

**FINAL  
WORK PLAN TO CONDUCT ENGINEERING DESIGN  
AT  
ORDNANCE OPERABLE UNIT (OOU) 6  
FORMER CAMP CROFT ARMY TRAINING FACILITY  
SPARTANBURG, SOUTH CAROLINA**

**DACA87-95-D-0018**

**DELIVERY ORDER 0009**

**PREPARED FOR  
U.S. ARMY ENGINEERING AND SUPPORT CENTER  
HUNTSVILLE, ALABAMA**

**PREPARED BY  
PARSONS ENGINEERING SCIENCE  
57 EXECUTIVE PARK SOUTH, NE, SUITE 500  
ATLANTA, GEORGIA 30329**

**NOVEMBER 1996**

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**LIST OF ACRONYMS AND ABBREVIATIONS**

AOI	areas of interest
AR	Army Regulation
ARAR	Applicable or Relevant and Appropriate Requirement
ASR	Archives Search Report
CAL	caliber
CCATF	Camp Croft Army Training Facility
CEHNC	Corps of Engineers, Huntsville Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CPM	Contract Project Manager
CWM	chemical warfare material
dB	decibel
DEM	digital elevation models
DERP	Defense Environmental Restoration Program
DoD	U.S. Department of Defense
DTIC	Defense Technical Information Center
EE/CA	Engineering Evaluation/Cost Analysis
EOD	explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
ERPP	Environmental Resources Protection Plan
ESE	Environmental Science & Engineering, Inc.
ft-bgs	feet below ground surface
ft	foot
FUDS	Formerly Used Defense Site
GIS	geographic information system
HE	high explosive



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HEAT	high explosive anti-tank
HFA	Human Factors Applications, Inc.
lb/acre	pounds per acre
mm	millimeter
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NTCRAs	non-time-critical removal actions
ODC	other direct cost
OE	ordnance and explosives
OE <i>Cert</i>	OE Cost-Effectiveness Risk Tool
OOU	ordnance operable unit
ORS	ordnance-related scrap
OSHA	Occupational Safety and Health Administration
PPE	personal protection equipment
PRSC	post-removal site control
QA/QC	quality assurance/quality control
QuantiTech	QuantiTech, Inc.
RAC	risk assessment code
ROE	right-of-entry
SAR	synthetic aperture radar
SASR	Supplemental Archive Search Report
SCDPRT	South Carolina Department of Parks, Recreation, and Tourism
SOP	Standard Operating Procedure
SOW	Statement of Work
SRA	Safety Risk Assessment
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TCRA	time-critical removal action
TEU	Technical Escort Unit

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(CONTINUED)**

<b>USACE</b>	<b>U.S. Army Corps of Engineers</b>
<b>USGS</b>	<b>U.S. Geological Survey</b>
<b>UXO</b>	<b>unexploded ordnance</b>
<b>WP</b>	<b>Work Plan</b>

## **1.0 INTRODUCTION**

### **1.1 PROJECT AUTHORIZATION**

Parsons Engineering Science, Inc. (Parsons ES) received Contract No. DACA87-92-D-0018, Delivery Order No. 0009, from the Corps of Engineers, Huntsville Center (CEHNC), to conduct an Engineering Design at Ordnance Operable Unit (OOU)6 at the former Camp Croft Army Training Facility (CCATF), Spartanburg, South Carolina (Figure 1.1). The Engineering Design will be conducted in accordance with the National Contingency Plan (NCP), related Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or Superfund guidance, the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS), and relevant U.S. Army regulations and guidance for ordnance and explosives (OE) programs.

### **1.2 PURPOSE AND SCOPE**

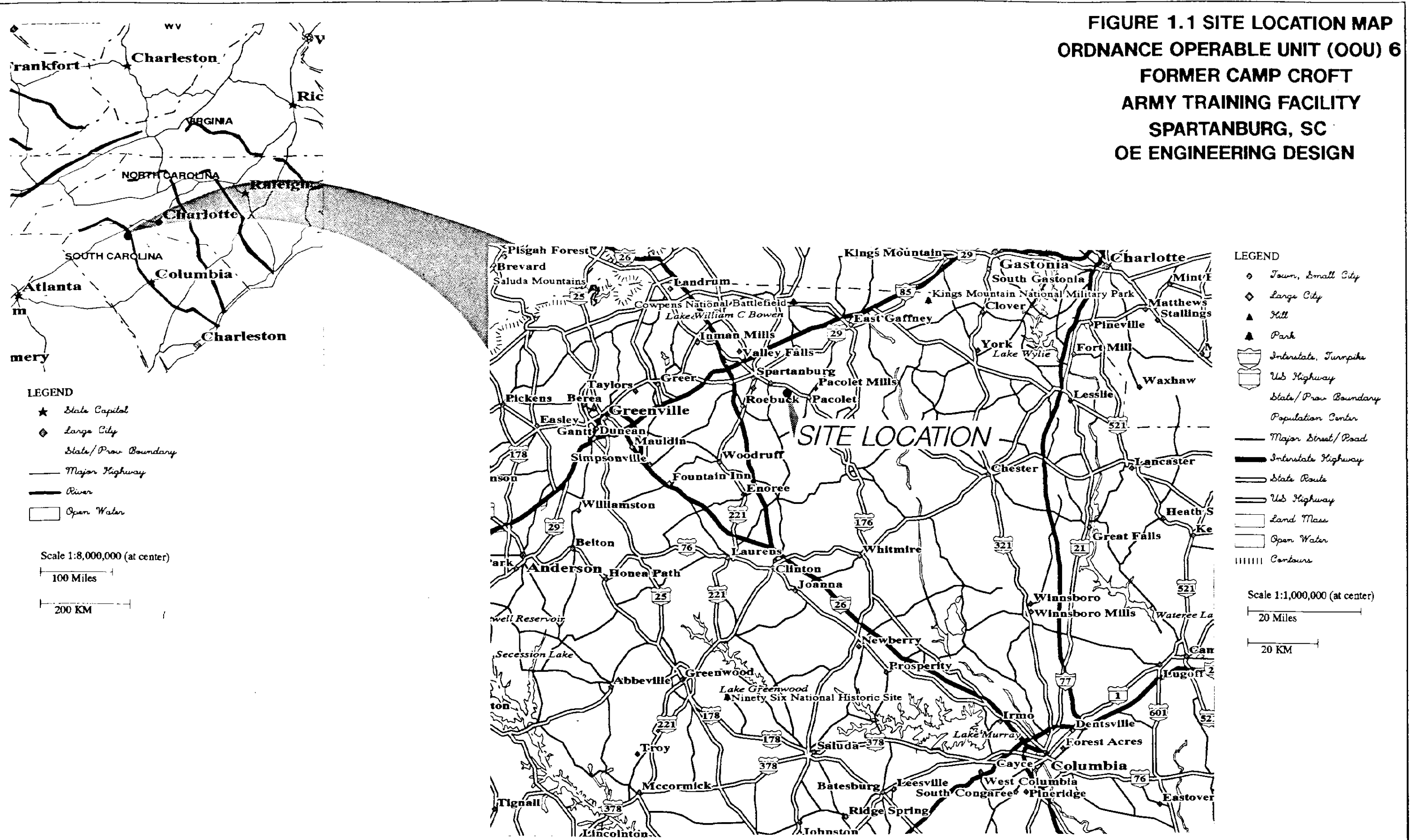
1.2.1 The purpose of the Engineering Design is to select removal actions necessary to reduce public safety risk associated with OE/unexploded ordnance (UXO) at OOU6. The purpose of this Engineering Design project is to determine the most appropriate response action to address any OE risk at OOU6 and to prepare a design package for follow on remedial action where warranted.

1.2.2 This Work Plan (WP) details the OE remedial activities as stipulated in the CEHNC Statement of Work (SOW) for Delivery Order No. 0009 (see Appendix A). The Engineering Design will focus on conventional OE/UXO risks requiring non-time-critical removal actions (NTCRAs) within the boundaries of the OOU6. The objective of this WP is to present the site background, objectives, procedures, personnel, and equipment to be used for the Engineering Design activities. During the Engineering Design, site characterization efforts involving sampling and data collection will be conducted to determine or classify those portions of the site that are contaminated or potentially contaminated with OE/UXO and to estimate the type and density of OE/UXO contamination.

1.2.3 This Work Plan describes the major components of the work that will be conducted to complete the Engineering Design for OOU6, which include the following:

- Review historical data, including the Archives Search Report (ASR), Supplemental Archive Search Report (SASR), Supplemental Engineering Report, and other data that may be provided by the CEHNC;
- Visual inspection of the site, and collecting any additional relevant data that may be locally available;

**FIGURE 1.1 SITE LOCATION MAP  
 ORDNANCE OPERABLE UNIT (OOU) 6  
 FORMER CAMP CROFT  
 ARMY TRAINING FACILITY  
 SPARTANBURG, SC  
 OE ENGINEERING DESIGN**



**LEGEND**

- ★ State Capital
- ◆ Large City
- State/Prov Boundary
- Major Highway
- River
- Open Water

Scale 1:8,000,000 (at center)

100 Miles

200 KM

**LEGEND**

- ◆ Town, Small City
- ◆ Large City
- ▲ Hill
- ▲ Park
- Interstate, Turnpike
- US Highway
- State/Prov Boundary
- Population Center
- Major Street/Road
- Interstate Highway
- State Route
- US Highway
- Land Mass
- Open Water
- ||||| Contours

Scale 1:1,000,000 (at center)

20 Miles

20 KM

- Preparing a WP (this document) for the field investigation that specifically includes the following subplans: an OE/UXO Operational Plan and a Demolition/Disposal Standard Operating Procedure (SOP); Site Safety and Health Plan (SSHP); Equipment Plan (EP); Location Survey and Mapping Plan; Environmental Resources Protection Plan (ERPP); Quality Control (QC) plan; Work, Data, and Cost Management Plan; Technical and Management Plan (TMP); Regulatory Compliance Plan (RCP); Subcontractor Management Plan; Scrap Waste Disposal Plan; and a geophysical investigation plan;
- Perform location surveys and mapping of the site;
- Perform a geophysical investigation;
- Perform intrusive investigation;
- Determine the presence or absence of OE contamination, and the disposal of any conventional OE encountered;
- Safety Risk Assessment (SRA) using *OECert* model;
- Provide technical support to the government for meetings; and
- Provide project management.

### 1.3 WP ORGANIZATION

1.3.1 This WP is organized to provide each of the required plan components in the SOW. Each of the required plan components are included or incorporated in the Sections and Appendices outlined in Table 1.1. This WP adheres to the general format of the EE/CA work plan approved for CCAFT by CEHNC.

1.3.2 Other required plans that are not identified in Table 1.1 are incorporated into the Work Plan as described in this section. Components of the Location Survey and Mapping Plan are described in Section 3.3.3, 3.5.1, and 3.5.2. Specific elements of the Work, Data, and Cost Management Plan are discussed in Section 3.4. The Technical and Management Plan is described in Section 3.1. Components of Subcontract Management Plan are described in Section 3.1.5. Specific task pertaining to Scrap Waste Disposal Plan is described in Section 3.5.11.

**Table 1.1 Format and Content of the Engineering Design Work Plan for OOU6**

<b>Section</b>	<b>Content</b>
Section 1	Introduction
Section 2	Site Description and Previous Investigations
Section 3	Project Plan
Section 4	Project Quality Assurance and Quality Control Plan
Section 5	Safety Procedures
Section 6	Public Affairs
Section 7	OE-UXO Operational Plan
Section 8	Environmental Resources Protection Plan (ERPP)
Appendix A	Statement of Work
Appendix B	Project Schedule
Appendix C	Explosives Safety Precautions
Appendix D	Parsons ES Site Safety and Health Plan
Appendix E	Subcontractor (UXB) Site-Specific Safety and Health Plan
Appendix F	Demolition/Disposal SOPs
Appendix G	Field Investigation Equipment Plan
Appendix H	ERPP
Appendix I	Regulatory Compliance Plan (RCP)
Appendix J	Key Project Personnel Resumes

## **2.0 SITE DESCRIPTION AND PREVIOUS INVESTIGATIONS**

### **2.1 PROJECT LOCATION**

The former CCATF, consisting of approximately 19,000 acres, is located south of Spartanburg, Spartanburg County, South Carolina. Figure 1.1 shows the location of the study area. Ordnance Operable Unit 6 is located east of the State Park. Figure 2.1 shows the boundaries and major features of the former CCATF, Croft State Park and OOU6.

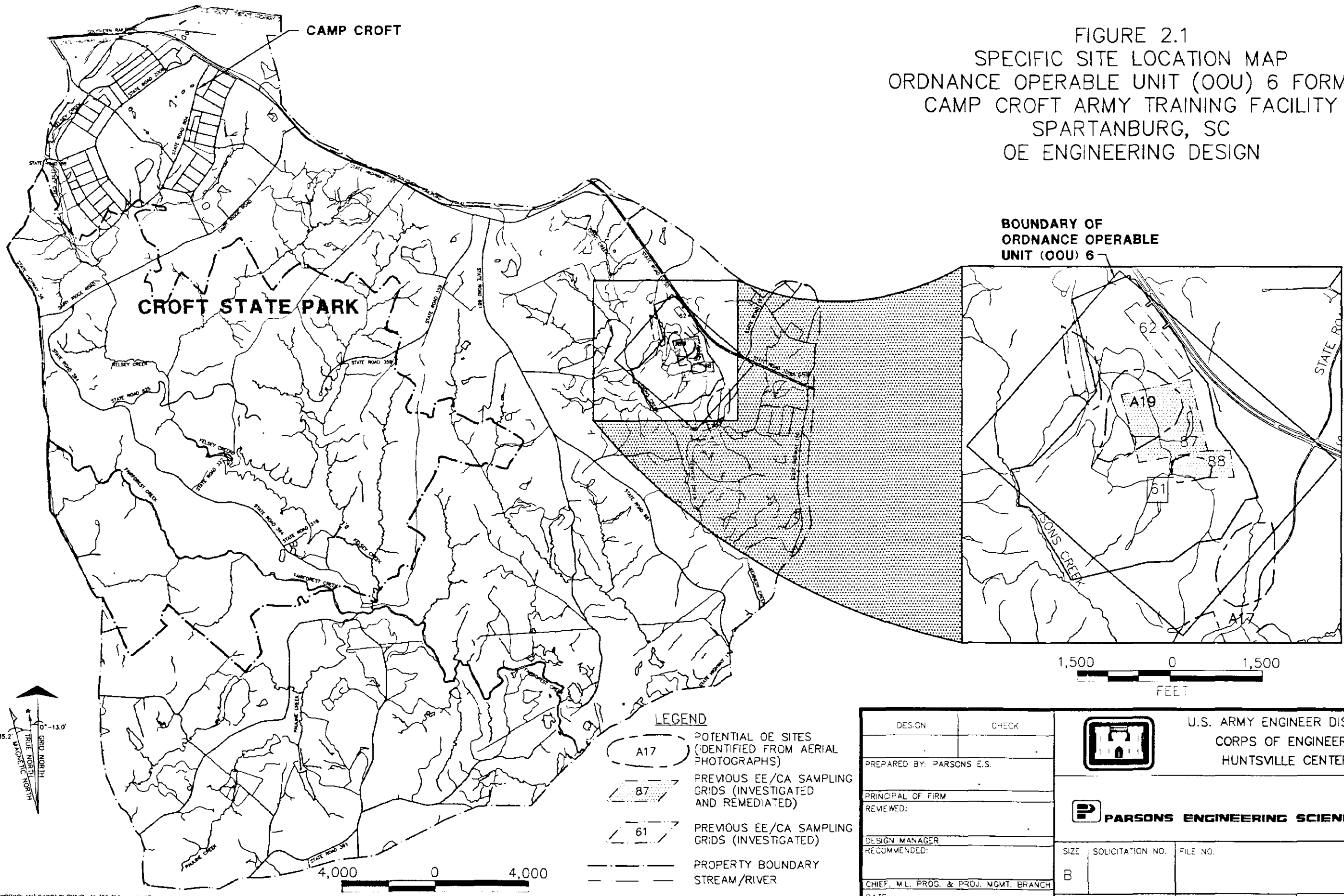
### **2.2 CCATF AND SITE DESCRIPTION**

2.2.1 Camp Croft was established in January 1941 as an army training facility. The camp consisted of two general areas: a series of training, firing, and impact ranges (approximately 16,929 acres), and a troop housing (cantonment) area with attached administrative quarters (approximately 167 acres). The firing ranges at the former CCATF consisted of pistol, rifle, machine gun, mortar, anti-aircraft, and anti-tank ranges. OE/UXO that may be encountered at the former CCATF include: .30-caliber (cal) and .50-cal small arms; 105 mm artillery shells; 20-millimeter (mm) hand and rifle smoke, tear gas, and incendiary grenades; 60- and 81-mm high explosive (HE), practice, smoke, tear gas, and illumination mortar rounds; and 2.36-inch high explosive anti-tank (HEAT), smoke, incendiary, and practice rockets. The former CCATF also contained a gas chamber/gas obstacle course area (approximately 199 acres) where realistic chemical warfare training was conducted.

2.2.2 In 1947, the entire acreage of the former CCATF was declared surplus by the War Assets Administration. By 1950, the Army sold the land by pieces to organizations and businesses. This sale also included the transfer of 7,088 acres of land to the South Carolina Commission of Forestry for the creation of the Croft State Park. The remaining acreage has been converted to residential housing, churches, and industrial and commercial businesses. The gas chamber and gas obstacle course have been removed, and no ordnance or other evidence of past chemical training are found at the site.

2.2.3 OOU6 is located within the boundaries of former Camp Croft, but outside Croft State Park. It is situated off of Mimosa Lake Road and is adjacent to the south of U.S. Highway 176 Bypass. OOU6 contains an area of 397.80 acres, as per the Division of Tract 'A' "Whitestone Tract" boundary survey map, dated January 24, 1994. The property is privately owned and is used for agricultural and industrial purposes including tree planting and industrial landfills.

FIGURE 2.1  
 SPECIFIC SITE LOCATION MAP  
 ORDNANCE OPERABLE UNIT (OOU) 6 FORMER  
 CAMP CROFT ARMY TRAINING FACILITY  
 SPARTANBURG, SC  
 OE ENGINEERING DESIGN



BOUNDARY OF  
 ORDNANCE OPERABLE  
 UNIT (OOU) 6

LEGEND

- A17 POTENTIAL OE SITES (IDENTIFIED FROM AERIAL PHOTOGRAPHS)
- 87 PREVIOUS EE/CA SAMPLING GRIDS (INVESTIGATED AND REMEDIATED)
- 61 PREVIOUS EE/CA SAMPLING GRIDS (INVESTIGATED)
- PROPERTY BOUNDARY
- STREAM/RIVER

DESIGN	CHECK
PREPARED BY: PARSONS E.S.	
PRINCIPAL OF FIRM	
REVIEWED:	
DESIGN MANAGER	
RECOMMENDED:	
CHIEF, M.L. PROG. & PROJ. MGMT. BRANCH	
DATE:	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS HUNTSVILLE CENTER			
PARSONS ENGINEERING SCIENCE, INC.			
SIZE	SOLICITATION NO.	FILE NO.	PLATE
B			
SCALE:			SHEET

C:\730414\WORKPLAN\CADD\BLOWUP, 11/22/96 at 11:17



## **2.3 PREVIOUS OE/UXO INVESTIGATIONS**

### **2.3.1 1984 Site Survey of Former CCATF**

In 1984, the Charleston District conducted a site survey of the former CCATF. This study concluded that the "potential for unexploded and dangerous bombs, shells, rockets, mines and charges either upon or below the surface" could be found at the former CCATF.

### **2.3.2 1991 Preliminary Assessment**

In 1991, the U.S. Army Corps of Engineers (USACE), Charleston District conducted a Preliminary Assessment Study of this site. This study determined that the site was eligible for further investigation under the DERP for FUDS. This study also determined that the site contains several locations where drums were placed inside wells during the closure procedures conducted at the site. The report generated by this assessment did not indicate the presence of soil or groundwater contamination due to medical, ordnance, or chemical weapons.

### **2.3.3 1994 OE ASR**

In 1994, the USACE, Rock Island District conducted a site inspection and archives search of the former CCATF (USACE, 1994). The final report, dated April 1994, outlined the nature and degree of OE/UXO contamination to be found at the former CCATF. This report listed the ordnance that may be found at or below the surface (see Section 2.2 of the ASR). This report also stated that the gas chamber and gas obstacle course no longer exist, and that no historical recorded evidence was located to document and confirm the presence of chemical ordnance since site closure. It did state, however, that based on the nature of the former CCATF's training mission, the potential for chemical ordnance or chemical contamination of the area's soil does exist. It is believed that chemical training during that period would have involved the use of CN, a tear agent, as the training chemical.







### **2.3.4 1994-1995 TCRA**

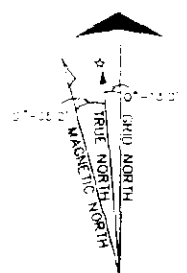
2.3.4.1 In 1994 and 1995, Human Factors Applications, Inc. (HFA) performed a Time Critical Removal Action (TCRA) at the former CCATF. The TCRA was conducted over a 30 acre area, currently owned by Dr. Lowry. The areas to be cleared included access roads into and out of the site and a work area where asphalt equipment recycling equipment was to be installed. Future development areas proposed by Dr. Lowry (for example, Phase I and II landfill areas, see Section 2.4) were also included. Figure 2.2 presents the locations of the TCRA grids.

2.3.4.2 The objective of the TCRA was to remove surface and subsurface OE to a depth of four feet within the work areas and to conduct geophysical mapping of the planned site. HFA established grids in the work areas and performed magnetometry searches using Schonstedt GA52/72 magnetometers. The following table provides a list of the ordnance recovered during the TCRA:





FIGURE 2.2  
 PREVIOUS INVESTIGATION MAP  
 ORDNANCE OPERABLE UNIT (OOU) 6  
 FORMER CAMP CROFT  
 ARMY TRAINING FACILITY  
 SPARTANBURG, SC  
 OE ENGINEERING DESIGN

-  ESTIMATED TCRA AREA
-  BOUNDARY OF OOU6
-  PROPERTY BOUNDARIES
-  PREVIOUS EE/CA GRIDS (REMEDIATED)
-  PREVIOUS EE/CA GRIDS (INVESTIGATED)
-  POTENTIAL OE SITE



NOTE: MAP ATTRIBUTES INFERRED FROM ELLIOTT'S PAGE MAPS PROVIDED BY CEHNC AND INTERPRETATION FROM SOIL CONSERVATION MAPS AND 1934 AERIAL PHOTOGRAPHS.

DESIGN	DATE:		U.S. ARMY ENGINEER DISTRICT	
PREPARED BY: PARSONS E.S.			CORPS OF ENGINEERS HUNTSVILLE CENTER	
PRINCIPAL ENGINEER	REVIEWED:		PARSONS ENGINEERING SCIENCE, INC.	
DESIGN MANAGER	RECOMMENDED:		SIZE: B	SECTION NO:
CHIEF, MIL. PROG. & PROJ. MGMT. BRANCH	DATE:	SCALE:		SHEET:

Date	Description	Grid
Oct. 18, 1994	Live 105mm with M48 fuse	A13
Nov. 17, 1994	60mm HE with fuse	B30
Nov. 17, 1994	60mm HE with fuse	B15
Nov. 17, 1994	155mm Burster Tube	B14

2.3.4.3 All subsurface anomalies were excavated by hand and their identities determined. UXO that was unsafe to move was detonated in place. UXO and OE determined to be safe were destroyed on-site in a designated open detonation area.

### 2.3.5 1995-1996 EE/CA

2.3.5.1 In 1995 and 1996, Environmental Science and Engineering, Inc. (ESE) performed an EE/CA at the former CCATF (ESE, 1996a). The purpose of this EE/CA was to analyze removal alternatives to reduce the risk of public exposure to OE/UXO at sites previously identified in the 1994 ASR (USACE, 1994). The EE/CA addressed nine ordnance operable units (OOU's) where OE/UXO was either previously confirmed or suspected. Six OOU's were within Croft State Park. The remaining three OOU's were private property sites located outside the park but within the former CCATF boundary.

2.3.5.2 ESE was directed by Corps of Engineers Huntsville Center (CEHNC) to investigate four areas within the boundaries of OOU6, including the planned "compost B" area, the "poppy field", the proposed location of "landfill No. 2", and one unnamed area. These areas were designated as Grids 61, 62, 88, and 87, respectively. Grids 61 and 62 were investigated on October 28 and 29, 1994, and Grids 87 and 88 were investigated January 17 through 23, 1995. Figure 2.2 presents the locations of the EE/CA grids.

2.3.5.3 The investigation of Grids 61 and 62 consisted only of magnetometer surveys and recording of anomalies. No intrusive operations were conducted. However, investigation of Grids 87 and 88 included both magnetometer surveys and intrusive operations. Significant UXO findings included one 81mm illumination round, five 105 mm projectile rounds, and numerous fragments in Grid 87. No UXO was found in Grid 88. All recovered UXO was detonated in place by qualified UXO personnel.

2.3.5.4 Table 2.1 summarizes the configuration, sampling methodology, anomalies recorded, anomalies investigated, and OE findings for each grid within OOU6. QuantiTech performed a safety risk assessment for the EE/CA for OOU6 and estimated a maximum UXO density of 1.31 per acre for OOU6 and a probability of exposure of zero to 1/2 per activity per visit.

**Table 2.1**  
**OE/UXO Findings at OOU6, EE/CA Effort**

Grid	Configuration (ft)	Sampling Method	Anomalies Recorded/ Investigated	OE/UXO Findings (quantity in parentheses)
Ordnance Operable Unit 6				
61	Linear	none	372/0	none
62	Linear	none	709/0	none
87	Rectangular	other	218/218	105mm smoke canisters (9), 60mm (4) and 81mm (7), mortar parts, fragments
88	Irregular	other	42/42	fragments

Source: ESE, 1996

### **2.3.6 1995-1996 Evaluation and Mapping**

2.3.6.1 In 1995-1996, ESE obtained an orthophotograph and prepared a geographic information system for the site as part of the development of the evaluation and prioritization of OE removal at former CCATF (ESE, 1996b). The purpose of the assignment was to develop a plan of action that could be used in the future to facilitate the efficient investigation, identification, and removal of suspected OE at the former CCATF with the prediction of the presence and location of OE to be accomplished through the study of historical records and the evaluation of past and current land use at the former CCATF.

2.3.6.2 The initial investigation focused on using historical and current information to identify areas of interest (AOI). These AOIs formed the basis for subsequent evaluations and analyses. Aerial photography and orthophotography, SAR image analysis, and digital elevation models (DEM) were used to identify potential OE (sites) and adjacent properties.

### **2.3.7 1996 Supplemental Archive Search Report (SASR)**

In March 1995, CEHNC authorized ESE to prepare a SASR in an effort to locate possible additional firing, bombing, and strafing ranges at the former CCATF (ESE, 1996c). The following activities were conducted from April through August 1995 as a part of the SASR:

- Searches of national, regional, and local archives;
- Searches of databases including the Department of Defense database-Defense Technical Information Center (DTIC), Lexis, and Nexis;
- Placement of notices in national and local publications;
- Operation of a toll-free telephone number to receive information from persons knowledgeable of past CCATF activities;
- Onsite interviews with the local populace;
- Hosted a Public Open House near the former CCATF; and
- Conducted Windshield Surveys or driveby surveys to locate possible OE sites.

As a result of the SASR, 134 sites were identified as having potential OE contamination.

### **2.3.8 1996 Supplemental Engineering Report**

In October and November 1995, ESE performed a site reconnaissance of each of the 134 sites where a right-of-entry (ROE) was available from the owner(s) (ESE, 1996d). ROEs were available and a site reconnaissance conducted at 97 sites. The reconnaissance consisted of a non-intrusive, magnetometer survey and visual inspection of each site that could be identified. A Final Supplemental Engineering Report was submitted to CEHNC in March 1996.

## **2.4 1996 SITE VISIT AND RECORD SEARCH/REVIEW**

During the period of August 28 and 29, 1996 a site visit was conducted at OOU6. The purpose of the site visit was:

- To visually inspect, photograph, and videotape existing development at OOU6;
- Review the CEHNC scope of work;
- Discuss site logistics, environmental concerns, endangered species, and wetlands issues with the CEHNC and site owner;
- Gather recorded documentation of planned development for the site;
- Establish contacts with local agencies and collect applicable information; and
- Locate the local hospital and fire department and other emergency contacts.

### **2.4.1 Existing Development**

2.4.1.1 OOU6 encompasses all of the property owned by Dr. W. Brownlee Lowry (MD) and portions of properties owned by J. Larry Faulkenberry & Almond Forest Products, Inc., Robert E. Lee, Dr. Glenn L. Scott (MD), Neil Robinette, Timothy M. Chastain, Margie F. Purser, and Milliken & Co. Figure 2.3 provides a property boundary map showing the properties located within OOU6.

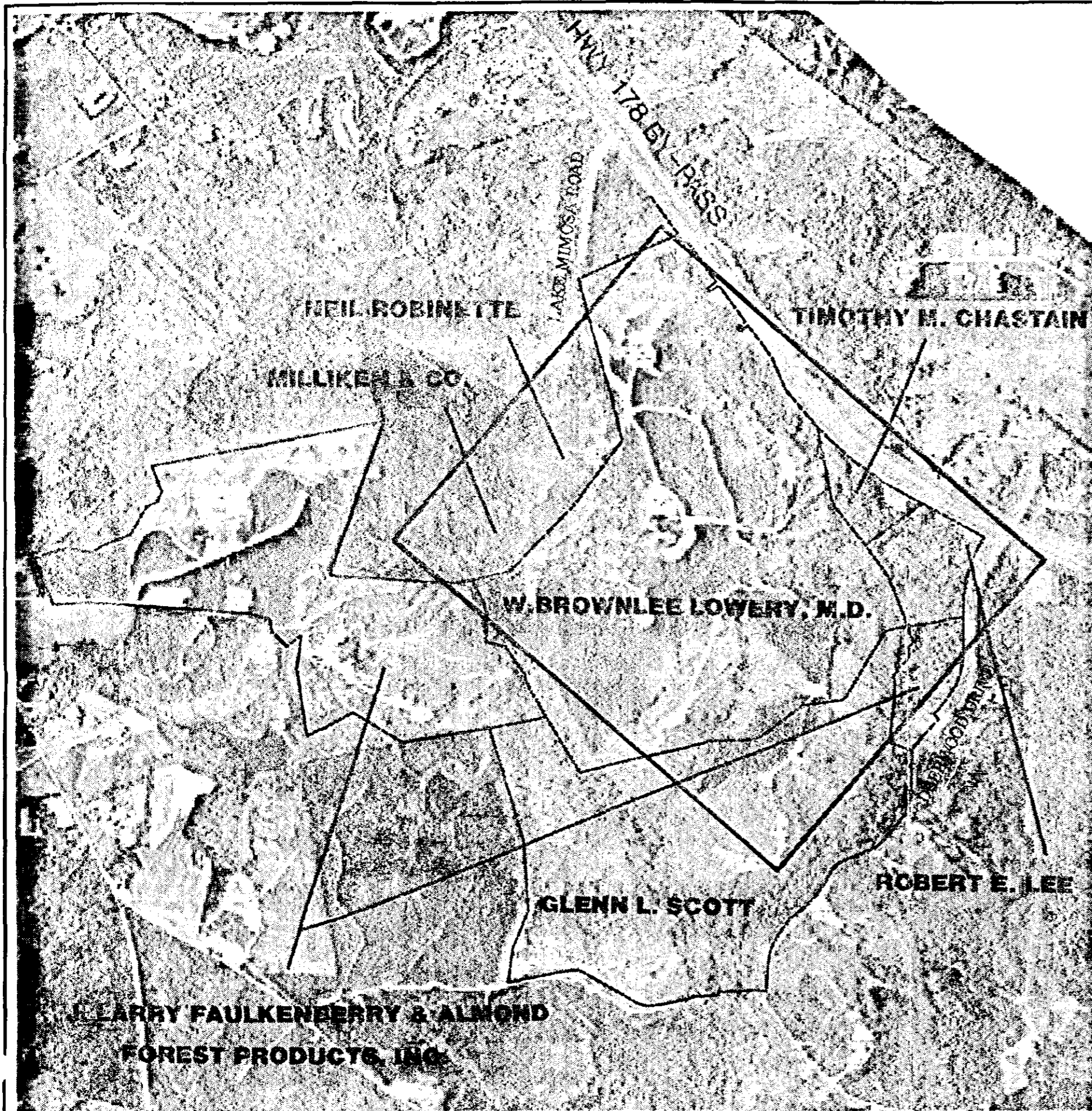
2.4.1.2 On August 28, 1996 OOU6 was found to be heavily vegetated, except in the areas of development on Dr. Lowry's property, such as the Phase I landfill; compost area; site pond; front gate area; roads; magazine storage area; and isolated clearings. Figure 2.4 provides a development map showing existing development in the area of OOU6.



2.4.1.3 The Phase I landfill area (footprint is approximately 3 acres), located in the center of Dr. Lowry's property, is currently in the process of being filled with Class I industrial waste and demolition debris. According to Dr. Lowry, the Phase I landfill area will cover an area of approximately 3 acres at completion. In addition, Dr. Lowry stated that once the Phase I landfill area is filled, his landfill operation will move into the area of the site known as the Phase II landfill. The Phase II landfill operation will be located on the east side of the property. Dr. Lowry stated his future plans are to fill the Phase II landfill area and move westward towards the Phase I landfill in subsequent phases.

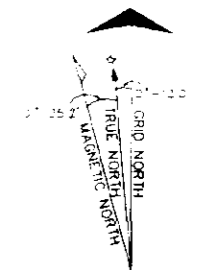
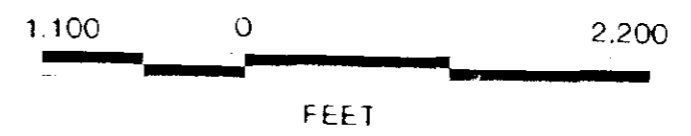
2.4.1.4 A compost area (Compost Site A) is located south of the Phase I landfill area. Dr. Lowry stated that his plans are to expand the compost operations within the immediate area. In addition, Dr. Lowry plans on building another compost facility east of Compost Site A.

2.4.1.5 A site pond is currently under development in the area immediately southwest of the Phase I landfill. The construction is expected to disturb approximately 5 acres of land.



FIGURE 2.3  
 PROPERTY BOUNDARIES LOCATED  
 WITHIN OOU6  
 ORDNANCE OPERABLE UNIT (OOU) 6  
 FORMER CAMP CROFT  
 ARMY TRAINING FACILITY  
 SPARTANBURG, SC  
 OE ENGINEERING DESIGN



 BOUNDARY OF OOU6  
 PROPERTY BOUNDARIES



NOTE: MAP ATTRIBUTES INFERRED FROM ELLIPSOID BASE MAPS PROVIDED BY CEHNC AND INTERPRETATION FROM SOIL CONSERVATION MAPS AND 1994 AERIAL PHOTOGRAPHS.

DESIGN	CHECK	 U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS HUNTSVILLE CENTER
PREPARED BY: PARSONS E.S.		
PRINCIPAL SUPERVISOR		 <b>PARSONS ENGINEERING SCIENCE, INC.</b>
REVIEWED:		
DESIGN MANAGER		SHEET NO. <b>B</b>
RECOMMENDED:		SCALE:
DATE:		SHEET NO.

