct of site operations. It accompanies any personnel when medical assistance is needed or if transport to a hospital is required.

Project: _____

Name: _____ Home Telephone: _____

Address: _____

Age: _____ Height: _____ Weight: _____ Blood Type: _____

Name and Telephone Number of Emergency Contact: _____

_____

Drug or Other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

Provide A Check List Of Previous Illnesses: _____

_____

_____

_____

What Medications Are You Presently Using? _____

_____

_____

Do You Have Any Medical Restrictions? _____

_____

Name, Address, And Phone Number Of Personal Physician: _____

_____

_____

ATTACHMENT 6-4
PERSONAL PROTECTIVE EQUIPMENT SELECTION TABLE

Foster Wheeler Environmental Corporation

PERSONAL PROTECTIVE EQUIPMENT SELECTION

ACTIVITY:_____

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR

ATTACHMENT 6-5
HEALTH AND SAFETY PROGRAM FOR HEARING CONSERVATION

EHS 4-4: Hearing Conservation (Previously HS4-4)

Purpose
The purpose of this program is to establish the Foster Wheeler Environmental Corporation (FWENC) Hearing Conservation Program to prevent hearing loss from on-the-job noise exposure and to comply with the requirements of Occupational Safety and Health Administration (OSHA) regulation for occupational noise exposure, 29 CFR 1910.95.

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Approved by:	

FOSTER WHEELER ENVIRONMENTAL CORPORATION

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6.0 REFERENCES

1.0 PURPOSE

The purpose of this program is to establish the Foster Wheeler Environmental Corporation (FWENC) Hearing Conservation Program to prevent hearing loss from on-the-job noise exposure and to comply with the requirements of Occupational Safety and Health Administration (OSHA) regulation for occupational noise exposure, 29 CFR 1910.95.

2.0 SCOPE

This program applies to all FWENC operations.

3.0 MAINTENANCE

The Director, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with FWENC's President and Chief Executive Officer. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Director, Administration and Compliance.

4.0 DEFINITIONS

4.1 Audiogram

A graph showing hearing acuity as a function of frequency.

4.2 dBA (A-Weighted Sound Level)

A quantity, in decibels, read from a standard sound level meter that is switched to the weighting network labeled "A." The A-weighted sound level measures the approximate relative "noisiness" of a given environment.

4.3 Decibel

The unit in which the levels of various acoustical quantities are expressed. Typical quantities so expressed are sound pressure level, noise level, and noise power level.

4.4 Hearing Loss

At a specified frequency, an amount, in decibels, by which the individual's hearing acuity is less than the selected norm.

4.5 Standard Threshold Shift

A change in the hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2,000, 3,000, and 4,000 Hertz (Hz), in either ear.

5.0 DISCUSSION

5.1 Responsibilities

5.1.1 Line Management

Site Supervisors are responsible for ensuring that hearing protection is worn when required and in the proper manner.

5.1.2 Environmental, Health and Safety Personnel

The Director, Health and Safety is responsible for:

- Notifying affected employees of an observed threshold shift upon notification by the Corporate Medical Consultant (CMC), and
- Ensuring that the case is recorded on the OSHA 200 log.

The Environmental and Safety Supervisor (ESS) is responsible for:

- Verifying that site employees are trained and have valid audiometric examinations prior to the start of work;
- Providing hearing protection to employees and ensuring proper fitting of hearing protection devices;
- Posting high noise warning signs in affected areas;
- Conducting exposure monitoring of high noise areas;
- Providing hearing conservation program information to employees and post a copy of the OSHA standard in the workplace;
- Maintaining site hearing conservation program records; and
- Overseeing the requirements of the hearing conservation program at the site.

5.1.3 Medical Personnel

The Corporate Medical Consultant (CMC) is responsible for:

- Determining if a significant threshold shift (STS) has occurred when reviewing the audiometric examination results;
- Providing Director, Health and Safety with an annual summary of STSs which occurred to FWENC employees; and
- Providing Director, Health and Safety with an assessment of the effectiveness of the hearing conservation program training.

The Local Medical Provider (LMP) is responsible for:

- Conducting audiometric testing, reviewing results, and maintaining records of audiometric tests; and
- Notifying the Project Environmental and Safety Manager (PESM) if an STS is observed.

5.2 Hearing Conservation Program

FWENC maintains a Hearing Conservation Program for employees who are exposed to noise levels in excess of the action level. Engineering and/or administrative methods to maintain employee exposure below the action level will be used whenever feasible. Whenever these control methods are not feasible, employees are included in the Hearing Conservation Program which includes noise exposure monitoring, audiometric testing, use of hearing protective devices, and employee training and access to information.

5.3 Action Level

The action level for this program is a noise exposure level equal to or greater than an 8-hour time weighted average (TWA) of 85 dBA slow response or a dose of 50% as measured by an audiodosimeter.

5.4 Hearing Protection

Hearing protection will be required when employee exposure exceeds the action level while using equipment resulting in a noise exposure in excess of 85 dBA, or when working in areas where warning signs indicate that the use of hearing protection is required.

Whenever hearing protection is required by the Environmental, Health and Safety (EHS) plans, FWENC offers a choice between one or two types of ear plugs and one type of ear muffs. All hearing protectors used must meet the noise attenuation requirements for the exposure.

The adequacy of hearing protection used shall be evaluated by the ESS or designee

The adequacy of hearing protection used shall be evaluated by the ESS or designee using one of the evaluation methods described in 29 CFR 1910.95, Appendix B, *Methods for Estimating the Adequacy of Hearing Protection Attenuation.*

5.5 Exposure Monitoring

Noise exposure monitoring shall be conducted when information indicates that an employee's exposure may be equal to or greater than the action level.

Monitoring shall be conducted in accordance with the FWENC EHS Field Procedures Guides HSG1-5, Noise Monitoring, including the following components:

- The identity of all employees that may be exposed to noise at or above the action level.
- Area monitoring or representative personal monitoring. Personal Monitoring (noise dosimetry) shall be used when area monitoring is not feasible due to worker mobility sound levels varying over time, or significant impulse noise exists.
- All continuous, intermittent, and impulsive sound levels between 80 and 130 dBA will be integrated into noise measurement.
- The use of properly calibrated instruments in accordance with the FWENC EHS Field Guide.
- Repeat monitoring whenever workplace changes occur that may result in increased personnel exposure or render protective equipment inadequate.
- Employee notification if they are exposed at or above the action level.
- The opportunity for affected employees to observe exposure monitoring measurements.

5.6 Audiometric Testing

Audiometric testing shall be made available by FWENC to employees included in the Hearing Conservation Program. All such identified employees shall undergo baseline and annual audiometric testing.

General Requirements

Audiometric tests shall be performed by the LMP using qualified personnel meeting the requirements of 29 CFR 1910.95 (g) and (h).

Audiometric testing equipment shall be operated and meet the requirements of 29 CFR 1910.95, Appendix C, *Audiometric Testing Instruments,* Appendix D, *Audiometric Test Rooms*, and Appendix E, *Acoustic Calibration of Audiometers.*

Baseline Audiogram. A baseline audiogram shall be established for employees exposed above the action level within six months of exposure. The baseline audiogram forms the basis for comparison to subsequent audiograms.

Annual Audiogram. An audiogram shall be repeated at least annually for affected employees. Results are compared to the baseline audiogram by the LMP to determine validity and any shifts in employee hearing acuity.

Procedure for Standard Threshold Shift. If an STS is observed, the affected employee shall be retested within 30 days and the results reviewed by an audiologist, otolaryngologist, or qualified LMP to determine if further evaluation is needed.

If an STS has occurred, the following actions shall be taken:

1. The PESM informs the employee in writing of the condition within 21 days of receipt of results and ensures that the case is recorded on the OSHA 200 log as a recordable illness. A copy of the physician's report is furnished to the employee.

2. The employee is trained in the use and care of one or more hearing protective devices, is fitted for one or more devices, and is required by the ESS to wear the device(s) when on the job. If the employee already wears protective devices, retraining and refitting will be provided, and if necessary a more efficient device or devices will be supplied.

3. Additional testing may be advised if a medical pathology of the ear occurs, particularly if wearing hearing protection is suspected of causing the condition.

4. An annual audiogram will be substituted for the baseline audiogram when a threshold shift is persistent or there is significant hearing improvement.

5.7 Employee Training and Information

Employees included in the Hearing Conservation Program shall receive hearing conservation training initially and at least annually. This training usually is conducted during the initial 40-hour health and safety training, during annual 8-hour refresher health and safety training, and during site safety meetings. Training shall consist of the following:

- The effects of noise on hearing;
- The purpose of hearing protectors;
- The advantages and disadvantages of various types of hearing protection;
- Instructions for selecting, fitting, using, and caring for hearing protection devices;
- The purpose of audiometric testing; and
- An explanation of audiometric test procedures.

A copy of 29 CFR 1910.95, Occupational Noise Exposure, is included as Appendix A. This standard will be provided to affected employees upon request and posted at

project locations where the action level for noise is exceeded.

5.8 Warning Signs

Warning signs indicating the presence of a high noise area and the requirement to wear hearing protection will be visibly posted and enforced at the work location whenever ambient noise level exceeds 85 dBA.

5.9 Recordkeeping

Audiometric Testing Records. An accurate record of all audiometric testing in accordance with the 29 CFR 1910.95(m) is maintained by the CMC in the employee's medical record.

Exposure Records. Records of noise exposure monitoring are maintained in the project EHS records in accordance with EHS 1-9, Recordkeeping.

Training Records. Hearing Conservation Program training records are maintained in the project EHS records by the ESS and in the employee EHS records by the Director, Health and Safety. Records shall be maintained in accordance with EHS 1-9, Recorkeeping.

6.0 REFERENCES

Environmental, Health & Safety Programs EHS 1-9, Recordkeeping
Environmental, Health & Safety Field Guides HSG 1-5, Noise Monitoring
OSHA (U.S. Department of Labor, Occupational Safety and Health Administration) 29 CFR 1910.95, Occupational Noise Exposure and Appendices.

ATTACHMENT 6-6
TEMPERATURE EXTREMES

EHS 4-6: Temperature Extremes (Previously HS4-6)

Purpose
The purpose of this program is to prevent heat and cold stress related injuries and illnesses at field operations.

Version Date:	**03/17/98** - Revised
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1.0 PURPOSE

The purpose of this program is to prevent heat and cold stress related injuries and illnesses at field operations.

2.0 SCOPE

This program applies to all Foster Wheeler Environmental Corporation (FWENC) and subcontractor field personnel that may be exposed to heat or cold stress during the performance of their field work assignments.

3.0 MAINTENANCE

The Director, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with FWENC's President and Chief Executive Officer. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Director, Administration and Compliance.

4.0 DEFINITIONS

4.1 Adjusted Temperature

The dry bulb temperature adjusted to account for solar radiation, to be used as a heat stress indicator for personnel in impermeable protective clothing.

4.2 Deep Frostbite

The tissue beneath the skin is solid to the touch; it may involve a full thickness freeze to the bone. This is an extreme emergency and can result in permanent tissue loss.

4.3 Frostbite

Freezing of body tissue.

4.4 Frostnip or Incipient Frostbite

A cold related injury that progresses slowly and is painless while developing. The victim is usually unaware that he/she has frost nip. The skin first becomes reddened, then changes to white; no freezing of tissue occurs.

4.5 Heat Cramp

Painful muscle spasms usually occurring on the arms, legs, and abdomen; caused by excessive loss of body electrolytes from profuse sweating.

4.6 Heat Exhaustion

A form of shock that occurs when the body loses large amounts of water and electrolytes from excessive perspiration after exposure to heat and physical activity; also called heat prostration.

4.7 Heat Rash

Profuse tiny raised red vesicles (blister-like) on affected areas of the skin which cause a prickling sensation during heat exposure.

4.8 Heat Stroke

A life-threatening condition caused by rapidly rising body core temperature that occurs when the body's temperature regulating mechanisms are overwhelmed. Sweating stops and the skin is dry and hot.

4.9 Hyperthermia

A rise in body core temperature above 99.6 C.

4.10 Hypothermia

Decreased body core temperature from prolonged exposure to freezing or near-freezing temperatures. This is the most life-threatening cold injury and affects the entire body with possible localized severe cooling.

4.11 Superficial Frostbite

Frostbite which affects the skin and tissue just beneath the skin. The skin is firm and waxy, tissue beneath is soft and numb. The skin turns purple and may tingle and burn during warming.

4.12 Wet-Bulb Globe Temperature (WBGT)

Method used to measure the environmental factors (e.g., temperature, relative humidity) which impacts the body's physiological responses to heat.

4.13 Wind-Chill Factor or Equivalent Chill Temperature (ECT)

An index describing the effect of the cooling power of moving air on exposed flesh. The effect of wind velocity at a certain temperature is expressed as the equivalent cooling effect of a lower temperature with still air.

4.14 Work/Rest Regimen

The ratio of time spent working to time spent resting in an area designed to relieve heat related conditions. This ratio is expressed in one hour periods. Example: A work/rest regimen of 75% work, 25% rest corresponds to 45 minutes work, 15 minutes rest each hour.

5.0 DISCUSSION

5.1 Responsibilities

5.1.1 Field Personnel

All field personnel will be trained in heat and cold stress prevention and treatment. Field personnel will monitor themselves and their workmates for symptoms of heat and cold stress and will inform the Environmental and Safety Supervisor (ESS) or their supervisor immediately should symptoms become apparent.

5.1.2 Line Management

Site Supervisors have the responsibility to:

- Provide resources and facilities necessary to prevent health effects from temperature extremes
- Enforce work rules related to such prevention
- Ensure implementation of the requirements of this program as specified in the Site Environmental, Safety and Health (EHS) plans.

5.1.3 Environmental, Health and Safety Personnel

The Project Environmental and Safety Manager (PESM) will make the initial determination of heat and cold stress prevention requirements as part of the site EHS Plan (see EHS 3-2, EHS Plans) and oversee the implementation of this program on a project basis for all FWENC field programs.

The ESS will assist with implementation of heat and cold stress prevention programs.

The ESS will, in most cases, be the person responsible for monitoring heat and cold stress on the job, determining work/rest and work/warm-up schedules where used, and will implement emergency response or corrective action, if needed. The ESS will train site personnel on the effects of temperature extremes and the site prevention program, and will maintain records related to this program.

5.2 General Program Requirements

Adverse weather conditions must be considered when planning site operations. Excessively hot or cold working environments can produce a number of different injuries. Critical to the ability to care for those injuries is a basic understanding of the way in which the body maintains its temperature and how it physiologically adjusts to extremes of heat and cold. Attachment A provides information on the body's physiological responses to heat and cold stress.

Proper care of victims who are suffering from the effects of heat or cold exposure will help to minimize injuries and speed recovery. On the other hand, improper treatment of these emergencies can result in serious injury, disability, or death.

The most effective first aid for any injury is prevention. When acceptable monitoring and prevention programs are followed, there should be no victims.

5.3 Heat Stress

A heat stress prevention program will be implemented when ambient temperatures exceed 70 °F for personnel wearing impermeable clothing and for other personnel when the WBGT index exceeds the ACGIH Threshold Limit Values.

5.3.1 Selection of Chemical Protective Clothing

The PESM will review site data and working conditions and select the personal protective equipment ensemble that best protects the employees from site hazards. The risk of heat related illness will be fully considered in balancing the risks and benefits of the PPE. Where contact with a waste material is unlikely; contact is not expected to result in a serious dermal hazard; and significant absorption of the contaminants is not likely to occur, then impermeable clothing should not be required. In this case, the risk of heat related illness may grossly outweigh the benefits provided by such equipment. Even when chemical protective clothing is needed, the PESM should consider the probable exposure scenarios and select protective equipment accordingly. For example, if dermal exposure is likely to be localized, strong consideration should be given to using gloves, boots, gauntlets, leggings, aprons, bibs, face shields, etc., in lieu of full body coveralls and respirators.

5.3.2 Hydration

FWENC will supply cool (50 °–59°F) potable water or other suitable drinks (e.g., sport electrolyte replacements) for fluid replacement. Employees involved in the heat stress prevention program will be trained and encouraged to drink at a rate of approximately 8 oz. every 20 minutes. Individual cups will be used and kept in closed containers or dispensers.

5.3.3 Cool Rest Areas

Shaded rest areas will be provided. On large remediation projects, air conditioned rest areas should be provided for workers exposed to heat stress conditions.

5.3.4 Other Prevention Program Elements

The PESM, ESS and the Project Manager will incorporate other elements into the heat stress prevention program as necessary. The selected elements will be described in the EHS plans. Engineering controls are preferred. Where their use is not feasible, the program must incorporate administrative/work practice controls, personal protective equipment, or a combination. Examples of other prevention program elements include:

- **Engineering Controls**

Engineering controls may include:

— Air conditioned cabs for heavy equipment and vehicles (Such controls may eliminate the need for other program elements);

— Fans or blowers; and

— Cold water for drenching personnel in impermeable clothing. This can be provided through a garden hose, a garden sprayer filled with ice water, a clean drum full of water for "hard hat dipping" or containers of ice water and clean towels in the rest area to hasten cool down.

- **Administrative and Work Practice Controls**

Administrative controls include:

— Adjusting work schedules to do the bulk of the work during the cooler parts of the day;

— Acclimatizing workers; and

— Implementing work/rest regimens (See Attachment B for Work/Rest Regimen Procedures).

- **Personal Protective Equipment**

Personal cooling devices which may be useful include:

— Ice vests;

— Circulating water vests; and

— Vortex tubes.

Where ice vests and circulating water vests are used, rest periods of approximately 15 minutes should be taken when ice packs or batteries need to be changed. Continuous work over long periods of time with these devices may present an increased musculoskeletal injury risk due to the extra weight. Since the duration of the cooling effectiveness of these devices will vary with heat and work loads, users must be instructed to leave the area to replenish ice or batteries at the first sign of loss of cooling.

- **Monitoring**

A program of environmental and physiological monitoring must be established in order to use work/rest regimens. The monitoring procedures are described in Attachment B.

5.3.5 Training

All site personnel must receive training on the following topics:

- Health effects of hot environments and symptoms of heat related illness;
- Personal risk factors;
- Effect of personal protective equipment on heat stress conditions;
- Preventive measures;
- Fluid replacement;
- Elements of the site Heat Stress Prevention Program; and
- First aid and emergency response.

Records shall be maintained in accordance with EHS 1-9, Recordkeeping.

5.4 Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trenchfoot or immersion foot, and hypothermia as well as slippery surfaces, brittle equipment, poor judgement and taking short cuts. The current ACGIH threshold limit values (TLVs) for cold stress will be used as a guideline. FWENC will implement the following cold stress prevention program elements when there is a potential for cold related injuries.

5.4.1 Personal Protective Equipment

The following personal protective equipment will be provided as necessary to FWENC employees when conditions indicate a potential for cold-related injury. Subcontractors will be expected to supply appropriate equipment to their employees.

- Hard hat liners,
- Gloves or glove liners,
- Rain gear or water impermeable coveralls and gloves for potentially wet operations,
- Fleeced boot liners where rubber steel-toe boots are used, and
- Winter coveralls.

5.4.2 Engineering Controls

A variety of engineering controls shall be evaluated to minimize cold stress. These include:

- General or spot heating should be used to increase temperature at the workplace.
- If fine work is to be performed with bare hands in a cold environment, special provisions should be made to keep the worker's hands warm. Warm air jets, radiant heaters, or contact warm plates can be used.
- The work area should be shielded from winds and drafts that may affect the wind chill factor.
- The air velocity in refrigerated rooms should be minimized as much as possible, and should not exceed 1m/sec in the work zone.
- At temperatures below freezing, metal handles of tools and control bars should be covered with thermal insulating material.
- Unprotected metal chair sets should not be used as they conduct heat away from the body.
- When necessary, equipment and processes should be substituted, isolated, relocated, or redesigned to reduce cold stress at the worksite.
- Power tools, hoists, cranes, or lifting aids should be used to reduce metabolic workload.
- Heated warming shelters such as tents and cabins should be made available if work is performed continuously in an equivalent chill temperature of 20 °F or below.
- The ESS may implement a work-rest schedule to reduce exposure to cold stress.
- Scheduled rest breaks should be enforced.
- Personnel exposed to the cold should be provided the opportunity for frequent intake of warm, sweet, caffeine-free, nonalcoholic liquids or soup.

- Work should be moved to warmer areas whenever possible.
- Extra workers should be assigned to highly demanding tasks.
- Workers should be allowed to pace themselves, taking breaks when needed.
- Workers shall be trained in the prevention, symptoms, and emergency response to cold stress.
- Utilize the "buddy system" to monitor cold stress symptoms among the workers.
- Allow new employees time to adjust or "acclimate" to cold conditions.
- Minimize the need to sit or stand in one place for long periods of time.
- Minimize the amount of work time spent in a cold environment.
- Allow for the weight and bulkiness of protective clothing when estimating work performance goals and tasks.

5.4.3 Warm Rest Areas

FWENC will make warm rest areas, e.g., heated trailers, available for rest breaks in cold weather. Employees will be permitted and encouraged to use the heated trailers whenever they experience symptoms of cold stress.

5.4.4 Work/Warm-up Schedule

The work/warm-up schedule found in the ACGIH TLVs for cold stress will be followed. In addition, FWENC will make warm-up periods available to employees who need to change into dry clothing to prevent immersion foot or hypothermia.

5.4.5 Training

All FWENC employees and subcontractors will be trained in:

- The effects of cold stress, including frostbite, immersion foot and hypothermia;
- Personal risk factors;
- Recognition of the symptoms;
- Methods employees can use to protect themselves; and
- First aid procedures and recognition of medical emergencies.

Records shall be maintained in accordance with EHS 1-9, Recordkeeping.

6.0 REFERENCES

ACGIH (American Conference of Government Industrial Hygienists)
Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 1994-95.
Environmental Health & Safety Programs EHS 1-9, Recordkeeping
Environmental Health & Safety Programs EHS 3-2, EHS Plans
NIOSH (National Institute for Occupational Safety and Health)
Occupational Exposure to Hot Environments, Revised Criteria 1986.
NIOSH/OSHA/EPA/USCG/EPA
Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. October 1985.
National Safety Council
Fundamentals of Industrial Hygiene. Third Edition, 1988.

7.0 ATTACHMENTS

Attachment A - Heat and Cold Stress Information
Attachment B - Work/Rest Regimens and Monitoring

ATTACHMENT A (Page 1 of 6)
HEAT AND COLD STRESS INFORMATION

FOSTER WHEELER ENVIRONMENTAL CORPORATION

HEAT AND COLD STRESS INFORMATION

HEAT STRESS

Hot weather can cause physical discomfort, loss of efficiency, and personal injury. The human body strives to maintain a constant core temperature of 98.6o. If this temperature is to be maintained, heat loss must equal heat production. This balance is maintained by variations in the blood flow to the outer part of the body. When the core temperature rises, blood vessels beneath the skin dilate, and the blood brings increased heat to the skin, where it is dissipated by radiation and convection. This works only as long as the skin temperature is lower than the temperature of the outside environment. Heat loss by radiation convection is impossible when the temperature of the outside air approaches or exceeds the temperature of the skin. The body will now rely on dissipation through evaporation of sweat. But the sweat mechanism also has limits. The normal adult can sweat only about one liter per hour and can sweat at that rate for only a few hours at a time. In addition, sweating only works if the relative air humidity is low. Sweat evaporation ceases entirely when the relative humidity reaches 75 percent.

Of particular concern in heat stress monitoring is the use of personal protective clothing which decreases natural body ventilation and greatly increases the temperature and humidity to the skin. If precautions are not taken, heat stress will progress into a heat-related injury. Heat-related injuries fall into three major categories: heat cramps, heat exhaustion, and heat stroke.

Heat Cramps

Symptoms

Heat cramps are the least common and least severe of heat injuries. Heat cramps occur when the electrolytic balance in the blood between water, calcium, and sodium (salt) is altered. Low blood salt level, from profuse sweating and inadequate salt consumption, is the usual cause.

Symptoms of heat cramps include:

- Severe muscle cramps and pain, especially of the upper legs, calves, and abdomen, and occasionally in the arms
- Faintness and dizziness
- Possible nausea and vomiting

Treatment

Emergency care will include:

- Remove victim from the hot environment

ATTACHMENT A (Page 2 of 6)
HEAT AND COLD STRESS INFORMATION

- Dilute one teaspoon of salt in one quart of water or use a commercial product with a low glucose content; allow victim to sip this solution at the rate of one-half glassful every 15 minutes

- To relieve pain, gently stretch the involved muscle group; gently message cramps as long as it does not increase the pain or discomfort

The victim should avoid exertion of any kind for 12 hours. A victim of heat cramps is prone to recurrence.

Heat Exhaustion

Symptoms

Heat exhaustion is the most common heat injury and usually occurs in an individual who is involved with heavy physical exertion in a hot, humid environment, and is wearing protective clothing. Heat exhaustion is a mild state of physical shock caused by the pooling of blood in the vessels just below the skin, causing blood to flow away from the major organs of the body. Due to prolonged and profuse sweating, the body also loses large amounts of salt and water.

The symptoms of heat exhaustion include:

- Profuse sweating
- Pale, cool, sweaty skin
- Headache and extreme weakness, fatigue
- Nausea and possible vomiting
- Dizziness and faintness
- Collapse and possible brief unconsciousness
- Body core temperature normal, may even be slightly below normal

Treatment

Emergency care will include:

- Remove victim from the hot environment and out of the exclusion zone
- Lie victim down with feet slightly raised
- Remove as much clothing as reasonable (especially personal protective clothing); loosen what cannot be removed
- Apply cold, wet compresses to the skin; fanning will also aid in cooling
- If the victim is fully alert, allow him/her to drink water or the same solution, at the same rate, that was used for the emergency care of heat cramps
- If the victim vomits, do not give fluids by mouth, transport him/her to a hospital immediately (dehydration is the most critical problem in heat exhaustion victim; intravenous fluids will have to be given)
- Take oral temperature every 10 minutes, if the victim's temperature is above 101

- Take oral temperature every 10 minutes, if the victim's temperature is above 101 °

  or shows a steady increase, transport to a hospital immediately and start sponging him/her off with cool water

ATTACHMENT A (Page 3 of 6)
HEAT AND COLD STRESS INFORMATION

Heat Stroke

Heat stroke is a true life-threatening emergency having a mortality rate of 20 to 70 percent. This condition results when the heat regulating mechanisms of the body break down and fail to cool the body sufficiently. The body temperature rises to between 105 and 110 F; no sweating occurs in about 50 percent of the victims. Because no cooling takes place, the body stores increasingly more heat, and eventually brain cells are damaged, causing permanent disability or death. About 4,000 Americans die of heat stroke annually.

There are two basic kinds of heat stroke: classic heat stroke and exertional heat stroke. Classic heat stroke, in which people lose the ability to sweat, generally effects the elderly or chronically ill. Exertional heat stroke, in which victims retain the ability to sweat, is accompanied by physical exertion and muscle stress. Exertional heat stroke is the type that will be most commonly encountered on a field operation requiring strenuous physical activity.

The symptoms of heat stroke include:

- Oral temperature of 105 F or higher
- Hot, reddish skin, skin is usually dry
- Headache
- Dry mouth
- Shortness of breath
- Nausea or vomiting
- Increasing dizziness and weakness
- Mental confusion and anxiety; victims may show unusual irritability, aggression, combative agitation, or hysterical behavior
- Convulsions, sudden collapse and possible unconsciousness; all heat stroke victims having varying levels of consciousness, ranging from disorientation to coma

Treatment

Emergency care will include:

- Remove the victim from the hot environment and from the exclusion zone
- Call for trained emergency medical personnel immediately
- Remove as much clothing as reasonable (especially personal protective clothing); cut clothing with bandage scissors, if necessary, being careful not to injure victim
- Pour cool water over the victim, avoiding his nose and mouth
- Fan the victim
- Place cold packs under the arms and against neck and ankles
- Wrap victim in a wet blanket
- Continue a combination of these methods until the oral temperature falls below 103 F (take measures to prevent chilling, if necessary, i.e., use slower cooling if the victim starts shivering
- Elevate the head and shoulders slightly during cooling
- Never give the victim anything to drink unless fully conscious and vomiting is unlikely
- Because heat stroke involves the entire body, a number of complications may result:

- Brain swelling, convulsions, coma, kidney failure, liver failure, high blood pressure and heart failure.

Therefore, always transport the victim to a hospital even if the body core temperature has lowered to near normal.

ATTACHMENT A (Page 4 of 6)
HEAT AND COLD STRESS INFORMATION

The two most reliable and distinct differences between heat stroke and heat exhaustion are:

Heat Stroke

- Skin flushed (red); may be dry; hot to touch
- Oral temperature above 105°F.

Heat Exhaustion

- Skin pale; wet or clammy; cool to touch
- Oral temperature usually normal.

Cold Stress

Hypothermia is a drop in the core body temperature below 98.6 F. The first symptoms of hypothermia are uncontrollable shivering and the sensation of cold; this is followed by a slowed and sometimes irregular heart beat, a weakened pulse and a drop in blood pressure. Vague or slow slurred speech, memory lapses, apathy, incoherence and drowsiness can occur. Other symptoms may include cool skin, slow, irregular breathing, apparent exhaustion, and fatigue after rest.

Prevention

Hypothermia is caused by prolonged exposure to a cold environment, whether air, water, or snow and ice. Adequate dry clothing with appropriate insulating capacity must be provided to workers to prevent hypothermia, especially if work is performed in air temperatures below 40 F. Wind chill is a critical factor. Work at a slow but steady pace. The job should be a "no sweat" operation.

Unless there are unusual or extenuating circumstances, cold injury to other than the extremities (hands, feet, and head) is not likely to occur without the development of the initial signs of hypothermia. Older workers or workers with circulatory problems require special precautionary protection against hypothermia. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions which should be considered for these workers. The precautionary actions to be taken will depend upon the physical condition of the worker and should be determined with the advice of a physician with knowledge of the cold stress factors and the medical condition of the worker.

Treatment

First aid for mild hypothermia will be performed as follows:

1. End the exposure - get the victim out of the cold and wet.

2. Replace wet clothing with dry or add insulation to clothing.

3. Offer warm, non-alcoholic fluids.

4. Increase exercise.

5. Seek shelter from wind, wet and cold.

ATTACHMENT A (Page 5 of 6)
HEAT AND COLD STRESS INFORMATION

CAUTION: If the victim remains cold for a number of hours, chemical changes may have taken place which, on rewarming, may cause major medical problems for the victim and which could result in death. Severely hypothermic victims are best warmed in the hospital under controlled conditions. If a severely hypothermic victim cannot be transported to a hospital within a few hours, rewarming should begin in the field.

Symptoms

Frostbite can occur either before or after the onset of hypothermia when body tissue (usually an extremity) is exposed to freezing temperatures. Frostbite occurs when the fluids surrounding tissue cells freezes. The danger of frostbite increases with increased wind chill and/or reduced temperatures below 32 F. Frostbite can also occur if tissues are in prolonged contact with a frozen material or object. Skin contact with frozen metal, for example, can result in frostbite in a short period of time, even in a warm environment.

There are three degrees of frostbite:

- First degree - freezing without blistering or peeling, "frostnip"
- Second degree - freezing with blistering and/or peeling, and
- Third degree - freezing resulting in the death of skin tissue and possibly the death of underlying tissues as well

Symptoms of frostbite include the following:

- The skin changes color to white or grayish-yellow, progresses to reddish-violet, and finally turns black as the tissue dies
- Pain may be felt at first, but subsides
- Blisters may appear, and
- The affected area is cold and numb

Prevention

Frostbite can be prevented by wearing sufficient protection to prevent skin from coming into prolonged contact with a freezing environment. The following steps can be taken:

1. Wear sufficient clothing. Mittens are better than gloves. Face masks and wool stocking caps are better than hats. Wind and waterproof hoods protect the face and neck.

2. Clothing should be loose enough to prevent constriction of blood vessels. Boots must be roomy enough to permit movement of the toes with no feeling of tightness.

3. Do not contact conductive metals or contact gasoline or other solvents with bare skin as rapid evaporation of solvents may quickly lead to frozen tissues in a cold environment.

4. Exercise the toes and fingers to maintain circulation.

5. Observe the condition of your partners' face, hands and ears frequently for signs of frostbite.

6. Avoid smoking and drinking alcoholic beverages.

ATTACHMENT A (Page 6 of 6)
HEAT AND COLD STRESS INFORMATION

Treatment

First aid for superficial (first degree) frostbite is as follows:

1. Place a warm body part next to the frozen area, applying firm, steady pressure.
2. DO NOT RUB THE AREA. Rubbing may cause further damage to already injured skin.
3. Protect the area from further freezing.

First aid for deep frostbite (second and third degree) is as follows:

1. KEEP THE FROZEN PART FROZEN!
2. Prevent further injury: avoid rubbing and further freezing of unaffected tissue.
3. If the part has thawed, the part should NOT be allowed to refreeze or bear weight. A victim with thawed feet should be carried out.
4. Give the victim plenty of fluids and evacuate to medical assistance as soon as possible.

Symptoms

This condition may be caused by long, continuous exposure to cold without freezing, combined with persistent dampness or actual immersion in water. Edema (swelling), tingling, itching, and severe pain occur, and may be followed by blistering, death of skin tissue, and ulceration. When other areas of the body are affected besides the feet, the condition is known as chilblains.

Prevention

Trenchfoot and chilblains can be prevented by keeping the body as dry as possible at all times. Waterproof boots should be worn when required, but provisions must be made for preventing excessive perspiration to accumulate inside the boots. Socks should be changed at least twice daily and the boots wiped dry inside with each change of socks. The feet should also be wiped dry and foot powder applied.

Treatment

Affected body parts should not be rubbed or massaged, but bathed in water using plain white soap. Dry thoroughly and elevate the body part, allowing the body part to be exposed at room temperatures. If the feet are affected, do not walk during treatment.

ATTACHMENT B (Page 1 of 5)

WORK/REST REGIMENS AND MONITORING

FOSTER WHEELER ENVIRONMENTAL CORPORATION

HEAT STRESS
WORK/REST REGIMES AND MONITORING

Introduction

Establishing a work/rest regimen that allows work to be completed in a timely manner while providing adequate rest time to prevent heat stress requires involvement of the ESS, FOL, and individuals involved. In many cases, particularly when wearing normal field type clothing (i.e., level D), awareness and communication are the key elements to a successful program. Allowing rest periods on an "as needed" basis while ensuring vigilance for initial symptoms of heat stress, encourages this success.

There are times when this approach is not appropriate. When heat stress contributing protective clothing (e.g., respirators, impermeable coveralls) are worn for extended periods, or when "as needed" work/rest regimens adversely impact either the individuals exposed to the heat source or work completion, a more formal work/rest regimen will be established.

Formal work/rest regimens are based either on 1) monitoring ambient conditions (e.g., with a WBGT), estimating work loads and establishing work/rest times, 2) monitoring physiological conditions and adjusting work/rest periods, or 3) using personnel heat stress monitors.

The WBGT, physiological monitors, and personnel heat stress monitors will be used in accordance with manufacturer's instructions. Personnel heat stress monitors will be approved for use by the PESM.

II. WBGT Based Work/Rest Regimens

A. Work/Rest Regimens

When required, the WBGT will be used in conjunction with the work load to determine the appropriate work/rest regimen for personnel wearing regular work clothing or semipermeable disposal coveralls (uncoated Tyvek). Light work examples include sitting or standing or performing light hand or arm work. Moderate work includes walking about with moderate lifting and pushing. Heavy work corresponds to pick and shovel-type work.

The work/rest regimen using the WBGT procedure will be used as a guideline. Table B-1 outlines the work/rest regimen guidelines based upon WBGT temperature and work load. Table B-2 identifies the correction factors. The WBGT temperature will be determined in accordance with Section B of this attachment.

ATTACHMENT B (Page 2 of 5)

WORK/REST REGIMENS AND MONITORING

Table B-1. Examples of Permissible Heat Exposure Threshold Limit Values. (Values are given in °F WGBT)*

	Work Load		
Work - Rest Regimen	**Light**	**Moderate**	**Heavy**
Continuous work	86	80	77
75% Work - 25% Rest, each hour	87	82	78
50% Work - 50% Rest, each hour	89	85	82
25% Work - 75% Rest, each hour	90	88	86

* Notes on Table B-1

1) These values are for fully acclimatized workers wearing light weight pants and shirts. For conditions other than this use this table with the correction factors from Table B-2.

2) These values assume that workers drink frequently and have properly increased salting of food prior to exposure.

3) These values are guidelines. Actual levels may be modified based on individual physiological response and actual work and rest conditions.

4) These values assume that the rest location is cool enough to alleviate heat load conditions.

ATTACHMENT B (Page 3 of 5)

WORK/REST REGIMENS AND MONITORING

Table B-2. Correction Factors for Table B-1 in °F*

Clothing Type	WBGT Correction
Summer work uniform	0
Cotton overalls	-3.5
Winter work uniform	-7
Water barrier, permeable	-11
Condition	**WBGT Correction**
Unacclimatized worker, moderate work load	-4.5

*To use this table, identify the most restrictive applicable clothing type and whether unacclimatized workers are involved. Add the two. Modify Table B-1 temperatures by this amount. For example, the Table B-1 TLV for continuous work, light workload is 86oF. If cotton overalls (-3.5) are work and acclimatized workers are acclimatized (no additional change) the modified limit is 82.5oF.

B. WBGT Determination

If the Wet Bulb Globe Temperature (WBGT) is used to determine if field conditions are conducive to heat stress illnesses, the WBGT is determined through the following equations:

- Outdoors with solar load: (1)

  WBGT=0.7 NWB+0.2GT+0.1DB

- Indoors or outdoors with no solar load: (2)

  WBGT=0.7 NWB+0.3GT

Where:
WGBT = Wet Bulb Globe Temperature Index
NWB = Natural Wet-Bulb Temperature
DB = Dry-Bulb Temperature
GT = Globe Thermometer Temperature

ATTACHMENT B (Page 4 of 5)

WORK/REST REGIMENS AND MONITORING

The factors involved in the above equations can be measured in the following manner:

- Through the use of a direct-reading heat stress monitor capable of measuring all of the individual factors associated with the WBGT equation. For example, the Reuter-Strokes Wibet No. RSS-214 heat stress monitor.

- By measuring the individual factors manually using the following type of equipment

  Natural Wet-Bulb Temperature Thermometer
  Dry-Bulb Temperature Thermometer
  Globe Temperature Thermometer
  Stand

III. Adjusted Temperature Based Work/Rest Regimens

When wearing impermeable protective clothing, the use of work/rest regimens based on WBGT is not recommended. The WBGT index is designed to account for the effects of evaporative cooling. Vapor barrier clothing impedes the evaporation of sweat and renders the WBGT an inappropriate physiological model. The most important environmental conditions related to heat stress for workers wearing impermeable protective clothing have been suggested to be the ambient dry bulb temperature and the radiant solar heat. These factors are combined into an index called the adjusted temperature using the following formula:

$$T^\circ \text{ adjusted} = \text{ambient dry bulb temperature} + (13 \times \%\ \text{sunshine})$$

where % sunshine is an estimate of the amount of time the sun is covered by clouds thick enough to produce a shadow. The thermometer bulb should be shielded from radiant heat when taking measurements.

The adjusted temperature values are then used to determine the initial work/rest regimen and physiological monitoring frequency. Table B-3 gives the work period and monitoring frequency. Initially, rest periods will be at least 15 minutes. Physiological monitoring that is normally recommended is pulse rate and body temperature. Procedures for each are described below. Initially, both should be done. Pulse rate monitoring may be discontinued with the approval of the PESM if temperature monitoring proves to be effective.

ATTACHMENT B (Page 5 of 5)

WORK/REST REGIMENS AND MONITORING

A. Pulse Rate Monitoring

Take the pulse immediately at the start of the rest period (P1). Take the pulse again 2 1/2 to 3 minutes into the rest period (P2). If any of the following conditions exist, shorten the next work period by a third:

P1 > 110 beats per minute(bpm)

P2 > 90 bpm

P1 - P2 < 10 bpm.

Pulse rates can be taken with an electronic pulse meter, or manually with a stopwatch for 30 seconds.

B. Oral Temperature

Take the oral temperature immediately at the start of the rest period. If the oral temperature exceeds 99.5o shorten the next work period by a third. Do not return the worker to hot work in semipermeable or impermeable clothing until the oral temperature is less than 99.5oF.

Oral temperatures may be taken with disposable oral thermometers or infrared ear drum scanners, such as the Thermoscan. Note: If a Thermoscan unit is purchased, the Pro Model should be selected. The home model available through drugstores cannot be recalibrated.

C. Removal from Exposure

If an individual requires a shortening of the work period on more than two consecutive monitoring periods, or repeatedly over a few days, they should be removed from exposure to hot environments wearing semipermeable impermeable protective clothing until examined and cleared for such work by the consulting physician.

Table B-3. Initial Work Period and Physiological Monitoring Frequency [1]

ADJUSTED TEMPERATURES	SCHEDULE
90° F or above	15 minutes
87.5° - 90° F	30 minutes
82.5° - 87.5° F	60 minutes
77.5° - 82.5° F	90 minutes
70° - 77.5° F	120 minutes

[1] Schedule is for fit and acclimatized workers in impermeable protective clothing.

ATTACHMENT 6-7
HEALTH AND SAFETY FORMS

FOSTER WHEELER ENVIRONMENTAL CORPORATION
GENERAL HEALTH AND SAFETY RULES

1. All site personnel must attend each day's Daily Briefing.

2. Any individual taking prescribed drugs shall inform the FOL/ESS of the type of medication. The FOL/ESS will review the matter with the PHSM and the Corporate Medical Consultant (CMC), who will decide if the employee can safely work on-site while taking the medication.

3. The personal protective equipment specified by the FOL/ESS and in the EHS plan(s) shall be worn by all site personnel. This includes hard hats and safety glasses which must be worn at all times in active work areas.

4. Facial hair (beards, long sideburns or mustaches) which may interfere with a satisfactory fit of a respirator mask is not allowed on any person who may be required to wear a respirator.

5. All personnel must sign the site log and the exclusion zone log when used at the site.

6. Personnel must follow proper decontamination procedures and shower at the end of the work shift.

7. Eating, drinking, chewing tobacco or gum, smoking and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the exclusion zone or the contamination reduction zone. (Exceptions may be permitted by the PHSM to allow fluid intake during heat stress conditions.)

8. All lighters, matches, cigarettes and other forms of tobacco are prohibited in the Exclusion Zone.

9. All signs and demarcations shall be followed. Such signs and demarcation shall not be removed, except as authorized by the FOL/ESS.

10. No one shall enter a permit-required confined space without a permit. Confined space entry permits shall be implemented as issued.

11. All personnel must follow Hot Work Permits as issued.

12. All personnel must use the Buddy System in the Exclusion Zone.

13. All personnel must follow the work-rest regimens and other practices required by the heat stress program.

HEALTH AND SAFETY WORK RULES CONTINUED

14. All personnel must follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources.

15. No person shall operate equipment unless trained and authorized.

16. No one may enter an excavation greater than four feet deep unless authorized by the Competent Person. Excavations must be sloped or shored properly. Safe means of access and egress from excavations must be maintained.

17. Ladders and scaffolds shall be solidly constructed, in good working condition, and inspected prior to use. No one may use defective ladders or scaffolds.

18. Fall protection or fall arrest systems must be in place when working at elevations greater than six feet for temporary working surfaces and four feet for fixed platforms.

19. Safety belts, harnesses and lanyards must be selected by the Supervisor. The user must inspect the equipment prior to use. No defective personal fall protection equipment shall be used. Personal fall protection that has been shock loaded must be discarded.

20. Hand and portable power tools must be inspected prior to use. Defective tools and equipment shall not be used.

21. Ground fault interrupters shall be used for cord and plug equipment used outdoors or in damp locations. Electrical cords shall be kept out walkways and puddles unless protected and rated for the service.

22. Improper use, mishandling, or tampering with health and safety equipment and samples is prohibited.

23. Horseplay of any kind is prohibited.

24. Possession or use of alcoholic beverages, controlled substances, or firearms on any site is forbidden.

25. All incidents, no matter how minor, must be reported immediately to the Supervisor.

26. All personnel shall be familiar with the Site Emergency Response Plan.

The above Health and Safety Rules are not all inclusive and it is your responsibility to comply with all regulations set forth by OSHA, the FWENC Environmental, Health and Safety Programs, the EHS plan(s), the client, FWENC Supervisors, and the FOL/ESS.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

WEEKLY HEALTH AND SAFETY REPORT

Project Name: _____
Location: _____
Delivery Order No. _____

SITE INFORMATION
Week Ending _____

Hours Worked_____

Level of Protection B __ C __ D __

INJURIES AND ILLNESSES
Yes _____ No _____

Describe and attach reports:
_____
_____

MAJOR ACTIVITIES CONDUCTED THIS WEEK:
(drum handling, sampling, excavation, abatement/T&D, etc.)
_____
_____
_____

SIGNIFICANT EVENTS THIS WEEK:
(regulatory visits, equipment malfunctions, process start-up or shutdown):
_____
_____
_____

FUTURE ISSUES:
(schedule, manpower allocation, monitoring equipment, other resources needed)
_____
_____
_____
_____
_____
_____

SITE AUDIT/INSPECTIONS CONDUCTED Yes _____ No _____
(describe outstanding findings and attach results)
_____
_____
_____
_____
_____

AIR MONITORING:
Real Time

Major Activity	Location(s)	Worker Occupation	FID/PID Range	CGI/O2 Range	PDM Range	Other

PERSONAL AIR MONITORING

Analyte	Activity Monitored	Occupation	Location	Result	Type of Sample

SUBCONTRACTORS ON SITE

Company Name	Task or Function	Return to Site Next Week (Y/N)

Health and Safety Officer - Signature **Date**

ATTACHMENT 6-8
EXCAVATION AND TRENCHING PROGRAM

EHS 6-3: Excavation and Trenching (Previously HS6-4)

Purpose
This program provides the requirements for activities involving excavations in accordance with 29 CFR 1926, Subpart P - Excavations.

Version Date:	**04/04/2000** - Revised
Original Issue Date:	**02/01/95**
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Approved by:	

FOSTER WHEELER ENVIRONMENTAL CORPORATION

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1.0 PURPOSE

This program provides the requirements for activities involving excavations in accordance with 29 CFR 1926, Subpart P - Excavations.

2.0 SCOPE

These requirements are applicable to all Foster Wheeler Environmental Corporation (FWENC) operations.

3.0 MAINTENANCE

The Director, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with FWENC's President and Chief Executive Officer. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Director, Administration and Compliance.

4.0 DEFINITIONS

4.1 Benching

A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

4.2 Competent Person

A competent person is one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

4.3 Excavation

Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

4.4 Hazardous Atmosphere

An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

4.5 Protective Systems

A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

4.6 Sloping

A method of protecting employees from cave-ins by forming sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

4.7 Support System

A structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

4.8 Trench

A narrow excavation made below the surface of the ground. In general the depth is greater than the width, but the width of a trench measured at the bottom is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less, the excavation is also considered to be a trench.

5.0 DISCUSSION

5.1 Responsibilities

5.1.1 Competent Person

The competent person(s) shall be responsible for:

- Day-to-day oversight of open excavations and trenches
- Conducting soil classifications
- Selection of protective systems
- Conducting daily inspections of open excavations and trenches; and
- Providing the Environmental and Safety Supervisor (ESS) with all required documentation on a daily basis.

5.1.2 Line Management

The Project Manager (PM) shall be responsible for:

- Ensuring compliance with this procedure
- Providing the necessary resources for compliance with this procedure; and
- Designating competent personnel in consultation with the Project Environmental, Health and Safety Manager (PESM)

5.1.3 Environmental, Health and Safety Personnel

The ESS shall be responsible for:

- Providing oversight on the implementation of the requirements contained in this procedure
- Conducting periodic reviews of open trenches and excavations
- Consulting with the project manager and competent person on excavation issues; and
- Maintaining required records.

5.2 Designation of Competent Personnel

Prior to the start of any excavation work the project manager shall designate a competent person to fulfill the requirements of this procedure.

5.3 General Requirements

The following section provides general requirements governing activities in and around excavation and trenches, as well as the requirements for the selection and use of protective systems.

- Surfaces surrounding open trenches and excavations shall have all surface hazards removed.
- All utilities shall be located and cleared prior to initiating digging. Public or facility utility groups shall be utilized where possible for this purpose. In the absence of either, the ESS shall specify the procedures to be used to clear utilities in consultation with the project PESM and project manager. When the excavation is open, utilities shall be supported and protected from damage. Clearance and support methods shall be documented on the daily inspection checklist.
- Where structural ramps are used for egress they shall be installed in accordance with 29 CFR 1926.651(c)(1).

- Stairways, ladders, or ramps shall be provided as means of egress in all trenches 4 feet or more in depth. Travel distance shall be no more than 25 feet between means of exit.
- Employees exposed to vehicular traffic shall wear traffic vests.
- No employee shall be permitted under loads being lifted or under loads being unloaded from vehicles.
- When vehicles and machinery are operating adjacent to excavations warning systems such as stop logs or barricades shall be utilized to prevent vehicles from entering the excavation or trench.
- Scaling or barricades shall be used to prevent rock and soils from falling on employees.
- Excavated and loose materials shall be kept at least 3 feet from the edge of excavations.
- Walkways or bridges with standard railing shall be provided at points employees are to cross over excavations or trenches.
- Barriers shall be provided to prevent personnel from inadvertently falling into an excavation.

5.4 Hazardous Atmospheres

Where atmospheres containing less than 19.5 percent oxygen or other types of hazardous atmospheres may exist the following requirements shall be implemented.

- Atmospheric testing shall be done prior to employees entering excavations 4 feet or greater in depth.
- Testing methods shall be listed on the daily inspection checklist and results documented daily in field logs.
- Control measures such as ventilation and personal protective equipment (PPE) shall be used to control employee exposure to hazardous atmospheres below published exposure limits.
- Ventilation shall be used to control flammable and combustible vapors to below 10 percent of their lower explosive limit.
- Testing shall be repeated as often as necessary to ensure safe levels of airborne contaminants.
- Emergency equipment shall be provided and attended when the potential for a hazardous atmosphere exists. This equipment shall include but not be limited to emergency breathing apparatus, harnesses, lifelines, and basket stretchers. Required equipment will be listed on the daily inspection checklist and reviewed daily.

5.5 Protection From Water Hazards

When water has collected or is collected in excavations and trenches the following requirements shall be applied.

- Employees shall not work in excavations in which water has, or is, accumulating without the use of additional protection such as special support systems or water removal.
- Water removal shall be monitored by a competent person.
- Barriers such as ditches and dikes shall be used to divert runoff from excavations and trenches.
- Trenches shall be reinspected prior to re-entry after water accumulation due to heavy rainfall or seepage.

5.6 Stability of Adjacent Structures

When excavating or trenching near an adjacent structure the following practices shall be implemented.

- Support systems such as shoring, bracing, or underpinning shall be provided where the stability of buildings, walls, or other structures is endangered by excavation.
- Excavation bases or footings of foundations shall be prohibited unless support systems are used, the excavation is in stable rock, a professional engineer has determined the structure is sufficiently removed from the site as to not pose a hazard, or the PE determines that the excavation shall not pose a hazard to employees due to the structure.
- Support systems shall be used when it is necessary to undermine sidewalks, pavements, and appurtenant structures.
- Surcharge load sources and adjacent encumbrances shall be listed with their evaluation date on the daily inspection checklist.

5.7 Daily Inspections

Inspections shall be performed daily on all excavations, adjacent areas, and protective systems before personnel enter the trench. The checklist provided in Attachment A or equivalent shall be used.

5.8 Soil Classification

To perform soil classification, the competent person shall use a thumb test, pocket penetrometer, or shear vane to determine the unconfined compressive strength of the soils being excavated. In soils with properties that change (i.e., one soil type mixed with another within a given area) several tests may be necessary. When different soil types are present the overall classification shall be that of the type with the lowest unconfined compressive strength. Classifications shall result in a soil rating of Stable Rock, Type A, Type B, or Type C in accordance with 29 CFR

1926.652, Appendix A. Soil classifications shall be listed on the daily inspection checklist. The soils analysis checklist provided in Attachment B or equivalent shall be used for soil classifications.

5.9 Sloping and Benching

All sloping and benching shall be done in accordance with 29 CFR 1926.652, Appendix B. Selection of the sloping method and evaluation of surface surcharge loads shall be made by a competent person familiar with the requirements contained therein. Sloping and benching methods and specifications shall be listed on the daily inspection checklist.

5.10 Protective Systems

Protective systems are required on all excavations over 5 feet in depth or in excavations less than 5 feet when examination of the ground by a competent person reveals conditions that may result in cave-ins.

Selection and installation of protective systems shall be done in accordance with 29 CFR 1926.652, Appendices C & D, or manufacturers data for shoring and shielding systems. Selection of a protective system shall be made based upon soil classification and job requirements by a competent person. Protective systems and specifications shall be listed on the daily inspection checklist.

5.11 Training

Competent persons shall have an adequate combination of experience and training to classify soil types and select protective systems as outlined in 29 CFR 1926.652. Training and experience pertaining to qualification as a competent person shall be documented and include the following:

- General safety practices related to working in or near open excavations;
- Inspection requirements and techniques;
- Classification of soils in accordance with 29 CFR 1926.652, Appendix A; and
- Uses, limitations, and specifications of protective systems in accordance with 29 CFR 1926.652.

Training records shall be maintained in accordance with EHS 1-9, Recordkeeping.

6.0 REFERENCES

Environmental, Health & Safety Programs EHS 1-9, Recordkeeping
OSHA (U.S. Department of Labor, Occupational Safety and Health Administration), 29 CFR 1926, Subpart P, Excavations.

7.0 ATTACHMENTS

Attachment A - Daily Excavation Inspection Checklist
Attachment B - Soils Analysis Checklist

ATTACHMENT 6-9
INCIDENT REPORTING AND INVESTIGATION

EHS 1-7: Incident Reporting and Investigation (Previously HS1-7, RC-5 & RC-6)

Purpose
The purpose of this program is to specify the types of incidents to be reported and investigated, to define internal Foster Wheeler Environmental Corporation (FWENC) incident notification requirements, to ensure proper management and follow-up of each incident, and to meet regulatory notification and investigation requirements.

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Approved by:	

FOSTER WHEELER ENVIRONMENTAL CORPORATION

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1.0 PURPOSE

The purpose of this program is to specify the types of incidents to be reported and investigated, to define internal Foster Wheeler Environmental Corporation (FWENC) incident notification requirements, to ensure proper management and follow-up of each incident, and to meet regulatory notification and investigation requirements.

2.0 SCOPE

Incident reporting requirements apply to all FWENC operations, including FWENC subcontractor activities.

3.0 MAINTENANCE

The Director, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with FWENC's President and Chief Executive Officer. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Director, Administration and Compliance.

4.0 DEFINITIONS

4.1 Incident

For the purposes of this program, an incident is:

- An injury or illness which meets the OSHA recordability criteria,
- An exposure to a hazardous substance above the allowable exposure unit,
- A property/vehicle/equipment/heavy equipment/truck/passenger damage case which results in damage greater than $500,
- A fire or explosion,
- A spill or release resulting from FWENC, or subcontractor activities, including spills or releases from operations at a client facility of which FWENC employees have become aware,
- A permit exceedence, or
- A "near miss" or an event which has a reasonable probability in resulting in one the outcomes described above if the circumstances were different and for which modifications to management programs will reduce the probability of occurrence or the severity of the outcome (See page 4 of Attachment A, Incident Report and Investigation, for a listing of management control areas).

5.0 DISCUSSION

5.1 Responsibilities

5.1.1 All FWENC Personnel

All personnel have the responsibility to immediately report any incident to their supervisor. The report can be verbal or in writing.

5.1.2 Line Management

Project Managers are responsible for identifying an Environmental and Safety Supervisor (ESS) for each project, for implementation of this program, and for making all client notifications in accordance with Section 5.4.

Supervisors are responsible for:

- Implementing the appropriate internal notifications as required by this program as soon as an incident becomes known;
- Completing the Incident Report and Investigation Form (Attachment A);
- Ensuring that a copy of the report is forwarded to his/her manager and the responsible environmental, health and safety (EHS) person responsible for the office or project; and
- Ensuring that follow-up activities are conducted.

5.1.3 Environmental, Health and Safety Personnel

The designated project ESS, or Office Environmental and Safety Coordinator (ESC) where the incident occurred has the responsibility to:

- Ensure that all notifications are made promptly;
- Ensure that all reports are fully completed;
- Ensure that all insurance and workers compensation forms are completed and submitted as necessary;
- Participate in incident investigations of all OSHA recordable injuries/illnesses, spills, releases and other investigations as requested;
- Maintain a file of all incident reports and investigations within their area of responsibility;
- Communicate information about the incident to all site and/or office employees; and
- Transmit a copy of the incident report and investigation, and workers compensation forms to the Project Environmental and Safety Manager (PESM) responsible for the office or project.

The PESM or his/her designee has responsibility to provide site-specific training to the designated

ESS regarding implementation of this procedure on-site and to provide the Director, Health and Safety Programs with summaries of project incidents each month.

5.1.4 Director, Health and Safety Programs

Director, Health and Safety Programs shall:

- Notify OSHA of any injuries or illnesses as required;
- Review/maintain log of all investigations which includes basic causes, immediate causes, and management control issues;
- Distribute summaries of incidents with periodic management reports;
- Communicate significant incidents to key personnel within FWENC;
- Perform statistical and root cause analyses of FWENC incidents;
- Recommend EHS program modifications, as necessary; and,
- Immediately notify the Foster Wheeler Corporation (FWC), Health and Safety Director of any serious accident, FAX the Preliminary Serious Accident Report to the FWC, Health and Safety Director within 24 hours of a serious incident, provide follow-up information on serious incidents to the FWC, Health and Safety Director as it developed, and provide the Annual Safety Report to the FWC, Health and Safety Director each January.

5.2 Incident Reporting and Internal Notification

5.2.1 Reporting Incident to Supervision

FWENC employees are required to notify their supervisor as soon as possible after an incident has occurred. The notification may be verbal or in writing, but it should be done as soon as reasonably possible.

5.2.2 Internal FWENC Notifications By Supervision

In addition to the reporting responsibilities specified in Section 5.1.2, the responsible supervisor is required to immediately notify selected FWENC personnel as outlined in Table below.

The phone numbers and other means of contact for FWENC personnel should be posted with the emergency notification list and/or integrated into the site-specific emergency notification list.

INCIDENT TYPE	SUPERVISOR NOTIFIES...	TIMING[1]	... WHO NOTIFIES	TIMING[1]
Spill/release or Permit Exceedence	ESS	Immediately	PESM and ESQ Regional Manager	Immediately 24 hours
	Project Manager	Immediately	Client and Area/Program Manager	Immediately 24 hours
Fatality, Hospitalization of 1 or more persons, Fire, or Explosion	ESS	Immediately	PESM and ESQ Regional Manager Director Health and Safety Programs FW Risk Management Liberty Mutual (FWENC personnel only)	Immediately Immediately Immediately Immediately

	Project Manager	Immediately	Area/Program Manager VP Construction Client	Immediately Immediately Immediately
Confirmed or Potential OSHA Recordable	ESS	Immediately	PESM and ESQ Regional Manager FW Risk Management Liberty Mutual	Same day Same day Same day
	Project Manager	Immediately	Area/Program Manager VP Construction Client, if required	Same day Same day 24 hours
Equipment/Property/ Vehicle Damage	ESS	Immediately	PESM and ESQ Regional Manager FW Risk Management	24 hours 24 hours
	Project Manager	Immediately	Client (client property) Client (other property, if required) Equipment Manager Area/Program Manager VP Construction	Immediately 24 hours 24 hours 24 hours 24 hours
Potential Insurance Claim	Project Manager	Immediately	Law Department and Procurement	24 hours

[1]Timing - Immediately - real time verbal discussion
Same day - may be voice com or FAX notification
24 hours - written incident report copy; Client Notification, or as specified in contract or project specifications.

5.2.3 Completion of the Incident Report

The Incident Report is to be completed by the end of the supervisor's work shift on the day of the incident if possible, but no later than 24 hours after the incident was reported by the supervisor and employee(s) involved in the incident.

Completion of the form is self-explanatory. If the supervisor or the employee has any questions regarding completion of the report, the ESS or ESC should be contacted for support.

Both the employee(s) and the employee's supervisor must sign the Incident Report.

5.2.4 Transmittal and Filing of the Incident Report

For incidents at project sites, the Site Superintendent shall send a copy of the Incident Report within 24 hours to the:

- Project Manager,
- PESM, and
- ESS

The PESM shall send copies to the Director, Health and Safety and Regional ESQ Manager.

For office incidents, the employee's supervisor shall send a copy of the Incident Report to the Office Manager and ESC. The ESC shall forward copies to the Director, Health and Safety and Regional ESQ Manager.

The ESS or ESC shall maintain a copy of each Incident Report in the project or office files and, for OSHA recordable injuries/illnesses with the OSHA 200 log for each office or project. Do not include the investigation portion of the form with the OSHA log.

5.3 Incident Investigations

5.3.1 Initiation and Completion of the Incident Investigation

Incident investigations are to be initiated and completed as soon as possible, but no later than 72 hours after the incident has been reported.

5.3.2 Investigation Team

The Foster Wheeler Environmental supervisor responsible for the work has the prime responsibility for coordinating and conducting the incident investigation. At a minimum, the ESS or ESC will participate in investigations of OSHA recordable injuries or illnesses, spills, releases and permit exceedences.

The supervisor shall send copies of the completed Investigation Report within 72 hour to the:

1. Project Manager or Office Manager for review and signature;
2. PESM for review and signature
3. ESS (for projects) or ESC (for offices) for review and signature.

The PESM shall forward copies to the Director, Health and Safety Programs and the Regional ESQ Manager.

The Project Manager or Office Manager shall ensure that all corrective actions identified on the Investigation Report are completed and closure is properly documented.

5.3.3 Special Requirements

Investigations which fall within the scope of the OSHA Process Safety Management Standard must meet the requirements of 29 CFR 1910.119(m).

5.4 External Notifications

5.4.1 OSHA Notification

Notification to OSHA is required within eight hours if the incident resulted in one or more fatalities and/or three or more hospitalized individuals. The 8-hour notification of OSHA is also required if a fatality or hospitalization of three individuals occurs within thirty days after the incident.

The Director, Health and Safety Programs has the responsibility for making the OSHA notification. The local OSHA area office number can be found in the phone book. Most offices have 24-hour message machines. The senior operations person should make the notification if the Director, Health and Safety Programs, or Director, ESQ Programs are unavailable.

The Project Manager is responsible for notifying the client of any required OSHA notifications.

5.4.2 Agency Notifications for Environmental Spills, Releases, and Permit Exceedences

Prior to initiation of project field activities, the Project Manager shall communicate to and establish with the client agency notification responsibilities and procedures as part of the project Communications Plan. If no Communications Plan is developed, the Project Manager shall document these client agency notification responsibilities and procedures. It is FWENC's policy that *if a spill, release, or permit exceedence is determined to be reportable, FWENC or the client shall perform the reporting in a timely fashion as defined by federal, state, or local laws and regulations.*

The Project Manager, in conjunction with the PESM must determine if a spill, release, or permit exceedence is reportable to a regulatory agency under federal, state and/or local laws and regulations or permit conditions. This determination must be made quickly since many laws and regulations have short time frames for requiring notifications (e.g. immediately upon knowledge, but no later than 24 hours).

If a spill or release is determined not to be reportable, the PESM in consultation with the Director, Environmental Programs, shall evaluate whether the spill or release poses a threat to human health (e.g., has or may release into known drinking water sources, has or may cause contamination of surface soils/materials/air accessible to the public, etc.). If determined to pose a threat to human health, the Project Manager and Director, Environmental Programs shall consult with the client to determine whether the spill or release should be reported to a regulatory agency.

The client shall be notified regarding the spill, release, or permit exceedence and FWENC's notification determination. Notifications shall be made per the contract or the project Communications Plan.

The Project Manager should allow the Director, Environmental Programs to review any written notification prior to submittal to the agency.

5.4.3 Documentation of Agency and Client Notifications

All agency and client notifications shall be documented on the Incident Report and Investigation Form and maintained in the project files. Other documentation generated regarding verbal or written agency notifications (if required), including agency response to such notification, shall be maintained in the project file.

In instances where the client conducts the reporting, documentation shall be obtained from the client indicating that the agency was notified in accordance with federal, state, or local regulations and maintained in the project files. In instances where the client verbally notifies FWENC that the notification was made, the Project Manager shall document the conversation with the client indicating that the agency notification was made.

Copies of the Incident Report and Investigation Form and other documentation regarding agency notification shall be maintained in the project files.

If the spill, release, or permit exceedence is determined to not be reportable, the Report and Investigation Form shall include the rationale for not reporting the spill, release, or permit exceedence to a regulatory agency.

5.5 Training

Conducting a thorough incident investigation requires training in loss control principles and

incident investigation techniques. The ESQ Regional Manager has the responsibility for ensuring that site and office supervisory personnel have the appropriate training to conduct incident investigations. ESS shall be trained on a project-specific basis by the PESM to implement the spill/release and permit exceedence reporting requirements in conjunction with training on the requirements of the EHS Plan(s) per EHS 3-2, EHS Plans.

6.0 REFERENCES

Environmental, Health & Safety Programs EHS 3-2, EHS Plans
OSHA (U.S. Department of Labor, Occupational Safety and Health Administration)
29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals.

7.0 ATTACHMENTS

Attachment A - Incident Report And Investigation Form

EHS 1-7 ATTACHMENT A
INCIDENT REPORT AND INVESTIGATION FORM

Click the icon below to launch or download.

EHS 1-7 Attachment A.d

Select the "Detach" button in the pop-up window to save a copy to a disk or hard drive.

EHS 1-7 ATTACHMENT A

CORPORATE ESQ REPORT # _____

FOSTER WHEELER ENVIRONMENTAL CORPORATION

FOSTER WHEELER ENVIRONMENTAL CORPORATION
INCIDENT/NEAR MISS REPORT AND INVESTIGATION

TYPE OF INCIDENT - CHECK ALL THAT APPLY

❒ INJURY/ILLNESS	❒ VEHICLE DAMAGE	❒ PROPERTY DAMAGE	❒ FIRE
❒ SPILL/RELEASE	❒ PERMIT EXCEEDENCE	❒ HIGH LOSS POTENTIAL (NEAR MISS)	❒ OTHER

GENERAL INFORMATION

PROJECT/OFFICE: REPORT #: DATE OF REPORT:

DATE OF INCIDENT: MILITARY TIME: ____ DAY OF WEEK: ____

FW SUPERVISOR ON DUTY: AT SCENE OF INCIDENT: ❒ YES ❒ NO

LOCATION OF INCIDENT:

WEATHER CONDITIONS: ADEQUATE LIGHTING AT SCENE: ❒ YES ❒ NO ❒ N/A

DESCRIBE WHAT HAPPENED (STEP BY STEP - use additional pages if necessary)

AFFECTED EMPLOYEE INFORMATION

(Include injured person, driver/operator, or employee whose activities resulted in the incident. Use another page to provide information for additional employees)

NAME: FWENC EMPLOYEE: ❒ YES ❒ NO

HOME ADDRESS:

SOCIAL SECURITY #: HOME PHONE #:

JOB CLASSIFICATION: YEARS IN JOB CLASSIFICATION:

HOURS WORKED ON SHIFT PRIOR TO INCIDENT: YEARS WITH FWENC: AGE:

DID INCIDENT RELATE TO ROUTINE TASK FOR JOB CLASSIFICATION: ❒ YES ❒ NO

INJURY/ILLNESS INFORMATION

NATURE OF INJURY OR ILLNESS:

OBJECT/EQUIPMENT/SUBSTANCE CAUSING HARM:

FIRST AID PROVIDED: ❒ YES ❒ NO

IF YES, WHERE WAS IT GIVEN: ❒ ON SITE ❒ OFF SITE

IF YES, WHO PROVIDED FIRST AID:

WILL THE INJURY/ILLNESS RESULT IN: ❒ RESTRICTED DUTY ❒ LOST TIME ❒ UNKNOWN

EHS 1-7 ATTACHMENT A

CORPORATE ESQ REPORT # _____

MEDICAL TREATMENT INFORMATION		
WAS MEDICAL TREATMENT PROVIDED?:	❒ YES	❒ NO
IF YES, WAS MEDICAL TREATMENT PROVIDED:	❒ ON SITE	❒ DR.'S OFFICE ❒ HOSPITAL
NAME OF PERSON(S) PROVIDING TREATMENT:		
ADDRESS WHERE TREATMENT WAS PROVIDED:		
TYPE OF TREATMENT:		
VEHICLE AND PROPERTY DAMAGE INFORMATION		
VEHICLE/PROPERTY DAMAGED:		
DESCRIPTION OF DAMAGE:		
SPILL AND AIR EMISSIONS INFORMATION		
SUBSTANCE SPILLED OR RELEASED:	FROM WHERE:	TO WHERE:
ESTIMATED QUANTITY/DURATION:		
CERCLA HAZARDOUS SUBSTANCE? YES ❒ NO ❒	RQ EXCEEDED? YES ❒ NO ❒ SPECIFY: _____	
REPORTABLE TO AGENCY? YES ❒ NO ❒	SPECIFY: _____	
WRITTEN REPORT? YES ❒ NO ❒	TIME FRAME: _____	
RESPONSE ACTION TAKEN		
PERMIT EXCEEDENCE		
TYPE OF PERMIT:	PERMIT #:	
DATE OF EXCEEDENCE:	DATE FIRST KNOWLEDGE OF EXCEEDENCE:	
PERMITTED LEVEL OR CRITERIA (e.g., Water quality):		
EXCEEDENCE LEVEL OR CRITERIA:	EXCEEDENCE DURATION:	
REPORTABLE TO AGENCY? YES ❒ NO ❒	SPECIFY: _____	
WRITTEN REPORT? YES ❒ NO ❒	TIME FRAME: _____	
RESPONSE ACTION TAKEN:		
NOTIFICATIONS		
NAME(S) OF FWENC PERSONNEL NOTIFIED:		DATE/TIME:
CLIENT NOTIFIED:	DATE/TIME:	
AGENCY NOTIFIED:	DATE/TIME:	❒ NOT REQUIRED
CONTACT NAME:		
PERSONS PREPARING REPORT		
EMPLOYEE'S NAME: (PRINT)	SIGN:	
EMPLOYEE'S NAME (PRINT)	SIGN:	
SUPERVISOR'S NAME: (PRINT)	SIGN:	

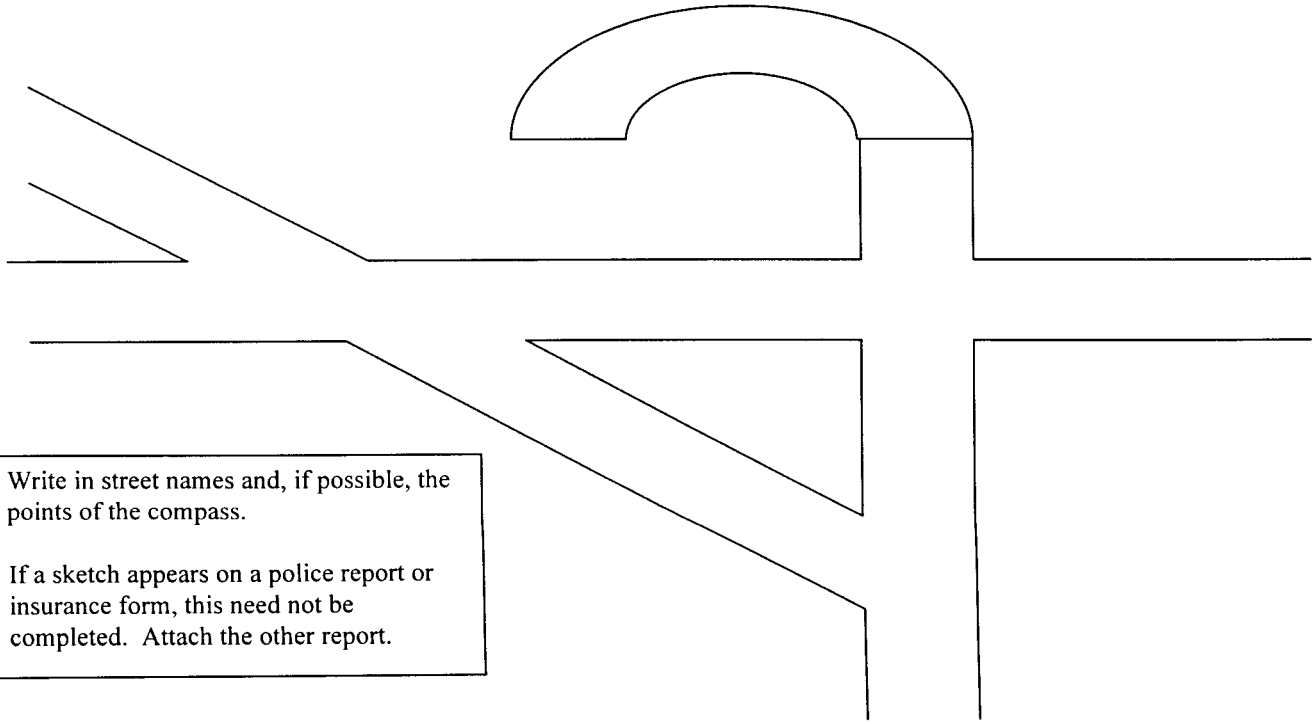
NOTE: Supervisor to forward a copy of Incident Report to immediate supervisor, PESM, ESS or ESC, and other personnel as identified in Table 1 of this procedure ASAP, but no later then 24 hours.

EHS 1-7 ATTACHMENT A

INCIDENT SKETCH

CORPORATE ESQ REPORT # _____

VEHICLE INCIDENTS



Write in street names and, if possible, the points of the compass.

If a sketch appears on a police report or insurance form, this need not be completed. Attach the other report.

EHS 1-7 ATTACHMENT A

INVESTIGATIVE REPORT

CORPORATE ESQ REPORT # _____

DATE OF INCIDENT:_____ DATE OF INVESTIGATION REPORT:_____

INCIDENT COST: ESTIMATED: $_____ ACTUAL: $_____

OSHA RECORDABLE(S): ❒ YES ❒ NO # RESTRICTED DAYS_____ # DAYS AWAY FROM WORK_____

CAUSE ANALYSIS

Was the activity addressed in an AHA? ❒ YES (Attach a copy) ❒ NO

IMMEDIATE CAUSES – WHAT ACTIONS AND CONDITIONS CONTRIBUTED TO THIS EVENT? (USE NEXT PAGE)

BASIC CAUSES - WHAT SPECIFIC PERSONAL OR JOB FACTORS CONTRIBUTED TO THIS EVENT? (USE NEXT PAGE)

ACTION PLAN

REMEDIAL ACTIONS - WHAT HAS AND OR SHOULD BE DONE TO CONTROL EACH OF THE CAUSES LISTED? INCLUDE MANAGEMENT PROGRAMS (SEE ATTACHED LIST) FOR CONTROL OF INCIDENTS IF APPLICABLE.

ACTION	PERSON RESPONSIBLE	TARGET DATE	COMPLETION DATE

PERSONS PERFORMING INVESTIGATION

INVESTIGATOR'S NAME: (PRINT) SIGN: DATE:

INVESTIGATOR'S NAME: (PRINT) SIGN: DATE:

INVESTIGATOR'S NAME: (PRINT) SIGN: DATE:

MANAGEMENT REVIEW

PROJECT/OFFICE MANAGER (PRINT) SIGN:

COMMENTS:

PESM or ESC (PRINT) SIGN:

COMMENTS:

***NOTE:** Attach additional information as necessary. Supervisor to forward copy of Investigative Report to the PM or OM, PESM or ESC ASAP, but no later then 72 hours after the incident. A copy shall be sent to the Director, Health and Safety Programs within 24 hours of completion of the report.*

EHS 1-7 ATTACHMENT A

EXAMPLES OF IMMEDIATE CAUSES	
SUBSTANDARD ACTIONS	SUBSTANDARD CONDITIONS
1. OPERATING EQUIPMENT WITHOUT AUTHORITY	1. GUARDS OR BARRIERS
2. FAILURE TO WARN	2. PROTECTIVE EQUIPMENT
3. FAILURE TO SECURE	3. TOOLS, EQUIPMENT, OR MATERIALS
4. OPERATING AT IMPROPER SPEED	4. CONGESTION
5. MAKING SAFETY DEVICES INOPERABLE	5. WARNING SYSTEM
6. REMOVING SAFETY DEVICES	6. FIRE AND EXPLOSION HAZARDS
7. USING DEFECTIVE EQUIPMENT	7. POOR HOUSEKEEPING
8. FAILURE TO USE PPE PROPERLY	8. NOISE EXPOSURE
9. IMPROPER LOADING	9. EXPOSURE TO HAZARDOUS MATERIALS
10. IMPROPER PLACEMENT	10. EXTREME TEMPERATURE EXPOSURE
11. IMPROPER LIFTING	11. ILLUMINATION
12. IMPROPER POSITION FOR TASK	12. VENTILATION
13. SERVICING EQUIPMENT IN OPERATION	13. VISIBILITY
14. UNDER INFLUENCE OF ALCOHOL/DRUGS	
15. HORSEPLAY	

EXAMPLES OF BASIC CAUSES	
PERSONAL FACTORS	JOB FACTORS
1. CAPABILITY	1. SUPERVISION
2. KNOWLEDGE	2. ENGINEERING
3. SKILL	3. PURCHASING
4. STRESS	4. MAINTENANCE
5. MOTIVATION	5. TOOLS/EQUIPMENT
	6. WORK STANDARDS
	7. WEAR AND TEAR
	8. ABUSE OR MISUSE

MANAGEMENT PROGRAMS FOR CONTROL OF INCIDENTS	
1. LEADERSHIP AND ADMINISTRATION	10. HEALTH CONTROL
2. MANAGEMENT TRAINING	11. PROGRAM AUDITS
3. PLANNED INSPECTIONS	12. ENGINEERING CONTROLS
4. TASK ANALYSIS AND PROCEDURES	13. PERSONAL COMMUNICATIONS
5. TASK OBSERVATION	14. GROUP MEETINGS
6. EMERGENCY PREPAREDNESS	15. GENERAL PROMOTION
7. ORGANIZATIONAL RULES	16. HIRING AND PLACEMENT
8. ACCIDENT/INCIDENT ANALYSIS	17. PURCHASING CONTROLS
9. PERSONAL PROTECTIVE EQUIPMENT	

NOTIFICATION REMINDER
Fatalities or hospitalization (admittance) of three or more individuals requires notification to OSHA within 8 hours. Contact the Director, Health and Safety Programs or Director, ESQ Programs to make the notification. If unavailable, the senior operations person on site should make the notification.

EHS 1-7 ATTACHMENT A

INCIDENT/NEAR MISS REPORT AND INVESTIGATION INSTRUCTIONS

General: The incident report (pages 1 and 2) must be completed within 24 hours. Do not delay the report if any information is unknown. It can be provided later by revising the Report.

Type of Incident: Check all that apply. A High Loss Potential (Near Miss) incident is one that does not result in loss, but under slightly different circumstances, could have resulted in an OSHA Recordable injury, spill, release, permit exceedence, fire, or vehicle/property damage in excess of $500. All High Loss Potential (Near Miss) incidents are to be investigated.

General Information

Project/Office: If the incident occurs on a delivery order contract, give the contract/program name, DO# and location. If the incident occurs on a C&E field project, give the Office location managing the project as well as the project/location.

Report No.: Optional numbering field for offices/projects.

FW Supervisor: The Foster Wheeler Supervisor responsible for the work effort involving the incident. Do not give a subcontractor supervisor or craft foreman name. If a Foster Wheeler Supervisor was the Affected Employee, this field should contain the name of his or her supervisor. The Supervisor is the project supervisor if the incident happens on a project, or the administrative supervisor if the incident happens in the office. E.g., a geologist, acting as an FOL gets injured on a job site, or in a motor vehicle in the course of project work. The FW Supervisor is most likely the Project Manager. If the same geologist gets injured lifting a box in his office, the FW Supervisor is likely the Office Science Lead.

Location of Incident: The specific location on the project, in the office, or off-site location.

Weather Conditions: Temperature, precipitation, approximate wind speed and direction, cloud cover, relative humidity. This information may be included in the description section, and must be given in detail whenever it is a factor in the cause or impact., e.g., spill, release, heat stress, wind blown material.

Describe What Happened: This section must be completed in sufficient detail to adequately describe the events and conditions leading up to and resulting from the incident. Try to answer the questions who, what, where, when, and how. This information is then used to determine why (cause). Provide details such as work objective, procedure being used, body position, and PPE. Include diagrams or sketches for all incidents involving vehicles/equipment and other incidents where they aid in providing detail or perspective. Consider attaching photographs. Follow the guidelines in Practical Loss Control Leadership, and consider the impact of each of the following:

P - People
E - Equipment
M – Material
E – Environment

To do an effective job, a visual inspection of the scene is usually necessary along with private interviews of affected employees and witnesses.

Where appropriate, use terms indicating the type of contact, e.g., struck by; struck against; fall from elevation; fall on same level; caught in; caught between or under; caught on; contact with; overstress; equipment failure; environmental release; fire.

Affected Employee Information

FWENC Employee: Direct hire, whether professional, administrative, or craft; full-time or part-time; permanent or temporary. If the affected employee is not a FWENC employee, give the name of the employer and business relationship (e.g., client, subcontractor) in the description section above.

Hours Worked on Shift Prior to the Incident: Only include the amount of time the employee worked that shift or day prior to the incident.

Years with FWENC: For FWENC employees, give the number of years employed with FWENC. If the employee has worked for FWENC for less than a year, do not write <1. Give the answer in fraction of year, or specify the number of months, e.g., 0.1 or 1 month.

Injury/Illness Information

Nature of Injury or Illness: If the incident resulted in an injury or illness, give a brief description of the body part affected and type of injury or illness, e.g., fractured thumb, left hand; carpal tunnel syndrome, right hand.

First Aid Provided: First Aid is any treatment that does not have to be provided by a health care professional, even if it is. E.g., a laceration that is cleaned and bandaged in a clinic may constitute first aid, if sutures are not given.

Will the Injury Result In:. Do not delay the report if this information is unknown.

Medical Treatment Information

Was Medical Treatment Provided? Medical treatment is hat treatment that must be provided by a licensed medical practitioner, e.g., sutures, prescription medication, etc.

Type of Treatment: This information is important in determining OSHA recordability, since some forms of treatment would not constitute a Recordable case (e.g., one-time administration of prescriptions, negative diagnostic exams). Attach a copy of the treating professional's statement/work release.

Vehicle and Property Damage Information

Vehicle/Property Damaged: For vehicles, indicate VIN and whether it is company owned or leased, business trip rental (Avis) or owned by others.

Description of Damage: Be specific as to the identity of damaged part, location and extent.

Spill and Air Emissions Information

Substance Spilled or Released: For pure substances, list materials by common name/chemical. For wastes, indicate waste code. For mixtures or contaminated media, provide contaminant name, CAS No., concentration.

RQ Exceeded? Reportable quantity. Contact your ESQ representative for guidance. Specify the RQ for the material, whether you answer yes or no.

Reportable to Agency? If yes, specify the federal, state or local agency that must be provided with verbal and/or written notification.

Written Report? Answer yes if the release requires a written report to be filed and note the time frame.

Response Action Taken: Describe the mitigation efforts, as well as any reports made, beyond initial notification.

Permit Exceedence

Type of Permit: List name of permit including the agency name where applicable (e.g., NPDES, PSAPCA NOC)

Date of Exceedence: Specify date exceedence occurred (e.g., date discharge in excess of permit limits occurred)

Date First Knowledge of Exceedence: Specify date when first knew there was an exceedence (i.e., date analytical received). This date may be different from the date of the exceedence listed above.

Permitted Level or Criteria: List numerical discharge or emission limit or narrative criteria specified in the permit (e.g., 20% opacity limit, Best Management Practices (BMP) implementation per SWPPP).

Exceedence Level or Criteria: Specify actual numerical discharge/emission limit or narrative criteria which was exceeded (e.g., 22% opacity, failure of BMPs (silt fencing collapse) per SWPPP)

Exceedence Duration: Specify time frame by date and hours (using military time) during which exceedence occurred.

See "**Spill/Release Information**" (above) for description of remaining questions.

Persons Preparing Report

Employee's Name: The affected employee described on page 1 should review the report and sign here, as well as other employees witnessing or involved in the incident.

Supervisor's Name: The FWENC Supervisor must review and sign the report indicating agreement. The FWENC Supervisor and the Investigator (next page) should be the same person.

Investigative Report

Report No.: This is the same as the project/office optional report number from page 1 of the Incident/Near Miss Report.

Date of Investigative Report: This date should be within 72 hours of the incident. In cases where the investigation is not completed until a later date, submit the incomplete report within the 72 hours, and a revised report should be submitted when the missing information is obtained .

Incident Cost: For all vehicle/equipment or property damage cases, an estimated or actual loss value must be entered. If an estimated value is entered, the report must be revised when the actual costs are known.

OSHA Recordables: This section should be completed in consultation with the PESM. If it cannot be determined at the time of the report, the PESM should consult with the Director, Health and Safety Programs and revise the report when a determination is made.

No. of Restricted Days: This relates to days of restricted work activity, not restrictions on motion or physical capability. If the employee is capable of doing his normal job the day after the injury and thereafter, there are no restricted days, even if the physician indicates a physical restriction. It does not include the day of the injury.

No. of Days Away from Work: The number of days after the day of the injury that the employee was scheduled to work but could not due to an occupational injury. If the treating physician releases an employee to return to work, but the employee chooses not to come to work, do not count those days. In this case the PESM should contact the Director, Health and Safety Programs.

Cause Analysis

Immediate Causes: Determine the immediate causes, using the example on page 4. If one or more of the examples fits the circumstance, use those words in the cause description. This facilitates statistical analysis of the incident database for program evaluation/modification. However, do not confine your cause determination to the guide words. Explain, e.g., Improper Lifting – employee attempted to lift box by bending at the waist and twisting while lifting. Be sure that the incident description on page 1 is sufficiently detailed to support the causal analysis in this section. An assumption of cause (e.g., improper lifting) from the injury (low back pain) is not acceptable.

Basic Causes: Like the Immediate Causes, use the guide words in the attachment whenever appropriate and explain. For example, improper motivation may be because the correct way takes more time or effort; short cutting standard procedure is tolerated or positively reinforced; or the person thinks there is no personal benefit to always doing the job correctly.

Note: The investigator is encouraged to review the Practical Loss Control Leadership chapters on *Causes and Effects of Loss* and *Accident/Incident Investigation* before doing the causal analysis. As a check, the investigator may refer to the S.C.A.T. Chart available from the PESM.

Remedial Actions: Include all actions taken or those that should be taken to prevent recurrence. Be sure that actions address the causes. For example, training (safety meetings) may be a necessary response for lack of knowledge, but may be inadequate for improper motivation. If completion dates exceed the 72 hours reporting period, a revised report must be submitted when all remedial actions are complete.

Persons Performing Investigation: The primary investigator is the FWENC Supervisor in charge of the work where the incident occurred. Others participating in the investigation, such as the Project Manager, ESS, QC, site engineer, foreman, etc. should also sign the report.

Management Review: The Project or Office Manager and the PESM or office ESC must sign the report indicating their satisfaction with thoroughness of the investigation and the report, and their concurrence that the action items address the identified causes. This constitutes the peer review, and the report, particularly the description, should be clear to readers not familiar with the project or incident.

ATTACHMENT 6-10
UXO SAFETY PRECAUTIONS

BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR ORDNANCE AND EXPLOSIVES OPERATIONS

U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE

7 Mar 2000

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BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR ORDNANCE AND EXPLOSIVES (OE) OPERATIONS

CHAPTER 1
INTRODUCTION

1-1. Purpose. This pamphlet establishes the safe operating procedures for dealing with ordnance and explosives (OE) and unexploded ordnance (UXO) items on formerly used defense sites (FUDS), base realignment and closure (BRAC) and installation restoration (IR) projects. Because there are no absolute safe procedures for dealing with OE, merely procedures considered being least dangerous, it is essential that a planned and systematic approach be established.

1-2. Applicability. This pamphlet applies to all Headquarters, United States Army Corps of Engineers (HQUSACE) elements, United States Army Corps of Engineers (USACE) commands, and their contractors having the responsibility for performing OE response activities. For the purpose of this document, all references to OE include UXO.

1-3. References. Required and related publications are listed in appendix A.

1-4. Distribution. Approved for public release; distribution is unlimited.

1-5. Policy. It is the policy of the USACE to produce products and services that fully meet the customers' expectations of quality, timeliness and cost effectiveness. All OE response procedures must be formulated to ensure harmony with the USACE Strategic Vision and should be in concert with activities presented in other USACE guidance. There should be no compromise of health and safety requirements to meet production or quality goals. Safety is the leading edge of quality.

1-6. Responsibilities. It is the responsibility of all USACE and contractor personnel involved with OE response projects to safely execute them in accordance with (IAW) the approved plan, (SSHP), Work Plan (WP), and all applicable laws, regulations, and policies.

1-7. Terms and Definitions.

a. Ordnance and Explosives. Ammunition, ammunition components, chemical or biological warfare materiel, or explosive that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried or fired. Such ammunition components and explosives are no longer under accountable record control of any DOD organization or activity.

b. Explosive Soil. Explosive soil refers to a mixture of explosives in soil, sand, clay or other solid media at concentrations such that the mixture itself is explosive.

c. 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 the operations, installations, personnel, or material, and remain unexploded either by malfunction, design, or any other cause.

d. UXO Qualified Personnel. The term UXO Qualified Personnel applies only to personnel meeting the requirements for the positions of UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, and the Senior UXO Supervisor.

e. OE Procedures. These procedures include, but are not limited to, the following actions preformed by a UXO qualified individual.

(1) Gaining access to (manual excavation) and identifying subsurface anomalies and assessing the condition of buried OE.

(2) Identifying and assessing the condition of surface OE.

(3) Recovery and final disposal of all OE.

f. OE Related procedures: These OE related procedures include, but are not limited to, the following and can be performed by a non-UXO qualified individual:

(1) Location and marking of subsurface anomalies.

(2) Location and marking of suspected surface OE.

(3) Transportation and storage of recovered OE.

(4) Utilizing earth-moving machinery (EMM). Earth-moving machinery may be used to excavate overburden within 12 inches of a suspected OE.

1-8. General Safety Concerns and Procedures.

a. OE operations will not be conducted until a complete plan for the site is prepared and approved. These plans will be based upon limiting exposure to the minimum number of personnel, for the minimum time, to the least amount of OE consistent with safe and efficient operations.

b. Only UXO qualified personnel will perform OE procedures. Non-UXO personnel may be utilized to perform certain OE related procedures when supervised by UXO qualified

personnel, i.e., mag/flag operations and gaining access using heavy equipment. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III.

c. Personnel who will be handling OE items will not wear outer or inner garments having static electricity generating characteristics. Materials made of 100 percent polyester, nylon, silk and wool, are highly static producing. Refer to DA Pam 385-64 for more information regarding non-static producing clothing.

d. Prior to any action being performed on an ordnance item, all fuzing will be positively identified. This identification will consist of fuze type by function, condition (armed or unarmed), and the physical state/condition of the fuze, i.e., burned, broken, parts exposed/sheared etc.

CHAPTER 2
OE SAFETY PRECAUTIONS

2-1. OE Safety Precautions.

a. Every effort will be made to identify a suspect OE item. Under no circumstances will any OE be moved in an attempt to make a positive identification. The OE item will be visually examined for markings and other external features such as shape, size, and external fittings. If an unknown OE item is encountered, the on-site USACE representative will be notified immediately. If there is no USACE personnel on-site, the District or Design Center's OE Safety representative will be notified as soon as possible. If external research is required, it will be initiated by the U.S. Army Engineering and Support Center, Huntsville. The following are additional considerations for the safe handling of OE items.

(1) Projectiles containing Base Detonating (BD) fuzes are to be considered armed if the round is fired.

(2) Arming wires and pop-out pins on unarmed fuzes should be secured prior to any movement.

(3) Do not depress plungers, turn vanes, rotate spindles, levers, setting rings or other external fittings on OE items. Such actions may arm or activate the OE.

(4) Do not attempt to remove any fuze(s) from the OE. Do not dismantle or strip components from any OE items.

(5) UXO Personnel are not authorized to inert any OE items found on-site.

(6) OE /UXO items will not be taken from the site as souvenirs/training aids

(7) Civil War ordnance will treated as any other OE.

b. Prior to entering areas/ranges contaminated with Improved Conventional Munitions (ICM) an approved DA weaver must be obtained. The District and/or Design Center's OE Safety representative must be notified.

c. Anytime during site activities a suspected chemical munition (CWM) is encountered, all work will cease, workers will evacuate upwind. A minimum of two UXO qualified individuals will position themselves upwind as far as possible to prevent unauthorized personnel from accidental
exposure. The on site USACE OE Safety Specialist will be notified immediately. If a USACE OE Safety Specialist is not present the PM will contact the District or Design Center's OE Safety

representative. The area will be secured until properly relieved, i.e., active duty Explosive Ordnance Disposal (EOD) personnel, Technical Escort Unit (TEU) or local authority.

d. Avoid inhalation and skin contact with smoke, fumes, and vapors of explosives and other related hazardous materials.

e. Consider OE items, which may have been exposed to fire and detonation, as extremely hazardous. Chemical and physical changes may have occurred to the contents, which might render it more sensitive than its original state.

f. Do not rely on the color coding of OE for positive identification. Munitions having incomplete or improper color codes have been encountered.

g. Avoid approaching the forward area of an OE item until it can be determined whether or not the item contains a shaped charge. The explosive jet, which is formed during detonation, can be lethal at great distances. Assume that all shaped charge munitions contain a piezoelectric (PZ) fuzing system until identified. PZ fuzing is extremely sensitive. They can function at the slightest physical change and can remain hazardous for an indefinite period of time.

h. Approach an unfired rocket motor from the side at a 45-degree angle. Accidental ignition can cause a missile hazard and hot exhaust.

i. Do not expose unfired rocket motors to any Electromagnetic Radiation (EMR) sources.

j. Consider an emplaced landmine armed until proven otherwise. It may be intentionally booby-trapped to deceive.

(1) Many training mines contain spotting charges capable of inflicting serious injury.

(2) Exercise extreme care with wooden mines that have been buried for long periods of time. Certain soil conditions can cause the wood to deteriorate and any inadvertent movement or pressure may initiate the fuze.

k. Assume that practice OE contains a live charge until it can be determined otherwise. Expended pyrotechnic and practice devices can contain red or white phosphorus residue. Due to incomplete combustion, the phosphorous residue may re-ignite spontaneously if the crust is broken and exposed to air.

l. Do not approach a smoking white phosphorous (WP) munition. Burning WP may detonate the explosive burster charge at anytime.

m. Foreign ordnance was returned to the United States for exploitation and subsequent disposal. Every effort will be made to research the applicable documentation and publications prior to commencement of a project.

n. Anomaly Avoidance Operations. Anomaly Avoidance procedures are detailed in

- ETL 385-1-2, (Draft) Generic Scope of Work for Ordnance Avoidance Operations, August 1996, and

- Ordnance and Explosives (OE) Center of Expertise (CX) Interim Guidance Document 99-01, Unexploded Ordnance (UXO) Support for Other Activities, 5 February 1999.

These documents can be located on the OE Home Page at:

http://www.hnd.usace.army.mil/oew/policy/regpro.html.

CHAPTER 3
OE STORAGE

3-1. OE Storage. During OE projects, explosive storage falls into two categories, on-DOD installations and off-DOD installations.

a. On-DOD installations the provisions of DOD 6055.9 STD will be followed. Generally, the installation should have an explosive storage area that meets DOD standards. The permitting and compliance requirements are the responsibility of the installation. The compatibility of explosives found in Chapter 3, DOD 6055.9 STD will be followed. OE items waiting final disposition will not be stored with other explosives. Storage of commercial explosives require DOD hazard class storage compatibility group

b. In the event the installation does not have an existing storage facility, the provisions of paragraph c, in this section, will apply.

c. Off-DOD installations, the contractor will be responsible for the construction of a temporary explosive storage area. This temporary storage area will meet all local, state, and 27 CFR, Bureau of Alcohol Tobacco and Firearms (BATF) requirements and as much of DOD 6055.9 STD as is practical to implement. The establishment of a temporary explosive storage area must meet the following requirements.

(1) The area will, if possible, meet the inhabited building and public traffic route distances specified in DOD 6055.9 STD. If the distances are less than required by the DOD guidance, a proposed barricading plan to protect the public from accidental detonation must be submitted and approved by the Huntsville Center's Structures Branch.

(2) Magazines must meet the requirements of the BATF regulations, and each magazine must have a Net Explosive Weight (NEW) established for the explosives to be stored.

(3) Each magazine must be grounded as specified in NFPA 780 and must meet the inter magazine distances as define in the DOD guidance.

(4) A physical security survey will be conducted to determine if fencing or guards are required. This survey will be coordinated through local law enforcement agencies. Generally, a fence around the magazine is not needed IAW BATF regulations. However, it is the responsibility of the contractor for determining the degree of protection to prevent the theft of explosives and OE items.

(5) A fire plan for either on or off-installation explosive storage areas will be prepared and coordinated with the local fire department. All magazines will have placards IAW 27 CFR/ATF P 5400.7 or DOD 6055.9 STD.

CHAPTER 4
OE TRANSPORTATION

4-1. OE Transportation. In the event that OE items must be transported off-site, the provisions of 49 CFR, DA Pam 385-64 state and local laws will be followed. These additional considerations are provided for the safe transportation of OE items:

a. USACE contractors are prohibited from transporting OE off-site for destruction until the provisions of paragraph 1-9, TB 700-2 are followed.

b. Do not transport WP munitions unless they are immersed in water, mud or wet sand.

c. If loose pyrotechnic, tracer, flare or similar mixtures are to be transported, they will be placed in #10 mineral oil or equivalent to minimize the fire and explosion hazards.

d. Incendiary loaded munitions should be placed on a bed of sand and covered with sand to help control the burn if a fire should start.

e. If an unfired rocket motor must be transported, it will be positioned in the vehicle parallel to the rear axle. This will afford maximum protection for the personnel operating the vehicle.

f. If a base-ejection projectile must be transported to a disposal area, the base will be oriented in the vehicle so that it is parallel to the rear axle. This will afford maximum protection for the personnel operating the vehicle.

g. OE with exposed hazardous fillers such as High Explosive (HE), will be placed in appropriate containers with packing material to prevent migration of the hazardous fillers. Padding should be added to protect the exposed filler from heat, shock and friction.

CHAPTER 5
EXCLUSION ZONE OPERATIONS

5-1. Exclusion Zone Operations. On OE project sites, it is the responsibility of the contractor's UXO Safety Officer (UXOSO) to establish the exclusion zone for each UXO team. This exclusion zone should not be confused with the safe separation distance, which is maintained between teams.

a. The purpose of the exclusion zone is for the protection of non-essential project personnel and the public from blast overpressure and fragmentation hazards. There are two criteria for calculating exclusion zones;

(1) Intentional Detonations. When destroying ordnance, both the hazards from fragmentation and overpressure must be considered. The minimum separation distances in DOD 6055.9 STD will be used unless otherwise stated. The maximum fragmentation and overpressure distances may also be calculated IAW HNC-ED-CS-S-98-1, Methods for predicting Primary Fragmentation Characteristics of Cased Munitions.

(2) Unintentional Detonations. If the identification of OE on an OE site is unknown, the minimum separation distance specified in DOD 6055.9 STD, chapter 5, paragraph C5.5.4, will be
used to establish the exclusion zones. When the identification of OE items are known, the exclusion zones will be determined by the U.S. Army Engineering and Support Center, Huntsville, (USAESCH) Engineering Directorate using HNC-ED-CS-S-98-1.

b. When multiple teams are working on site, a safe separation distance will be established. The minimum distance maintained between teams will never be less than 200 feet or the K50 overpressure distance. The one that is greater will be used.

c. While OE operations are being conducted, only personnel essential for the operation will be allowed in the exclusion zone. When non-essential personnel enter the exclusion zone, all OE operations will cease. In addition to this work stoppage, the following actions will be accomplished:

(1) The individual(s) must receive a safety briefing and sign the visitor's log prior to entering the zone.

(2) The individual(s) will be escorted by a UXO qualified individual.

(3) All OE operations will cease within the radius of the exclusion zone for the areas to be visited.

d. All personnel working within the exclusion zone will comply with the following:

(1) There will be no smoking within the exclusion zone, except in areas designated by the UXOSO.