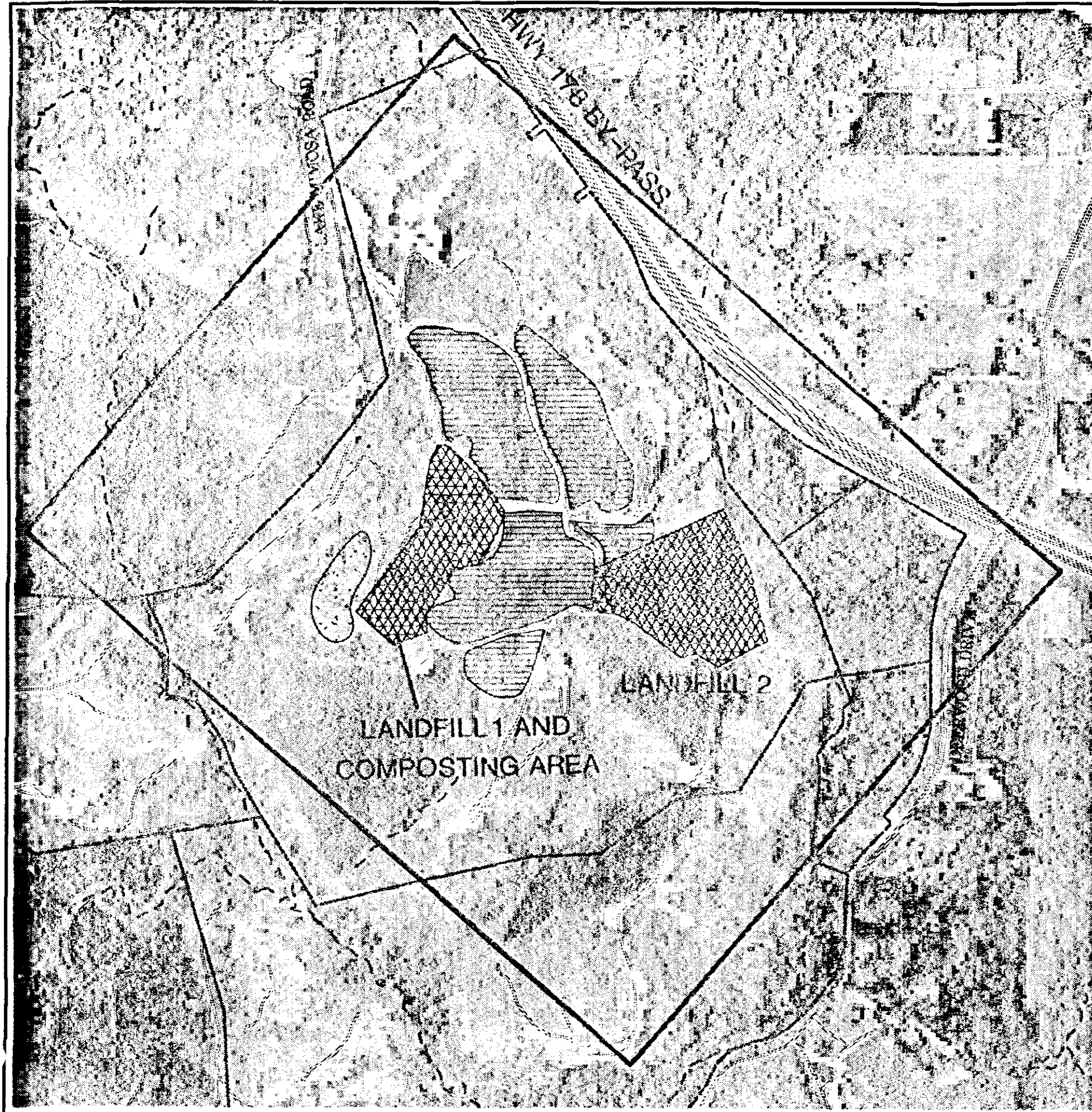
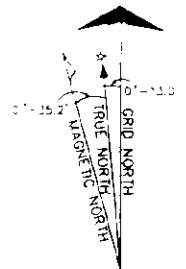
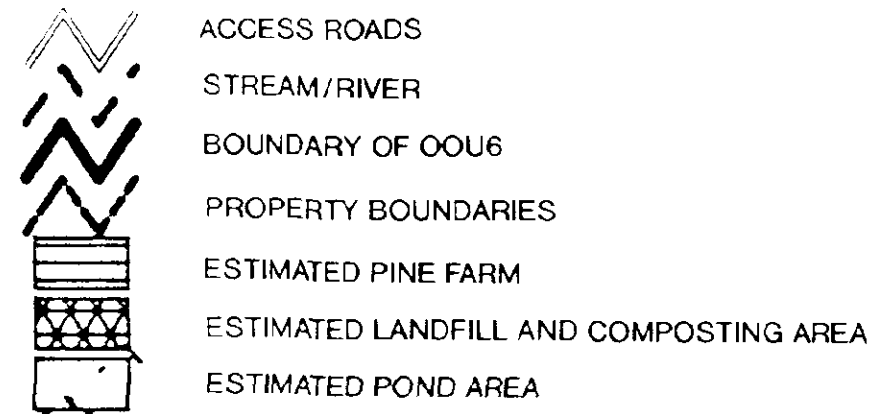




FIGURE 2.4  
 SITE DEVELOPEMENT MAP  
 ORDNANCE OPERABLE UNIT (OOU) 6  
 FORMER CAMP CROFT  
 ARMY TRAINING FACILITY  
 SPARTANBURG, SC  
 OE ENGINEERING DESIGN



NOTE: MAP A UNITS INFERRED FROM ENGINEERING BASE MAPS PROVIDED BY CEHNC AND INTERPRETATION FROM SOIL CONSERVATION MAPS AND 1994 AERIAL PHOTOGRAPHS.

DESIGN	DATE	 J.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS HUNTSVILLE CENTER	
PREPARED BY: PARSONS E.S.		 <b>PARSONS ENGINEERING SCIENCE, INC.</b>	
PRINCIPAL OFFICER		SIZE	PLATE
REVIEWED:		B	
DESIGN MANAGER		SCALE	
RECOMMENDED:			
CHIEF, MIL. PRDG. & PROJ. MGMT. BRANCH			
DATE:			



2.4.1.6 Dr. Lowry stated that a storage barn is planned to be located next to the magazine storage area. During the site visit, clearing activities were noted to have already begun.

2.4.1.7 Pine farm areas are located throughout several areas on Dr. Lowry's property. These pine farm areas are generally located near the landfill and composting areas.

2.4.1.8 Based on a visual inspection of OOU6, it appeared that there is no existing development on the adjacent properties within OOU6, except for some additional pine farms located south of Dr. Lowry's property.

## **2.4.2 Proposed Development**

2.4.2.1 On August 29, 1996 Parsons ES visited the Spartanburg County Planning Department regarding the planned development of OOU6. Discussions were conducted with Mr. Dale Harvey, Department Manager. Mr. Harvey stated that his department issued the permits for the landfill and compost activities at Dr. Lowry's property. Parsons ES received a copy of the compost facility, Class I landfill, and the construction/demolition debris permits, issued in April 1994.

2.4.2.2 Mr. Harvey provided Parsons ES with a copy of the development plans for Dr. Lowry's property. These plans indicated a minimum of four landfill expansions (phases) which are shown to progress from the Phase II area westward towards the Phase I area. The Phase I landfill will cover an area of 3.1 acres and the Phase II landfill will cover an area of 4.2 acres. Two additional phases (Phase III and IV) are shown on the development drawings as possible expansion areas.

2.4.2.3 The development plans provided locations of the compost areas (Compost Sites A and B). Compost Site A is shown covering an area of 3 acres and Compost Site B is shown covering an area of 4.6 acres. During the site visit, it was noted that Compost Site A has been constructed and is currently in operation.

2.4.2.4 The development plans also provided cross-sections and details with locations of proposed roads, diversion dikes, sediment basins, and an equipment shelter. During the site visit, it was noted that some of the site access roads have been completed.

2.4.2.5 Mr. Harvey stated that a grading permit would be required for all land disturbing activities, such as the excavation of soils and the building of roads (excluding waste disposal or composting) if the land disturbance was two acres in size or greater. The grading permit would require the development of stormwater runoff and sedimentation plans. Areas that are impacted, which are less than two acres in size, only require notification.

2.4.2.6 Mr. Harvey was unaware of the construction of the site pond on Dr. Lowry's property. There was no indication of any existing grading permit on file for the site pond.

2.4.2.7 Proposed development on adjacent properties has not been determined, but will be investigated prior to the beginning of site characterization work. Figure 2.4 provides a development map that includes proposed development in the area of OOU6.

## **3.0 PROJECT PLAN**

### **3.1 PROJECT TECHNICAL AND AND COST MANAGEMENT PLAN**

The Project Technical and Management Plan defines the project objectives, identifies key personnel and their responsibilities, defines project communications and reporting requirements, and outlines a schedule for implementing the project.

#### **3.1.1 Project Objectives**

The objective of this report is to perform an Engineering Design for OOU6. To accomplish the objective, Site characterization including OE/UXO sampling and excavation and removal of any OE/UXO discovered during the sampling efforts will be conducted within OOU6 boundaries. Sufficient information will be collected to prepare a design package that recommends areas/sectors to be remediated and depths of remediation.

#### **3.1.2 Project Organization**

The project team consists of the USACE, Charleston District life cycle manager, the CEHNC technical manager, and the Parsons Engineering Science team. Figure 3.1 is a project organization chart showing key personnel and project organization details.

#### **3.1.3 Technical Team Members**

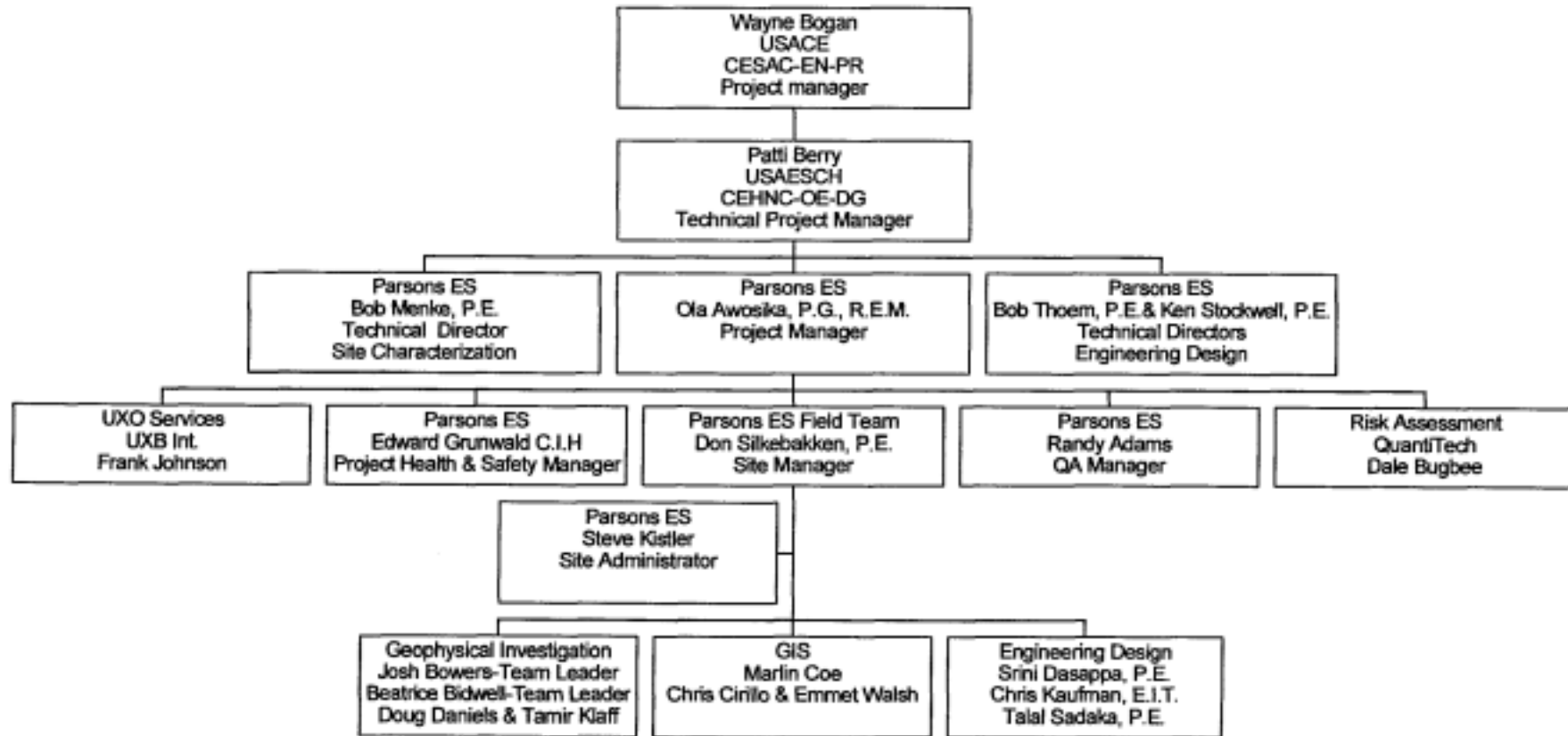
3.1.3.1 CESAC is the overall project manager of the day-to-day activities, including public relations at the site. CEHNC is responsible for the technical management at the site.

3.1.3.2 Parsons ES. Parsons ES will provide overall engineering support and services for this project. Parsons ES will provide personnel to perform the geophysical survey of OOU6. Parsons ES will also provide the GIS services including incorporation of the survey data, geophysical investigation data, and intrusive investigation data. Parsons ES is under contract to CEHNC, whose project manager directs all work to be performed by Parsons ES and its subcontractors. CEHNC will provide existing GIS-CADD maps (aerial photography and planimetric mapping of the CCATF) in electronic format. Parsons ES will derive site specific GIS information for OOU6 from these maps.

3.1.3.3 UXB International, Inc. (UXB) will perform surface survey of the selected grid location, grid brush location, and perform intrusive investigations on anomalies identified during the geophysical survey performed by Parsons ES. UXB is under contract to Parsons ES.

3.1.3.4 QuantiTech will provide all risk assessment modeling using the government furnished OE-Cert. QuantiTech is under contract to Parsons ES.

FIGURE 3.1  
**TECHNICAL TEAM**  
**ENGINEERING DESIGN FOR OOU6**  
**SPARTANBURG, SOUTH CAROLINA**



3-2

### **3.1.4 Project Personnel**

#### **3.1.4.1 Project Manager**

3.1.4.1.1 The Parsons ES project manager is responsible for communicating with CEHNC through the project manager, including all directions received from managing all aspects of the project, overseeing the overall performance of all individuals on the project team, coordinating all contract and subcontract work, and resolving problems. The project manager is also responsible for controlling the contractual cost and schedule targets. The project manager will coordinate the implementation of Site characterization activities, and implementation of the design effort including preparation of an executive summary and design package for OOU6.

3.1.4.1.2 The project manager will interface directly with subcontractor project managers to keep subcontractor teams advised of scope of work, schedule, and budgets. The project manager is also responsible for ensuring that the subcontractor costs are within budget and schedule commitments are achieved.

#### **3.1.4.2 Site Manager**

The Parsons ES site manager is responsible for managing and executing project field operations. Daily duties will include scheduling and including a daily tailgate safety meeting, scheduling and coordinating subcontractor field team activities, and submitting a daily activities report to the Parsons ES project manager. Site manager duties will also include enforcing compliance with the SSHP and general daily field operating procedures. The site manager will also be responsible for monitoring the execution of project field activities by subcontractors. The site manager will report all QC failures and corrective actions to the project manager and quality assurance (QA) manager.

#### **3.1.4.3 Site Administrator**

The site administrator will be responsible for tracking and reporting daily field financial and schedule activities. The site administrator will report daily activities directly to the Parsons ES project manager and site manager. Additional site administrator duties will include inventorying and ordering field equipment and expendable items, staff logistics, daily report preparation (including compilation of data acquired on a daily basis) , and daily contact and status update reports to the Parsons ES project manager.

#### **3.1.4.4 QA Manager**

The QA manager is independent of the project team and is responsible for the following:

- Reviewing all quality assurance/quality control (QA/QC) procedures to be used in the project.
- Reviewing subcontractor system audits and QC procedures to ensure compliance with the project QC guidelines in the WP.

- Performing a quality review to ensure the quality of deliverables from the project team to CEHNC.
- Interaction and communication with subcontractor and CEHNC QA personnel.

### **3.1.5 Subcontractor Management**

3.1.5.1 Parsons ES is the prime contractor on this project. All other team members, UXB and QuantiTech, will report to Parsons ES. Subcontractors will provide any and all supplies, equipment, and personnel necessary to perform the surveys and other field work outlined in this work plan. Prior to initiating field work, the subcontractors will provide Parsons ES with a work duty chart outlining the responsibility of each team member. The subcontractors will also provide a Field Supervisor that will act as a point of contact on the job site. A Site Specific Health and Safety (SSHP) plan is required by the subcontractors who will be performing work in the field.

3.1.5.2 Parsons ES anticipates using two subcontractors to complete this project successfully. Survey of grids, QC of the geophysical surveys, excavation of geophysical anomalies, and UXO venting/destruction and disposal will be performed by UXB. A second subcontractor, QuantiTech, will provide OE risk assessment services.

3.1.5.3 Daily supervision of subcontractor field activity will be the responsibility of the Parsons ES site manager, with the Parsons ES project manager providing overall supervision. Subcontractors will adhere to all applicable safety and health and QC requirements. The project SSHP is appended to this WP (Appendix D) and specifies individual requirements for OE/UXO safety and health referenced in the SOW and other CEHNC health and safety requirements.

### **3.1.6 UXO Personnel Qualifications**

UXO personnel required for this project will include EOD-qualified UXO supervisors and specialists, all of whom possess a minimum of 3 years of relevant U.S. military EOD experience. Non-UXO qualified personnel will not perform any handling of OE/UXO at any time or under any conditions. Any additional personnel who may be assigned to the project field team will meet the qualifications required in the SOW.

### **3.1.7 UXO Subcontractor Personnel**

The following paragraphs describe the specific responsibilities of UXO subcontract personnel assigned to the project team.

#### **3.1.7.1 UXO Project Manager**

The UXO project manager is responsible for communication with and execution of all instructions received from the Parsons ES project manager, managing all UXO subcontract requirements of the project, overseeing the performance of all individuals on the UXO project team, coordinating contract work, and overseeing UXO-specific task identification and resolutions. The UXO project manager is also responsible for achieving the subcontract cost and schedule requirements. The UXO project manager

will coordinate the preparation of detailed work order specifications and schedules as required by the Parsons ES project manager. The UXO manager will also schedule field efforts, identify the UXO technical and site personnel to accomplish the specific tasks as defined in the WP, implement project quality and safety procedures, and direct UXO personnel to achieve successful and timely completion of the WP tasks. The UXO project manager will interface directly with the Parsons ES project manager to keep him advised of progress and to promptly implement approved and authorized changes to ongoing work orders, as necessary.

#### **3.1.7.2 Senior UXO Supervisor**

The Senior UXO Supervisor is UXB's most senior UXO-qualified on-site representative. The Senior UXO Supervisor will monitor all aspects of the field project, including subcontractor site activities, to ensure efficient performance of the approved WP and SSHP. The Senior UXO Supervisor has the authority to temporarily stop work to correct safety deficiencies. The Senior UXO Supervisor makes daily progress reports to the Contract Project Manager (CPM) and is also responsible for monitoring on-site project expenditures, finances, and equipment use and maintenance. Internally, the Senior UXO Supervisor reports directly to the Project Manager. The Senior UXO Supervisor meets the USACE requirements as a graduate of the U.S. Naval School of Explosive Ordnance Disposal; 40-hour and 8-hour Hazardous Waste Site Worker; Supervisor courses in accordance with 29 CFR 1910.120; and has at least 15 years of EOD experience, 10 of which have been in supervisory EOD positions. Three years of documented UXO contractor experience may be substituted for 3 years of active duty EOD experience. The Senior UXO Supervisor is directly responsible for:

- Project site work;
- Coordination with subcontractor activities/work on-site;
- Compliance with all safety and work related SOPs, including the SSHP;
- Meeting schedule time lines and budgetary control amounts;
- Compliance with all federal and state regulations;
- Coordination with the Site Safety Officer to ensure all site safety considerations are enforced; and
- Equipment and on-site vehicles.

#### **3.1.7.3 UXO Site Safety Officer**

The UXB Site Safety Officer reports to the CPM and UXB's Quality Control/Compliance Officer. The Site Safety Officer meets the same requirements as the UXO Supervisor and is responsible for the following:

- Coordinating and observing site operations;
- Enforcing the project SSHP (a copy will be provided in the office trailer);
- Enforcing the Accident Prevention Plan (The APP will be located in the office trailer);

- Explosive safety;
- Fire prevention;
- Industrial safety;
- Conducting daily safety audits and assures equipment calibrations are accomplished in accordance with factory specifications;
- Environmental safety;
- Chemical material surety and safety;
- UXB Site Employee Medical Monitoring Program;
- Daily safety briefings;
- Visitor access and entry control to the project site;
- Coordinating with local emergency response agencies;
- Complying with CFR, OSHA, and COE safety protocols;
- Complying with specific state and local ordinances, as required;
- Daily inspection of emergency equipment;
- Maintaining the site emergency vehicle and supplies; and
- Monitoring activities, reports, and document deviations from established procedures.

#### **3.1.7.4 UXO Supervisor**

The UXO Supervisor takes daily direction from and reports directly to the Senior UXO Supervisor. The UXO Supervisor directs the action of an OE team in accordance with the approved WP and the daily verbal direction of the Senior UXO Supervisor. The UXO Supervisor maintains continuous communication with the Senior UXO Supervisor during the performance of OE operations and has the authority to temporarily stop the performance of work to resolve and correct and unsafe condition. The UXO Supervisor is a graduate of the U.S. Naval Explosive Ordnance Disposal School, 40-hour and 8-hour Hazardous Waste Site Worker, and Site Supervisor courses in accordance with 29 CFR 1910.120; the UXO Supervisor has at least 10 years EOD/UXO experience, 3 years of which must be active duty military EOD experience. He may also serve concurrently as the Site Safety Officer. Duties/responsibilities include:

- Supervision of the direct OE field operations for assigned tasks;
- Task/team compliance with all safety and work related SOPs, including SSHP;
- Meeting schedules on task/team time lines and budgetary control amounts;
- Coordination with the Site Safety Officer to ensure that all site safety considerations are enforced;
- Task/team assigned equipment and vehicles; and
- Supervision of assigned personnel.



### **3.1.7.5 Quality Control Specialist**

UXB's Quality Control Specialist (QCS) monitors a project's performance in accordance with safety protocols and technical compliance. The QCS is responsible for the oversight and implementation of the UXB QC Program. The QCS coordinates with the CPM and assists him during the development of work/safety plans, site remediation, and reporting. The CPM monitors each contract milestone to ensure contract deliverables are in accordance with contract disciplines, standards and UXB corporate policies. The QCS provides guidance, as required, and performs scheduled reviews of documentation (QC reports, field progress reports, and technical findings). The QCS ultimately reports directly to CPM and the Corporate Quality Control/Compliance Officer, thereby assuring QC reporting responsibilities on the CPM, the Project Management Team Coordinator, as well as other staff and officer positions. UXB has structured this position to assure that UXB's Senior Management is informed of any problems or situations which may affect safety, quality, manner, or style of work performed by UXB. The QCS is directed to work with and coordinate all activities with the client's QA. The QCS shall have the same minimum prerequisite experience requirements as the UXO Supervisor.

### **3.1.7.6 UXO Specialist**

Under the direct supervision of the UXO Supervisor, the UXO Specialist is responsible for the safe and efficient performance of OE field operations, including the location, identification, removal and disposal of UXO in accordance with the approved WP and SSHP. The UXO Specialist is authorized to temporarily stop the performance of work to immediately alert the UXO Supervisor of an unsafe condition. Internally, the UXO Specialist reports to the UXO Supervisor. The UXO Specialist is a graduate of the U.S. Naval School of Explosive Ordnance Disposal and a 40-hour Hazardous Waste Site Worker course, in accordance with 29 CFR 1910.120. The UXO Specialist has more than 3 years of active duty military EOD experience, or was an UXO Assistant with at least 5 years documented military EOD and contractor UXO experience.

### **3.1.8 Logistics**

3.1.8.1 Logistics. Parsons ES will establish a field office (trailer) at OOU6 for use by the site manager, field team and the UXO subcontractor. In addition, storage space for securing equipment and field supplies will be provided by Parsons ES. Parsons ES will establish a calibration strip for daily equipment calibrations.

3.1.8.2 Job site considerations. Parsons ES and all subcontractors must conform to job site security requirements and other safety requirements concerning site operations. Parsons ES will coordinate field operations with Dr. Lowry to avoid disruption of site activities.

### **3.1.9 Project Communication and Reports**

3.1.9.1 All aspects of importance to the administration of the contract must be substantiated by permanent records, such as written correspondence, notes, and photographs. It is essential to summarize important nonwritten communications with notes covering conferences, telephone calls, and discussions, giving the date, location, parties involved, and important aspects discussed. Written correspondence is the most deliberate, as well as the most important, of the three general types of contractual communication (i.e., person to person, telephone calls, and written correspondence). All incoming correspondence from the Corps that requires a reply must be responded to within 5 working days in one of the following ways:

- Reply in full;
- Interim reply (stating date by which full answer can be expected); and
- Acknowledgment of receipt.

3.1.9.2 The following communications will be documented in a chronological communications log maintained by the Parsons ES project manager:

- Each and every occasion that OE/UXO is encountered;
- When work is stopped for safety reasons;
- Health and safety violations; and
- Personnel changes and reason for changes.

3.1.9.3 Office Hours/Holidays. The staff will work 7:30 a.m. to 4:30 p.m. Monday-Friday, except Parsons ES-observed holidays. Typically, CEHNC would not have any field work in progress during the week before the Christmas Holidays. The current schedule indicates the field work would occur through December 20. Therefore, CEHNC will make necessary plans to accommodate this work. The subcontractors will schedule personnel to provide adequate coverage of their operations. Such scheduling will provide for a 40-hour work week. Work may be scheduled other than these times to accommodate work in areas where site operations are heavy during the weekdays (for example, landfill operations).

### **3.1.10 The Organization, Name and Addresses**

Key technical contacts on this Delivery Order No. 0009 are provided in Table 3.1.

**Table 3.1**  
**Key Technical Contacts**  
**Engineering Design - Ordnance Operable Unit (OOU)6**  
**Spartanburg, South Carolina**

Organization	Name	Telephone/FAX
US Army Engineering Charleston District CESAC-EN-PR 334 Meeting Street PO Box 919 Charleston, SC 29402-0919	Mr. Wayne Bogan Project Manager	(803) 727-4366 (803) 727-4260 (FAX)
US Army Engineer Center Huntsville CEHNC-OE-DG 4820 University Square Huntsville, AL 35816-1822	Ms. Patti Berry Project Manager	(205) 895-1525 (205) 895-1378 (FAX)
Parsons Engineering Science 57 Executive Park South NE Suite 500 Atlanta, GA 30329	Mr. Ola Awosika Project Manager	(404) 235-2371 (404) 235-2500 (FAX)
Parsons Engineering Science 10521 Rosehaven Street Fairfax, VA 22030	Mr. Robert Menke Technical Director	(703) 218-6288 (703) 591-1305 (FAX)
UXB International, Inc. 21641 Beaumeade Circle Ashburn, VA 22011	Mr. Frank Johnson	(703) 724-9600 (703) 724-3528 (FAX)
QuantiTech 6703 Odyssey Drive Suite 304 Huntsville, AL 35806	Mr. Dale Bugbee	(205) 922-9650 (205) 922-9655 (FAX)

### 3.1.11 Project Work Schedule

3.1.11.1 The project schedule was initiated with the Notice to Proceed date of September 30, 1996, and ends with the technical completion of the Final Design package on July 22, 1997. The period of performance of the overall project ends August 22, 1997. The present overall schedule is presented chronologically with major milestones in Appendix B to this WP.

3.1.11.2 A milestone that could potentially alter this schedule is the receipt of rights-of-entry (entry permission) for several proposed sampling sites (grids) outside Dr. Lowry's property but within OOU6. To maintain the project schedule, these rights-of-entry must be received in a timely manner. The USACE, Charleston District will be responsible for obtaining rights-of-entry.

3.1.11.3 The Parsons ES site manager, senior UXO supervisor, and UXO SSHO will be onsite during the Site Characterization sampling, estimated to be 7 weeks. The site manager will provide overall management and supervision of multidiscipline teams composed of the following personnel:

- Senior UXO Supervisor;
- A UXO Safety SSHO;
- 2, two-man crews (each made up of a UXO technician and a laborer) include a brush hog operator and a UXO escort crew to perform brush clearance;
- Two land survey teams (each consisting of a surveyor and a rodman) will be used to locate and mark grid corners. The rodman will be UXO qualified, to eliminate the need for an additional UXO escort for the surveyor;
- Two, 2-man geophysical teams to perform EM-61 survey, each with UXO escort; and
- Two, 2-man UXO excavation teams will provide the intrusive investigation activities.

3.1.11.4 It is assumed that 300, 50 x 50 ft grids (approximately 18 acres) will be investigated and 70% of these grids will require brush clearance. The proposed grid locations are depicted in the Proposed Grid Investigation Map (Figure 3.2) and Site Characterization Map (Figure 3.3). We have estimated thirteen days for clearance of 210 (50 by 50 ft) grids. The survey effort will take 13 days to complete. The geophysical investigation effort and the intrusive effort will each take 15 days to complete. The geophysical investigation and the intrusive efforts are based on a production rate of 10 grids per team per day. It is assumed that 80%, or 240 grids will contain contacts (anomalies) which would require intrusive investigation. The remaining 60 grids are assumed to contain no anomalies. The geophysical investigation will start 5 days ahead of the intrusive investigation team. The work week will consist of five 8-hour days not to exceed 40 hours per work week (Monday-Sunday).

3.1.11.5 This estimate is based on an average and will depend on the degree of clearing required and the number of anomalies excavated. The number and location of anomalies to be excavated will be established in the field as the EM-61 surveys are completed.

3.1.11.6 Parsons ES and the UXO subcontractor will only work near the landfills over the weekend when landfill operations are not active. The landfills will be closed when intrusive investigation work is in progress within safety distance of landfill. Parsons ES will plan to investigate grids near the landfills in a manner that minimizes the time required for closing the landfill. Current schedule indicates intrusive investigation will be performed in January therefore, arrangement can be made in December with Dr. Lowery to close the landfill if necessary in January.

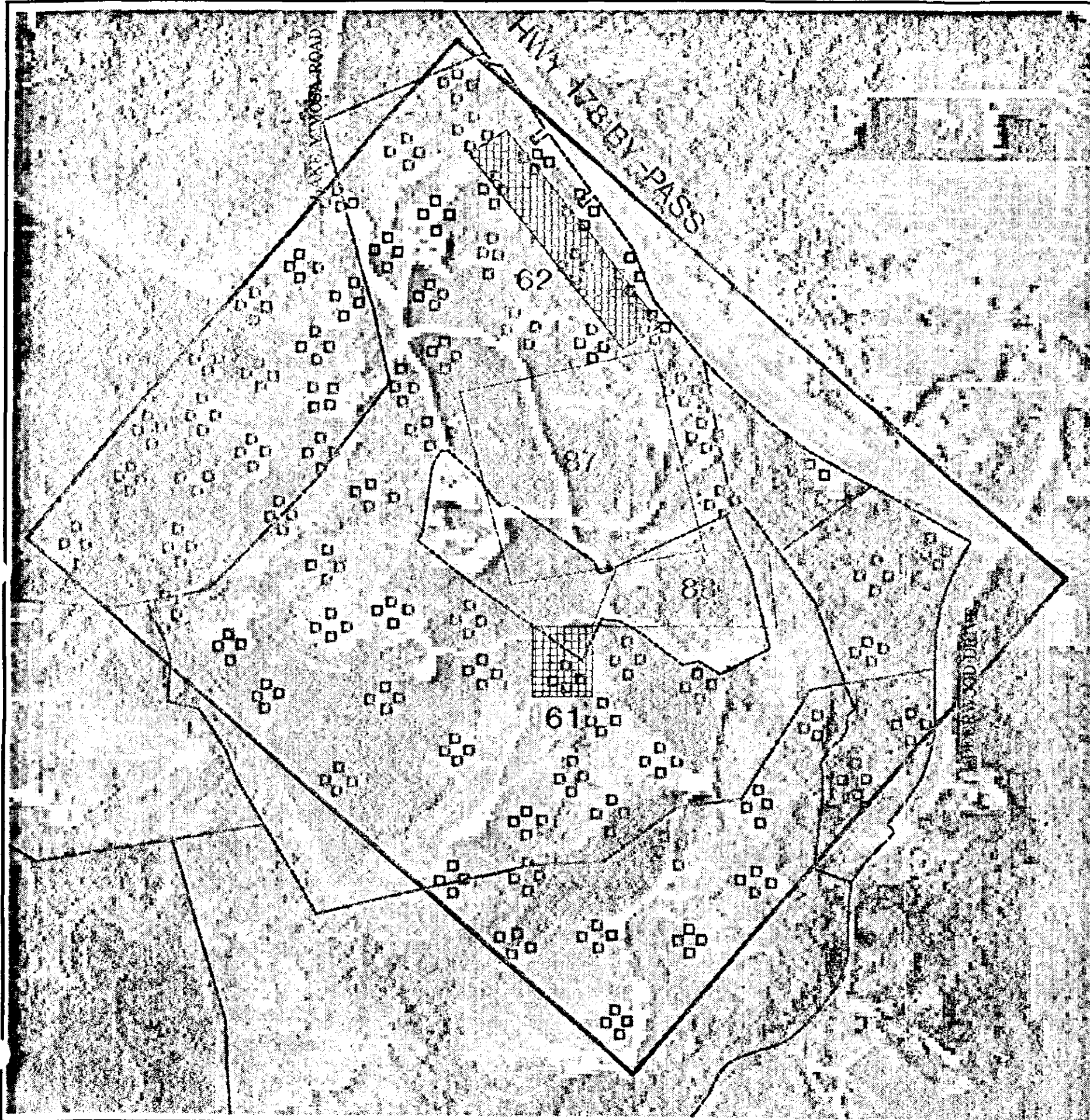






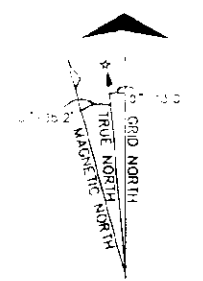




FIGURE 3.2  
 PROPOSED GRID INVESTIGATION MAP  
 ORDNANCE OPERABLE UNIT (OOU) 6  
 FORMER CAMP CROFT  
 ARMY TRAINING FACILITY  
 SPARTANBURG, SC  
 OE ENGINEERING DESIGN

-  GEOPHYSICAL SURVEY SAMPLING GRID
-  ESTIMATED TCRA AREA
-  BOUNDARY OF OOU6
-  PROPERTY BOUNDARIES
-  PREVIOUS EE/CA GRIDS (REMEDIATED)
-  PREVIOUS EE/CA GRIDS (INVESTIGATED)



NOTE: MAP AT THIS EB TRANSFERRED FROM ALL PREVIOUS PHASE MAPS PROVIDED BY CEHNC

DESIGN	CHECK	 U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS HUNTSVILLE CENTER			
PREPARED BY: PARSONS E.S.					
PRINCIPAL OF FIRM		 <b>PARSONS ENGINEERING SCIENCE, INC.</b>			
REVIEWED:					
DESIGN MANAGER		SIZE	SOLUTION NO.	FILE NO.	PLATE
RECOMMENDED:		B			
CHIEF, MIL. PROJ. & PROJ. MGMT. BRANCH		SCALE:			
DATE:					S-11

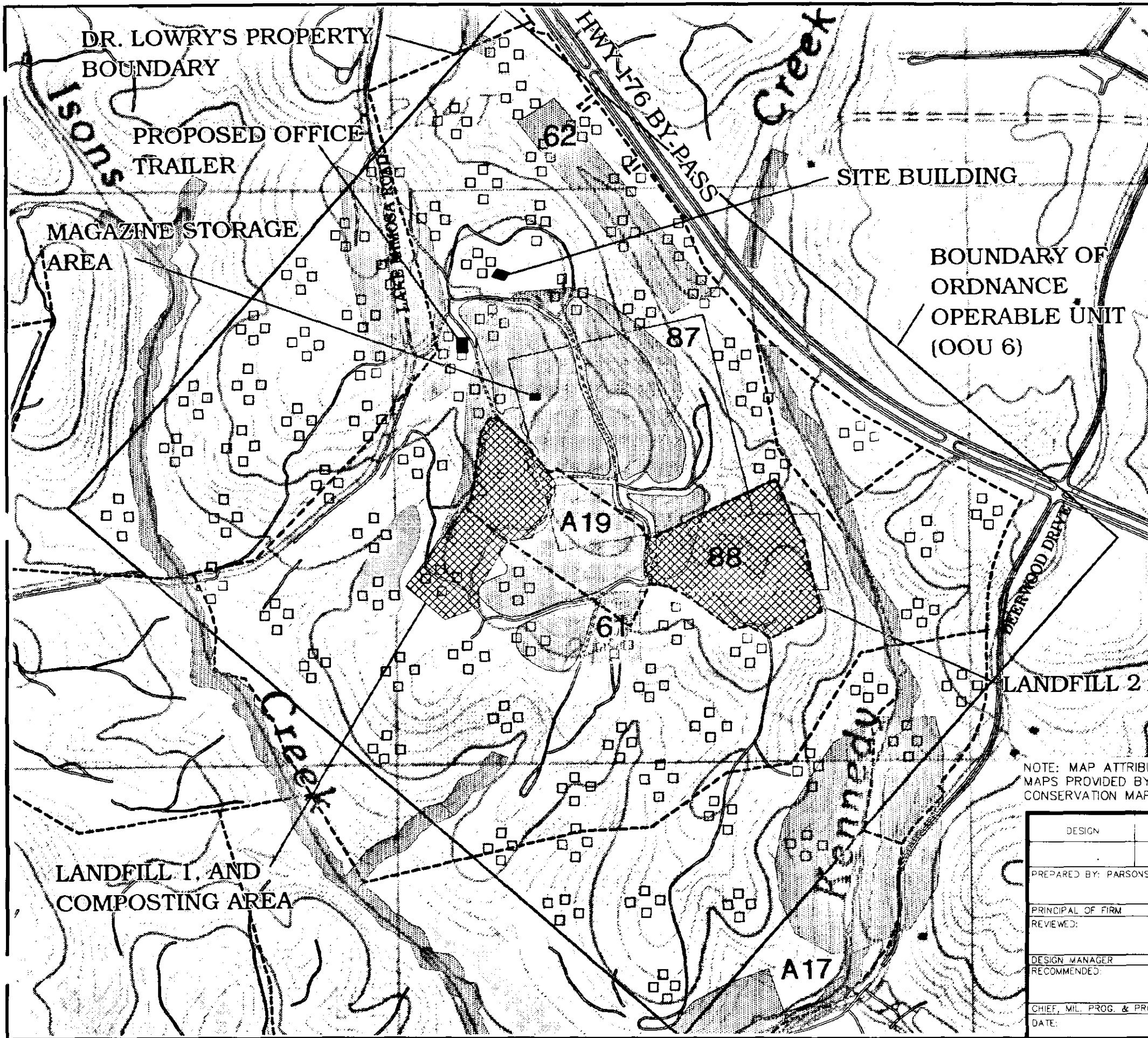


FIGURE 3.3  
 SITE CHARACTERIZATION MAP  
 ORDNANCE OPERABLE UNIT (OOU) 6  
 FORMER CAMP CROFT  
 ARMY TRAINING FACILITY  
 SPARTANBURG, SC  
 OE ENGINEERING DESIGN

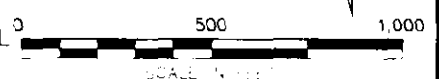
**LEGEND**

- STREAM/RIVER
- GEOPHYSICAL SURVEY SAMPLING GRID

**SECTORS**

- POTENTIAL OE SITE A17 (IDENTIFIED FROM AERIAL PHOTOGRAPHS)
- POTENTIAL OE SITE A19 (IDENTIFIED FROM AERIAL PHOTOGRAPHS)
- PREVIOUS EE/CA SAMPLING GRIDS (REMEDIATED)
- PREVIOUS EE/CA SAMPLING GRIDS (INVESTIGATED)
- TCRA AREA
- ESTIMATED PINE FARM
- ESTIMATED LANDFILL AREA 1, COMPOST AREA AND LANDFILL 2
- ESTIMATED WETLAND AREAS
- ACCESS ROADS AND SITE OPERATIONS BUILDING
- NATURAL SPARSE VEGETATION COVER WITH CLEARINGS

NOTE: MAP ATTRIBUTES INFERRED FROM ELECTRONIC BASE MAPS PROVIDED BY CEHNC AND INTERPRETATION FROM SOIL CONSERVATION MAPS AND 1994 AERIAL PHOTOGRAPHS.