(2) There will be no open fires for heating or cooking (gas stoves, grills etc.) within the exclusion zone, except where authorized by the UXOSO.

(3) During magnetometer operations, workers will have no metal parts in or on their shoes that would cause the magnetometer to present false indications.

CHAPTER 6
OE EXCAVATION OPERATIONS

6-1. OE Excavation Operations.

a. Hand excavation is the most reliable method for uncovering OE provided the item is near the surface. Hand excavation exposes personnel to the hazard of detonation for longer periods of time than any other method. Taking this into consideration, only UXO personnel will be used to accomplish this task.

b. Earth-Moving Machinery (EMM) may be used to excavate buried OE. EMM will not be used to excavate within 12 inches of a suspected OE. Once the EMM is within the 12 inches of the OE, the excavation will be completed by hand excavation methods. Personnel who are not UXO qualified can operate EMM only when supervised by a UXO Technician III.

(1) If more than one EMM is to be used on site, they will observe the same safe separation distances required for multiple work teams.

(2) During EMM excavation operations, only those personnel absolutely necessary for the operation will be within the exclusion zone.

(3) EMM operations will be conducted with the guidelines of EM 385-1-1 and 29 CFR 1926 subpart P.

c. Excavation operations, whether by hand or EMM will employ a step down or offset access method. Under no circumstances will any excavation be made directly over the suspected OE.

CHAPTER 7
OE DISPOSAL OPERATIONS

7-1. OE Disposal Operations. All demolition operations will be conducted IAW TM 60A 1-1-31 and the USAESCH Procedures for Demolition of Multiple Rounds on OE Sites. No other publications are to be used for these operations. Open burning of explosives, propellants, incendiary materials, and pyrotechnics is unauthorized.

a. As a general rule, all demolition operations will be accomplished by electrical means to assure maximum safety. There are exceptions to this requirement in situations where static electricity or Electromagnetic Radiation (EMR) hazards are present. Unintentional detonations can occur because of these induced currents (or lightning). The following precautions from TM 9-1375-213-12 are to be followed.

(1) Premature detonation of electric blasting caps by induced current from radio frequency (RF) signals is possible. Refer to TM 9-1375-214 that shows the minimum safe distance in respect to transmitter power and indicates distance beyond which it is safe to conduct electric blasting even under the most adverse conditions.

(2) Lightning is a hazard to both electric and non-electric blasting caps. A strike or a nearby miss is almost certain to initiate either type of cap or other sensitive explosive elements such as caps in delay detonators. Lightning strikes, even at distant locations, may cause extremely high local earth currents that may initiate electrical firing circuits. Effects of remote lightning strikes are multiplied by proximity to conducting elements, such as those found in buildings, fences, railroads, bridges, streams, and underground cables or conduits. The only safe procedure is to suspend all blasting activities during electrical storms and when one is impending.

(3) Electric power lines also pose a hazard for electric initiating systems. It is recommended that any demolition operation closer than 155 meters to electric power lines be done with a non-electric system such as NON-EL. This non-electric firing system provides the same amount of safety and control as electrical firing systems, but without the interference of EMR and static electricity hazards.

(4) Provisions of paragraph 1-9, TB 700-2 will be fully complied with prior to Corps contractors transporting OE off-site for destruction.

b. Personnel involved with demolition operations will not wear garments, which have static electricity generating characteristics. Materials such as polyester, nylon, silk or wool are highly static producing. No personnel handling demolition materials will wear any of these types of clothing. Refer to DA Pam 385-64 for more information regarding non-static producing clothing.

c. Only serviceable condition explosive material will be used for disposal operations.

d. The only acceptable disposal method is the one stated in the appropriate TM60 Series manual for specific ordnance types. Any commercial explosives being used will be equivalent to the military explosive required for the disposal operation.

NOTE

Oil well perforators/conventional shape charges are not acceptable substitutes for bulk explosives and will not be used for disposal operations except where applicable, refer to TM 60A-2-1-51. Otherwise these items are to be used only for the venting OE items prior to their turn-in as scrap.

e. If a situation dictates, protective measures to reduce shock, blast overpressure, and fragmentation will be taken. The USAESCH Engineering Directorate will assist in any design work and will review and approve all proposed protective works. As a minimum requirement all demolition shots will be tamped with clean earth or sand. IAW DOD 6055.9 STD the following separation distances will be observed unless otherwise directed by the Structures Branch.

(1) Minimum separation distance for non-fragmenting explosive materials will be no less than 1250 feet.

(2) Minimum separation distance for fragmenting explosive ordnance will be no less than 2500 feet. For bombs and projectiles with a diameter of 5 inches or greater, use a minimum distance of 4000 feet.

(3) Ordnance items with lifting lugs, strong backs, base plates, etc., will be oriented away from personnel, as fragments from these items tends to travel farther than normal.

f. Once demolition operations are completed, a thorough search of the demolition area will be conducted with a magnetometer to ensure a complete disposal was accomplished.

g. Inert ordnance will not be disposed of for scrap until the internal fillers/voids have been exposed and unconfined. Heat generated during the reclamation process can cause the inert fillers, moisture or air to expand and burst the sealed casings. In this situation, Oil Well Perforators can be used for venting these ordnance items which require demilitarization.

Appendix A

27 CFR 55	Alcohol, Tobacco Products and Firearms
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
49 CFR 100-199	Hazardous Materials Transportation
DOD 6055.9 STD	DOD Ammunition and Explosive Safety Standards, August 1997
AR 190- 11	Physical Security
DA PAM 385-64	Ammunition and Explosive Safety Standards
TM 9-1375-213-12	Operators and Organizational Maintenance Manual; Demolition Materials,
TM 60A 1-1-22	EOD Procedures /General EOD Safety Procedures, April 1991
TM 60A 1-1-31	EOD Procedures/General Information on EOD Disposal Procedures, May 1994
EM 385-1-1	USACE Safety and Health Requirements Manual, September 1996
USAESCH	Procedures for Demolition of Multiple Rounds (consolidated shots) on Ordnance and Explosive Sites, August 1998.
ER 1110-1-8153	Ordnance and Explosives Response, 19 May 1998.
EP 1110-1-18	Ordnance and Explosives Response (Draft).
ATF P 5400.7	ATF Explosive Laws and Regulations, June 1990
HNC-ED-CS-S 98-1	Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives, January 1998
HNC-ED-CS-S 98-2	Methods for Calculating Range to No More Than One Hazardous Fragment Per 600 Square Feet on OE Sites, January 1998
HNC-ED-CS-S 96-8	Guide Selection and Siting of Barricades for Selected OE, September 1997

Memorandum of Agreement, U.S. Army Engineering and Support Center, Huntsville, and Headquarters Forces Command, 52nd Ordnance Group, 18 July 1997.

ATTACHMENT 6-11
STANDARD AHAS

ACTIVITY HAZARD ANALYSES

Project: M2 Parcel, Clearance Activities
Activity: Mobilization /Demobilization
Location: Fort McClellan, Anniston, Alabama

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Mobilization/ demobilization of equipment and supplies.	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available; instruct personnel on proper lifting techniques.
	2. Heavy Equipment Operation	2. Follow procedures in Section 4.3.1; equipment will have rollover protective structures and seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; all slings chains and ropes will be rated for the load in which it is expected to lift; spills and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; avoid equipment swing areas; know hand signals; all equipment will be equipped with backup alarms.
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, vegetation in walk areas; mark tripping hazards and repair if possible.
	5. Vehicular Traffic	5. Spotters will be used when backing up trucks and heavy equipment; trucks and heavy equipment will be equipped with back up alarms; traffic cones/vests will be used when working in public traffic areas.
	6. Overhead Hazards	6. Personnel will be required to wear hard hats.
	7. Dropped Objects	7. Steel toe boots will be worn.
	8. Noise	8. Hearing protection with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) will be worn as needed during heavy equipment operations; all equipment will be equipped with manufacturer's required mufflers.
	9. Eye Injuries	9. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.
	10. Sharp Objects	10. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.
	11. Fire	11. 10 lb. ABC type fire extinguisher will be located adjacent to work area; all gasoline powered equipment will be grounded.
	12. Spills	12. Spill and absorbent materials will be readily available. All waste materials generated will be contained in 55-gallon drums.
	13. Biological Hazards	13. Follow procedures outlined in Section 4.2.
	14. Hand and Power Tools	14. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, tools will be used in accordance with manufacturer's instructions.
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Heavy Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Monthly inspections will be performed on first aid kits. 3. Portable eye wash will be inspected monthly. 4. Monthly inspections will be performed on fire extinguishers 5. Conduct pre-use inspections 6. Conduct pre use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools

ACTIVITY HAZARD ANALYSES

Project: M2 Parcel, Clearance Activities
Activity: OE surface survey
Location: Fort McClellan, Anniston, Alabama

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Initial/surficial OE survey of study areas.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available; Instruct personnel on proper lifting techniques.
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, vegetation in walk areas; mark tripping hazards and repair if possible.
	5. Overhead Hazards	5. Personnel will be required to wear hard hats.
	6. Dropped Objects	6. Steel toe boots will be worn.
	7. Hand and Power Tools	7. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, tools will be used in accordance with manufacturer's instructions.
	8. Eye Injuries	8. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.
	9. Sharp Objects	9. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.
	10. Biological Hazards	10. Follow control measures outlined in Section 4.2. If poisonous plant s are present, PPE will be upgraded to include tyvekand gloves.
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Geophysical Survey Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Monthly inspections will be performed on first aid kits. 3. Portable eye wash will be inspected monthly. 4. Monthly inspections will be performed on fire extinguishers 5. Conduct pre-use inspections as per manufacturer's recommendations 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools

ACTIVITY HAZARD ANALYSES

Project: M2 Parcel, Clearance Activities
Location: Fort McClellan, Anniston, Alabama
Activity: Survey study areas, establish corners and boundaries

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Conventional survey of study areas, establish corners and bounds.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available; Instruct personnel on proper lifting techniques.
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, vegetation in walk areas; mark tripping hazards and repair if possible.
	5. Dropped Objects	5. Steel toe boots will be worn.
	6. Hand and Power Tools	6. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, tools will be used in accordance with manufacturer's instructions.
	7. Eye Injuries	7. Safety glasses will be worn. A portableeye wash station will be located adjacent to work activities.
	8. Sharp Objects	8. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.
	9. Biological Hazards	9. Follow control measures outlined in Section 4.2. If poisonous plants are present, PPE will be upgraded to include tyvek and gloves.

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Conventional Survey Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Monthly inspections will be performed on first aid kits. 3. Portable eye wash will be inspected monthly. 4. Monthly inspections will be performed on fire extinguishers 5. Conduct pre-use inspections as per manufacturer's recommendations 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aidtraining 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools

ACTIVITY HAZARD ANALYSES

Project: M2 Parcel, Clearance Activities
Activity: Brush clearance
Location: Fort McClellan, Anniston, Alabama

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Tree and Brush Trimming	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available; Instruct personnel on proper lifting techniques.
	3. Heavy Equipment Operation	3. Follow procedures in section 4.3.1; equipment will have rollover protective structures and seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; all slings chains and ropes will be rated for the load in which it is expected to lift; spills and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; avoid equipment swing areas; know hand signals; all equipment will be equipped with backup alarms.
	4. Temperature Extremes	4. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.
	5. Slips/Trips/Falls	5. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, vegetation in walk areas; mark tripping hazards and repair if possible.
	6. Vehicular Traffic	6. Spotters will be used when backing up trucks and heavy equipment; trucks and heavy equipment will be equipped with back up alarms; traffic cones/vests will be used when working in public traffic areas.
	7. Overhead Hazards	7. Personnel will be required to wear hard hats.
	8. Dropped Objects	8. Steel toe boots will be worn.
	9. Noise	9. Hearing protection with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) will be worn as needed during heavy equipment operations; all equipment will be equipped with manufacturer's required mufflers.
	10. Eye Injuries	10. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.
	11. Sharp Objects	11. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.
	12. Fire	12. 10 lb. ABC type fire extinguisher will be located adjacent to work area; all gasoline powered equipment will be grounded.
	13. Spills	13. Spill and absorbent materials will be readily available; all waste materials generated will be contained in 55-gallon drums.
	14. Biological Hazards	14. Follow control measures outlined in Section 4.2. If poisonous plants are present, PPE will be upgraded to include tyvek and gloves.
	15. Hand and Power Tools	15. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, tools will be used in accordance with manufacturer's instructions.
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Heavy Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Monthly inspections will be performed on first aid kits. 3. Portable eye wash will be inspected monthly. 4. Monthly inspections will be performed on fire extinguishers 5. Conduct pre-use inspections 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools

ACTIVITY HAZARD ANALYSES

Project: M2 Parcel, Clearance Activities
Location: Fort McClellan, Anniston, Alabama
Activity: Establish geophysical test lines and grids

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Establish geophysical test lines and grids in study areas.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice ontamination avoidance; follow good personal hygiene practices.
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available; Instruct personnel on proper lifting techniques.
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, vegetation in walk areas; mark tripping hazards and repair if possible.
	5. Hand and Power Tools	5. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, tools will be used in accordance with manufacturer's instructions.
	6. Dropped Objects	6. Steel toe boots will be worn.
	7. Eye Injuries	7. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.
	8. Sharp Objects	8. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.
	9. Biological hazards	9. Follow control measures outlined in Section 4.2.
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Conventional Survey Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Monthly inspections will be performed on first aid kits. 3. Portable eye wash will be inspected monthly. 4. Monthly inspections will be performed on fire extinguishers 5. Conduct pre-use inspections as per manufacturer's recommendations 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools

ACTIVITY HAZARD ANALYSES

Project: M2 Parcel, Clearance Activities
Activity: Conduct geophysical surveys
Location: Fort McClellan, Anniston, Alabama

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Conduct geophysical survey in study areas.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available; Instruct personnel on proper lifting techniques.
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, vegetation in walk areas; mark tripping hazards and repair if possible.
	5. Hand and Power Tools	5. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, tools will be used in accordance with manufacturer's instructions.
	6. Dropped Objects	6. Steel toe boots will be worn or other sturdy work shoes if the stel toe boots interfere with the survey for magnetic anomalies.
	7. Eye Injuries	7. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.
	8. Sharp Objects	8. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.
	9. Biological Hazards	9. Follow control measures outlined in Section 4.2.
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Geophysical Survey Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Monthly inspections will be performed on first aid kits. 3. Portable eye wash will be inspected monthly. 4. Monthly inspections will be performed on fire extinguishers 5. Conduct pre-use inspections as per manufacturer's recommendations 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel in proper use of hand and power tools

ACTIVITY HAZARD ANALYSES

Project: M2 Parcel, Clearance Activities
Activity: Excavate anomalies
Location: Fort McClellan, Anniston, Alabama

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Excavation of magnetic anomalies in study areas.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available; Instruct personnel on proper lifting techniques.
	3. Heavy Equipment Operation	3. Follow procedures in Section 4.3.1; equipment will have rollover protective structures and seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; all slings chains and ropes will be rated for the load in which it is expected to lift; spills and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; avoid equipment swing areas; know hand signals; all equipment will be equipped with backup alarms.
	4. Temperature Extremes	4. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.
	5. Slips/Trips/Falls	5. Maintain work areas safe and orderly; unloading areas should be oneven terrain; watch for uneven terrain, stumps, vegetation in walk areas; mark tripping hazards and repair if possible.
	6. Vehicular Traffic	6. Spotters will be used when backing up trucks and heavy equipment; trucks and heavy equipment will be equipped with back up alarms; traffic cones/vests will be used when working in public traffic areas.
	7. Overhead Hazards	7. Personnel will be required to wear hard hats.
	8. Dropped Objects	8. Steel toe boots will be worn.
	9. Noise	9. Hearing protection with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) will be worn as needed during heavy equipment operations; all equipment will be equipped with manufacturer's required mufflers.
	10. Eye Injuries	10. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.
	11. Sharp Objects	11. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.
	12. Fire	12. 10 lb. ABC type fire extinguisher will be located adjacent to work area; all gasoline powered equipment will be grounded.
	13. Spills	13. Spill and absorbent materials will be readily available; all waste materials generated will be contained in 55-gallon drums.
	14. Hand and Power Tools	14. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, tools will be used in accordance with manufacturer's instructions.
	15. Biological Hazards	15. Follow control measures outlined in Section 4.2. If poisonous plant are present, PPE will be upgraded to include tyvek and gloves.

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Heavy Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Monthly inspections will be performed on first aid kits. 3. Portable eye wash will be inspected monthly. 4. Monthly inspections will be performed on fire extinguishers 5. Conduct pre-use inspections 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel in proper use of hand and power tools

ACTIVITY HAZARD ANALYSIS

Project: M2 Parcel, Clearance Activities
Activity: Decontaminate heavy equipment
Location: Fort McClellan, Anniston, Alabama

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Steam clean heavy equipment and accessories (Hazards and controls 1 –14 apply)	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should beused to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	2. Slips/Trips/Falls	2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.
	3. Vehicular Traffic	3. Spotters will be used when backing up trucks and heavy equipment and moving equipment. When working on or near roadways, the area will be clearly marked with traffic cones or high visibility fencing. Workers will wear high visibility traffic safety vests. Work done in the roadway proper will be limited. Coordinate with facility personnel if road closings are necessary.
	4. Overhead Hazards	4. Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. All ground personnel will stay clear of suspended loads and equipment swing areas. All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. All overhead hazards will be identified prior to commencing work operations.
	5. Dropped Objects	5. Steel toe boots meeting ANSI Standard Z41 will be worn during all site activities.
	6. Chemical Hazards	6. Wear PPE per Table 6-1; practice contamination avoidance; follow good personal hygiene practices
	7. Steam/Heat/Splashing	7. Use face shield **and** safety glasses or goggles; stay out of the splash/steam radius; do not direct steam at anyone; do not hold objects with your foot and steam area near it; ensure that direction of spray minimizes spread of constituents of concern; use shielding as necessary, personnel will be trained on the proper operation of pressure washer, pressure washer wand will be equipped with a dead man's switch.
	8. Pinch/Cut/Smash	8. Use hand tools properly and wear appropriate protective equipment, cut resistant work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.
	9. Temperature Extremes	9. Drink plenty of fluids; train personnel of signs/symptoms of heat/cold stress; monitor air temperatures when extreme weather conditions are present; stay in visual and verbal contact with your buddy; and use Temperature Extremes program EHS 4-6.
	10. Hand and Power Tools	10. Daily inspections will be performed; remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturer's instructions.
	11. Inclement Weather	11. Monitor weather conditions daily.
	12. Eye Injuries	12. Safety glasses meeting ANSI Standard Z87 will be worn.
	13. Heavy Equipment Operation	13. Equipment will have seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; spill and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; ground personnel will stay out of the swing radius; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; all equipment will be equipped with backup alarms.

Project: M2 Parcel, Clearance Activities
Activity: Decontaminate heavy equipment
Location: Fort McClellan, Anniston, Alabama

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	14. Struck by/Burns	14. Personnel operating the pressure washer will use the lowest effective pressure and temperature settings on the pressure washer. Pressure washer spray/stream will not be aimed at people. Personnel using pressure washer will not use hands, feet or knees to brace or hold material to be pressure washed. Pressure washer will not be used to clean personnel boots. Thermal/insulated boots may be used during pressure washing operations.

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Hand and Power Tools 2. Appropriate PPE 3. Pressure Washer	1. Initial inspection of heavy equipment will be performed upon arriving on-site. 2. Pressure washers will be inspected daily, prior to each days use. 3. Hand and power tools will be inspected to ensure they are in good condition prior to each days use. 4. PPE will be inspected before and after each use.	1. Personnel have read and will comply with SSHP. 2. Personnel will receive site specific training. 3. Only qualified operators can operate heavy equipment or vehicles. 4. Personnel will have knowledge of proper use of hand and power tools and pressure washer. 5. At least 2 individuals on-site will have current CPR and first aid training.

ACTIVITY HAZARD ANALYSIS

Project: General Site Wide Work Plan

Location: Fort McClellan, Anniston, Alabama

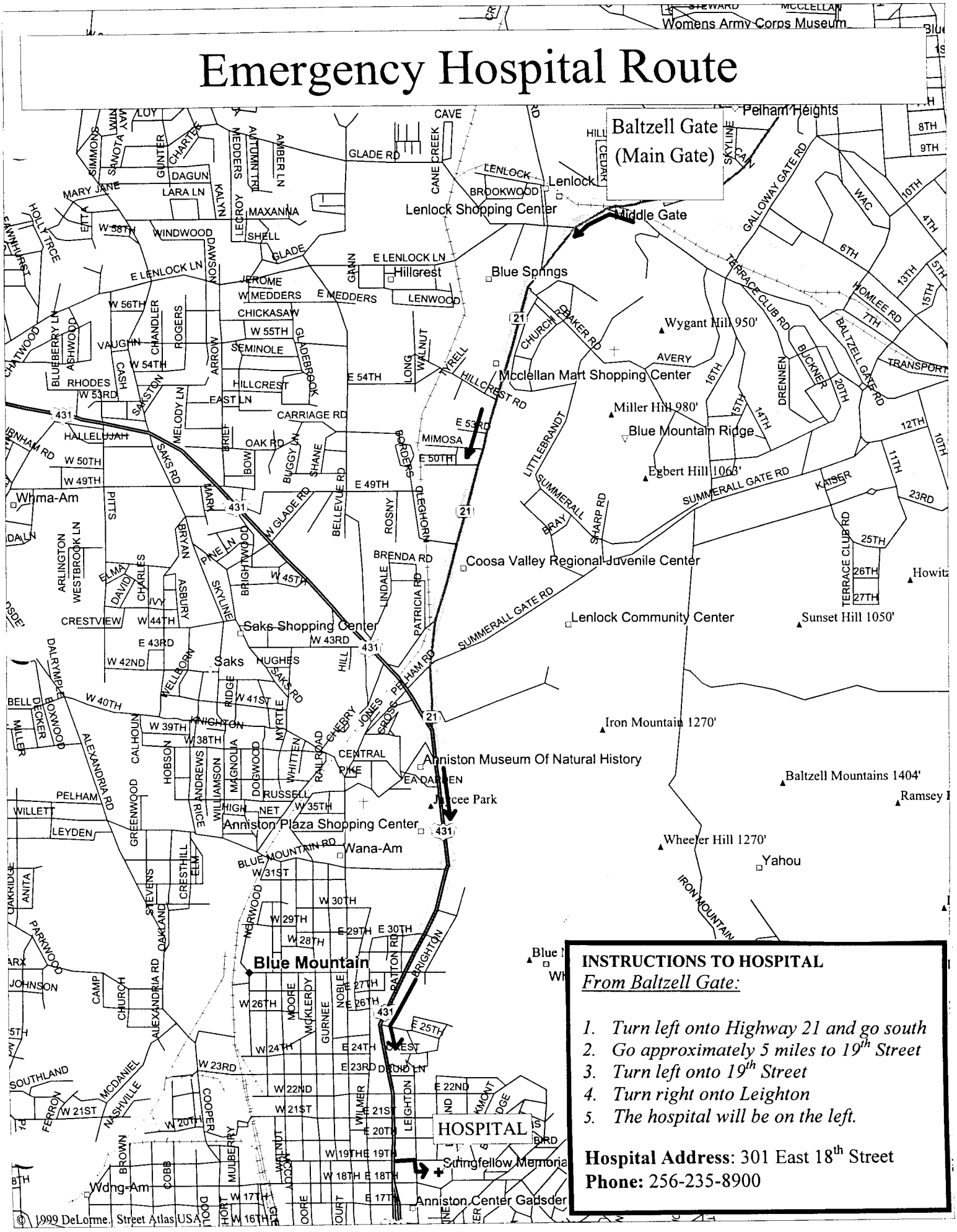
Activity: Utility Vehicle (Gator, Mule, etc.) Operations

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	ANALYZED BY/DATE
1. Operating Utility Vehicle	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques.	GD 2/3/02
	2. Utility Vehicle Operation	2. Utility vehicles will be operated in accordance with procedures stated in the owner's manual; follow procedures in Section 6.15.2 of the General Site-Wide Work Plan, equipment will have rollover protective structures and seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment in case os spills; and all equipment will be outfitted with fire extinguishers. The utility vehicle emergency brake will be activated whenever the utility vehicle is parked.	GD 2/3/02
	3. Pinch points	3. All machinery or equipment shall be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done	GD 2/3/02
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, and vegetation in walk areas; mark tripping hazards and repair if possible. Maintain three points of contact with equipment during mount/dismount. Getting on or off equipment while it is in motion is prohibited.	GD 2/3/02
	5. Dropped Objects	5. Composite or steel-toe boots will be worn *around heavy equipment only.*	GD 2/3/02
	6. Eye Injuries	6. Safety glasses will be worn during all field activities.	GD 2/3/02
	7. Fire	7. 10 BC type fire extinguisher will be mounted on each vehicle.	GD 2/3/02
	8. Spills	8. Spill and absorbent materials will be readily available. All waste materials generated will be contained in 55-gallon drums.	GD 2/3/02
	9. Biological Hazards	9. Follow procedures outlined in Section 6.4.3 of the General Site-Wide Work Plan.	GD 2/3/02
	10. Rollover / Roll Back	10. Whenever possible, utility vehicle will be operated perpendicular on steep slopes. Prior to making turns, the driver will slow the utility vehicle. Terrain will be surveyed for slopes, holes, and drop-offs, prior to utility vehicle operation.	GD 2/3/02

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Heavy Equipment 6. Hand and Power Tools	1. All inspections are the responsibility of the operator and will be conducted prior to use. 2. Pre-use inspection 3. Inspect first aid kits monthly. 4. Inspect portable eyewash monthly 5. Inspect fire extinguishers monthly 6. Conduct pre-use inspections 7. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site-specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used. The Site Safety Officer will conduct training to certify employees as "competent" 6. Instruct personnel on proper use of hand and power tools

ATTACHMENT 6-12
HOSPITAL ROUTE

Emergency Hospital Route



INSTRUCTIONS TO HOSPITAL

From Baltzell Gate:

1. *Turn left onto Highway 21 and go south*
2. *Go approximately 5 miles to 19th Street*
3. *Turn left onto 19th Street*
4. *Turn right onto Leighton*
5. *The hospital will be on the left.*

Hospital Address: 301 East 18th Street
Phone: 256-235-8900

7.0 LOCATION SURVEYS AND MAPPING PLAN

These sections present the Location Surveys and Mapping Plan for the Draft General Site-wide Work Plan in support of UXO activities at Fort McClellan. The purpose of this document is to provide details of the methods and equipment to be used to achieve, and whenever possible, exceed accuracy requirements in performing location surveys and mapping plans.

7.1 UXO SAFETY PROVISION

During all phases of the field investigation activities, a UXO Technician II level individual to be determined, will accompany all survey, flagging and mapping crews performing work at any OE site. The individual may either be Foster Wheeler Environmental or subcontractor personnel. The individual will be responsible for conducting preliminary visual surveys for surface ordnance at any suspected area prior to any survey crew member or any other individual entering that area. The purpose of this survey is to ensure each suspected site is anomaly free prior to a survey crew setting monuments, driving stakes or working with story poles and transoms.

7.1.1 This will be achieved by conducting a magnetometer survey of each selected intrusive activity site. Any potential access routes, such as trails, or wooded paths which intersect suspected areas will also be surveyed in this manner to ensure the safety of all site personnel. A preliminary surface features map will be prepared as part of the visual survey, which will include specific locations of all potential surface hazards such as uneven terrain, slip trip hazards and potential biological hazards such as insects, poisonous plants or evidence of animals. The UXO Technician II individual will be responsible for performing visual reconnaissance of the proposed survey area to remove metallic surface debris and any potentially dangerous ordnance and explosives waste.

7.1.2 At no time will the UXO Technician II be assigned additional tasks which would preclude that individual from being solely responsible for all OE safety aspects of suspected area clearance including, but not limited to, providing clearance for driving stakes, iron pins, monuments, or other survey control, in addition to providing clearance for general access.

7.2 CONTROL POINTS

Reference coordinates for each suspected area will be assigned from acquired survey control data points. Each geophysical survey plot will be oriented approximately parallel to magnetic north. A minimum number of (four) control points will be established at each suspected area. The specific number of required control points for each project will be specified in the delivery order.

7.2.1 This will enable UXO personnel to easily locate the grid corners during subsequent intrusive activities. These basic control points will consist of concrete monuments with 3 ¼ to 3 ½ inch domed, brass, bronze or aluminum alloy survey markers with witness posts at each site. These basic control points will be covered with plastic or wooden caps. The top will be set flush with the ground surface and the bottom will be set a minimum of 0.6 meters below frost depth. The concrete monuments will be located within the project limits, set a minimum of 10 meters from the edge of any existing road within the project limits. Each control point will be field marked using tape flagging or pin flags for convenient identification purposes. Each basic control point will be set a minimum of 300 meters apart. Each control point will be surveyed by a Registered Land Surveyor (RLS). All geophysical data recorded within each suspected area will be referenced to Alabama State Plane Coordinates.

7.2.1 Accuracy

The network of monuments serving as control points will determine the degree of accuracy achievable in all field measurements, particularly in the effective use of aerial photographs. This network will enable subsequent geophysical measurements to be referenced to a useful and accurate coordinate system. Horizontal and vertical control will be established for the network of monuments.

7.2.1.1 The accuracy of the horizontal and vertical control will be accomplished by maintaining "Class 1, Third Order" or better for the network of monuments. Horizontal control will be based on the English or metric system and referenced to the North American Datum of 1983 (NAD83) and the State Plane Coordinate System. The vertical control will also be based on the English or metric system and referenced to the North American Datum of 1988 (NAVD88). Whenever aerial photographs or orthophotography are to be used to provide this survey, the same horizontal and vertical accuracy and requirements detailed above will be met for the aerial targets used for control points.

7.2.2 Monument Caps

The network of monuments will be identified with brass, bronze or aluminum alloy caps. Each new monument will be stamped in a consecutively numbered sequence and the identification will be provided with each specific Delivery Order as follows:

SWAMPY-1-1996	SWAMPY-2-1996	SWAMPY-3-1996
USAESCH	USAESCH	USAESCH

7.2.2.1 The identified name will be provided with each specific Delivery Order. The dies to be used for stamping the individual numbers and letters into these monument caps will be between

1/8-inch to 3/16- inch in size. All coordinates and elevations will be shown to the closest one-thousandth of a meter (0.001m) and one-hundredth of a foot (0.01 ft.).

7.2.3 Plotting

The control points recovered and/or established at this site will be plotted at the appropriate coordinate point on a reproducible (Mylar) planimetric or topographic map. Points to be plotted include all monuments, aerial targets, and property corners.

7.2.4 Description Cards

A list of all established or new control points (monuments and aerial targets) used for this project will be tabulated and submitted along with a "Description Card." The Description Card will provide a north arrow, a sketch of each monument and it's relative location to reference marks such as buildings, roads, railroads, towers, trees, etc.; a typed description of instructions for locating the monument from a well known and easily identifiable point; the monument's name or number; and the final adjusted coordinates and elevations in meters and feet to the closest 0.001 m and 0.01 ft., respectively. Each Description Card will be 5 by 8 inches with a description of one monument per card, or a 8-1/2 by 11-inch sheet of bond paper may be used for describing two monuments.

7.3 MAPPING

The location, identification, coordinates, and elevations of all the control points recovered and/or established for this delivery order will be plotted on reproducible (Mylar) planimetric or topographic maps at the scale as specified in the delivery order. Each control point will be identified on the map by its name and number and the final adjusted coordinates and elevations (to the closest 0.001 m and 0.01 ft.) Each map will include a grid north, a true north and a magnetic north arrow with differences between them in minutes and seconds shown. Grid lines or tic marks at systematic intervals with their grid values will be shown on the edges of the map. A legend will be shown which provides the standard symbols used for the mapping along with a map index showing the site in relationship to all other sites within the boundary lines of the project area.

7.3.1 In addition, the state plane coordinates will be established for the corners of each grid area investigated (100' by 100'; 100' by 200'; etc.; size and accuracy requirements to be determined when the Scope of Work for the delivery order is prepared). The locations of individual recovered items shall be tape measured, to obtain a horizontal accuracy of plus or minus one foot within the grid, and plotted and identified on the map. The use of a total station, global positioning system (GPS) or other precision survey method used to locate recovered munition items is not required

7.4 DIGITAL DATA

An overall planimetric design file will be created and be digitized into a Microstation ". dgn" file at an elevation of zero. If contours and spot elevations are required, all data will be digitized into a second Microstation 3D design file with each element (contours and spot elevations) at their correct elevation, and topologically triangulated network (ttn) files will be created to model the topographic surface. The ttn file will be created using the elements of the topographic file, and all spot elevations, contours, and breaklines necessary to create the ttn file will be used. The ttn file will be created so that it can be used in an Intergraph software product INROADS to recreate the contours at their exact locations. Cut sheet plots and views into the project data will be created by referencing the planimetric and contour files from additional Microstation work files.

7.4.1 Sheet Requirements

Each sheet will be standard metric A-1 size drawing, which is 841 mm by 594 mm (33.1 inches by 23.4 inches). Each sheet will also have a standard border; revision block; title block; complete index sheet layout; bar scale; legend; grid lines or grid tic layout in feet or meters; a True North, a Magnetic North and a Grid North arrow, with their differences shown in minutes and seconds; and will be plotted at the horizontal scales required.

7.4.2 Cell Library

The cell library used will be attached and provided with the digital data set along with all other supporting files or data. All production and work files will be fully documented into a concise data manual. This manual will include all specific information required for an outsider to be able to recreate all products and determine the location, names, structures, and association of the data such as layer description, weights, colors, symbology, referencing of files etc. This manual will be included as an ASCII file titled READ.ME that is included with all distributed digital data.

7.4.3 CEHNC Compatibility

No digital data will be acceptable until proven compatible with the CEHNC Graphics System. All revisions required to obtain compatibility with the CEHNC Graphics System will be done at the contractor's own expense.

7.5 DIGITAL FORMAT FOR INTERGRAPH SURVEY/MAPPING DATA

7.5.1 Sources and Standard

All data will conform to the Tri-Service Spatial Data Standards (TSSDS) and as outlined in the site-specific Delivery Order Work Plan. The TSSDS have been developed and produced by the Tri-Service CADD/GIS Technology Center. They are designed for computer assisted mapping methods that must interface with other surveying firms, government contractors, and customers so that the final product will be usable with consistent CADD documents.

7.5.2 Geographic Information System (GIS) Incorporation

Foster Wheeler Environmental will take the GIS data, manual, file, and database structure from the CEHNC GIS standard and apply it to the projects to the extent required to create the products outlined in the delivery orders specific Scope of Work. The standard will be used as a starting point to load data and to create a GIS tailored for the specific ordnance investigative needs of the site. All digital data will be created using Microstation 5.5 and Intergraph's MGE GIS tools to allow it to be loaded directly into the CEHNC Ordnance GIS system. The main purpose of the GIS is to assemble all the data required to associate the non-intrusive subsurface geophysics investigative data to it's correct geographical location, the relational database, mapping and remote sensing data. The GIS tools are used to manage the project, assemble data for the administrative record, help determine areas requiring further investigation and to discriminate ordnance and explosives waste from background anomalies. The discrimination is done by a program that uses a subset of the GIS data called the OE Knowledge Base (OE-KB). The OE-KB's purpose is to collect, analyze and store key investigative information for ordnance from multiple ordnance GIS systems, geophysical sensors and techniques, remote sensors, and existing imagery and compile it to establish a knowledge base of characteristics of investigated ordnance. An objective is to establish a profile or fingerprint of a specific ordnance item that can assist in evaluations for current and future projects. A proven product will be provided for use in this contract with technical support and updates provided by CEHNC.

7.5.3 Computer Files

All final text files generated by this contract and other individual delivery orders will be furnished to CEHNC in MS Word 6.0 or higher software, IBM PC compatible format and in Adobe Portable Document Format (PDF), suitable for viewing, without modification, on the Internet. Freeware versions of Adobe Acrobat Reader, Netscape, and Internet Explorer shall accompany the text files on CD-ROM, so that the user can use the CD to either install the programs and text files on a machine, or use the CD in a stand alone mode to view the text files. The basic software supported to the field shall be capable of operating on a typical single Intel Pentium processor PC utilizing the Windows NT version 4.0 operating system with a minimum

of 32 megabytes of memory and adequate disk storage for project data. All in progress and fielded GIS data, design drawings, survey data, relational databases and related data generated may be required to be available on line to the government through the use of an Internet connection. Formal submittals for all GIS, survey and mapping data, and design drawings, generated by the contractor under this contract will be submitted in the proper format and media that will permit their loading, storage, and use without modification or additional software on the CEHNC GIS workstations. The base GIS workstations consist of Intel dual Pentium GIS machines with 96 megabytes of memory. The workstations run under the Windows NT 4.0 operating system with Microstation utilizing the MGE 6.0 compliment of software and the Oracle relational database. Current GIS project related software includes: Microstation 5.5, Oracle 8.0, IRAS B, IRAS C 5.04 and IRAS Engineer, DB Access, MGE Basic Nucleus, MGE Analyst, MGE Map Finisher, MGE Projection Manager, MGE Grid Analyst, MGE Modeler, MGGA, ERMA Data Manager, ERMA Site Geologist, Inroads, and Insitu. Other specific packages to be considered must be proposed to CEHNC for approval and for system and mission compatibility. All GIS data for formal submittals will be on either eight millimeter NT 10 Gigabyte tape, PC 3.5" floppies or PC CD-ROM. The PC CD-ROM is the preferred format, supplemented with 10 Gigabyte tape for larger data sets.

7.6 ITEMS AND DATA

The following items and data will be submitted to CEHNC (submittal dates will be specified for each Delivery Order) :

- Field survey. The original copies of all field books, layout sheets, computation sheets, abstracts, and computer printouts. All of these items will be suitably bound, and clearly marked and identified.

- A tabulated list of all control points (monuments, aerial targets and corners) showing the adjusted coordinates and elevations (in meters and feet) established and/or used for this survey.

- The negatives and three sets of prints of the aerial photographs taken for the project, if aerial photography is required in the Scope of Work.

- A tabulated list of all UXO items with location information, or specific anomalies, as identified in the individual project SOW that were located in the field.

- A "Report on Establishment of Survey Mark" (Description Card) on each permanent control monument established and/or used for the survey. In addition to the name or ID number of the monument, the cards will show the adjusted coordinates, the adjusted elevations, a typed description for locating the monument, and a sketch showing how to locate the monument.

- All unique items created and/or used to create the end products and the narrative and description required by the Scope of Work.

- Drawings and Digital Data. All maps will be drawn on 841mm by 594mm (standard metric A-1 size drawing) reproducible (Mylar) drawings generated by the CADD system. One original Mylar and five blueline prints of each final map, and two copies of the digital data will be delivered to CEHNC.

8.0 WORK, DATA, AND COST MANAGEMENT PLAN

The purpose of this Work, Data and Cost Management Plan (WDCMP) is to ensure the effective management of allocated funds, manpower, and equipment. This plan describes: the resources and tools Foster Wheeler Environmental will use to manage the project to ensure effective delivery of the required scope of services.

8.1 PROJECT MANAGEMENT

Effective management is an essential element in the delivery of a quality product. Foster Wheeler Environmental is committed to providing a management structure that meets this goal and is tailored to the operational requirements of the project. Figure 2-1 depicts the management team that Foster Wheeler Environmental will utilize throughout the execution of the various delivery orders associated with this project. This team provides the appropriate level of management, safety, and quality oversight to ensure that all work will be performed in an efficient, safe, and cost-effective manner. As discussed previously, the management will report directly to the Foster Wheeler Environmental Project Manager, who will in turn report to the CEHNC Project Manager to ensure effective communication of technical and management issues throughout the performance of work. All support personnel required for a specific delivery order will report to the appropriate member of the management team as identified in the Delivery Order Specific Work Plans.

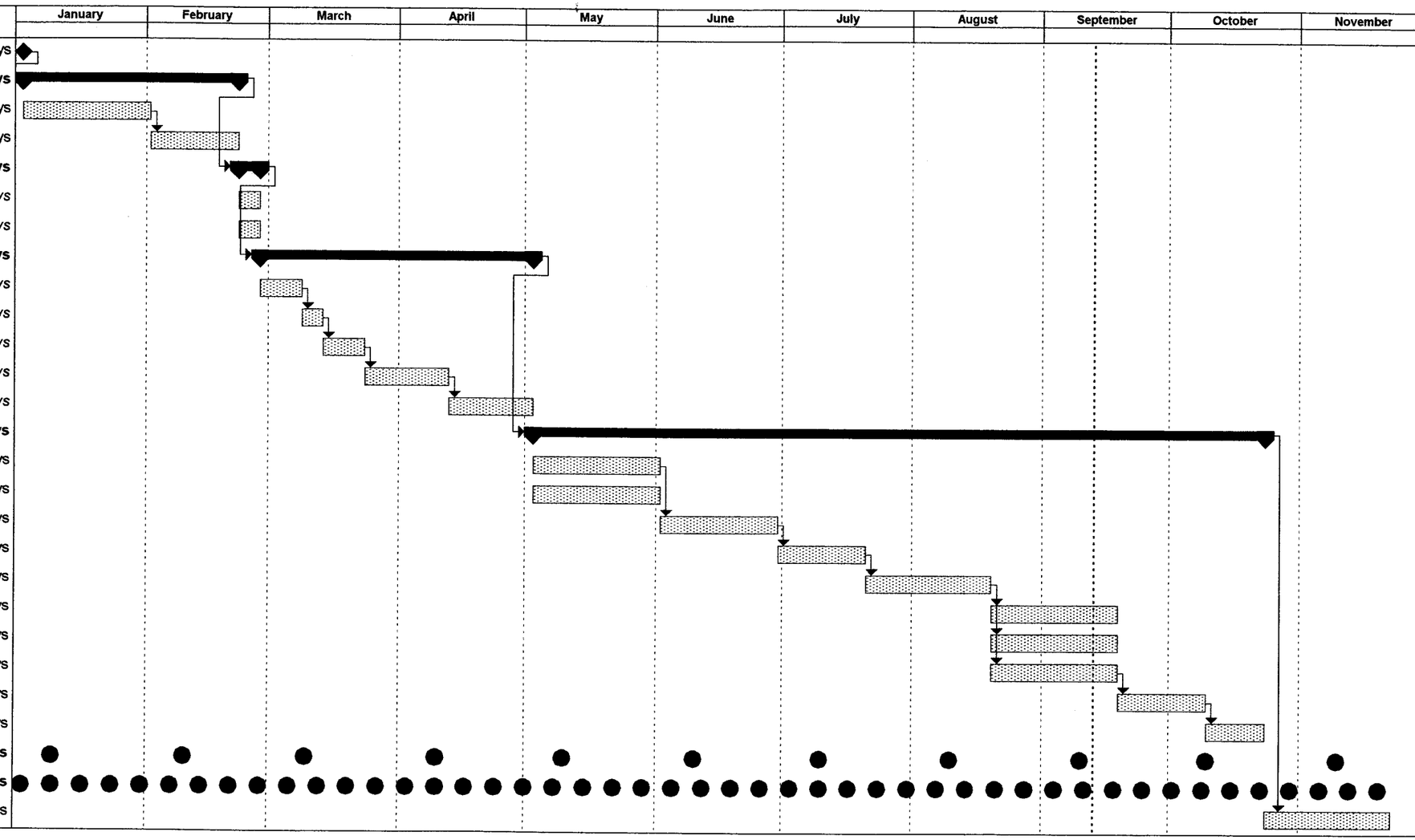
8.2 SCHEDULE

Foster Wheeler Environmental has prepared a generic delivery order schedule, presented in Figure 8-1, that depicts the anticipated tasks and milestones for a typical Delivery Order. The schedule identifies the individual activities potentially associated with a delivery order, their duration, and the sequence in which the work will be performed. As indicated in the figure, the duration of certain tasks (i.e., field investigation activities) will be dependent on the specific delivery order requirements, and only representative durations are provided for these tasks on the schedule. The generic schedule will be modified, as necessary for individual delivery orders, and presented in the Delivery Order Specific Work Plans.

8.2.1 The schedule will be used to track the work progress on each 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, reduction in scope, etc. This schedule is based on a forty-hour work week, consisting of four 10-hour days. Work schedules may vary depending upon site requirements and the time of year in which the project is performed.

FIGURE 8-1
OE RESPONSE AT FORT MCCLELLAN
GENERIC DELIVERY ORDER SCHEDULE

ID	Task Name	Duration
1	**Delivery Order (DO) Award**	0 days
2	**DO-Specific Work Plan**	**51 days**
3	Draft WP	30 days
4	Final WP	21 days
5	**Mobilization**	**5 days**
6	*Personnel Mobilization*	*5 days*
7	*Equipment Mobilization*	*5 days*
8	**Field Investigation**	**65 days**
9	*Surface Sweep*	*10 days*
10	*Surveying*	*5 days*
11	*Vegetative Clearance*	*10 days*
12	*Geophysical Investigation*	*20 days*
13	*Intrusive Investigation*	*20 days*
14	**EE/CA (if applicable)**	**174 days**
15	Draft EE/CA	30 days
16	Institutional Controls Analysis	30 days
17	Review Draft EE/CA	28 days
18	Draft Final EE/CA	21 days
19	Public Comment Period	30 days
20	Responsiveness Summary	30 days
21	Final EE/CA	30 days
22	Draft Action Memorandum	30 days
23	Action Memorandum Review	21 days
24	Final Action Memorandum	14 days
25	**Monthly Reports**	**305 days**
37	**Weekly Reports**	**322 days**
85	**Closeout**	30 days



Note: The durations of tasks in italics are examples only.
Actual duration for these tasks will be determined on a delivery-order specific basis.

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

8.3 MANPOWER REQUIREMENTS

The Foster Wheeler Environmental management team will be on-site full-time (excluding the geophysicist) during the performance of all work under this contract, thus providing continuity on the project between delivery orders. The on-site management team will be supported by additional technical and support personnel on an as-needed basis during performance of the work. Specific support required (e.g., additional UXO personnel, engineering support, drafting, cost estimating, etc.) will be determined by the management team on a task-order specific basis and documented in the Delivery Order Specific Work Plan.

8.4 COST CONTROL AND TRACKING

The Delivery Order specific schedules discussed in Section 8.2 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 will be developed and the approved budget will be entered into the software for tracking purposes.

8.4.1 The Project Manager will approve all hours charged to the project by all field and office personnel to ensure no unauthorized hours are charged to individual delivery orders. 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 (see below), Foster Wheeler Environmental will report cost and schedule performance, identifying any actual or anticipated variances and proposing corrective action.

8.5 RECURRING DELIVERABLES

This section describes recurring deliverables that will be prepared during performance of work under the Fort McClellan contract. Recurring deliverables include monthly progress reports issued at the program level describing cost/schedule performance for all delivery orders, as well as weekly and daily reports issued at the delivery order level The monthly progress report will be issued when any delivery order under the contract is active. Weekly and/or daily progress reports will be issued only as necessary; the requirement for weekly and/or daily progress reports will be identified in the Delivery Order Specific Work Plan.

8.5.1 Monthly Progress Report

Foster Wheeler Environmental will prepare and submit monthly reports to CEHNC IAW OT-FMC-080. The report will be submitted no later than the 10th day of each calendar month and will consist of an OE Monthly Progress Report and an Exposure Data Report for each active Delivery Order.

8.5.1.1 Delivery orders will be grouped and reported by types indicating both a work category and technology used by a Roman numeral and Arabic letter, as best described using the following:

Work Category	Technology Type
I: Surface clearance only	A. Geophysical Instrument w/analog readout
II: Sampling effort only (detection and confirmation)	B. Geophysical Instrument w/digital recorder
III: Geophysical mapping effort only (no confirmation)	C. Geophysical Instrument w/digital navigation system
IV: Subsurface clearance	D. Geophysical Instrument w/multi-sensor system
V: Construction Support	E. Visual Only
Note: The required column for Acres Sampled should include the total number of acres on which all of the planned sample grids have been completed (all data collected). Do not indicate the total grid area of the sample grids that are completed.	

8.5.1.2 An Exposure Data Report will be prepared for all active delivery orders and will include the following information for each delivery order, summarized from the weekly reports:

1) Month and year for which the report is made.

2) Contract Number/Delivery Order/Project Name/Site Name and Location.

3) Hours worked in direct support of the contract (by all personnel) during the reported month, and cumulative, excluding corporate personnel issues, but including hours expended by subcontract personnel in direct support of the contract.

4) Total number of lost workday accidents during the reported month, and cumulative.

5) Total number of lost workdays due to on-the-job accidents during the reported month, and cumulative.

6) Number of property damage accidents (including vehicles) with property loss value of $2,000 or more, during the reported month, and cumulative.

8.5.1.3 The Foster Wheeler Environmental Project Manager will sign and date both the OE progress report and the exposure data report and will provide both under a single letter of transmittal to the Contracting Officer; copies will be provided to additional CEHNC and/or Fort McClellan personnel in accordance with individual delivery order requirements.

8.5.2 Weekly Progress Report

Foster Wheeler Environmental will prepare and submit weekly reports to the CEHNC PM and the on-site safety specialist in accordance with OE-085. The report will be submitted via facsimile or e-mail no later than the first working day of the week following the week for which the report is prepared. A weekly progress report will be prepared for each active delivery order and will consist of the following information:

1) General Identifying Information:

   a. Contract number, delivery order number, project location and ending date of report.

   b. Brief description of project scope and methodology/equipment used for detection of OE (e.g., Subsurface clearance of 35 acres using 52Cx magnetometers).

   c. Name of Contractor's Project Manager, Senior UXO Supervisor, UXO Safety Officer, and UXO Quality Control Specialist.

   d. Name of Government Safety Specialist on site (if applicable).

2) Schedule/Progress Data:

   a. Progress by task, or sub-task if appropriate, indicating level of completion and including supporting data (e.g., number of grids cleared, actual versus planned).

b. A graph which depicts a cumulative summary by month of the percentage of costs budgeted, the percentage of costs expended, and the percentage of work completed.

c. A project schedule prepared in MS Project (or similar cost-schedule software) indicating changes from baseline schedule and explaining deviations.

3) Discussion of Issues Relating to Project Expenditures and Work Progress:

a. Notice of 85% of expended funds, or other percentage expended, as required by contract clauses.

b. Discussion of ability to complete the project within funds currently authorized.

c. List/status of pertinent correspondence related to the project.

d. List/status of deliverables and dates submitted.

e. Discussion of any issue that impacts completion of project on schedule and within budget.

4) Field Information:

a. Total number of grids in project.

b. Number of grids cleared or sampled during week and to date.

c. Percent of project completed.

d. Number of grids passing QC checks during week and to date.

e. Number of grids failing QC during week and to date.

f. Number of grids passing QA checks during week and to date.

g. Number of grids failing QA during week and to date.

h. Number of hours spent re-working grids failing QC or QA.

i. Number of digs during week and to date.

j. Number of live OE items located during week and to date.

k. Number of inert OE items recovered during week and to date.

l. Number of small arms recovered during week and to date.

m. Pounds of scrap removed during week and to date.

n. Significant comments relating to type of OE located, location of teams by grid numbers, presence of visitors or other contractors, OE shipments, and demolitions.

o. A detailed list of OE located during the week and its disposition and a summary of all OE recovered to date by ordnance type.

p. Results of daily safety inspections.

q. Description of operations planned for the following week.

5) Summary of Vehicles and Equipment:

a. List of vehicles by type, source of rental or lease, unit cost, VIN number, ending mileage and team to which assigned.

b. Gallons of gasoline used during week and to date.

c. List of major equipment on site and sources.

6) Demolition Materials Accounting:

a. list of demolition materials received since the project began.

b. tabulation of materials used during week.

c. balance on hand at the end of the reporting period.

7) Personnel on Site:

   a. List of personnel on site by name, position, and workday.

   b. List of employee absences and associated explanations.

   c. Summary of workers and total number of man-hours expended during week by job category.

8) Exposure Data:

   a. Hours worked in direct support of the contract (by all personnel) during the reported week and cumulative for the project, excluding hours expended on corporate personnel issues, but including hours expended by subcontract personnel in direct support of the delivery order.

   b. Number of lost workday accidents during the reported week and cumulative for the project.

   c. Number of lost workdays due to on-the-job accidents during the reported week and cumulative for the project.

   d. Number of property damage accidents (includes vehicles) in which property loss value is $2,000 or more, during the reported week and cumulative for the project.

8.5.3 Daily Progress Report

Foster Wheeler Environmental will prepare daily progress reports for each active Delivery Order. The daily report will be maintained in the Foster Wheeler Environmental field office for compilation of weekly and monthly reports and for review by CEHNC upon request (i.e., daily reports will not be submitted to CEHNC on a formal basis unless specifically required in the Scope of Work for a specific Delivery Order). The daily report will be prepared using the form presented in Figure 8-2 or an equivalent form that provides the relevant information for the specific delivery order (Delivery Order Specific Daily Report forms will be provided in the Delivery Order Specific Work Plan if appropriate).

Figure 8-2
Foster Wheeler Environmental Corporation
Daily Report

Date:_____

Contract No.:_____

Project Title & Location:_____

Weather: _____ Precipitation:_____in. Temp: Min. ___F Max. _____ Wind ___mph

Personnel On site: FOSTER WHEELER ( ) SUBCONTRACTOR ( )

NAME	COMPANY	FUNCTION	HOURS

Total man hours this day: ____ Foster Wheeler ( ) Subcontractor ( )
Total man hours this project: ____ Foster Wheeler ( ) Subcontractor ( )

1. Work Performed: (Indicate location and description of work performed by prime and/or subcontractors and complete Table.

TASK	DAILY TOTAL	CUMULATIVE
GRIDS ESTABLISHED	( )	( )
UXO VISUAL CLEARANCE	( )	( )
GRIDS CLEARED (VEGETATION)	( )	( )
GEOPHYSICAL SURVEY	( )	( )
UXO INTRUSIVE SAMPLING	( )	( )
ANOMALIES INVESTIGATED	( )	( )

2. Operating Plant or Equipment Utilized, Mob and/or Demo. (Not hand tools)

Equipment Utilized:

3. Control Activities Performed:
   Preparatory Inspections: ( )
   Initial Inspection: ( )
   Follow-up Inspections: ( )

4. Material Received: (Note inspection results and storage provided)

5. Waste Generated and/or Disposed: (- lbs) was picked up by project personnel and placed in designated pickup areas. Total metal debris picked up to date:____- lbs_____
   -UXO Located: (date/grid #/anomaly ID/description/disposal information)

   -UXO Related: (date/grid #/anomaly ID/description/disposal information)

6. Job Safety: (List items checked, results, instructions and corrective actions taken)

Total Number of Days Worked on Site:____
Total Man-hours Worked with No Lost Time Accidents: _____
Total Number of Lost Time Accidents on the Site to Date:_____
Number of Lost Man-hours for Bad Weather Today:_____; To Date_____,
Lost intrusive time today: Equipment ( ), EZ violation ( ), Miscellaneous ( ), Total ( )
Lost intrusive time to Date: Equipment ( ), EZ violation ( ), Miscellaneous ( ), Total ( )
Safety functions completed today:

7. Remarks: (Instructions received or given. Conflict(s) in Plans and/or specifications. Delays encountered).

COMMENTS:

8. Attachments:

9.0 PROPERTY MANAGEMENT PLAN

9.1 PURPOSE

This document outlines the basic government and Foster Wheeler Environmental procedures for the acquisition, storage, control, usage and maintenance of the government property in possession of Foster Wheeler Environmental or its subcontractors for the purposes of performing work for the Fort McClellan project, under Contract No. DACA87-99-D-0010. The government property may be furnished to, acquired by, or fabricated at Foster Wheeler Environmental or its subcontractor's facilities.

9.2 SCOPE

The provisions provided herein delineate the basic requirements of the Federal Acquisition Regulation (FAR) Part 45, and they include the property classifications/definitions and provisions for property acquisition, receipt, identification, records, physical inventory, utilization and maintenance, loss/damage reporting, and final disposition of residual property upon contract completion and/or termination.

9.2.1 Equipment Types

This plan is applicable for the three different categories of equipment that will be used for the project: expendable, non-expendable and leased or rented. Descriptions of those three types are as presented in the following subsections.

9.2.1.1 Expendable Equipment

Expendable equipment is supplies and materials that are consumed during the course of it's use at a site.

9.2.1.2 Non-Expendable Equipment

Non-expendable equipment is defined as, equipment with a value over $500 that does not get consumed during the course of its use and/or would be difficult to replace and may impact the project schedule.

9.2.1.3 Leased or Rented Equipment

Equipment that is leased or rented by a vendor or by Foster Wheeler.

9.3 RESPONSIBILITIES

Foster Wheeler Environmental is accountable for all government property acquired for the performance of work for the project until properly relieved of that responsibility. The government provides a written release of accountability properly signed by an authorized contract official when all government property has been properly dispositioned at the end of the contract.

9.4 PROPERTY MANAGEMENT

9.4.1 Acquisition of Government Property

9.4.1.1 General

Foster Wheeler Environmental shall acquire government property either through requisition or transfer from government sources, fabrication, or purchase when the property is contractually authorized. Foster Wheeler Environmental shall not fabricate equipment when like commercial equipment is available.

9.4.1.1.1 Foster Wheeler Environmental personnel requesting property shall take responsible steps to ensure that the quantity of property requested be the minimum required to perform the work. They shall also ensure the property is not available from the project or program-specific stock that may be stored at any Foster Wheeler Environmental maintained warehouse, or available in government stocks provided to Foster Wheeler Environmental.

9.4.1.1.2 All Purchase Requisition (PR) status files will be maintained by the Project Manager (or designee) to control distribution, cancellations, or changes to PRs or Purchase Orders (POs) until items are received.

9.4.1.2 Authorization

Authorization to acquire government-furnished property (GFP) is the responsibility of the government Contracting Officer (CO), and authorization to procure the required equipment and material is granted by the contract. Acquisitions of accountable government property must be approved by the CO prior to acquisition. Any accountable government property provided to

Foster Wheeler Environmental under the contract will be described or listed to include an item description, manufacturers name, serial number, model number, and the particular agency decal number (if applicable).

9.4.1.2.1 PRs that are placed for the purchase or lease of government property shall be submitted to the Foster Wheeler Environmental Project Manager (or designee). The Project Manager (or designee) then performs the following steps:

1. Review PRs to ensure that there is no government property available for the intended purpose from government stores.
2. Determine what category the property should be reported and assigns an identification (ID) tag for all applicable items
3. If the item is a chemical or hazardous material, the PR must be submitted to the HSO for approval before it is submitted to the Foster Wheeler Environmental Procurement Department.
4. Return PR to the Foster Wheeler Environmental Procurement Department for placement.

9.4.1.3 Acquisition of Expendable Property

The Project Manager (or designee) has the authority to acquire expendable property required for the contract. Authority to acquire expendable property may be granted to other site employees as required. When a requirement for expendable property is identified, it must be determined if the property is authorized for use on the contract and if the property is currently available from Foster Wheeler Environmental held government property. If the property is not readily available from current stock or government sources, the material may be procured.

9.4.1.4 Acquisition of Non-expendable Property

When a requirement for non-expendable property is identified, it must be determined if the property is authorized for use on the contract and determine if the property is currently available from Foster Wheeler Environmental held government property that is authorized for the intended use or available from government stores or stock. If the property is not readily available the material may be procured.

9.4.1.4.1 Requests for equipment and non-expendable property not authorized by the contract shall be submitted to the government CO with sufficient justification to permit objective analysis. Copies of all quotes will be made available to the government upon request for all procurements requiring competitive pricing. The requests shall be submitted in a timely manner to the CO to ensure a reasonable amount of time to complete an adequate review of the request. If a need arises that equipment is required immediately in order to continue contract performance

without delay, the PM may make a preliminary approval for the purchase with a follow-up request being submitted to the government CO.

9.4.1.5 Leased Equipment

If equipment is not available from the government, property may be leased. The Project Manager (or designee) shall conduct a lease/purchase analysis prior to leasing property. If the lease is not approved in the contract, the CO must approve the lease prior to any costs being incurred.

9.4.1.5.1 Leased property shall be considered and handled as government property while being used in conjunction with government contracts.

9.4.2 Receipt of Government Property

9.4.2.1 General

Upon receipt of any item Foster Wheeler Environmental personnel (who are authorized to accept deliveries), shall perform a receipt inspection and determine whether the item is government property (see Attachment 9-8). This is accomplished by referencing the PO, PR, or project charge number found on the packing slip to the appropriate purchasing documentation. The individual accepting delivery of any item becomes responsible for the property until it has been transferred to another authorized individual. Before property can be accepted, the following must be accomplished:

- Prior to assuming responsibility of the item from the carrier, the receiver must visually inspect the containers for damage and verify the quantity received against that which the carrier states is being delivered. If a discrepancy is discovered prior to acceptance of the shipment, the receiver must obtain an endorsement on the delivery receipt and on the waybill by the carrier's representative, giving a detailed description of any damage or shortage and the condition of any damaged containers. The carrier's representative must sign such endorsements.

- The individual accepting the shipment must sign and date the packing slip or appropriate form.

9.4.2.1.1 After the authorized individual has accepted an item the following steps will be performed:

1. Start a Material Receiving Report (MRR) (see Section 9.4.2.3)
2. Send copies of completed MRR to Project Manager.
3. Deliver or store the item in a secure area so that it is not delivered to an unauthorized person.

9.4.2.2 Discrepancies Incident to Shipment

If overages, shortages, or damages are discovered upon receipt of government-furnished or contractor-acquired government property, the receiver shall notify the Project Manager and provide a statement of the quantity, condition, and probable causes of the discrepancy in the lower portion of the MRR.

9.4.2.3 Material Receiving Report

The person receiving government property is responsible for initiating and completing the MRR (Attachment 9-1) by signing for the delivery and immediately sending all documentation to the Project Manager.

9.4.2.3.1 The description of the item must be thorough enough to identify the property at a later time. This includes serial number, ID/government tag number, and/or part number. When leased items are received (rental equipment from outside vendor, gas cylinders, reusable containers), the vendor's identification number must be recorded on the packing slip and MRR.

9.4.2.3.2 If there are any discrepancies, the receiver will mark the type of discrepancy and write a thorough description of the discrepancy in the space provided on the lower portion of the MRR.

9.4.2.3.3 After receiving the property the authorized receiver shall forward all original MRRs and packing slips to the Project Manager (or designee). The person receiving the property should maintain a copy of the MRR for his or her own records. The Project Manager (or designee) maintains one copy of the packing slip and one copy of the MRR in a project-specific file.

9.4.2.4 Distribution of Property

9.4.2.4.1 Expendable Property

After expendable property has been received, the items may be forwarded to the person identified as requesting the property. Prior to property distribution, the Property Request/Availability Form (Attachment 9-2) must be completed. The Government Property Hand Receipt and Transfer Document (see Attachment 9-3) shall be used for transfer between locations.

9.4.2.4.1.1 Consumable or expendable property items will be allocated on an as-required basis when practicable. The Project Manager (or designee) shall make every effort to ensure excess expendables are not delivered to the site.

9.4.2.4.2 Non-expendable Property

After receipt of non-expendable property, the items shall be forwarded to the person identified for receipt of the property. The Government Property Hand Receipt or Property Receipt and Transfer Document shall be used for all transfers between locations (such as between offices, temporary field offices, warehouses, and monitoring sites).

9.4.3 Identification of Government Property

Foster Wheeler Environmental will tag and adequately identify items that are government property. ID tags are attached to the main body of an item in a manner that will make the tag readily visible, but not interfere with the normal operation of the equipment. Items that cannot be readily tagged may be identified by other means such as using indelible ink, paint, or etching.

9.4.3.1 Software shall not require a physical ID tag. Software shall be identified as government property during initial startup of the program in the software license agreement. During initial startup of the program, the user will be prompted to enter their name and company name. The user shall enter "United States Government" in the name block and Agency Name and Contract No. in the company name block.

9.4.3.2 When government property is received on site, the Project Manager (or designee) shall be responsible for identifying the person responsible for receiving government property and accomplishing all receiving and identification requirements outlined in this document.

9.4.4 Records of Government Property

9.4.4.1 General

The Project Manager (or designee) shall maintain records of all government property, including Government-furnished and contractor-acquired property, regardless of value. Property records will be maintained in a manual and/or automated system depending on the nature of the property.

9.4.4.1.1 All government property records shall be maintained for a period of four years as outlined in FAR 4.705.

9.5 MOVEMENT OF GOVERNMENT PROPERTY

9.5.1 General

Standard shipping practices shall be used to prevent damage or loss when relocating property. The person shipping the item shall be responsible for determining the need for and acquiring any permits and/or approvals for movement of government property.

9.5.2 Property Requests

When government property is required for the completion of a field project, the requester shall complete the Property Request/Availability Form (see Attachment 9-2). The Project Manager (or designee) shall review the form to determine if the property is available from the inventory of government property. For those requested items which are not available from the government property inventory, a purchase requisition for rental of equipment or purchase of material shall be completed by the requester and approved by the Project Manager.

9.5.3 Movement Using External Sources

For movement of government property using an external source, (U.S. Postal Service, Federal Express, etc.) a Property Receipt and Transfer Document (see Attachment 9-3) will be used and completed in its entirety.

9.5.3.1 The Project Manager (or designee) will maintain the original copy with the contract property records, and will update the property records database to show movement of tagged property.

9.5.4 Return of Government Property

When property is returned from a project, the Property Return form shall be completed. The Foster Wheeler Environmental Manager (or designee) shall verify this form.

9.6 TRANSFER OF GOVERNMENT PROPERTY

DD Form 1149, Requisition and Invoice/Shipping Document is used to transfer government property between the government and Foster Wheeler Environmental or between Foster Wheeler

Environmental and a subcontractor. The DD Form 1149 is not only used as a shipping document, but also shows the transfer of liability for government property. Until this form is completed, all liability for the property lies with the original holder. Complete instructions regarding the completion of the DD Form 1149, are included in Attachment 9-4. Transfer of government property is prohibited without a written authorization from the CO.

9.7 STORAGE OF GOVERNMENT PROPERTY

Foster Wheeler Environmental shall use standard storage practices that prevent loss or damage to all government property. Government property that is not in current use shall be stored in a secure site location or in a Foster Wheeler Environmental warehouse. Government property located at the project site shall be kept in a storage area that will provide adequate protection from theft or loss.

9.8 PHYSICAL INVENTORIES OF GOVERNMENT PROPERTY

As a minimum a physical inventory shall be performed on an annual basis. The Project Manager (or designee) will oversee the inventory. The individual performing the inventory shall not be the same individual who maintains the property records or has custody of the property. The scope of the inventory shall be project wide. The report shall be for all accountable government property used on the project and also includes accountable government property in the custody of subcontractors.

9.8.1 The inventory report shall contain, at a minimum, the following items:

- Contract and delivery order number
- A listing that identifies all discrepancies
- The date that the inventory was completed
- The name, title, and signature of the person who conducted the inventory
- A statement that the official property records are in agreement with the physical inventory, except for the discrepancies reported
- The inventory results on a quantitative and monetary basis by type of property
- A statement that all adjustments to records for variances will be annotated on the official property records with the adjustment date and the date of the physical inventory.

9.8.2 During demobilization an inventory of all government property will be made.

9.9 REPORTS OF GOVERNMENT PROPERTY

9.9.1 General

Foster Wheeler Environmental may be required to submit a variety of reports that will keep the government apprised of the status of any government property in the possession of Foster Wheeler Environmental. Foster Wheeler Environmental shall ensure the accuracy and completeness of such submissions.

9.9.2 Report of Government Property in the Custody of Foster Wheeler Environmental

Foster Wheeler Environmental shall use and submit DD Form 1662, Report of Department of Defense (DoD) Property in the Custody of Contractors to the GPA, for all Foster Wheeler Environmental government contracts, on an annual basis. The report will also contain a list of property in the custody of subcontractors. Instructions for completion of DD Form 1662 are included in Attachment 9-5.

9.9.3 Loss, Damage, or Destruction Reports

Any loss, damage, or destruction (LDD) of Government Property shall be reported immediately. The Project Manager (or designee) shall maintain records containing data related to loss, damage, or destruction of Government property (see Attachment 9-9).

9.9.3.1 The LLD report shall contain, at a minimum, the following items:

- Contractor's or subcontractor's name and contract number.
- Report number
- Submitted by
- Date submitted
- Title of person submitting
- Description of item(s) lost, damaged, or destroyed.
- Identification number if applicable
- Original cost of property lost, damaged, or destroyed.

9.9.3.2 Any loss due to theft or suspected theft must be reported immediately to the local police or security department.

9.10 CONSUMPTION OF MATERIALS

During the performance of the contract, Foster Wheeler Environmental will consume many of the items that are furnished by the government or acquired by Foster Wheeler Environmental for use on the project. Foster Wheeler Environmental shall base their material requirements on past experience and specific project requirements. At all times, Foster Wheeler Environmental shall use its best effort to ensure that the minimum material required to complete the effort is procured. Excess materials will be promptly returned to vendors for credit to the project or reported as excess for disposal purposes.

9.10.1 Foster Wheeler Environmental shall use a first-in, first-out system that allows for the most efficient use of material and to avoid unnecessary loss of material due to expiration.

9.11 UTILIZATION OF GOVERNMENT PROPERTY

9.11.1 General

Foster Wheeler Environmental shall endeavor to utilize all equipment to its maximum capacity. However, some equipment that is required by the contract may have been acquired based on minimum usage requirements. In cases such as this, Foster Wheeler Environmental shall ensure that the minimum amount of equipment is made available to meet the requirements.

9.11.2 Authorized Usage

Foster Wheeler Environmental defines authorized usage as the operation or utilization of a property by qualified individuals. Qualified users of property, for example, have either received training (e.g., respirator, breathing apparatus, combustible gas indicator instruction), or instruction (e.g., computer, well bailer training). Subcontractors and program management shall ensure that only authorized users operate, health and safety equipment, and other equipment for which they are responsible. The Foster Wheeler Environmental PM shall have the final authority for authorizing usage.

9.11.3 Utilization Records

Foster Wheeler Environmental shall maintain utilization data as required by FAR Part 45.509-2. An equipment utilization log (Attachment 9-6) shall be used with any equipment with an

acquisition value of greater than $5,000. All columns on the log shall be completed for each usage. The Project Manager (or designee) shall maintain for analysis the current quarterly data as well as the data for the previous three quarters.

9.12 MAINTENANCE OF GOVERNMENT PROPERTY

9.12.1 General

Foster Wheeler Environmental shall be responsible for the proper care, maintenance, and use of government property in its possession or control from the time of receipt until relieved of responsibility. Maintenance records shall be maintained in an equipment maintenance log for each piece of Government property that requires regular maintenance.

9.12.1.1 Whenever any type of maintenance is performed, an Equipment Maintenance Record shall be completed (see Attachment 9-7). If the maintenance is being performed by other than Foster Wheeler Environmental personnel, all repair information (e.g., calibration charts, logs, or repair information) and a copy of the packing slip and/or MRR shall be attached to the Equipment Maintenance Record form.

9.12.2 Preventive Maintenance

Foster Wheeler Environmental shall schedule and perform or make arrangements for preventive maintenance (e.g., lubrication, adjustments, servicing, inspections) on equipment in accordance with the required frequencies (e.g., daily, weekly, monthly, or annually) as recommended in the manufacturer's service manual, technical bulletins/manuals, other pertinent directives, or historical data. If an item is scheduled for maintenance while in use, the Project Manager (or designee) will make arrangements to have the unit removed from service and an alternate unit provided as needed. The preventive maintenance schedule will be maintained in the property records database. The operator shall report defects discovered during these checks or during operation of the equipment.

9.12.2.1 Foster Wheeler Environmental shall include normal parts replacement required to forestall excessive wear, repair, malfunction, or deterioration of equipment during preventive maintenance to minimize downtime and maximize use.

9.12.2.2 Foster Wheeler Environmental shall maintain an inspection record and annotate the following at the time of each inspection:

- Date of inspection
- Name of personnel performing the inspection

- Findings of the inspection and deficiencies noted, if any
- Corrective action taken, if required, and the date action was taken

9.12.2.3 When preventive maintenance is performed by other than Foster Wheeler Environmental personnel, Foster Wheeler Environmental shall ensure, to the best of its ability that it is accomplished and that the equipment is in safe operating condition.

9.12.3 Corrective Maintenance

Foster Wheeler Environmental shall also perform, or arrange for the performance of, corrective maintenance (e.g., repair or overhaul) of government equipment outside the scope of preventive maintenance when required. Corrective maintenance shall be accomplished in accordance with the manufacturer's recommendations, technical bulletins/manuals, other pertinent directives, or historical data.

9.12.3.1 Any major repairs, replacement or capitol rehabilitation work for government property will be disclosed and reported to the government CO. Foster Wheeler Environmental shall provide a cost estimate and request approval from the government CO to exceed the maintenance expenditure limit (MEL) based on the current replacement price of the equipment when repair or overhaul of the equipment is required.

9.12.3.2 The corrective maintenance of equipment that is beyond the ability of Foster Wheeler Environmental personnel will be subcontracted to commercial vendors. Foster Wheeler Environmental shall endeavor to ensure that the subcontractor complies with the objectives contained herein. The Project Manager or designee must authorize all repairs prior to the repairs being made.

9.12.4 Calibration

Equipment calibration shall be performed in accordance with Manufacturer’s Specifications. Calibration results will be recorded on equipment specific calibration logs.

9.12.5 Material-Handling Equipment Maintenance and Serviceability Standards

An inspection and service shall be performed on material-handling equipment every 500 hours or semiannually, whichever occurs first. This inspection and service shall be performed as prescribed in the manufacturer's service manual. All inspection and service records shall be maintained in the equipment maintenance log.

9.13 SUBCONTRACTOR PROPERTY ADMINISTRATION

Foster Wheeler Environmental shall perform surveillance over government property in the possession of subcontractors and ensure to the best of its ability that the subcontractor complies with the provisions of the contract. All cost-reimbursement, time and material, or labor-hour subcontracts and POs issued under the prime contract shall reflect the property administration requirements of this document in the Terms and Conditions for the subcontract. All subcontractors shall conform to FAR Part 45.5. Any deviation from these requirements shall require written confirmation from the government.

9.14 DISPOSITION OF GOVERNMENT PROPERTY

9.14.1 General

At the completion of the project, all residual government property shall be accumulated in storage areas to facilitate the completion of a final inventory. All excess and residual property will be reported on form SF 1428, Inventory Schedule B. The Project Manager (or designee) will complete the inventory.

9.14.1.1 If Foster Wheeler Environmental is instructed to abandon property, all government markings shall be removed and the item shall be disposed of, and in a manner that does not endanger the health and safety of the public.

9.14.2 Return of Leased or Returnable Property

At completion of the project, all leased or returnable property will be returned to the original vendor. When returning property to the vendor, whether the item is shipped to the vendor or the vendor picks up the item, the person responsible for the property shall prepare a packing slip. The packing slip shall identify the item in a manner that allows other employees to readily identify the specific item that was returned including the vendor's property identification number. This procedure applies to all leased and returnable property at all times throughout the project performance.

9.14.3 Contract Closeout

Foster Wheeler Environmental will dispose of Government property in accordance with instructions provided by the GPA, and the property records will be annotated as to the method of disposition. The following is a list of disposal methods:

- If the contract is a cost-reimbursement type contract, Foster Wheeler Environmental may offer to buy contractor acquired property at 100 percent of the acquisition value.
- Items in new condition may be returned to the original vendor for reimbursement as outlined in the Foster Wheeler Environmental purchase agreement.
- Property may be transferred to a new contract.
- The government may transfer the inventory to a licensee by means of a Revocable License Agreement for a loan.
- The inventory may be returned to the government.
- The government may wish to report the inventory as excess and direct Foster Wheeler Environmental to abandon, destroy, or donate the inventory.

9.14.3.1 Final inventories will include subcontractor inventories and will contain the following statements:

- "I certify that except that items consumed in the performance of the contract, this inventory includes all materials, supplies, and equipment furnished by the government or acquired by the contractor for the account of the government under contract number DACA87-99-D-0010.
- "I further certify that all property is in a state free from contamination by any hazardous for toxic substances, and requires no additional clean-up or decontamination efforts."

9.14.3.2 If the inventory is to be transferred to another contractor, Foster Wheeler Environmental shall conduct the final inventory in conjunction with the follow-on contractor.

9.14.3.3 Once all property has been disposed of, The Project Manager (or designee) will submit a DD 1662 report as outlined in Section 9.9.2, reflecting a zero balance.

ATTACHMENT 9-1
MATERIAL RECEIVED REPORT (MRR)

ATTACHMENT 9-1

MATERIAL RECEIVED REPORT (MRR)

(*CONTRACT #)*
Client Name)

PARTIAL SHIPMENT No. _____ Page ____ of ____

RECEIVED AT:	PO NO:	MRR NO:
VENDOR:	DATE:	WEIGHT:
SHIPPER:	CHARGE NO:	
SHIPPED FROM:	SERIAL NO:	
RECEIVED BY:	VENDOR ID NO (RENTALS)	DATE
RECEIVED AS: PIECES _____ BOXES _____ CARTONS _____ BAGS _____	BUNDLES _____ OTHER ____	

ITEM DESCRIPTION

ITEM NO.	QUANTITY	DESCRIPTION	INVENTORY ID TAG NO.	CATEGORY

REPORT OF SHORTAGE: _____ DAMAGE: _____ OVERSHIPMENT: _____

If a discrepancy is discovered prior to acceptance of shipment, obtain endorsement of delivery receipt and freight bill by carrier's representative, giving detailed description of any damage or shortage and the condition of any damaged containers even though the contents are in apparent good order. The signature of the carrier's representative must be affixed to such endorsements

ITEM NO.	QUANTITY	DESCRIPTION

ATTACHMENT 9-2
PROPERTY REQUEST/AVAILABILITY FORM

ATTACHMENT 9-2 (Page 1 of 2)
PROPERTY REQUEST/AVAILABILITY FORM

Requested By: _____ Request/Availability No.: _____
Delivery Order No.: _____ Date Requested: _____
Deliver To: _____ Date Need By: _____
Order was Filled _____ **Partial** _____ **Need to Order via Purchasing** _____

Item Description	Qty	Special Information
Office Supplies		
Job Site Office Supply Kit _____		No. of Personnel: _____
Trash Bags _____	_____	Size: _____
Other _____	_____	_____
_____	_____	_____
Clothing Supplies:		
Coveralls		
Cotton _____		Size:_____ Wo/Mens: _____
Insulated _____	_____	Size:_____ Wo/Mens: _____
Tyvek _____	_____	Size:_____ Wo/Mens: _____
Other: _____	_____	Size:_____ Wo/Mens: _____
_____	_____	Size:_____ Wo/Mens: _____
Rain Gear		
Pants _____		Size:_____ Wo/Mens: _____
Jackets _____	_____	Size:_____ Wo/Mens: _____
Other _____	_____	Size:_____ Wo/Mens: _____
_____	_____	Size:_____ Wo/Mens: _____
Rubber Boots Steel Toed _____	_____	Size:_____ Wo/Mens: _____
Gloves		
Leather _____		Size:_____
Cloth _____	_____	Size:_____
Nitrile _____	_____	Size:_____
Latex _____	_____	Size:_____
Other: _____	_____	Size:_____
_____	_____	Size:_____
Safety Supplies		
Fire Extinguishers _____		Size: _____ Type:_____
Eye Wash Station _____	_____	_____
Safety Glasses _____	_____	_____
Hard Hats _____	_____	_____
Hard Hat Shields _____	_____	_____
Ear Plugs _____	_____	_____
First Aid Kit _____	_____	_____
Safety Signs _____	_____	_____
Respirators Full Face/Other	_____	_____
Resp. Cartridges _____	_____	_____
Caution Tape _____	_____	_____
Water Coolers _____	_____	_____
Other : _____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
	_____	

ATTACHMENT 9-2 (Page 2 of 2)
PROPERTY REQUEST/AVAILABILITY FORM

Small Tools Shovels ______________ Brooms ______________ Mop ______________ Hammer ______________ Other: ______________________________	QTY	Flat: __________ Round: ______________ Push: __________ Sweep: ______________
Miscellaneous Gas Cans ______________ Extension cords ______________ Engine Oil ______________ Duct Tape ______________ Plastic Tubs/Buckets ______________ Garbage Cans ______________ Paint Marker ______________ 55 Gal. Drums ______________ Bathroom Tissue ______________ Paper Towels ______________ Cloth Rags ______________ Other: ______________________________	QTY	Size: ______________________________ Length: ______________________________
Special Need:		QTY

ATTACHMENT 9-3
PROPERTY RECEIPT AND TRANSFER DOCUMENT

ATTACHMENT 9-3

PROPERTY RECEIPT AND TRANSFER DOCUMENT

GOVERNMENT PROPERTY RECEIPT AND TRANSFER DOCUMENT SHIPPING TRANSFER RECEIPT	TRANSFER NO.
.NAM E and ADDRESS OF ISSUING RECIEPT	. DESTINATION
CONTRACT NO	DELIVERY ORDER NO:
SHIPPING DATA	

BILL of LADING NO.	CARRIER OR METHOD OF SHIPMENT			DATE
NO. of PAGES	SIGNATURE OF MAILROOM CLERK	POSTAGE	WEIGHT	DATE

PROPERTY

I.D. TAG NO.	DESCRIPTION OF PROPERTY	QUANTITY	UNIT	UNIT COST	TOTAL AMOUNT

SIGNATURE OF PROPERTY ADMINISTRATOR	DATE

RECEIVING

RECEIVED BY	DATE
TITLE	

ATTACHMENT 9-4
INSTRUCTIONS FOR THE USE, COMPLETION, AND DISTRIBUTION OF DD FORM 1149, "REQUISITION AND INVOICE/SHIPPING DOCUMENT"

ATTACHMENT 9-4 (Page 1 of 3)

INSTRUCTIONS FOR THE USE, COMPLETION, AND DISTRIBUTION OF DD FORM 1149, "REQUISITION AND INVOICE/SHIPPING DOCUMENT"

1. Use. The DD Form 1149 may be used for the following purposes (unless otherwise approved by the PA, CO, or contract):

   a) Return of Government Furnished Property (GFP) except for material obtained through the Military Standard-Requisitioning and Issue Procedures (MILSTRIP) and Real Property. MILSTRIP material may be returned on DD Form 1348-1, as prescribed by DoD Manual 4000.25 1-M. Real Property will be transferred on DD Form 1354.
   b) Shipment of Industrial Plant Equipment (IPE) controlled by the Defense Industrial Plant Equipment Center (DIPEC), Memphis, Tenn. (Use DD Form 1149 issued by DIPEC.)

   c) Internal transfer of Government property accountability from one contract to another, with proper authorization (i.e., contract modification).

   d) Shipment of Government property to other contractors and subcontractors. DD Form 1149 may also be used for shipments to secondary locations of the prime contractor.

2. Preparation and Completion of DD Form 1149

   a) The following information will be reflected in each appropriate block:

(1) From - Consignor (including contract number under which shipment is made).

(2) To - Consignee - Enter complete name. Do not abbreviate or use letter symbols.

(3) Ship to - Mark for - as indicated in the shipping instructions. Indicate contract number under which consignee will receive shipment, if furnished with shipping instruction.

(4) Accounting and Funding Data - Cite applicable data if specified in the shipping or other instructions. For Item 4 leave blank in all other cases. Items 4a through 4i shall be completed in all instances.

(4a) Item No. - Numerical sequence of items being shipped or transferred.

(4b) National Stock Number, Description and Coding of Material and/or Services - enter data listed in applicable Federal catalogs. Use Manufacturer's part number and description if item is not listed in Federal catalogs and so indicate in the description. If applicable, include in this block a listing of all attachments and accessories.

ATTACHMENT 9-4 (Page 2 of 3)

INSTRUCTIONS FOR THE USE, COMPLETION, AND DISTRIBUTION OF DD FORM 1149, "REQUISITION AND INVOICE/SHIPPING DOCUMENT"

(4c) Unit of issue - as appropriate.

(4d) Quantity requested - enter quantity requisitioned by consignee, if appropriate. If not applicable, leave blank.

(4e) Supply action - enter quantity being shipped or transferred.

(4f) Type container - carton, wooden or metal box, skid, etc.

(4g) Container Numbers. - Number each container if more than one and indicate in this block the container numbers in which the particular item is located.

(4h) Unit price - cost of each individual item - Use estimate when cost is not available.

(4i) Total cost - Unit price multiplied by the total number of the applicable item shipped.

(5), (6), (7) and (8) Requisition date, number, requirement and priority - Leave blank unless such data are included in the shipping instructions.

(9) Authority or purpose - cite document, contract modification, or other Government directive that authorized shipment or transfer.

(10) Signature - leave blank

(11a) Voucher number and date - enter number assigned by the shipping contractor or consignor to identify this shipping document and to credit his property account.

(11b) Indicate date the voucher number was assigned.

(12) Date shipped - enter date items are picked up by carrier. For in-place transfers, enter date transaction is completed.

(13) Mode of shipment - enter type of carrier used - railroad, commercial or Government truck, pick-up, commercial, or Government aircraft.

(14) Bill of lading number - enter the commercial or Government bill of lading number on which shipment is accomplished.

ATTACHMENT 9-4 (Page 3 of 3)

INSTRUCTIONS FOR THE USE, COMPLETION, AND DISTRIBUTION OF DD FORM 1149, "REQUISITION AND INVOICE/SHIPPING DOCUMENT"

(15) Air Movement Designator or Port Reference No. - enter data when applicable. ;

(16) Transportation via MSTS Chargeable to - Cite appropriate funds for these items as called for in shipping instructions. Leave blank if not applicable.

(17) Special handling - enter special handling requirement specified in the shipping instructions or required by the nature of the items shipped (i.e. “fragile,” "do not drop,” etc.).

(18) Recapitulation of shipment - enter appropriate data only when shipments are of such magnitude and complexity that this information will be helpful in controlling shipment. This block may be left blank at the discretion of the Consignor.

(19) Receipt data - for use by consignee.

b. OAR verification. When appropriate, the QAR will place a verification stamp or signature in block 4b following the last line item entered. DD Form 1149C, "Requisition ad Invoice/Shipping Document (Continuation sheet)" will be used if more than one page is required for a single shipment.

3. Distribution

a) The DD Form 1149, as a minimum, will be distributed as follows:

Original - To Consignee with shipment
1 Copy - Consignor
I Copy - Mailed to consignee as advance copy
I Copy - Attached to original copy of Bill of Lading
I Copy - Attached to Transportation Office copy of GBL
1 Copy- Carrier
1 Copy - Quality Assurance Representative (QAR)
1 Copy - Plant Clearance Officer (PLCO) (if applicable)
1 Copy - Property Administrator (if required for information purposes)

b) Distribution should be reflected in the body of DD Form 1149 or 11 49-1.

c) Classified shipments and documents will be marked and handled in accordance with existing security regulations.

ATTACHMENT 9-5
INSTRUCTIONS FOR THE USE, COMPLETION, AND DISTRIBUTION OF DD FORM 1662, "DOD PROPERTY IN THE CUSTODY OF CONTRACTORS"

ATTACHMENT 9-5
INSTRUCTIONS FOR THE USE, COMPLETION, AND DISTRIBUTION OF DD FORM 1662, "DOD PROPERTY IN THE CUSTODY OF CONTRACTORS"

GENERAL - The prime contractor shall report all DoD property (as indicated) in its custody or in that of its subcontractors as of September 30 to the Government Property Representative by October 31 of each year. Report zero balances on contracts accountable for DoD property when they close.

REPORT AS OF 30 SEPTEMBER 19 - Fill in the appropriate year (or other date).

ITEM l-TO - Enter the name of the Government Property Representative, the Contract Administration Office, or other office the Government Property Representative works for and the full mailing address (including City, State, and Zip +4).

ITEM 2-FROM - Enter the full name and address of the reporting contractor with the division name stated after the corporate name. Use the name as it appears on the contract but omit articles and insert spaces between company names that are made up of letters like BDM international, Inc., for example. Also, enter the commercial and government entity (CAGE) code.

ITEM 3 - Enter the government name of the plant if the plant is Government-owned and Contractor-operated. Leave blank if it is a Contractor-owned plant.

ITEM 4 - CONTRACT NO. (PIIN). - Enter the 13 - digit contract number or Procurement Instrument Identification Number (PIIN) under which the Government property is accountable Use format XXXXXX - X - XXXX.

ITEM 5 - CONTRACT PURPOSE. - Enter one of the following 1 - character alphabetic codes to identify the general purposes of the contract:

a) RDT&E
b) Supplies and Equipment (deliverable end items)
c) Facilities Contract
d) Lease of facilities by the contractor
e) Maintenance, Repair, Modification, or Rebuilding of Equipment
f) Operation of a Government-owned plant or facilities including test facilities,
g) ranges or sites
h) Service contract performed primarily on Military installations, test facilities,
i) ranges, or sites
j) Contract for storage of Government property

ATTACHMENT 9-6
EQUIPMENT UTILIZATION LOG

ATTACHMENT 9-6

EQUIPMENT UTILIZATION LOG

EQUIPMENT I.D._____

DESCRIPTION_____

DATE OUT	TIME OUT	COND. CODE & COMMENTS OUT	CHECKED OUT BY	DATE IN	TIME IN	CHECKED IN BY	COND. CODE & COMMENTS IN

ATTACHMENT 9-7
EQUIPMENT MAINTENANCE/REPAIR

ATTACHMENT 9-7
EQUIPMENT MAINTENANCE/REPAIR

MAINTENANCE/REPAIR NO._____

NECESSARY ATTACHMENTS _____ PACKING SLIP, and/or _____ MRR, abd _____LOGS

TYPE OF EQUIPMENT	SERIAL NO.
MAKE:	MODEL:
P O NUMBER	DELIVERY ORDER NO.
STANDARD MAINTENANCE	DATE
DESCRIPTION OF PROBLEM (if any) _____ _____ _____	

MAINTENANCE/REPAIRS TO BE PERFORMED

IN-HOUSE REPAIRS	DATE
SENT OUT TO	COST ESTIMATE AIRBILL NO. P O NO. DATE RET'D
CORRECTIVE ACTION _____ _____ _____ _____	

PARTS LIST

PART DESCRIPTION	QUANTITY	COST/EA
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

TOTAL LABOR (hours) PERFORMED BY	DATE
RETURNED TO WHICH JOB SITE/WAREHOUSE	

ATTACHMENT 9-8
GOVERNMENT PROPERTY HAND RECEIPT

ATTACHMENT 9-8

GOVERNMENT PROPERTY HAND RECEIPT

Current Location_____ Contract_____

New Location _____ OFS _____

Comments _____ Date/Time Req'd_____

_____ MRR No._____

_____ P.O. No._____

ITEM NO.	QUANTITY	UNIT	ARTICLES (*Describe Fully*)

Approved_____ Issued By_____ Received by_____

Date/Time Issued_____

ATTACHMENT 9-9
LOST, DAMAGED, OR DESTROYED PROPERTY REPORT FORM

ATTACHMENT 9-9 (Page 1 of 2)
LOST, DAMAGED, OR DESTROYED PROPERTY REPORT FORM

D.O. No:_____	D.O. Title:_____	**TYPE OF INCIDENT:**
D.O.M.:_____	Site Superintendent:_____	Lost: _____
Incident	By Whom:	Damaged: _____
Date/Time: _____	Witnesses (if any):_____	Destroyed: _____

Item Description	ID Tag No. (if any)	PO Number	Replace/Repair Cost	REMARKS

DETAILED DESCRIPTION of Loss, Damage or Destruction Incident: *(Include ALL Details Available)*

(DOM and Property Administrator's Findings

ATTACHMENT 9-9 (Page 2 of 2)
LOST, DAMAGED, OR DESTROYED PROPERTY REPORT FORM

Page 2 (Contract No.)

CORRECTIVE ACTION to be taken to prevent the incident from occurring again: *(DOM Action Taken / In Future Advise)*

Submitted By:_____ Title: _____

Signature: _____ Date: _____

DOM's Review Approval: Print Name:

Signature: _____ Date: _____

PA's Signature: _____ Date: _____

Additional Notes (if any):

10.0 SAMPLING AND ANALYSIS PLAN

Any incidental HTRW sampling that may be required during the performance of OE investigations and response actions will be performed by Foster Wheeler Environmental in accordance with the approved "Installation-Wide Sampling and Analysis Plan" prepared by International Technology Corporation (IT). Other site-specific sampling requirements and protocols will be identified in the Delivery Order Specific Work Plans. Any sampling and analysis required for chemical agent contaminated media will be performed in accordance with the CWM Site Safety Submission and site-specific requirements will be identified in the site-specific amendment(s) to the CWM Site Safety Submission.

11.0 QUALITY ASSURANCE AND QUALITY CONTROL PLAN

The purpose of this data Quality Assurance and Quality Control (QA/QC) Plan is to plan and implement a comprehensive set of controls and systematic procedures to ensure quality throughout the execution of tasks performed during site activities at Fort McClellan. Quality Control is defined as the following: an appropriate evaluation, performed by the provider of contractually defined products, to assure that those products meet prescribed requirements and comply with applicable laws, regulations and sound technical practices of the disciplines involved. The objective of this plan is to ensure that the data acquired are of a quality necessary to fulfill Data Quality Objectives (DQOs) implemented for each project. Foster Wheeler Environmental is responsible for the control of the quality of all products, and for ensuring that only products/services are submitted to the government which conform to contractual requirements.

11.0.1 The Foster Wheeler Environmental Corporate QA/QC policy requires several levels of internal, interdisciplinary reviews of all project related data and deliverables prior to submittal. The QA/QC process allows each project team member to understand the quality expected and encourage positive communication between the Fort McClellan project team members (i.e., Foster Wheeler Environmental, CEHNC, and Fort McClellan). Only qualified and experienced geophysicists, UXO personnel, and subcontractors will be utilized in order to ensure that the program and project objectives and data requirements are achieved.

11.0.2 The data collected during geophysical and OE field investigations, removal actions (TCRA and NTCRA), construction support, as well as data collected for the EE/CA and institutional analysis, will be used to support the evaluation of risk reduction and removal action alternatives for the site. Therefore, shall be of sufficient quality and quantity to: 1) evaluate the risk of OE exposure; 2) make decisions regarding appropriate actions to mitigate those risks; and 3) implement the selected actions. The objective of the QC process is not to place blame and criticize those parties involved in activities that are not meeting minimum project requirements, rather it is to identify problem areas early-on in the process, so improvements can be made to ensure a successful project.

11.0.3 It should be noted that this plan provides an overview of the QA/QC process and describes QA/QC components for some of the anticipated tasks to be conducted at Fort McClellan. Delivery Order specific QA/AC plans will be developed based on the tasks identified in the CEHNC Scope of Work for each project (e.g., investigation, EE/CA, construction support, removal action, etc.) and will be provided in the Delivery Order Specific Work Plans.

11.1 DATA QUALITY OBJECTIVE PROCESS

DQOs are qualitative and quantitative statements that specify the quality of the data required to support decisions during all phase of work (e.g. investigation, removal actions, construction

support, etc.) at Fort McClellan. 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

11.1.01 The minimum DQOs that will be fulfilled and applied to all phases of work at Fort McClellan are identified in the CEHNC Data Item Descriptions (DIDs), which are presented in Attachment 11-1. Any additional DIDs/DQOs identified for specific Delivery Orders will be detailed in the Delivery Order Specific Work Plans.

11.1.1 Data Quality Characteristics

The overall QA/QC objective for the activities conducted at Fort McClellan 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). Data Quality Objectives for each of these parameters are determined based on the level of data required. Descriptions of these characteristics are provided below.

- Precision – A measure of the agreement between repetitive measurements of the same property.

- Accuracy - A measure of the agreement of a measurement or the average of several measurements with a pre-defined (or accepted) value.

- Representativeness – A measure of the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Careful choice and use of appropriate methods in the field helps to ensure that samples are representative.

- 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 plan and perform each task.

- Comparability – Describes the degree of confidence in comparing one data set with another.

11.1.2 General Sequence of QA/QC Components

The general sequence and associated QA/QC components for Fort McClellan activities are as follows:

(1) Project personnel and subcontractors review and develop an understanding of the Scope of Work. The Scope of Work for each Delivery Order will be provided in the Delivery Order Specific Work Plans.

(2) Prepare the Delivery Order Specific Work Plan to detail the project strategy, procedures and requirements.

(3) Collect data and perform the tasks required in accordance with the CEHNC-approved Work Plan

- Data will be collected and reviewed by the appropriate project personnel (peer review);

- A second review of a representative portion of collected data will be conducted by the Foster Wheeler Environmental UXOQCS; and

Note: Each of the above elements has a feed-back loop to the field team to evaluate to perform data corrections as necessary.

(4) An assessment of QA/QC results, non-conformance, and any associated corrective actions taken will be presented in the Investigation Report.

The Chain of Custody form utilized to document the QA/QC process for specific tasks is presented as Table 11-1.

11.2 GEOPHYSICAL MAPPING AND OE INVESTIGATION QC

For the Fort McClellan project, screening data generated by geophysical mapping will achieve a data use level for OE site characterization. Definitive OE data generated during the intrusive field investigation will achieve a data use level to support a OE risk assessment. Specifically, these data will be used to:

- Confirm and further define the nature and extent of surface and subsurface OE contamination, through the excavation of geophysical anomalies and identification of excavated material as scrap, ordnance scrap, inert ordnance, or live OE;

Table 11-1
QA/QC Chain of Custody

Sector ID: _____ **Grid ID:**_____

Task	Performed by/Date	Checked by/Date	Comments/Resolution
Geophysical equipment calibration			
DGPS reference check			
Geophysical survey			
Geophysical mapping and target selection			
Dig sheet production			
Anomaly excavation			
Geophysical confirmation			
Anomaly re-excavation			
UXO/anomaly identification			

- Obtain sufficient data for the performance of a OE risk assessment; and
- Obtain sufficient data for the screening and evaluation of appropriate risk reduction and removal action alternatives during the EE/CA.

11.2.1 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, must be achieved for the geophysical investigation. 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

11.2.2 If the performance goals cannot be achieved, Foster Wheeler Environmental will propose and document alternative goals for the CEHNC CO's consideration.

11.2.3 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. An example of the Geonics EM-61 acceptable accuracy requirements is 5 percent of the total reading at 20 millimhos per meter. 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 elsewhere in this Work Plan, will be followed and thus provide a greater degree of confidence associated with the measurements. Accuracy DQOs include horizontal accuracy and false positive restrictions.

11.2.4 According to the Geophysical Investigation Plan DID (OE-005-05), 98 percent of all excavated targets must lie within a 20cm radius of their mapped surface location as marked in the field after reacquisition. If node measurements (as determined with a tape measure) exceed the prescribed limits, the location data from the applicable grids and other grids processed since the last acceptable evaluation must be re-evaluated to determine the cause. If possible, corrections will be performed in the processing center (e.g., revise incorrect conversions of relative coordinates to State Planar Coordinates), followed by re-flagging the locations, and performing an in-field check with a geophysical instrument. If the discrepancy cannot be

corrected, and the anomalies flagged in these grids are not at the actual target locations (as determined by a geophysical instrument), then the data at the grids in question will be re-acquired.

11.2.5 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.

11.2.6 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 OE 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). The UXOQCS and SUXOS will compare 100 percent of the excavation results with anomaly size and depth estimates provided by the geophysicist. If an anomaly is not recovered within a 1.5 foot radius of the mapped location at the estimated depth, the interpretation geophysicist will confirm the anomaly location and size by resurveying and/or reprocessing the data. Continuous communication and feedback between the UXO field team and the interpretation geophysicist is required. DID OE-005-05 specifies that there may be no more than 15 percent false positives where the reacquired anomalies result in no detectable, metallic material during excavation. An accountability log of false positives will be maintained.

11.2.7 In geophysical applications, comparability 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 surficial and subsurface cultural "noise" at the site, which may adversely effect the geophysical measurement process. The noise determined during the prove out will serve as the standard for the site; however, if site conditions and noise levels change during the field program, this issue will be addressed and corrective actions will be taken (e.g., an additional test plot).

11.2.8 Precision and repeatability of the geophysical equipment used in each grid will be assessed by re-acquiring measurements with each detection system along a portion of one

selected data acquisition line within the sample area. These data points will be used to assess the repeatability of the geophysical measurements and the results documented in the field log book. To further assess the repeatability of the equipment, the Geophysical Test Plot established for this project will be utilized throughout the field investigation as a Geophysical Survey Validation and Equipment Repeatability Test Area. Baseline geophysical data will be acquired daily over the targets using the geophysical field detection systems to establish a reference with which to compare future repeat measurements. Repeat measurements will be taken with each of the geophysical field detection systems whenever a replacement system is incorporated for use in the project.