DESIGN	CHECK		U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS HUNTSVILLE CENTER		
PREPARED BY: PARSONS E.S.				PARSONS ENGINEERING SCIENCE, INC.	
PRINCIPAL OF FIRM REVIEWED:		SIZE		SOLICITATION NO.	FILE NO.
DESIGN MANAGER RECOMMENDED:		B			
CHIEF, MIL. PROG. & PROJ. MGMT. BRANCH		SCALE:		SHEET	
DATE:					

### **3.1.12 Project Management**

Project management activities will occur frequently throughout the project period. These activities will include monthly progress reports, periodic project meetings, and other non-specified activities.

### **3.1.13 Project Deliverables**

Project deliverables will meet the schedule requirements of the project and will be prepared in the format indicated in the SOW. Major deliverables for the project are shown in the project schedule (Appendix B). Deliverables will include VHS videotapes and photographs where required. Deliverables will receive thorough internal Parsons ES and external USACE QC reviews to ensure correctness and provide necessary oversight.

#### **3.1.13.1 Sampling Data**

Sampling data will be compiled daily onsite on a personal computer. All data compilation and tabulation will be in accordance with the approved Data Management Plan incorporated into this WP. At the completion of field activities, sampling data will be input into the Engineering Design process as the OE/UXO site database. VHS video and photographic records of field activities will also be obtained, as appropriate.

#### **3.1.13.2 Sampling Data for SRA**

During sampling activities, sampling data will be compiled in a format specified by the CEHNC for input into a CEHNC SRA model. The model output will then be input into the design process to assist in determining appropriate remedial actions at OOU6.

#### **3.1.13.3 Engineering Design Package**

Parsons ES will prepare a single Design Package that summarizes previous site work and documents the work performed during the site characterization effort under this delivery order. The report will describe field activities (clearing, surveys, excavation, disposal, etc.) performed at the site, the nature and extent of anomalies found, all materials encountered during surface and subsurface sweeps/clearance, remedial alternatives developed and analyzed for removal action, technical comparison and cost analysis for remedial alternatives, and recommendations for removal actions. The design package will include an Executive Summary, Design Report, Specifications, Drawings and a detailed Cost Estimate.

## **3.2 OVERALL PROJECT APPROACH FOR ENGINEERING DESIGN**

3.2.1 The Engineering Design for OOU6 will be performed in accordance with the CEHNC SOW. All Engineering Design activities will also be in accordance with requirements of the NCP for NTCRAs [40 Code of Federal Regulations (CFR) 300.415], specified in the EPA guidance document Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (EPA, 1993), and specific requirements of the U.S. Army for Engineering Design activities at DERP FUDS.

3.2.2 All Engineering Design work will be under the funding and administrative authority of CEHNC, as the responsible party under authority of the NCP and the CERCLA. Under this authority, the Charleston District will issue all regulatory and public notice statements and documents required by the relevant statutes and regulations and will conduct all public hearings or meetings required by those same statutory and regulatory authorities.

3.2.3 Specific tasks required to complete the Engineering Design process are described in the following sections of this Work Plan.

### **3.3 SCOPE OF WORK BY TASK**

The scope of work for this delivery order requires completion of five specific tasks to implement the engineering design for OOU6.

Task 1 — Prepare Work Plan.

Task 2 — Perform Site Characterization.

Task 3 — Location Surveying and Mapping.

Task 4 — Prepare Design Package.

Task 5 — Project Meetings.

#### **3.3.1 Task 1 - Prepare Site Specific Work Plan**

This task requires Parsons ES to prepare and submit a work plan to conduct the Engineering Design at OOU6. The statement of work requires Parsons ES to use the existing Draft Work Plan prepared for the EE/CA effort at CCATF by ESE, to the maximum extent possible in the development of the work plan for OOU6. The work plan will include the following sub-plans:

- UXO Operational Plan
- Site Specific Safety and Health Plan (SSHP)
- Equipment Plan (EP)
- Location Survey Mapping Plan
- Environmental protection Plan
- Quality Control Plan
- Work, Data, and Cost Management Plan
- Technical and Management Plan
- Regulatory Compliance Plan (RCP)
- Subcontract Management Plan
- Scrap Waste Disposal Plan



### **3.3.2 Task 2 - Site characterization**

OOU6 will be characterized on the basis of the work described in the work plan. Specifically, site characterization effort will include:

- Establishment of an Investigation Grid;
- Geophysical Investigation;
- Intrusive Investigation; and
- UXO Destruction.

#### **3.3.2.1 Establishment of an Investigation Grid**

3.3.2.1.1 A grid system depicting sampling location for the geophysical investigation will be established at OOU6 to include areas of interest. It is estimated that no more than 300 grids, 50 x 50 ft in dimension, totaling no more than 18 acres will be investigated (Figures 3.2 and 3.3). The location of each of these grids will be surveyed. All grids will be oriented north-south to enable quick tracking of grid locations and access to each grid during subsequent investigations. Grids will be grouped to reduce time between grids.

3.3.2.1.2 Several sectors have been identified within OOU6. Some of these sectors will be excluded from the Site Characterization effort, therefore, grids will not be established in these sectors. The rationale for excluding these sectors is because they have been previously investigated and cleaned (see Section 2.4). The only exception is the wetland areas which are excluded based on regulatory requirements. The sectors to be excluded from the gridding effort are:

- EE/CA grid 87 and 88
- Wetlands
- Landfill 1
- Landfill 2
- Compost Area
- Access Roads

The grids will be dispersed randomly across the areas of interest within OOU6. This should result in optimum search effectiveness.

#### **3.3.2.2 Geophysical Investigation**

3.3.2.2.1 The geophysical investigation will be performed at 300 established grid locations (Figures 3.2 and 3.3). A Geonics EM-61 Time Domain Metal Detector instrument will be used for the geophysical survey to detect presence or absence of OE contamination. Parsons ES will provide all necessary equipment and personnel to perform the geophysical investigation. During the investigation if UXO is discovered and identified as containing military toxic chemical agent, all operations will cease immediately within 500 meters of the site. Parsons ES will notify the CEHNC project

manager immediately who will in-turn request military EOD support. If the grid location is critical to the sector of interest, the Parsons ES project manager will be consulted to identify, direct, recommend and approve an alternate sampling location.

3.3.2.2.2 The sectors that will be included in the geophysical investigation are:

- Natural Vegetation Area (including cleanings)
- Potential OE Area A17
- Potential OE Area A19

### **3.3.2.3 Intrusive Investigation**

3.3.2.3.1 Intrusive investigation of all identified anomalies (suspected subsurface OE/UXO) will be conducted. The effort will be conducted after completion of the geophysical survey in each grid will be performed. Qualified UXB personnel will perform the intrusive investigation under the guidance of a UXO Site Supervisor and UXO Safety Officer. A magnetometer will be used for locating the sources of each anomaly identified throughout the intrusive effort. Parsons ES will provide action options for various scenarios in the work plan to include UXO discovery, OE or non-OE related debris. Upon completion of clearance actions, excavated materials will be back filled and ground cover will be replaced. New ground cover will be the same as that removed during excavation. If the excavated material can not be back filled within a couple days of excavation or the material is suspected to contain RCRA or other hazardous contaminants, Parsons ES will consolidate, contain and cover the excavated material with two layers of at least six mil polyethylene sheeting. The polyethylene sheeting will be secured along each edge such that wind and rain will not displace or penetrate it. If any excavations are left open, precautions IAW 29 CFR 1926 and EM 385-1-1 will be employed. All access holes and detonation pits will be back filled upon completion of the project.

3.3.2.3.2 The EM-61 used by the geophysical investigation team and the Magnetometers (Schonstedt GA-S2B the xngate and GA-72C/V Loli Plus) used by the UXO team will be field tested and calibrated daily to ensure that they are operating properly. This will be accomplished by planting an inert practice 105 mm Howitzer or similar magnetic inert item to a depth of four feet and determining the standard indication. If an instrument does not meet the standard during the daily check, it will be calibrated, repaired or replaced.

3.3.2.3.3 Parsons ES will maintain a detailed accounting of all materials encountered during the surface and subsurface sweep/clearance. This accounting will include the amounts of OE, their location, identification/condition, and disposition greater than 1 square inch. The accounting will include all non OE-related metallic debris that are present. The non OE-related metallic debris will be detailed in pounds per acre. This accounting will be included in the Executive Summary detailing the site characterization effort.

3.3.2.3.4 Parsons ES will notify the CEHNC safety specialist if UXO is encountered, it is determined that the UXO cannot be moved, and the situation precludes detonating the UXO in-place. Two UXO specialists will secure the item until such time that a consensus is reached concerning what actions to take regarding the UXO. Parsons ES will then proceed as directed.

3.3.2.3.5 Access will be gained to investigate all grid locations and suspect subsurface UXO to perform identification and disposal procedures. All access, identification, and disposal procedures of OE/UXO will be accomplished by a UXO Specialist. Non-UXO qualified personnel will not perform UXO procedures. UXO procedures include, but are not limited to, gaining access (manual excavation) to subsurface UXO and identification, transportation, storage, and disposal of UXO. Training requirements of 29 CFR 1910.120e apply to this project.

3.3.2.3.6 Personnel Qualification. Qualifications of UXO personnel will be submitted through CEHNC-OE-DG to the Contracting Officer for review and approval prior to mobilization.

3.3.2.3.7 Safety and Health Requirements. Parsons ES will review all available site information and develop the safety and health documents necessary to protect on-site personnel, the environment, and potential off-site receptors. Parsons ES has utilized the services of a certified industrial hygienist qualified, as defined in ER-385-1-92, to oversee the development and implementation of the required safety and health documents.

#### **3.3.2.4 UXO Destruction**

Destruction of UXO encountered during site investigation and characterization shall be closely monitored by the UXO safety officer and the UXO site supervisor. Records of all UXO destruction activities shall be kept in the safety logbook to document all related efforts. OE destruction activities involving detonation or the use of explosives in-place if warranted will be completed in accordance with the Demolition/Disposal SOP (Appendix E) by UXO specialist only.

#### **3.3.3 Location Surveying and Mapping**

3.3.3.1 CEHNC provided existing CCATF GIS-CADD maps (maps and digital orthophotographs) for the site to Parsons ES in electronic format. These maps were used to develop the investigation map for the site. All the proposed investigation grids are depicted on this map. Coordinates for the grids will be derived from this map and provided to the subcontract surveyors to locate and identify each grid in the field. The exact locations of the grids will be set in the field. The deviations from the given grid coordinate will be relayed back to the Site Manager with adequate reasoning. Once a grid is confirmed in the field, the coordinates of the corners of each sampling grid will be plotted at its appropriate location on the site map(s). Coordinates of each sampling grid will be located to nearest plus/minus 1 foot and will be North American Datum of 1983 (NAD83) referenced to South Carolina State Plane Grid System

3.3.3.2 The corners of grids will be marked with stakes that are visible. Site survey effort will be accomplished using a GPS unit. High precision survey methods will not be employed to identify locations of OE materials. Location of ordnance scrap, ordnance fragments, shrapnel, small arms ammunition and metallic debris will be recorded on a "per grid" basis and not by coordinates. The locations of recovered UXOs will be measured with a measuring tape. The X and Y reference to a UXO location will be distance estimated from established grid corner. The survey data for each grid and any UXO found will be provided on a Table and as an insert on the Site Map. The survey data will include the depth at which each OE/UXO item was found. The survey effort will occur on the first field investigation activity. This effort will be followed by brush clearing to enable complete access to each grid of interest.

3.3.3.3 Specific site features such as the landfills, compost cell site operations, building, roads, etc. will be depicted on the site map upon completion of site survey and mapping effort.

3.3.3.4 Records of all sketches, computation sheets and all field logbooks used during this effort will be kept by the Site Manager and provided to the Project Manager at the completion of the field work.

### 3.3.4 Design Package for UXO Removal at OOU6

#### 3.3.4.1 Design Package

The major submittal on this project is the Design Package. This Design Package will document all the investigation and design efforts for OOU6. The package will include:

- **Executive Summary** that details project objective and historical attributes, site characterization effort, results and conclusions and recommended remediate action and estimated cost.
- **Design Report**, including design analysis, calculations, assumptions and site characterization results utilized for the design effort; Safety risk assessment utilizing the OE-cert model with evaluation of the risk the site represents to human health and the environment; surveying and mapping data, UXO and UXO-related materials records, field activities journal, QC documentation, scrap turn-in documentation, analyses of removal alternatives, records of endangered plants and animals encountered during OE removal efforts, records of site restorations effort, and a copy of CEHNC Form 948s issued.
- **Specifications** for recommended remedial action. Specifications will include elements described in the SOW (Appendix A) shown below:
  - Summary of the work to be accomplished
  - Site Description
  - Special Clauses (i.e., site access, environmental protection, work hours, etc.)

- Safety, Health and Emergency Response
- Temporary Construction Facilities
- Demolition Site(s)
- Site Restoration
- Permits and Required Submittals
- Transportation and Disposal of Ordnance and Scrap
- Bid Schedule
- Requirements for the Closure Report
- **Drawings** detailing locations and depths of excavations, removal boundaries for each sector, temporary facilities and site storage. Design drawings will be supervised by a Professional Engineer registered in the State of South Carolina. The design package will be signed by the registered State of South Carolina P.E.
- **Cost Estimate** will be submitted under a separate cover and shall be protected as "Official Use Only."

#### **3.3.4.2 SRA**

A safety risk assessment will be performed as part of the Engineering Design process. The SRA methodology to be used is the OECert. The safety risk assessment will use the data collected during the Engineering Design field effort to mathematically determine the expected number of exposures and the associated risk to the population from exposure to UXO at the site. The SRA will be included as part of the Engineering Design report.

#### **3.3.5 Project Meetings**

Several project meetings will be conducted during the Engineering Design effort. The first meeting is scheduled during preparation and completion of the Work Plan prior to start-up of field work. A second meeting is scheduled to provide briefing after completion of the field work. The third meeting will be scheduled after the draft Engineering Design package has been submitted for review. A public meeting or hearing may be conducted after the Draft Final Engineering Design Package is completed and has been reviewed by the CEHNC, to comply with NCP requirements for public involvement. The Engineering Design Package (cost estimate not included) will be made available to the public at the local depositories to solicit comments. Appropriate comments received from the public via the public meeting process will be incorporated into the final Design package.

### **3.4 ENGINEERING DESIGN DATA MANAGEMENT PLAN**

#### **3.4.1. Engineering Design Field Data Management**

3.4.1.1 Significant data will be generated during the Engineering Design sampling-field investigations. This Data Management Plan has been developed for this

Engineering Design project to accommodate volume of data collected and generated. This data management plan describes the procedures Parsons ES will follow to track and store the data collected during the Engineering Design field effort.

3.4.1.2 OE discoveries and associated remediation activities can be expected to produce significant public interest from property owners and other interested parties. OE survey results will be strictly controlled by the project field investigation team to preclude any possible inappropriate public disclosure. Disclosure of any information to the public will not be allowed without approval of the Contracting Officer.

### **3.4.2 Field Data Collection and Processing Facilities**

3.4.2.1 There are three categories of data to be maintained during the field effort. These categories include cost tracking, safety, and site activity records. The field investigation team will record all data and field measurements in non-erasable written format in field daily logbooks.

3.4.2.2 Cost tracking records include all labor, field equipment rental and purchase, and all other direct costs (ODCs) charged to the field task will be tracked. These records will be maintained in a cost tracking logbook.

3.4.2.3 Site safety records include all safety aspects of the project including training, inspections, and accident/incident records. These records will be maintained in the Site Safety, and Accident Report Logbooks.

3.4.2.4 Site activity records include all field data and activity records. This category can be further divided into four subcategories including site investigation data, ordnance /explosives records, land survey data, and administrative records.

3.4.2.5 Site investigation data include all data collected for the purpose of the Engineering Design report. These data include site maps showing geophysical anomalies, weight and description of ordnance-related scrap (ORS), and QA data.

3.4.2.6 Ordnance/explosives records include accountability records of ordnance and explosives. These data are included in Ordnance Accountability logs, Explosives Accountability Logs, and records of detonations (Blast Records).

3.4.2.7 Survey data include records from the land surveyor including logbooks, maps, and GPS data. These data are not required to be maintained onsite, but must be turned over to the CEHNC project manager within 30 days of the completion of the field effort. The land survey subcontractor will be responsible for installing and documenting all grids and survey control markers.

3.4.2.8 Administrative data include all records collected during the administration of the field effort. These data are included in Daily Reports, Team Leader Logbooks, Telephone Logs, the Site Manager Logbook, correspondences, and photographic logs. Time logs of site activities must also be maintained in the appropriate logbooks.

3.4.2.9 The initial processing of the field data will be conducted in the field by members of the field investigative team. The data will be checked for completeness and the results reviewed by the Parsons ES site manager. Hard copies of field notes, tabulations, maps, or other data products will be processed and stored in the appropriate logbooks and provided to the Parsons ES project manager on a daily basis.

### **3.4.3 Onsite Engineering Design Field Data Management**

3.4.3.1 Parsons ES's site manager will be responsible for the review and tracking of all field documentation. All field data will be reviewed for completeness by Parsons ES's site manager prior to posting into a central data library. Each logbook/3-ring binder will be individually named and numbered. The number and name of each logbook or binder will be included on a document control log which will be maintained at the site. The document control log will also have the name of the person(s) responsible for the upkeep of each logbook/binder.

3.4.3.2 Only bound notebooks will be allowed for use as daily logbooks. Each page of the logbook will be consecutively numbered and all writing will be in black ink. Field forms and computer data will be maintained in three ring binders and identified or referenced by consecutive numbering, date of generation, and/or document control number.

3.4.3.3 A central data library will be maintained by Parsons ES for all field sampling data and logbooks. This data library will be used to store, log, and retain all field investigation data collected during the project. The central data library will be established at the field office to provide working copies of the data in support of the field investigation activities. Necessary copies will be kept at the Project Manager's office as a back up.

### **3.4.4 Office Management Of Field Data**

After the field phase of the project is completed, the data library will be shipped in its entirety to the Atlanta, Georgia Parsons ES office for further processing and storage. All field data will be maintained under the control of the project manager. The project manager will be responsible for storing the field data library.

### **3.4.5 Project Deliverables**

3.4.5.1 All written project deliverables prepared during this project will be produced in WordPerfect® Version 6.1 software format or higher software IBM PC compatible format and submitted in both hard copy and in electronic format on 3.5-inch diskettes and CDs (final versions only). Quality reviews will be completed by review teams prior to submittal to CEHNC. Archive copies of all deliverables will be maintained by Parsons ES for future reference.

3.4.5.2 The land survey deliverable will include: the original field logbooks of the land survey team, one Mylar copy of final map drawings, five blue-line copies of map drawings, one disk or tape copy of the drawing file, and one copy of each monument

description card. The survey subcontractor will provide description cards for all monuments and control points established during surveys. These documents shall have a north arrow and a sketch of each monument with its location relative to reference marks, structures, roads, railroads, towers, etc. The description cards shall be 5 by 8 inches with one monument per description card, or two monuments being described on an 8½ by 11-inch sheet of bond paper.

3.4.5.3 All drawings will be produced in hard copy and on reproducible Mylar. In addition, all mapping data will be delivered in electronic format (depicted into a Microstation 5.0 three dimensional design files) compatible with Intergraph® Version 4.0. The format for drawings will conform to the SOW. Data will be delivered to CEHNC in either 8-mm 5GB tape or 3.5" floppy disk format.

### **3.4.6 Project Cost Management**

A cost and manpower plan will be derived from the approved proposal for this delivery order (DO) and will form the baseline for measuring cost and manpower variances. To closely monitor cost expended and project activities during the performance of this project, a list of opened tasks with budget and completion date estimates will be submitted monthly to CEHNC. This information will be included in the Cost Tracking Report. The Cost Tracking Report consists of a monthly Individual Performance Report (IPR) and Cost/Schedule Variance Report. The IPR system is automated with each approved work task providing the baseline. A technical progress report providing a concise narrative assessment of the current project status will also be provided. The report will address work accomplished during the reporting period, work to be accomplished during the next reporting period, and significant problem areas with recommended solutions. The Parsons ES project manager will be responsible for project cost management and will be available to discuss any concerns with the CEHNC Technical Project Manager. If it becomes evident that a change (addition or deletion) to the scope of work is needed, Parsons ES Project Manager and the Program Manager will discuss the change and then verbally present it to the CEHNC Technical Project. Based on this discussion Parsons ES will follow this with written notification for a change. If the COE Program/Technical Manager agrees with the change, this will come back to Parsons ES in the form of a written scope revision, followed by a cost proposal and negotiation of the value. Upon successful negotiation, the CEHNC will issue a delivery order amendment.

## **3.5 ENGINEERING DESIGN FIELD INVESTIGATION PLANS AND PROCEDURES**

The field investigation activities for this Engineering Design project will include the grid layout and survey, clearing of vegetation, mapping, OE geophysical sensor survey, OE excavation and removal as necessary, and OE removal/disposal procedures. The methods and procedures to be used during the field phase of the Engineering Design investigation are described in the following subsections. The work performed during this field effort will be in accordance with the OE Operations Plan (Section 7) and the SSHP (Appendix D), unless the procedures are modified and approved in writing by the



CEHNC onsite representative. If there is no onsite CEHNC representative, the CEHNC technical manager must provide written approval.

### **3.5.1 Grid Location**

3.5.1.1 The CEHNC and Parsons ES agreed that a standard grid size of 50 by 50 ft will be adequate to obtain density data for OOU6. The proposed location of these grid is depicted in Figures 3.2 and 3.3. The number of grids proposed at each sector was chosen based on the review of the total acreage, site prioritization, site accessibility and topographic features. Larger sectors are allotted more grids than the smaller sites. Sectors of higher priority are more intensively investigated than the lower priority sites. Sites with high accessibility to the public and to the field crews are given more grids than sites that are difficult to access. Topography may influence the number of grids for a given sector because of steep slopes.

3.5.1.2 Where sectors with thick vegetation (i.e., Kudzu) will require extensive clearing and grubbing. Additional grids will be added in adjacent areas within the sector where vegetation is less dense to compensate as needed.

### **3.5.2 Sampling Site Layout And Field Survey Activities**

3.5.2.1 Land survey activities include field survey and mapping of each grid, using grid coordinates provided by Parsons ES. The corners of each grid shall be referenced to the South Carolina State Plane Grid System based on the North American Datum of 1983 (NAD83).

3.5.2.2 During all land survey activities, each survey team will be accompanied by one UXO specialist. In all areas suspected of having possible UXO contamination, the UXO specialist will inspect the areas where personnel or vehicular traffic may transit. A magnetometer check of all points where location stakes or posts are to be driven into the soil, or where permanent survey monuments are to be located, will be accomplished prior to placement of stakes. If the magnetometer indicates a positive reading (via audio/visual signal), no monuments, stakes, or posts will be driven into the ground at that specific location.

3.5.2.3 Site layout activities will be planned and completed prior to the start of field investigations. The grid locations will be marked on existing planimetric maps.

3.5.2.4 Site survey activities will include the following, with all activities being conducted in accordance with the SSHP and the Demolition/Disposal SOP (Appendix E):

- Establish permanent monuments.
- Establish NAD83 coordinates of site corner stakes by approved survey methods. Survey the sampling site location to the nearest benchmark or permanent monument. Alternatively, it may be feasible to determine the locations by GPS methods. However, due to the thick brush and trees and heavy foliage over the majority of sites, its use may be limited.

3.5.2.5 The coordinate system used for the land survey activities will be the state plane coordinate system referenced to NAD83. A control network is required to merge the relative positions of individual survey data and related sampling site features information. A primary land survey control point for each sampling grid site will be identified and marked by the land surveyor. Secondary control points will be the corner reference points established at each grid sampling site.

### **3.5.3 Site Clearing**

Because most sampling sites are heavily vegetated, it is anticipated that most of the total sampling site acreage will require some degree of clearing prior to conducting geophysical surveys. Site clearing operations will be completed prior to startup of activities at each sampling site to avoid time delays. Two teams will be scheduled to complete clearing efforts at designated sampling sites, prior to scheduled geophysical survey efforts. Each site clearing team will consist of one UXO technician and a laborer.

In addition, a bush hog operator and a UXO escort team will be available to handle clearing of thick undergrowth. A Senior UXO supervisor will be present to manage the two brush clearing teams.

### **3.5.4 Tree Removal**

Trees (3 inches in diameter and smaller) will be removed on a case-by-case basis and only as required to accomplish the tasks outlined in the SOW. A biologist familiar with the species found in the Croft State Park area will be onsite for two days to assist in the identification of protected species, if any on site, prior to any tree cutting. If removal is required, the tree will be cut using chain saws. The tree will be sectioned, if necessary, to remove it from the immediate area, so it does not interfere with OE detection or survey activities. If trees larger than 3 inches in diameter are determined to impact the investigation, Parsons ES will advise CEHNC and CESAC. No further site action will be taken without full coordination and approval of CEHNC and CESAC.

### **3.5.5 Brush Cutting**

Brush clearance will be accomplished with a brush hog or other equipment (for example, gas-powered string trimmers with saw blade attachments and ditch axes if appropriate). The brush will be cut to a height of no greater than 6 inches above ground surface to eliminate interferences with OE sampling operations.

### **3.5.6 Grass Cutting**

If encountered, grass will be cleared using a gas-powered string trimmer with a saw blade or line attachment. The grass will be cut to a height of no greater than 6 inches above ground surface, if warranted, to eliminate interferences with OE sampling operations. If possible, other equipment, such as a bush hog, may be used to clear grass.

### **3.5.7 Geophysical Survey Plan and Procedures**

This section describes standard practices and procedures for collecting, processing, and controlling the data associated with OE geophysical surveys at each of the sampling

grid sites. The geophysical survey techniques to be used at the OOU6 incorporate a Geonics EM-61 and flagging (mag & flag). Use of any other technique, if warranted, may require SOW amendment and modifications of project budget and schedule. Features of this technique are described in Appendix G.

### **3.5.7.1 Geophysical Survey**

3.5.7.1.1 The field investigation team will subdivide each sampling site into geophysical sensor survey lanes approximately 5 ft apart. Survey lane spacing of 5 ft is appropriate to provide full coverage when using an EM-61 instrument. Each survey lane will be sensor surveyed using approved magnetic methods, as specified in the Field Investigation Equipment Plan (Appendix G).. The selected sensor survey method will be capable of detecting a 105 mm Howitzer (or equivalent) up to 4 feet below ground surface (ft-bgs), as specified in the CEHNC SOW.

3.5.7.1.2 Prior to daily use, the EM-61 will be calibrated by using a 105 mm Howitzer projectile (or equivalent) buried 4 ft-bgs to verify the operation of the instrument. The batteries will be checked during the calibration and will be periodically checked. This QC procedure will be documented in the site safety logbook.

3.5.7.1.3 If problems arise that result in proving the selected survey method to be ineffective or incapable of providing the required data quality and resolution, the site may require resurveying using other approved geophysical methods. Onsite trials may be necessary before a final decision can be made as to which method will perform best at OOU6. Geophysical survey sweep of each grid will be conducted in a manner that provides 100-percent coverage for the instrument used.

### **3.5.7.2 EM-61 Survey and Flag Procedures**

3.5.7.2.1 An EM-61 survey using the instrument in the audio mode will be conducted in a manner that will allow full coverage of the grid and quick identification of anomalies. All anomalies detected during the field investigation will be located in the field and on a map.

3.5.7.2.2 A small surveyor's flag will be marked and placed at the exact location of each anomaly detected during the investigation. The estimated locations of the anomalies will be placed on a map unless the quantity of anomalies is so great that the map would be meaningless. In these instances, after each lane is surveyed, the total quantity of anomalies on that lane will be denoted at the end of the lane on each map.

3.5.7.2.3 The locations of all surface UXO encountered during the investigation will be identified on the geophysical investigation map. These items will be identified and their condition determined. These data will be included as comments on the map. Also included as comments on the map will be an identification of the type of OE found (i.e., 4.2-inch mortar frag).

### **3.5.8 Access and Excavation**

3.5.8.1 Access to and excavation of OE items will be completed only after a work zone is established and all preparatory actions required in the Demolition/Disposal SOP (Appendix F) are completed. A definition of work zone is provided in Appendix E, paragraph 6.1.2.

3.5.8.2 Access to suspect subsurface OE targets will be granted to perform identification and to determine the need for detonation. All access activities will be performed by the UXO specialist under the direct supervision of the senior UXO supervisor. Only UXO qualified personnel will be allowed to perform UXO access procedures.

3.5.8.3 Manual or equipment methods (e.g., hand tools) as specified in the Demolition/Disposal SOP (Appendix F) will be used to perform all excavation activities. Soil removed from the disposal area will be stockpiled in the immediate area for later backfilling of excavations.

3.5.8.4 If circumstances allow, photographs of the unearthed OE item may be taken for documentation purposes prior to in-place detonation.

3.5.8.5 If UXO items are confirmed and the situation precludes detonating the UXO item in-place, the CEHNC safety representative will be notified.

3.5.8.6 Hard copies of field data will be collected and stored in a three-ring binder by site and grid location number. The three-ring binder will be labeled as the Engineering Design data logbook.

### **3.5.9 OE Handling and Disposal**

3.5.9.1 Handling and Disposal of OE will be undertaken by the field investigation team, with only UXO specialists handling any OE items in accordance with the SSHP and the Demolition/Disposal SOP (Appendix F). The senior UXO supervisor will evaluate all encountered and suspected UXO and determine if the work planned for the area can safely continue or what actions must occur prior to commencing OE handling and disposal efforts. Such recommendations will be made immediately to the senior UXO supervisor, who will contact the onsite Parsons ES site manager and CEHNC safety representative to determine the appropriate course of action.

3.5.9.2 Relevant training requirements of 29 CFR 1910.120e(i) will apply to all OE handling and disposal activities conducted during the field investigation [Occupational Safety and Health Administration (OSHA), 1994].

3.5.9.3 If an OE item is discovered and identified as potential chemical warfare material (CWM), all field operations will be stopped immediately at the particular sampling site and the area will be secured by two UXO specialists, in accordance with SSHP requirements. The UXO personnel shall evaluate encountered UXO/CWM and

immediately notify the CEHNC safety officer and project manager, who will in turn notify EOD for management of the occurrence.

### **3.5.10 UXO Disposal**

All fuzed UXO items encountered during this project and all UXO determined to be unsafe to move and OE items that are positively identified will be blown in place. OE items that cannot be positively identified will be referred to the Site Manager who will, in return, request assistance from the CEHNC Safety Specialist in identifying the item. Unfuzed ordnance and casings/fragments containing explosive residue will be removed from the grid, placed in a holding magazine and disposed of in a mass detonation. Disposal procedures will be completed in accordance with the Demolition/disposal SOP (Appendix F) by UXO specialists only.

### **3.5.11 Disposal of Metal Debris**

3.5.11.1 Inert OE items, including all OE metallic debris, shrapnel or fragments, will be collected, transported to the onsite explosives/inert OE storage area and placed in an approved holding container, such as storage magazine.

3.5.11.2 The storage area will be secured by temporary fencing and other security measures that prevent vandalism or contact with the public. If portable magazines are used for this purpose, they will be kept locked except during loading and unloading.

3.5.11.3 Metal debris will be physically inspected by UXO qualified personnel for the presence of explosive material. Items found to contain explosive material will be segregated and secured for on site disposal. Debris determined free of explosives will be certified to that fact and will be disposed of through a local civilian scrap dealer.

### **3.5.12 Accounting**

3.5.12.1 A detailed accounting of all OE materials encountered during the geophysical surveys will be completed. This accounting will include the number of items of UXO, identification numbers for UXO items, mapping of discovery location, description of condition with photographs (as appropriate), date, and disposal method.

3.5.12.2 The scrap material accounting process will include all OE shrapnel, and all non-OE metallic debris encountered. All identifiable ORS items will be listed in the field data for each site. All non-OE items will also be identified and listed. The total metallic OE and non-OE debris will be accounted for by gross weight per sampling site and converted to pounds per acre (lb/acre). Suitable weighing methods will be used to determine weights of metallic debris (e.g., truck scales).

3.5.12.3 The accounting system will also account for all explosives expended in the disposal of UXO items. This information will be maintained by the UXO subcontractor, who will supply all explosives for this purpose.

## 3.6 GIS AND MAPPING PROCEDURES

3.6.1 All GIS activities will be performed by Parsons ES. These activities will be performed to meet Parsons ES-specified requirements. This system will be used to effectively map the results of OE site characterization effort at OOU6.

3.6.2 There are two primary data types used that must be reviewed. The first is graphic data contained within the GIS data set. The second data type is tabular data contained within the Relational Interface System (RIS) schema in Oracle.

3.6.3 As a general rule, the GIS effort will involve preparation, analysis, processing, and interpretation of data acquired from the field survey of grid locations, geophysical, and intrusive investigation. GIS data layers will be constructed to evaluate OE contamination of each sector of concern at OOU6. All files contributing to the GIS data sets will be backed up prior to editing or manipulating. The GIS operator will be responsible for registering and processing all survey and intrusive data collected in the field into the OOU6 GIS and also for preparing maps depicting specific attributes for each sector of concern at OOU6.

3.6.4 The GIS data set has been created using the design files provided CEHNC. The coordinate system has been established by CEHNC. However, it is possible to acquire a design file that does not meet the conditions prescribed. This can lead to problems in trying to use that file. It is important that the precise definitions for all aspects related to coordinate systems be determined. Without a usable coordinate system, the GIS cannot function properly. The coordinate system of design files will be checked by opening the design file within MicroStation.

3.6.5 Setup of the Mapping Working Units for design files will be checked, and files will be correctly positioned if they do not match the project standard. This type of edit will be conducted by an experienced MicroStation user. Any deviations between design files will be noted in a GIS Operations Log by the GIS operator.

3.6.6 We will take the results of a GPS (including total station) survey to determine control points on the site which can be used to coordinate all spatially-based activities. These control points will be recognizable at the surface, from maps, and from aerial photographs. A visual survey of the controls points will be made by Parsons ES representatives and subcontractors to assure their suitability for this purpose. For identification purposes, photographs will be taken of each control point and the surrounding area. The control points will be hand entered into the GIS (i.e., the coordinates of the control points will be keyed into the GIS thus assuring they are spatially accurate; these keyed-in entries can be confirmed using spatial position tools within the GIS). Trial distances will be measured during the survey between known fixed points to establish a pattern of confirmed distances.

3.6.7 The Computer Aided Drafting and Design (CADD) files provided to Parsons ES by the CEHNC will be used to establish references to the coordinates of sampling grids designed for the site characterization effort. Each proposed sampling grid

will be identified and tagged. The sampling grid identifier and the corresponding coordinates for the corners of the grid will be tabulated on a site characterization map and will be provided to the site manager and the field team at the beginning of the field work.

3.6.8 The registered CADD files will be imported into the GIS as the graphics element. The GIS coverages developed from these CADD files will be the basis for any and all analyses of the site. The GIS operator will locate the origin points for the survey area from the basis of the established control points and use the GIS to map the prospective survey area. On completion of this task, the GIS operator will visually inspect the survey area to make sure that there are no unexpected problems. If a problem should arise, its spatial position will be determined by triangulation and then its location noted within the GIS.

3.6.9 On completion of a given excavation, UXB will provide the exact location, identification, and attributes of the excavated specific UXO object to the Site Manager. The data will be compiled on a daily basis and sent to the project office for processing. The results will be entered into the GIS and will provide to all concerned parties a map showing the location and type of the excavated objects.