11.2.9 Post-excavation QC procedures will be carried out to determine if geophysical anomalies have been completely and successfully removed. Geophysical data will be re-acquired over approximately five percent of all grids (up to 10% in areas of high exposure potential) after OE intrusive operations. Geophysical data will indicate if chosen anomalies have been encountered and removed during the intrusive excavations. To aid in this process, it will be necessary for UXO personnel to completely remove all OE and scrap metal (i.e., selected anomalies, but not all anomalies) encountered from the grid area to ensure that the targeted anomalies are completely removed. Excavated targets will be thoroughly documented and then transported to established storage stockpile areas. The SUXOS and UXOQCS 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. During surface/subsurface investigations, the SUXOS will notify the Foster Wheeler Environmental Project Manager on whether any discrepancies (e.g., locations, numbers, etc.) have been recognized on the anomalies detected and identified by the geophysical investigation. These discrepancies, if any, will be resolved between the FTL of the surface/subsurface investigation and the geophysical investigation, prior to clearance of the anomalies.

11.3 LAND SURVEY QC

Surveying and field layout activities will be performed in accordance with the Location Surveys and Mapping Plan (Section 7 of the Work Plan) and DID OE-005-07. The theory and implementation of surveying activities will follow standard survey practices. The work will be checked by direct and indirect methods whenever possible (i.e., work laid out to one set of controls shall be checked back to an independent set of controls).

11.3.1 Layout of the work will be from established base lines and bench marks indicated on existing site drawings. Where no base lines or bench marks are provided, the establishment of reference bench marks and base lines will be documented in the surveying field books. Any control lines established for the purpose of layout or checking the location of permanent components of the work will be documented in the surveying field books in accordance with standard surveying practices.

11.3.2 Prior to use on site, surveying equipment will be checked for accuracy via standard surveying practice. Calibration of equipment, where applicable, will be verified to be current, and will be maintained current during use of the equipment on the project. After being placed in service, surveying equipment will be checked prior to further use if subjected to unusual shock, if dropped, or if the accuracy is suspected to be out of tolerance for any reason. Surveying equipment will be checked periodically in accordance with standard surveying practice. Field books used for recording layout and control will be routed to the Quality Control Site Manager when completed. These field books will be retained as project records.

11.4 GIS QC

Guidelines are necessary to ensure data quality after it has been entered into the system. The QC guidelines presented in this section pertain only to GIS data that has been loaded into the system. Potential data problems include source data errors, data entry errors that can be corrected, data editing errors that can be corrected, data corruption errors that can be prevented, and user errors that can be anticipated. QC measures will be implemented to ensure that data is within acceptable spatial accuracy parameters that will be determined for each Delivery Order.

11.4.1 After all coordinate information (e.g., grid corners; OE contamination locations; removal action boundaries, etc.) is verified, the geometric accuracy of the geographic features will be inspected. This process will eliminate free endpoints, unclosed polygons, and dangles. After this is complete, corners and endpoints will be examined for coordinate accuracy. Certain geographic features may be incorrectly located. When this is detected, the source data will be examined and the correct location and place points will be determined in the GIS data set to represent identifiable elements of the feature such as corners or intersections. To prevent errors from occurring during the editing process, original files will be backed up prior to making edits.

11.4.2 One of the strengths of GIS is the accuracy with which geographic phenomena can be mapped. However, this strength can become a weakness if the overall spatial accuracy of the data is not clearly indicated. Whereas Microstation can measure to within a fraction of an inch, if the accuracy of the data is limited to ±5 feet (as an example) than Microstation's supposed accuracy can be deceptive. A statement of the accuracy of the spatial data will be included with documentation of the graphic files, assuming that it is known. Standard situations to be examined in all GIS coverages include evaluating the graphical accuracy of the geographic features. The GIS coverages will be evaluated to determine if the geographic features are graphically correct. If they are not in accordance with the data dictionary, they will be corrected. All such corrections will be noted in a GIS Operations Log.

11.4.3 Several programs manipulate the various files used by the GIS and relational database. Due to hard disk limitations, Random Access Memory (RAM) limitations, or human error, these programs occasionally crash, and the files that are manipulated by these programs are corrupted among other problems. To prevent data loss, these files will be backed up.

11.4.4 The database values also require quality control. Quality control procedures will be developed by the GIS operator to ensure that the data contained therein is accurate and usable. Before editing any database tables, the tables will be unloaded for backing up the schema. A reference file will also be used to document how data entry is performed.

11.4.5 The GIS operator will develop and use a checklist of standard QC steps.

11.5 SUBCONTRACTOR QC

All subcontractors performing work on the project shall be responsible for compliance to the requirements of their respective subcontract. Foster Wheeler Environmental has overall responsibility for maintaining conformance to the quality requirements of the contract, including responsibility for subcontracted items and services. The requirements for personnel qualifications, technical performance levels, QC procedures, acceptability levels, and documentation will be included as part of the subcontract documents.

11.5.1 The UXOQCS will be responsible for the implementation of inspections, surveillance, document reviews, audits, and other QC activities for monitoring the subcontractor's compliance with the contract and subcontract requirements. These activities will be documented on inspection reports, pre-established checklists, audit reports, field logs, or other forms appropriate to the function performed. Examples of QC documentation forms are provided in Attachment 11-2. For field operations, the UXOQCS will provide QC checks before, during, and at completion of the subcontractor's activities, to the extent necessary, to determine the subcontractor's compliance with the QC measures set forth by the contract and applicable subcontract documents including:

- Meeting quality program requirements;
- Generating, controlling, and maintaining required documentation;
- Performing and documenting required inspections and tests; and
- Identifying, reporting, and correcting nonconforming conditions.

11.6 DOCUMENT CONTROL

The Project Manager will establish a document control plan in accordance with Foster Wheeler Environmental Administrative Procedure A-2, Document Control. Preparation, review, approval, and issuance of documents (including revisions) affecting quality will be controlled to the extent necessary to determine that the documents include the specified requirements and provide adequate procedures or guidelines to perform the intended activities. Such documents may include, but are not limited to, drawings, specifications, calculations, procedures, plans, and

reports. The UXOQCS, or designee, will review the documents to verify the inclusion of appropriate quality requirements.

11.7 AUDITS

The UXOQCS will conduct internal audits as necessary on all phases of the activities affecting quality. These internal audits will assess the continuing implementation, effectiveness, compliance, and adequacy of the QC Program. QC procedures will identify audit schedules, evaluate work performance and critical areas such as health and safety, and review documentation controls. The UXOQCS will record audit criteria and results of the QC review on a task-specific check list.

11.7.1 QC Audits are to be conducted on both a scheduled and an unscheduled basis. They will be conducted at a frequency commensurate with the status of the activity and will be initiated early in the work phase to ensure desired quality. The results of the audit, including deficiencies, non-conformance, and potential quality problems will be carefully documented and continue to be monitored until corrective action is made. The Project Manager and the SUXOS will recommend solutions to correct each quality control problem, ensure that the corrective actions are implemented, and guarantee that re-audit of the activity is completed.

11.7.2 The UXOQCS will conduct an audit of the documentation (e.g., field activity logbooks) relating to field operations to assure accuracy and completeness of the forms. Audits will concentrate on locating procedures, on-site transportation of explosives, storage of explosive material/ordnance, on-site disposal, scrap metal, proper documentation, and safety procedure compliance.

11.7.3 The UXOQCS will perform random, unscheduled audits of the various site activities to ensure that personnel accomplish all work and record keeping as specified in this Work Plan and Delivery Order Specific Work Plans. The UXOQCS will then submit a report of findings to the SUXOS and Project Manager. These QC inspections shall include property accountability, UXO related tasks, equipment operator maintenance, PPE usage and Work Plan compliance.

11.8 CORRECTIVE/ PREVENTATIVE ACTIONS

The following procedures have been established to assure that conditions adverse to data quality (e.g., malfunctions, deficiencies, deviations, errors, etc.) are promptly investigated, documented, evaluated, and corrected. When a significant condition that effects the levels of quality is noted (i.e., failure to meet DQOs or other requirements, the cause of the condition will be determined and corrective action taken to prevent repetition. Condition identification, cause(s), and planned corrective action will be documented and reported to the UXOQCS who will in turn notify the Foster Wheeler Environmental Project Manager. Implementation of corrective actions will be

approved prior to implementation and verified by documented follow-up action. All project personnel have the responsibility to identify and immediately report any problems. At a minimum, corrective actions will be initiated:

- When performance goals or standards are not attained;
- When procedures are determined to be inadequate;
- When data errors are identified;
- When QC requirements are not implemented properly; and/or
- When routine scheduled audits or daily inspections identify areas of concern.

11.9 DATA MANAGEMENT

A data processing center will be established at a centrally located facility at Fort McClellan. At this center data reduction and interpretation activities can be completed on a daily basis in order to verify that the project objectives are being met and to aid in the planning, or modification, if necessary, of the next day's field activities.

11.9.1 A database will be maintained on field laptop computers and desktop computers at the processing center. Data will be backed-up on tape cartridge daily and a file naming convention and subdirectory structure will be established.

11.9.2 Upon completion of geophysical surveys, digitally recorded survey data along with sensor position information will be downloaded from the data logging systems to a field computer for minor editing and preprocessing prior to analyses via PC-based target characterization software. The interpolated data are then formatted for input into a commercially available mapping system which has the ability to map the interpolated data to an image of the subsurface signal response and provide image enhancement capabilities to aid in the detection of the more subtle anomalies present in the image.

11.10 EQUIPMENT CALIBRATION AND EQUIPMENT TESTING

In order to satisfy quality assurance procedures, each piece of equipment utilized at Fort McClellan will be listed according to make, model and serial number on field data sheets. Checklists of equipment tests and calibrations will be filled out and retained in the project files. In addition, calibration and testing procedures may be stored on magnetic media or in field logbooks. If equipment is sent to the manufacturer for repair or maintenance, it will be recalibrated. Documentation of any recalibrations will be maintained in the project files.

11.10.1 To ensure optimal accuracy and performance of field equipment used in this project, daily testing of the equipment will be performed according to the manufacturer's recommended testing procedures as outlined in the operating manual for the specific piece of equipment. In accordance with 10 CFR Part 50, results of the tests performed will be recorded in field logbooks or in digital format.

11.10.2 Since each piece of equipment planned for use in this project is calibrated by the manufacturer prior to leaving the factory, on-site calibration of the equipment will not be required. If equipment field checks indicate that certain equipment is not operating properly and a field repair cannot be performed, the equipment will be tagged and removed from service. Replacement equipment will meet the same specifications for accuracy and sensitivity as the original equipment. Documentation regarding any necessary factory recalibration of the equipment will, however, be maintained in the project file.

11.11 DOCUMENTATION

All site documentation will be recorded in the field activity logbooks, and each page will be numbered consecutively. The field activity logbooks will be used to record the daily activities of the field team and will provide drawings and locations, materials consumed, and other observations related to the project. These field logs will include the following: Daily Activity Log, Safety Log, Training Log, QC Log, and Ordnance Accountability Log.

11.11.1 The UXOQCS will maintain a record of all activities evaluated, including the function, personnel involved, specific task, results, and recommended corrective action. In addition to these observations, the UXOQCS will ascertain if additional training, or re-accomplishment of a specific task is required.

11.11.2 The UXOQCS will audit the on-site logbooks for neatness, accuracy, and completeness. Field activities will be monitored and the results documented to the SUXOS and the Project Manager. This plan is the source document to be used to establish audit criteria.

11.11.3 All QC records and documentation will be maintained on site and furnished for government inspection upon request. All QC documentation will be submitted as part of, or as supporting documentation of the Investigation Report.

11.12 LESSONS LEARNED REPORTING

Results of an audit will result in a written report which will document findings and also result in preparation of lessons learned summary.

11.13 DOCUMENT REVIEW PROCESS

All technical work prepared under this contract will be reviewed by a fully competent individual within the specific area of expertise and of the same peer level (minimum). Reviewers will be designated by the Project Manager.

11.14 TRAINING

Personnel performing work under the Fort McClellan contract will be trained and qualified in accordance with Foster Wheeler Environmental requirements and contract requirements. Personnel selected to perform or verify activities affecting quality will possess the education, experience, and training commensurate with the specified activity and contract requirements. All necessary training will be conducted to overcome any deficiencies noted within an audit.

11.15 CHEMICAL DATA QUALITY MANAGEMENT

The sampling and analysis of environmental media (i.e., soil, groundwater, surface water, etc.) by Foster Wheeler Environmental, will be conducted in accordance with the "Installation-Wide Sampling and Analysis Plan" prepared for Fort McClellan by IT.

ATTACHMENT 11-1
DATA ITEM DESCRIPTIONS

ATTACHMENT 11-1

Current Number	Date	Title	New Number	Revision Date
		Type I Work Plan	OE-001	000303
OT-005-01	990205	Type II Work Plan	OE-005-01	000303
OT-005-02	990205	Technical Management Plan	OE-005-02	000303
OT-005-03	990825	Explosives Management Plan	OE-005-03	000303
OT-005-04	990205	Explosives Siting Plan	OE-005-04	000303
OT-005-05	990825	Geophysical Investigation Plan	OE-005-05	000303
OT-005-06	990205	Site Safety and Health Plan	OE-005-06	000303
OT-005-07	990825	Location Surveys and Mapping Plan	OE-005-07	000303
OT-005-08	990205	Work, Data, and Cost Management Plan	OE-005-08	000303
OT-005-09	990205	Property Management Plan	OE-005-09	000303
OT-005-10	990205	Sampling and Analysis Plan	OE-005-10	000303
OT-005-11	990205	Quality Control Plan	OE-005-11	000303
OT-005-12	990205	Environmental Protection Plan	OE-005-12	000303
OT-005-13	990205	Investigative Derived Waste Plan	OE-005-13	000303
		Geographical Information System Plan	OE-005-14	000320
		Engineering Evaluation/Cost Analysis (EE/CA) Report	OE-010	000303
OT-015	990205	Accident/Incident Reports	OE-015	000303
OT-025	990825	Personnel/Work Standards	OE-025	000303
OT-030	990825	Site Specific Final Report	OE-030	000303
OT-040	990205	Disposal Feasibility Report	OE-040	000303
OT-045	990205	Report/Minutes, Record of Meetings	OE-045	000303
OT-055	990205	Telephone Conservation/Correspondence Records	OE-055	000303
OT-060	990205	Conventional Explosives Safety Submission (ESS)	OE-060	000303
OT-080	990205	Monthly Status Report	OE-080	000303
OT-085	990205	Weekly Status Report	OE-085	000303
OT-090	990427	Ordnance Filler Report	OE-090	000303
		Analysis of Institutional Controls	OE-100	000303

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE	2. IDENTIFICATION NUMBER
Type I Work Plan	OE-001

3. DESCRIPTION / PURPOSE To provide the format, content, and preparation instructions for **Engineering Evaluation/Cost Analysis** (EE/CA) Work Plans for Ordnance and Explosives projects.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-ED-CS-G		

7. APPLICATION / INTERRELATIONSHIP

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 Format - This plan shall be printed on standard size (e.g. 8 ½ by 11 inch) white paper, with drawings folded, if necessary, to this size or to fit within pockets of this size. Pages shall be sequentially numbered. Drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features. When drawings are required, data may be combined to reduce the number of drawings. All attachments shall be identified and referenced in the text of the report. The plan shall be legible and suitable for reproduction.

10.1.1 Chapters shall be numbered sequentially. Within each chapter each page shall be numbered sequentially, starting with the specific chapter number. Within each chapter the paragraphs shall be numbered sequentially starting with the chapter number and using a decimal system, with each section and paragraph having a unique decimal designation. Within each chapter any figures, tables, and charts shall be numbered sequentially starting with the chapter number. Work plans shall be bound in a three-ring binder. Binders shall hold pages firmly while allowing easy removal, addition, or replacement of pages.

10.1.2 Appendices shall be lettered alphabetically. Within each appendix, each page shall be numbered sequentially starting with the appendix letter.

10.1.3 A title sheet will be provided on the front of the binder and also inside the binder which includes the the name of the project (site), contractor's name and address, the contract number, the task order number, the project number, the date of the plan, and the title of the plan. The title sheet shall identify the contracting agency and shall name the Geographical Corps District where the project is located. The title sheet shall be signed by a principle of the company or the person performing quality control on the document. Draft versions of the Work Plan shall be clearly identified as such on the title sheet.

10.1.4 Each page of the Work Plan shall contain a date footer and the contract/task order number. When revisions to the Work Plan are required, a revision date, revision number, contract/task order and amendment/modification number (if applicable) shall be included in the date footer. A dated summary page listing all revised pages shall be submitted with each revision.

10.2 The contractor shall determine inapplicable requirements, or requirements in addition to those listed below, that should be included in the Work Plan. When an issued Task Order does not require a specific chapter or sub plan, the chapter shall be included with a declaration that the information is not required by the Task Order. Chapters shall be organized as follows:

10.2.1 Chapter 1. Introduction. At a minimum the following information shall be included:

10.2.1.1 Project Authorization

10.2.1.2 Purpose and Scope

11. DISTRIBUTION STATEMENT

DD Form 1664, JUN 86 *PREVIOUS EDITIONS ARE OBSOLETE*

10.2.2 Chapter 2. Site Description.

10.2.2.1. Location

10.2.2.2. Physical Description

10.2.2.3. History

10.2.2.4. Previous Investigations

10.2.2.5. Initial Summary of OE Risk (summarize OE potentially on site, and characteristic hazard presented by those items.

10.2.3 Chapter 3. Project Management

10.2.3.1. Project Objectives

10.2.3.2. Project Organization

10.2.3.3. Project Personnel

10.2.3.4. Project Communication and Reporting

10.2.3.5. Project Deliverables

10.2.3.6. Project Schedule

10.2.3.7. Periodic Reporting

10.2.3.8. Costing and Billing

10.2.3.9. Project Public Relations Support

10.2.3.10. Subcontractor Management

10.2.3.11. Management of Field Operations

10.2.4. Chapter 4. Overall Approach to OE EE/CA

10.2.4.1. Preliminary Removal Action Goals

10.2.4.2. Identification of Data Quality Objectives

10.2.4.3. Required Data

10.2.4.4. Data Reduction and Evaluation

10.2.4.5. Data Incorporation into EE/CA Reports

10.2.4.6. OE Exposure Analysis

10.2.4.7. Alternatives Identification and Analysis, including:

10.2.4.7.1 No Action Options

10.2.4.7.2 Institutional Control Options

10.2.4.7.3 OE Removal Options

10.2.4.8 EE/CA Report (See DID OE-010)

10.2.4.9 EE/CA Approval Memorandum

10.2.4.10 EE/CA Completion and Close-out

10.2.4.11 Use of Time Critical Removal Actions During the EE/CA Process

10.2.4.12 Follow-on Activities

10.2.5 Chapter 5. Scope of Work by Task. The contractor shall describe each task contained in the scope of work and describe the approach to be taken to accomplish each task. Guidance, regulations, or other policy under which the work will be done will be identified. Assumptions and procedures will be discussed. Tools and software to be used will be described.

10.2.6 Chapter 6. Site Characterization Planning and Operations. The contractor shall describe how the site will be investigated. Potential investigation methods include, but are not limited to, evaluations of archival data, evaluations of historical aerial photographs provided by the Government or obtained by the contractor from public sources, geophysical investigations, and excavation of representative areas. The contractor shall propose and justify methods and procedures that are well suited to the anticipated site conditions and project objectives. The contractor shall consider technical requirements for site characterizations as well as safety and security regulations applicable to the site. The plan shall describe the goals, methods, procedures, and personnel used for field sampling and data gathering activities in accordance with the following outline:

10.2.6.1 Site Characterization Goals.

10.2.6.2 Site Characterization Procedural Overview

10.2.6.3 OE Sampling Locations

10.2.6.4 OE Sampling Procedures

10.2.6.5 Surveying and Site Layout and Control. The contractor shall provide a map, zone delineation, minimum separation distances, on/off-site communications, site access controls, and security (physical and procedural). If applicable, the contractor will determine three areas; exclusion, contamination reduction, and support, for each work site in accordance with the requirements of 29 CFR 1910. (See also DID OE-005-07)

10.2.6.6 Geophysical Investigations (See also DID OE-005-05)

10.2.6.7 Risk Characterization and Analysis

10.2.6.8 Institutional Analysis (See also DID OE-100)

10.2.6.9 Geographical Information System (GIS), if required (See also DID OE-005-14)

10.2.6.10 Others, as required

10.2.7 Chapter 7. OE Planning and Operations. The contractor shall describe how OE operations will be planned and implemented utilizing appropriately qualified personnel, equipment, and procedures. All OE operations must be performed utilizing qualified OE personnel, equipment, and procedures as defined in DID OE-025 and ETL 385-1-1, Safety Concepts and Basic Considerations for UXO Operations. No substitute experience or qualifications will be accepted. The Work Plan shall describe the following:

10.2.7.1 Operations in OE Areas

10.2.7.2 OE Accountability and Records Management

10.2.7.3 OE Identification

10.2.7.4 OE Removal

10.2.7.5 OE Transportation

10.2.7.6 OE Storage

10.2.7.7 OE Disposal Procedures

10.2.7.8 OE Disposal Range, if used

10.2.7.9 OE Personnel and Qualifications

10.2.7.10 Disposal Alternatives. If OE destruction cannot take place on site by detonation, include disposal alternatives and recommendation as described in DID OE-040.

10.2.7.11 Management and storage of demolition explosives

10.2.8 Chapter 8. Site Safety and Health Plan (See DID OE 005-06).

10.2.9 Chapter 9. Environmental Protection. (See also DID OE-005-12)

10.2.10 Chapter 10. Data Management Plan.

10.2.11 Chapter 11. Quality Control (See DID OE-005-11)

10.2.12 Chapter 12. References shall be listed.

10.2.13 Appendices

10.2.14 Resumes of Key Personnel Not Listed on USAESCH Database.

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Type II Work Plan	2. IDENTIFICATION NUMBER OE-005-01

3. DESCRIPTION / PURPOSE To provide the format, content, and preparation instructions for Work Plans for all Ordnance and Explosives projects or response actions (i.e., removal actions, site characterizations, etc.) EXCEPT Engineering Evaluation/Cost Analysis (EE/CA) projects.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP

Refer to DID OE-001 for requirements for EE/CA (Type I) Work Plans.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 Format – This plan shall be printed on standard size (e.g. 8 ½ by 11 inch) white paper, with drawings folded, if necessary, to this size or to fit within pockets of this size. Pages shall be sequentially numbered. Drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features. When drawings are required, data may be combined to reduce the number of drawings. All attachments shall be identified and referenced in the text of the plan. The plan shall be legible and suitable for reproduction.

10.1.1 Chapters shall be numbered sequentially. Within each chapter each page shall be numbered sequentially, starting with the specific chapter number. Within each chapter the paragraphs shall be numbered sequentially starting with the chapter number and using a decimal system, with each section and paragraph having a unique decimal designation. Within each chapter any figures, tables, and charts shall be numbered sequentially starting with the chapter number. Work plans shall be bound in a three-ring binder. Binders shall hold pages firmly while allowing easy removal, addition, or replacement of pages.

10.1.2 Appendices shall be lettered alphabetically. Within each appendix, each page shall be numbered sequentially starting with the appendix letter.

10.1.3 Each page of the Work Plan shall contain a date footer and the contract/task order number. When revisions to the Work Plan are required, a revision date, revision number, contract/task order and amendment/modification number (if applicable) shall be included in the date footer. A dated summary page listing all revised pages shall be submitted with each revision.

10.1.4 A title sheet will be provided on the front of the binder and also inside the binder which includes the contractor's name and address, the contract number, the task order number, the project number, the name of the project, the date of the plan, and the title of the plan. The title sheet shall identify the contracting agency and shall name the Geographical Corps District where the project is located. The title sheet shall be signed by a principal of the company or the person performing quality control on the document. Draft versions of the work plan shall be clearly identified as such on the title sheet.

10.2 Each work plan shall contain the sub plans specified in the Contract Task Order.

10.3 Work Plans shall be organized by chapters containing the sub plans unless specifically excluded by the Task Order. When an issued Task Order does not require a specific sub plan, the chapter shall be included with a declaration that the sub plan is not required by the Task Order. Chapters shall be organized as follows:

10.3.1 Chapter 1. Introduction. At a minimum the following information shall be included:

10.3.1.1 General Information deemed appropriate by the contractor

10.3.1.2 Site Location

11. DISTRIBUTION STATEMENT

10.3.1.3 Site History

10.3.1.4 Topography

10.3.1.5 Climate

10.3.2 Chapter 2. Technical Management Plan. Refer to DID OE-005-02.

10.3.3 Chapter 3. Explosives Management Plan. Refer to DID OE-005-03.

10.3.4 Chapter 4. Explosives Siting Plan. Refer to DID OE-005-04.

10.3.5 Chapter 5. Geophysical Plan. Refer to DID OE-005-05.

10.3.6 Chapter 6. Site Safety and Health Plan. Refer to DID OE-005-06.

10.3.7 Chapter 7. Location Surveys and Mapping Plan. Refer to DID OE-005-07.

10.3.8 Chapter 8. Work, Data, and Cost Management Plan. Refer to DID OE-005-08.

10.3.9 Chapter 9. Property Management Plan. Refer to DID OE-005-09.

10.3.10 Chapter 10. Sampling and Analysis Plan. Refer to DID OE-005-10.

10.3.11 Quality Control Plan. Refer to DID OE-005-11.

10.3.12 Environmental Protection Plan. Refer to DID OE-005-12.

10.3.13 Investigative Derived Waste Plan. Refer to DID OE-005-13.

10.3.14 Geographical Information System. Refer to DID OE-005-14.

10.4 Appendices. The work plan shall contain the following documents as appendices.

10.4.1 Task Order Scope of Work

10.4.2 Site Maps

10.4.3 Local Points of Contact

10.4.4 Contractor Forms for collecting and recording the following data:

10.4.4.1 Quality Control Log

10.4.4.2 Safety Meeting Attendance Log

10.4.4.3 Site Visitors Log

10.4.4.4 Safety Inspections Log

10.4.4.5 Daily Report of OE Operations

10.4.4.6 Explosives Accountability Forms

10.4.5 Resumes. Resumes shall be submitted in accordance with the requirements of DID OE-025. The format for resumes is contained in Section J.

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Technical Management Plan	2. IDENTIFICATION NUMBER OE-005-02

3. DESCRIPTION / PURPOSE To provide requirements for a plan describing the approach, methods, and operational procedures to be employed to perform Ordnance and Explosives (OE) and technical operations at a specific project site.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters addressing technical management for OE projects.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS A Technical Management Plan shall be prepared to document the approach and procedures to be used to execute the tasks required by a task order and shall include the following:

10.1 General.

10.1.1 Identification of guidance, regulations, or other policy under which the OE operations will be conducted.

10.1.2 Discussion, assumptions, and procedures to be followed relating to the discovery of CWM on a conventional ordnance site.

10.1.3. Procedures to be employed in the event that unexploded ordnance (UXO) cannot be destroyed on site, if planned; and if an unidentified UXO is located.

10.1.4. Technical scope of the project, grid sizes, grid layout, and software to be used in sampling or removals.

10.1.5. Expected number of excavations and procedures to be employed if changed site conditions occur.

10.2 Organizational chart specific to the project. Indicate assignment of functions, duties, and responsibilities and functional relationships among the organizational elements participating in the work. Address the composition and management of sweep teams.

10.3 Description of mobilization plans, office set-up details, and other preliminary activities.

10.4 Procedures for site preparation and activities such as brush cutting, geophysical test plots, and surface sweeps.

10.5 Procedures to be followed when performing statistical sampling, if applicable.

10.6 Detailed procedures for reporting and disposition of UXO, including responsibilities of personnel, overall safety precautions, UXO identification, transportation, safe holding areas, operations in populated/sensitive areas, and all demolition and post demolition operations and any required engineering controls for intrusive operations and intentional detonations.

10.7 Detailed procedures for managing, reporting, venting, and disposing of OE scrap and non-OE scrap.

10.8 Discussion of additional tasks and procedures to be followed in executing those tasks, if not addressed in subsequent chapters of the work plan (e.g., public affairs, community relations, dissemination of data, final report).

10.9 Reference to the appropriate work plan chapters for additional plans covering major activities of the planned work.

11. DISTRIBUTION STATEMENT

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Explosives Management Plan	2. IDENTIFICATION NUMBER OE-005-03

3. DESCRIPTION / PURPOSE To provide details of the plan for management of explosives at a specific project site in accordance with applicable regulations.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains the instructions for preparing a work plan chapter to address explosives management for a specific Ordnance and Explosives (OE) project.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 Submission: If required by a specific task order, this plan shall be prepared and included in the appropriate chapter of the task order's work plan.

10.2 General: The contractor shall prepare a detailed plan for management of explosives in accordance with FAR 45.5, local and state laws and regulations, ATFP 5400.7, DOD 6055.9-STD, DOT regulations, and AR 190-11.

10.3 Licenses/Permits. At each project site, the contractor shall have and, upon request, make available to any local, state, or federal authority a copy of any license/permit obtained authorizing the contractor to purchase, store, transport, and use explosives.

10.4 Content. The plan shall include:

10.4.1 Acquisition.

10.4.1.1 A description and estimated quantity of explosives to be used.

10.4.1.2 The acquisition source, and a statement addressing whether explosives will be government furnished or purchased from a commercial vendor.

10.4.1.3 If explosives are to be contractor acquired, each explosive item will be identified in the Equipment Plan. This requirement does not apply to firm fixed price (FFP) task orders.

10.4.2 Initial Receipt

10.4.2.1 Procedures for receipt of explosives from an installation ammunition supply activity, commercial vendor, or a previous contractor at a site.

10.4.2.2 Procedures for reconciling discrepancies in quantities shipped and quantities received.

10.4.3 Storage.

10.4.3.1 Establishment of explosive storage facilities.

10.4.3.2 Physical security of explosive storage facilities.

11. DISTRIBUTION STATEMENT

10.4.4 Transportation.

10.4.4.1 Procedures for transportation from storage facility to disposal locations at the project site.

10.4.4.2 Requirements for vehicles transporting explosives at the project site.

10.4.5 Receipt Procedures.

10.4.5.1 The contractor shall establish receipt procedures accounting for each item of explosives from initial delivery to the site until the item is expended or the contractor is relieved from accountability by the Contracting Officer.

10.4.5.2 The contractor shall identify individuals authorized to receive, issue, transport, and use explosives by contract position title and those individuals shall assume accountability by signing the receipt documents.

10.4.5.3 The end user of explosives shall certify in writing that the explosives were used for their intended purpose.

10.4.5.4 Procedures for reconciling receipt documents, and proposed intervals.

10.4.6 Inventory.

10.4.6.1 Procedures for physical inventory of explosives in storage facilities.

10.4.6.2 Procedures for reconciling discrepancies resulting from inventories.

10.4.6.3 Inventories of explosives in stock shall be conducted weekly, at a minimum.

10.4.7 Procedures upon discovery of lost, stolen, or unauthorized use of explosives: Proper authorities shall be notified in writing within 24 hours of the event. Immediate telephonic notification to the Contracting Officer, followed up by a written report within 24 hours.

10.4.8 Procedures for return to storage of any daily issued explosives not expended.

10.4.9 Procedures for disposing of any remaining explosives at the end of the contractor's site activities.

10.4.10 The contractor shall perform an economic analysis for different alternatives and submit to the Contracting Officer for approval. This requirement does not apply to FFP task orders.

10.5 Forms. The contractor may use corporate designed forms or Department of the Army forms.

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188
1. TITLE Explosives Siting Plan	2. IDENTIFICATION NUMBER OE-005-04

3. DESCRIPTION / PURPOSE To provide explosives safety criteria for planning and siting explosives operations at Ordnance and Explosives (OE) sites.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP: This Data Item Description contains instructions for preparing a work plan chapter to address explosives siting procedures.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS:

10.1 The contractor shall, when required by the government, submit an explosives siting plan which describes the safety criteria to be employed during OE operations.

10.2 The following explosives operations shall be described in the plan and sited on the Q-D map.

10.2.1 Ordnance and Explosives Areas

10.2.1.1 Minimum separation distances for nonessential personnel, during OE operations, at an OE site shall be determined using the following criteria: distances in Chapter 5, paragraph C5.5.4, DOD 6055.9 STD, if the type of OE is unknown; the maximum fragmentation distance for the Most Probable Munition (MPM), as calculated by Huntsville Center's Engineering Directorate, Structural Branch; or when conditions and OE hazards permit, the minimum separation distance may be reduced to fit the situation, but in no case shall the distance be less than 1/600 ft^2, 200 ft, or the K50 based on over pressure, whichever is greater. The information on which distance to be used will be furnished by the District Project Manager along with the calculation sheet determining the fragmentation distance. The distance shall be explained in text of the plan, and Quantity Distance Arcs drawn on the map. Q-D Arcs shall be drawn from the outermost edge of the OE area.

10.2.1.2 Planned or Established Demolition Areas. These areas shall be sited and shown on the map. Minimum separation distance for all personnel shall be established based on the following criteria: distances in Chapter 5, paragraph C5.5.4, DOD 6055.9-STD; or the maximum fragmentation distance for the MPM at the site calculated by Huntsville Center's Engineering Directorate, Structural Branch. The safe separation distance shall be explained in the plan and the distance arcs drawn on the map.

10.3 Foot Print Areas. The following footprint areas shall be addressed in the plan but do not have to be shown on the map.

10.3.1 Blow-in-Place. Minimum separation distance for all personnel shall be determined using the criteria for established demolition areas.

10.3.2 Collection Points. Collection points, if used, shall have the same minimum separation distance as the MPM for the site.

10.3.3 In-Grid Consolidated Shots. Minimum separation distance for all personnel shall be determined using the criteria for established demolition areas. The contractor shall use the USAESCH procedures, approved by DDESB, for consolidate shots. These procedures may be downloaded from the USAESCH OE Home Page.

11. DISTRIBUTION STATEMENT

10.4 Explosives Storage Magazines

10.4.1 Specify the type(s) of magazines used: commercial portable type, above ground, shed, earth-covered, etc.

10.4.2 State the Net Explosives Weight (NEW) and hazard division to be stored in each magazine. Generally, recovered OE is considered HD 1.1 unless there are obvious reasons it should not be.

10.4.3 Quantity Distance criteria specified in Chapter 9, Table 9-1, DOD 6055.9-STD shall be used to site the magazines at an Ordnance and Explosives site.

10.4.4 Specify design criteria for any engineering controls to be used to mitigate exposures to the public when required Quantity Distances cannot be met.

10.5 Site Map. The site map should be scaled at 1 inch equals 400 feet. A smaller scale is acceptable if distances can be accurately shown. If an unscaled map is used, the map must have labeled distances.

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Geophysical Investigation Plan	2. IDENTIFICATION NUMBER OE-005-05

3. DESCRIPTION / PURPOSE To provide details of the approach, methods, and operational procedures to be (1) documented as part of the Ordnance and Explosives (OE) project work plan and (2) employed to perform geophysical investigations at OE sites.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-ED-CS-G		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters addressing geophysical investigations.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

GEOPHYSICAL INVESTIGATION REQUIREMENTS

10.1 Unexploded Ordnance (UXO) Safety. During all initial fieldwork and all intrusive activities, the geophysical crew shall be accompanied by a UXO Technician II. The UXO Technician II shall conduct visual surveys for surface ordnance prior to the survey crew entering an area potentially containing UXO, and a magnetometer or electromagnetic survey of each intrusive activity site to ensure the site is anomaly free prior to the crew setting monuments of driving stakes. The UXO Technician II will not be required on a full time basis for most of the project, for non-intrusive activities.

10.2. Personnel Qualifications. All geophysical investigations shall be managed by a qualified geophysicist meeting the qualification requirements listed in DID OE-025.

10.3 Geophysical Investigation Plan Outline. The Contractor shall prepare a geophysical investigation plan, in accordance with the following outline:

10.3.1 Site Description

- Geophysical Investigation Program Objectives
- Specific Area(s) to be Investigated, including a map
- Past, current and future use
- Anticipated UXO type, composition and quantity
- Depth anticipated
- Topography
- Vegetation
- Geologic conditions (including bedrock type, mineralization and depth)
- Soil conditions (including soil type/composition, typical moisture content, and thickness)
- Shallow groundwater conditions (including depth, mineralization, existence of perched tables, and seasonal & tidal variations)
- Geophysical conditions, including background geophysical gradients
- Site Utilities
- Man-made features potentially affecting geophysical investigations
- Site-specific dynamic events such as tides, unusually strong winds, or other unusual factors affecting site operations
- Overall Site Accessibility and Impediments
- Potential Worker Hazards

11. DISTRIBUTION STATEMENT

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Data Item Description OE-005-05 (Continued):

10.3.2 Geophysical Investigation Methods

· Equipment
· Procedures
· Personnel
· Production Rates
· Data Resolution, or line/grid width requirements
· Data density
· Data Processing

10.3.3 Location Surveying, Mapping & Navigation

· System Description
· If GPS systems are used, correlate satellite availability with work/rest periods

10.3.4 Instrument Standardization

· Instrument Drift (DC offset)
· Standardization Procedures
· Abbreviated Standardization Checks
· Instrument Response to a Known Standard

10.3.5 Data Processing, Correction and Analysis

· Instrument Drift Correction
· Diurnal Drift Correction
· Digital Filtering and Enhancement
· Correlation With Ground Truth

10.3.6 Quantitative Interpretation and Dig Sheet Development

10.3.7 Anomaly Reacquisition

10.3.8 Feed-Back Process (Comparison of dig-sheet predictions with ground-truth)

10.3.9 Quality Control

10.3.10 Corrective Measures

10.3.11 Records Management

10.3.12 Interim Reporting

10.3.13 Final Reports and Maps

10.4 Geophysical Investigation Performance Goals.

10.4.1 OE Detection. Function 1 shows criteria the Contractor must meet when using magnetometry. Function 2 shows criteria the Contractor must meet when using electromagnetic geophysical detection methods. The function used for determining acceptable performance depends upon the geophysical equipment selected and justified by the Contractor.

$\log(d) = 1.354 \log(dia) - 2.655$	(Function 1 – magnetometry)
$\log(d) = 1.002 \log(dia) - 1.961$	(Function 2 – electromagnetics)

dia = diameter of minor axis of UXO, in millimeters.
d = required depth of detection to top of buried UXO, in meters.

Data Item Description OE-005-05 (Continued):
[Note: To confirm the calculation is performed correctly, use "105 mm" as the diameter in Function 1. This will result in a required detection depth of 1.2 meters (4.0 ft) for a ferromagnetic projectile of that diameter.]

Minimum UXO "dia" (diameter) must be determined on a project-specific basis and will be specified in the Scope of Work.

10.4.1.1 The contractor shall detect and remove all UXO and UXO look-alikes located above the performance line. If the contractor believes these goals cannot be achieved at a particular site, then he/she shall propose and document alternative goals for the Contracting Officer's consideration. The contractor will not be held liable for technically unachievable goals, as determined during the initial phase of field work.

10.4.2 Horizontal Accuracy. Horizontally, 98% of all excavated items must lie within a 20 cm. radius of their mapped surface location as marked in the field after reacquisition.

10.4.3 False Positives. There shall be no more than 15% "false positives" where anomalies reacquired by the Contractor result in no detectable, metallic material during excavations.

10.5. Test Plot. The Contracting Officer may require that the Contractor demonstrate and document the capabilities of the proposed sensors, navigation equipment, data analysis, data management and associated equipment and personnel to operate as an integrated system capable of meeting project performance goals. When the Contracting Officer requires a site-specific geophysical prove-out, a Work Plan that includes test plot design shall be prepared and implemented.

10.6. Geophysical Mapping Data.

10.6.1 The Contractor shall correlate all sensor data with navigational data based upon a local first-order control point. If a suitable point is not available, the Contractor shall have a first-order point shot in. All sensor data shall be preprocessed for sensor offsets, diurnal magnetic variations, etc. and correlated with navigation data. Diurnal magnetic variations measured at a base-station must be collected at approximately the same frequency that readings are collected by instruments used by field crews. The approved geophysical mapping technology shall digitally capture the instrument readings into a file coincident with the state grid coordinates. This field data shall be checked, corrected and processed into ASCII files in the ADF file format. Corrections such as for navigation, instrument bias, and diurnal magnetic shift shall be applied but there shall be no filtering or normalization of the data. All corrections shall be documented. Grids geophysically mapped shall be exactly coincident with the grid system used by the UXO removal action contractor and shall use exactly the same datum and coordinate system. However the geophysical contractor may choose to provide geophysical data files in grids of up 200 ft. x 200 ft. square. The data shall be presented in delineated fields as x, y, z where x and y are local State Grid Plane Coordinates in East and North and z is the instrument reading. Each data field shall be separated by a space (not a comma). There shall be no header or other information included in the file. No individual file may be more than 4 megabytes in size and no more than 60,000 lines long. Each grid of data shall be logically and sequentially named so that the file name can be easily correlated with the grid name used by other project personnel. The formats specified in this paragraph are REQUIRED to be exactly followed, although the contractor may choose to submit the data in additional formats as well. No later than 36 hours after collection, the Contractor shall furnish each day's data to USAESCH, via internet using FTP or other approved method, for inspection. Such data is considered to be in draft form. The Contractor shall also provide a digital planimetric map, in Intergraph .DGN format, and coincident with the location of the geophysical survey, that each day's geophysical data set can be registered within. Within 14 days of completion of survey activity The Contractor shall provide USAESCH all final geophysical maps, dig-sheets and supporting geophysical interpretations. All geophysical data shall be accompanied by a Microsoft Word 6.0 file documenting the field activities associated with the data, and the processing performed. The Government will periodically load the geophysical data provided by the Contractor onto a USAESCH Intergraph Workstation for a validation check to assure positional accuracy, proper instrument calibration or other analysis.

10.6.2 Geophysical Data Analysis, Field Reacquisition and Reporting. The Contractor shall analyze the geophysical data and provide "dig-sheets" containing, as a minimum, the following information:
· Project Site
· Geophysical Contractor
· Responsible Geophysicist
· Grid Number
· Anomaly Number
· Predicted Easting & Northing
· Predicted Depth to Top of Item

The dig sheets shall be provided to USAESCH as hard copy and digitally.

Data Item Description OE-005-05 (Continued):

10.6.3 Anomaly Reacquisition and Marking. The Contractor shall use precision surveying methods of his/her choice to reacquire all geophysical anomalies identified on the dig sheets. The Contractor shall flag the actual field location of each identified anomaly shown on the "dig-sheet" and paint the ground at the flag location with high-visibility paint. Such reacquisition shall be carried out concurrently with other site activities and shall be completed no later than 14 days after field investigations are completed. The Contractor shall record and report on all discrepancies between original mapped locations of anomalies as shown on the dig-sheet, and actual locations of the reacquired anomalies. The Contractor shall also report any anomalies that could not be reacquired.

10.6.4 Anomaly Excavation Reporting. The Contractor shall, in full accordance with the project work plan, excavate the anomalies identified on the dig-sheets, reacquired, and marked in the field. The disposition and final location details of each anomaly shall be recorded on the final dig sheets, which shall be submitted to USAESCH within 14 days of completed excavations and also submitted in the final report, according to DID OE-030.

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Site Safety and Health Plan	2. IDENTIFICATION NUMBER OE-005-06

3. DESCRIPTION / PURPOSE To provide requirements for (1) the contractor's Safety and Health Program and (2) the Site Safety and Health Plan for a specific Ordnance and Explosives (OE) project site.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-ED-SY		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters addressing site safety and health for OE projects.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 Safety and Health Program. The contractor shall be responsible for initiating and maintaining a safety and health program that complies with the requirements of the Occupational Safety and Health Administration (OSHA) and the U.S. Army Corps of Engineers (USACE). The Safety and Health Program shall include, as a minimum, the requirements listed below:

10.2 Site-specific Safety and Health Plan (SSHP). The contractor shall develop a Site-Specific Safety and Health Plan in accordance with the requirements of 29 CFR 1910/29 CFR 1926, ER 385-1-92, EM 385-1-1 and any other applicable Federal, State and Local safety and health requirements. The level of detail provided shall be tailored to the type of work, complexity of operations to be accomplished, and the hazards anticipated. The SSHP shall address all elements required by 29 CFR 1910.120(b)(4)(ii), 29 CFR 1926.65(b)(4)(ii), and ER 385-1-92, Appendix B. Where a specific element is not applicable, list the element in the plan, state that the element is not applicable with a brief justification for its omission. The SSHP may serve as the Accident Prevention Plan provided it addresses all content requirements of 29 CFR 1910.120 and EM 385-1-1, Table 1. Daily safety and health inspections shall be conducted to determine if site operations are conducted IAW the accepted plans and contract requirements.

10.2.1 General. The SSHP shall be developed, implemented, and overseen by a board-certified or board-eligible Industrial Hygienist (IH) with at least 2 years hazardous waste site experience. Board certification or eligibility shall be documented by submission of a copy of the certificate or letter of acceptance to sit for the exam by the American Board of Industrial Hygiene (ABIH) to the Contracting Officer. A fully trained and experienced UXO Safety Officer (meeting the qualifications specified in DID OE-025), responsible to the prime contractor, shall be delegated to implement the on-site elements of the SSHP. The SSHP shall be in a form usable by authorized U.S. Government representatives and other authorized visitors to the site during site operations.

10.2.2 Staff Organization, Qualifications, and Responsibilities. The operational and safety responsibilities of each key person shall be identified. The organizational structure, with lines of authority and overall responsibilities for the safety and health of the contractor employees and all subcontractors, shall be discussed. An organizational chart showing the lines of authority for safety shall be provided. Each person assigned specific safety and health responsibilities shall be identified and his/her qualifications and experience documented by a resume in the SSHP.

10.2.3 Site Description and Contamination Characterization. Provide a description of the site based on results of previous studies, site history, and prior uses and activities. Compile a summary of hazardous substances and safety and health hazards likely to be encountered onsite. Include ordnance and chemical/biological, concentration ranges, media in which found, locations onsite, and estimated quantities/volumes to be impacted by this work. The site descriptions shall be based on results of previous studies and the history of prior uses and activities conducted under Task 1 of the Scope of Work.

11. DISTRIBUTION STATEMENT

Data Item Description OE-005-06 (Continued):

10.2.4 Hazard Analysis and Risk Assessment. In the SSHP, the contractor shall provide a complete description of the work to be performed at each site. The contractor shall identify the chemical, physical, safety and biological hazards that are expected to be encountered for each task and/or site operation to be performed. Each task/operation is to be discussed separately. Routes and sources of exposure for chemical hazards anticipated onsite, along with chemical/biological names, concentration ranges, media in which found, locations onsite, estimated quantities/volumes, and the applicable regulatory standards (PELs) and recommended exposure limits (TLVs), shall be provided. Action levels shall be specified and justified for implementation of engineering controls and/or work practice controls, initial levels or changes in level of personal protective equipment, for emergency evacuation of onsite personnel, and for the prevention and/or minimization of public exposure to hazards created by onsite activities.

10.2.5 Training. All general site workers shall receive 40 hours of initial off-site safety and health training (24 hours for workers occasionally onsite and whose tasks are limited and are unlikely to be overexposed) which is relevant to hazardous waste site activities, plus three days of supervised field experience (one day for workers occasionally onsite), in compliance with 29 CFR 1910.120(e). In addition, site-specific, supervisory, refresher and visitor training IAW the aforementioned regulations shall be addressed. The content, duration, and frequency of all training shall be described.

10.2.6 Personal Protective Equipment. A Personal Protective Equipment (PPE) Program shall be included in the SSHP. The contractor shall describe in detail and provide appropriate PPE to ensure workers, official visitors and government employees are not exposed to levels greater than the action level for identified hazards for each operation and work zone. The program shall address all the elements of 29 CFR 1910.120(g)(5), 29 CFR 1910.134, and 29 CFR 1910.132. Minimum levels of protection necessary for each task/operation to be performed at each site based on probable site conditions, potential occupational exposure, and the hazard analysis/risk assessment required above. Include specific types and materials for protective clothing and respiratory protection. Establish and justify upgrade/downgrade criteria based upon the action levels established as required by paragraph 10.2.6 (as a minimum) and as appropriate. The following emergency and first aid equipment shall be immediately available for onsite use: (1) First aid equipment and supplies approved by the consulting physician; (2) Emergency eye-washes/showers which comply with ANSI Z-358.1; (3) Emergency use respirators (worst case appropriate and as identified by the hazards analysis); (4) Spill control materials and equipment as appropriate; and (5) Fire extinguishers (specify type, size and locations).

10.2.7 Medical Surveillance. All personnel performing onsite activities shall participate in an ongoing medical surveillance program meeting with the requirements of 29 CFR 1910.120. If chemical agent is a suspect site contaminant the requirements in DA PAM 40-8 and/or 40-173 shall apply. The medical examination protocols and results shall be overseen by a licensed physician who is certified in Occupational Medicine by the American Board of Preventive Medicine, or who by necessary training and experience is board eligible. Minimum specific exam content and frequency based on probable site conditions, potential occupational exposures, and required protective equipment shall be specified. A written medical opinion from the examining physician as to fitness to perform the required work shall be made available to the Contracting Officer upon request for any site employee.

10.2.8 Environmental and Personal Monitoring. Where it has been determined that there may be employee exposures to and/or off site migration potential of hazardous airborne concentrations of hazardous substances, appropriate direct reading (real-time) air monitoring and integrated (time weighted average) air sampling shall be conducted IAW applicable federal, state, and local requirements. Air monitoring/sampling must accurately represent concentrations of air contaminants encountered onsite and leaving the site. The types and frequency of air monitoring/sampling to be performed shall be specified for onsite and perimeter locations, where applicable. Where perimeter monitoring is not deemed necessary, provide suitable justification for its exclusion. When applicable, NIOSH and/or EPA sampling and analytical methods shall be used. Personal samples, where necessary, shall be analyzed by laboratories successfully participating in and meeting the requirements of the American Industrial Hygiene Association's (AIHA) Proficiency Analytical Testing (PAT) or Laboratory Accreditation Program. Include, as appropriate, real time (direct-reading) monitoring and integrated Time Weighted Average (TWA) sampling for specific contaminants of concern, Meteorological, noise and radiation monitoring shall be conducted as needed depending upon the site hazard assessment. All monitoring and sampling protocol shall be specified to include instrumentation to be used and calibration of instruments. All monitoring results shall be compared to action levels to determine the need for corrective actions.

10.2.9 Site Control. The contractor shall describe site control measures which include site maps, the work zone delineation and access points, the on/off site communication system, general site access controls, and security procedures (physical and procedural).

10.2.10 Personnel and Equipment Decontamination. The contractor shall develop and specify decontamination procedures with 29 CFR 1910.120 for personnel, personal protective equipment, monitoring instruments, sampling equipment, and other equipment used onsite. Decontamination procedures shall address specific measures to ensure that contamination is confined to the

work site. Necessary facilities and their locations, detailed standard operating procedures, frequencies, supplies, and materials to accomplish decontamination of site personnel and to determine adequacy of equipment decontamination shall be discussed.

10.2.11 Emergency Response and Contingency Procedures (Onsite and Off-site). An Emergency Response Plan, as required by 29 CFR 1910.120 shall be developed and implemented. As a minimum, it shall address the following elements: (1) Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposure, personal injuries, fire/explosions, environmental spills and releases, discovery of radioactive materials; (2) Personnel roles, lines of authority, communications; (3) Posted instructions and list of emergency contacts: physician, notified nearby medical facility, fire and police departments, ambulance service, state/local/federal agencies, CIH, and Contracting Officer; (4) Emergency recognition and prevention; (5) Site topography, layout and prevailing weather conditions; (6) Criteria and procedures for site evacuation, emergency alerting procedures/employee alarm system, emergency PPE and equipment, safe distance, place of refuge, evacuation routes, site security and control; (7) Specific procedures for decontamination and medical treatment of injured personnel; (8) Route maps to nearest pre-notified medical facility; (9) Criteria for initiating community alert program, contacts and follow-up. Material Safety Data Sheets (MSDS) for each hazardous substance anticipated to be encountered on site shall be made accessible to site personnel at all times and shall be submitted in an appendix to the SSHP.

10.2.12 Confined Space Entry. The contractor shall develop procedures for confined space entry in IAW 29 CFR 1910.146. If no confined spaces exist onsite and there is no planned excavations which could result in a confined space, this section may be omitted.

10.2.13 Spill Containment. Where major spills may occur, a spill containment program shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred or stored. The program will be designed IAW 29 CFR 1910.120(j) and will be required for hazardous substances on the site as well as hazardous materials brought on to the site for use during the work process.

10.2.14 Heat/Cold Stress Monitoring. Heat and cold stress monitoring protocols, as appropriate, shall be described in detail. Work/rest schedules shall be determined based upon ambient temperature, humidity, wind speed (wind chill), solar radiation intensity, duration and intensity of work, and protective equipment ensembles. Minimum required physiological monitoring protocols which will affect work schedules shall be developed. In cases where impervious clothing is worn, the NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" protocol for prevention of heat stress shall be followed and heat stress monitoring shall commence at temperatures of 70 degrees Fahrenheit and above. Where impervious clothing is not worn, the American Conference of Governmental Industrial Hygienists (ACGIH) heat stress standard (TLV) shall be used. For cold stress monitoring to help prevent frostbite and hypothermia, the ACGIH cold stress standard shall be referenced and followed, as a minimum.

10.2.15 Standing Operating Procedures, Engineering Controls, and Work Practices. The contractor shall develop Standing Operating Procedures (SOPs) to protect field personnel, prevent accidents, minimize hazards, and to take action to correct hazards where necessary. Site rules and prohibitions for safe work practices shall be discussed and shall include such topics as use of the buddy system, smoking restrictions, material handling procedures, confined space entry, excavation safety, physiological and meteorological monitoring for heat/cold stress, illumination, sanitation, daily safety inspections, etc. This list of topics is not intended to be all-inclusive.

10.2.16 Logs, Reports and Record Keeping. Record keeping procedures for training logs, daily safety inspection logs, employee/visitor registers, medical surveillance records and certifications, air monitoring results, and personal exposure records shall be specified. All personal exposure and medical monitoring records shall be maintained IAW applicable OSHA standards, CFR 1904, 1910, and 1926. The contractor shall develop, retain, and submit, as part of the final report, all visitor registration logs, training logs, and daily safety inspection logs (as part of the daily QC Reports). The contractor shall maintain copies of the required training and medical certificates onsite and shall make them available for government inspection upon request. All recordable accidents/injuries/illnesses shall be telephonically reported to the Contracting Officer immediately. Lost workday accidents require a completed ENG Form 3394, Accident Investigation Report, be submitted within 30 calendar days in accordance with AR 385-40 and USACE Supplement 1 to that regulation. The Safety Exposure Report, a tabulation of field labor hours, lost workday accidents, and number of lost workdays shall be submitted monthly in accordance with DID OE-080.

10.2.17 Radiological and Chemical Warfare Material (CWM). CWM sites have requirements above the SSHP requirements on an HTRW site. Guidance for these requirements are found in ER 385-1-92, Appendix C and other applicable Army regulations. When response activities are required on CWM sites, the contractor shall coordinate with the Contracting Officer and the Commander, Chemical and Biological Defense Command (CBDCOM) to determine the assistance to be provided by the Army Technical Escort Unit (TEU) and/or Edgewood Research, Development and Engineering Center (ERDEC).

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Location Surveys and Mapping Plan	2. IDENTIFICATION NUMBER OE-005-07

3. DESCRIPTION / PURPOSE To describe methods, equipment and accuracy required for location surveys and mapping of Ordnance and Explosives (OE) sites and to provide requirements for the Location Surveys and Mapping Plan at a specific project site.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-ED-CS-D		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters addressing location surveys and mapping for OE projects.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 General. The site-specific Location Surveys and Mapping Plan for each project will document the site specific survey, mapping, and aerial photography requirements tailored to the needs of that project. The specific task orders will specify the appropriate mix required for implementing each OE project and the methodology to accomplish the tasks. Some projects may not require any of these capabilities but others may require comprehensive capabilities. Surveying and Mapping products will be required in either metric or English units depending upon the needs of the individual projects. English is the standard unit, unless otherwise specified by the specific task order. All required services will be accurately specified in the individual project Scope of Work (SOW) tasks.

10.1.1 Unexploded Ordnance (UXO) Safety Provision. During all initial fieldwork and all intrusive activities, the contractor shall provide a UXO Technician II to accompany the survey crew. The UXO Technician II shall conduct visual surveys for surface ordnance prior to the survey crew entering a suspected area, and a magnetometer survey of each intrusive activity site to ensure the site is anomaly free prior to the surveying crew setting monuments or driving stakes. The UXO Technician II shall not be assigned additional survey tasks which would interfere with the OE safety aspects of area clearance for driving stakes, iron pins, monumentation or other survey control, which will penetrate the surface in a potentially OE contaminated area. The UXO Technician II may not be required on a fulltime basis for most of the project, for non-intrusive activities.

10.1.2 Control Points. Plastic or wooden hubs shall be used for all basic control points. A minimum number (to be specified in the task order for each project) of concrete monuments with 3-1/4 to 3-1/2 inch domed brass, bronze or aluminum alloy survey markers (caps) with witness posts shall be established at each site. The concrete monuments shall be located within the project limits, set 10 meters (m) from the edge of any existing road in the interior of the project limits, and a minimum of 300 meters apart. The top shall be set flush with the ground and the bottom a minimum of 0.6 meters below frost depth. NOTE: Revised specifications may be included in each task order.

10.1.2.1 Accuracy. Horizontal and vertical control of "Class I, Third Order" or better shall be established for the network of monuments. Horizontal control shall be based on either the English or metric system and referenced to the North American Datum of 1983 (NAD83) and the State Plane Coordinate Grid System. Vertical control, if required, shall also be based on either the English or metric system and referenced to the North American Datum of 1988 (NAVD88). If aerial photographs or orthophotography are used to provide this survey, the aerial targets used for control points shall meet the same horizontal and vertical accuracy and requirements detailed above.

11. DISTRIBUTION STATEMENT

10.1.2.2 Monument Caps. The caps for the new monuments shall be stamped in a consecutively numbered sequence and the identification shall be provided with each task order as follows:

PROJ.NAME-1-2000	PROJ.NAME-2-2000	PROJ. NAME-3-2000
USAESCH	USAESCH	USAESCH

Note: The name to be stamped on the caps shall be provided with each task order.

The dies for stamping the numbers and letters into these caps shall be 1/8-inch to 3/16-inch in size. All coordinates and elevations shall be shown to the closest one-thousandth of a meter (0.001 m) and one-hundredth of a foot (0.01 ft).

10.1.2.3 Plotting. All of the control points (monuments, aerial targets, and property corners) recovered and/or established at this site shall be plotted at the appropriate coordinate point on a reproducible (Mylar) planimetric or topographic map at scales appropriate for the parcel size being described. Parcels less than 10 acres shall be plotted at 1"=30' (1:360). Parcels 10 – 100 acres shall be plotted at 1"=50' (1:600). Parcels larger than 100 acres will be plotted at 1"=200' (1:2,400). Area maps shall be provided for parcels of 100 acres, and shall show sheet breakdown for subsequent sheets required for the set.

10.1.2.4 Description Cards. A tabulated list and a "Description Card" of all control points (monuments and aerial targets) established or used for this project shall be submitted. The Description Card shall show a north arrow; a sketch of each monument and its location relative to reference marks, buildings, roads, railroads, towers, trees, etc.; a typed description telling how to locate the monument from a well known and easily identifiable point; the monument's name or number; and the final adjusted coordinates and elevations in meters and feet (to the closest 0.001m and 0.01 ft.) The Description Cards shall be 5 by 8 inches describing one monument per card, or an 8-1/2 by 11 inch sheet of bond paper may be used for describing two monuments.

10.1.3 Mapping. The location, identification, coordinates, and elevations of all the control points recovered and/or established at the site shall be plotted on reproducible (Mylar) planimetric or topographic maps at the scale specified in the task order. Each control point shall be identified on the map by its name and number and the final adjusted coordinates and elevations (to the closest 0.001m and 0.01 ft.). Each map shall include a grid north, a true north and a magnetic north arrow with the differences between them in minutes and seconds shown. Grid lines or tic marks at systematic intervals with their grid values shall be shown on the edges of the map. Also, a legend showing the standard symbols used for the mapping and a map index showing the site in relationship to all other sites within the boundary lines of the project area shall be shown. In addition, the state plane coordinates shall be established for the corners of each grid area investigated (100' by 100'; 100' by 200'; etc.; size and accuracy requirements to be determined when the SOW for the task order is prepared). The coordinates for the grid corners shall be shown to the closest one-foot (1.0 ft.). The locations of individual recovered OE items shall be tape measured or the X and Y distance estimated, to obtain a horizontal accuracy of plus or minus one foot within the grid, and plotted and identified on the map. The use of a total station, global positioning system (GPS) or other precision survey method used to locate recovered munition items is not required. NOTE: Accuracies for the location of anomalies and suspected UXO may be greater for the geophysical mapping requirements. The lesser of the two will be the driving accuracy required for the location of recovered munitions with each grid.

10.2 DIGITAL DATA

10.2.1 General Design File Requirements. An overall planimetric design file shall be created and shall be digitized into a Microstation ". dgn" file at an elevation of zero. If contours and spot elevations are required, all data shall be digitized into a second Microstation 3D design file with each element (contours and spot elevations) at their correct elevation, and topologically triangulated network (ttn) files shall be created to model the topographic surface. The ttn file shall be created using the elements of the topographic file, and all spot elevations, contours, and breaklines necessary to create the ttn file shall be used. The ttn file shall be created so that it can be used in an Intergraph software product INROADS to recreate the contours at their exact locations. Cut sheet plots and views into the project data shall be created by referencing the planimetric and contour files from additional Microstation work files.

10.2.1.1 Each sheet shall be standard metric A-1 size drawing, which is 841 mm by 594 mm (33.1 inches by 23.4 inches). Each sheet shall also have a standard border; revision block; title block; complete index sheet layout; bar scale; legend; grid lines or grid tic layout in feet or meters; a True North, a Magnetic North and a Grid North arrow, with their differences shown in minutes and seconds; and shall be plotted at the horizontal scales required.

10.2.1.2 The cell library used shall be attached and provided with the digital data set along with all other supporting files or data. All production and work files shall be fully documented into a concise data manual. This manual shall include all specific

information required for an outsider to be able to recreate all products and determine the location, names, structures, and association of the data such as layer description, weights, colors, symbology, referencing of files etc. This manual shall be included as an ASCII file titled READ.ME that is included with all distributed digital data.

10.2.1.3 No digital data will be acceptable until proven compatible with the USAESCH Graphics System. All revisions required to obtain compatibility with the USAESCH Graphics System shall be done at the contractor's own expense.

10.3 DIGITAL FORMAT FOR INTERGRAPH SURVEY / MAPPING DATA

10.3.1 All data shall conform to the Tri-Service Spatial Data Standards (TSSDS) and as outlined in the specific task order.

10.3.2 Sources and Standard: The TSSDS have been developed and produced by the Tri-Service CADD/GIS Technology Center. They are designed for computer assisted mapping methods that must interface with other surveying firms, Government contractors, and customers so that the final product will be usable with consistent CADD documents.

10.3.3 Electronic Submittal: All data shall be submitted electronically on either eight millimeter NT 10 Gigabyte tape, PC 3.5" floppies or PC CD-ROM. The PC CD-ROM is the preferred format, supplemented with 10 Gigabyte tape for the extremely large data sets.

10.4 ITEMS AND DATA. The following items and data shall be submitted to USAESCH (submittal dates will be specified for each task order):

10.4.1 Field survey. The original copies of all field books, layout sheets, computation sheets, abstracts, and computer printouts. All of these items shall be suitably bound, and clearly marked and identified.

10.4.2 A tabulated list of all control points (monuments, aerial targets and corners) showing the adjusted coordinates and elevations (in meters and feet) established and/or used for this survey.

10.4.3 The negatives and three sets of prints of the aerial photographs taken for the project, if aerial photography is required in the SOW.

10.4.4 A tabulated list of all UXO items with location information, or specific anomalies, as identified in the individual project SOW that were located in the field.

10.4.5 A "Report on Establishment of Survey Mark" (Description Card) on each permanent control monument established and/or used for the survey. In addition to the name or ID number of the monument, the cards shall show the adjusted coordinates, the adjusted elevations, a typed description for locating the monument, and a sketch showing how to locate the monument.

10.4.6 All unique items created and/or used to create the end products and the narrative and description required by the SOW.

10.4.7 Drawings and Digital Data. All maps shall be drawn on 841mm by 594mm (standard metric A-1 size drawing) reproducible (Mylar) drawings generated by the CADD system. One original Mylar and three blueline prints of each final map and two copies of the digital data shall be delivered to USAESCH.

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DATA ITEM DESCRIPTION

FORM APPROVAL
OMB NO 0704-0188

1. TITLE Work, Data, and Cost Management Plan	2 IDENTIFICATION NUMBER OE-005-08

3. DESCRIPTION / PURPOSE To provide requirements for a plan describing procedures for the management and control of work and costs for a specific task order.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters addressing work, data and cost management for Ordnance and Explosives (OE) projects.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 Work, Data, and Cost Management Plan. This part of the Work Plan shall describe how the work will be managed and accomplished, and how costs will be controlled.

10.2 Describe the project management approach to all tasks required under the task order. Describe the controls that will be used to ensure that work is performed in a timely manner and that all established procedures and plans are being followed. Describe the manner in which subcontractors' work will be managed and integrated into the overall effort.

10.3 A schedule shall be presented using MS Project or similar software which shall contain milestones for task deliverables and associated costs, show the task components in their relative chronological positions, and state the intervals between milestones in terms of working days following the previous events.

10.4 Describe the cost control and tracking methodology to be used.

10.5 List the recurring deliverables to be submitted which relate to work, data, and cost management.

11. DISTRIBUTION STATEMENT

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Property Management Plan	2. IDENTIFICATION NUMBER OE-005-09

3. DESCRIPTION / PURPOSE To provide requirements for a plan describing how property management will be performed at a specific Ordnance and Explosives (OE) project site.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-CT-S		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters addressing property management for OE projects. This DID does not apply to firm fixed price (FFP) task orders.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1. General. The Contractor shall prepare a detailed plan for management of Government property in accordance with FAR, Part 45.5, and its supplements.

10.2 Content. The plan shall separate field equipment, office equipment, and consumable supplies and include:

10.2.1 A description and quantity of materials to be used.

10.2.2 The source and estimated rental/acquisition costs of all materials.

10.2.3 Documentation of the contractor's process to acquire 3 quotes for each item and a comparison of rental versus purchase cost for each item, when reimbursement for actual costs is claimed by the Contractor

10.2.4 Basis of selection to be used by the contractor to recommend the source for leased vehicles, when reimbursement for actual costs is claimed by the Contractor. The selection process will include an analysis of rates for leasing vehicles using the quotes obtained from 3 commercial vendors as described above and GSA (GSA only if the lease period is greater than 3 months). The following guidelines should be considered when selecting the number and kind of vehicles:

10.2.4.1 The maximum number of vehicles allowable, such as 1 vehicle for approximately each 4 employees working on site or larger carrying capacity vehicles such as vans to replace several vehicles.

10.2.4.2 The type/kind of vehicle required to perform the function on site; considering the physical conditions at the site (i.e., terrain, weather conditions, distance from living quarters to site office area, distance from site office area to field work area, etc.).

10.2.4.3 Exceptions to the above must be justified by the contractor and approved by the Contracting Officer.

10.2.5 A list of consumable supplies and personal property that are included in the Contractor's overhead rate.

10.2.6 A proposed storage plan, including the method of separation of Government property from Contractor property.

10.2.7 Ultimate disposal plan covering salvage, turnover to the Government, or other disposition of material upon contract termination.

10.2.8 A plan for submitting, on a quarterly basis, or at project's end if the project duration is less than 3 months, a property tracking log report. The report will list all contractor-acquired property that is directly charged to the project.

10.2.9 Procedures for notifying the Contracting Officer of loss, damage, or destruction of accountable government property.

11. DISTRIBUTION STATEMENT

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Sampling and Analysis Plan	2. IDENTIFICATION NUMBER OE-005-10

3. DESCRIPTION / PURPOSE To provide requirements for a plan describing sampling and analysis, quality assurance/quality control, laboratory qualification, data acquisition/data reporting, and chain-of-custody when samples are required for Ordnance and Explosives (OE) projects.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-ED-CS-P/G		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters for OE projects when soil, sludge, sediment, ash, and/or water samples are required.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 The Sampling and Analysis Plan shall be a site-specific plan that shall describe the contractor's procedures, equipment, and methods to collect and preserve samples.

10.2 The Sampling and Analysis Plan shall be a site-specific plan that shall describe the contractor's procedures, equipment, and methods to analyze collected samples, both in the field and laboratory.

10.3 The Sampling and Analysis Plan shall be a site-specific plan that shall describe the contractor's procedures, equipment, and methods to ship the collected samples.

10.4 The Sampling and Analysis Plan shall be a site-specific plan that shall describe the contractor's procedures, equipment, and methods to perform quality assurance/quality control for the project.

10.5 The Sampling and Analysis Plan shall be a site-specific plan that shall describe the contractor's procedures for data reporting.

10.6 The Sampling and Analysis Plan shall identify the laboratory that will perform analytical work.

10.6.1 For analysis of hazardous and toxic waste (HTW), the proposed laboratory must be validated by the Corps of Engineers. The proposed laboratory shall also be an EPA contract laboratory or be familiar with the Contract Laboratory Program (CLP) requirements and can perform CLP work. A copy of the validation shall be included as Appendix to the Sampling and Analysis Plan.

10.6.2 For analysis of samples suspected of chemical agent contamination, the contractor shall use a certified DoD Chemical Surety Material (CSM) laboratory. In addition, at the discretion of the Contracting Officer, a certified mobile laboratory may be required. Certification shall be obtained through the Contracting Officer from the following:

Director, U.S. Army Edgewood Chemical
& Biological Center
ATTN: ECBC-COR-C (Kelly McGuire)
Aberdeen Proving Ground, MD 21010-5423
Phone: 410-436-8428

11. DISTRIBUTION STATEMENT

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10.7 The Sampling and Analysis Plan shall identify the number and locations of samples to be collected, including QA/QC samples. When sampling for chemical agent contamination, the methodology for deciding when a sample should be collected should also be described. The Sampling and Analysis Plan shall identify the EPA approved methods to be used. If the methods are not the EPA approved methods, the certified agencies of the methods shall be identified.

10.8 The Sampling and Analysis Plan shall identify all of the contaminants of concern and the associated detection limits.

DATA ITEM DESCRIPTION

FORM APPROVAL
OMB NO 0704-0188

1. TITLE Quality Control Plan	2. IDENTIFICATION NUMBER OE-005-11

3. DESCRIPTION / PURPOSE To provide details of the approach, methods, and operational procedures to be employed to perform quality control at a specific Ordnance and Explosives (OE) project site.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters addressing quality control for OE projects.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS:

10.1 A quality control plan shall be prepared to document the approach and procedures to be used to ensure quality throughout the execution of the tasks required by the individual task order.

10.1.1 The contractor is solely responsible for the control of product quality and for offering to the Government for acceptance only those products/services that conform to contractual requirements.

10.1.2 Personnel performing quality functions shall have well-defined responsibilities, to include stop-work authority, and the organizational freedom to identify, evaluate, initiate, recommend or provide solutions, and approve corrective actions to ensure all work complies with stipulated contractual requirements.

10.2 The QC Plan shall document processes affecting quality and will include the following:

10.2.1 Audit procedures, corrective/preventive action procedures, data management, anomaly acquisition and reacquisition, field operations, equipment calibration/maintenance requirements (geophysical instruments, radios/cell phones, vehicles/machinery, air monitoring equipment and personal protective equipment etc.), pass/fail criteria for all quality audits and records generated (daily logs, meeting minutes, inventory forms, inspection forms etc.).

10.2.2 The QC plan shall also describe how lessons learned are captured, documented, and submitted to the government.

10.2.3 The QC plan shall describe the procedure used to ensure contract submittal (reports, work plans, etc.) are reviewed/processed to ensure they meet contractual requirements and how changes to existing documents are processed and communicated to appropriate personnel.

10.2.4 The QC Plan shall include a process/training plan for all on-site personnel that ensures each employee meets the qualifications requirements (education, training, and/or experience), as defined for this contract to perform the duties of the job for which they were hired. The QC plan will also address all site specific and routine training requirements for contractor personnel and site visitors.

10.2.5 If applicable, the QC Plan shall contain a Chemical Data Quality Management sub plan in accordance with Engineering Regulation (ER) 1110-1-263.

10.3 All QC documentation will be submitted as part of or as supporting documentation for the final report.

10.4 All QC records and documentation will be kept on site and made available for government inspection upon request.

11. DISTRIBUTION STATEMENT

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Environmental Protection Plan	2. IDENTIFICATION NUMBER OE-005-12

3. DESCRIPTION / PURPOSE To provide requirements for a plan describing the approach, methods, and operational procedures to be employed to protect the natural environment during performance of all tasks at specific Ordnance and Explosives (OE) projects.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-ED-CS-P		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters addressing environmental protection for OE projects.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 The Environmental Protection Plan (EPP) shall be a site-specific plan that shall describe the contractor's procedures and methods during site activities to minimize pollution, protect and conserve natural resources, restore damage, and control noise and dust within reasonable limits. The site specific EPP shall be approved, as part of the Work Plan, prior to the start of any on-site activities.

10.2 Prior to the start of any on-site activities, the Contractor and the Contracting Officer's Representative (or other on-site Government inspection personnel) shall make a joint existing condition survey. During this survey, any wetlands, endangered species, special habitat areas, cultural and natural resources shall be identified and marked. The report of the existing environmental conditions and identification/compliance with potential applicable or relevant and appropriate requirements (ARARs) shall be submitted by the Contractor.

10.3 The site specific EPP shall detail the identification and location of all known:

- 10.3.1 Endangered/threatened species within the project site.
- 10.3.2 Wetlands within the project site.
- 10.3.3 Cultural and archaeological resources within the project site.
- 10.3.4 Water resources within the project site.
- 10.3.5 Coastal zones within the project site.
- 10.3.6 Trees and shrubs that will be removed within the project site.
- 10.3.7 Existing waste disposal sites within the project site.
- 10.3.8 Compliance with ARARs.

10.4 The site specific EPP shall detail procedures and methods to protect and/or mitigate the resources/sites identified in Section 10.3 above.

10.5 The site specific EPP shall detail mitigation procedures for the following:

- 10.5.1 All waste disposal.
- 10.5.2 All burning activities.
- 10.5.3 Dust and emission control.
- 10.5.4 Spill control and prevention.
- 10.5.5 All storage areas.
- 10.5.6 Access routes

11. DISTRIBUTION STATEMENT

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Data Item Description OE-005-12 (Continued):

10.5.7 Trees and shrubs protection and restoration.
10.5.8 Control of water run-on and run-off.
10.5.9 Manifesting and transportation of wastes.
10.5.10 Temporary facilities.
10.5.11 Decontamination and disposal of equipment.
10.5.12 Minimizing areas of disturbance.

10.6 The site specific EPP shall include the procedures for post-activity clean-up to be accomplished.

10.7 The site-specific EPP shall include the Environmental Documentation under the National Environmental Policy Act for the proposed activities as an Appendix. The Contractor may be required to prepare environmental documentation prior to any fieldwork for non-time critical removals. The Contracting Officer will determine the type of environmental documentation required at each site.

10.8 The site specific EPP shall reference the air monitoring plan prepared as part of the Site Safety and Health Plan (DID OE-005-06).

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Investigative Derived Waste Plan	2. IDENTIFICATION NUMBER OE-005-13

3. DESCRIPTION / PURPOSE To detail requirements for the Investigative Waste Plan for Non-Stockpile Chemical Warfare Material (CWM) projects.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-ED-CS-G		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing Work Plan chapters addressing investigative derived wastes for CWM ordnance projects.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS:

10.1 Investigative Derived Waste (IDW) Plan. The contractor shall describe how IDW shall be handled at the site. The plan shall describe if the IDW must be containerized, type of containerization method, sampling and analytical strategy to be utilized, acceptable disposal facilities, site storage and security, transportation, manifesting, and storage time limits. Regulatory acceptance of the IDW Plan may be required prior to contractor field mobilization.

11. DISTRIBUTION STATEMENT

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Geographic Information Systems (GIS) Plan	2. IDENTIFICATION NUMBER OE-005-14

3. DESCRIPTION / PURPOSE: To describe the incorporation of geographic information systems (GIS) into Ordnance and Explosives (OE) projects and to provide requirements for the GIS Plan at a specific project site.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000320	CEHNC-ED-CS-D		

7. APPLICATION / INTERRELATIONSHIP: This Data Item Description contains instructions for preparing Work Plan chapters addressing geographic information systems for OE projects.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 General. The site-specific Geographic Information Systems (GIS) Plan for each project will document the site-specific GIS requirements tailored to the needs of that project. All required services will be accurately specified in the individual project Scope of Work (SOW) tasks.

10.1.1 All data shall conform to the CADD/GIS Technology Center Spatial Data Standards (SDS) and as outlined in the specific task order.

10.1.2 Sources and Standard: The SDS have been developed and produced by the CADD/GIS Technology Center. They are designed to provide a standard for GIS implementations at Department of Defense installations and Army Corps of Engineers Civil Works activities, to provide a GIS implementation schema for approved Federal Geographic Data Committee (FGDC) Data Standards, to provide a "nonproprietary" standard designed for use with commercially available "off-the shelf" CADD, GIS, and relational database software, and to provide a de facto standard for GIS implementations in other Federal, State, and local government organizations, public utilities, and finally, private industry.

10.2 GEOGRAPHIC INFORMATION SYSTEMS (GIS) INCORPORATION. The contractor shall take the GIS data, manual, file, and database structure from the USAESCH GIS standard and apply it to the projects to the extent required to create the products outlined in the specific task order SOW. The standard shall be used as a starting point to load data and to create a GIS tailored for the specific ordnance investigative needs of the site. All digital data shall be created using MicroStation 5.5, 95, or SE and Intergraph's MGE GIS tools to allow it to be loaded directly into the USAESCH OE GIS. Other copies of the GIS may be requested in AutoCad Version 12 or 14, ArcView Version 3.1, and/or Intergraph's Geomedia, version 3.0, to support specific project location requirements. The main purpose of the GIS is to assemble all the data required to associate the non-intrusive subsurface geophysics investigative data to its correct geographical location, the relational database, mapping and remote sensing data. The GIS tools are used to manage the project, assemble data for the administrative record, help determine areas requiring further investigation and to discriminate OE from background anomalies. A program that uses a subset of the GIS data does the discrimination between background anomalies and OE items.

10.3 COMPUTER FILES. All final text files generated by this contract and other individual task orders shall be furnished to USAESCH in MS Office 97 or higher software, IBM PC compatible format and in Adobe Portable Document Format (PDF), suitable for viewing, without modification, on the Internet. Freeware versions of Adobe Acrobat Reader, Netscape, and Internet Explorer shall accompany the text files on CD-ROM, so that the user can use the CD to either install the programs and text files on a machine, or use the CD in a stand alone mode to view the text files. The basic software supported to the field shall be capable of operating on a typical single Intel Pentium processor PC utilizing the Windows NT version 4.0 operating system with a minimum of 64 megabytes of memory and adequate disk storage for project data. All in progress and fielded GIS data, design drawings, survey data, relational databases and related data generated may be required to be available on line to the government

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through the use of an Internet connection. Formal submittals for all GIS, survey and mapping data, and design drawings, generated by the contractor under this contract shall be submitted in the proper format and media that will permit their loading, storage, and use without modification or additional software on the USAESCH GIS workstations. The base GIS workstations consist of Intel dual Pentium GIS machines with 256 megabytes of memory. The workstations run under the Windows NT 4.0 operating system. Current GIS project related software includes: MicroStation 5.5, Oracle 8.04, IRAS B, IRASC 5.04, MGE Basic Nucleus, MGE Analyst, MGE Map Finisher, MGE Projection Manager, MGE Grid Analyst, MGE Modeler, Inroads, and Insitu. Other specific packages to be considered must be proposed to USAESCH for approval and for system and mission compatibility. All GIS data for formal submittals shall be on either four millimeter NT 12 Gigabyte tape (DDS-3), PC 3.5" floppies, or PC CD-ROM. The PC CD-ROM is the preferred format, supplemented with 12-Gigabyte tape for the extremely large data sets, with USAESCH approval.

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188
1. TITLE Engineering Evaluation/Cost Analysis (EE/CA) Report	2. IDENTIFICATION NUMBER OE-010
3. DESCRIPTION / PURPOSE To provide the requirements for EE/CA Reports for Ordnance and Explosives projects.	

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-ED-CS-G		

7. APPLICATION / INTERRELATIONSHIP

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 Format - This report shall be printed on standard size (e.g. 8 ½ by 11 inch) white paper, with drawings folded, if necessary, to this size or to fit within pockets of this size. Pages shall be sequentially numbered. Drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features. When drawings are required, data may be combined to reduce the number of drawings. All attachments shall be identified and referenced in the text of the report. The plan shall be legible and suitable for reproduction.

10.1.1 Chapters shall be numbered sequentially. Within each chapter each page shall be numbered sequentially, starting with the specific chapter number. Within each chapter the paragraphs shall be numbered sequentially starting with the chapter number and using a decimal system, with each section and paragraph having a unique decimal designation. Within each chapter any figures, tables, and charts shall be numbered sequentially starting with the chapter number. Reports shall be bound in a three-ring binder. Binders shall hold pages firmly while allowing easy removal, addition, or replacement of pages.

10.1.2 Appendices shall be lettered alphabetically. Within each appendix, each page shall be numbered sequentially starting with the appendix letter.

10.1.3 A cover sheet will be provided on the front of the binder and also inside the binder which includes the name of the project (site), contractor's name and address, the contract number, the task order number, the project number, the date of the plan, and the title of the report. The cover sheet shall identify the contracting agency and shall name the Geographical Corps District where the project is located. Draft versions of the report shall be clearly identified as such on the cover sheet. The Cover Sheet shall be repeated inside the document

10.1.4 Each page of the Report shall contain a date footer and the contract/task order number. When revisions to the Report are required, a revision date, contract/task order and modification number (if applicable) shall be included in the date footer. A dated summary page listing all revised pages shall be submitted with each revision.

10.1.5 The final EE/CA report shall contain a professional engineer certification.

10.1.6 The report shall be written in common language easily understood by the general public.

10.2 The contractor shall determine inapplicable requirements, or requirements in addition to those listed below, that should be included in the Report. The Report should contain only those data necessary to support the selection of a response alternative and future recurring reviews. Existing documentation should be relied on whenever possible. Chapters shall be organized as follows:

10.2.1 Executive Summary.

10.2.2 Chapter 1. Introduction. At a minimum the following information shall be included:

10.2.2.1 Background

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10.2.2.2 Project Authorization

10.2.2.3 Purpose and Scope

10.2.2.4 Project Team

10.2.2.5 Project Objectives

10.2.3 Chapter 2. Site Description and History

10.2.3.1. Location

10.2.3.2. Physical Description

10.2.3.3. History

10.2.3.4 Demographic Profile

10.2.3.5. Current and Future Site Use

10.2.3.6 Analysis of Historical Records

10.2.3.7 Previous Investigations

10.2.3.8 Previous Removal Actions

10.2.4 Chapter 3. Site Characterization

10.2.4.1. Site Investigations

10.2.4.2. Source, Nature, and Extent of OE

10.2.4.3. Description of Hazards of Specific OE Encountered. Summarize OE on site and characteristic hazard presented by each of those items. Include photographs and/or schematics of all significant items.

10.2.4.4 Update of Archives Search Report (ASR) findings (if necessary).

10.2.5. Chapter 4. Risk Evaluation. Describe the level of safety risk that exists at a site as a result of the OE contamination, using the risk characterization tools identified in the Task Order.

10.2.6 Chapter 5. Institutional Analysis. Refer to DID OE-100.

10.2.7 Chapter 6. Identification of Response Action Objectives.

10.2.8 Chapter 7. Identification and Analysis of Response Action Alternatives.

10.2.8.1 Effectiveness (Overall protection to human health and the environment, compliance with ARAR's, long-term effectiveness, short-term effectiveness).

10.2.8.2 Implementability (technical feasibility, administrative feasibility, availability of services and materials, stakeholder acceptance).

10.2.8.3 Cost (capital costs, post-removal site control costs).

10.2.9 Chapter 8. Comparative Analysis of Response Action Alternatives. Compare the feasible alternatives that survive the analysis in Chapter 7.

10.2.10 Chapter 9. Recommended Response Action Alternative (to be included only when specifically required by a task order SOW).

10.2.11 Chapter 10. Recurring Reviews.

10.2.12 References and appendices (as required)

DATA ITEM DESCRIPTION

FORM APPROVAL
OMB NO 0704-0188

1. TITLE Accident/Incident Reports

2. IDENTIFICATION NUMBER OE-015

3. DESCRIPTION / PURPOSE This Data Item Description contains instructions for reporting accidents/incidents which occur on the work site or in connection with the stated work of this contract.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-ED-SY-S		

7. APPLICATION / INTERRELATIONSHIP Required by AR 385-40, USACE Supplement 1 to AR 385-40, EM 385-1-1 (Corps of Engineers Safety and Health Requirements Manual) and CEHNCR 385-1-1 (Safety and Occupational Health Program Management).

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 The following categories of accidents/incidents shall be reported to the Contracting Officer by telephone or written report.

10.1.1 Accidents/Incidents which result in a fatality, injury of employees, lost workdays, and/or property damage assessed at a cost of $10,000 or more shall be reported telephonically to the Contracting Officer as soon as possible after learning of the incident. The report shall contain as much information as is known concerning the incident. An ENG Form 3394 shall be completed within 30 calendar days after the incident in accordance with the instructions attached to the form and forwarded to the Contracting Officer. The ENG Form 3394 shall be legible and signed by the supervisor of the person injured (or supervisor of the activity where property damage occurred) and by the next level of management.

10.1.2 The contractor shall immediately report to the Contracting Officer any incident which could bring adverse attention or publicity to the U.S. Army or the Corps of Engineers.

10.1.3 The contractor shall maintain a list of alternate points of contact in the event the Contracting Officer is not available. CEHNC shall provide the alternate points of contact.

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Personnel/Work Standards	2. IDENTIFICATION NUMBER OE-025

3. DESCRIPTION / PURPOSE To describe the personnel qualifications and work requirements for Ordnance and Explosives (OE) projects.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS:

10.1 Qualifications of proposed key personnel and of personnel filling core labor categories (see par. 10.3, 10.4) shall meet the requirements listed below and shall be submitted in resume form. The resumes shall document all required educational and experience requirements. Resumes for Unexploded Ordnance (UXO) personnel shall be accompanied by the Explosive Ordnance Disposal (EOD) school course graduation certificate. Resumes need not be submitted for personnel listed on the USAESCH Database for UXO Personnel; contractors need only submit name, proposed position, and UXO number. The contractor shall certify in writing to the Contracting Officer that UXO personnel scheduled to fill the positions of Senior UXO Supervisor, UXO Safety Officer, and UXO Quality Control Specialist are fully qualified to fill those positions. The other labor categories are provided for the contractor's encouraged use and guidance.

10.2 **Unexploded Ordnance (UXO) Personnel, General.** UXO personnel, assigned to positions UXO Technician I, UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, and Senior UXO Supervisor, shall be U.S. citizens and graduates of one of the following schools or courses:

a. US Army Bomb Disposal School, Aberdeen Proving Ground, MD;

b. US Naval Explosive Ordnance Disposal (EOD) School, Indian Head, MD;

c. EOD Assistants Course, Redstone Arsenal, AL; EOD Assistants Course, Eglin Air Force Base, FL; or, a DoD certified equivalent course.

10.2.1 The term UXO Qualified Personnel applies only to personnel meeting the requirements for the positions of UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, and Senior UXO Supervisor. .

10.2.2 EOD experience in National Guard or Reserve Units will be based on the actual documented time spent on active duty, not on the total time of service.

10.3 **Key Personnel**. When required for the work effort, the following personnel will be designated as key personnel and shall meet the minimum qualifications listed for each labor category.

10.3.1 **Geographical Information System (GIS) Manager**. This individual shall have a minimum of 3 years of direct experience managing computerized GIS within a Microstation GIS Environment. Operation and management of site specific GIS, based on USAESCH hardware and software standards described in DID OE-005-14, may be a major element of this project.

10.3.2 **Project Geophysicist**. This individual shall have a degree in geophysics, geology, geological engineering, or a closely related field, and shall have a minimum of 5 years of directly related geophysical experience. This individual has overall responsibility for design, implementation, and management of all geophysical investigations required for the work effort, but may not necessarily be on-site full time. This individual shall be the project geophysicist-of-record.

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10.3.2.1 **Site Geophysicist**. This individual shall have the same education requirements as the project geophysicist, except the five years minimum experience requirement is waived, if working under the general supervision of a Project Geophysicist. This individual is responsible for day-to-day operations of the site geophysical investigations. This individual may also be the project geophysicist.

10.3.3 **Project Manager**. This individual shall have at least 3 years experience in general contract project management on programs similar in size and complexity to the effort described in the SOW. Exceptions shall be submitted to the Contracting Officer for approval.

10.3.4 **Senior UXO Supervisor (SUXOS)**. This individual shall be a graduate of a school listed in paragraph 10.2.a or 10.2.b. This individual shall have at least 15 years UXO experience, which may be a combination of active duty military EOD and contractor UXO experience, and shall include 10 years in supervisory positions. A SUXOS must be able to fully perform all of the functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. In addition, the ability to perform the following functions is a requirement for the SUXOS: Planning, coordinating, and supervising all contractor on-site UXO activities; preparation of standard operating procedures (SOPs) for UXO operations ensuring compliance with DOD directives as well as local, state, and federal statues and codes; and certification of Ammunition, Explosives, and Dangerous Articles (AEDA) and/or range scrap as ready for turn-in or disposal in accordance with current policies. The SUXOS must also be fully capable of supervising multiple project teams which may be performing UXO and UXO related activities; e.g., vegetation clearance; land surveying; reconnaissance and classification of UXO, pyrotechnic items, and military explosives and demolition materials; locating surface and subsurface UXO; destroying UXO and OE by burning or detonation; and/or transporting and storing UXO and explosives material.

10.3.5 **UXO Safety Officer (UXOSO)**. This individual shall have the same minimum qualifications as a UXO Technician III as listed in paragraph 10.4.2. In addition, this individual shall have the specific training, knowledge, and experience necessary to implement the SSHP and verify compliance with applicable safety and health requirements. This individual must be able to perform all functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. In addition, the UXOSO must have the ability to implement the approved UXO and explosives safety program in compliance with all DOD, federal, state, and local statutes and codes; analyze UXO and explosives operational risks, hazards, and safety requirements; establish and ensure compliance with all site specific safety requirements for UXO and explosives operations; enforce personnel limits and safety exclusion zones for UXO clearance operations, UXO and explosives transportation, storage, and destruction; conduct safety inspections to ensure compliance with UXO and explosives safety codes; and operate and maintain air monitoring equipment required at site for airborne contaminates.

10.3.6 **UXO Quality Control Specialist (UXOQCS)**. This individual shall have the same minimum qualifications as a UXO Technician III as listed in paragraph 10.4.2. In addition, this individual shall have documented Quality Control Training. This individual must be able to fully perform all functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. This individual must have the specific training, knowledge, and experience necessary to fully implement the contractor's QC plans. In addition, the UXOQCS must have the ability to implement the UXO specific sections of the Quality Control Program for all OE related evolutions; conduct quality control inspections of all UXO and explosives operations for compliance with established procedures; and direct and approve all corrective actions to ensure all OE related work complies with contractual requirements.

10.4 **Core Labor Categories**. The following labor categories may be required for each work effort, as described in each specific task order.

10.4.1 **Civil Engineer**. This individual shall have, as a minimum, a bachelor's degree in Civil Engineering or Civil Engineering Technology and 3 years of field or office experience. Preferably this individual should have a minimum of 3 years experience in OE or OE related activities. This could include surveying, mapping, aerial triangulation, global positioning system, geographical information systems development, or project management.

10.4.2 **UXO Technician III**. This individual, who supervises a project team, shall be a graduate of a school listed in paragraph 10.2.a. or 10.2.b. This individual shall have experience in OE clearance operations and supervising personnel, and shall have at least ten years combined active duty military EOD and contractor UXO experience. This individual must be able to fully perform all functions enumerated for UXO Sweep Personnel, UXO Technicians I and II. In addition, the ability to perform the following functions is a requirement for the UXO Technician III: Supervising and performing on-site disposal of Ordnance and Explosives; preparing explosives storage plans in accordance with all applicable guidance; preparing required OE administrative reports; preparing SOPs for on-site OE operations; performing risk hazard analyses; conducting daily site safety briefings; and supervising the conduct of all on-site evolutions directly related to OE operations.

10.4.3 **UXO Technician II.** This individual shall be a graduate of a school listed in paragraph 10.2.a. or 10.2.b. As an exception, a UXO Technician II may be an UXO Technician I with at least five years combined military EOD and contractor UXO

experience. This individual must be able to fully perform all functions enumerated for UXO Sweep Personnel and UXO Technician I. In addition, the ability to perform the following functions is a requirement of the UXO Technician II: Properly storing OE material in accordance with applicable guidance; identifying fuzes and determining fuze condition; determining a magnetic azimuth using current navigational/locating equipment; performing field expedient identification procedures to identify explosives contaminated soil; preparing an on-site holding area for OE material; and operating modes of transportation for transporting OE material, when appropriate.

10.4.4 **UXO Technician I.** This individual shall be a graduate of a course listed in paragraph 10.2.c. A UXO Technician I can advance to the UXO Technician II category after five years combined active duty military EOD and contractor UXO experience. This individual assists fully qualified personnel (UXO Technician II and above) in the following functions: Conducting reconnaissance and classification of UXO and other OE materials; identifying all munitions including bombs and bomb fuzes, guided missiles, projectiles and projectiles fuzes, rockets and rocket fuzes, land mines and associated components, pyrotechnics items, military explosives and demolition materials, grenades and grenade fuzes, and submunitions; locating subsurface UXO using military and civilian magnetometers and related equipment; performing excavation procedures on subsurface UXO; locating surface UXO by visual means; transporting UXO and demolition materials; preparing firing systems, both electric and non-electric, for destruction operations; operating Personnel Decontamination Stations (PDS); inspecting salvaged OE related material and erection of UXO related protective works; and donning and doffing personnel protective equipment.

10.5 **Other Labor Categories.** The following labor categories may typically be required to perform each work effort:

10.5.1 **Biologist.** This individual shall be able to apply a knowledge of principles and theories of biology and related sciences in the collection, measurement, analysis, evaluation, and interpretation of biologic information concerning the structure, composition, and history of plants and animals. This includes the performance of basic research to establish fundamental principles to identify and protect special-status species and habitats.

10.5.2 **Certified Industrial Hygienist.** This person shall meet the Office of Personnel Management Standards for the Industrial Hygiene Series GS-690 and is certified by the American Board of Industrial Hygiene with at least 2 years hazardous waste site operations experience. Board certification or eligibility shall be documented by written confirmation by the American Board of Industrial Hygiene (ABIH). Military personnel must be identified as being a qualified Industrial Hygienist by the Surgeon General and be certified by the American Board of Industrial Hygiene.

10.5.3 **Chemist.** Performs a full range of experiments and analyses and any of the duties associated with a lab technician while also holding at least a bachelor's degree in chemistry.

10.5.4 **Drafter 1.** Performs drafting work using a computer, requiring knowledge and skills in drafting methods, procedures, and techniques. Prepares drawings of structures, facilities, land profiles, water stems, mechanical and electrical equipment, pipelines, duct system, and similar equipment, systems, and assemblies. Drawings are used to communicate engineering ideas, design, and information. Uses recognized systems of symbols, legends, shadings, and lines having specific meanings in drawings.

10.5.5 **Emergency Medical Technician.** Provides emergency medical treatment to sick or injured persons at site of emergency and while in transit to medical facility, working as a member of an emergency medical team. Determines nature and extent of illness or injury, or magnitude of catastrophe, and establishes procedures to be followed or need for additional assistance, basing decisions on statements of persons involved, examination of victim or victims, and knowledge of emergency medical practice. Administers prescribed medical emergency treatment at site of emergency, or in vehicle en route to medical facility, performing such activities as applying splints, administering oxygen, maintaining an adequate airway, treating minor wounds or abrasions, or performing cardiopulmonary resuscitation. Communicates with professional medical personnel at emergency treatment facility to obtain instructions regarding further treatment and to arrange for reception of victims at treatment facility.

10.5.6 **Environmental Engineer.** This individual shall have, as a minimum, a bachelor's degree in chemical engineering, civil engineering or environmental engineering.

10.5.7 **Field Office (Administrative).** This individual shall have the same qualifications as a clerk/typist but must be capable of operating the office in the absence of the UXO Supervisor. This person must be able to understand and answer questions relating to project status as obtained from status reports. This individual must also be capable of keeping track of field office personnel and appropriate time sheets.

10.5.8 **Geologist.** This individual shall be able to apply a knowledge of principles and theories of geology and related sciences in the collection, measurement, analysis, evaluation, and interpretation of geologic information concerning the structure, composition, and history of the earth. This includes the performance of basic research to establish fundamental principles and

hypotheses and develop a fuller knowledge and understanding of geology and the application of these principles and knowledge to a variety of scientific, engineering, and economic problems.

10.5.9 **Heavy Equipment Operator**. Operates heavy equipment such as cranes, clamshells, power shovels, motor graders, heavy loaders, carryalls, bulldozers, rollers, scrapers, and tractors. Equipment is used to excavate, load or move dirt, gravel or other materials. Operator may be required to read and interpret grade and slope stakes and simple plans. May be required to grease, adjust and make emergency repairs to equipment.

10.5.10 **Industrial Hygienist**. This individual shall meet the Office of Personnel Management Standard for the Industrial Hygiene Series GS-690, with three years experience in HTRW work; personnel certified by the American Board of Industrial Hygiene with one year experience in HTRW work; and military personnel identified as being a qualified Industrial Hygienist by the Surgeon General having three years experience in HTRW work. In addition, it is expected that these personnel, by virtue of their education, special studies and training, have acquired competence in the practice of Industrial Hygiene.

10.5.11 **Lab Technician**. Performs laboratory tests according to prescribed standards to determine chemical and physical characteristics or composition of solid, liquid, or gaseous materials and substances. Sets up and adjusts laboratory apparatus and operates grinders, agitators, centrifuges, ovens, condensers, and vibrating screens to prepare material for testing according to established laboratory procedure. Test materials for presence and content of elements or substances, such as HTRW. Examines materials using microscope. Records test results on standard forms, writes test reports describing procedures used, and prepares graphs and charts. Cleans and sterilized laboratory apparatus. May prepare chemical solutions according to standard formulae.

10.5.12 **Laborer**. Performs tasks, which primarily require physical abilities and effort involving little or no specialized skill or prior work experience. The following tasks are typical of this occupation: Loads and unloads trucks and other conveyances; moves supplies and materials to proper location by wheelbarrows or hand trucks; stacks materials for storage or binning; collects refuse and salvageable materials; digs, fills, and tamps earth excavations; levels ground using pick, shovel, tamper, and rake; shovels concrete and snow; cleans culverts and ditches; cuts tree and brush; operates power lawnmowers; moves and arranges heavy pieces of office and household furniture, equipment, and appliances; moves heavy pieces of automotive, medical engineering, and other types of machinery and equipment. Spreads sand and salt on icy roads and walkways; picks up leaves and trash.

10.5.13 **Mechanic.** Repairs, rebuilds, or overhauls major assemblies of internal combustion automobiles, buses, trucks, or tractors. Diagnoses the source of trouble and determines the extent of repairs required; replaces worn or broken parts.

10.5.14 **Safety Engineer**. This individual shall meet the Office of Personnel Management Standards for a Safety Engineer Series GS-803 with three years experience in HTRW work; or be certified by the Board of Certified Safety Professionals with one-year experience in HTRW work. In addition, it is expected that these personnel, by virtue of their education, special studies and training, have acquired competence in the practice of safety and occupational health.

10.5.15 **Security Guard**. Protects property from theft or damage, or persons from hazards or interference. Duties involve serving at a fixed post, making rounds on foot or by motor vehicle, or escorting persons or property. May be deputized to make arrests. May be required to demonstrate (1) proficiency in the use of firearms and other special weapons and (2) continuing physical fitness.

10.5.16 **Surveyor**. This individual should have minimum of 5 years experience as a Survey Party Chief, performing the following functions Leading day-to-day work activities of survey party under the direction of a land surveyor; supervising a crew engaged in gathering data about the earth's surface, using a variety of surveying instruments; clearing land and setting stakes to identify certain points; checking final field notes for clarity and accuracy; and completing transmittal of forms.