### **3.7 SAFETY RISK ASSESSMENT PROCEDURE/APPROACHES**

3.7.1 The data collected from the Site Characterization effort will be inputted into the OE Cost/Risk Effectiveness Program (*OECert*). Results and conclusions from the Safety Risk Assessment (SRA) will be used in addition with other Site Characterization data to prepare the design package.

3.7.2 The *OECert* site and sector data base inputs will be used to identify total data requirements for estimating the public risk at OOU6. We will review available CCATF documentation, site OE sampling data, and associated maps to assess sectors based on terrain factors, ordnance density, and other *OECert* factors as needed. Expected exposures as well as expected exposures multiplied by the hazard factor will be addressed in the SRA for the site. All data gathered will be collected and documented in an appendix to the Design Report.

3.7.3 An estimated OE density for each risk sector will be evaluated that takes into consideration the hazard factor for the type of OE found at OOU6. A review of the OE density estimates is planned as part of the *OECert* parameters/data collection and assessment. All data acquired will be used to develop risk estimates for OOU6 sectors and associated removal alternatives. Removal alternatives to be considered will include:

- no further action;
- surface removal action;
- subsurface removal action to a depth of 1 foot;

- subsurface removal action to a depth of 2 feet;
- subsurface removal action to a depth of 4 feet; and
- subsurface removal action to a depth of 10 feet (or other depth of interest).

3.7.4 The output product of this analysis is the residual risk expected as a result of each removal alternative.

### **3.8 DESIGN APPROACHES/PROCEDURES**

#### **3.8.1 Design Package**

3.8.1.1 The design begins in part with the submittal, review, and modification of this Engineering Design work plan to meet CEHNC approval. All the activities previously described will be completed to provide adequate data to perform the design effort. All data provided for the design effort will be checked to ensure complete, accurate, and well organized records for the project design files. The design will begin with the preliminary design that will include process conceptualization and identification of equipment, labor, machinery, construction, operational, and restoration needs. Also included in the preliminary design will be an outline or listing of drawings and specifications needed to guide the activities.

3.8.1.2 The draft design package will be submitted to CEHNC for review when the design effort is 60% complete. This will include an Executive Summary, Design Report, and detailed cost estimate and will include in detail drafts of all drawings and specifications for remedial action components, including delineation of removal boundaries for various identified sectors, site work such as geophysical investigation, temporary construction facilities (site office, demolition site(s) etc.), excavation, drainage control structures, and site restoration. . Modification to the draft design package will be addressed in the draft final design package.

3.8.1.3 The draft final design package will be submitted to CEHNC when the design effort is 90% complete.

3.8.1.4 The final design package will be submitted when the design effort is 100% complete, and will include completed drawings and specifications.

#### **3.8.2 Drawings and Specification**

3.8.2.1 Drawings/plans and specifications will be prepared to incorporate preliminary and detailed design and these will be presented by drawings and written text in a form suitable for use by a subcontractor consistent with CEHNC requirements. Detailed design effort and preparation of drawings/plans and specifications are typically performed concurrently. Design analysis will involve calculation preparation, checking, review, and approval. Calculations will be prepared and maintained in a neat and orderly manner that will facilitate ease of interpretation. Where judgement on which specific



design analysis is preferred proper document will also be maintained. Calculations made under this Engineering Design effort will be civil and cost related.

3.8.2.2 Drawings and specifications will be prepared for remedial action recommended and approved for the sectors within OOU6. Specifications and drawings will be prepared in accordance with the requirements of CEHNC-1110-1-1, October 1994, "Design Manual for Architect Engineers". It is estimated that no more than 10 drawings will be provided in the Design Package. Anticipated drawings will include but not limited to the following:

- Title Sheet
- Site Plan
- Site OE Distribution plan
- Site Work/Operations/Security Details
- Operation Equipment Details
- Site Restoration Details

3.8.2.3 At a minimum, the site plan will include consideration of site constraints, topography, onsite and adjacent land usage, mitigation of environmental impacts (for example, traffic, visual aspects, safety, etc.), ordinances and regulations, buildings on site, internal traffic operations (for example site landfill operations), site drainage, and access limitations.

3.8.2.4 A list of specifications applicable to this Engineering Design effort will be prepared at the beginning of the design effort. A format for specification will be selected consistent with requirements of the SOW. An outline of specifications for major equipment will also be prepared. At a minimum, the specifications will include consideration of these elements;

- Summary of remediation work;
- Site description;
- Special clauses (for examples, site access, environmental protection, work hours, etc.)
- Safety, health and Emergency Response;
- Temporary Construction Facility;
- Demolition Site(s);
- Site Restoration;
- Permits and Required Submittals;
- Transportation and Disposal of Ordnance and Scrap;
- Bid Schedule; and

- Requirements for the Closure report.

### **3.8.3 Cost Estimate**

An estimate of cost associated with the implementation of the recommended response action(s) will be provided. This estimate will include the direct and indirect cost for implementation of the response action(s). An important factor in the cost estimation effort is the time frame for completion of the response action. The basis for the cost estimate will include:

- construction cost data bases;
- cost from recent projects;
- cost from contractors and suppliers; and
- allowances for contingencies and professional services (surveying, geotechnical evaluations, geophysical surveys, engineering, legal and administrative costs, etc.).

## **4.0 PROJECT QUALITY ASSURANCE AND QUALITY CONTROL PLAN**

### **4.1 INTRODUCTION**

4.1.1 The Parsons ES quality assurance process starts with top management's commitment and involvement. The process provides a permanent and workable system that allows each employee to understand the job performance expected. The Parsons ES quality assurance and improvement process ensures that every employee is supported by the actions, procedures, tools, and training required to do a job according to the requirements. By promoting teamwork and by focusing attention on the solutions, the quality of work can be increased and assured throughout the project.

4.1.2 Our Quality Assurance Plan is based on the work and concepts of several recognized authorities on quality management in the United States, especially Philip Crosby, Dr. W.E. Deming, and Dr. J.M. Juran. These three experts each have different methods for addressing and resolving problems. Parsons ES has taken unique portions of their concepts and have tailored them to corporate work processes. As a result, Parsons ES has placed a greater emphasis on the actual elements pertaining to work processes, project requirements, and lessons learned from past performances. These concepts have been developed into a systematic and practical approach for improving quality.

4.1.3 Generally, Parsons ES Quality Assurance Program relies on four fundamentals, termed "the absolutes of quality." They answer the questions:

- What is quality? Conformance to Requirements
- How do we achieve it? Prevention
- What is our performance standard? Zero Defects
- How can we measure quality? Cost of Doing Things Wrong

### **4.2 REQUIREMENTS**

4.2.1 The Parsons ES Quality Assurance Plan for OOU6 has been written to encourage positive communication throughout the Parsons ES project team. It is also intended to foster clear communication between Parsons ES and the CEHNC. Honest and effective communication among the project team requires that all parties clearly understand the project requirements. This Quality Assurance Plan will dictate the methods and procedures that will be used during the project. Additionally this plan will define the tolerances for the product of the work process. For example, the goal for tolerances of data inputs for OOU6 geophysical survey is  $\pm 24$  inches in the horizontal plane (which has an accuracy of  $\pm 12$  inches from the surveying mapping and  $\pm 12$  inches from the geophysical survey instrument).

### **4.3 INSTRUMENT AND EQUIPMENT CALIBRATION**

4.3.1 Calibration Procedures and Frequency. Instruments and equipment used to gather and generate environmental data are calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Field instruments and equipment will be calibrated daily. Calibration, repair, or replacement records will be filed and maintained by the Geophysical Survey Team Leader and Intrusive Investigation Field Supervisor. Calibration records of the field instrumentation will be filed with the Project Manager in Atlanta after the field work is completed.

4.3.2 Field Instruments. All geophysical survey instruments will be calibrated immediately prior to each day's use over the on-site calibration strip. The calibration procedures will conform to manufacturer's standard instructions. This calibration will ensure that the equipment is functioning within the allowable tolerances established by this project. Calibration records will be maintained by the Parsons ES geophysical survey team leader and Intrusive Investigation Field Supervisor and may be subject to audit by the QA manager.

### **4.4 GEOGRAPHIC INFORMATION SYSTEM QUALITY ASSURANCE PROCEDURES**

4.4.1 The accuracy of the geographic analysis is only as good as the underlying data being analyzed. Certain guidelines are necessary to ensure data quality after it has been entered into the system. The quality assurance guidelines presented in this section pertain only to GIS data that has been loaded into the system.

4.4.2 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.

4.4.3 Quality control measures will be implemented to ensure that the data is within acceptable spatial accuracy parameters. The spatial accuracy of the intrusive investigative data (OE contamination locations) will be determined by cadastral surveys of the site conducted in accordance with the 1983 North American Datum (NAD83) referenced to the South Carolina State Plane Grid System.

4.4.4 Geometric Accuracy. After all coordinate information for grids and OE contamination locations are verified, the geometric accuracy of the geographic features will be checked. This process will eliminate free end points, 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, as previously stated, original files will be backed up prior to making edits.

4.4.5 Geographic Accuracy. 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  $\pm 5$  feet (as an example) then Microstation's supposed accuracy can be deceptive. Therefore, a statement of the accuracy of the spatial data should always 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 should be evaluated to determine if the geographic features are graphically correct. If they are not in accordance with the data dictionary, they should be corrected. After such corrections, it is generally a good idea to rebuild topology for the coverage(s) affected by the operation. All such corrections will be noted in a GIS Operations Log by the contractor. The accuracy of the grid corners will be  $\pm 12$  inches.

4.4.6 Data Loss and File Corruption. There are several programs that 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 being manipulated by these programs are corrupted among other problems. To prevent data loss, these files should be backed up.

4.4.7 Schema Quality Control. The database values are the other part of the data structure that require quality control. The database is generally treated as a single file with unique properties. 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. Another safeguard is to use a reference file of how data entry is performed.

4.4.8 The GIS operator will develop and use a checklist of standard quality control steps. For example, another approach to fixing errors is to run a program that edits the ASCII data export file.

## **4.5 DATA REDUCTION, VALIDATION, QUALITY CONTROL AND REPORTING**

### **4.5.1 Data Reduction**

Any raw data from field measurements (including geophysical and intrusive data collection activities) will be appropriately recorded and notated in the field notebooks. If the data are to be used in the project reports, they will be reduced and summarized, and the reduction method will be documented in the report. Data reduction and analysis methodologies will be dependent upon those geophysical methods selected. Data reduction requirements will meet accepted standards.

## **4.5.2 Data Validation and QC**

Validation of geophysical data will be performed by actually excavating geophysical anomalies. Post-excavation data review will be performed by reexamining a limited quantity of surveyed areas (10% of all grids investigated) and rechecking the excavated location. Data review will be performed on both the geophysical surveys and the intrusive investigations.

## **4.5.3 Quality Control of Geophysical Data**

Prior to beginning work, teams will sweep a controlled area (calibration strip) of known magnetic anomalies. The results of the calibration procedure will be recorded in the log book. The calibration strip will be constructed in the following manner. A 100 percent electronic sweep of the strip will be conducted by UXB to determine existing anomalies. The strip will be seeded with inert ordnance items (for example, 155 mm projectile). Readings will be taken at locations atop the seeds and will be recorded in a calibration log. Inert ordnance items, indigenous to the OOU6, will be buried as seed items in the calibration strip. The location of all existing and seeded anomalies will be recorded on the calibration strip map. The geophysical survey teams will conduct an initial sweep of the calibration strip and record their instrument readings for each anomaly. These readings will serve as a baseline reading. Prior to beginning each day's work, the geophysical survey teams will re-check their instruments in the calibration strip. An instrument reading differing more than 25 percent from the baseline reading may suggest equipment failure or procedural error. QC of the EM-61 geophysical survey will be accomplished by performing a magnetometer survey of 10% of the grids investigated. The UXO subcontractor will perform the QC effort. The purpose of this QC effort is to evaluate the effectiveness of the EM-61 geophysical survey instrument at OOU6 and to ensure data integrity for subsequent safety risk assessment and remedial design efforts.

## **4.5.4 Data Reporting**

4.5.4.1 For all anomaly analyses and review, at a minimum, the GIS data packages/maps will show traceability to the anomaly location and will contain the following information required for data validation:

- Case narrative describing any deviations from the normal anomaly evaluation procedures required and the anomalies affected;
- Anomaly location identifications;
- Geophysical data set identifications;
- Individual parameter results; and
- Summary of all GIS quality control procedures.

4.5.4.2 As a part of the data evaluation process, the GIS operator will confirm that its documentation is complete, paginated, and legible; qualitative identifications are accurate; calculations are accurate; and the results are expressed in the appropriate units. A copy of the OE/UXO data as displayed on the GIS anomaly maps will be checked for

completeness and compliance. In addition, the data will be validated and any results not in compliance with established QA/QC criteria will be identified. The effect of any noncompliance on the usability of the data will also be discussed. In general, the information on the diskettes will include:

4.5.4.3 Parsons ES will take the data packages generated by the GIS and check them for completeness. The data will then be evaluated by Parsons ES, in conjunction with UXB. The evaluation process will include:

- The anomaly's location with respect to confirmed OE/UXO;
- The detection instrument readings (e.g., the electronic signature);
- Subsurface conditions and proximity to sources of interference that affect the sensitivity and reliability of the detection instrument; and
- Field observations and comments by the geophysical and intrusive investigation personnel.

## **4.6 INTERNAL QUALITY CONTROL PROCEDURES**

### **4.6.1 Internal Quality Control**

The overall effectiveness of the quality control program for this project depends on the site survey, geophysical survey, intrusive investigation, and the GIS activities being conducted in accordance with a program that ensures the precision and accuracy of analyses by detecting errors and preventing recurrences or measuring the degree of error inherent in the activities and procedures. The field calibration strip used during this project is discussed in Section 4.5.3. The routine GIS QC procedures to be employed during the project are also discussed in section 4.4.

### **4.6.2 GIS Quality Control Checks**

GIS data analysis will be conducted in accordance with accepted and appropriate methods.

## **4.7 PREVENTIVE MAINTENANCE**

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendation and written procedures developed by the operators.

### **4.7.1 Maintenance Procedures**

The manufacturer's written maintenance schedule shall be followed to minimize the downtime of the measurement system. It will be the operator's responsibility to adhere to this maintenance schedule and to arrange any necessary and prompt service as required. At a minimum, equipment used daily will be cleaned at the end of each work day and kept in good operating condition. Service to the equipment instruments, tools, etc., shall be performed by qualified personnel. In the absence of any manufacturers

recommended maintenance criteria, a maintenance procedure will be developed by the operator based upon experience and previous use of the equipment.

#### **4.7.2 Maintenance Records**

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the geophysical equipment operators and/or UXO technicians when this equipment is used at the site. The QA Manager can audit these records to verify complete adherence to these procedures.

#### **4.7.3 Equipment Spare Parts**

An extra battery pack for each geophysical instrument shall be on-site at all times. Additionally, a back-up geophysical instrument will be on site and in operating condition. This will be used if an instrument becomes unusable during the work day. Arrangements shall be made with a spare parts supplier so that any spare parts needed can be delivered to the site by overnight delivery or equivalent means.

### **4.8 CORRECTIVE ACTION**

4.8.1 The following procedures have been established to assure that conditions adverse to quality such as malfunctions, deficiencies, deviations, and errors are promptly investigated, documented, evaluated, and corrected.

4.8.2 Adverse Conditions and Corrective Actions. When a significant condition adverse to quality is noted in the field or at other subcontractor locations, the cause of the condition will be determined and corrective action taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned will be documented and reported to the site team leader, project manager, QA manager, and involved subcontractor management. Implementation of corrective actions will be verified by documented follow-up action. All project personnel have the daily responsibility to promptly identify problem areas, solicit approved corrective actions, and report any condition adverse to quality.

4.8.3 Corrective actions will be initiated at a minimum:

- When predetermined acceptance standards are not attained;
- When procedures or data compiled are determined to be faulty;
- When equipment or instrumentation is found faulty;
- When quality assurance requirements are violated;
- As a result of system and performance audits; and/or
- As a result of management assessment.



## **4.9 QUALITY ASSURANCE REPORTS**

4.9.1 During the project, the Quality Assurance Manager will prepare at least one quality assurance report to discuss:

- The periodic assessment of measurement data accuracy, precision, and completeness; and
- Significant quality assurance problems and corrective actions taken.

4.9.2 In addition, the Parsons ES Project Manager will receive periodic updates concerning quality assurance in the field or with the GIS. A final report prepared upon completion of the project may include a separate data assessment report summarizing data quality information.

## **4.10 OVERALL QC MANAGEMENT**

4.10.1 The overall responsibility for implementing QC activities for this project is the Parsons ES QA manager. Responsibility for field OE/UXO operations QC rests with the UXO subcontractor QC manager. A list of responsibilities for these two QC roles is provided in Section 3.0 of this WP.

4.10.2 The Parsons ES and UXO subcontractor project managers will have overall responsibility for assigning QC responsibilities and ensuring that QC programs are implemented in accordance with the CEHNC SOW.

## **4.11 FIELD INVESTIGATION DOCUMENTATION**

### **4.11.1 Daily Field Activity Records**

Field activity logbooks will be maintained daily, if applicable, and all entries will be recorded in ink. All personnel will use bound and numbered field logbooks with consecutively numbered pages. The following logs will be maintained.

#### **4.11.1.1 Daily Activity Log**

- Date and recorder of field information;
- Start and end time of work activities including breaks, lunch, and down times;
- Visitors;
- Weather conditions;
- Relevant events;
- Important phone calls;
- Changes from approved or planned work instructions; and
- Signature of the Parsons ES site manager indicating concurrence.

#### **4.11.1.2 Safety Log**

- Date and recorder of log,

- Tailgate safety briefing (time conducted and by whom),
- Weather conditions,
- Significant site events relating to safety,
- Accidents,
- Stop work due to safety,
- Safety audits, and
- Signature of the Parsons ES site manager indicating concurrence.

#### **4.11.1.3 Training Log**

- Date and recorder of log;
- Nature of training (personnel will complete the Parsons ES and the UXO documentation of training form);
- Visitor training; and
- Signature of both the Parsons ES and The UXO subcontractor site managers, indicating concurrence.

#### **4.11.1.4 QC Activity Log**

- Date and recorder of log;
- Equipment calibration;
- Equipment monitoring results;
- QC audits;
- Nonconformance reports; and
- Signature of the Parsons ES site manager and the senior UXO supervisor, indicating concurrence.

#### **4.11.1.5 Ordnance Accountability Log**

- Date and recorder of log;
- Assigned identification number;
- Type, condition, and location;
- Disposition; and
- Signature of the Parsons ES site manager and the senior UXO supervisor, indicating concurrence.

#### **4.11.2 Photographic Records**

Photographic records, in addition to the required site videotape, will be maintained by site personnel. Significant activities will be documented by 35-mm color prints and/or by videotape. Photographic records will be used to supplement information recorded in the daily activity logs, including photographs of equipment prior to use, typical ordnance

items, and the condition of sites prior, during, and after any activity. Photographs will be maintained in a photograph logbook with appropriate labels identifying the negative and a complete description of the photograph subject.

#### **4.11.3 Working Map**

Working maps or sketches of the sampling sites will be used to document ordnance locations during excavation and removal activities. As UXO is located and identified, the assigned technician will record (on the working map) the location and corresponding log entry number in the Ordnance Accountability Log. If a large number of OE/UXO items are found, such as a burial site, the area will be marked on the working map along with the total number of OE/UXO items found at that site.

#### **4.11.4 Records Of Inert Ordnance Items**

4.11.4.1 Inert ordnance items and nonhazardous scrap will be disposed of through a local civilian scrap yard at no cost to the government. Appropriate documentation will be obtained from the scrap dealer as instructed by CEHNC.

4.11.4.2 Parsons ES will prepare a certificate to be signed by the senior UXO supervisor. The certificate will state the following:

“I certify that the property listed hereon has been inspected by me, and, to the best of my knowledge, contains no items of a dangerous nature.”

\_\_\_\_\_ Date \_\_\_\_\_

Senior UXO Supervisor

#### **4.11.5 Field Office/Communications**

Field QC procedures will include establishing field office entry requirements and communication protocols. A field office will be established within the property boundaries of OOU6. All official visitors will report to the project field office to sign in. No one will be allowed to visit any portion of the site without an escort. All visitors will be announced to the site via a two-way radio if the visitors are touring the actual site work areas. All internal communications will be by use of Motorola MTX portable and base station equipment, or equivalent. All official external communications shall be via cellular telephone or land line from the field office.

### **4.12 DESIGN QUALITY ASSURANCE**

4.12.1 During the detailed design phase, the project will receive formal, in-house, and technical reviews conducted at approximately 30, 60, and 90 percent completion. The purpose of each review is to ensure that the latest company-wide

experience is being incorporated into the design and to constructively critique the project. Constructability reviews will be included in both of these sessions.

4.12.2 The Technical Director for design effort on this project is Mr. Robert Thoem. Mr. Thoem is a registered professional engineer in South Carolina and has extensive design and construction management experience obtained during 30 years of consulting for governmental and industrial clients. Mr. Thoem is well suited to his role as Technical Director for design effort on this project. Mr. Ken Stockwell, also a registered professional engineer will perform in the role of Design Quality Assurance coordinator. Under the directorship of Mr. Thoem, Mr. Stockwell will coordinate internal formal reviews of all design documents.

4.12.3 All design related documents will receive an intra-discipline and inter-discipline reviews by a technically qualified Parsons ES staff.

## **5.0 SAFETY PROCEDURES**

This section outlines safety and health procedures to be employed for all field investigation activities conducted at OOU6. Detailed safety procedures for the use of explosives in detonating OE/UXO at the site are provided with this WP as Appendix C. A detailed SSHP is provided with this WP as Appendices D and E.

### **5.1 OE/UXO SAFETY**

5.1.1 Any suspected or known OE/UXO encountered during geophysical survey operations will be clearly marked and its position annotated on the appropriate map. The UXO Supervisor will evaluate all encountered UXO and determine if the work planned for the area can safely continue or what actions must occur prior to commencing work. Such recommendations will be made immediately to the senior UXO supervisor who will contact the Parsons ES Site Manager. The senior UXO supervisor will be notified of the discovery and of the conclusion made by the UXO supervisor. The Senior UXO Supervisor will immediately notify the Parsons ES Site Manager of any discovery which in his opinion, warrants a review of current procedures or work stoppage.

5.1.2 In accordance with the SOW, if a CWM is encountered, all field operations will cease, and the area will be secured by two UXO specialists. The UXO personnel will notify the CEHNC safety representative for guidance.

5.1.3 Except for the intrusive investigation of geophysical contacts, within sampling grids, and establishment of a calibration grid for the EM-61, no intrusive activities are authorized by personnel at any time without authorized modifications to delivery order SOW.

### **5.2 SITE CONTROL**

5.2.1 On discovery of suspected OE/UXO, the work zone will be reevaluated based on the net explosive weight to determine the suitability of the work zone. Fragmentation distances will be calculated per EODB-60A-1-1-f.

5.2.2 On discovery of suspected OE, the UXO team leader will investigate the item and determine its hazard. If in the opinion of the UXO team leader and Senior UXO Supervisor, the item can remain undisturbed without presenting a safety concern to personnel, the item will be marked for avoidance and work may resume in the grid. Items which present a safety concern will be marked and immediately disposed of by detonation. Only the demolition crew and CEHNC Safety Specialist will be permitted in the exclusion zone until the item has been destroyed and the "all clear" is announced by the Senior UXO Supervisor.

5.2.3 Due to the distance between sampling grid sites and the large size of OOU6, overall site control through one point is not feasible. The rural setting should inhibit frequent trespassing; however, the potential for hikers and horseback riders to enter the immediate site areas exists and must be prevented. All employees working on site will remain vigilant for unauthorized personnel. If necessary, civilian authorities may be called upon to ensure site security.

### **5.3 GENERAL SITE UXO AND SAFETY PROCEDURES**

5.3.1 General site safety procedures listed in this section will be followed throughout this project, in addition to USACE safety concepts and considerations for UXO as described in the Explosives Safety Precautions (Appendix C), SSHP (Appendix E), and Demolition/Disposal SOP (Appendix F).

5.3.2 UXO operations will not be conducted during the hours from sunset to sunrise or during electrical storms or other severe weather conditions.

5.3.3 A minimum of two UXO technicians will be present during all UXO operations, so that one may always act as a safety observer.

5.3.4 All UXO encountered will be reported to the Senior UXO Supervisor, and appropriate measures will be chosen to safeguard the area.

5.3.5 During all OE/UXO confirmation operations, only the minimum number of personnel (two) required to safely perform the task will be allowed onsite. All others will evacuate to a predesignated assembly point.

## **6.0 PUBLIC AFFAIRS**

Mr. Wayne Bogan, Charleston District life cycle project manager, will be the overall coordinator for public affairs on this project. The following protocol will be followed during execution of this WP:

- All communications and contacts with the public will be under the direction of Mr. Bogan.
- All public information/contacts made during the project will be documented and forwarded immediately to Mr. Bogan.
- If public meetings are warranted under this delivery order, Parsons ES will maintain records as requested by CEHNC.

## **7.0 OE/UXO OPERATIONAL PLAN**

Based on data from previous investigations, sampling sites have been selected to provide site characterization data for the Engineering Design process at OOU6. A geophysical survey layout comprising of 300, 50 by 50 ft, grids will be selected for geophysical investigation for suspected subsurface OE. The site characterization effort will be performed using the field investigation equipment listed in Appendix G. The following general methods and procedures will be followed for all instances of OE discovery during Engineering Design sampling activities:

### **7.1 IDENTIFICATION**

- Right-of-entry to the sites will be obtained by the Charleston District.
- Excavations greater than 4 ft will not be performed without prior approval from the CEHNC safety representative.
- Any suspected or known OE/UXO encountered during excavation will be clearly marked and its position annotated on the appropriate map. The site UXO supervisor will evaluate the UXO item found and immediately report the condition of the item to the senior UXO supervisor.
- A detailed account of all materials (OE and non-OE) encountered during the surface/subsurface investigation will be maintained.
- If the material is OE, the amounts, identification/condition, and disposition will be accounted for.
- If the material is non-OE (e.g., metallic debris), it will be accounted for as pounds per acre.
- All access holes will be refilled and compacted upon completion of the excavation.

### **7.2 SAFETY PROCEDURES**

The following safety procedures will be followed during identification of the suspected OE material at OOU6:

- EM-61 (or other detectors) operators or other non-UXO qualified personnel will not be allowed to perform UXO operations (e.g., gaining access to subsurface UXO, identification, transportation, storage, and disposal of UXO).
- UXO operations will not be conducted during the hours from sunset to sunrise or during electrical storms or other severe weather conditions.
- A minimum of two UXO personnel, trained as per 29 CFR 1910.120, will be present during all UXO operations.



- During all OE confirmation operations, only the minimum number of personnel (two) required to safely perform the task will be allowed onsite. All others will evacuate to a pre-designated assembly point.
- All access, identification, and disposal/venting procedures of OE will be accomplished by a UXO specialist.

### **7.3 DISPOSAL/VENTING**

The following methods and procedures will be followed for the disposal/venting of OE encountered during surface/subsurface investigation.

#### **7.3.1 Disposal Areas**

All disposal areas will be clearly marked and, during disposal operations, total site control **MUST** be maintained to ensure that no one is admitted to or gains access to the area other than those involved in the disposal operation. An accountability system will be used for all explosive materials expended in the disposal of UXO.

#### **7.3.2 OE/UXO Disposal and Explosive Venting**

7.3.2.1 If UXO is encountered that cannot be destroyed in place, the CEHNC safety specialist will be notified, and a decision will be made on the disposal procedure.

7.3.2.2 If possible, prior to the end of each work day, all OE located, identified, and accounted for that requires disposal by detonation or explosive venting, will be disposed of in place. After explosive charges have been set, the shot will be covered with earth or sand. Destruction of OE will be accomplished by detonation using electrical firing systems to ensure maximum control and safety. Disposal by detonation will be conducted within approved-EOD procedures and DoD regulations and guidelines (e.g., disposal by detonation will not occur during electrical storms; a 30-minute wait period will be observed for all misfires). All disposed UXO will be set up and detonated one shot at a time. Upon completion of disposal shots, the area will be checked for low orders and/or kickouts in accordance with the SSHP and the OE Operational Plan. Any fuzed kickouts and/or low ordered ordnance will be considered armed and will not be moved until a determination has been made that they can be transported safely.

7.3.2.3 This site presents possible explosive hazards from various projectiles. One of the following disposal procedures will be used:

- UXO will be vented using a small-shaped charge placed on top or along side the UXO that will penetrate through the casing. If the projectile is live, it will detonate as designed; if the projectile is inert-filled, it can be considered explosively vented and staged as scrap metal. If there is any doubt after venting as to the condition, the UXO will be disposed of in place. This procedure incorporates the least amount of explosives for disposal. Firing procedures will be determined on a case-by-case basis.
- Using a suitable amount of high explosive, UXO will be destroyed in place.

## **8.0 ENVIRONMENTAL RESOURCES PROTECTION PLAN**

An ERPP, attached to this WP as Appendix H, has been prepared to ensure compliance with the National Environmental Policy Act (NEPA) and Army Regulation (AR) 200-2, so that activities at the site minimize potential adverse environmental impacts. The ERPP will observe and comply with all applicable South Carolina state and local statutes and regulations.

## REFERENCES

- Environmental Science and Engineering, Inc. (ESE). 1996. Draft Work Plan. *Engineering Evaluation/Cost Analysis Former Camp Croft Army Training Facility, Spartanburg, South Carolina*. Prepared for U.S. Army Engineering and Support Center, Huntsville, January 1996.
- Environmental Science and Engineering, Inc. (ESE). 1996a. *Engineering Evaluation/Cost Analysis Former Camp Croft Army Training Facility, Spartanburg, South Carolina*. Prepared for U.S. Army Engineering and Support Center, Huntsville, January 1996.
- Environmental Science and Engineering, Inc. (ESE). 1996b. *Evaluation and Mapping, Former Camp Croft Army Training Facility, Spartanburg, South Carolina*. Prepared for U.S. Army Engineering and Support Center, Huntsville, January 1996.
- Environmental Science and Engineering, Inc. (ESE). 1996c. *Former Camp Croft Final Supplemental Archive Search Report*. Prepared for U.S. Army Engineering and Support Center, Huntsville, July 1996.
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- U.S. Environmental Protection Agency (EPA). 1993. *Guidance on Conducting Non-time-Critical Removal Actions Under CERCLA*. Publication 9360.0-32, 8/93.
- U.S. Environmental Protection Agency. 1990. *Superfund Removal Procedures, Action Memorandum Guidance*, EPA/540/P-90/004, 12/90.
- U.S. Army Corps of Engineers (USACE), Rock Island District. 1994. *Ordnance and Explosive Waste Archives Search Report for the Former Camp Croft Army Training Facility*, April, 1994.
- U.S. Occupational Health and Safety Administration (OSHA). 1994. *Hazardous Waste Operations and Emergency Response Training Regulations*. 40 CFR 1910.120, 7/94.
- Code of Federal Regulations (CFR). 1993. *National Oil and Hazardous Substances Pollution Contingency Plan (NCP)*. 40 CFR 300.415, 7/93.
- South Carolina Department of Parks, Recreation, and Tourism (SCDPRT). 1989. *Croft State Park Management Plan*.

**APPENDIX A**  
**STATEMENT OF WORK**

**APPENDIX A  
ANNEX K**

**STATEMENT OF WORK  
ENGINEERING DESIGN  
Ordnance Operable Unit (OOU) 6  
FORMER CAMP CROFT  
SPARTANBURG, SOUTH CAROLINA**

23 September 1996

**1.0 BACKGROUND AND GENERAL STATEMENT OF WORK:** The work required under this Scope of Work (SOW) falls under the Defense Environmental Restoration Program - Formerly Used Defense Sites (DERP-FUDS). Ordnance explosives (OE) exists on property formerly owned by the Department of the Army.

1.1 Explosive ordnance is a safety hazard and constitutes an imminent and substantial endangerment to site personnel and the local populace. During this engineering design, it is the Government's intent that the A-E perform a records search, grid or sector the Operable Unit 6 area for this design, evaluate the density of ordnance and depths, and recommend sectors for no further action, surface clearance only, clearance to a specified depth. Ordnance encountered during this design effort shall be destroyed, by detonation, on-site. This action will be performed in substantial compliance with the Comprehensive Environment Response, Compensation, and Liability Act (CERCLA), Section 104 and the National Contingency Plan (NCP), Section 300.400; therefore, permits for on-site disposal are not required.

1.2 This ordnance action does not fall under the RCRA hazardous waste management requirements.

1.2.1 Per the Department of the Army Policy, the applicable provisions of 29CFR 1910.120 apply.

1.2.2 Due to the inherent risk in this type of operation, the UXO contractor shall be limited to a 40-hour work week: either five 8-hour days or four 10-hour days. UXO personnel shall not perform UXO-related tasks more than 10 hours per day.

1.3 General Description :The former Camp Croft Training Facility was approximately 19,044.46 acres and was approximately 5 miles southeast of Spartanburg, South Carolina. Current land usage is approximately 7,088.08 acres for Camp Croft State Park, 4,936.24 acres for farming, 256 acres for private industry, and 6,764.14 acres of residential used to include a public golf course. This SOW pertains to Ordnance Operable Unit (OOU) 6 as identified by the Engineering Evaluation/Cost Analysis (EE/CA), Former Camp Croft, January 1996.

1.3.1 Ordnance Operable Unit 6 - Ordnance Operable Unit 6 (OOU6) is located within the boundaries of former Camp Croft, but outside Croft State Park. It is situated off of Mimosa Lake Road and is adjacent to the south of U.S. Highway 176 Bypass. The property is privately owned and is used for tree planting. The owner plans to develop the property for industrial use, including landfills. The potential exists for future construction of ponds and buildings on the property.

1.3.2 A Time Critical Removal Action (TCRA) was conducted at the time of the EE/CA sampling effort due to reported and confirmed findings of 105 mm projectiles on the property. ESE was directed by CEHNC to investigate four areas within the boundaries of the TCRA, including the planned "compost B" area, the "poppy field", the proposed location of "landfill No. 2", and one unnamed area. These areas were designated as Grids 61, 62, 88, and 87, respectively. Grids 61 and 62 were investigated on October 28 and 29, 1994, and Grids 87 and 88 were investigated January 17 through 23, 1995.

1.3.3 The investigation of Grids 61 and 62 consisted only of magnetometer surveys and recording of anomalies. No intrusive operations were conducted. However, investigation of Grids 87 and 88 included both magnetometer surveys and intrusive operations. Significant UXO findings included one 81mm illumination round, five 105mm projectile rounds, and numerous fragments in Grid 87. No UXO was found in Grid 88. All recovered UXO was detonated in place by UXO qualified personnel.

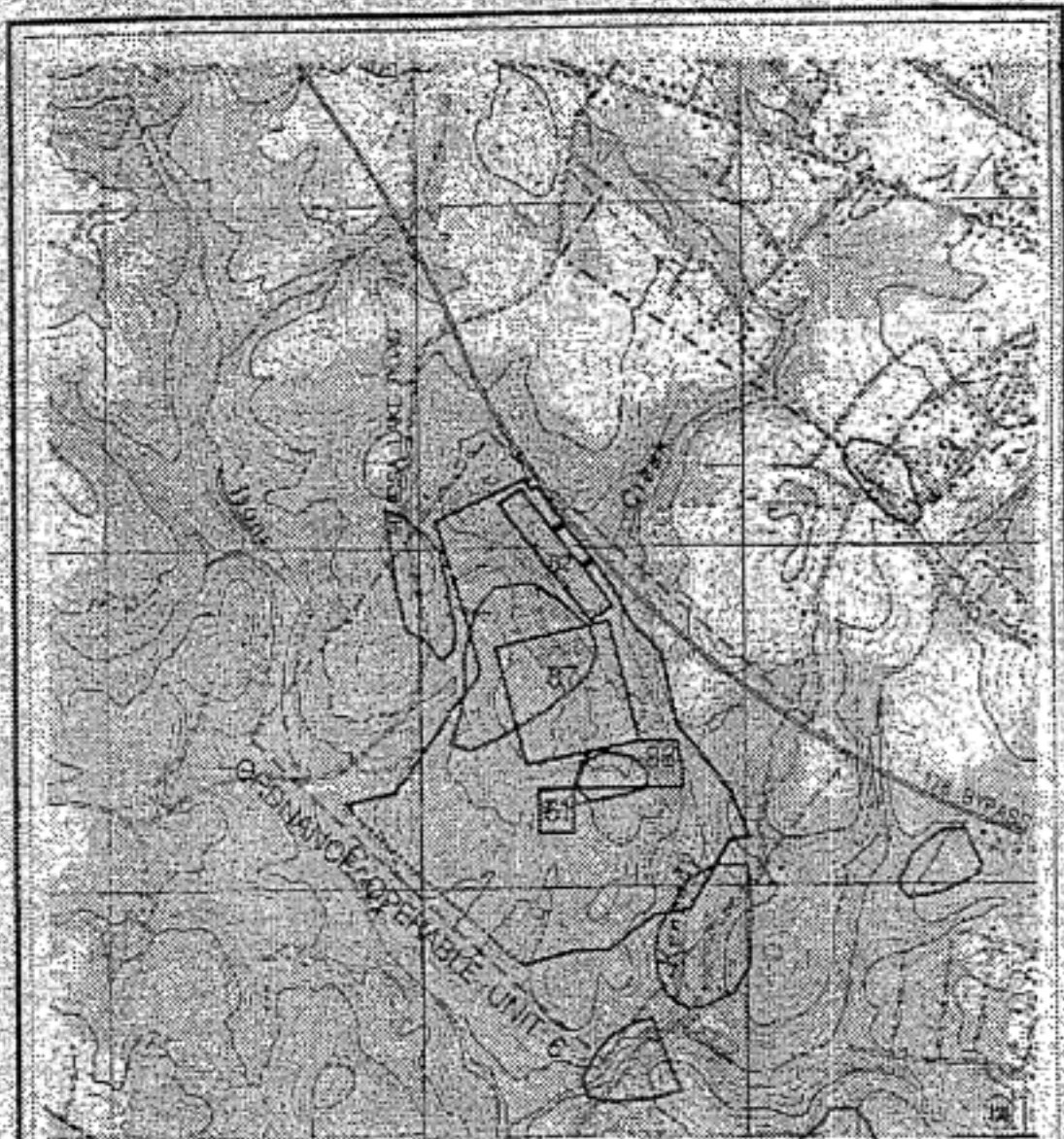
1.3.4 Figure 1 shows the locations of the grids. The table below summarizes the configuration, sampling methodology, anomalies recorded, anomalies investigated, and OE findings for each grid within OOU6.






1.3.5 The TCRA was completed on January 19, 1995, and resulted in the discovery of four UXO items over the entire work area.

OEW/UXO Findings at Former Camp Croft

Grid	Configuration (ft)	Sampling Method	Anomalies Recorded/ Investigated	OEW/UXO Findings (quantity in parentheses)
Ordnance Operable Unit 6				
61	Linear	none	372/0	none
62	Linear	none	709/0	none
87	Rectangular	other	218/218	105mm smoke canisters (9), 60mm (4) and 81mm (7), mortar parts, fragments
88	Irregular	other	42/42	fragments

1.3.6 The site's proximity to public roads and inhabited areas may create a physical security situation during demolition operations that shall be addressed in the work plan.



-  APPROXIMATE BOUNDARY OF FORMER CAMP CROFT
-  CROFT STATE PARK ROADWAY
-  ORDNANCE OPERABLE UNIT
-  BETA BARRACKS
-  POSITION OF B115



SCALE 1" = 1500'

Figure 1  
ORDNANCE OPERABLE UNIT 6

FORMER CAMP CROFT ARMY  
TRAINING FACILITY  
SPARTANBURG, SC  
U.S. ARMY CORPS OF ENGINEERS  
HUNTSVILLE DIVISION



**2.0 OBJECTIVE:** Perform an Engineering Design that shall recommend and justify areas/ sectors to be remediated and depths of remediation. This design shall be implemented by a follow-on contractor. This design shall be accomplished as follows:

### **3.0 DESCRIPTION OF SERVICES:**

#### **3.1 (TASK 1) PREPARE WORK PLAN:**

3.1.1 The A-E shall review existing work plans that have been approved for Camp Croft and shall utilize the approved work plan to the maximum extent possible in the development of a work plan for this task order. The WP shall outline the A-E's proposed methodology of accomplishing the objective. This shall include site-specific training, UXO-related procedures and practices, equipment, administrative area equipment, demolition materials and their security and accountability system, personal protective equipment, responsibilities and qualifications of personnel, organizational structure to include subcontractor(s), if applicable, internal and external communications, project site office, a project schedule, UXO safety and site general safety to include snakes, ticks, and other flora and fauna, quality control procedures, on-site and off-site emergency medical arrangements to include transportation, and the completion of ENG Form 3394 in the event of an accident. All UXO-related procedures shall comply with CEHNC Safety Concepts and Basic Considerations for UXO.

3.1.2 Additionally, the WP shall include maps in sufficient scale to clearly identify the OOU6 investigation grids. The grids identified for geophysical and intrusive action shall be sufficient to determine which areas warrant no further action, surface clearance, and clearance to a specified depth. Documented areas proposed for future development shall contain a greater number of field sampling grids than areas proposed for no development. The A-E shall propose and justify sampling lanes, grids, etc. to adequately characterize the OOU6 location for subsequent remediation. The drawings and maps shall be placed upon the GIS. Sites such as the existing landfills and the TCRA areas, or physical features that a remediation effort would not be warranted, should be deleted from the overall OOU6 design effort with location boundaries and justification for no action clearly stated in the work plan.

3.1.3 If disposal by detonation is not feasible, the contractor shall describe feasible alternatives for disposal and recommend the safest and most cost-effective method of treatment and disposal of OE encountered during sampling activities. The method of treatment shall be recommended by the A-E and approved by the contracting officer.

3.1.4 The WP shall include the following subplans:

3.1.4.1 UXO Operational Plan.

3.1.4.2 Site-specific Safety and Health Plan (SSHP). The contractor shall submit a SSHP IAW 29CFR 1910.120 that contains OE safety standards and procedures. The A-E shall review all

available site information and develop the necessary safety and health documents sufficient to protect on-site personnel, the environment and potential off-site receptors. The A-E shall utilize the services of qualified personnel, as defined in ER-385-1-92 to oversee the development and implementation of the required safety and health documents as defined in Section 5 of this SOW.

3.1.4.3 Equipment Plan (EP). The contractor shall prepare and submit a detailed EP (as a WP subplan) describing the equipment to be employed to perform all necessary operations. It is the responsibility of the A-E to insure that the appropriate geophysical methods and equipment are applied to investigate and discriminate anomalies.

3.1.4.4 Location Survey and Mapping Plan.

3.1.4.5 Environmental Protection Plan.

3.1.4.6 Quality Control Plan. The A-E shall prepare a plan describing the A-E's Quality Control for the project. Note that the A-E is responsible for developing and implementing only the project QC. The government will perform Quality Assurance (QA).

3.1.4.7 Work, Data, and Cost Management Plan. The A-E shall develop and implement a plan that describes how the data and information collected in this project will be collected, stored and evaluated. This section will also describe, in detail, the process by which raw data is assimilated into a Geographical Information System (GIS), if applicable.

3.1.4.8 Technical and Management Plan. The A-E shall describe anticipated geophysical investigations and the excavation of representative areas. The A-E shall propose and justify methods and procedures that are well suited to the anticipated site conditions. The A-E shall consider technical requirements for site characterizations as well as safety and security regulations applicable to this site. The plan shall describe the goals, methods, procedures and personnel used for field sampling and data gathering activities. The geophysical instrumentation used shall be capable of detecting a round at a specified depth. Field instrumentation shall be field tested daily to ensure that it is operating properly. This shall be accomplished by planting an inert round or very similar magnetic inert item at a specified depth and determining the standard indication. The depth and type of round(s) shall be identified and addressed in the Work Plan. If an instrument does not meet the standard during the daily check, it shall be calibrated, repaired or replaced.

3.1.4.9 Regulatory Compliance Plan (RCP). The A-E will provide a list of potential applicable or relevant and appropriate requirements (ARARs) and make an initial determination as to their actual applicability to the project. The RCP shall describe how the A-E will maintain compliance with ARARs during field investigation activities. The A-E should also note that evaluation of ARARs is an iterative process which the A-E shall perform throughout the life of the project, and particularly when evaluating and recommending an appropriate removal response.

3.1.4.10 Subcontractor Management Plan. The A-E shall prepare a plan describing, in detail, methods and procedures to maintain control of all subcontractor activities.

3.1.4.11 Scrap Waste Disposal Plan. The A-E shall describe how scrap waste shall be handled at the site. The plan shall describe if the waste must be containerized; type of containerization method; acceptable disposal facilities; site storage and security; transportation; manifesting; and storage time limits.

**3.2 (TASK 2) SITE CHARACTERIZATION:** The A-E shall characterize OOU6 site as identified in the Work Plan and including, but not necessarily limited to, the following activities:

3.2.1 Geophysical Investigations. The A-E shall implement geophysical investigations as described in the approved Work Plan.

3.2.2 Intrusive Investigations. The A-E shall, utilizing qualified personnel, implement site UXO sweeps as described in the approved Work Plan in order to actually locate OE at these sites. All anomalies shall be excavated to the depth(s) as identified and approved in the WP. This excavation is intended for site design characterization.

3.2.3 UXO Destruction. The A-E will be responsible for the destruction of UXO encountered during site investigations and characterizations utilizing an approved UXO subcontractor and in accordance with all aspects of the project Work Plan.

3.2.3.1 All fuzed UXO encountered during this project and all UXO determined to be unsafe to move shall be "blown in-place".

3.2.3.2 All UXO operations shall comply with the U.S. Army Corps of Engineers, Huntsville Division, Safety Concepts and Basic Considerations for Unexploded Explosive Ordnance (UXO). Only USAESCH approved UXO personnel shall perform UXO-related tasks.

3.2.3.3 The contractor shall maintain a detailed accounting of all UXO encountered on the project site. This accounting shall include the amounts of UXO, identification, condition, depth located, disposition and location/mapping. This accounting shall be a part of the Design Report.

3.2.3.4 An accountability system shall be used that accounts for all demolition materials expended in the disposal of UXO.

3.2.3.5 If a scenario is encountered that precludes detonating an UXO in place, an unidentifiable UXO is found, or a suspected toxic chemical munition is found, the on-site USAESCH Safety Specialist will request EOD support.

3.2.3.6 If an excavation is required in an area of endangered/ protected plant or animal, excavation shall proceed only after approval by the Charleston District Environmental personnel.

3.2.3.7 Unless approved by the USAESCH Safety Specialist, all recovered UXO shall be disposed of daily.

3.2.3.8 All access/excavation/detonation holes shall be backfilled to grade and reseeded/sodded with indigenous grass as directed by the contracting officer.

3.2.4 Surveying. The A-E shall perform location surveys as described in the approved Work Plan. The surveying performed by the A-E will be utilizing accuracy and methods that are fully compatible with the site GIS, and shall utilize Government provided base maps. Additional survey requirements are identified in Paragraph 3.3.

3.2.5 Turn in of Recovered Inert UXO and Related Scrap:

3.2.5.1 The contractor shall furnish all necessary personnel and equipment to turn in all recovered inert UXO-related scrap and non UXO-related scrap metal greater than 1 square inch in size. The methodology to accomplish this task shall be proposed in the WP.

3.2.5.2 Inert UXO-related scrap shall be segregated from other types of scrap. Inert ordnance items shall be vented prior to turn in.

3.2.5.3 The contractor shall complete a DD Form 1348-1 and/or local form required by the nearest Defense Reutilization Marketing Office (DRMO). The contractor shall prepare, and the Senior UXO Supervisor shall sign, a certificate as follows:

"I certify that the property listed hereon has been inspected by me and, to the best of my knowledge and belief, contains no items of a dangerous nature."

3.2.5.4 DRMO turn-in documentation receipts shall be submitted as a component of the Removal Report.

3.2.5.5 In the event that DRMO does not accept scrap or is not locally available, the contractor shall arrange for a local scrap contractor to remove the scrap. This shall be done, if possible, at no cost to the government.

3.2.6 Perform Quality Control:

3.2.6.1 The contractor shall furnish the necessary personnel and equipment to administer a Quality Control (QC) Program to manage, control, and document contractor and subcontractor activities. The methodology to accomplish this task shall be proposed in the WP. The QC activities shall be documented and included in the design analysis report.

3.2.6.2 During the Government's periodic QA inspections, if an UXO is located in a grid or if excessive anomalies are located, that entire grid shall be reswept by the contractor at no cost to the government.

3.2.7 All UXO operations shall be closely coordinated with the property owner(s) to prevent disruption of on-going activities (landfill operations) currently being performed by the landowner(s) on the site.

### **3.3 (TASK 3) LOCATION SURVEYING AND MAPPING:**

3.3.1 Surveying. The Contractor shall perform all location surveys and mapping required to establish boundaries of areas specified in the work plan and design report and as required to support the project. During all field and intrusive activities, the survey crew shall be accompanied by a UXO specialist who shall perform a UXO survey in each area prior to the surveyors starting work. Based on site conditions it is possible that a UXO escort will not be required in all areas at all times after the initial site visit. However, such a decision will be made jointly by the on-site safety officer and the CEHNC Safety Specialist who may rescind or modify it at any time. Grid corners shall be established using precision surveying methods. Each corner of each grid area shall be located by establishing the appropriate state plane grid system to the closest 1 foot and shall be both tabulated and shown on maps of the site. Other coordinate systems and accuracy specifications are not acceptable and shall not be used. The Contractor shall mark and survey the corners of the designated grids with stakes or other visible temporary markers. Individual locations of recovered UXOs only shall be tape measured or the "x" and "y" distance estimated from the established grid corners. If subsurface UXOs are encountered, their depth below ground surface shall also be measured. The location of ordnance scrap, ordnance fragments, shrapnel, small arms ammunition and metallic debris shall be recorded only on a "per-grid" basis and not located by coordinates. The use of Total Station, GPS or other precision survey methods to locate individual UXOs, UXO scrap, or geophysical anomalies within a grid shall not be performed. A magnetometer shall be used to survey the location for the establishment of any monuments or markers.

3.3.2 Items and data to be submitted to CEHNC as part of the tasks are as follows:

3.3.2.1 A tabulated list of all control points and a list of all adjusted coordinates established and/or used for this survey.

3.3.2.2 Electronic copies of all survey data, maps, or boundary controls information developed during this action. These files shall include all CADD drawing in Microstation (Version 5.0) format, all raw field notes, or any GPS triangulations in ASCII format.

### 3.4 (TASK 4) DESIGN PACKAGE for UNEXPLODED ORDNANCE REMOVAL at OOU6.

3.4.1 The A-E shall prepare a Design Package for a follow on remedial action contract. The Design Package shall be provided to the U.S. Army Engineering and Support Center, Huntsville for CEHNC's contract action. The Design Package shall consist of an Executive Summary, Design Report, Specifications, Drawings and a detailed Cost Estimate.

3.4.1.1 Executive Summary. The Executive Summary shall consist of the following: the purpose of the project, site conditions and background, site characterization conclusions and findings, recommendations for follow on remediation action and estimated cost. The Executive Summary shall include drawings, photographs, maps, charts, etc., as required to clearly delineate the work proposed. The Executive Summary shall be submitted as a separate stand alone document.

3.4.1.2 Design Report. The Design Report shall consist of the following:

3.4.1.2.1 Design Analysis. Design calculations, assumptions, and field results that were needed to complete the design effort.

3.4.1.2.2 Risk Assessment. The A-E shall utilize a UXO risk assessment model provided by the Contracting Officer to perform the risk assessment. The A-E shall evaluate the risk that the site represents to human health and the environment. The risk evaluated shall be related to site safety related OE and shall not consider chronic health effects which could result from chemical constituents of OE. The A-E shall collect the data items (for the applicable site type) to be used in the OE Cost/Risk Effectiveness Program (OE Cert).

3.4.1.2.3 All original surveying and mapping data.

3.4.1.2.4 Detailed accounting of all UXO and UXO-related materials located and destroyed.

3.4.1.2.5 A daily journal of all field activities associated with this SOW.

3.4.1.2.6 A recapitulation of exposure data. This shall include total number of man-hours worked on site.

3.4.1.2.7 QC documentation.

3.4.1.2.8 DRMO or local scrap dealer turn-in documentation.

3.4.1.2.9 After the site investigation is complete and the baseline site risk is assessed, the A-E shall identify and analyze removal alternatives. Then, based on close consultation with the Contracting Officer, the A-E shall recommend a preferred removal action.

3.4.1.2.10 A minimum of 20 4" X 6" color photographs shall be included in the report depicting major action items and UXO discoveries. The original, Final Report furnished to USAESCH shall include original photographic prints. Photographs contained in draft submissions and copies of final submissions shall be color reproductions. Further, a minimum of 45 minutes of narrated video tape depicting all activities shall be provided in two copies to USAESCH.

3.4.1.2.11 A written record of all endangered plants and animals destroyed during the OE removal activities on site. The contractor shall include all restoration efforts performed as required in this SOW.

3.4.1.2.12 A copy of all CEHND Form 948s issued.

3.4.1.3 Specifications. The specifications shall clearly describe site specific concerns and how the follow on remedial work shall be accomplished. The specifications at a minimum shall discuss the following elements:

- o Summary of the work to be accomplished
- o Site Description
- o Special Clauses (i.e. site access, environmental protection, work hours, etc.)
- o Safety, Health and Emergency Response
- o Temporary Construction Facilities
- o Demolition Site(s)
- o Site Restoration
- o Permits and Required Submittals
- o Transportation and Disposal of Ordnance and scrap
- o Bid schedule
- o Requirements for the Closure report

3.4.1.4 Drawings. Drawings shall clearly identify at a minimum where and at what depths excavations are to be conducted, removal boundaries for the various sectors, temporary facilities, and site restoration. The design shall utilize the ordnance data gathered in the field to prepare sectors for removal actions. All work shall be performed under the general supervision of a Professional Engineer registered in the State of South Carolina. The design package shall be signed by the registered State of South Carolina P.E.

3.4.1.5 Cost Estimate. The cost estimate shall be protected and submitted under separate cover to the US Army Engineering and Support Center, Huntsville (CEHNC) only and shall be protected as "Official Use Only". Options shall be incorporated into the design package to define and manage changes in the extent of ordnance removal.

**3.5 (TASK 5) MEETINGS:** The contractor shall attend and participate in up to 3 meetings with DoD, regulatory, civilian personnel, and the public as directed by the Contracting Officer.

One of the meetings may be a Public Meeting in which the A-E may be required to prepare a briefing to include view graphs, charts, maps, handouts, etc.

#### **4.0 SUBMITTALS AND CORRESPONDENCE:**

4.1 Format and Content of Engineering Reports. Engineering Reports presenting all data, analyses, and recommendations shall be prepared. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features. The contents and format of the engineering reports shall be arranged in accordance with all pertinent guidance documents. When drawings are required, data may be combined to reduce the number of drawings. Reports shall consist of 8-1/2" X 11" pages with drawings folded, if necessary, to this size. A decimal paragraphing system shall be used, with each section and paragraph of the reports having a unique decimal designation. The report covers for each submittal shall consist of durable 3-ring binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A report title page shall identify the site, the A-E, the US Army Engineering and Support Center, Huntsville (CEHNC), and the date. The A-E identification shall not dominate the title page. All data, including raw analytical and electronic data, generated under this contract are the property of the Department of Defense and the government has unlimited rights regarding its use. All work performed by the A-E shall, so far as possible, be designed and implemented in a manner which compliments earlier and ongoing environmental work at Camp Croft, and in particular, the TCRA and the EE/CA. The specifications, drawings, and cost estimate shall be prepared in accordance with CEHND-1110-1-1, Oct 1994, "Design Manual for Architect Engineers". All work shall be performed under the general supervision of a Professional Engineer registered in the State of South Carolina. All work shall be performed in accordance with the State of South Carolina, U.S. EPA and U.S. Army Corps of Engineers requirements as indicated in the current guidance documents listed in Section 8.

4.2 Review Comments. Various reviewers will have the opportunity to review submittals made by the A-E under this DO. The A-E shall review all comments received through the CEHNC Contracting Officer and evaluate their appropriateness based upon their merit and the requirements of the SOW. The A-E shall issue to the Contracting Officer a formal, written response to each comment no later than 10 days after the A-E receives the comment. All versions of the report shall include a concise yet thorough executive summary. An appendix shall be provided to include a response to all regulatory, public, and Government review comments.

4.3 Draft Reports. Each page of draft reports shall be stamped "DRAFT". Submittals shall include incorporation of all previous review comments accepted by the A-E.

4.4 Identification of Responsible Personnel. Each report shall identify the specific members and title of the A-E's staff and subcontractors which had significant, specific input into the reports' preparation or review. All final submittals shall be sealed by the registered Professional Engineer-In-Charge.



4.5 Presentations. The A-E shall make presentations of work performed according to the schedule in paragraph 4.13. The presentation shall consist of a summary of the work accomplished and anticipated followed by an open discussion among those present.

4.6 Minutes of Meetings. Following the presentation, the A-E shall prepare and submit minutes of all meetings attended to the Contracting Officer within 10 calendar days.

4.7 Correspondence. The A-E shall keep a record of each phone conversation and written correspondence affecting decisions relating to the performance of this DO. A summary of the phone conversations and written correspondence shall be submitted with the monthly progress report to the Contracting Officer.

4.8 Project Control and Reporting. The A-E shall prepare and submit a master network schedule, cost and manpower plan, monthly progress reports, technical progress reports, monthly individual performance reports and cost/schedule variance report, work task proposals, and a program control plan in accordance with the basic contract SOW.

4.9 Monthly Progress Report. The A-E shall prepare and submit a monthly progress report describing the work performed since the previous report, work currently underway and work anticipated. The report shall state whether current work is on schedule. If the work is not on schedule, the A-E shall state what actions are anticipated in order to get back on-schedule. The report shall be submitted not later than the 10th day of each month.

4.10 Computer Files. All final text files generated by the A-E under this task order shall be furnished to the Contracting Officer in WordPerfect 6.1 or higher software, IBM PC compatible format. All final drawings by the A-E under this DO shall be digitized into a Microstation 5.0 three dimensional design files and furnished to the Contracting Officer on either eight millimeter 5 GB tape or 3.5" floppies. The data will be used on CEHNC's Geographical Information System (GIS) equipment. This equipment consists of INTERGRAPH Corporation T-3 and T-4 dual Intel Pentium work stations running Microstation Version 5.0 under Windows NT.

**5.0 CONTRACTOR QUALIFICATIONS:** The contractor shall furnish a staff that is qualified through education, training and experience that shall accomplish the objective and tasks of this SOW. Federal military and civilian employees shall not be employed by the contractor in the performance of any work under the contract, e.g., during off-duty hours, regular hours or while on annual leave, or terminal leave. Resumes for UXO and other personnel, which document the attached qualifications (Items 10.2.1 - 10.2.7 only), shall be included in the WP for approval. If UXO personnel are substituted at the project site, their resumes shall be approved by the contracting officer prior to their admittance onto the site. Training and medical screening IAW 29CFR 1910.120(e) is required for this project.

**6.0 SUBMITTALS:** The contractor shall furnish copies of the plans, maps, and reports as identified in paragraph 4.1 to each addressee listed below in the quantities indicated. The contrac-

tor shall use express mail services for delivering these plans and reports. Following each submission, comments generated as a result of their review shall be incorporated.

<b>ADDRESSEE</b>	<b>COPIES</b>
US Army Engineering and Support Center Huntsville ATTN: CEHNC-OE-DG (Ms. Patricia Berry) PO BOX 1600 Huntsville, Alabama 35807-4301	10
US Army Engineer District, Charleston ATTN: CESAC-PM-M (Wayne Bogan) PO BOX 919 Charleston, SC 29402-0919	8
US Army Engineer Division, South Atlantic ATTN: CESAD-PM-H (Ms. Sharon Ernst) 77 Forysth Street, SW Atlanta, GA 30335-6801	1
Headquarters, US Army Corps of Engineers ATTN: CEMP-RF (Mr. James Huang) Room 2214-C 20 Massachusetts Avenue, NW Washington, DC 20314-1000	1
Commander, 547th Ordnance Detachment (EODCT) Fort Gillem, GA 30050-5000	1

6.1 Submittals and Due Dates:

<b>SUBMITTAL</b>	<b>DUE DATE</b>
Draft Work Plan	18 October 1996
Final Work Plan	22 November 1996
Draft Design Package	15 April 1997
Draft Final Design Package	5 June 1997
Final Design Package	22 July 1997

The overall completion date of this task order is 22 August 1997.

**7.0 PUBLIC AFFAIRS:** The contractor shall not make available or publicly disclose any data generated or reviewed under this contract or any subcontract unless specifically authorized by the contracting officer and the U.S. Army Engineer District, Charleston (CESAC) Public Affairs Office (PAO). When approached by any person or entity requesting information about the subject of this contract, the contractor shall defer to the PAO for response. Reports and data generated under this contract shall become the property of the Government and distribution to any other source by the contractor is prohibited unless authorized by the contracting officer.

**8.0 REFERENCES:**

8.1 DOD Manual 4160.21.M, Defense Utilization and Disposal Manual.

8.2 AR 200-1, Environmental Protection and Enhancement.

8.3 AR 385-40 with USACE Supplement.

8.4 AR 386-63, Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat.

8.5 EM 385-1-1, CE Safety and Health Requirements Manual.

8.6 TM 9-1300-206, Ammunition and Explosive Standards.

8.7 CEHND Safety Concepts and Basic Considerations for UXO.

8.8 DoD 6055.9 Std. DoD Ammunition and Explosive Safety Standards

**9.0 GOVERNMENT FURNISHED.**

9.1 Former Camp Croft Archives Search Report and Supplemental Archives Search Report

9.2 Rights of Entry (CESAC)

9.3 UXO technical publications/information (USAESCH).

9.4 Available equipment (USAESCH)

9.5 Engineering Evaluation /Cost Analysis

9.6 Abbreviated Site Safety and Health Plan form

9.7 Existing Maps and Digital Orthophotographs of the Former Camp Croft and surrounding areas, in support of this effort.

DATA ITEM DESCRIPTION		FORM APPROVAL OAS NO 07040188	
2. TITLE PERSONNEL QUALIFICATIONS		1. IDENTIFICATION NUMBER OT-025	
3. DESCRIPTION / PURPOSE To describe the qualification requirements for personnel involved in ordnance clearance projects.			
4. APPROVAL DATE (YYMMDD) 960717	5. OFFICE OF PRIMARY RESPONSIBILITY	6. DTIC APPLICABLE	6. GIDEP APPLICABLE
7. APPLICATION / INTERRELATIONSHIP Use for resume submittal documenting the required education and experience of personnel listed below			
8. APPROVAL LIMITATION	9. APPLICABLE FORMS	9. AMSC NUMBER	
10. PREPARATION INSTRUCTIONS Qualifications of proposed key personnel and of personnel filling core labor categories (see para. 10.4, 10.5) shall meet the requirements listed below and shall be submitted in resume form. The resumes shall document all required educational and experience requirements. The other labor categories are provided for the contractor's encouraged use and guidance.			
10.1 Project Manager. This individual shall have at least 3 years experience in general contract project management programs similar in size and complexity to the effort described in the SOW. Exceptions may be submitted to the Contracting Officer for approval.			
10.2 Unexploded Ordnance (UXO) Personnel.			
10.2.1 General. UXO personnel shall be U.S. citizens and graduates of the US Army Bomb Disposal School, Aberdeen Proving Ground, MD or the US Naval Explosive Ordnance Disposal (EOD) School, Indian Head, MD. Credit for 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.			
10.2.2 Senior UXO Supervisor. The Senior UXO Supervisor shall supervise all Contractor on-site UXO activities. The Senior UXO Supervisor shall have served at least 15 years in military EOD assignments, to include at least 10 years in supervisory EOD positions. Three years of documented civilian contractor UXO experience may be substituted for three years of active duty military EOD experience. This individual shall have documented experience supervising multi-team operations involving range clearance actions. This individual shall have pertinent experience with the type of OEW expected to be encountered on the site.			
10.2.3 UXO Supervisor. This individual supervises an UXO Sweep Team/Brush Removal Team/Survey Team, etc. This individual shall have documented experience in range clearance operations and supervising personnel. This individual shall have at least ten years combined active military EOD and contractor UXO experience. Three years active duty military EOD experience is not waivable for this position.			
11. DISTRIBUTION STATEMENT			

OT-025 Continued:

10.2.4 UXO Specialist. This individual shall have more than three years active duty military EOD experience. A UXO Specialist may be an UXO Assistant with at least five years combined military EOD and contractor UXO Experience.

10.2.5 UXO Assistant. This individual shall be a graduate of the EOD Assistant Course at Redstone Arsenal, AL, or Eglin\* AFB, FL. An EOD Assistant cannot fill a position above the UXO Specialist level. An UXO Assistant shall not perform an UXO Task without the direct supervision of an UXO Supervisor.

10.2.6 Quality Control Specialist. This individual shall have the same minimum prerequisites as the UXO Supervisor.

10.2.7 Site Safety and Health Officer (SSHO). This individual shall have the same minimum prerequisites as the UXO supervisor. The site safety officer shall be on site to implement the overall safety program during the project. In addition, the SSHO shall have the specific training, knowledge and experience necessary to implement the SSHP and verify compliance with applicable safety and health requirements.

**APPENDIX B**  
**PROJECT SCHEDULE**



## **APPENDIX C**

### **EXPLOSIVES SAFETY PRECAUTIONS**



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**Revised February 16, 1996**  
**U.S. Army Engineering and Support Center, Huntsville**  
**SAFETY CONCEPTS AND BASIC CONSIDERATIONS FOR**  
**UNEXPLODED ORDNANCE (UXO) OPERATIONS**

**1. Introduction.** There is no "safe" procedure for dealing with UXO, merely procedures which are considered least dangerous. However, maximum safety in any UXO operation can be achieved through adherence to applicable safety precautions, a planned approach and intensive supervision. Only those personnel absolutely essential to the operation shall be allowed in the restricted/exclusion area during UXO operations (DoD 6055.9-STD). Safety must become a firmly established habit when working with UXO. Safety is the leading edge of quality.

**2. References.** The following documents form a part of this document to the extent referenced.

ATFP 5400.7	Alcohol Tobacco and Firearms Explosives Laws and Regulations
27 CFR Part 55	Commerce in Explosives
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
49 CFR 100-199	Transportation
DoD 6055.9-STD	DoD Ammunition and Explosives Safety Standards
DA Pam 385-64	Ammunition and Explosives Safety Standards
ETL 385-1-2	Generic Scope of Work for Ordnance Avoidance Activities
TM 9-1300-200	Ammunition General
TM 9-1300-214	Military Explosives
TM 9-1375-213-12	Operator's and Organization Maintenance Manual (Including Repair Parts and Special Tools List); Demolition Materials

**3. Definitions**

a. **Unexploded Ordnance (UXO).** An item of ordnance which has failed to function as designed, or has been abandoned or discarded, and is still capable of functioning and causing injury to personnel or damage to material.

b. **UXO Procedures.** UXO procedures include but are not limited to the following actions:

(1) Gaining access to (manual excavation) and identifying subsurface anomalies, and assessing condition of buried UXO.

(2) Identifying and assessing condition of surface UXO.

(3) Recovery and final disposal of all UXO.

c. **UXO Related procedures:** UXO related procedures include but are not limited to the following:

(1) Location and marking of subsurface anomalies.

(2) Location and marking of suspected surface UXO.

(3) Transportation and storage of recovered UXO.

(4) Utilizing Earth Moving Machinery (EMM) to excavate soil to no closer than approximately 12 inches of a subsurface anomaly.

d. **UXO Qualified Personnel:** UXO qualified personnel are US citizens who have graduated from the US Army Bomb Disposal School, Aberdeen, MD, or the US Naval Explosive Ordnance Disposal (EOD) School, Indian Head, MD. Graduates of the EOD assistant Course, Redstone Arsenal, AL, or Elgin AFB, FL with more than three years combined active duty military EOD and contractor UXO experience shall also be UXO qualified.

#### **4. General Safety Concerns.**

a. UXO operations shall not be conducted until a complete plan for the operation involved is prepared and approved. Plans shall be based upon limiting exposure to a minimum number of personnel, for a minimum time, to the minimum amount of UXO, consistent with safe and efficient operations.

b. Only UXO qualified personnel shall be involved in UXO procedures. Non-UXO qualified personnel may be utilized to perform UXO related procedures when supervised by UXO qualified personnel. All personnel engaged in operations shall be thoroughly trained in explosive safety and be capable of recognizing hazardous explosive exposures.

c. The use of electroexplosive devices (EED) susceptible to electromagnetic radiation (EMR) devices in the radio frequency (RF) range, that is, radio, radar, and television transmitters, has become almost universal.

d. Some ordnance is particularly susceptible to EMR (RF) emission.. A knowledge of ordnance that is normally unsafe in the presence of EMR (RF) is important so preventive steps can be taken if the ordnance is encountered in a suspected EMR (RF) field.

(2) The presence of antennas, communication and RADAR devices should be NOTED on initial site visits and/or preliminary assessments.

(3) When potential EMR hazards exist, the site shall be electronically surveyed for EMR/RF emissions and the appropriate actions will be taken. Minimum safe distances from EMR/RF sources are listed in Tables 2-2, 2-3, and 2-4 of TM 9-1375-213-12.

f. Do not wear outer or undergarments made of materials which have high static generating characteristics when working on UXOs. Materials of 100 percent polyester, nylon, silk, or wool are highly static-producing. Any person handling a UXO suspected of containing EEDs will ground himself/herself prior to touching the UXO. Refer to DA Pam 385-64 for more information regarding non-static producing attire.

## **5. UXO Safety Precautions for Site Characterization.**

a. Make every effort to identify the UXO. Visually examine the item for markings and other identifying features such as shape, size, and external fittings. However, do not move the item to inspect it. If an unknown UXO is encountered, the US Army Engineering and Support Center, Huntsville (USAESCH) representative will be notified.

b. Foreign UXO were returned to the United States for exploitation and disposal. When a records search indicates the possibility of foreign UXO being on a site, appropriate safety precautions and procedures will be incorporated into UXO operation plans.

c. Any time a suspected chemical munition is encountered, all personnel will withdraw up wind from the munition. A two person UXO team, located upwind, shall secure the munition until relieved by the Technical Escort Unit (TEU) or Explosive Ordnance Disposal (EOD) personnel.

d. Ordnance items which penetrate the earth to a depth where the force of the explosion is not enough to rupture the earth's surface forms an underground cavity called a camouflet. Camouflets will be filled with the end product of the explosion, carbon monoxide gas. Camouflet detection and precautions must be considered if a records search indicates the site was used as an impact area.

e. Avoid inhalation of, and skin contact with, smoke, fumes, and vapors of explosives and related hazardous materials.

f. Consider UXO which has been exposed to fire and detonation as extremely hazardous. Chemical and physical changes may have occurred to the contents which render it much more sensitive than it was in its original state.

g. Do not rely on the color coding of UXO for positive identification of contents. Munitions having incomplete, or improper color coding have been encountered.

h. Avoid the area forward of the nose of a munition until it can be ascertained the item does not contain a shaped charge. The explosive jet can be fatal at great distances forward of the longitudinal axis of the item. Assume any shaped charge munitions to contain a piezoelectric (PZ) fuzing system until the fuzing system is positively identified. A PZ fuze is extremely sensitive, can function at the slightest physical change, and may remain hazardous for an indefinite period of time.

i. Examine a projectile for the presence or absence of an unfired tracer. Also examine the item for the presence or absence of a rotating band and its condition.

j. Approach an unfired rocket motor from the side. Ignition will create a missile hazard and hot exhaust.

(1) Do not expose rocket motors to any EMR source.

(2) If an unfired rocket motor must be transported, it shall be positioned in the direction which offers the least exposure to personnel in the event of an accidental ignition.

k. Consider an emplaced landmine armed until proven otherwise. It may not be possible to tell, or it may be intentionally rigged to deceive.

(1) Many training mines contain firing indicator charges capable of inflicting serious injury.

(2) Exercise care with wooden mines that have been buried for a long time. Because of soil conditions, the wood deteriorates and the slightest inadvertent pressure/movement may initiate the fuze.

l. Assume a practice UXO contains a live charge until it can be determined otherwise. Expended pyrotechnic/practice devices may contain red/white phosphorus residue. Due to incomplete combustion, phosphorous may be present and reignite spontaneously if subjected to friction or the crust is broken and the contents exposed to air."

m. Do not approach a smoking white phosphorus (WP) UXO. Burning WP may detonate the burster or dispersal explosive charge at any time.

n. If the positive identification of suspected explosive materials is required, procedures in Chapter 13, TM 9-1300-214, "Military Explosives" or other approved explosives analysis shall be used to identify the explosives.

## **6. Ordnance Avoidance for HTRW Activities.**

a. Investigative activities on potential ordnance contaminated sites will be accomplished using approved ordnance avoidance procedures.

b. HTRW ordnance avoidance procedures are detailed in Engineering Technical Letter 385-1-2. This ETL is available on the Internet, or through the Quality and Technology team at USAESCH.

## **7. Restricted/Exclusion Area Operations.**

a. On Ordnance and Explosives sites, the contractor's site safety personnel shall establish a restricted/exclusion area for each UXO team operating on the site. The purpose of the area is for the protection of the public and other personnel from the blast and fragmentation hazards of an accidental detonation. The area shall be established based on the following minimum factors:

(1) Previous site use that caused the contamination: impact area, open burn/ open detonation, burial, etc..

(2) Project type: surface clearance, subsurface clearance, sifting operation, sampling, etc.

(3) Known ordnance contamination, distances to public exposure, terrain, etc.

b. When multiple UXO teams are operating on a site, the restricted/exclusion area and team separation distances shall never be less than 200 feet.

c. During the time frame that UXO operations are being accomplished, only personnel necessary for the UXO operation shall be within the restricted/exclusion area. When non-essential personnel enter the restricted/exclusion area, all UXO operations will cease.

(1) Plan for, provide, and know the measures to be taken in the event of an accident.

(2) Provide a designated emergency vehicle in the area in case of an accident or other emergency.