10.5.17 **Surveyor Aide**. Performs any of following duties to assist in surveying land: Holds level or stadia rod at designated points to assist in determining distances and elevations and laying out stakes for map making, construction, mining, land, and other surveys. Calls out reading or writes station number and reading in notebook. Marks points of measurement with elevation, station number, or other identifying mark. Measures distance between survey points, using steel or cloth tape or surveyor's chain. Marks measuring point with keel(marking crayon), paint sticks, scratches, tacks, or stakes. Places stakes at designated points and drives them into ground at specified elevation, using hammer or hatchet. Cuts and clears brush and trees from line of survey, using brush hook, knife, ax, or other cutting tools.

10.5.18 **Truck Driver**. This individual shall have the appropriate Commercial Drivers License (CDL) depending on the vehicle type and transportation requirements. This individual drives a truck to transport materials, merchandise, equipment, or workers between various types of establishments such as manufacturing plants, freight depots, warehouses, wholesale and retail

establishments or between retail establishments and customers' houses or places of business. May also load or unload truck with or without helpers, make minor mechanical repairs, and keep truck in good working order.

10.5.19 **UXO Sweep Personnel**. UXO Sweep personnel assist UXO technicians and supervisory personnel in the clearance of UXO, operating only under the direct supervision of qualified UXO technicians and/or UXO supervisors. This position requires site and job specific contractor training (which may include ordnance recognition, safety precautions, donning and doffing personnel protective equipment, etc.) but does not require UXO technician qualifications. UXO Sweep Personnel conduct visual and/or instrumented UXO search activities in the field; perform field maintenance on military and civilian magnetometers; operate ordnance detection instruments and other similar equipment to include digital geophysical mapping instruments; and remove OE scrap after such items have been certified/verified safe for handling by a qualified UXO technician. UXO sweep personnel are not involved in the execution of explosives operations.

10.6 **Work Standards**: The following are minimum work standards for Ordnance and Explosives projects. Prior approval of the Contracting Officer shall be obtained to relax these standards.

10.6.1 **Work Week:** UXO personnel involved in performing UXO field operations shall be limited to a 40 hour week, either four 10 hour days or five eight hour days. Two consecutive work weeks shall be separated by 48 hours of rest.

10.6.2 **Project Team Composition and Roles.**

10.6.2.1 Conventional OE Investigations or Removal Actions.

10.6.2.1.1 Each UXO team shall consist of one UXO Technician III and six or less team members. Teams shall have a minimum of two UXO qualified personnel, one of which shall be the UXO Technician III. When the UXO operations are limited to surface removals using UXO Sweep Personnel identified in paragraph 10.5.19, personnel ratios shall NOT exceed six (6) UXO Sweep Personnel to one (1) UXO Technician II, or three (3) UXO Technicians II to one (1) UXO Technician III.

10.6.2.1.1.1 The minimum team separation distance for all teams is the greater of 200 feet or the K50 distance of the most probable munition (MPM) for the OE area.

10.6.2.1.2 The UXO Technician III shall supervise all UXO tasks and UXO teams. This individual may supervise other than UXO teams such as brush-clearing teams. When non-UXO teams are under the direct supervision of someone other than a UXO Technician III, the teams shall be accompanied by a UXO Technician II who will provide UXO avoidance support.

10.6.2.1.3 The Senior UXO Supervisor shall supervise no more than ten UXO Technicians III. There shall be no more than one Senior UXO supervisor on an OE project without prior approval of the Contracting Officer.

10.6.2.1.4 A full time UXOSO shall be on site for each OE project This position may be dual-hatted with the UXOQCS when there are less than 15 personnel on site. The UXOSO shall not be involved in any OE removal or investigation tasks. The UXOSO shall be directly hired by and work for the prime contractor and shall report directly to the project manager or someone higher in the contractor's organization.

10.6.2.1.5 A UXO Quality Control Specialist may not be required full time on site. However, QC functions shall be performed for all field activities. The UXOQCS shall ensure high quality in the field without compromising safety. The UXOQCS shall not perform any removal or investigative tasks. The UXOQCS shall be directly hired by and work for the prime contractor and must report directly to the project manager or someone higher in the contractor's organization. When this position is dual hatted as the UXOSO the individual filling this position shall remain on site during the project.

10.6.2.1.6 The UXO Technician I shall be limited to the functions listed in paragraph 10.4.4 The UXO Technician I shall not determine if UXO are safe to move.

10.6.2.1.7 UXO Sweep Personnel shall not excavate anomalies nor handle UXO. They may only perform the functions listed in paragraph 10.5.19.

10.6.2.2 Chemical Warfare Materiel (CWM) Investigations and Removal Actions.

10.6.2.2.1 A full time UXOSO shall be present during all field operations on a CWM project site due to the complex hazards posed by CWM.

10.6.2.2.2 A full time UXOQCS shall be used for all CWM field operations. This requirement may be relaxed if a written request, citing actual site conditions, is submitted to the Contracting Officer for approval.

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Site Specific Final Report	2. IDENTIFICATION NUMBER OE-FMC-030

3. DESCRIPTION / PURPOSE To provide the requirements for final reports for Ordnance and Explosives (OE) projects.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing final reports for OE projects.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS:

10.1 General. The Contractor shall prepare a Site Specific Final Report (SSFR) covering all operations and activities and stating that the project has been completed in accordance with the task order Scope of Work (SOW) and approved Work Plan.

10.2 General. The SSFR shall be typed on standard size (e.g. 8.5 X 11 inch) white paper. Chapters shall be numbered sequentially. Within each chapter the paragraphs shall be numbered sequentially starting with the chapter number. Within each chapter any figures, tables, and charts shall be numbered sequentially starting with the chapter number. Appendices shall be lettered alphabetically and shall be identified and referenced in the text of the SSFR. Within each appendix, each page shall be numbered sequentially starting with the appendix letter. Every page of the SSFR shall contain a date footer and the task order number. The plan shall be legible and suitable for reproduction. The SSFR shall also be provided in CD-ROM format, including all text, drawings, maps, forms, tables, field notes, and other data gathered during the response action. Contents of the SSFR shall be as described below.

10.2.1 The front cover of draft SSFR's shall be prepared in accordance with ATTACHMENT 1 of this form and shall bear the following statement in addition to other requirements, "The views, opinions, and/or findings contained in the report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation."

10.2.2 Introduction shall consist of a narrative statement of the reasons for the response action, make reference to the task order SOW, Technical Instructions, other contract direction, previous related submittals and citation of the Government authorization. It should also state aims, objectives, probability of solution or accomplishment, estimated scope of development effort required and technical approach.

10.2.3 Discussion shall give a detailed discussion of the technical effort or work performed covering procedures, equipment, facilities, data and mathematical computations used (both successful and unsuccessful), and results (both expected and unexpected).

10.2.4 Documentation should be made making reference to all related submittals (drawings, logs, intermediate reports, laboratory reports, conference reports and other research sources.)

10.2.5 Tests. Identify tests conducted, and test results, both QA and QC.

10.2.6 Summary. The main SSFR body shall end with a summary which should be a concise, self-explanatory recapitulation of the report.

10.2.7 Conclusion. The SSFR will contain conclusions, only if specifically required by a task order SOW. If required by the task order SOW, the SSFR should contain a logical conclusion based on the contractor's evaluation of data presented in the

11. DISTRIBUTION STATEMENT

report when an evaluation is applicable. The conclusion should be concise and based on supporting arguments presented in the body of the SSFR.

10.2.8 Recommendations. The SSFR will contain recommendations, only if specifically required by a task order SOW. If required by the task order SOW, the recommendations should be a logical outcome of the conclusions and should provide information necessary for action leading to improvements of a system or the state-of-the-art.

10.3 Content:

10.3.1 The SSFR shall contain maps showing the search grids established and records of OE and OE scrap found designated by grid number, type, and quantity. A separate list shall be included which identifies all UXO, ordnance scrap, and other material recovered during the response action. The list, arranged by grid numbers, will identify UXO by M number, type and condition, ordnance scrap in pounds (including types of any fragmentation not represented in the list of UXO), and pounds of other material. Other material is defined as non-munitions material found at the ordnance site. The depth to the top of each UXO item recovered will be reported on the list as well as x and y coordinates and the soil type (either sand, clay, or loam) at which the item was recovered. The presence of limestone at the location of the item shall also be noted.

10.3.2 The result of quality control sweeps shall be reported separately, but in the same manner as the original sweep.

10.3.3 Any additional sweeps required shall be reported separately but in the same manner.

10.3.4 A description of the methods used to clear ordnance, including lessons learned and advice for future operations.

10.3.5 All documentation for final disposition of scrap/range residue.

10.3.6 Color photographs of major activities and UXO discoveries. Photos shall be 4" by 6" (10 cm by 15 cm) and shall be color photocopies for draft submittals and copies of final submittal. Original prints and negatives shall be submitted with the original final SSFR.

10.3.7 A video tape, if required by a task order, will show major activities and UXO discoveries. The video tape shall be hi-grade VHS color tape with voice narration describing the actions being taped and length as specified in the task order. The original video tape shall be submitted with the original final SSFR.

10.3.8 Description and results of laboratory analyses and maps indicating sample locations.

10.3.9 Daily SUXOS Reports. Reports should be condensed to the maximum extent possible. More than one report may be included on the same page. Daily reports shall contain factual information only concerning locations and activities of UXO teams, discoveries and/or demolition of OE items, work stoppages or interruptions, visitors to the site, unusual site conditions, substantive telephone calls or conversations, accidents, incidents, special training or safety issues, or other unusual happenings.

10.3.10 All Forms 948 or similar documentation issued by the Government during the task order's duration.

10.3.11 Dig sheet data for all excavations prepared as a result of geophysical mapping and investigation. Information may be presented in tabular form, to avoid excessive pages within the SSFR. Actual locations versus predicted locations of expected ordnance items will be reported.

10.3.12 Boundaries of actual response activities and any areas that were avoided.

10.3.13 Description and maps of any archaeology sites and environmentally sensitive areas that were encountered and corrective or protective procedures that were taken.

10.3.14 Description of any damages that were done to trees, utilities, or facilities and corrective actions that were taken to repair these damages.

10.3.15 Number of acres on which re-vegetation or re-seeding was done.

SITE SPECIFIC FINAL REPORT
(Title of project)
(Name of site where work is being performed)
(Location of site where work is being performed)

PREPARED FOR:

U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE

(US Army Corps of Engineers LOGO)

(Contract number)

(Task Order number)

(Project number)

Geographical District:

PREPARED BY:

(Company name)

(Date of report)

ATTACHMENT 1

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Disposal Feasibility Letter Report	2. IDENTIFICATION NUMBER OE-040

3. DESCRIPTION / PURPOSE Letter report describing three Ordnance and Explosives (OE) disposal alternatives, required only when on-site disposal is not possible.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX-R		

7. APPLICATION / INTERRELATIONSHIP The alternative approved by the Contracting Officer shall be the basis of the Work Plan.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 Format. The report shall be prepared on 8 1/2 by 11 inch paper in accordance with the Contractor's standard format for letter reports.

10.2 Content. The report shall contain:

10.2.1 Description of at least three technical alternatives for disposal of OE and hazardous waste.

10.2.2 Analysis of the alternatives according to regulatory requirements, geographical proximity, and packaging and handling requirements.

10.2.3 Estimated cost associated with each alternative.

10.2.4 Summary and recommendations.

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Report/Minutes, Record of Meeting	2. IDENTIFICATION NUMBER OE-045

3. DESCRIPTION / PURPOSE To provide a record of the proceedings of any specified meeting.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY:	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-DC		

7. APPLICATION / INTERRELATIONSHIP

7.1. This data item can be used for any Programs/Projects requiring formal documentation of meetings of any type, i.e., audits, design reviews, etc.

7.2. The data item shall also be used to provide a written record of attendees, questions and answers from public meetings and submitted within 5 days after the meeting.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 The title page shall contain, as appropriate, the following:

10.1.1 Date of report/meeting.

10.1.2 Title - Type of meeting (study contract, audit, design review, etc.).

10.1.3 Title of Program/Project.

10.1.4 Contract number and/or task order number.

10.1.5 Signature(s) - Contractor (supporting activity) Project Manager or designated representative.

10.2 The report/minutes shall include, as appropriate, the following types of information:

10.2.1 An introduction which will include:

10.2.1.1 Statement relating to the purpose/objective of the meeting.

10.2.1.2 The original agenda/revisions thereto. (This may be accomplished by reference to attachment/enclosure.)

10.2.2 Administrative data which will include:

10.2.2.1 Date and location of the meeting.

10.2.2.2 Agency under whose direction the meeting was convened.

10.2.2.3 Name and title of the chairperson or co-chairpersons.

10.2.2.4 Names and titles of persons attending.

11. DISTRIBUTION STATEMENT

10.2.3 Information covered during the meeting, including as appropriate, such items as:

10.2.3.1 A description and/or listing of the material and documentation, if any, discussed/reviewed during the meeting.

10.2.3.2 Specific statements relating to changes, deletions, modifications, etc., discussed/reviewed during the meeting, including:

10.2.3.2.1 A description of the change/modification required.

10.2.3.2.2 The reason for the change/modification.

10.2.3.2.3 The agency responsible for preparing change proposals, if required, necessary to effect the change/modification.

10.3 The record of each item discussed/reviewed during the meeting will appear, in general, in the following format:

10.3.1 Item - A brief statement identifying the item, or questions from the meeting attendees.

10.3.2 Discussion - Summary of pertinent information associated with the item.

10.3.3 Recommendations - A list of both the Project/Program Manager's and the contractor's recommendations, and answers to the attendee's questions.

10.3.4 Action - A brief statement of agreements reached, action(s) required by the Program/Project Manager or the contractor, identity of the personnel or activity assigned responsibility for taking and/or coordinating required actions, contractual action, if required, and all key dates.

10.4 The report/minutes will be typed on 8 1/2" by 11" white paper. Charts, graphs, drawings, lists, and sketches may be included, if necessary, to support or clarify the text of the report/minutes. Oversize material shall be one-way foldouts. All material presented shall be sufficiently clear and sharp for further reproduction if required. All pages and supporting material shall be securely bound together.

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Telephone Conversations/ Correspondence Records	2. IDENTIFICATION NUMBER OE-055

3. DESCRIPTION / PURPOSE: To record telephone conversations and written correspondence.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-DC		

7. APPLICATION / INTERRELATIONSHIP

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 The contractor shall keep a record of each substantive phone conversation and written correspondence related to the performance of this contract. For this contract, "substantive" is defined as:

10.1.1. All calls to or from Government personnel that require action by either the Government or the Contractor.

10.1.2. All calls to or from Government personnel that directly or indirectly affect contract terms and conditions.

10.1.3. All calls to or from federal, state, or local regulatory agency personnel.

10.1.4. All calls to contractor personnel that require calling party to be referred to a Corps of Engineers Public Affairs Office.

10.2 Calls involved in the routine performance of project work that do not fit the above definition of substantive need not be recorded and provided to the Contracting Officer.

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188
1. TITLE Conventional Explosives Safety Submission (ESS)	2. IDENTIFICATION NUMBER OE-060

3. DESCRIPTION / PURPOSE To provide Ordnance and Explosives (OE) removal action safety criteria for approval by an appropriate DOD Element.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP Incorporates guidance contained in DDESB Memorandum, Subject: Guidance for Clearance Plans, 27 Jan 98.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 The contractor shall, when required by the government, submit a conventional explosives safety submission which describes the safety criteria to be employed during OE removal operations. The ESS shall be a separate document and shall be prepared using the following format:

10.2. **Reason for OE**: Provide a brief description of why OE exists in the specific area(s) covered by the submission.

10.3 **Amount and Type of OE**. Provide the expected amount(s) and type(s) of OE based on historical research or data generated from surface or intrusive sampling.

10.3.1 **Most Probable Munition**. For Q-D purposes, the most probable munition (MPM) shall be established for each OE area. The most probable munition is the round with the greatest fragment distance that can reasonably be expected to exist in any particular OE area. The MPM can be selected from historical data or sampling data, sampling data is the best.

10.3.2 If, during the course of actual removal, a round with a greater fragment distance is encountered, then Q-D arcs shall be adjusted and an amendment to the safety submission shall be submitted for approval.
10.3.3 For explosive contaminated soil, select a Maximum Credible Event (MCE). For soil the MCE is the concentration of explosives times the weight of the mix. When the concentration varies within the area, weighted averages or any other valid mathematical technique can be used, as long as the technique is explained and technically supported in the submission.

10.3.4 MCEs for explosive contaminated buildings slated for cleanup or dismantlement shall be estimated on a case-by-case basis and the rationale for the estimation must be included in the safety submission.

10.4 **Start Date**. State when the OE removal action is scheduled to start. This is the date intrusive or surface removal operations are scheduled to begin.

10.5 **Frost Line**. State the depth of the frost line for the area. Where OE is above frost line, yet located below the removal depth, describe what provisions will be made for continued surveillance of the area. **The information on continued surveillance shall be provided by the government for inclusion into the document.**

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10.6 Clearance **Techniques**. Describe the techniques to be used to detect, recover, and destroy OE. These techniques can be described using excerpts from the work plan for the removal action.

10.6.1 Describe the capabilities and limitations of the detection method.

10.6.1.1 Describe the selection criteria for the explosives remediation technology based on local geology and topography of the explosives remediation areas.

10.6.1.2 Provide a statement that the equipment is capable of detecting the smallest item expected to the detection depth.

10.6.1.3 Address limitations imposed by terrain, soil type, etc.

10.6.2 Describe quality assurance/quality control (QA/QC) standards and pass/fail criteria for QA/QC audits. **QA standards and pass/fail criteria shall be furnished by the government for inclusion into the document.**

10.6.3 Describe the process that will be used to determine that OE scrap presents no explosion hazards.

10.6.4 Describe procedures for disposition of OE scrap removed from the site or generated during the clearance.

10.7 **Alternate Techniques**. If the on-site method to destroy OE is something other than detonation, provide a brief description of the method.

10.8 **Off-Site Destruction**. If recovered OE cannot be destroyed on-site, explain how explosives safety requirements will be met during transportation and off-site destruction. Discuss the environmental restrictions and legal aspects that influence this process.

10.9 **Technical Support**. Summarize Explosive Ordnance Disposal (EOD), Technical Escort Unit (TEU), and/or contractor support required for the removal action.

10.10 Land **Use Restrictions**. For real property being released outside DOD, summarize any land use restrictions or other institutional controls to be placed on the property. **The information will be provided by the government for inclusion into the document.**

10.11 **Public Involvement**. Briefly discuss the public planning document(s) that ensure involvement of public and local officials where there is a risk to the public as a result of the clearance action. **The information will be provided by the government for inclusion into the document.**

10.12 **Maps**: Furnish the following maps:

10.12.1 **Regional Map:** Provide a map showing the regional location of the site.

10.12.2 **Site Map**: Furnish an overall map of the site showing the following:

10.12.2.1 OE areas covered by the submission. Show other areas not covered and explain them; i.e., covered in previous submission, or will be covered in future submission

10.12.2.2 OE removal depth for each OE area. Explain any reason for removal at depths less than DOD's default removal depths.

10.12.2.3 Location of any magazines used for storage of demolition explosives and/or recovered OE.

10.12.2.4 Location of any planned or established demolition areas to be used to destroy recovered OE.

10.12.2.5 Existing or planned use of each OE area after the clearance. Describe in terms of these categories.

10.12.2.5.1 Construction activity, whether commercial, residential, recreational, utility, or other.

10.12.2.5.2 Farming, agriculture, surface recreation, vehicle parking, or surface supply storage.

10.12.2.5.3 Livestock grazing or wildlife preserves.

10.12.2.5.4 Other (explain).

10.12.3 **Q-D Maps**: Q-D maps should scaled at 1 inch equals 400 feet. Smaller scale is acceptable if distances can be accurately shown. If unscaled maps are use, the maps must label distances. Q-D map and site may be shown on the same map. The Q-D maps shall show the following areas:

10.12.3.1 Each OE area being cleared under the submission.

10.12.3.2 Location of magazines for the storage of demolition explosives and any recovered OE awaiting destruction.

10.12.3.3 Areas planned or established for intentional detonation or burning of OE shall have an exclusion zone associated with them. The exclusion zone will be defined by a public withdrawal distance. Show each area and exclusion zone around it. Identify every inhabited building, occupied area, and public exposure inside the exclusion zone. Describe measures to be taken to eliminate/minimize risk for exposures within the exclusion zone.

10.12.3.4 **Soil Sampling Maps**. For OE areas involving explosives in soil, provide a map outlining the area sampled and the location and depth of sampling points. Identify field screening methods used and concentration of explosives for each sampling point. Address methods to be used to reduce explosives concentrations to below explosion hazard levels, and methods which will be used to reduce explosives hazards. Identify environmental or legal considerations, which may be important.

10.13 Quantity-**Distance**. The following activities shall be sited and shown on the Q-D maps in the OE safety Submission.

10.13.1 OE **Area(s)**. Inhabited Building Distance (IBD) applies from OE areas to non-project personnel while surface or intrusive removals are taking place. IBD is the fragment distance for the MPM for the area. Use the default IBDs for fragmentation protection (based on public withdrawal distance) given in DOD 6055.9-STD, Chapter 5, Paragraph C5.5.4, unless lesser distances are supported by analysis or test data.

10.13.1.1 Preliminary site work such as surveying, laying search lanes, and detecting anomalies do not require an exclusion zone for Q-D purposes.

10.13.2 Magazines. Magazines used to store demolition explosives and recovered OE shall be sited and their location shown on the Q-D maps.

10.13.2.1 IBD applies from magazines to non-project personnel. Use IBD in DOD 6055.9-STD unless a sound rationale for other distances is provided.

10.13.2.2 Describe the types of magazines used: commercial portable type, aboveground, shed, earth-covered, etc.

10.13.2.3 State the Net Explosives Weight (NEW) and hazard division to be stored in each magazine. Generally, recovered OE is considered HD 1.1 unless there are obvious reasons it isn't.

10.13.3 **Planned or Established Demolition Areas**. These areas shall be sited and shown on the Q-D maps.

10.13.3.1 An exclusion zone shall be provided around each planned or established demolition area. The size of the exclusion zone may be based on one of the following:

10.13.3.1.1 Default distances in DOD 6055.9-STD, Chapter 5, Paragraph C5.5.4.

10.13.3.1.2 Distances other than the above defaults may be used, if technically supportable rationale for the distances is included the safety submission. Such rationale shall address primary fragments, blast, and crater ejecta.

10.13.4 **Footprint Areas**. The safety submission does not have to show the locations for the following footprint areas, but the safety submission shall state the size of the IBD arc or exclusion zone that will apply around the areas.

10.13.4.1 **Blow-in-Place**. The exclusion zone shall be determined using the same rules as for an established demolition area.

10.13.4.2 **Collection Points**. These areas are used to temporarily accumulate OE within a search grid pending transport to another area for storage or destruction. Collection points shall have the same exclusion zone as the MPM for the area being worked. For this reason, Q-D arcs from collection points shall never be any larger than those already in the submission as drawn around the OE area containing the collection point. Since on a actual project site only small portions of the overall OE area are being worked on a given day, the Q-D arcs from the collection points shall have actual use in establishing the daily exclusion zones.

10.13.4.3 **In-Grid Consolidated Shots**. Consolidated shots occur within a search grid rather than at a demolition area. Consolidated shots shall use the same Q-D as established demolition areas.

DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Monthly Status Report	2. IDENTIFICATION NUMBER OE-080

3. DESCRIPTION / PURPOSE To provide summarized cost and performance information and statistical exposure data for program management purposes.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP

7.1 Data included on the monthly status report will be reported for all task orders in a summary format.

7.2 The Monthly Status Report will be submitted no later than 10 calendar days following the reporting cut-off date. Reports will reflect data as of the last working day of the week that includes the end of the calendar month. If the calendar month ends on a Sunday, the report will end on the previous week's last working day.

7.3 Exposure data is required by EM 385-1-1, Section 01.D.04.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS The monthly status report, consisting of a progress report and an exposure data report, shall be prepared in accordance with this Data Item Description. Additional reporting requirements may be specified in individual task orders. The reports shall be submitted on 8.5 x 11-inch plain bond paper or corporate letterhead. Multiple sites may be on the same page, but shall be listed separately on the form.

10.1 An **OE Monthly Progress Summary** report covering all individual task orders shall be provided as indicated in Table 1. The projects/task orders shall be grouped and reported by types indicating both a work category and technology used by a Roman numeral and Arabic letter, as best described using the following:

Work Category
I: Surface clearance only
II: Sampling effort only (detection and confirmation)
III: Geophysical mapping effort only (no confirmation)
IV: Subsurface clearance
V: Construction Support

Technology Type
A. Geophysical Instrument w/analog readout
B. Geophysical Instrument w/digital recorder
C. Geophysical Instrument w/digital navigation system
D. Geophysical Instrument w/multi-sensor system
E. Visual Only

Note: The required column for Acres Sampled should include the total number of acres on which all of the planned sample grids have been completed (all data collected). Do not indicate the total grid area of the sample grids that are completed.

10.2 An **Exposure Data Report** shall be prepared covering all individual task orders. (Note: This report does not negate the requirement to submit an ENG FORM 3394 to report an accident). The report shall include the following information:

10.2.1 Title of Report (i.e., EXPOSURE DATA REPORT)

10.2.2 Month and year for which the report is made.

10.2.3 Contract Number/Task Order/Project Name/Site Name and Location. Report each Task Order on separate line on form.

10.2.4 Hours worked in direct support of the contract (by all personnel) during the reported month, and cumulative. (Do not report hours expended on corporate personnel issues, payroll, etc.) Do report hours expended by subcontract personnel in direct support of the contract.

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Data Item Description OE-080 (Continued):

10.2.5 Total number of lost workday accidents during the reported month, and cumulative.

10.2.6 Total number of lost workdays due to on-the-job accidents during the reported month, and cumulative.

10.2.7 Number of property damage accidents (includes vehicles) with property loss value of $2,000 or more, during the reported month, and cumulative.

10.3 Signature, Title and Date: A corporate manager shall sign and date both the progress report and the exposure data report. The reports shall be submitted under a single letter of transmittal to the Contracting Officer, with 2 copies furnished to CEHNC-OE-S-P.

TABLE 1
OE MONTHLY PROGRESS SUMMARY
MONTH OF _____, 19 _____

Contractor:_____
Contract Number: DACA87-_____

Page ____ of ____

Project Location	Task Order #	Task Order Type	Total # Grids to be Cleared	Grid Size (Ac.)	# Grids passing QC Mo./Total		# Grids passing QA Mo./Total		# Grids failing QC Mo./Total		# Grids failing QA Mo./Total		Acres Geophy. Mapped Mo./Total		Acres Sampled Mo./Total		Cost of Work Completed
Totals																	

Prepared By: _____ Title: _____ Date: _____

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Weekly Status Report	2. IDENTIFICATION NUMBER OE-085

3. DESCRIPTION / PURPOSE To provide a weekly summary of cost, performance, and exposure data for program management purposes.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP This Data Item Description contains instructions for preparing the weekly status report on an individual task order basis. Reports for each previous week are due by facsimile or E-mail on the first working day of each week. Specific data from this report will be collected and reported on a contract basis once per month in accordance with DID OE-080.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 The weekly status report (WSR) shall be prepared in accordance with this Data Item Description, unless otherwise specified in individual task orders. The reports shall be submitted on 8.5 x 11 inch plain bond paper or corporate letterhead. The report shall be signed by the Project Manager and shall consist of the following:

10.1.1. General.

10.1.1.1 Contract number, task order number, project location and ending date of report.

10.1.1.2 Brief description of project scope and methodology/equipment used for detection of OE (e.g., Sub-surface clearance of 35 acres using 52Cx magnetometers).

10.1.1.3 Name of Contractor's Project Manager, Senior UXO Supervisor, UXO Safety Officer, and UXO Quality Control Specialist.

10.1.1.4 Name of Government Safety Specialist on site.

10.1.2 Cost/Schedule/Progress Data.

10.1.2.1 Costs (for cost-type contracts/task orders only). In spreadsheet format, indicate total hours and funds authorized by contract line item number (CLIN). Separate labor, materials, and travel. Indicate the task order modification number (if applicable) under which the funds are authorized. For each CLIN, show the current week and cumulative expenditures in both dollars and hours (for labor). Indicate balance, and percentage of total, remaining for hours and dollars. Expenditures shall be reported as accrued/incurred, and do not necessarily have to be paid. Notes shall be used to explain pertinent facts that are not apparent within the spreadsheet.

10.1.2.2 Progress (for all type contracts/task orders). By tasks, or sub-tasks if appropriate, indicate level of completion. Include supporting data (e.g,, number of grids cleared, actual versus planned).

10.1.2.3 Include a graph which depicts a cumulative summary by month of the percentage of costs budgeted, the percentage of costs expended, and the percentage of work completed.

10.1.2.4 Schedule (for all type contracts/task orders). Include a project schedule prepared in MS Project or similar software. Indicate changes from baseline schedule and explain deviations.

10.1.3 Discussion of Issues Relating to Project Expenditures and Work Progress.

10.1.3.1 Notice of 85% of expended funds, or other percentage expended, as required by contract clauses.

10.1.3.2 Discussion of ability to complete the project within funds currently authorized.

10.1.3.3 List/status of pertinent correspondence related to the project.

10.1.3.4 List/status of deliverables and dates submitted.

10.1.3.5 Discussion of any issue that impacts completion of project on schedule and within budget.

11. DISTRIBUTION STATEMENT

Data Item Description OE-085 (Continued):

10.1.4 Field Information.

10.1.4.1 Statistical Data. Total number of grids in project, number of grids cleared or sampled during week and to date, percent of project completed, number of grids passing quality control (QC) checks during week and to date, number of grids failing QC during week and to date, number of grids passing quality assurance (QA) checks during week and to date, number of grids failing QA during week and to date, number of hours spent re-working grids failing QC or QA, number of digs during week and to date, number of live OE items located during week and to date, number of inert OE items recovered during week and to date, number of small arms recovered during week and to date, and pounds of scrap removed during week and to date.

10.1.4.2 Significant Comments. Include comments relating to type of OE located, location of teams by grid numbers, presence of visitors or other contractors, OE shipments, and demolitions.

10.1.4.3 Detailed OE listing. Provide a list of OE located during the week and its disposition. Include a summary of all OE recovered to date by ordnance type.

10.1.4.4 Results of daily safety inspections.

10.1.4.5 Description of operations planned for the following week.

10.1.5 Summary of Vehicles and Equipment. (To be provided on cost-type Task Orders, or when Government Furnished Equipment (GFE) is used). List vehicles by type, source of rental or lease, unit cost, VIN number, ending mileage and team to which assigned. List gallons of gasoline used during week and to date. List major equipment on site and indicate its source.

10.1.6 Demolition Materials Accounting. . (To be provided on cost-type Task Orders, or when Government Furnished Equipment (GFE) is used). Provide a list of demolition materials received since the project began and a tabulation of materials used on a weekly basis. Indicate the balance on hand at the end of the reporting period.

10.1.7 Personnel on Site. . (To be provided on cost-type Task Orders.) List each contract person on site by name, position, and workday. List employee absences and associated explanations. Summarize workers and total number of man-hours expended during week by job category.

10.1.8 Exposure Data:

10.1.8.1 Hours worked in direct support of the contract (by all personnel) during the reported week and cumulative for the project. (Do not report hours expended on corporate personnel issues, payroll, etc.) Do report hours expended by subcontract personnel in direct support of the task order.

10.1.8.2 Number of lost workday accidents, during the reported week and cumulative for the project.

10.1.8.3 Number of lost workdays due to on-the-job accidents during the reported week and cumulative for the project.

10.1.8.4 Number of property damage accidents (includes vehicles) in which property loss value is $2,000 or more, during the reported week and cumulative for the project.

DATA ITEM DESCRIPTION

FORM APPROVAL
OMB NO 0704-0188

1. TITLE Ordnance Filler Report

2. IDENTIFICATION NUMBER OE-090

3. DESCRIPTION / PURPOSE To provide ordnance filler data to assess possible damage to environmental media

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP

7.1 Data included on the ordnance filler report will be reported for all task orders in a tabular format.

7.2 The Ordnance Filler Report will be submitted no later than 10 calendar days following the reporting cut-off date. Reports will reflect data as of the last working day of the week that includes the end of the calendar month. If the calendar month ends on a Sunday, the report will end on the previous week's last working day.

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS The ordnance filler report shall be prepared in accordance with this Data Item Description. Additional reporting requirements may be specified in individual task orders. The reports shall be submitted on 8.5 x 11 inch plain bond paper or corporate letterhead. Multiple sites may be on the same page, but shall be listed separately on the form.

10.1 The contractor shall gather data on all items that are easily identified as munitions during field operations. OE item identified during the monthly reporting period shall be listed separately and shall be described by the following:

10.1.2 Site Name and Location

10.1.3 Contract number and Task Order Number

10.1.4 Grid Number

10.1.5 Identified Ordnance Item

10.1.6 Fired: Yes, No

10.1.7 Filler type: HE, Smoke, TNT, WP, etc. Use all terms that describe the filler type.

10.1.8 Case intact: Yes, No

10.1.8.1 Case rusted: Yes, No

10.1.9 If no, apparent cause of rupture: rusted through, low order detonation, impact, etc.

10.1.10 Filler leak: Yes, No

10.1.11 Soil type and condition at depth of item: sandy, loam, clay, other (specify)

10.1.12 Era munitions were deployed: WWI, WWII, Korea, Vietnam, recent, other

10.1.13 Any clarification notes

10.1.14 Compiled data shall be forwarded to the following addresses:

Dr. Rosemarie Szostak
Army Environmental Policy Institute
Georgia Institute of Technology
430 Tenth Street, NW, Suite S-206
Atlanta, Georgia 30318-5768

U.S. Army Engineering and Support Center, Huntsville
ATTN: CEHNC-OE-CX-Q
P.O. 1600
Huntsville, AL 35807-4308

10.1.15 This DID shall expire 18 months from the date it is included in a contract.

11. Distribution Statement

DD Form 1664, JUN 86 *PREVIOUS EDITIONS ARE OBSOLETE*

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DATA ITEM DESCRIPTION	FORM APPROVAL OMB NO 0704-0188

1. TITLE Analysis of Institutional Controls	2. IDENTIFICATION NUMBER OE-100

3. DESCRIPTION / PURPOSE To provide the requirements for Institutional Controls Analyses which are prepared as part of the Engineering Evaluation/Cost Analysis Reports for Ordnance and Explosives (OE) projects.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
000303	CEHNC-OE-CX		

7. APPLICATION / INTERRELATIONSHIP

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER

10. PREPARATION INSTRUCTIONS

10.1 The contractor shall prepare an institutional analysis to support the development of institutional control plans of action. Institutional controls rely on existing powers and authorities of other government agencies to protect the public at large from OE risks. Instead of direct elimination of the OE from the site, these plans rely on behavior modification and access control strategies to reduce or eliminate OE risk. An objective of the institutional analysis is to identify government agencies having jurisdiction over OE contaminated lands and to assess their appropriateness, capability, and willingness to assert this control. Institutional Control Alternatives selected for evaluation shall be based on their apparent ability to satisfy project objectives. Potentially effective Institutional Controls shall be developed and evaluated as a part of the Engineering Evaluation/Cost Analysis (EE/CA).

10.2. Institutional Summaries. For each institution selected for review, the following information shall be provided by the contractor:

10.2.1. Name of Agency

10.2.2 Origin of Institution

10.2.3 Basis of Authority

10.2.4 Sunset Provisions

10.2.5 Geographic Jurisdiction

10.2.6 Public Safety Function

10.2.7 Land Use Control Function

10.2.8 Financial Capability (in general terms only; not detailed accounting)

10.3 Institutional Control Alternatives Selection. The recommendation for detailed analysis shall document and consider the following factors:

10.3.1 Purpose of Study

10.3.2 Methodology

10.3.3 Scope of Effort/Selection Criteria (If not totally comprehensive, how were evaluated agencies selected?)

10.3.4 Technical Capability

10.3.5 Intergovernmental Relationships (Ability to partner with other agencies)

10.3.6 Stability

10.3.7 Funding Sources Recommended for Detailed Analysis

11. DISTRIBUTION STATEMENT

10.4 Institutional Control Alternatives Analysis. Institutional Control alternatives for detailed analysis may consist of single or combined strategies, as appropriate. These alternatives must be completely formulated. All management, execution, and support roles shall be identified. All costs to participating institutions shall be estimated by the contractor. Candidate strategies may involve concepts similar to the following:

Access Control Alternatives
Direct intervention like fencing and other barriers combined with trespass law enforcement
Land use restrictions (zoning laws and enforcement)
Regulatory control (permit application, review, and approval of development plans)
Passive measures such as dedication of property to appropriate land uses
Behavior Modification Alternatives
Notification of real estate defect
Notices attached to building and/or construction permits
Training clinics, education to children, etc.

10.5 Residual Risk. Each alternative that makes final cut (screening) shall be assessed for its role in reducing residual risk (that from OE/UXO not eliminated by physical removal alternatives or left due to incompatibility of physical removal with community needs). Bizarre behavior should be specifically excluded. Normal behavior of reasonable persons is the model for analysis. Thoughtful prose is sufficient. Statistical, numerical and phenomological expressions should be excluded.

ATTACHMENT 11-2
QC DOCUMENTATION

SAMPLE DAILY QUALITY CONTROL REPORT FORM
(Page 1 of 2)

CONTRACT NO.	DAY S M T W TH F S (Circle One)	REPORT NO.	
PROJECT NAME/NUMBER		DATE/SHIFT	
WEATHER/PRECIPITATION	TEMPERATURE	HIGH	LOW
WIND	HUMIDITY		
FWENC PERSONNEL ON SITE (REFERENCE/ATTACH SUPERINTENDENT'S DAILY REPORT IF APPLICABLE)			
EQUIPMENT ON SITE		ACTIVE THIS SHIFT YES/NO	
SUBCONTRACTORS ON SITE		SUBCONTRACTOR'S QC REPORT ATTACHED YES/NO	
MATERIAL/EQUIPMENT RECEIVED (REFERENCE/ATTACH INSPECTION REPORTS)			
WORK PERFORMED			

SAMPLE DAILY QUALITY CONTROL REPORT FORM
(Page 2 of 2)

PROJECT NAME & NO.	REPORT NO.
CONTRACTOR/SUBCONTRACTOR	DATE/SHIFT
QUALITY CONTROL ACTIVITIES (REFERENCE/ATTACH INSPECTION REPORTS)	
PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN	
DIRECTIONS GIVEN/RECEIVED	
SPECIAL NOTES/OTHER	
VISITORS	

NAME SIGNATURE TITLE

SAMPLE PREPARATORY INSPECTION CHECKLIST FORM
(Page 1 of 2)

CONTRACT NO.		REPORT NO.		
PROJECT NAME/NUMBER		DATE/SHIFT		
ITEM/ACTIVITY INSPECTED				
DRAWING REFERENCE	REV.	SPECIFICATION REFERENCE		REV.
PERMITS/LICENSES OBTAINED		YES/NO	REFERENCE NO.	
WORK PLAN WRITTEN		YES/NO	REFERENCE NO.	
QC INSPECTION PLAN WRITTEN		YES/NO	REFERENCE NO.	
REQUIRED SUBMITTALS APPROVED		YES/NO	REFERENCE NO.	
REQUESTS FOR INFORMATION ANSWERED		YES/NO	REFERENCE NO.	
FCRs/DCNs APPROVED/ISSUED		YES/NO	REFERENCE NO.	
NONCONFORMANCES DISPOSITIONED/CLOSED		YES/NO	REFERENCE NO.	
MATERIAL/EQUIPMENT AVAILABLE		YES/NO	CONDITION	

SAMPLE PREPARATORY INSPECTION CHECKLIST FORM
(Page 2 of 2)

PROJECT NAME & NO.	REPORT NO.
ITEM/ACTIVITY INSPECTED	DATE/SHIFT
PREPARATORY SITE CONDITIONS	
CONTRACT VARIANCE	
ACTIVITIES/ITEMS REQUIRING COMPLETION	
COMMENTS	
MEETING ADDRESS	

NAME SIGNATURE TITLE

SAMPLE INITIAL INSPECTION CHECKLIST FORM
(Page 1 of 2)

CONTRACT NO.				REPORT NO.
PROJECT NAME/NUMBER				DATE/SHIFT
ITEM/ACTIVITY INSPECTED				
DRAWING REFERENCE	REV.	DRAWING REFERENCE		REV.
SITE CONDITIONS				
INSPECTION ATTRIBUTE	SPECIFICATION REFERENCE	ACCEPTANCE CRI TERIA	INSPECTION RESULT	ACCEPT/ REJECT
REQUESTS FOR INFORMATION ISSUED/SUBJECT			REFERENCE NO.	
FCRs ISSUED/SUBJECT			REFERENCE NO.	
NONCONFORMANCES ISSUED/SUBJECT			REFERERENCE NO.	
REINSPECTION REQUIRED	YES	NO		

SAMPLE INITIAL INSPECTION CHECKLIST FORM
(Page 2 of 2)

PROJECT NAME & NO.	REPORT NO.
ITEM/ACTIVITY INSPECTED	DATE/SHIFT
COMMENTS	
CONTRACT VARIANCE	
ATTENDEES	

NAME SIGNATURE TITLE

SAMPLE FOLLOW-UP INSPECTION CHECKLIST FORM
(Page 1 of 1)

CONTRACT NO.				REPORT NO.	
PROJECT NAME/NUMBER				DATE/SHIFT	
ITEM/ACTIVITY INSPECTED					
DRAWING REFERENCE	REV.	DRAWING REFERENCE			REV.
INSPECTION ATTRIBUTE		SPECIFICATION REFERENCE	ACCEPTANCE CRI TERIA	INSPECTION RESULT	ACCEPT/ REJECT
REQUESTS FOR INFORMATION ISSUED/SUBJECT				REFERENCE NO.	
FCRs ISSUED/SUBJECT				REFERENCE NO.	
NONCONFORMANCES ISSUED/SUBJECT				REFERERENCE NO.	
REINSPECTION REQUIRED		YES	NO		
COMMENTS					

SAMPLE NONCONFORMANCE REPORT FORM
(Page 1 of 1)

PROJECT NAME & NO.	AREA/LOCATION	NONCONFORMANCE REPORT NO.
RESPONSIBLE CONTRACTOR		

REEERENCE DWG. NO.		REV.	SPECIFICATION NO.		REV.
1			1		
2			2		

DESCRIPTION OF NONCONFORMANCE

NAME & SIGNATURE	TITLE/COMPANY	DATE

RECOMMENDED DISPOSITION

NAME & SIGNATURE	TITLE & COMPANY	DATE

ENGINEERING ACCEPTANCE OF DISPOSITION		
NAME & SIGNATURE	TITLE & COMPANY	DATE

DESIGN CHANGE REQUIRED	Yes	NO	
DOCUMENT MODIFIED	MODIFICATION TYPE/IDENTIFICATION		DATE ISSUED

CERTIFICATION THAT REWORK OR REPAIR DISPOSITIONS COMPLETED		
NAME & SIGNATURE	TITLE & COMPANY	DATE

QC VERIFICATION OF DISPOSITION COMPLETION		
NAME & SIGNATURE	TITLE & COMPANY	DATE

CLIENT ACCEPTANCE OF NONCONFORMANCE DISPOSITION COMPLETION		
NAME & SIGNATURE	TITLE & COMPANY	DATE

12.0 ENVIRONMENTAL PROTECTION PLAN

This Environmental Protection Plan (EPP) has been developed to minimize any potential adverse effects to the environment occurring as a result of OE investigations at Fort McClellan. Specifically, this EPP will describe sensitive natural resources within Fort McClellan and will set forth methods to protect and conserve those resources during OE sampling activities. The investigation sample areas will be field verified by a Foster Wheeler Environmental biologist and a site biologist from Fort McClellan in order to minimize the project's potential disturbance to natural resources. Location of sampling areas will meet the following objectives where feasible:

- Elimination of the need to use heavy machinery;
- Elimination of off-road intrusion (i.e., trucks and cars can be parked on roads, side roads, lots, etc.);
- Utilization of areas that require minimal trimming and cutting of brush, and elimination of cutting brush to ground level; and
- Avoidance of areas known to have threatened or endangered flora and/or fauna.

12.0.1 Where impacts to sensitive biological resources cannot be avoided, this EPP outlines potential measures that can be implemented to mitigate such impacts. These mitigation measures were developed based upon a site-specific analysis that addressed unique concerns at Fort McClellan and incorporate more general best management procedures and guidelines that have been implemented for intensive UXO remediation undertakings at other former military training sites.

12.1 ENDANGERED AND THREATENED SPECIES

12.1.1 Federally Listed Species

Three species listed as endangered or threatened by the United States Fish and Wildlife Service have been recorded on Fort McClellan (Table 12-1). One of these species, the red-cockaded woodpecker, has not been found on the installation since 1968. The installation has prepared an Endangered Species Management Plan that is designed to manage at the community or systems level for federal and state listed species, as well as unusual or sensitive species on the installation. Two other species, Mohr's barbara buttons and Tennessee yellow-eyed grass have been identified at Pelham Range, but not on the Main Post. However, due to the proximity of Pelham Range to the Main Post, the potential exists that these species may also be present on the Main Post.

12.1.1.1 Blue Shiner

Within Alabama, the blue shiner is currently restricted to Weogufky and Choccolocco Creeks as well as the lower reaches of the Little River. Approximately two miles of the Choccolocco Creek flow through the Choccolocco Corridor. The entire length of the stream within this corridor is considered optimal habitat for the blue shiner (DOE, 1996).

Table 12-1
Federally Listed Species Occurring at the Project Site

Common Name	Scientific Name	Federal Status	Location
Blue shiner	*Cyprinella caerulea*	Threatened	Choccolocco Creek
Red-cockaded woodpecker	*Picoides borealis*	Endangered	Main Post
Gray Bat	*Myotis grisescens*	Endangered	Main Post
Mohr's barbara buttons	*Marshallia mohrii*	Threatened	See note 1 below
Tennessee yellow-eyed grass	*Zyris tennesseensis*	Endangered	See note 1 below

Source: Fort McClellan Directorate of Environment (DOE), 1996

[1]These species have been identified at Pelham Range, but not on the Main Post at Fort McClellan. However, due to the proximity of Pelham Range to the Main Post, the potential exists that these species may also be present on the Main Post.

12.1.1.2 Red-cockaded Woodpecker

Historically, longleaf pine forests on the Main Post were known to contain red-cockaded woodpeckers. The lack of fires coupled with the removal of longleaf pine (as a result of historical land clearing and forestry activities) resulted in the decline of this species. In fact, the last remaining active red-cockaded woodpecker cluster on Fort McClellan was recorded in 1968. Subsequent surveys in 1972, 1982, 1985 and 1997 failed to identify any birds or significant suitable habitat and the cluster was classified as inactive (DOE, 1996).

12.1.2 Other Special Status Species

A total of five species that have been found on the site are state candidate species for future potential listing (Table 12-2). Fort McClellan pro-actively manages these species and their associated communities as Special Interest Natural Areas under their Endangered Species Management Plan.

Table 12-2
State Candidate Species Identified on the Site

Common Name	Scientific Name	Special Interest Natural Area
Appalachian cottontail	*Syvilagus obscurus*	Mountain Longleaf Community Complex
Diana butterfly	*Speyeria diana*	Marcheta Hill Orchid Seep
Carlson's caddisfly	*Polycentropus carlsoni*	Bains Gap Seep and Cave Creek Seep
Fraser's loosestrife	*Lysimachia fraseri*	Bains Gap Seep
White fringeless orchid*	*Platanthera integrilabia*	Marcheta Hill Orchid and Cave Creek Seeps
Coldwater darter	*Etheostoma ditrema*	See note 1 below

Source: DOE, 1996
* Expected to soon be listed as a threatened and endangered species.
[1] This species has been identified at Pelham Range, but not on the Main Post at Fort McClellan. However, due to the proximity of Pelham Range to the Main Post, the potential exists that this species may also be present on the Main Post.

12.12.1 The white-fringeless orchid (*Platanthera intergrilabia*) is a federal candidate species. This perennial herb has either a leafy flowering stem to 2 ft (6 dm) tall, or a single, strap-shaped basal leaf, all attached to tuberous, fleshy roots. It flowers mid-July to late August and bears fruit during September-October. It is typically found in red maple/black gum swamps and along sandy, damp stream margins. It also is found on seepy, rocky, thinly vegetated slopes. It is often associated with other orchids, white violets, cowbane, and grass-of-parnassas.

12.1.3 Special Interest Natural Areas

Fort McClellan has identified 16 Special Interest Natural Areas (SINAs) in order to help manage and protect those biological communities that harbor Federal, candidate, or state-listed species, as well as those habitats containing single or groups of unique or unusual species. Eleven of the SINAs are found on the Main Post in the vicinity of the site (see Table 12-3). Some of these represent a community complex, for example, Mountain Longleaf Community Complex comprises the entire Choccolocco Mountain Area. Other SINAs contain a community type (e.g., wetlands, and stream), along with a buffer to mitigate sedimentation and related disturbances. Within these sites, a "critical element" has been delineated to identify the community of concern. The specific location and description of these SINAs can be found in Fort McClellan's Endangered Species Management Plan.

Table 12-3
Special Interest Natural Areas Delineated at Fort McClellan's Main Post

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

Source: DOE, 1996

12.2 WETLANDS

Over 200 acres of wetlands and 22.8 acres of open water and ponds comprise existing land use on Fort McClellan's Main Post. Palustrine forested, scrub-shrub, and emergent wetlands, as well as larger wetland complexes have been identified on the installation. The following five wetland community types characterize the majority of these wetlands: bottomland hardwoods, hardwood depressions, mixed shrub communities, shrub depressions, and herbaceous wetlands. A description of each of these wetland communities is provided below; however, it should be noted that ecological succession has resulted in gradations between several of these classifications.

12.2.1 Bottomland Hardwoods

This community type is characterized by floodplain hardwood communities occurring on first and second floodplain levels, as well as on wetland transitional terraces. These wetlands are typically seasonally and temporarily flooded and are classified as palustrine forested. Dominant canopy hardwood species include green ash (*Fraxinus pennsylvanica*), hackberry (*Celtis sp*.), red maple (*Acer rubrum*), American elm (*Ulmus americana*), water oak (*Quercus niger*), and sweet gum (*Liquidamber styraciflua*). Dominant creek bank canopy vegetation includes sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), and black willow (*Salix nigra*). The shrub layer species include cane (*Arundinaria gigantea*) and strawberry bush (*Lindera benzoin*), as well as hardwood saplings. Herbaceous layer vegetation includes sedges (*Carex sp*.), false nettle (Boehmeria cylindrica), snakeroot (*Sanicula canadensis*), green dragon (Arisaema dracontium), spotted jewelweed (*Impatiens capensis*), purple bluets (*Houstonia purpurea*), sensitive fern (*Onoclea sensibilis*), Virginia dayflower (*Commelina virginica*), river oats (*Chasmanthium latifolium*), sphagnum (*Sphagnum sp*.), nut rush (*Scleria triglomerata*), and woolgrass bulrush (*Scirpus cyperinus*). Water oak flats comprised a small portion of this community type.