(3) Coordination with the appropriate airspace representative shall be conducted and the appropriate notification procedures arranged.

(4) When non-essential personnel must enter the restricted/exclusion area, the following must be accomplished: a) The individual must receive a safety briefing, b) be escorted by a UXO qualified individual; and c) All UXO operations must cease within the fragmentation radius of the largest item expected to be encountered within the area.

d. Before any movement of a UXO, the fuze condition must be ascertained. If the condition is questionable, consider the fuze to be armed. The fuze is considered the most hazardous component of a UXO, regardless of type or condition.

(1) In general, a projectile containing a Base Detonating (BD) fuze is to be considered armed if the projectile has been fired.

(2) Arming wires and pop out pins on unarmed fuzes should be secured by taping in place prior to movement.

(3) Do Not dismantle or strip any UXO.

(4) Do Not depress plungers, turn vanes, or rotate spindle, levers, setting rings, or other external fittings on UXO's. Such actions may arm, actuate, or function the UXO.

(5) Do Not subject mechanical time fuzes to any unnecessary movement.

(6) Do Not remove any fuzes from UXO's.

(7) Some ordnance items do not contain any positive safety features. Positively identify and review all safety precautions prior to handling any ordnance.

e. Personnel working within the Restricted area/Exclusion zone shall comply with the following:

(1) Do not conduct operations without an approved Site Specific Safety and Health Plan and an approved Work Plan.

(2) Do not smoke, except in authorized areas.

(3) Do not have fires for heating or cooking, except in authorized areas.

(4) Do not conduct explosive operations during electrical, sand, dust, or snow storms.

(5) Explosive operations will be conducted during daylight only.

(6) During magnetometer operations, UXO teams shall not wear safety shoes or other footwear which would cause the magnetometer to present a false indication.

f. Do not undertake the handling or disposal of liquid propellant fuels or oxidizers if not familiar with the characteristics of the material.

g. Civil War projectiles shall be treated as any other UXO.

h. If records search indicated WP munitions were fired or destroyed in the area, extra care shall be taken when uncovering a buried UXO. A buried WP munition may be damaged and when exposed to air, may start burning and detonate. An ample supply of water and mud shall be immediately available if excavation reveals a WP UXO. Appropriate protective equipment (leather gloves, face shield, and flame-retardant clothing) and first aid shall also be immediately available.

## **8. Storage.**

a. During Ordnance and Explosives projects, storage of explosives and UXO fall into two categories.

(1) On-DoD Installations.

(2) Off-DoD Installations.

b. On-DoD Installation Storage.

(1) The provisions of DoD 6055.9-STD shall be followed. Generally, an installation should have an explosive storage area that meets requirements in DoD 6055.9-STD. Permitting and compliance requirements for existing facilities are an installation responsibility. Compatibility of explosives found in Chapter 3, DoD 6055.9 -STD shall be complied with. UXO awaiting disposal shall not be stored with other explosives.

(2) If an installation does not have an existing storage facility, the provisions of paragraph c. below shall apply.

c. Off-DoD Installation Storage.

(1) Generally, the contractor is responsible for construction of a temporary explosive storage area that meets all local, state, ATF requirements, and as much of DoD 6055.9-STD that is practical to implement.

(2) When establishing an explosive storage area, the following requirements must be met.

(a) The area shall, 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 DoD 6055.9-STD, then a proposed barricading and berm plan to protect the public from accidental detonation must be submitted and approved.

(b) Magazines must meet requirements of ATF Regulations, and each magazine must have an Net Explosive Weight established for the explosives to be stored.



(c) Each magazine must have lightning protection IAW Chapter 7, DoD 6055.9-STD.

(d) Magazines must meet intramagazine distances as defined in Chapter 9, DoD 6055.9-STD.

(e) A physical security survey shall be conducted to determine if fencing or guards are required. Generally, a fence around the magazines is needed, but the contractor is responsible to determine the degree of protection required to prevent the theft of explosives and UXO.

d. A fire plan for the storage area shall be prepared and coordination with the nearby fire department shall be conducted. Placarding of magazines shall be in accordance with local, state, and federal requirements.

## **9. Excavation Operations.**

a. The usual method for uncovering buried UXO is to excavate by hand. Hand excavation is the most reliable method for uncovering UXO, but unless the UXO is very near the surface, hand excavation exposes more people to the hazard of detonation for a longer period of time than any other method. Hand excavation will be accomplished only by UXO qualified personnel.

b. Earth moving machinery (EMM) may be used to excavate buried UXO, if the UXO is estimated to be deeper than 12 inches. EMM shall not be used to excavate within 12 inches of an UXO. When excavation gets within approximately 12 inches of an UXO, hand excavation shall be used to uncover the UXO. EMM may be operated by non-UXO personnel, under the direct supervision of UXO personnel.

(1) If more than one EMM will be used on the same site, they will be separated by the same separation distances required for multiple teams on that site.

(2) During excavation operations, only those personnel absolutely necessary for the operation shall be within the restricted area/exclusion zone.

(3) Excavation and trenching shall comply with the provisions of 29 CFR 1926 subpart P.

## **10. Disposal Operations.**

a. As a general rule, UXO will be detonated in place when the situation allows. All detonation-in-place operations shall be conducted by electrical means to assure maximum control of the site, except in situations where static electricity or EMR hazards are present. Non-electrical means can be used when the situation dictates.

(1) Do not allow one person to work alone in disposal operations. At least one person shall be available near the disposal site to give warning and assist in rescue activities in the event of an accident.

(2) 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.

(3) Only condition "Code A" or "Code C" explosive items shall be used as donor explosives for disposal operations.

(4) Exercise extreme care in handling and preparing high explosives for detonation. They are subject to detonation by heat, shock, and friction.

(5) Do not pack bomb fuze wells with explosives unless it can be positively confirmed that the fuze well does not contain any fuze components.

(6) Photo flash bombs must be handled with the same care as black powder filled munitions.

(7) WP UXO shall not be detonated into the ground. The UXO shall be counter-charged on the bottom center line when possible.

b. The following safety rules will be adhered to at all times:

(1) 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.

(2) 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.

(3) Do not use explosives or accessory equipment that is obviously deteriorated or damaged. They may cause a premature detonation or fail completely.

(4) Always point the explosive end of a blasting cap, detonators, and explosive devices away from the body during handling.

(5) Use only standard blasting caps of at least the equivalent of a commercial No. 8 blasting cap.

(6) Use electric blasting caps of the same manufacture for each demolition shot involving more than one cap.

(7) 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.

(8) Test electric blasting caps for continuity at least 25 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.

c. When disposing of explosives by detonation, do not approach the disposal site for at least thirty minutes, after the expected detonation time, in the event of a misfire. When conducting non-electric procedures, the wait time shall be thirty minutes plus time fuse burn time.

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

e. 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, contains data on blast effects, ground shock, cratering, ejection, and fragmentation. The following distances shall be used unless protective measures are implemented.

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

(2) For fragmenting explosive materials, evacuation distance should be a minimum of 2500 feet. For bombs and projectiles with caliber 5-inch or greater, use a minimum evacuation distance of 4000 feet.

(3) Items with lugs, strong backs, tail plate sections, etc., should be oriented away from personnel locations as these items tend to travel further than normal fragmentation.

f. 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.

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

(1) 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.

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

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

h. 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 confined pressure.

## **11. Transportation.**

a. If UXO must be transported off-site for disposal, the provisions of 49 CFR 100-199, DA Pam 385-64, state and local laws shall be followed.

b. Armed fuzes will only be transported when absolutely necessary and when all other avenues of "in place" disposal have been exhausted. Transportation to an on-site disposal area for these items is preferred.

c. Do not transport WP munitions unless it is immersed in water, mud, or wet sand.

d. If loose pyrotechnic, tracer, flare, and similar mixtures are to be transported, they shall be placed in #10 mineral oil or equivalent to minimize fire and explosion hazards.

e. 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.

f. If an unfired rocket motor must be transported, it shall be positioned in such a manner as to offer the maximum protection to personnel in the event of an accident.

g. If base-ejection type projectiles must be transported to a disposal area or collection point, the base will be oriented to the rear of the vehicle and the projectile secured, in the event the ejection charge functions in route.

h. If an UXO, with exposed hazardous filler (HE, etc), has to be moved to a disposal area, the item shall be placed in an appropriate container with packing materials to prevent migration of the hazardous filler. Padding should also be added to protect the exposed filler from heat, shock, and friction.

**APPENDIX D**  
**PARSONS ES SITE-SPECIFIC SAFETY AND**  
**HEALTH PLAN**

**SITE SAFETY AND HEALTH PLAN (SSHP)  
FOR ENGINEERING DESIGN  
AT ORDNANCE OPERABLE UNIT (OOU) 6  
FORMER CAMP CROFT ARMY TRAINING FACILITY  
SPARTANBURG, SOUTH CAROLINA**

**Prepared for**

**U.S. ARMY CORPS OF ENGINEERS  
HUNTSVILLE CENTER  
Huntsville, Alabama**

Contract No. DACA 87-95-D0018  
Task Order No. 0009

**Prepared by**

**PARSONS ENGINEERING SCIENCE, INC.**

Suite 500  
57 Executive Park South, NE  
Atlanta, Georgia 30329

**November 1996**

**Reviewed and Approved By:**

**Ola Awosika, P.G., REM  
Project Manager:**

  
\_\_\_\_\_  
(Signature)

*November 25, 1996*  
\_\_\_\_\_  
(date)

**Edward L. Grunwald, C.I.H.  
Office Health and  
Safety Representative:**

  
\_\_\_\_\_  
(Signature)

*November 25, 1996*  
\_\_\_\_\_  
(date)

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## **APPENDIX D**

### **PARSONS ES SITE SAFETY PLAN**

#### **1.0 INTRODUCTION**

##### **1.1 PURPOSE**

1.1.1 The nature of field work has made a Site-Specific Safety and Health Plan (SSHP) a principal concern both during project planning and in the field. Planning and field personnel must develop a health and safety consciousness, avoiding unnecessary risks.

1.1.2 The purpose of this SSHP is to establish personnel protection standards and mandatory safety practices and procedures for all work conducted for the following project: Engineering Design at Ordnance Operable Unit (OOU) 6 at the former Camp Croft Army Training Facility (CCATF), Spartanburg, South Carolina. The plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at field work sites.

1.1.3 This SSHP provides general guidance for making decisions during field activities. Sections cover field personnel responsibilities and work procedures, physical and chemical risks, emergency procedures, and levels of personal protection. Site-specific information such as a project description and site history, a contingency plan, a list of emergency contacts, and necessary health and safety equipment are also discussed. Attachments A-1 and A-2 contain an Accident Report Form and a Plan Acceptance Form, respectively. Attachment A-3 contains an Occupational Safety and Health Administration (OSHA) Job Health and Safety Protection Poster.

##### **1.2 APPLICABILITY**

1.2.1 The plan provisions are mandatory for all on-site activities undertaken at OOU6 by Parsons Engineering Science, Inc. (Parsons ES) personnel. All site activities comply with the provisions of the Corporate Health and Safety (H&S) Policies and Procedures Manual and applicable standards in 29 CFR Parts 1910 and 1926. As site activities change, this plan may need to be modified. Such modifications are submitted as SSHP addenda and are numbered sequentially. All SSHP addenda are reviewed and approved by the Project H&S Manager.

1.2.2 Parsons ES personnel will not be involved in hazardous material activities at this site; therefore, this plan will not cover personnel performing these tasks. Subcontractors must submit SSHPs to the Project H&S Manager addressing hazards associated with their specific project activities. Subcontractor plans must comply with all applicable standards in 29 CFR Parts 1910 and 1926, and be reviewed by Parsons ES prior to commencing specific site tasks. Subcontractors' SSHPs will be attached to the Work Plan as appendices.

1.2.3 All Parsons ES personnel must read this plan and submit a signed Plan Acceptance Form prior to the start of the work at this site. The Plan Acceptance Form is shown as Attachment A-2.

1.2.4 Hazard Communication. All project work will be conducted in accordance with Parsons ES's standard policies for hazard communication. Material safety data sheets for any chemicals brought on site will be located at Parsons ES's main trailer. Site orientation and training will be provided to all new employees brought on site and this will include an overview of all known hazards associated with the site. A copy of Parsons ES's hazard communication program will be located at the site trailer.

### **1.3 SITE DESCRIPTION AND HISTORY**

The following description and history of the former CCATF was adapted from previous investigations and studies listed below:

- Site Survey, conducted by the U.S. Army Corps of Engineers (USACE), Charleston District, 1984;
- Preliminary Assessment Study, conducted by the USACE, Charleston District, 1991;
- Archives Search Report (ASR), prepared by the USACE, Rock Island District, April 1994;
- EE/CA, prepared by Environmental Science and Engineering, Inc. (ESE), 1995 and 1996;
- Orthophotography and Geographic Information System (GIS) Study, prepared by ESE, 1995 and 1996;
- Supplemental Archive Search Report (SASR), prepared by ESE, 1996; and,
- Supplemental Engineering Report, prepared by ESE, March 1996.

#### **1.3.1 Site Description and History**

1.3.1.1 The former CCATF is located south of Spartanburg, Spartanburg County, South Carolina. Camp Croft was established in January 1941 as an army training facility. The camp consisted of two general areas: a series of training, firing, and impact ranges (approximately 16,929 acres), and a troop housing (cantonment) area with attached administrative quarters (approximately 167 acres). The firing ranges at the former CCATF consisted of pistol, rifle, machine gun, mortar, anti-aircraft, and anti-tank ranges. OE/UXO that may be encountered at the former CCATF include: .30-caliber (cal) and .50-cal small arms; 20-millimeter (mm) hand and rifle smoke, tear gas, and incendiary grenades; 60- and 81-mm high explosive (H.E.),

practice, smoke, tear gas, and illumination mortar rounds; and 2.36-inch high explosive anti-tank (HEAT), smoke, incendiary, and practice rockets. The former CCATF also contained a gas chamber/gas obstacle course area (approximately 199 acres) where realistic chemical warfare training was conducted.

1.3.1.2 In 1947, the entire acreage of the former CCATF was declared surplus by the War Assets Administration. By 1950, the Army sold the land by pieces to organizations and businesses. This sale also included the transfer of 7,088 acres of land to the South Carolina Commission of Forestry for the creation of the Croft State Park. The remaining acreage has been converted to residential housing, churches, and industrial and commercial businesses. The gas chamber and gas obstacle course have been removed, and no ordnance or other evidence of past chemical training are found at the site.

1.3.1.3 OOU6 is located within the boundaries of former CCATF, but outside Croft State Park. It is situated off of Mimosa Lake Road and is adjacent to the south of U.S. Highway 176 Bypass. OOU6 contains an area of 397.80 acres, as per the Division of Tract 'A' "Whitstone Tract" boundary survey map, dated January 24, 1994. The property is privately owned and is used for agricultural and industrial purposes including tree planting and industrial landfills. The owner plans to continue developing the property for commercial industrial use. The potential exists for future construction of ponds and buildings on the property.

### **1.3.2 Visual Site Inspection**

1.3.2.1 Visual site inspections of the former CCATF were conducted during the ASR and EE/CA from 1994 through 1996. At OOU6, a Time Critical Removal Action (TCRA) was conducted at the time of the EE/CA sampling effort due to reported and confirmed findings of 105 mm projectiles on the property. ESE was directed by Corps of Engineers Huntsville Center (CEHNC) to investigate four areas within the boundaries of the TCRA, including the planned "compost B" area, the "poppy field", the proposed location of "landfill No. 2", and one unnamed area. These areas were designated as Grids 61, 62, 88, and 87, respectively. Grids 61 and 62 were investigated on October 28 and 29, 1994, and Grids 87 and 88 were investigated January 17 through 23, 1995.

1.3.2.2 The investigation of Grids 61 and 62 consisted only of magnetometer surveys and recording of anomalies. No intrusive operations were conducted. However, investigation of Grids 87 and 88 included both magnetometer surveys and intrusive operations. Significant UXO findings included one 81mm illumination round, five 105 mm projectile rounds, and numerous fragments in Grid 87. No UXO was found in Grid 88. All recovered UXO was detonated in place by UXO qualified personnel.

## **1.4 SCOPE OF WORK**

### **1.4.1 Introduction**

Parsons ES field activities will include performing a geophysical survey of the site, coordination between subcontractors of non-intrusive and intrusive investigations at this site, and assisting in delineating work zones.

### **1.4.2 Work Zone Delineation**

At the direction of qualified UXO personnel, Parsons ES field personnel will assist in delineation of work zones to be established around areas of intrusive activities. UXO personnel will determine the specific areas to be cordoned off and the materials to be used as barricades. Once the work zone has been delineated and intrusive activities have begun, Parsons ES personnel will not enter the work zone until all work has been completed. After the completion of intrusive activities in a specific work zone, Parsons ES personnel will assist in removing barricades and clearing areas.

### **1.4.3 Work Zone Evacuation**

Prior to beginning intrusive activities at specific work areas (such as along the highway), the local law enforcement authorities will assist in coordinating pedestrian and traffic control along the highway and if necessary assist in evacuating inhabited areas near established work zones. This will be accomplished through personal interaction with residents and posting signs around work areas stating the intentions and dates of the investigations. Upon completion of intrusive activities, COE personnel will inform residents in evacuated areas that UXO personnel have cleared the area, and it is safe to resume normal activities.

## **1.5 PROJECT TEAM ORGANIZATION**

Table 1.1 describes the responsibilities of all on-site personnel. The names of principal on-site personnel are delineated below.

Project Manager:	Ola Awosika, Parsons ES, Atlanta, Georgia
Site Manager	Don Silkebakken, Parsons ES, Atlanta, Georgia
Site Health and Safety Officer:	Don Silkebakken, Parsons ES, Atlanta, Georgia
Project Health and Safety Officer:	Edward L. Grunwald, Parsons ES Atlanta, Georgia
Subcontractors:	UXB International, Inc., Ashburn, Virginia 22011 Quantitech Inc., Huntsville, AL. 35806

**TABLE 1.1  
ON-SITE PERSONNEL**

Title	General Description	Responsibilities
Project Manager	Reports to upper-level management. Has authority to direct response operations. Assumes total control over site activities.	<ul style="list-style-type: none"> <li>• Prepares and organizes the background review of the situation, the Field Sampling Plan, the Quality Assurance Plan, the SSHP, and the field team.</li> <li>• Obtains permission for site access and coordinates activities with appropriate officials.</li> <li>• Briefs the field teams on their specific assignments.</li> <li>• Uses the site health and safety officer to ensure that safety and health requirements are met.</li> <li>• Serves as the liaison with public officials.</li> </ul>
Project Health and Safety Manager	Advises Project Manager on all aspects of H&S	<ul style="list-style-type: none"> <li>• Provides technical support concerning health and safety issues.</li> <li>• Ensures that the Parsons ES health and safety protocols being followed conform with established industry protocols.</li> <li>• Confirms each team member's suitability for work based on a physician's recommendation.</li> <li>• Conducts field health and safety audits to ensure SSHP conformance and Parsons ES policy compliance.</li> <li>• Certifies that all workers have proper training.</li> <li>• Reports all accidents to Parsons ES Corporate H&amp;S Manager.</li> </ul>
Site Health and Safety Officer	Advises the Project H&S Manager on all aspects of health and safety on site. Stops work if any operation threatens work or public health or safety.	<ul style="list-style-type: none"> <li>• Ensures that Parsons ES and all subcontractors perform personal inspections of protective equipment and clothing are being performed prior to, during, and after each use.</li> <li>• Ensures that Parsons ES and all subcontractors protective clothing and equipment are properly stored and maintained.</li> <li>• Controls entry and exit at the access Control Points.</li> <li>• Monitors Parsons ES personnel for signs of stress, such as cold exposure, heat stress, and fatigue.</li> <li>• Implements the SSHP.</li> <li>• Prior to each work event, conducts inspections to determine if the SSHP is being followed.</li> </ul>

**TABLE 1.1 (Continued)  
ON-SITE PERSONNEL**

Title	General Description	Responsibilities
Site Health and Safety Officer (cont'd)	<p>Advises the Project H&amp;S Manager on all aspects of health and safety on site. Stops work if any operation threatens work or public health or safety.</p>	<ul style="list-style-type: none"> <li>• Knows emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.</li> <li>• Coordinates decontamination procedures/provisions for medical care with CEHNC/Army TEU personnel.</li> <li>• Notifies CEHNC of emergency conditions.</li> <li>• Ensures that all required equipment is available.</li> <li>• Advises medical personnel of potential exposures and consequences.</li> <li>• Coordinates with the local fire department and emergency medical services.</li> <li>• Notifies emergency response personnel by telephone or radio in the event of an emergency.</li> <li>• Maintains log book for site workers and visitors.</li> <li>• Acts as spokesperson if OSHA inspector arrives on site.</li> <li>• Conducts on site training concerning pertinent H&amp;S issues and new concerns.</li> <li>• Reports all accidents or H&amp;S incidents to the office H&amp;S Officer and CEHNC.</li> </ul>
Site Manager	<p>Responsible for field team operations and safety.</p>	<ul style="list-style-type: none"> <li>• Manages field operations.</li> <li>• Oversee subcontractors field operations.</li> <li>• Coordinates with the Site Safety and Health Officer in determining protection level.</li> <li>• Enforces site control.</li> <li>• Documents field activities.</li> </ul>
Field Team	<p>The work party must consist of at least two people.</p>	<ul style="list-style-type: none"> <li>• Safely completes the on-site tasks.</li> <li>• Complies with Site Health and Safety Plan.</li> <li>• Notifies site Safety Officer or Supervisor of suspected unsafe conditions.</li> <li>• Inspects personal protective equipment prior to, during, and after each use.</li> </ul>

## **2.0 RISK ANALYSIS**

### **2.1 CHEMICAL AND BIOLOGICAL HAZARDS**

Previous studies and investigations performed at OOU6 have not identified the presence of any chemical or biological warfare hazards. Should suspected chemical warfare munitions (CWM) or biological warfare munitions (BWM) be encountered, personnel will immediately withdraw from the work area and notify the Site Manager who will in turn notify the onsite CEHNC Safety Representative and the CEHNC project manager for guidance.

### **2.2 PHYSICAL HAZARDS**

#### **2.2.1 Construction Hazards**

Although Parsons ES personnel will not be directly involved with intrusive activities during this investigation, personnel need to be aware of the hazards associated with this type of work. Physical hazards associated with site activities include:

- Parsons ES personnel should be cautious of OE on the surface.
- Parsons ES personnel should be cautious of construction debris which may be partially buried or hidden by grass or shrubbery, limbs, brush, etc.
- Although Parsons ES personnel will not be participating in intrusive activities, heavy equipment may traverse Parsons ES work areas.
- Parsons ES personnel should exercise caution while working in the vicinity of the existing landfill and compost areas, site access roads and adjacent highway, and near vehicular traffic.

#### **2.2.2 Safety Hazards**

Prior to entry to any work area on-site, UXB (UXO subcontractor) will perform screening (clearance) of areas of interest. Procedures and safety requirements for site screening are provided in the UXB SSHP.

#### **2.2.3 Heat Stress**

##### **2.2.3.1 General**

2.2.3.1.1 Sweating does not cool the body unless moisture is removed from the body. The use of personal protective equipment (PPE) reduces the body's ability to eliminate large quantities of heat because the evaporation of sweat is decreased. The body's effort to maintain an acceptable temperature may become impaired and this may cause heat stress. Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks.



2.2.3.1.2 Heat related problems include heat rash, fainting, heat cramps, heat exhaustion, and heat stroke. Heat rash occurs because sweat is not evaporating, making the skin wet most of the time. Standing erect and immobile in the heat allows blood to pool in the lower extremities. As a result, blood does not return to the heart to be pumped back to the brain and fainting may occur. Heat cramps are painful spasms of the muscles due to excessive salt loss from profuse sweating. Heat exhaustion occurs due to the large fluid and salt loss from profuse sweating. A person's skin is clammy and moist; and nausea, dizziness, and headaches may be exhibited.

2.2.3.1.3 Heat stroke occurs when the body's temperature regulatory system has failed. Skin is hot, dry, red, and spotted. The affected person may be mentally confused, delirious, and convulsions may occur. A person exhibiting signs of heat stroke should be removed from the work area to be shaded area immediately. The person should be soaked with water and fanned to promote evaporation. Medical attention should be obtained immediately. **EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.**

2.2.3.1.4 Monitoring of personnel wearing PPE should begin when the ambient temperature is 70°F or above. Table 2.1 presents the suggested frequency for such monitoring. Monitoring frequency should increase as the ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a person with a current first aid certification who is trained to recognize heat stress symptoms. Other methods for determining heat stress monitoring, such as the wet bulb globe temperature (WBGT) index from American Conference of Governmental Industrial Hygienist (ACGIH) Threshold Limit Values (TLV) booklet can be used.

### **2.2.3.2 Early Symptoms of Heat Related Problems**

Early symptoms of heat related problems include the following:

1. Decline in task performance
2. Lack of coordination
3. Decline in alertness
4. Unsteady walk
5. Excessive fatigue
6. Muscle cramps
7. Dizziness

To monitor the worker, measure:

**Table 2.1<sup>(1)</sup>**  
**Suggested Frequency of Physiological Monitoring**  
**For Fit and Acclimatized Workers<sup>(a)</sup>**  
**Ordnance Operable Unit (OOU) 6**  
**Former Camp Croft Army Training Facility**  
**Spartanburg, South Carolina**

Adjusted Temperature <sup>(b)</sup>	Normal Work Ensemble <sup>(c)</sup>	Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°- 30.8°C)	After each 90 minutes work	After each 60 minutes of work
77.5°-82.5°F (25.3°- 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°- 25.3°C)	After each 150 minutes of work	After each 120 minutes of work

(1) NIOSH/OSHA/USCG/EPA, 1985.

(a) For work levels of 250 kilocalories/hour.

(b) Calculate the adjusted air temperature ( $t_{a \text{ adj}}$ ) by using the equation:

$$t_{a \text{ adj}} = t_a + (13 \times \text{percent sunshine})$$

where:  $t_a$  is the air temperature in °F.

Measure air temperature ( $t_a$ ) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat.

Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow (100 percent sunshine = no cloud cover and a sharp, distinct shadow; zero percent sunshine = no shadows.)

(c) A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
  - If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
  - If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.
- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
  - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.
  - If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
  - Do not permit a worker to wear a semipermeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

### 2.2.3.3 Prevention of Heat Stress

Proper training and preventive measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heart related illnesses. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
  - Modify work/rest schedules according to monitoring requirements.
  - Mandate work slowdowns as needed.
  - Perform work during cooler hours of the day, if possible, or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluids intake must approximately equal the amount of water lost in sweat, i.e, 8 fluid ounces (0.23 liters) of water must be ingested for approximately every 8 ounces (0.23 kg) of weight loss. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
  - Maintain water temperature at 50° to 60°F (10°-16.6°C).
  - Provide small disposable cups that hold about 4 ounces (0.1 liter).

- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- Train workers to recognize the symptoms of heat-related illnesses.
- Rotate personnel and alternate job functions.
- Avoid double shifts and/or overtime.

#### 2.2.4 Cold-Related Illness

Exposure to low temperatures presents a risk to employee safety and health both through the direct effect of the low temperature on the body and collateral effects such as slipping on ice, decreased dexterity, and reduced dependability of equipment. Work conducted in the winter months can become a hazard for field personnel due to cold exposure. All personnel must exercise increased care when working in cold environments to prevent accidents that may result from the cold. The symptoms of cold exposure include frostbite and hypothermia. Wind increases the impact of cold on a person's body. Work will cease under unusually hazardous conditions (e.g., windchill less than 20°F, or wind chill less than 30°F with precipitation). Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally labeled frostbite. Recognition of the symptoms of cold-related illness will be discussed during the health and safety briefing conducted prior to the onset of site activities.

- **Hypothermia.** Hypothermia is defined as a decrease in a person's core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of "cold" ambient temperatures. The first symptom of systemic hypothermia is shivering. Maximum shivering starts when the core body temperature drops below 95°F. The next set of symptoms as the body's cooling progresses is apathy, listlessness, and sleepiness. The person remains conscious and responsive with normal blood pressure and a core temperature of 93.2°F. The person must be removed immediately to a facility with heat. As hypothermia advances beyond this point, the person has a glassy stare, slow pulse, slow respiratory rate, and may lose consciousness. Severe hypothermia starts when the core body temperature reaches 91.4°F. Finally, the extremities start to freeze hard and death could result.

#### 2.2.5 Other Hazards

The planned field activities may bring personnel into contact with snakes, spiders, ticks, chiggers, mosquitoes, and poisonous plants (poison ivy and oak). The following precautions will be taken as necessary by field personnel to avoid contact with wildlife/insects:

- Hat to ward off insects;
- Snake guards;

- Insect/tick spray, especially on hat, ankles, wrist, and waist
- Use of Oak-N-Ivy cleanser or equivalent at field hand-wash station.

## **2.3 HANTA VIRUS**

2.3.1 Hanta Virus results from intimate contact with rodents, such as may occur in agricultural areas with dense human and rodent populations or during soil excavation. There is no evidence of spread of this virus from person to person. The overwhelming evidence is that spread is from rodent to humans through contact with infected rodent secretions or airborne transmission by infected dust particles.

2.3.2 Preventive measures should focus on cleaning all cuts and scratches with soap and water, followed by rinsing with hydrogen peroxide. Put liquid skin on the affected areas. However, the best preventative measure is to avoid all rodent nests found during intrusive activities, and notify CEHNC of their locations.

2.3.3 During the course of field investigations, it may be necessary for personnel to enter areas that present the potential contact with rodent nests. Because of the potential for exposure to the Hanta Virus, all personnel will be alert for any rodent nest. If a nest is encountered, activities at that area will cease until Level C personal protective equipment is donned and the nest is treated with bleach.

## **3.0 PERSONNEL PROTECTION AND MONITORING**

### **3.1 PERSONAL PROTECTIVE EQUIPMENT**

3.1.1 Parsons ES staff will work in established work zone during survey, brush clearing, and geophysical survey work but will not work in the established work zone during intrusive operation. Personnel working in the established work zones will be required to wear Level D protection. This will consist of at a minimum:

- Standard work clothes with long pants and sleeves;
- Safety boots; and
- Hard hat (when overhead hazard is present).

3.1.2 Personnel working away from established work zone areas will not be required to wear safety boots, long sleeves, or hard hats.

3.1.3 All workers on site must wear orange safety vests during the field work because work will be performed during the hunting season.

### **3.2 MONITORING REQUIREMENTS**

No hazardous materials have been identified at this site. If there is any indication of toxic substances discovered in these or other locations where intrusive investigations are to occur, work will be suspended until proper monitoring equipment can be obtained and properly utilized.

### **3.3 SITE-SPECIFIC TRAINING**

The Site Safety Officer is responsible for developing a site-specific occupational hazard training program. This program complies with the CEHNC approved Health and Safety Plan (HSP) for the former CCATF site. The Site Safety Officer is responsible for providing training to all Parsons ES personnel and Parsons ES subcontractors under Parsons ES H&S supervision that are to work at OOU6. This training will cover the following topics:

- Names of personnel responsible for site safety and health.
- Safe work practices.
- Site history.
- Safety, health, and other hazards at site.
- Work zones and other locations.

- Emergency procedures, evaluation routes, emergency phone numbers.
- Proper use (e.g., donning and doffing) of personal protective equipment.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds at the site.
- UXO recognition and reporting.
- Prohibitions in areas and zones, including:
  - Site layout, and
  - Procedures for entry and exit of work areas and zones.

## **4.0 WORK ZONES AND DECONTAMINATION**

### **4.1 SITE WORK ZONES**

4.1.1 Work zone will be delineated at OOU6 to reduce potential exposure to OE hazards. Site visitors will not be allowed in the work zone areas. Personnel flow between the zones is controlled. Establishing work zones helps ensure that:

- Personnel are properly protected against any hazards present in the work areas;
- Work activities are confined to the appropriate areas; and
- Personnel can be located and evacuated in an emergency. Work zones are established by qualified UXO personnel.

4.1.2 Parsons ES personnel will not be permitted to enter the work zones during any phase of the intrusive investigations. Areas not delineated as work zones will be considered support zones, and these areas will be the only areas accessible to Parsons ES personnel.

4.1.3 Access control point will be established near the existing site operation building (close proximity to site office trailer) where potential visitors to the site can be observed upon arrival at OOU6, in particular on Dr. Lowery's property. Available information indicates entry and exit to the site occurs through Lake Mimosa Road. However, other potential entry points are possible in the OOU6 area.

### **4.2 DECONTAMINATION**

Decontamination effort is not required at this site because there are no indications of contaminants at the site.



## **5.0 ACCIDENT PREVENTION AND CONTINGENCY PLAN**

### **5.1 ACCIDENT PREVENTION**

5.1.1 All field personnel receive site-specific health and safety training before starting any site activities. On a day-to-day basis, individual personnel should watch for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Emergencies can be averted by rapid recognition of dangerous situations. Before assigning daily tasks, tailgate safety meetings will be held. Discussion should include:

- Tasks to be performed;
- Time constraints (e.g., rest breaks);
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, or danger signals;
- Emergency procedures; and
- Radio communication.

5.1.2 Hard hats and safety boots must be worn as a minimum within 50 feet of heavy equipment. The Field Supervisor or Site Health and Safety Officer supervises the field team to ensure they are meeting health and safety requirements. If deficiencies are noted, work is stopped and corrective action is taken (e.g., retain, purchase additional safety equipment). Reports of health and safety deficiencies and the corrective action taken is forwarded to the Project Manager and Project H&S Manager.

### **5.2 CONTINGENCY PLAN**

#### **5.2.1 Introduction**

5.2.1.1 If an emergency develops on site, the procedures delineated herein are immediately followed. Emergency conditions exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure;
- A condition occurs that is more hazardous than anticipated; and/or
- Fires, explosions, structural collapses/failures, and/or unusual weather conditions (thunderstorms, lightning, high winds, etc.) occur.

5.2.1.2 If an emergency occurs, direct voice communication is used to sound the alarm. If personnel are out of range of direct voice communication, an air horn meeting the requirements of 29 CFR 1910.165 is sounded. General emergency procedures and specific

procedures for personal injury are described within this section. Table 5.1 is a list of emergency contacts. Figure 5.1 show the routes to the medical facilities closest to OOU6.

### **5.2.2 General Emergency Procedures**

The emergency procedures are as follows:

- Notify the contact listed in Table 5.1 of the HSP when an emergency occurs. This list is posted prominently at the site.
- Use the "buddy" system (pairs).
- Maintain visual contact between "pairs." Each team member remains close to the other to assist in case of emergencies.
- If any member of the field crew experiences any adverse effects or symptoms of exposure, the entire field crew will immediately halt work and act according to the instructions provided by the Site Manager.
- Any condition that suggests a situation more hazardous than anticipated will result in evacuating the field team and re-evaluating the hazard and the level of protection required.
- If an accident occurs, the Field Supervisor is to complete an Accident Report Form (Attachment A-1). Follow-up action will be taken to correct the situation that caused the accident.
- Radio communication.

### **5.2.3 Personal Injury**

In case of personal injury at the site, follow the procedures listed below:

- Field team members or on-site emergency medics trained in first aid can administer treatment to an injured worker.
- The victim will be transported to the nearest hospital or medical center. If necessary, an ambulance will be called to transport the victim.
- The Field Supervisor is responsible for the completion of an Accident Report Form.

#### **5.2.3.1 Snakes**

A person bitten by a snake should try to lie still and be quiet. If the bite is in the arm or leg, keep the bite lower than the heart. Staying still and holding the bite lower than the heart will help to slow any poison spreading through the body. Ice the affected area if swelling or color change occur. Get medical care as soon as possible, even if the snake was known to be non-poisonous. The use of snake bite kits is prohibited. Because the field work will be performed in the late fall and in the winter it is doubtful if any snakes would be encountered.

**TABLE 5.1  
EMERGENCY CONTACTS**

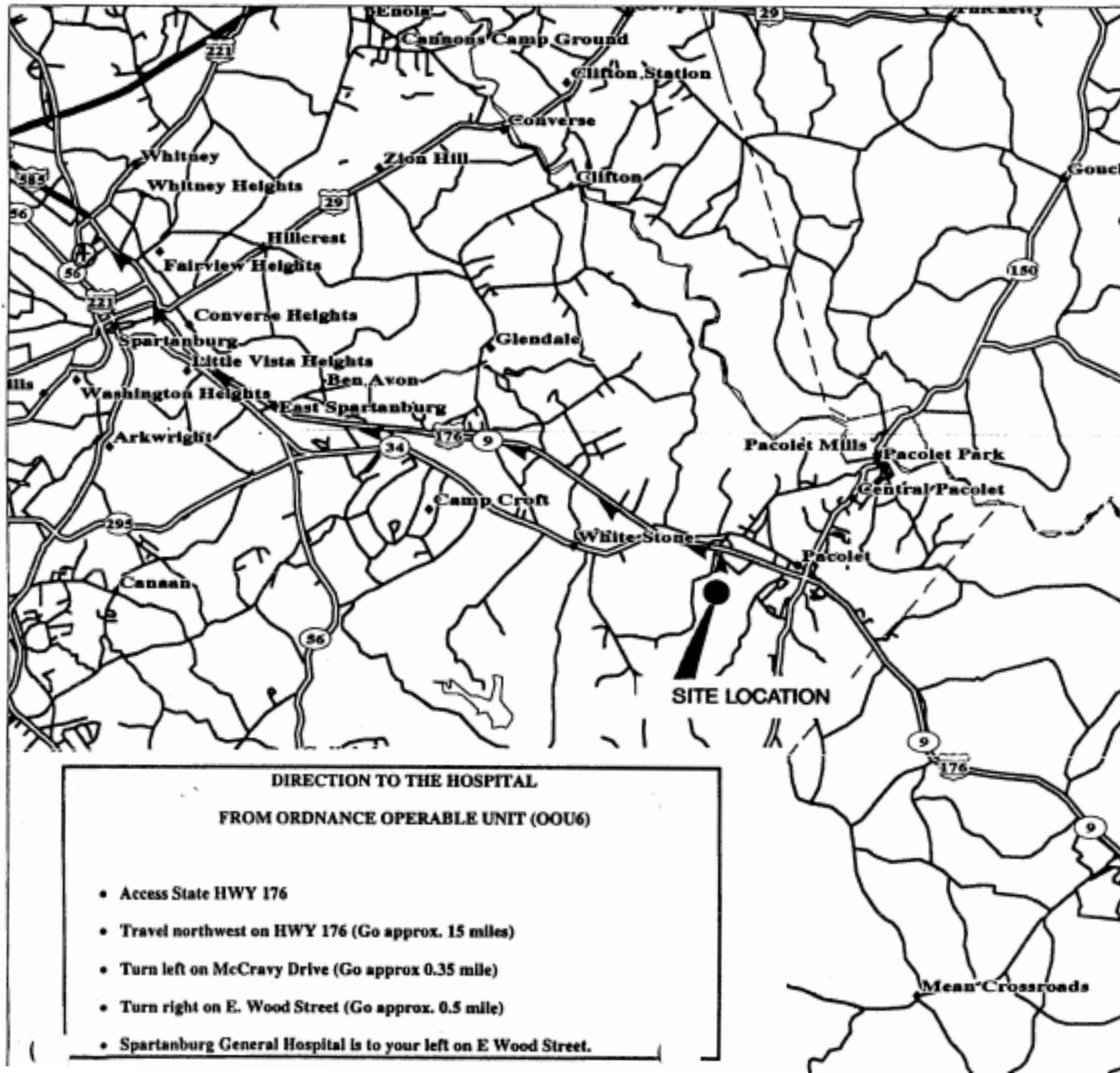
These contacts and maps should be posted prominently at the site. Should any situation or unplanned occurrence require outside assistance or support services, the appropriate contact from the following list should be made:

Agency/Contact	Telephone Number	
Police	Spartanburg Police Dept.	(803) 596-2035
Sheriff	Spartanburg County Sheriff	(803) 596-2540
Fire	Spartanburg Fire Dept.	(864) 596-2083
	Camp Croft Fire Dept.	(864) 582-7638
Ambulance	Spartanburg Regional Medical Center	(864) 560-6175
Poison Control Center		(800) 282-3171
Hospital	Spartanburg Regional Medical Center	(864) 560-6107
USEPA	24 Hours	(205) 655-2222
CEHNC-PM-OT	Patti Berry	(205) 895-1525

<u>Responsible Person</u>	<u>Telephone Number</u>	
	<u>Work</u>	<u>Home</u>
Ola Awosika (Parsons ES Proj. Mgr.)	404-235-2371	770-808-7802
Robert Menke (Parsons ES Tech. Dir.)	703-591-7575	703-765-2749
Don Silkebakken (Parsons ES Site Mgr.)	404-235-2384	770-642-7135
Don Silkebakken (Parsons ES Site H&S Officer)	404-235-2384	770-642-7135
Ed Grunwald (Parsons ES Project H&S Officer)	404-235-2394	404-299-9970

Medical Services Network (Dr. Merlin) 1-800-874-4676, ext. 111

FIGURE 5.1  
Direction to the Hospital



Scale 1:125,000 (at center)

2 Miles

2 KM

LEGEND

- State Route
- Town, Small City
- US Highway
- County Boundary
- Population Center
- Major Street/Road
- Interstate Highway
- State Route
- US Highway
- River
- Open Water
- Hospital

DIRECTION TO THE HOSPITAL

FROM ORDNANCE OPERABLE UNIT (OOU6)

- Access State HWY 176
- Travel northwest on HWY 176 (Go approx. 15 miles)
- Turn left on McCravy Drive (Go approx 0.35 mile)
- Turn right on E. Wood Street (Go approx. 0.5 mile)
- Spartanburg General Hospital is to your left on E Wood Street.

### **5.2.3.2 Ticks**

If found crawling on a person, ticks should be removed and burned or smashed between two rocks. Do not smash ticks with fingers. If a tick is found to be holding onto the skin, the tick should be covered with Vaseline until it can no longer breathe and backs out of the skin. At that time, all parts of the tick should be removed with tweezers. Areas of the skin where the tick may have crawled, as well as bite area will be scrubbed with soap and water. Hot showers are to be taken as soon as possible after site departure to wash away all ticks that have not adhered to the skin.

### **5.2.3.3 Insect Bites/Stings**

5.2.3.3.1 Mild insect bites should be treated by applying a baking soda paste or ice wrapped in a wet cloth. Bee stingers should be gently scraped off the skin, working from the side of the sting.

5.2.3.3.2 Persons who have been bitten by a brown recluse spider should be immediately transported to a hospital. The spider should be collected for confirmation of the species. Reactions to a brown recluse spider bite include mild to severe pain within two to eight hours and a star shaped area around the bite within three to four days.

5.2.3.3.3 If insect bites become red or inflamed or symptoms such as nausea, dizziness, shortness of breath, etc., appear, medical care will be sought. Immediate care is needed if a person is allergic to insect bites/stings. Personnel with insect allergies should inform the project manager and health and safety officer. If an allergic person receives a spider bite or insect bite/sting, seek immediate medical attention, keep the victim calm, and check vital signs frequently. Rescue breathing should be given if necessary to supply oxygen to the victim. Swelling of the breathing passages may require extra hard blowing.

### **5.2.3.4 Poisonous Plants**

5.2.3.4.1 The majority of skin reactions following contact with offending plants are allergic in nature and are characterized by:

- General symptoms of headache and fever;
- Itching;
- Redness; and
- A rash.

5.2.3.4.2 Some of the most common and severe allergic reactions result from contact with plants of the poison ivy group, including poison oak and poison sumac. Such plants produce a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim also may develop a high fever and may be very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

5.2.3.4.3 The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. In certain seasons, both plants also have greenish-white flowers and berries that grow in clusters.

5.2.3.4.4 A person experiencing symptoms of poison ivy or poison oak should remove contaminated clothing; wash all exposed areas thoroughly with soap and water. Apply calamine or other poison ivy/oak lotion if the rash is mild. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity. Oak and ivy cleanser can be used after site work or after potential exposure to reduce chances of irritation.

#### **5.2.4 Procedures Implemented for a Major Fire, Explosion, or On-Site Health Emergency Crisis**

For such emergencies, the Site H&S Officer and/or Field Supervisor shall

- Refer to this Site HSP;
- Notify the paramedics and/or fire department, as necessary;
- Signal the evacuation procedure previously outlined and implement the entire procedure;
- Isolate the area;
- Stay upwind of any fire;
- Keep area surrounding the problem source clear after the incident occurs; and
- Complete accident report form and distribute to appropriate personnel.

## 6.0 STANDARD SAFE WORK PRACTICES

The following are considered standard safe work practices.

1. Eating, drinking, chewing tobacco, smoking, and carrying matches or lighters are prohibited in a contaminated or potentially contaminated area or where the possibility for the contamination transfer exists.
2. Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or the ground. Do not place monitoring equipment on potentially contaminated surfaces (e.g., ground, etc.).
3. All field crew members should be alert to all potentially dangerous situations e.g., presence of strong and irritating or nauseating odors.
4. Field crew members shall be familiar with the physical characteristics of investigations, including
  - wind direction in relation to nearby buildings;
  - accessibility to associates, equipment, vehicles, communication;
  - hot zone (areas of known or suspected contamination)
  - site access; and
  - nearest water sources.
5. Protective equipment as specified in Section 3 will be used by workers during the initial site reconnaissance and follow-on geophysical activities.
6. Use of heavy equipment on-site, e.g., trucks, bobcats, may be hazardous to site workers. For example, the vision of the rig driver may be limited, so all field crew members should stay clear when rigs are operating. Drill rig booms and cables also provide aerial hazards to field crew members.
7. Wearing personal protective equipment can result in an impairment of the ability to operate site equipment. All field crew members should pay specific attention to decreased performance capabilities resulting from the use of personal protective equipment, such as poor tactile skills when wearing certain types of gloves. Prior knowledge of limitations imposed by the use of such equipment will allow the worker to assess the decrease in his or her capability to perform field operations in a safe manner.
8. Wearing of jewelry, such as rings and loose bracelets and necklaces, is prohibited in order to avoid their entanglement in site machinery.

9. Overhead power lines, downed electrical wires, and buried cables pose a danger of shock or electrocution if workers contact or sever them during site operations. The location of these potential hazards should be ascertained before beginning site activities.
10. Buddy system procedures will be enforced during site operations.
11. Site personnel will perform only those tasks which they are qualified to perform.
12. Site visitors are to be escorted by UXO qualified UXB personnel at all times.
13. Running and horseplay are prohibited in all areas of the site.
14. The number of personnel in the work zones will be the minimum number necessary to perform work tasks in a safe and efficient manner.



**APPENDIX E**

**UXB SITE-SAFETY AND HEALTH PLAN**

**UXB SITE SAFETY AND HEALTH PLAN  
FOR ORDNANCE OPERABLE UNIT (OOU6)  
FORMER CAMP CROFT ARMY TRAINING FACILITY  
SPARTANBURG, SOUTH CAROLINA**

Prepared for:

**U.S. ARMY ENGINEERING AND SUPPORT CENTER  
HUNTSVILLE (CEHNC)**

November 1996

**SSHP APPROVAL**

Project: **Camp Croft**

Site: **Former Camp Croft  
Army Training  
Facility**

Project Number: 7206-001

Site Location:  
**Spartanburg, South  
Carolina**


We have reviewed the attached SSHP for the referenced site. We recognize that when this form is completed, the attached SSHP is approved for field activities on the referenced site. Changes to this SSHP will be documented in writing.

Prepared by:   
F. Johnson, Project Manager, UXB

Date: 11/22/96

Reviewed by:   
Jim Ferris, Director of Compliance

Date: 11/22/96

Approved by:   
Steven P. Clay, CIH

Date: 11/22/96

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## LIST OF ACRONYMS AND ABBREVIATIONS

ALS	Advanced Life Saving
ANSI	American National Standards Institute
CBC	complete blood count
CCATF	Camp Croft Army Training Facility
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CPR	cardiopulmonary resuscitation
CSHP	Corporate Safety and Health Program
CWM	chemical warfare material
°C	degrees Celsius
DOD	U.S. Department of Defense
DOT	Department of Transportation
EOD	explosive ordnance disposal
°F	degrees Fahrenheit
FM	Factory Mutual Engineering Corp.
ft	foot
gal	gallon
GFCI	ground fault circuit interrupter
GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations and Emergency Response
hr	hour
HR	heart rate
IHS	industrial hygiene service
mph	miles per hour
MSDS	material safety data sheet



LIST OF ACRONYMS AND ABBREVIATIONS  
(Continued, Page 2 of 3)

NEC	National Electric Code
NESC	National Electrical Safety Code
NIOSH	National Institute of Occupational Safety and Health
OE	ordnance and explosive waste
OHP	occupational health program
OHS	occupational health services
OSHA	Occupational Safety and Health Administration
OT	oral temperature
oz	ounce
Parsons ES	Parsons Engineering Science, Incorporated
POL	petroleum, oil, and lubricant
PPE	personal protective equipment
SOP	standard operating procedure
SOW	scope (statement) of work
SSO	site safety and health officer
SSHP	site safety and health plan
SWP	safe work practice
SZ	support zone
TLV	threshold limit value
TWA	time-weighted average
UL	Underwriters Laboratory
USATEU	U.S. Army Technical Escort Unit
UV	ultraviolet
UXB	UXB International, Incorporated
UXO	unexploded ordnance
WBGT	wet bulb, dry globe temperature

**LIST OF ACRONYMS AND ABBREVIATIONS**  
(Continued, Page 3 of 3)

WP	work plan
WWII	World War II
WZ	Work Zone

## PREFACE

This Site Safety and Health Plan (SSHP) outlines and specifies the work practices and procedures needed to ensure protection of site personnel, the environment, and the local community during the conduct of the Engineering Design at Ordnance Operable Unit 6 (OOU6) the former Camp Croft Army Training Facility (CCATF), Spartanburg, South Carolina. All site activities will be performed in accordance with this SSHP and applicable U.S. Army Engineering and Support Center, Huntsville (CEHNC), federal, state, and local regulations.

In generating this document, attention has been given to identifying site- and task-specific hazards and to developing hazard control techniques and procedures. The hazard control methods detailed in this SSHP were evaluated and selected to minimize the potential for accident or injury and to safeguard the environment and general public. This SSHP, however, should be considered a living document, and may be subject to change based on review and site implementation of currently identified or additional tasks. Any tasks and their associated documentation that may be added after final approval of this document must be approved by the personnel on the following signature page and the CEHNC Contracting Officer. These additions to the SSHP will be treated as amendments and will not, unless otherwise specified, supersede the approved Work Plan or SSHP.

This SSHP is intended to be used by UXB International, Incorporated (UXB), UXO subcontractor. It attempts to address the corporate health and safety requirements of Parsons ES and the UXB as they relate to this project. In cases where there are differences in the safety requirements of these organizations, the more stringent requirements will apply.

## **1.0 INTRODUCTION**

### **1.1 PURPOSE/OBJECTIVES**

This Site Safety and Health Plan (SSHP) has been prepared by UXB International, Inc. (UXB) and is designed to anticipate, identify, evaluate, and control safety and health hazards which may be encountered during this engineering design study at Ordnance Operable Unit 6 (OOU6) the former Camp Croft Army Training Facility (CCATF), near Spartanburg, South Carolina. This SSHP also describes the response procedures that will be implemented if an emergency arises during the conduct of the site tasks outlined in this document and the Work Plan (WP). All project activities shall be performed in accordance with this SSHP and the references listed in Section 1.2. Where the word "shall" is used, the provisions of this plan are mandatory.

**1.1.1** The levels of personal protection and the procedures specified in this plan are based on the best available information from reference documents and current site data. These recommendations represent the minimum health and safety requirements to be observed by all personnel engaged in this project. Unforeseeable site conditions or changes in the Scope of Work (SOW) may warrant a reassessment of protection levels and controls stated. All adjustments to the SSHP must have prior approval by the CEHNC.

**1.1.2** All UXB personnel involved in this project shall read this document carefully, understand and comply with it, and complete the SSHP acknowledgment form prior to the start of work. All onsite personnel shall follow the designated safety and health procedures, be alert to the hazards associated with working onsite, and exercise reasonable caution at all times.

**1.1.3** Unexploded ordnance (UXO) poses a serious safety and health problem that endangers human and animal life and environmental quality. The regulations and guidelines listed in Section 1.2 provide employers and employees with information on the potential for injury and illness resulting from UXO operations.

## **1.2 REGULATIONS AND GUIDELINES**

The safety and health of onsite personnel and the local community will be ensured by following all applicable requirements and regulations listed in the following publications:

1. Occupational Safety and Health Administration (OSHA) General Industry Standards, 29 Code of Federal Regulations (CFR) 1910;
2. OSHA Construction Standards, 29 CFR 1926;
3. U.S. Army Corps of Engineers EM 385-1-1;
4. Army Regulation (AR) 385-40 (with CEHNC Supplement 1), Accident Reporting and Records;
5. U.S. Environmental Protection Agency (EPA) Hazardous Waste Management, 40 CFR 260-276, latest edition;
6. Engineering Regulation (ER) 385-1-92, Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) and Ordnance and Explosives (OE) Activities, 18 March 1994.

## **1.3 REFERENCES**

In addition to the publications and regulations previously listed, the following documents were used as reference material in the preparation of this document:

1. U.S. Department of Defense (DOD) 4145.26-M, Contractors' Safety Manual for Ammunition and Explosive.
2. Occupational Safety and Health Guidance for Hazardous Waste Site Activities, U.S. Department of Health and Human Services, National Institute of Occupational Safety and Health (NIOSH), October 1985; and
3. Threshold Limit Values and Biological Exposure Indices for 1993-94, American Conference of Governmental Industrial Hygienists (ACGIH), 1993.

## **2.0 SAFETY AND HEALTH ORGANIZATION**

### **2.1 GENERAL**

All operations and personnel having exposure potential to site hazards are subject to the requirements of this SSHP. Work may not be performed in a manner that conflicts with the intent of, or the inherent safety, health, or environmental precautions expressed in this SSHP. After due warnings, personnel violating safety procedures will be dismissed from the site.

**2.1.1** The safety and health requirements listed in this SSHP may change as site work progresses; however, no changes will be made without approval of CEHNC, Parsons ES, and UXB. Figure 2-1 shows UXBs safety and health chain-of-command.

### **2.2 Parsons ES HEALTH AND SAFETY PERSONNEL**

Parsons ES will provide on site management and administrative support during the conduct of field operations and will prepare or approve all CEHNC-required reports and documents. Parsons ES will also have overall responsibility for the health and safety of site personnel operating under this SOW at OOU6.

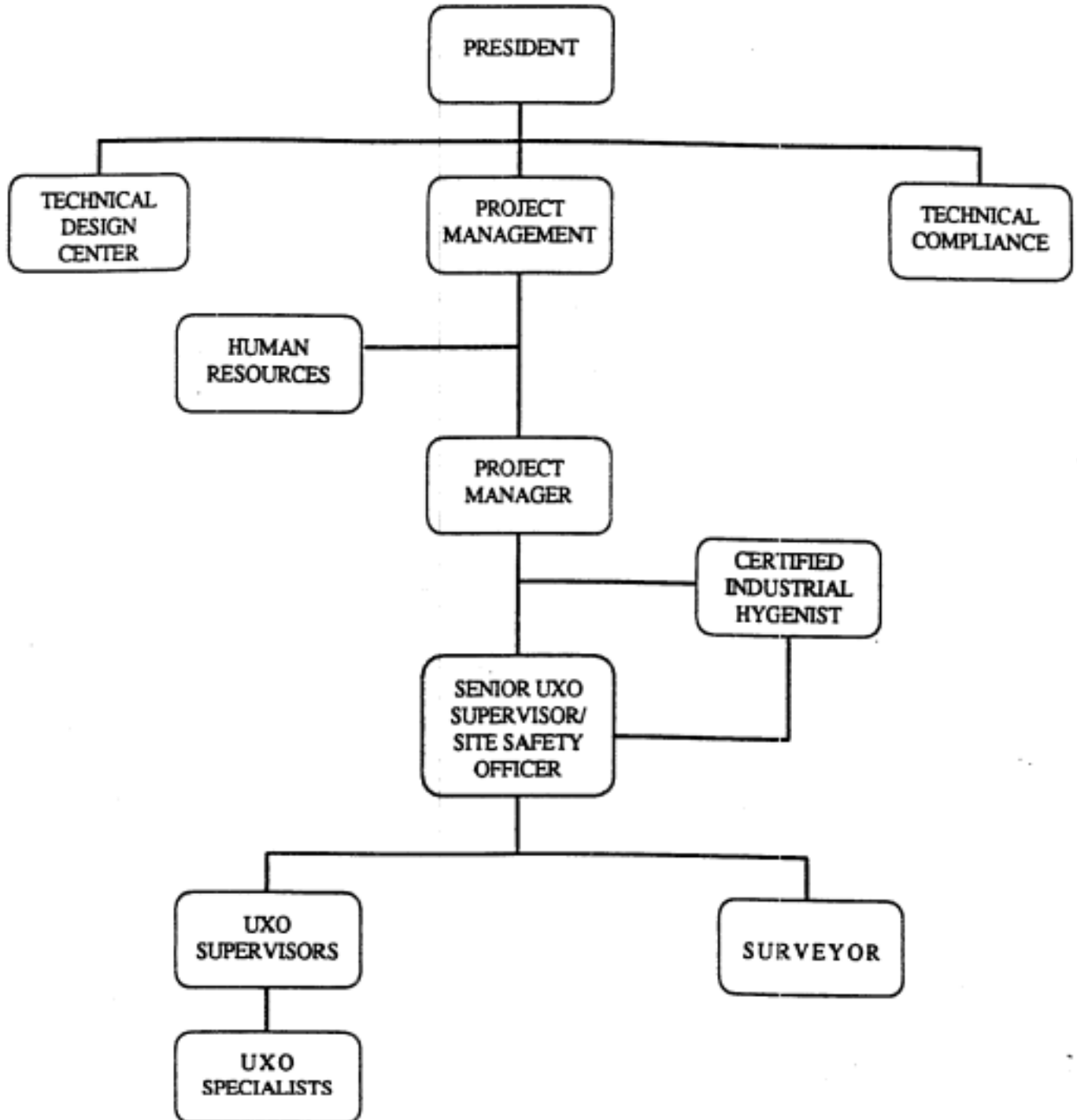
#### **2.2.2 UXB SITE HEALTH AND SAFETY OFFICER (SSO)**

The SSO is responsible for implementing the SSHP and maintaining all required records.



LXB International, Inc.

# CORPORATE SAFETY AND HEALTH ORGANIZATIONAL MANAGEMENT



## **2.3 UXB SITE PERSONNEL**

UXB will be responsible for providing trained site personnel to identify, handle, and remediate OE, and other hazardous wastes. UXB site personnel will have extensive experience in recognizing, evaluating, and handling OE and chemical hazards.

### **2.3.2 UXB Site Safety Officer (SSO)**

The responsibilities of the UXB SSO will be as follows:

1. Authorizing STOP WORK for safety and health reasons.
2. Completing personnel data sheets on all UXB site personnel.
3. Implementing and enforcing the SSHP.
4. Conducting daily tailgate safety briefings.
5. Training employees in site-specific hazards and completing the Parsons ES and UXB documentation of training form.
6. Specifying proper levels of personal protective equipment (PPE) IAW the specifications of this SSHP.
7. Developing additional safety and health procedures, as required, in coordination with UXB CIH.
8. Enforcing UXBs Alcohol/Drug Abuse Policy.
9. Investigating accidents/incidents and near misses.
10. Conducting visitor orientation.
11. Conducting daily safety inspections, weekly safety audits, and completing UXBs weekly safety audit checklist.
12. Conducting monitoring IAW this SSHP.

## **2.4 RESPONSIBILITIES OF ALL SITE PERSONNEL**

All Parsons ES, UXB, and CEHNC, personnel who will be involved in onsite activities are responsible for the following:

1. Taking all reasonable precautions to prevent injury to site personnel and being alert to potentially harmful situations. All personnel have stop-work authority.



2. Performing only those tasks that can be done safely with proper training provided.
3. Notifying the Senior UXO Supervisor of any special medical conditions (e.g., allergies, contact lenses, diabetes, etc.) which may be impacted by site operations.
4. Notifying the Senior UXO Supervisor of any prescription and/or nonprescription medication which a worker may be taking that might cause drowsiness, anxiety, or other unfavorable side effects.
5. Preventing spillage and splash of materials to the greatest extent possible.
6. Practicing good housekeeping by keeping the work area neat, clean, and in order.
7. Immediately reporting all injuries, no matter how minor, to the Senior UXO Supervisor.
8. Complying with the SSHP and all safety and health recommendations and precautions and properly using the PPE as determined by this SSHP.
9. Maintaining, at the work site, current training and medical documentation.

## **2.5 SEGREGATION OF SAFETY OFFICER RESPONSIBILITIES**

Parsons ES, as the CEHNC Contractor for this project, will have the responsibility for the safe and healthful conduct of all site operations. Therefore, the Parsons ES Site Supervisor will have the ultimate responsibility for safety and health of all on site personnel.

**2.5.1** Due to the inherent nature of the hazards associated with OE, and the unique training and experience required for investigating, identifying, and handling OE, the UXB Senior UXO Supervisor will have the responsibility for the daily implementation of the SSHP and operational safety and health. As such, he will be dual-hatted as the Senior UXO Supervisor and the SSO.

**2.5.2** In the event of an emergency, or whenever conditions at the site warrant such action, The UXB SSO will implement the Emergency Response Plan (ERP) found in Section 9.0 of this SSHP. The Parson's Site Supervisor will be responsible for ensuring the evacuation, emergency

treatment, emergency transport of site personnel as necessary, and notification of emergency response units and the appropriate management staff.

## **2.6 UXBs RESPONSIBILITIES**

UXB will also be responsible for providing equipment that is safe for operations and free from any obvious hazards.

## **3.0 TASK DESCRIPTIONS**

### **3.1 TASK DESCRIPTIONS**

#### **3.1.1 SITE CHARACTERIZATION**

Surveying of 300 (50' by 50') sample areas will be performed. The data collected from these grids will be compiled and form the basis for site evaluation and characterization and ultimately final recommendations for follow on action at the site. If suspect UXO is located during this sweep, the UXO Team Leader UXO Supervisor will report the encounter to the Senior UXO Supervisor, who will then inform the Parsons ES Site Manager of the find. UXB will take appropriate measures to safeguard the area.

#### **3.1.2 VEGETATION REMOVAL**

Vegetation removal will be necessary to conduct the EM-61 and magnetometer surveys. Vegetation removal will be conducted using chain saw, bladed weed eater and a brush hog. A visual clearance of the areas to be cleared will be conducted prior to vegetation removal.

#### **3.1.3 DISPOSAL OPERATIONS**

UXB shall dispose of any OE encountered in accordance with Appendices C (Explosive Safety Precautions) and (OE Operational Plan) of the WP.

## **4.0 HAZARD IDENTIFICATION**

### **4.1 PRELIMINARY EVALUATION**

Qualified personnel have performed a preliminary evaluation of the tasks and sites. During development of this SSHP, a Certification of Task Hazard Assessment has been completed for each task (or group of similar tasks) to be conducted under this SSHP. This assessment has been conducted to comply with the OSHA PPE standard 29 CFR 1910.132(d)(2) (effective July 5, 1994) and to ensure that all tasks have been assessed to determine the PPE and controls needed to protect site personnel. However, evaluation of work site characteristics and hazards is an ongoing process which will continue throughout the project.

### **4.2 CHEMICAL EXPOSURE RISK ASSESSMENT**

In assessing the risk of chemical exposure, Parsons ES and UXB personnel examined the following: archival data and sampling results provided by Parsons ES and CEHNC, current land usages, the physical properties of potential site contaminants, the potential exposure routes, and the operational tasks to be performed. Examination of these items indicate that the potential for exposure to chemical hazards will be essentially nonexistent during all planned site activities to which this SSHP applies. If site activities are modified, the potential for chemical exposure will have to be re-evaluated.

### **4.3 PHYSICAL HAZARDS IDENTIFICATION**

Physical hazards expected to be encountered in conducting operations are heat and cold stress, flammable materials, lifting, operation of hand and power tools, inclement weather, uneven/unstable surfaces, sharp objects (e.g., nails and broken glass), trips and falls, excessive noise, dense vegetation, biological hazards, and heavy equipment.

**4.3.1** Site personnel should look for potential safety hazards and immediately report the hazards to the Senior UXO Supervisor or a UXO Supervisor. Site personnel will be informed of the actions to be taken to control or remove the hazard.

**4.3.2** The Senior UXO Supervisor shall be responsible for thoroughly evaluating each day's field operations with respect to potential physical hazards. Any suspect or known physical hazards, and the specific procedures to control them, shall be reviewed and documented during the daily tailgate safety briefing. General procedures for reducing or eliminating these hazards are discussed in Section 8.0 of this SSHP.

#### **4.4 OE HAZARDS**

The hazards associated with OE will be specifically addressed as part of the geophysical survey conducted by UXB. If OE is encountered during field activities, Parsons ES will contact appropriate CEHNC personnel. Two UXO specialists will positively identify the item and condition. If possible, it will be moved out of the work area. If it cannot be moved, it will be visibly marked and barricaded. Work will not stop unless the item is a suspect CWM. If a known or suspected CWM is encountered, all work within 500 m of the location will cease, the area will be evacuated, and CEHNC notified. In the interim, two UXO specialists will maintain security on the item from an upwind location. The remainder of the field team will be posted on all access routes to ensure no unauthorized personnel enter the site. This posture will be maintained until relieved by proper military authority [i.e., EOD or U.S. Army Technical Escort Unit (USATEU)]. Parsons ES will render assistance as requested by CEHNC.

#### **4.5 BIOLOGICAL HAZARDS**

Biological hazards include stinging insects such as bees, wasps, and hornets; poisonous plants such as poison ivy, oak, and sumac; ticks; mosquitoes; and poisonous snakes. Employee awareness and the safe work practices outlined in Section 8.0 will reduce the risks associated with these hazards.

#### **4.6 HAZARD COMMUNICATION**

To comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200 and to ensure that site personnel are informed of the hazards associated with the materials with which they work, the following shall apply to all commercial products containing hazardous substances which are brought onsite:

1. A written Hazard Communication Program will be made available to site personnel.
2. Material safety data sheets (MSDSs) will be maintained for each product containing a hazardous substance which is used onsite.
3. All containers not supplied with adequate hazard labeling shall have a hazard communication label affixed to the container that communicates the health and physical hazards associated with working with the material.
4. Employees working with hazardous substances shall be trained in accordance with the requirements of 29 CFR 1910.1200.
5. An MSDS inventory of all hazardous substances used onsite will be maintained in Attachment A of this report.
6. All personnel, including UXB, affected by hazardous substances use shall be informed of the hazards.
7. When available, MSDSs for chemicals known or suspected to be onsite will be maintained in the field office. Workers will be advised of the location and contents of these MSDSs IAW the requirements of this SSHP.

#### **4.7 TASK HAZARD ASSESSMENT**

A task hazard assessment has been performed, and Certification of Task Hazard Assessment forms have been generated to provide a task-specific evaluation of the known or potential hazards associated with the conduct of an individual task. The SSHO will use these forms to inform site personnel of the hazards expected during the day's activities. The completed Certification of Task Hazard Assessment also outlines the engineering and administrative controls, operating procedures or programs, and PPE which will be required for the safe conduct of each task in the SOW.

**4.7.1** The hazard analyses have been conducted using the best-available information related to the site and the nature of the task itself. If site conditions or tasks change, the Senior UXO Supervisor will evaluate the new conditions or task and complete a new Certification of Task Hazard Analysis form. The Senior UXO Supervisor will then forward the form to the Parsons ES Site Manager for approval prior to resuming or initiating the task. Site Specific Hazard Analysis Forms and Certification of Task Hazard Assessment Forms for the Camp Croft Project are provided on the following pages:

**CERTIFICATION OF TASK HAZARD ASSESSMENT**

**TASK NAME:** Mobilization/Demobilization

**DATE:** 10/13/96

**1.0 Hazard Identification:** Items checked are known or anticipated site hazards, or may occur as a result of site operations.

<input type="checkbox"/> Physical exertion <input type="checkbox"/> Heat stress <input type="checkbox"/> Cold stress <input type="checkbox"/> Heavy equipment <input type="checkbox"/> Vehicle traffic <input type="checkbox"/> Fire hazards (underline) - Flammable materials - Fuel/gas lines - Low lying areas	<input type="checkbox"/> Lifting hazards <input type="checkbox"/> Slip, trip or fall <input type="checkbox"/> High noise (>85 dBA) <input type="checkbox"/> Overhead utilities <input type="checkbox"/> Underground utilities <input type="checkbox"/> Intrusive activity (underline) - Drilling - Soil excavation - Setting anchors	<input type="checkbox"/> Confined space <input type="checkbox"/> Poisonous plants <input type="checkbox"/> Poisonous/hazardous animals <input type="checkbox"/> Electrical <input type="checkbox"/> Airborne chemical exposure <input type="checkbox"/> Contaminated soil/water <input type="checkbox"/> Hand/Power tools <input type="checkbox"/> UXO/OE <input type="checkbox"/> Puncture/laceration
---	--	--

**2.0 Degree of Hazard:** Anticipated degree of hazard, based on the hazards associated with this task.

**Chemical Hazard:**     Low             Serious             Moderate             Unknown  
**Physical Hazard:**     Low             Serious             Moderate             Unknown

**3.0 Control or Protective Measures:** Items checked will be used to control or mitigate the above mentioned hazards.

<input checked="" type="checkbox"/> Tailgate Safety Briefing <input type="checkbox"/> Specialized Training <input type="checkbox"/> Safe Work Practices	<input type="checkbox"/> Personal protective equipment <input type="checkbox"/> Air Monitoring <input type="checkbox"/> Site Control Zones	<input type="checkbox"/> Decontamination <input type="checkbox"/> Magnetometer Survey
---	--	--

Engineering Controls (List):

Applicable Programs (List): Heat Stress, Hearing Conservation, the SSHP COLD STRESS

Other (List):

**4.0 Task PPE:** PPE has been assigned based on the potential for exposure as identified by this hazard assessment.

<b>Level of Protection</b>	<input type="checkbox"/> A <input type="checkbox"/> B	<input type="checkbox"/> C <input checked="" type="checkbox"/> D	<input type="checkbox"/> Modified
<b>Respiratory Protection</b>	<input type="checkbox"/> SCBA <input type="checkbox"/> Escape SCBA - Size	<input type="checkbox"/> Fullface respirator <input type="checkbox"/> 1/2 Face respirator	<input type="checkbox"/> Cartridge - Type <input type="checkbox"/> No respirator required
<b>Protective Clothing</b>	<input type="checkbox"/> Fully encapsulating suit <input type="checkbox"/> Standard Tyvek	<input type="checkbox"/> Saranex <input type="checkbox"/> PE Tyvek	<input checked="" type="checkbox"/> Company clothing <input type="checkbox"/> Other:
<b>Gloves</b> (specify inner/outer)	<input type="checkbox"/> Nitrile <input type="checkbox"/> Butyl	<input type="checkbox"/> Neoprene <input type="checkbox"/> Latex	<input type="checkbox"/> Leather <input type="checkbox"/> Cotton
<b>Head/Face/Eye/Ear Protection</b>	<input type="checkbox"/> Safety glasses <input type="checkbox"/> Ear plugs/muffs	<input type="checkbox"/> Safety goggles <input type="checkbox"/> Face shield	<input checked="" type="checkbox"/> Hard hat <input type="checkbox"/> Other:
<b>Foot/Leg Protection</b>	<input type="checkbox"/> Leather boots <input type="checkbox"/> Steel-toed leather boots	<input type="checkbox"/> Steel foot covers <input type="checkbox"/> Kevlar leg chaps	<input type="checkbox"/> Chemical over boots - Material

**5.0 Modifications Required:** \_Safety glasses required if an eye hazard exists; !Ear plugs, muffs, or a combination of the two, will be used if noise levels exceed 85 dBA, 8-hour time-weighted average (TWA); \*Hard hats required if an overhead hazard exists or when working around heavy equipment; \_Leather boots are adequate unless toe hazards exist.

**6.0 Certification:** The PPE and other control methods and procedures to be used in the conduct of this task have been selected as a result of a hazard assessment conducted by the following individual.

**Printed Name:** FRANK JOHNSON

**Signature:** 



**CERTIFICATION OF TASK HAZARD ASSESSMENT**

**TASK NAME:** Vegetation Clearing Using Chain Saw or Bladed Weed Eater (any work area)

**DATE:** 10/13/96

**1.0 Hazard Identification:** Items checked are known or anticipated site hazards, or may occur as a result of site operations.

- |  |   |  |
|--|---|--|
| <input checked="" type="checkbox"/> Physical exertion<br><input type="checkbox"/> Heat stress<br><input checked="" type="checkbox"/> Cold stress<br><input checked="" type="checkbox"/> Heavy equipment<br><input type="checkbox"/> Vehicle traffic<br><input type="checkbox"/> Fire hazards (underline)<br>· Flammable materials<br>· Fuel/gas lines<br>· Low lying areas | <input checked="" type="checkbox"/> Lifting hazards<br><input checked="" type="checkbox"/> Slip, trip or fall<br><input checked="" type="checkbox"/> High noise (>85 dBA)<br><input type="checkbox"/> Overhead utilities<br><input type="checkbox"/> Underground utilities<br><input type="checkbox"/> Intrusive activity (underline)<br>· Drilling<br>· Soil excavation<br>· Setting anchors | <input type="checkbox"/> Confined space<br><input type="checkbox"/> Poisonous plants<br><input type="checkbox"/> Poisonous/hazardous animals<br><input type="checkbox"/> Electrical<br><input type="checkbox"/> Airborne chemical exposure<br><input type="checkbox"/> Contaminated soil/water<br><input type="checkbox"/> Hand/power tools<br><input checked="" type="checkbox"/> UXO/OEW<br><input type="checkbox"/> Puncture/laceration |
|--|---|--|

**2.0 Degree of Hazard:** Anticipated degree of hazard, based on the hazards associated with this task.

- Chemical Hazard:**  Low       Serious       Moderate       Unknown
- Physical Hazard:**  Low       Serious       Moderate       Unknown

**3.0 Control or Protective Measures:** The items checked will be used to control or mitigate the mentioned hazards.

- |   |   |  |
|---|---|--|
| <input checked="" type="checkbox"/> Tailgate safety briefing<br><input checked="" type="checkbox"/> Specialized training<br><input checked="" type="checkbox"/> Safe work practices | <input checked="" type="checkbox"/> Personal protective equipment<br><input type="checkbox"/> Air monitoring<br><input type="checkbox"/> Site control zones | <input type="checkbox"/> Decontamination<br><input type="checkbox"/> Magnetometer survey |
|---|---|--|

Engineering Controls (List): Applicable machine guards will be in place.