12.2.2 Hardwood Depressions

This wetland community type occurs in upland forested areas that are temporarily flooded. Dominant vegetation is similar to that identified for bottomland hardwoods. Depressional areas dominated by sweet gum comprised only a small portion of total forested wetland areas.

12.2.3 Mixed Shrub Communities

These wetland areas are dominated by shrubs and occur along stream floodplains, impoundment shorelines, and streamheads. Characterized as palustrine scrub-shrub wetlands, this community type is temporarily and seasonally flooded. Species identified within this wetland type typically include swamp dogwood (*Cornus drummondii*), alder (*Alnus serrulata*), buttonbush (*Cephalanthus occidentalis*), and young hardwood species such as river birch, sycamore, sweet gum, and black willow. Herbaceous layer vegetation often consisted of woolgrass bulrush and soft needlerush (*Juncus effusus*).

12.2.4 Shrub Depressions

This community type is characterized by palustrine scrub-shrub wetlands occurring in depressions that exist within upland communities. These areas are temporarily and seasonally flooded and are dominated by deciduous vegetation similar to that described for the mixed shrub communities.

12.2.5 Herbaceous Wetlands

These wetland communities are dominated by persistent herbaceous vegetation and are typically located along floodplains and in impoundments, either man-made or created by beaver (*Castor canadensis*). Classified as palustrine emergent, these wetlands are dominated by species such as woolgrass bulrush, soft needlerush, cattail (*Typha latifolia*), seedboxes (*Ludwigia spp*.), panic grasses (*Panicum dichotomiflorum*), and sedges.

12.3 CULTURAL AND ARCHAEOLOGICAL RESOURCES

This Archaeological Resources Protection Plan has been developed for Fort McClellan, Anniston, Alabama to protect archaeological resources located within the project impact area that may be eligible for nomination to the National Register of Historic Places and that may be effected during unexploded ordnance removal activities at Fort McClellan. This plan was developed by locating and identifying significant archaeological resources as well as steps to avoid potentially significant resources within the project area.

This Archaeological Resources Protection Plan identifies measures that may be taken to minimize impacts to previously identified and potential unanticipated discoveries of cultural resources that cannot be avoided during the course of removal activities.

12.3.1 Archaeological Issues and Concerns

Previous investigations at Fort McClellan indicate that human occupations dating as long as 10-15 thousand years (kya) are contained within the area. Based on previous research on the Fort, the possibility for encountering archaeological sites during the course of work is high. This possibility must be considered seriously when work is underway, and all efforts must be made to minimize the impact of UXO activities on the cultural resources of Fort McClellan.

12.3.1.1 Archaeological artifacts such as individual pieces of pottery, arrowheads, etc. are scattered throughout Fort McClellan. These artifacts are the property of Fort McClellan and, if encountered, will be left in place and not disturbed. If an abundance of artifacts are discovered in one specific location not corresponding to a known site, a Fort McClellan representative will be contacted and informed about the discovery.

12.3.2 Potential Impacts of the UXO Removal Operations

Ground disturbing activities associated with the work have the potential to impact archaeological sites that may be present Of particular concern would be effects to prehistoric period sites relating to pre-Fort McClellan time periods.

12.3.3 Impact Minimization Measures

The National Historic Preservation Act of 1966 (section 106) specifies that federal agencies must take into account the effect of their undertakings on any district, site building, structure or object that is included in or eligible to be included in the National Register of Historic Places. It also specifies that Federal Agencies shall afford the Advisory Council on Historic Preservation an opportunity to comment on the undertaking and shall consult with the appropriate State Historic Preservation Officer (SHPO) about the proposed project.

12.3.3.1 In an effort to minimize the impacts to potential archaeological resources, Foster Wheeler Environmental and subcontractor will implement a variety of measures, including, but not necessarily limited to: worker education, avoidance of known resources, consultation with regulating agencies in instances of unanticipated discoveries, and the treatment of these finds as potentially eligible for nomination to the NRHP until deemed otherwise.

12.3.3.2 Prior to the commencement of on-site work, all project personnel will be briefed about the sensitivity of cultural resources in the area. Methods for recognizing cultural resources

typical to the area and for minimizing impacts to them will form an integral part of the onsite training. It will be stressed that site location confidentiality must be maintained in an effort to preserve the integrity of the sites and avoid any future vandalism or site looting.

12.3.3.3 Incorporated into the plan will be mitigation by avoidance of all sensitive areas. A pre-project literature and site map review will be conducted to identify all known cultural resources within the project area. Included with this plan is a list and map of all eligible or potentially eligible sites located on Fort McClellan.

12.3.3.4 Section 110 of the National Historic Preservation Act cautions that special consideration should be given to the likelihood that unanticipated discoveries may prove to be significant (i.e. potentially eligible for nomination to the NRHP). A preliminary evaluation of the discovered resources may be made in the field by a qualified cultural resources specialist or archaeologist.

12.3.3.5 To date, a total of 261 sites have been recorded on Fort McClellan and Pelham Range. Of these, 53 sites have been determined to be eligible or potentially eligible for nomination to the National Register of Historic Places (see Table 12-4).

12.4 WATER RESOURCES

12.4.1 Surface Waters

Three major creeks (Cane, Cave, and Choccolocco) and their associated tributaries drain Fort McClellan. With the exception of Choccolocco Creek, these creek systems originate on the western side of the Choccolocco Mountains and flow west through the Main Post. They are fed by springs originating from underlying limestone strata.

12.4.1.1 Choccolocco Creek originates east of the Choccolocco Mountains, passing in a northerly to southerly direction through the eastern portion of the Main Post. All drainage from Fort McClellan eventually drains into the Coosa River. The state has classified the above referenced creeks as suitable for fish and wildlife use. Water quality surveys conducted over the last 20 years have indicated generally good water quality. Lakes and ponds within Fort McClellan's Main Post constitute a total of 22.8 acres and are identified below in Table 12-5.

12.4.1.2 Freshwater springs occur abundantly on installation lands, often appearing along the trace of thrust faults. Many of the installation's surface water bodies are at least in part spring fed, with the exception of Lake Yahou (SAIC, 1993). Several high capacity springs have been mapped on Fort McClellan (Moser and DeJarnette, 1992), while additional unmapped springs potentially occur over much of the area.

Table 12-4
List of Eligible or Potentially Eligible Archaeological Sites

Site #	Location (Zone, UTM)	Eligibility Status
1Ca31	16: N3730540, E623100	PE
1Ca32	16: N3732400, E622360	E
1Ca40	16: N3730880, E621120	PE
1Ca41	16: N3730760, E621280	PE
1Ca42	16: N3732760, E622740	E
1Ca53	16: N3730240, E621080	PE
1Ca54	16: N3730060, E621080	PE
1Ca58	16: N3730260, E619000	PE
1Ca59	16: N3730340, E619760	PE
1Ca60	16: N3734080, E612140	PE
1Ca63	16: N3731000, E618460	PE
1Ca102	16: N3733200, E613540	PE
1Ca103	16: N3734460, E612180	E
1Ca105	16: N3733460, E614920	PE
1Ca110	16: N3731160, E614360	PE
1Ca112	16: N3733580, E614900	PE
1Ca113	16: N3734020, E616560	PE
1Ca114	16: N3731280, E614360	PE
1Ca115	16: N3731780, E614200	PE
1Ca116	16: N3733380, E616740	E
1Ca117	16: N3733900, E616580	E
1Ca118	16: N3727240, E614980	PE
1Ca119	16: N3730360, E624040	PE
1Ca120	16: N3727880, E614900	E
1Ca121	16: N3731240, E617520	PE
1Ca122	16: N3731100, E619780	PE
1Ca123	16: N3734240, E613700	PE
1Ca124	16: N3727260, E613300	PE
1Ca125	16: N3726280, E615760	PE
1Ca126	16: N3726020, E615360	PE
1Ca127	16: N3727700, E611320	PE
1Ca128	16: N3727560, E612440	PE
1Ca129	16: N3727340, E612360	PE
1Ca131	16: N3727860, E612340	PE
1Ca137	16: N3729560, E615120	PE
1Ca142	16: N3733380, E614320	PE
1Ca146	16: N3730900, E618860	PE
1Ca147	16: N3730560, E618940	PE
1Ca149	16: N3730440, E618740	PE
1Ca151	16: N3725960, E613540	PE
1Ca152	16: N3727580, E613200	PE
1Ca153	16: N3727680, E613280	PE
1Ca154	16: N3727820, E613400	PE
1Ca155	16: N3727820, E613720	PE
1Ca156	16: N3727980, E613500	PE
1Ca157	16: N3726940, E613780	PE
1Ca158	16: N3726140, E613720	PE
1Ca386	16: N3731600, E622080	PE
1Ca511	16: N3729532, E609209	PE
1Ca562	16: N3728040, E610000	PE
1Ca565	16: N3726000, E611000	PE
1Ca568	16: N3726540, E610940	PE
JSU616	16: N3727677, E611570	PE

1. Eligibility (PE) Potentially eligible for Nomination to the National Register of Historic Places; (E) Eligible for Nomination to the National Register of Historic Places

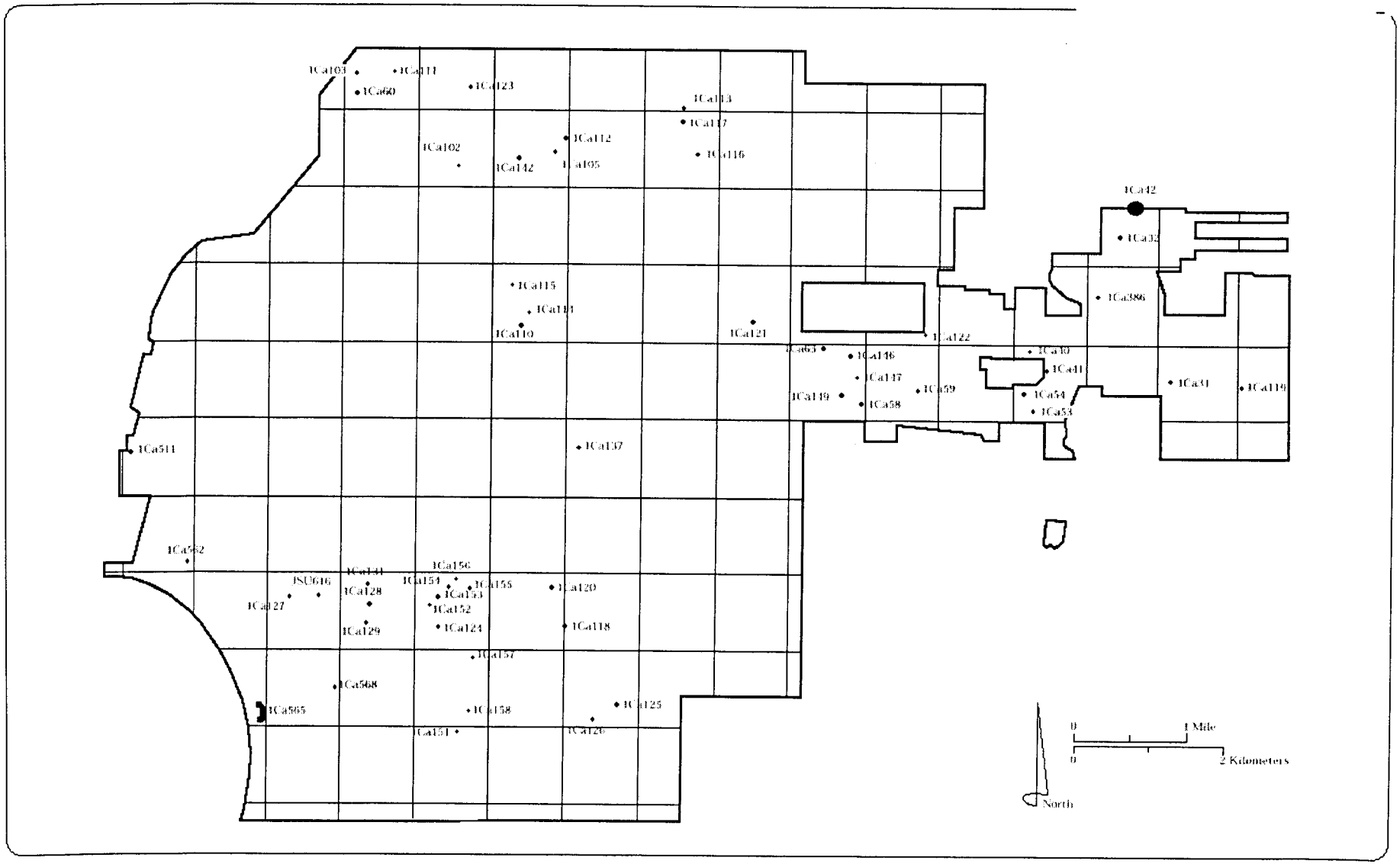

Figure 12-1 Potentially Eligible and Eligible Archaeological Site on Fort McClellan

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Table 12-5
Lakes and Ponds within the Project Site

Water Body	Size (acres)
Lake Yahou	13.5
Reilly Lake	8.5
Cappington Ridge	0.3
Duck Pond	0.5
TOTAL # OF ACRES	**22.8**

12.4.2 Groundwater

Aquifers in the vicinity of Fort McClellan are developed in residuum derived from bedrock decomposition, within fractured bedrock, along fault zones, and from the development of karst frame works. Although sufficiently detailed characterizations of groundwater movement in the region have not been conducted, the ultimate flow of groundwater may be estimated to be toward major surface water features. Groundwater intersection with the ground surface has resulted in the occurrence of numerous springs in the area (see Section 12.4.1) which act as important sources of discharge and water supply in the region.

12.4.2.1 Precipitation in the form of rainfall and subsequent infiltration is the primary source of groundwater recharge in the area of Fort McClellan, and thrust fault zones typical of the area form large storage reservoirs for groundwater. Points of discharge occur as springs, effluent streams, and lakes (i.e., Reilly Lake). Surface water movement into developed sinkholes provides an additional source of groundwater recharge and locally has promoted the formation of subsurface caves (SAIC, 1995).

12.5 COASTAL ZONES

Alabama's coastal area extends from ten feet above mean sea level to the limit of the state's territorial waters (three miles offshore). Fort McClellan is located approximately 225 miles inland of coastal waters and elevations range from 480 to 945 feet above sea level. Therefore, investigation activities will not effect coastal resources and are not subject to the requirements of the Coastal Zone Management Act of 1972, as amended.

12.6 TREE/BRUSH REMOVAL

The majority of the land use at Fort McClellan consists of both commercial and non-commercial forestland. The remaining land uses are characterized as improved grounds or semi-improved grounds. If forested areas are to be investigated, no root masses will be disturbed. Activities will be focused on the more open areas of the installation and tree removal will be avoided whenever possible. Any unavoidable removal of trees will be limited to hardwood trees with a diameter at breast height (dbh) less than 10 inches and a height of 40 feet and pine trees with a dbh less than 8 inches and a height of 40 feet. Should brush clearing be required, affected areas will not be cut less than four inches in height to prevent damage to the root system. (Refer to Section 12.9.9 for additional information regarding protection and mitigation relating to tree and brush removal.)

12.7 EXISTING WASTE DISPOSAL SITES

Fort McClellan formerly disposed of sanitary and solid waste in Landfill No. 4, located in the northwestern portion of the Main Post. This landfill has two areas, one for disposal of sanitary waste and one for disposal of construction/demolition debris. However, because of a change in permit requirements for sanitary landfills to be lined, the installation decided to close this portion of the landfill on April 8, 1994. Presently, the installation's sanitary solid waste is disposed of off-site by a contractor. Fort McClellan continues to dispose of industrial debris in a 12.5-acre portion of Landfill No. 4. This landfill accepts industrial wastes generated from construction and/or demolition activities, as well as rubbish.

12.7.1 Hazardous and toxic materials at Fort McClellan include explosives, petroleum products, herbicides and pesticides, pathological wastes, radioactive wastes, and chemical toxic wastes. The majority of these wastes are initially handled at two now inactive incinerators located on the Main Post. One incinerator is located adjacent to the Noble Army Community Hospital and burns approximately 1,000 to 1,200 pounds of regulated medical (infectious and pathological) waste per month. Wastes are burned daily and generated ash is disposed off-site by a contractor. The second incinerator is located at the Chemical Defense Training Facility and treats non-hazardous wastewater, personnel protective clothing, and other solid wastes such as plastic, paper, rubber, glass, and metal. The non-hazardous ash generated from this incinerator is disposed of in the industrial landfill. Gases generated from incinerator combustion are filtered through the air filtration system, a series of carbon units, prior to discharge into the atmosphere. Any solid residue generated from this combustion is double-bagged and sent to the industrial landfill for disposal. The only hazardous wastes that go through this incinerator are canister carbon filters containing chromium VI. Incinerated waste from these canisters is drummed and shipped to an off-site hazardous waste landfill. Various companies are contracted through the Defense Reutilization and Marketing Office to remove, for proper disposal, any hazardous materials not discussed above.

12.8 COMPLIANCE WITH ARARS

Information in relation to the Compliance with ARARs is provided in Section 2.1.

12.9 MITIGATION PROCEDURES

The Foster Wheeler Environmental FTL will ensure the implementation of the procedures outlined in this section in order to minimize potential impacts to environmentally sensitive resources during all phases of investigation. Activities will be conducted in compliance with all applicable federal and state regulations as described in Section 12.1 and elsewhere in this document. Every effort will be made to protect human health and safety, as well as air, water, land, cultural, and biological resources.

12.9.01 Impact minimization procedures will include briefing all on-site personnel on applicable health and safety issues as well as the need for minimizing impacts on sensitive biological resources. In conjunction with proposed investigation activities, surveys will be conducted by appropriately trained biologists to identify sensitive biological resources and sampling areas will be designed to avoid such resources, whenever possible. Methods for avoiding and minimizing potential impacts on the species and communities of concern will be stressed during the on-site training.

12.9.1 Endangered and Threatened Species and SINAs

Section 9 of the Endangered Species Act prohibits the taking of listed species without special exemption. Taking is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Under terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act, provided that such taking is in compliance with an incidental take statement.

12.9.1.1 Prior to any sampling events, surveys will be conducted by a trained biologist to identify sensitive biological resources within the areas to be affected. Sampling areas with a high probability of supporting endangered or threatened wildlife species, as well as candidate species, will be relocated or avoided. In addition, all identified SINAs will be avoided during sampling efforts. All wildlife species of concern that are encountered during any phase of the investigation will not be harmed and will be relocated outside the sample area. All personnel involved in sampling efforts will be also be instructed to avoid occurrences of endangered,

threatened, or candidate plant species (as seen in the field) to the extent possible. If such species are unavoidable, special efforts will be expended to minimize impacts to these plants.

12.9.1.2 If it will not be possible to entirely avoid having an impact on endangered, threatened, or candidate species (as determined from the pre-sampling survey), a trained biologist will monitor those activities that would directly effect these species. The trained biologist, along with appropriate representatives from local resource agencies, will be on-site during the first direct impact activities to oversee mitigation. Monitoring will continue with follow-up site visits on an as needed basis (as requested by Fort McClellan) to assess the level of disturbance to the affected species. A determination that the chosen course of action is acceptable will be made in the field. Should pre-sampling surveys reveal the presence of any state and/or federally listed species, the appropriate agencies will be consulted regarding the acceptability of the planned course of action.

12.9.1.3 Impacts to the white-fringeless orchid will be avoided since all planned site activities will not occur within delineated wetland boundaries or their transition areas.

12.9.1.4 For SINAs located within the Mountain Longleaf Community Complex, the first employed method to be implemented to minimize adverse impacts or degradation in these special interest natural areas will be avoidance. If it becomes necessary to conduct activities (e.g., surveys, investigation, removal action, etc.) in these areas, survey efforts will employ measures that minimize or avoid adverse alteration to SINAs. Since all potential site activities are located within the Mountain Longleaf Community Complex, site activities will take into consideration measures that minimize or avoid adverse alteration to this pine forest system. Special measures to be employed throughout this area will include the following:

- Locations of all sampling grids and access roads outside of wetland boundaries;
- Prescribed burning to remove under brush in larger areas;
- Hand clearing of under brush in smaller areas. Use of hand tools will avoid soil disturbances. Non woody under brush will be cleared with a high-weed mower. Woody under brush will be cleared with hand held chain saws; and
- Selective cutting to remove hardwoods only.

12.9.1.5 Additional measures will be identified, in conjunction with the USFWS, on a case by case basis as needed to meet conditions unique to specific areas.

12.9.2 Wetlands

Since the purpose of OE response at Fort McClellan is to make the land safe for reuse, sampling -- and potentially, removal actions-- may become necessary within wetland areas that fall within the boundaries of areas under investigation. However, sampling and removal actions within wetlands will be intentionally avoided to the extent that avoiding these areas does not compromise the effectiveness of the investigation or OE cleanup. If and when it becomes necessary to perform OE response activities within wetlands, specific guidance and procedures will be included in the site-specific work plans for minimizing damage to these sensitive ecological resources.

12.9.3 Cultural and Archaeological Resources

Mitigation methods are presented in Section 12.3.

12.9.4 Waste Disposal

Existing waste disposal sites at Fort McClellan will be avoided as part of the investigation activities. Any waste generated from these activities will be disposed of in accordance with existing procedures. Industrial type wastes may be discarded on-site in Landfill No. 4, while all other wastes will be disposed of off-site. Waste disposal activities are expected to have no effect on environmental resources and, therefore, mitigation is not required.

12.9.5 Burning Activities

Controlled burning may be used to remove brush from specific larger areas as an alternative to vegetative clearing using hand tools, upon consultation and agreement with Fort McClellan BEC. Brush clearing by controlled burning mimics natural conditions and is expected to result in positive effects on the Mountain Longleaf Community Complex.

12.9.6 Dust and Emission Control

It is not expected that investigation activities will cause a significant increase in dust or air emissions. Vehicular traffic to and from sampling locations will utilize paved roadways to minimize the possibility of dust-suspended particles. Vegetated areas affected by sampling activities will remain vegetated to not less than four inches above ground level and all pruning/clearing activities will be conducted manually, without the use of heavy ground-disturbing equipment. Detonation of any unmovable ordnance will involve covering the ordnance and the area immediately surrounding it with a blast blanket/mat to contain resulting dust and minimize emissions into the air.

12.9.7 Storage Areas

The investigation activities will avoid all storage areas, therefore mitigation with regard to such areas will not be required.

12.9.8 Access Routes

The investigation activities will have no effect on existing access routes within and around Fort McClellan, except for light vehicular traffic on roadways providing access to affected sites. However, access to specific sample areas may cause some temporary, short-term ground disturbance resulting from vehicular and/or foot traffic. Access to these areas could also require vegetation removal or pruning. Protection and mitigation measures associated with vegetation removal and/or pruning are contained in Section 12.9.9.

12.9.9 Trees/Shrubs Protection and Restoration

Limited tree removal will be necessary in performance of OE field activities at Fort McClellan. However, it will be selective removal and will be avoided whenever possible. Selective cutting will be limited to hardwood trees with a dbh less than 10 inches and a height of 40 feet and pine trees with a dbh less than 8 inches and a height of 40 feet. If forested areas are to be investigated, no root masses will be disturbed. Trees will be pruned on a case-by-case basis and only as required to accomplish necessary tasks. Should brush clearing be required, affected areas will be pruned with a clean cut no less than four inches from the ground. This approach will prevent damage to the root system and will facilitate re-sprouting of affected vegetation from the stump. Any cut brush will be stockpiled to provide additional habitat for wildlife that utilizes the area. Following proposed activities, affected areas will be allowed to naturally revegetate.

12.9.9.1 In densely vegetated areas, grasses will be removed as sod, rolled and stored during excavation, and replaced at the conclusion of work activities. In less densely vegetated areas, topsoil will be stripped, segregated, and replaced at the conclusion of work activities in the order in which it was removed. Any re-seeding will be done with species native to the Fort McClellan area.

12.9.10 Water Run-on and Run-off Control

The proposed EE/CA investigation activities at the site are not expected to significantly alter the amount of impervious area. When necessary, brush will be pruned to not less than four inches above the ground surface, leaving the existing root system in tact. Grasses and other vegetative cover will be removed in small (3’ by 3’) randomly selected plots during secondary sampling efforts, and will be replaced at the conclusion of sampling activities (typically on the same day). Therefore, significant amounts of runoff are not expected as part of the proposed activities.

12.9.11 Manifesting and Waste Transportation

All manifesting and waste transportation activities will be conducted in accordance with the Investigation Derived Waste Plan (see Section 13).

12.9.12 Temporary Facilities

Trailers will be installed at Fort McClellan as office/storage space.

12.9.13 Equipment Decontamination and Disposal

Equipment decontamination and disposal will be conducted in accordance with the Personnel and Equipment Decontamination Procedures identified in the SSHP.

12.9.14 Minimizing Areas of Disturbance

All areas that will potentially be disturbed as part of the investigation activities will be minimized, to the extent possible. Special efforts to minimize disturbance will be made in areas that contain or potentially contain plant and animal species of special concern or their associated habitat.

12.10 POST-ACTIVITY CLEAN-UP PROCEDURES

All areas will be cleaned of investigation derived wastes and litter.

12.11 ENVIRONMENTAL DOCUMENTATION

Observations shall be recorded in site logbook and will be discussed in reports as appropriate.

12.12 AIR MONITORING

All air monitoring will be conducted in accordance with the Air Monitoring Plan developed as part of the SSHP, or in accordance with the CWM Site Safety Submission when performing CWM response activities.

13.0 INVESTIGATION DERIVED WASTE MANAGEMENT PLAN

13.1 OVERVIEW

Limited amounts of Investigation Derived Wastes (IDW) will be generated during UXO investigation activities. This Investigation Derived Waste Management Plan outlines the requirements for the management of IDW generated at various sites within Fort McClellan.

13.1.1 Regulatory Parameters and Assumptions

This plan is based on the following parameters and assumptions:

- The DoD will be the generator of record for all site-related waste streams;
- Fort McClellan is being closed under the federal Base Realignment and Closure (BRAC) program; and
- All work performed at Fort McClellan will be in conformance with the General Site-Wide Work Plan as developed by Foster Wheeler Environmental.

13.2 REGULATORY DRIVERS AND GUIDANCE

The primary drivers for the waste management activities at this site are provided below.

13.2.1 **Alabama Department of Public Health's Solid Waste Regulations, Rule 420-3-5** - which provide the solid waste management requirements for storing, transportation and disposal of solid wastes.

13.2.2 **Defense Materiel Disposition Manual (DoD 4160.21-M)** - which provide instructions for the inspection, certification and segregation of OE scrap.

13.3 EXPECTED WASTE STREAMS

13.3.1 Waste Stream Quantities and Anticipated Classifications

The primary waste streams to be generated during this project, anticipated classification and the proposed storage/disposal methods are provided on the following page.

Waste Stream	Estimated Quantity	Anticipated Classification	Storage/Disposal Method
OE Scrap	< 25 yd^3	Non-Hazardous	Roll-off/Off-Site Recycling
Chemical Agent-Contaminated Soils[1]	< 100 yd^3	Hazardous	55-gallon drum/Off-site disposal
Soils	N/A	Non-Hazardous	Backfilling in Original Excavation
Decontamination Waters	<50 gallons	Non-Hazardous	55-gallon drum/Off-site disposal
Misc. Personal Protective Equipment (PPE), Plastic Sheeting, etc.	<25 cubic feet	Non-Hazardous	55-gallon drums/Off-site disposal

13.4 WASTE MANAGEMENT REQUIREMENTS

13.4.1 OE Scrap

OE scrap will be managed in accordance with the requirements of the OE Scrap Management Plan (see Section 2.9 of this General Site-Wide Work Plan).

13.4.2 Excavated Soils

Soils will be generated as a result of uncovering potential OE during site investigation activities. Soils will be temporarily stockpiled on plastic sheeting and returned to the original excavation upon the completion of investigation work. Where stockpiled soils will be stored overnight or for a duration of greater than one day, the soils are to be covered and temporary soil erosion controls deployed to minimize infiltration/run-off/erosion.

13.4.2.01 If, based upon visual observation or odors, suspect HTRW-contaminated soils are encountered while conducting EE/CAs the presence and location of these soils will be well documented. HTRW sampling that may be required during the performance of OE investigations and response actions will be performed by Foster Wheeler Environmental in accordance with the approved "Installation-Wide Sampling and Analysis Plan" prepared by International Technology Corporation (IT).

[1] Excavated soils with chemical agent contamination will not be returned to the area of excavation.

13.4.2.1 Chemical Agent Contaminated Soils

Soils that are suspect of chemical agent contamination will be drummed or staged on plastic tarps and covered to prevent infiltration/inflow of precipitation. Sampling and analysis required for chemical agent contaminated media will be performed in accordance with the CWM Site Safety Submission and site-specific requirements will be identified in the site-specific amendment(s) to the CWM Site Safety Submission.

13.4.3 Decontamination Wastewaters

Wastewaters will likely be generated from the decontamination of equipment used to handle contaminated soils. The presence of any hazardous constituents is expected to be dilute; therefore, the wastewaters are not expected to be classified as hazardous waste.

13.4.3.1 It is anticipated that liquid wastes will be placed in 55-gallon drums or similar containers for off-site disposal as non-hazardous waste in accordance with Table 13-1.

13.4.4 PPE/Miscellaneous Debris

Personal protective equipment and miscellaneous debris may be generated at each investigation site. These materials are not anticipated to be classified as hazardous wastes and therefore must be managed as solid wastes in conformance with the requirements of Table 13-1. These wastes are to be stored in lined 55-gallon drums for off-site disposal.

13.5 WASTE TRANSPORTERS AND DISPOSAL FACILITIES

13.5.1 Transporters

Solid waste transporters will be reviewed for approval by Foster Wheeler Environmental prior to use. At a minimum, transporters will have to possess a valid Solid Waste Transporter Permit as issued by the Alabama Department of Public Health and maintain and operate vehicles as per the Department's Solid Waste Collection and Transportation regulations. Only those transporters that receive approval will be utilized.

Table 13-1
Solid Waste Generator Requirements

Regulatory Standard	Requirements
Solid Waste Determination	Wastes which are not hazardous wastes are to be managed as solid waste
USEPA Identification Number	No USEPA ID No. needed
Packaging	Liquid wastes should be placed in USDOT Type 1A1 steel drums (closed top) Solid wastes should be placed in USDOT Type 1A2 steel drums (open top)
Labeling	Non-hazardous waste labels – may be affixed to each drum when the first quantity of soil is placed in the drum. Labels must contain the following information: Wording: "Non-Hazardous Waste" should appear in Bold lettering on the label Shipper's Name: TBD Address: Fort McClellan, Alabama Contents: Description of contents USDOT Labels - USDOT labels are pre-printed designating the hazard class of the material. Most likely, if the wastes are non-hazardous, the drums will not require DOT labels.
Placarding	Placards declaring the USDOT Hazard Class of the waste must be provided to the transporter of the waste by the shipper.
Bill of Lading	A bill of lading detailing the name and addresses of the generator, transporter and disposal facility and the weight and description of the contents should be completed by the transporter prior to the off-site shipment of material.
Storage	Stored in a manner that prevents the contamination of ground and surface waters Storage location is to be readily accessible by the generator
Accumulation Time	In Alabama, there are no set accumulation times for solid wastes. However, 180 days should be used as a guideline for the maximum accumulation/on-site storage period

13.5.2 Disposal Facilities

Solid waste disposal facilities, including recycling facilities, will be reviewed for approval by Foster Wheeler Environmental prior to use. Information related to the disposal facility's environmental compliance history will be evaluated. Only those facilities that receive approval will be utilized.

13.6 WASTE DOCUMENTATION AND NOTIFICATION REQUIREMENTS

13.6.1 Solid Waste

The DoD will be the generator of record for all solid wastes transported from the site. No prior notification for the solid waste shipments is expected to be required. A bill of lading corresponding to each shipment of solid waste will be completed and will accompany all off-site waste shipments.

14.0 GEOGRAPHICAL INFORMATION SYSTEM (GIS) PLAN

14.1 PURPOSE

GIS is a tool for collection and collation of data in a common location for processing, evaluation, storage, interpretation and planning. The main purpose of the GIS is to assemble all the data required to associate non-intrusive subsurface geophysics investigative data to it's correct geographical location, the relational database, mapping and remote sensing data. The GIS is used to manage the project, assemble data for the administrative record, help determine areas requiring further investigation and to discriminate ordnance and explosives waste from background anomalies.

14.2 DATA INPUTS

Data inputs may include historical data (e.g., archive search); site maps; aerial photographs; geographic, topographic and soils data; attributes; geophysical/remote sensing data; UXO data; risk data; reports; project schedules; and existing/proposed land uses. Existing GIS's developed for Fort McClellan by others will be incorporated into the Fort McClellan GIS.

14.3 GIS ACCESS

The GIS will be installed on a dedicated server located within the Foster Wheeler Livingston office. The GIS will be accessible from the Fort McClellan project field office, the Huntsville Engineering and Support Center and the Foster Wheeler offices at Denver, CO, and Huntsville, AL.

14.4 GIS DATA FLOW

Project Field Office. The field office will have the ability to upload/download data/information with the OE Center and Foster Wheeler offices in Denver, Livingston, and Huntsville. More specifically, the field office will upload geophysical/remote sensing data to the Denver office for processing and development of anomaly dig files; download "dig" files from Denver; print dig maps for use in intrusive anomaly investigations; and upload resulting UXO data to the Denver office.

14.4.1 Denver Office. The Denver office will have the ability to upload/download data with all Foster Wheeler offices. Project geophysicists in Denver will receive geophysical/remote sensing data from the field office; process the data; and produce dig files for intrusive investigations at Fort McClellan. Dig files will be downloaded to the field office. Final processed geophysical data will be uploaded to the archival database in Livingston.

14.4.2 Livingston Office. The Livingston office will have the ability to upload/download data with all Foster Wheeler offices and the Huntsville Engineering and Support Center. The Livingston office will maintain archival database storage for the entire GIS, analyze the data, and print maps.

14.5 SYSTEM REQUIREMENTS

14.5.1 Software

Foster Wheeler plans to develop the GIS using Intergraph's latest version of GeoMedia Professional (GeoMedia Pro). GeoMedia Pro is an open GIS with input, management and maintenance, analysis, and output functionality. It is interoperable with and complimentary to MGE. It supports simultaneous access to the following GIS databases and formats:

- MGE
- FRAMME
- ARC/INFO
- ArcView
- ORACLE Spatial Cartridge (SC)
- Microsoft Access
- MGE Segment manager
- MGE GeoData Manager
- MicroStation Design Files (.dgn)

14.5.1.1 The OE Center GIS was developed with Microstation and Intergraph's MGE 6.0 suite of software. The OE center will use Intergraph's GeoMedia Viewer software to view the Fort McClellan GIS.

14.5.2 Hardware/Operating System

The basic hardware requirements for operating GeoMedia Pro include: Pentium processor, 550 MHz; 128 MB memory; 20 gigabyte hard drive; 780x1024 resolution graphics; 16 bit color. Operating System: Windows NT 4.0.

15.0 REFERENCES

2) AR 71-13, Appendix G for Equipment Usage Standards

3) Department of Defense Federal Acquisition Regulation Supplement (DFARS) Part 245

4) Department of Energy Federal Acquisition Regulation Supplement (DEARS) Part 945

5) Department of Defense. 1997. DOD Ammunition and Explosives Safety Standards. DOD 6055.9-STD, July 1997. The Office of the Under Secretary of Defense, Washington, D.C.

6) EPA Contract Property Administration Requirements (EPACPAR), 19 April 1995

7) Federal Acquisition Regulation (FAR) Part 45

8) Foster Wheeler Environmental Corporation, 1996. Draft Environmental Impact Statement. Prepared for Mobile District Corps of Engineers, Contract Number DACA01-91-D-0031. December 1996.

9) Foster Wheeler Environmental Procedure SCI-003, Calibration and Maintenance Requirements

10) Foster Wheeler Environmental Procedure PD-201, Responsibilities, Signature Authority, and Anti-Kickback

11) Moser, P.H. and S.S. DeJarnette, 1992. Groundwater Availability in Calhoun County, Alabama. Geological Survey of Alabama, Special Map 228.

12) Navy Explosive Ordnance Disposal. 1990. Explosive Ordnance Disposal Procedures, Protection of Personnel and Property. Bulletin 60A-1-1-4, Revision 2, 24 September 1990. Naval Explosive Ordnance Disposal Technology Division. Indian Head, Maryland.

13) Navy Explosive Ordnance Disposal. 1994. Explosive Ordnance Disposal Procedures, General Information on EOD Disposal Procedures. Bulletin 60A-1-1-31, Revision 0, 31 May 1994. Naval Explosive Ordnance Disposal Technology Division, Indian Head, Maryland.

14) Science Applications International Corporation (SAIC), 1993. Site Investigation Report, Fort McClellan, Alabama, Delivery Order 001, Contract Number DAAA15-91-D-0017. August 31, 1993.

15) SAIC, 1995. Remedial Investigation Report, Fort McClellan, Alabama, Delivery Order 0005, Contract Number DAAA15-91-D-007. August, 1995.

16) TB 43-0142, Technical Bulletin, Safety Inspection and Testing of Lifting Devices

17) TB 43-0151, Technical Bulletin, Inspection and Test of Air and other Gas Compressors

18) U.S. Army. 1987. Ammunition and Explosives Safety Standards. Army Regulation 385-64, 22 May 1987. Headquarters Department of the Army, Washington, D.C.

19) U.S. Army Corps of Engineers. 1996. Safety and Health Requirements Manual. EM 385-1-1, September 1996. Department of the Army, Washington, D.C.

20) U.S. Army Corps of Engineers Huntsville, Personnel Qualifications Standard OT-025.

21) Unexploded Ordnance Management Principles. DoD and EPA - Management Principles for Implementing Response Actions at Closed, Transferring, and Transferred (CTT) Ranges", Interim Final, March 7, 2000.

22) Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions, OSWER Directive 9355.0-30, Issued by Don R. Clay, U.S. EPA, Assistant Administrator, December 31, 1990.

23) Interim R3M Range Rule Risk Methodology, A Process for Managing, Assessing, and Communicating Risk on Closed, Transferred, or Transferring U.S. Ranges, Interim Procedures Manual, Department of Defense, Working Draft, March 2000.

16.0 GLOSSARY

Administrative Record. The body of documents that forms the basis for selection of a response action, which could include workplans, reports, meeting minutes, responses to comments, a Community Relations Plan, and fact sheets.

Ammunition, Explosives and Other Dangerous Articles (AEDA) Residue. Any explosive or chemical-based munitions, such as small and large caliber ammunition, aerial bombs, grenades, mines, missiles, and rockets. AEDA residue consists of fired cartridge cases, shell fragments, packing material, wooden boxes, metal cans and fiber containers.

Anomaly. An indication of a buried item that might be a UXO.

Archive Search Report. A report prepared by the U.S. Army Corps of Engineers to give historic findings, data, and information pertaining to ordnance and explosives and chemical warfare materials.

Area of Concern. Area of potential ordnance and explosives.

Confidence level. In statistical sampling, we are often trying to determine a "best" estimate of some population value (e.g., OE density/acre) from a sample of observations from that population. Short of 100-percent sampling, we can never be absolutely certain of the accuracy of our estimate. Consequently, it is common practice to avoid stating, "We are 100 percent confident that there are .3 OE/acre in this sector," but rather to state, "We are 90 percent confident that the OE density in this sector falls between .2 and .4 OE/acre." Ninety percent is the "confidence level," and the range .2 to .4 is the "confidence interval."

Conventional Ordnance and Explosives (OE). The term “conventional OE” refers to ordnance and explosives other than CWM, BWM and nuclear ordnance. (ER 1110-8153)

Construction and Building Demolition Wastes. All materials from demolition of military structures which were constructed for support of military training activities

Demolition. Destruction of structures, facilities, or material by use of fire, water, explosives, mechanical, or other means.

Detonation. A chemical reaction that propagates with such rapidity that the rate of advance of the reaction zone into the unreacted material exceeds the velocity of sound and explosions.

Dig Team. A team consisting of UXO specialists that search for and excavate anomalies below the ground surface.

Fuze. A device with explosive components designed to initiate a train of fire or detonation in an item of ammunition by an action such as hydrostatic pressure, electrical energy, chemical action, impact, mechanical time, or a combination of these.

EM61 system (Time-Domain Electromagnetic Induction Metal Detector). A geophysical survey instrument that utilizes the rate at which electromagnetic signals in the ground decrease to detect and map metal objects that are buried near ground level (less than 10 feet below ground surface).

Expended Ordnance. A munition that has functioned as designed, leaving the shell or container behind. This shell of container may or may not contain explosive/pyrotechnic/toxic residue.

This material would not be considered inert, and could not be salvaged as scrap without appropriate visual inspection, sampling, and/or treatment.

Explosive Ordnance Disposal (EOD). The detection, identification, field evaluation, rendering safe, recovery, evacuation, and disposal of explosive ordnance that has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material.

Explosive Ordnance Disposal (EOD) Personnel. Active duty military personnel who have completed the training course at the U.S. Naval School, Explosive Ordnance Disposal (EOD), Indian Head, Maryland and are currently assigned to a military EOD unit.

Explosive Soil. Explosive soil refers to mixtures of explosives in soil, sand, clay, or other solid media at concentrations such that the mixture itself is explosive.

A) The concentration of a particular explosive in soil necessary to present an explosion hazard depends on whether the particular explosive is classified as "primary" or "secondary." Guidance on whether an explosive is classified as "primary" or "secondary" can be obtained from the OE MCX or Chapters 7 and 8 of TM 9-1300-214, Military Explosives.

B) Primary explosives are those extremely sensitive explosives (or mixtures thereof) that are used in primers, detonators, and blasting caps. They are easily detonated by heat, sparks, impact, or friction. Examples of primary explosives include Lead Azide, Lead Styphanate, and Mercury Fulminate.

C) Secondary Explosives are bursting and boostering explosives (i.e., they are used as the main bursting charge or as the booster that sets off the main bursting charge). Secondary explosives are much less sensitive than primary explosives. They are less likely to detonate if struck or when exposed to friction or electric sparks. Examples of secondary explosives include Trinitroluene (TNT). Composition B, and Ammonium Picrate (Explosive D).

D) Soil containing 10 percent or more by weight of any secondary explosive or mixture of secondary explosives is considered "explosive soil." This determination was based on information provided by the USAEC as a result of studies conducted and reported in USAEC Report AMXTH-TE-CR 86096.

E) Soil containing propellants (as opposed to primary or secondary high explosives) may also present explosive hazards.

Firing Point. The point within a range fan from which a munition is discharged.

Fluxgate magnetic gradiometer (Schonstedt). Instrument that measures changes in the magnetic field of the earth caused by the presence of iron- or steel-bearing objects in the near surface of the earth.

Foster Wheeler Environmental Command Center. A designated location staffed by personnel to relay and control all communications/activities of field personnel and other units.

Frost Heave. The uneven lifting or upward movement, and general distortion, of surface soils, rocks, vegetation, and structures, such as pavement, due to subsurface freezing of water and growth of ice masses.

Grid. A geographic parcel of land ranging from 200'x50' to 400'x100' in size. The number of grids within a sector is dependent upon the size of the sector and the size of the grids.

Ground-to-air. A tactical operation by ground-based defensive elements to engage airborne targets with guns, rockets, and bombs.

High explosive (HE). An explosive that normally detonates rather than burns; that is, the rate of detonation exceeds the velocity of sound.

Inert. Ordnance, or components thereof, that contains no explosives, pyrotechnic, or chemical agents.

Inert Ordnance. Ordnance that never contained explosives (e.g., munitions manufactured for classroom instruction

Intrusive Investigation. Excavating for suspected UXO items or for plotted anomalies. Excavation activities on UXO sites are performed by UXO qualified personnel only.

Inventory Project Report (INPR). A report that contains all real estate findings and preliminary assessment information. The INPR documents the determination that the property is a formerly used defense site and that potential projects could be eligible under the Defense Environmental Restoration Program.

Live. A slang term indicating ordnance containing explosives or active chemicals.

Memorandum of Agreement (MOA). A record between government agencies agreeing upon a specific action item.

Military munitions. Includes all types of both conventional and chemical ammunition products and their components, produced by or for the military for national defense and security.

Mortar range. A military training area designated for indirect fire (mortar and/or Howitzer) use.

Non-ordnance and Explosive Metal Debris. Metal debris recovered during operations that is not ordnance-related, such as metal rebar, angle iron, sheet metal, bar stock, etc.

Non-Stockpile Chemical Warfare Materiel (NSCWM). CWM that is not included in the chemical stockpile. NSCWM is divided into five categories: buried CWM, recovered chemical weapons (items recovered during range clearing operations, from chemical burial sites, and from research and development testing), former chemical weapon production facilities, binary chemical weapons, and miscellaneous CWM (unfilled munitions and devices and equipment specially designed for use directly in connection with employment of chemical weapons). (HQDA Interim Guidance for Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activities)

NCP (National Contingency Plan). The National Contingency Plan is the EPA's blueprint for implementing a Superfund law that addresses the legal requirements for responding to a potential hazard at a CERCLA site. The plan defines responsibilities and activities of affected parties within the site (which could include a Superfund site). The NCP is also the process used to address non-Superfund contaminated sites.

Non-OE Scrap. Items that are non-ordnance-related including, but not limited to: wooden boxes, wire, banding material, trash, auto parts, and nails.

OE scrap. Includes those items which are fragments of functioned ordnance, as designed or intentionally destroyed, and which contain no explosive or other items of a dangerous nature. OE scrap is inert and does not pose a safety risk.

Ordnance and Explosives (OE). Ammunition, ammunition components, chemical or biological warfare material 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"):

A. **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)

B. **Biological Warfare Materiel(BWM).** An item configured as a munition containing an etiologic agent that is intended to kill, seriously injure, or incapacitate a person through its physiological effects; includes biological agent identification sets. BWM can also include etiologic agents that are designed to damage or destroy crops that are intended for human consumption. (HQDA Interim Guidance for Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activities)

C. **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 266.201)

D. **Training Ammunition.** Ammunition used for training persons in marksmanship, handling weapons, etc. (Glossary of Ordnance Terms, Ordnance Engineering Handbook Office, Duke University)

(i). **Inert Ammunition.** Ammunition or ammunition components void of explosive or chemical material. An inert material may be used to represent an explosive filler or material. (AR 385-65)

(ii). **Dummy ammunition.** Ammunition or ammunition components having the appearance of actual items. Dummy ammunition is used for exhibits and for training operations, such as assembly and handling, and dry run operations of weapons or weapon systems. (AR 385-65)

(iii). **Empty Ammunition.** Ammunition or ammunition components void of any type of filler. (AR 385-65)

(iv). **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, such as black powder used as a spotting charge. (AR 385-65)

E. **Explosive Soil.** (refer to definition)

Ordnance and Explosives Cost-Effectiveness Risk Tool (OECert). OE*Cert*, a computer model, measures risk by quantifying how often people are exposed to UXO when participating in commonly performed activities at a site (e.g., hiking, jogging).

Ordnance and Explosive Waste. Materials that have been in direct contact with the energetic material of the ordnance, such as expended rocket motors, shell casings, warhead fragments, powder containers, etc.

Ordnance and Explosive Metal Debris. Ordnance materials that have not been in direct contact with the energetic materials of the ordnance, such as bomb fins, grenade spoons, shipping containers, etc.

Ordnance Related Materials. These materials include the following:

- All expended, inert, practice and unexploded ordnance on Fort McClellan, including high explosive and practice munitions, components of military munitions, including tail fins, guidance mechanism, mounting and dispensing hardware, ammunition and ammunition parts;
- Target Materials, including metal and other objects which were used as targets;
- Target Marking Materials - Principally used automotive tires.

Practice Ordnance. Munitions that demonstrate similar characteristics as their high explosive counterparts, and may or may not contain pyrotechnic, explosive, or chemical (e.g., titanium tetrachloride) spotting charges.

Range Fan. The radial portion of land used during practice firing sessions.

Range Residue. Material including, but not limited to practice bombs, expended artillery, small arms and mortar projectiles, aircraft bombs and missiles, rockets and rocket motors, hard targets, grenades, incendiary devices, experimental items, demolition devices, and any other material fired on, or upon a range. (Also referred to as Ordnance Related Scrap).

Sector. A designated geographic parcel of land within the boundary of a zone.

Small arms (Live OE). Small arms ammunition consists of cartridges and shells used in rifles, pistols, machine guns, and shotguns.

Smoke grenade. A burning type of grenade used to generate smoke for screening and signaling activities. The smoke can assume a variety of colors.

Submunitions. Bombs, grenades, mines, and other small miscellaneous munition items dispensed from cluster bombs, cluster bomb unit systems, modular weapon systems, and artillery dispensing rounds.

Surface clearance. Consists of using UXO personnel to "sweep" an area and remove items on the ground surface. The items removed are limited to those that can be placed in the back of the explosives transport vehicle.

Time Critical Removal Action (TCRA). Response taken when a removal action is appropriate and must be initiated within 6 months.

Training Device. A device or item of equipment designed or modified for use by the trainee in training. (Glossary of Ordnance Terms, Ordnance Engineering Handbook Office, Duke University)

Trash and Garbage Waste. All materials generated as a result of activities to remove residual materials from the site.

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.

UXO Clearance. The surface or subsurface removal of identified unexploded ordnance from a defined area.

UXO Personnel. Any former member of the United States Armed Forces who has graduated from the U.S. Naval School, Explosive Ordnance Disposal, Indian Head, Maryland, served in EOD billets and assignments while on active military duty, and now works as a civilian specialist with UXO items/materials.

.50 caliber round. Projectile body measuring 0.50 inch in diameter produced in the following types: ball, incendiary, armor piercing, tracer, and blank.

75mm. Ammunition used in guns, Howitzers, and recoilless rifles found in the following types: high explosive, armor piercing, high-explosive anti-tank, smoke, and practice.