Applicable Programs (List): Heat Stress, Hearing Conservation, the SSHP

Other (List):

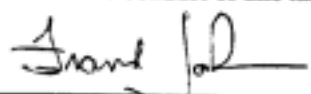
**4.0 Task PPE:** PPE has been assigned based on the potential for exposure as identified by this hazard assessment.

<b>Level of Protection</b>	<input type="checkbox"/> A <input type="checkbox"/> B	<input checked="" type="checkbox"/> C <input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> Modified BRUSH CLEARANCE
<b>Respiratory Protection</b>	<input type="checkbox"/> SCBA <input type="checkbox"/> Escape SCBA - Size	<input type="checkbox"/> Fullface respirator <input type="checkbox"/> 1/2 Face respirator	<input type="checkbox"/> Cartridge - Type <input checked="" type="checkbox"/> No respirator required
<b>Protective Clothing</b>	<input type="checkbox"/> Fully encapsulating suit <input type="checkbox"/> Standard tyvek	<input type="checkbox"/> Saranex <input type="checkbox"/> PE Tyvek	<input type="checkbox"/> Company clothing <input checked="" type="checkbox"/> Other: BRUSH CLEARANCE
<b>Gloves (specify inner/outer)</b>	<input type="checkbox"/> Nitrile <input type="checkbox"/> Butyl	<input type="checkbox"/> Neoprene <input type="checkbox"/> Latex	<input checked="" type="checkbox"/> Leather <input type="checkbox"/> Cotton
<b>Head/Face/Eye/Ear Protection</b>	<input type="checkbox"/> Safety glasses <input type="checkbox"/> Ear plugs/muffs	<input checked="" type="checkbox"/> Safety goggles <input type="checkbox"/> Face shield - Wire Mesh	<input type="checkbox"/> Hard hat <input type="checkbox"/> Other:
<b>Foot/Leg Protection</b>	<input checked="" type="checkbox"/> Leather boots <input type="checkbox"/> Steel-toed leather boots	(*) Steel toe/metatarsal covers <input type="checkbox"/> Kevlar leg chaps	<input type="checkbox"/> Chemical over boots - Material

**5.0 Modifications:** Level D is modified by the mandatory addition of ear plugs/muffs and wire mesh face shield.

**6.0 Certification:** The PPE and other control methods and procedures to be used in the conduct of this task have been selected as a result of a hazard assessment conducted by the following individual.

**Printed Name:** FRANK JOHNSON

**Signature:** 

**CERTIFICATION OF TASK HAZARD ASSESSMENT**

TASK NAME: Vegetation Clearing Using Brush Hog (any work area)

DATE: 10/13/96

**1.0 Hazard Identification:** Items checked are known or anticipated site hazards, or may occur as a result of site operations.

<input checked="" type="checkbox"/> Physical exertion <input type="checkbox"/> Heat stress <input checked="" type="checkbox"/> Cold stress <input checked="" type="checkbox"/> Heavy equipment <input type="checkbox"/> Vehicle traffic <input type="checkbox"/> Fire hazards (underline) • Flammable materials • Fuel/gas lines • Low lying areas	<input type="checkbox"/> Lifting hazards <input type="checkbox"/> Slip, trip or fall <input checked="" type="checkbox"/> High noise (>85 dBA) <input type="checkbox"/> Overhead utilities <input type="checkbox"/> Underground utilities <input type="checkbox"/> Intrusive activity (underline) • Drilling • Soil excavation • Setting anchors	<input type="checkbox"/> Confined space <input type="checkbox"/> Poisonous plants <input type="checkbox"/> Poisonous/hazardous animals <input type="checkbox"/> Electrical <input type="checkbox"/> Airborne chemical exposure <input type="checkbox"/> Contaminated soil/water <input type="checkbox"/> Hand/power tools <input checked="" type="checkbox"/> UXO/OE <input type="checkbox"/> Puncture/laceration
--	---	---

**2.0 Degree of Hazard:** Anticipated degree of hazard, based on the hazards associated with this task.

Chemical Hazard:  Low     Serious    Physical Hazard:  Low     Serious  
 Moderate     Unknown                       Moderate     Unknown

**3.0 Control or Protective Measures:** The items checked will be used to control or mitigate the mentioned hazards.

<input type="checkbox"/> Tailgate safety briefing <input type="checkbox"/> Specialized training <input type="checkbox"/> Safe work practices	<input type="checkbox"/> Personal protective equipment <input type="checkbox"/> Air monitoring <input type="checkbox"/> Site control zones	<input type="checkbox"/> Decontamination <input type="checkbox"/> Magnetometer survey
--	--	--

Engineering Controls (List): Applicable machine guards will be in place

Applicable Programs (List): Heat Stress, Hearing Conservation, the SSHP

Other (List):

**4.0 Task PPE:** PPE has been assigned based on the potential for exposure as identified by this hazard assessment.

<b>Level of Protection</b>	<input type="checkbox"/> A <input type="checkbox"/> B	<input type="checkbox"/> C <input checked="" type="checkbox"/> D	<input type="checkbox"/> Modified
<b>Respiratory Protection</b>	<input type="checkbox"/> SCBA <input type="checkbox"/> Escape SCBA - Size	<input type="checkbox"/> Fullface respirator <input type="checkbox"/> 1/2 Face respirator	<input type="checkbox"/> Cartridge - Type <input type="checkbox"/> No respirator required
<b>Protective Clothing</b>	<input type="checkbox"/> Fully encapsulating suit <input type="checkbox"/> Standard Tyvek	<input type="checkbox"/> Saranex <input type="checkbox"/> PE Tyvek	<input type="checkbox"/> Company clothing <input type="checkbox"/> Other:
<b>Gloves</b> (specify inner/outer)	<input type="checkbox"/> Nitrile <input type="checkbox"/> Butyl	<input type="checkbox"/> Neoprene <input type="checkbox"/> Latex	<input type="checkbox"/> Leather <input type="checkbox"/> Cotton
<b>Head/Face/Eye/Ear Protection</b>	<input checked="" type="checkbox"/> Safety glasses <input type="checkbox"/> Ear plugs/muffs	<input type="checkbox"/> Safety goggles <input type="checkbox"/> Face shield - wire mesh	<input type="checkbox"/> Hard hat <input type="checkbox"/> Other:
<b>Foot/Leg Protection</b>	<input type="checkbox"/> Leather boots <input type="checkbox"/> Steel-toed leather boots	<input type="checkbox"/> Steel metatarsal covers <input type="checkbox"/> Kevlar leg chaps	<input type="checkbox"/> Chemical over boots - Material

**5.0 Modifications Required:** \*Hard hat will be worn when brush hog is operating. Steel or fiber toed boots required if a toe crush hazard exists, otherwise leather boots will be adequate.

**6.0 Certification:** The PPE and other control methods and procedures to be used in the conduct of this task have been selected as a result of a hazard assessment conducted by the following individual.

Printed Name: FRANK JOHNSON

Signature: 

**CERTIFICATION OF TASK HAZARD ASSESSMENT**

**TASK NAME:** Visual Clearance and Location Survey

**DATE:** 10/13/96

**1.0 Hazard Identification:** Items checked are known or anticipated site hazards, or may occur as a result of site operations.

<input type="checkbox"/> Physical exertion <input type="checkbox"/> Heat stress <input checked="" type="checkbox"/> Cold stress <input type="checkbox"/> Heavy equipment <input type="checkbox"/> Vehicle traffic <input type="checkbox"/> Fire hazards (underline) - Flammable materials - Fuel/gas lines - Low lying areas	<input type="checkbox"/> Lifting hazards <input checked="" type="checkbox"/> Slip, trip or fall <input type="checkbox"/> High noise (>85 dBA) <input type="checkbox"/> Overhead utilities <input type="checkbox"/> Underground utilities <input type="checkbox"/> Intrusive activity (underline) - Drilling - Soil excavation - Setting anchors	<input type="checkbox"/> Confined space <input checked="" type="checkbox"/> Poisonous plants <input checked="" type="checkbox"/> Poisonous/hazardous animals <input type="checkbox"/> Electrical <input type="checkbox"/> Airborne chemical exposure <input type="checkbox"/> Contaminated soil/water <input type="checkbox"/> Hand/power tools <input checked="" type="checkbox"/> UXO/OE <input type="checkbox"/> Puncture/laceration
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**2.0 Degree of Hazard:** Anticipated degree of hazard, based on the hazards associated with this task.

**Chemical Hazard:**  Low       Serious      **Physical Hazard:**  Low       Serious  
 Moderate       Unknown       Moderate       Unknown

**3.0 Control or Protective Measures:** The items checked will be used to control or mitigate the mentioned hazards.

<input checked="" type="checkbox"/> Tailgate safety briefing <input checked="" type="checkbox"/> Specialized training <input checked="" type="checkbox"/> Safe Work Practices	<input type="checkbox"/> Personal protective equipment <input type="checkbox"/> Air monitoring <input checked="" type="checkbox"/> Site Control Zones	<input type="checkbox"/> Decontamination <input type="checkbox"/> Magnetometer survey
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Engineering Controls (List):

Applicable Programs (List): Cold Stress, the SSHP

Other (List):

**4.0 Task PPE:** PPE has been assigned based on the potential for exposure as identified by this hazard assessment.

<b>Level of Protection</b>	<input type="checkbox"/> A <input type="checkbox"/> B	<input type="checkbox"/> C <input checked="" type="checkbox"/> D	<input type="checkbox"/> Modified
<b>Respiratory Protection</b>	<input type="checkbox"/> SCBA <input type="checkbox"/> Escape SCBA - Size	<input type="checkbox"/> Fullface respirator <input type="checkbox"/> 1/2 Face respirator	<input type="checkbox"/> Cartridge - Type <input checked="" type="checkbox"/> No respirator required
<b>Protective Clothing</b>	<input type="checkbox"/> Fully encapsulating suit <input type="checkbox"/> Standard Tyvek	<input type="checkbox"/> Saranex <input type="checkbox"/> PE Tyvek	<input checked="" type="checkbox"/> Company clothing <input type="checkbox"/> Other:
<b>Gloves</b> (specify inner/outer)	<input type="checkbox"/> Nitrile <input type="checkbox"/> Butyl	<input type="checkbox"/> Neoprene <input type="checkbox"/> Latex	<input checked="" type="checkbox"/> Leather <input type="checkbox"/> Cotton
<b>Head/Face/Eye/Ear Protection</b>	<input type="checkbox"/> Safety glasses <input type="checkbox"/> Ear plugs/muffs	<input type="checkbox"/> Safety goggles <input type="checkbox"/> Face shield	<input checked="" type="checkbox"/> Hard hat <input type="checkbox"/> Other:
<b>Foot/Leg Protection</b>	<input checked="" type="checkbox"/> Leather boots <input type="checkbox"/> Steel-toed leather boots	<input type="checkbox"/> Steel foot/metatarsal covers <input type="checkbox"/> Kevlar leg chaps	<input type="checkbox"/> Chemical over boots - Material

**5.0 Modifications Required:** Safety glasses required if an eye hazard exists; \*Hard hats required if an overhead hazard exists or when working around heavy equipment; Leather boots are adequate unless a toe hazards exist.

**6.0 Certification:** The PPE and other control methods and procedures to be used in the conduct of this task have been selected as a result of a hazard assessment conducted by the following individual.

**Printed Name:** FRANK JOHNSON

**Signature:** 

**CERTIFICATION OF TASK HAZARD ASSESSMENT**

TASK NAME: Magnetometer Survey (any work area)

DATE: 10/13/96

**1.0 Hazard Identification:** Items checked are known or anticipated site hazards, or may occur as a result of site operations.

<input type="checkbox"/> Physical exertion <input type="checkbox"/> Heat stress <input type="checkbox"/> Cold stress <input type="checkbox"/> Heavy equipment <input type="checkbox"/> Vehicle traffic <input type="checkbox"/> Fire hazards (underline) · Flammable materials · Fuel/gas lines · Low lying areas	<input type="checkbox"/> Lifting hazards <input type="checkbox"/> Slip, trip or fall <input type="checkbox"/> High noise (>85 dBA) <input type="checkbox"/> Overhead utilities <input type="checkbox"/> Underground utilities <input type="checkbox"/> Intrusive activity (underline) · Drilling · Soil excavation · Setting anchors	<input type="checkbox"/> Confined space <input type="checkbox"/> Poisonous plants <input type="checkbox"/> Poisonous/hazardous animals <input type="checkbox"/> Electrical <input type="checkbox"/> Airborne chemical exposure <input type="checkbox"/> Contaminated soil/water <input type="checkbox"/> Hand/power tools <input type="checkbox"/> UXO/OEW <input type="checkbox"/> Puncture/laceration
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**2.0 Degree of Hazard:** Anticipated degree of hazard, based on the hazards associated with this task.

**Chemical Hazard:**  Low     Serious     Moderate     Unknown  
**Physical Hazard:**  Low     Serious     Moderate     Unknown

**3.0 Control or Protective Measures:** The items checked will be used to control or mitigate the mentioned hazards.

<input type="checkbox"/> Tailgate safety briefing <input type="checkbox"/> Specialized training <input type="checkbox"/> Safe work practices	<input type="checkbox"/> Personal protective equipment <input type="checkbox"/> Air monitoring <input type="checkbox"/> Site control zones	<input type="checkbox"/> Decontamination <input type="checkbox"/> Magnetometer survey
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Engineering Controls (List):

Applicable Programs (List): Cold Stress, Hearing Conservation, the SSHP

Other (List): Site personnel will remain aware of the potential for injury from contact with the stumps of small trees and bushes which have been grubbed.

**4.0 Task PPE:** PPE has been assigned based on the potential for exposure as identified by this hazard assessment.

<b>Level of Protection</b>	<input type="checkbox"/> B	<input type="checkbox"/> C <input checked="" type="checkbox"/> D	<input type="checkbox"/> Modified
<b>Respiratory Protection</b>	<input type="checkbox"/> SCBA <input type="checkbox"/> Escape SCBA - Size	<input type="checkbox"/> Fullface respirator <input type="checkbox"/> ½ Face respirator	<input type="checkbox"/> Cartridge - Type <input checked="" type="checkbox"/> No respirator required
<b>Protective Clothing</b>	<input type="checkbox"/> Fully encapsulating suit <input type="checkbox"/> Standard Tyvek	<input type="checkbox"/> Saranex <input type="checkbox"/> PE Tyvek	<input checked="" type="checkbox"/> Company clothing <input type="checkbox"/> Other:
<b>Gloves</b> (specify inner/outer)	<input type="checkbox"/> Nitrile <input type="checkbox"/> Butyl	<input type="checkbox"/> Neoprene <input type="checkbox"/> Latex	<input type="checkbox"/> Leather <input type="checkbox"/> Cotton
<b>Head/Face/Eye/Ear Protection</b>	<input type="checkbox"/> Safety glasses <input type="checkbox"/> Ear plugs/muffs	<input type="checkbox"/> Safety goggles <input type="checkbox"/> Face shield - Wire Mesh	<input checked="" type="checkbox"/> Hard hat <input type="checkbox"/> Other:
<b>Foot/Leg Protection</b>	<input checked="" type="checkbox"/> Leather boots <input checked="" type="checkbox"/> Plastic-toed leather boots	<input type="checkbox"/> Steel metatarsal covers <input type="checkbox"/> Kevlar leg chaps	<input type="checkbox"/> Chemical over boots - Material

**5.0 Modifications Required:** \*Hard hats required if an overhead hazard exists. \_Safety glasses required if an eye hazard exists. !Plastic-toed boots required if a crush hazard exists.

**6.0 Certification:** The PPE and other control methods and procedures to be used in the conduct of this task have been selected as a result of a hazard assessment conducted by the following individual.

Printed Name: FRANK JOHNSON

Signature: 

**CERTIFICATION OF TASK HAZARD ASSESSMENT**

**TASK NAME:** Intrusive Investigation of Anomalies

**1.0 Hazard Identification:** Items checked are known or anticipated site hazards, or may occur as a result of site operations.

<input type="checkbox"/> Physical exertion <input type="checkbox"/> Heat stress <input type="checkbox"/> Cold stress <input type="checkbox"/> Heavy equipment <input type="checkbox"/> Vehicle traffic <input type="checkbox"/> Fire hazards (underline) · Flammable materials · Explosive ordnance · Low lying areas	<input type="checkbox"/> Lifting hazards <input checked="" type="checkbox"/> Slip, trip or fall <input type="checkbox"/> High noise (>85 dBA) <input type="checkbox"/> Overhead utilities <input type="checkbox"/> Underground utilities <input checked="" type="checkbox"/> Intrusive activity (underline) · Drilling · Soil excavation · Hand digging of anomalies	<input type="checkbox"/> Confined space <input checked="" type="checkbox"/> Poisonous plants <input checked="" type="checkbox"/> Poisonous/hazardous animals <input type="checkbox"/> Electrical <input type="checkbox"/> Airborne chemical exposure <input type="checkbox"/> Contaminated soil/water <input checked="" type="checkbox"/> Hand/power tools <input checked="" type="checkbox"/> UXO/OE <input type="checkbox"/> Puncture/laceration
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**2.0 Degree of Hazard:** Anticipated degree of hazard, based on the hazards associated with this task.

**Chemical Hazard:**  Low     Serious     Moderate     Unknown  
**Physical Hazard:**     Low     Serious     Moderate     Unknown

**3.0 Control or Protective Measures:** The items checked will be used to control or mitigate the mentioned hazards.

<input checked="" type="checkbox"/> Tailgate safety briefing <input checked="" type="checkbox"/> Specialized training <input checked="" type="checkbox"/> Safe work practices	<input checked="" type="checkbox"/> Personal protective equipment <input type="checkbox"/> Air monitoring <input checked="" type="checkbox"/> Site control zones	<input type="checkbox"/> Decontamination <input checked="" type="checkbox"/> Magnetometer survey <input checked="" type="checkbox"/> Visual clearance
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Engineering Controls (List):

Applicable Programs (List): Heat Stress Program, this SSHP

Other (List): Site personnel will remain aware of the potential for injury from contact with the stumps of small trees and bushes which have been grubbed.

**4.0 Task PPE:** PPE has been assigned based on the potential for exposure as identified by this hazard assessment.

<b>Level of Protection</b>	<input type="checkbox"/> B	<input type="checkbox"/> C <input checked="" type="checkbox"/> D	<input type="checkbox"/> Modified
<b>Respiratory Protection</b>	<input type="checkbox"/> SCBA <input type="checkbox"/> Escape SCBA - Size	<input type="checkbox"/> Fullface respirator <input type="checkbox"/> ½ Face respirator	<input type="checkbox"/> Cartridge - Type <input checked="" type="checkbox"/> No respirator required
<b>Protective Clothing</b>	<input type="checkbox"/> Fully encapsulating suit <input type="checkbox"/> Standard Tyvek	<input type="checkbox"/> Saranex <input type="checkbox"/> PE Tyvek	<input checked="" type="checkbox"/> Company clothing <input type="checkbox"/> Other:
<b>Gloves</b> (specify inner/outer)	<input type="checkbox"/> Nitrile <input type="checkbox"/> Butyl	<input type="checkbox"/> Neoprene <input type="checkbox"/> Latex	<input checked="" type="checkbox"/> Leather <input type="checkbox"/> Cotton
<b>Head/Face/Eye/Ear Protection</b>	<input type="checkbox"/> Safety glasses <input type="checkbox"/> Ear plugs/muffs	<input type="checkbox"/> Safety goggles <input type="checkbox"/> Face shield - Wire Mesh	<input type="checkbox"/> Hard hat <input type="checkbox"/> Other:
<b>Foot/Leg Protection</b>	<input checked="" type="checkbox"/> Leather boots <input type="checkbox"/> Steel-toed leather boots	<input type="checkbox"/> Steel metatarsal covers <input type="checkbox"/> Kevlar leg chaps	<input type="checkbox"/> Chemical over boots - Material

**5.0 Modifications Required:** Safety glasses required if an eye hazard exists.

**6.0 Certification:** The PPE and other control methods and procedures to be used in the conduct of this task have been selected as a result of a hazard assessment conducted by the following individual.

**Printed Name:** FRANK JOHNSON

**Signature:** 

**CERTIFICATION OF TASK HAZARD ASSESSMENT**

TASK NAME: Disposal of UXO (Demolition Range)

DATE: 10/13/96

**1.0 Hazard Identification:** Items checked are known or anticipated site hazards, or may occur as a result of site operations.

<input type="checkbox"/> Physical exertion <input type="checkbox"/> Heat stress <input type="checkbox"/> Cold stress <input type="checkbox"/> Heavy equipment <input type="checkbox"/> Vehicle traffic <input type="checkbox"/> Fire hazards (underline) - Explosive materials - Fuel/gas lines - Low lying areas	<input type="checkbox"/> Lifting hazards <input type="checkbox"/> Slip, trip or fall <input type="checkbox"/> High noise (>85 dBA) <input type="checkbox"/> Overhead utilities <input type="checkbox"/> Underground utilities <input type="checkbox"/> Intrusive activity (underline) - Drilling - Soil excavation for demo pit - Setting anchors	<input type="checkbox"/> Confined space (potential) <input type="checkbox"/> Poisonous plants <input type="checkbox"/> Poisonous/hazardous animals <input type="checkbox"/> Electrical <input type="checkbox"/> Airborne chemical exposure <input type="checkbox"/> Contaminated soil/water <input type="checkbox"/> Hand/power tools <input type="checkbox"/> UXO/OE <input type="checkbox"/> Puncture/laceration
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**2.0 Degree of Hazard:** Anticipated degree of hazard, based on the hazards associated with this task.

**Chemical Hazard:**  Low     Serious    **Physical Hazard:**  Low     Serious  
 Moderate     Unknown                       Moderate     Unknown

**3.0 Control or Protective Measures:** The items checked will be used to control or mitigate the mentioned hazards.

<input type="checkbox"/> Tailgate safety briefing <input type="checkbox"/> Specialized training <input type="checkbox"/> Safe work practices	<input checked="" type="checkbox"/> Personal protective equipment <input type="checkbox"/> Air monitoring <input type="checkbox"/> Site control zones	<input type="checkbox"/> Decontamination <input type="checkbox"/> Magnetometer survey
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Engineering Controls (List): Demo pit will be covered with soil to reduce blast and noise hazards.

Applicable Programs (List): Basic Concepts and Considerations for UXO and Demolition Range Program, the SSHP

Other (List): Non-sparking tools

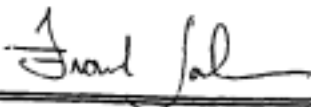
**4.0 Task PPE:** PPE has been assigned based on the potential for exposure as identified by this hazard assessment.

<b>Level of Protection</b>	<input type="checkbox"/> B	<input type="checkbox"/> C <input checked="" type="checkbox"/> D	<input type="checkbox"/> Modified
<b>Respiratory Protection</b>	<input type="checkbox"/> SCBA <input type="checkbox"/> Escape SCBA - Size	<input type="checkbox"/> Fullface respirator <input type="checkbox"/> 1/2 Face respirator	<input type="checkbox"/> Cartridge - Type <input checked="" type="checkbox"/> No respirator required
<b>Protective Clothing</b>	<input type="checkbox"/> Fully encapsulating suit <input type="checkbox"/> Standard Tyvek	<input type="checkbox"/> Saranex <input type="checkbox"/> PE Tyvek	<input checked="" type="checkbox"/> Company clothing <input type="checkbox"/> Other:
<b>Gloves</b> (specify inner/outer)	<input type="checkbox"/> Nitrile <input type="checkbox"/> Butyl	<input type="checkbox"/> Neoprene <input type="checkbox"/> Latex	<input type="checkbox"/> Leather <input type="checkbox"/> Cotton
<b>Head/Face/Eye/Ear Protection</b>	<input type="checkbox"/> Safety glasses <input type="checkbox"/> Ear plugs/muffs	<input type="checkbox"/> Safety goggles <input type="checkbox"/> Face shield - Wire Mesh	<input type="checkbox"/> Hard hat <input type="checkbox"/> Other:
<b>Foot/Leg Protection</b>	<input checked="" type="checkbox"/> Leather boots <input checked="" type="checkbox"/> Steel-toed leather boots	<input type="checkbox"/> Steel metatarsal covers <input type="checkbox"/> Kevlar leg chaps	<input type="checkbox"/> Chemical over boots - Material

**5.0 Modifications Required:** \*Hard hats required if working around heavy equipment. Safety glasses required if an eye hazard exists. !Steel-toed boots required if a crush hazard exists.

**6.0 Certification:** The PPE and other control methods and procedures to be used in the conduct of this task have been selected as a result of a hazard assessment conducted by the following individual.

Printed Name: FRANK JOHNSON

Signature: 



UXB International, Inc.

## Activity Hazard Analysis

Contract Number: DACA 87-95-D-0018 Project: 7206.001 Location: Camp Croft Est. Start Date: 12/95

Activity: Brush Cutting/Selective Pruning Analysis Performed By: F. Johnson Reviewed By: J. Ferris

Major Steps	Potential Hazards	Protective Measures / Controls
Preparation of use	Fuel and oil fires	Level "D" PPE (boots; coveralls; work gloves; leg protection; eye and ear protection; and hard hat, if applicable) Refueling in safe area away from personnel, smoking areas and vehicles. Fire extinguisher provided in refueling areas. Fuel stored in approved containers Equipment shut-down prior to refueling. Maintain firm footing Guards in place
Equipment Used	Inspection Requirements	Training Requirements
Chainsaws Machete	Inspect equipment for serviceability, fuel leaks. Effectiveness of guards and sharpness of Cutting surfaces.	Personnel have read and comply with SSHP Site mobilization training will include proper use of tools and equipment



UXB International, Inc.

## Activity Hazard Analysis

Contract Number: DACA 87-95-D-0018 Project: 7206.001 Location: Camp Croft Est. Start Date: 12/95

Activity: Brush Cutting/Selective Pruning Analysis Performed By: F. Johnson Reviewed By: J. Ferris

Major Steps	Potential Hazards	Protective Measures / Controls
Use of cutting equipment	Slip, trip, fall Cuts Falling objects Physical exertion Cold / heat stress Burns	Level "D" PPE (boots; coveralls; work gloves; eye and ear protection; and hard hat, if applicable) Maintain firm footing Kickback device in place Guards in place Proper idle speed Sharp cutting surfaces Work / rest regime established Establish heat / cold monitoring as appropriate Keep body away from exhaust system Never cut above shoulder height Wear leg chaps when operating weedwacker

Equipment Used	Inspection Requirements	Training Requirements
Chainsaws Machete	Inspect equipment for serviceability, fuel leaks. Effectiveness of guards and sharpness of Cutting surfaces.	Personnel have read and comply with SSHP Site mobilization training will include proper use of tools and equipment





UXB International, Inc.

## Activity Hazard Analysis

Contract Number: DACA 87-95-D-0018 Project: 7206.001 Location: Camp Croft Est. Start Date: 12/95

Activity: Magnetometer Sweeps / Excavation Analysis Performed By: F. Johnson Reviewed By: J. Ferris

Major Steps	Potential Hazards	Protective Measures / Controls
<p>Conduct magnetometer sweep of UXO area</p> <p>Excavate ferrous metal contacts</p>	<p>UXO</p> <p>Hazardous plants and animals</p> <p>Slip, trip, fall</p> <p>Heat / cold stress</p> <p>Repetitive motion injury</p>	<p>Wear Level "D" PPE (boots; coveralls; work gloves; eye &amp; ear protection; and hard hat, if applicable)</p> <p>Apply USACE, Huntsville Div. Safety Concepts and Basic Considerations for UXO</p> <p>Maintain proper footing/remove tripping hazards if possible</p> <p>Provide ID charts of hazardous plants and animals, avoid these items</p> <p>Know heat / cold stress warning signs and take proper action</p> <p>Do not move fuzed ordnance without approval of the CEHND on-site safety</p> <p>Have water, first aid, fire extinguishers, and eye wash on location</p> <p>Use wrist supports while using the magnetometer, if necessary</p> <p>Hand excavate the last foot to the UXO</p> <p>Use a color coded flagging system to mark UXO</p> <p>Use eye protection while digging</p> <p>Use dust mask if conditions dictate</p>

Equipment Used	Inspection Requirements	Training Requirements
<p>Magnetometers and Shovels</p>	<p>Daily check of the mag using a known buried object</p> <p>Daily serviceability check of shovels</p>	<p>40 hour hazard waste worker course (with applicable refresher)</p> <p>Graduate of USN EOD school</p> <p>Site-specific UXO and hazard training</p> <p>Personnel read and comply with SSHP</p> <p>Site mobilization training will include proper use of tools and equipment</p>



UXB International, Inc.

## Activity Hazard Analysis

Contract Number: DACA 87-95-D-0018 Project: 7206.001 Location: Camp Croft Est. Start Date: 12/95

Activity: Transportation of UXO Analysis Performed By: F. Johnson Reviewed By: J. Ferris

Major Steps	Potential Hazards	Protective Measures / Controls
Load and unload truck	Lifting heavy objects Unplanned detonation	Use proper lifting techniques Wear gloves and safety shoes Wear hard hats when overhead hazard is present Do not subject UXO to heat, shock, or friction Ensure condition of UXO being shipped is appropriate to allow movement by vehicle / properly placard vehicle Maintain explosive compatibility Limit personnel exposure to only the minimum number to accomplish the task
Transportation	Vehicle accident Vehicle fire Unplanned detonation	Use only qualified drivers Ensure drivers are rested before beginning trip Plan routes and travel times to avoid heavy traffic Provide escorts to clear traffic for UXO vehicle Use ground guides as required Inspect vehicles for explosive transportation suitability Provide appropriate fire extinguishers / first aid kits Notify emergency personnel along route prior to starting trip Plan routes to avoid heavily populated areas

Equipment Used	Inspection Requirements	Training Requirements
Pick-up truck Heavy lift equipment	IAW Title 49 CFR and DOT Regulations	Graduate of USN EOD school IAW state and local laws Personnel read and comply with SSHP Site mobilization training will include proper use of tools and equipment 40 hour hazard waste worker course (with applicable refresher)



UXB International, Inc.

## Activity Hazard Analysis

Contract Number: DACA 87-95-D-0018 Project: 7206.001 Location: Camp Croft Est. Start Date: 12/95

Activity: Transportation of UXO Analysis Performed By: F. Johnson Reviewed By: J. Ferris

Major Steps	Potential Hazards	Protective Measures / Controls
Transportation	Unplanned detonation	No sharp projections allowed inside vehicle bed Utilize a vehicle with a bed liner or use plywood Utilize a vehicle with a topper or use a tarp Store no other material in vehicle bed Place UXO in wooden containers and secure with sand Hand load containers into vehicle bed Individually secure each container to the vehicle floor and side rails with either rope or cloth cargo straps Bracing will be made in a cross-over pattern, side to side and forward to rear Sandbags will be used to assist in blocking containers in the bed

Equipment Used	Inspection Requirements	Training Requirements
Pick-up truck Heavy lift equipment	IAW Title 49 CFR and DOT Regulations	Graduate of USN EOD school IAW state and local laws Personnel read and comply with SSHP Site mobilization training will include proper use of tools and equipment 40 hour hazard waste worker course (with applicable refresher)



UXB International, Inc.

## Activity Hazard Analysis

Contract Number: DACA 87-95-D-0018 Project: 7206.001 Location: Camp Croft Est. Start Date: 12/95

Activity: UXO Disposal Analysis Performed By: F. Johnson Reviewed By: J. Ferris

Major Steps	Potential Hazards	Protective Measures / Controls
Explosive handling  Disposal by detonation	Explosives UXO Noise Slip, trip, fall Heat / cold stress Fragmentation	Level "D" PPE (boots; coveralls; work gloves; eye and ear protection; and hard hat, if applicable) Apply USACE, Huntsville Div. Safety Concepts and Basic Considerations for UXO Operations Maintain proper footing/remove tripping hazards Provide and use hearing protection Remove obstacles/hazards on demo range Use barricades & warning devices to deny access to the demo range Know heat/cold stress warning signs and take proper action Use TM 60 series for specific UXO Have water, first aid, fire extinguishers, and eye wash on location Personnel shall take cover in a barricaded structure during demolition operations at least the fragmentation distance away from disposal site

Equipment Used	Inspection Requirements	Training Requirements
Demolition equipment Electrical firing system Hand tools	Ensure demo equipment and hand tools are serviceable To be inspected daily, prior to use	40 hour hazard waste worker course (with applicable refresher) Graduate of USN EOD school Site-specific UXO and hazard training Personnel read and comply with SSHP



UXB International, Inc.

## Activity Hazard Analysis

Contract Number: DACA 87-95-D-0018 Project: 7206.001 Location: Camp Croft Est. Start Date: 12/95

Activity: Ordnance Identification Analysis Performed By: F. Johnson Reviewed By: J. Ferris

Major Steps	Potential Hazards	Protective Measures / Controls
Approach anomaly Remove overburden  Identify ordnance	Detonation of ordnance Injury to personnel	Follow guidelines established in CEHND 'Safety Concepts and Considerations for UXO Operations' Limit personnel exposure Level "D" PPE (boots; coveralls; work gloves; eye and ear protection; and hard hat, if applicable) Ground self prior to touching item

Equipment Used	Inspection Requirements	Training Requirements
Shovel Trowel	Insure handles are secure	Site mobilization training will include proper use of tools and equipment Personnel have read and comply with SSHP. 40 hour hazard waste worker course (with applicable refresher) Graduate of USN EOD school Site specific UXO and hazard training



UXB International, Inc.

## Activity Hazard Analysis

Contract Number: DACA 87-95-D-0018 Project: 7206.001 Location: Camp Croft Est. Start Date: 12/95

Activity: Soil Excavation Analysis Performed By: F. Johnson Reviewed By: J. Ferris

Major Steps	Potential Hazards	Protective Measures / Controls
Excavation	Slip, trip, fall Vehicle movement Open excavation Physical exertion Heat / cold stress Dust and respirable silica Pinch, cut, smash	Modified level "D" PPE (boots; coveralls; work gloves; eye & ear protection; hardhat; & 1/2 face respirator with HEPA filter) Maintain firm footing Use guides and spotters UXO safety rules Provide ladder for excavation over 4 feet deep Observe work / rest regime Establish heat / cold monitoring procedures Design sloping / benching procedures for excavation over 5 feet in depth Implement dust suppression procedures as appropriate Provide appropriate perimeter protection Dust and respirable silica monitoring as outlined in Annex L Increase to Level "C" PPE at action level of: 1/2 PEL-TWA = 0.05 mg/m <sup>3</sup> for respirable silica 1/2 PEL-TWA = 2.5 mg/m <sup>3</sup> for dust or at direction of CIH based on test result Have water, first aid kit, fire extinguisher, & eye wash on site
Equipment Used	Inspection Requirements	Training Requirements
Backhoe Shovel Truck	Ensure vehicle is in safe operating condition Inspection, maintenance and repairs in accordance with manufacturer's recommendation	Personnel read and comply with SSHP UXO personnel are graduates of USN EOD school 40 hour hazard waste worker course (with applicable refresher) Site mobilization training will include proper use of tools & equipment

## **5.0 TRAINING PLAN**

### **5.1 GENERAL**

All personnel assigned to or regularly entering the site will have the required training prior to participating in site activities. In accordance with 29 CFR 1910.120 and other OSHA regulations, applicable training shall include the following.

#### **5.1.1 BASIC OSHA TRAINING**

All general site workers must have the 40-hour offsite Hazardous Waste Operations and Emergency Response (HAZWOPER) training course and 3 days of field experience under the direct supervision of a trained experienced supervisor. Onsite management personnel (team leaders, site manager, and the Senior UXO Supervisor) must have an additional 8 hours of specialized supervisory training. All workers must have an annual refresher (8 hours) if initial training is over 1 year old. All training will be documented.

#### **5.1.2 FIRST-AID AND CARDIOPULMONARY RESUSCITATION (CPR) TRAINING**

At least two employees per site will be certified in first aid and CPR. The training shall be equivalent to that provided by the American Red Cross.

#### **5.1.3 SITE-SPECIFIC SAFETY AND HEALTH TRAINING**

This training covers the information and mandates of the project SSHP. This training stresses preventive measures, but also addresses emergency response procedures and will cover the chemical and physical hazards of the site and site operations.

#### **5.1.4 BLOODBORNE PATHOGEN TRAINING**

The Senior UXO Supervisor will primarily be responsible for rendering first aid in the event of injury or accident. However, other UXB site personnel may be needed to assist in rendering first

aid for severe injuries. Therefore, UXB personnel will receive training in controlling exposures to bloodborne pathogens. This training will consist of the following:

1. Review of the bloodborne pathogen standard.
2. Requirements of the exposure control plan.
3. Description of the risks of exposure and how bloodborne pathogens are transmitted.
4. Management and employee responsibilities.
5. Methods of protection against exposure and procedures for decontamination.
6. Post-exposure procedures.
7. Labeling and color coding of infectious waste.

#### **5.1.5 HEARING CONSERVATION TRAINING**

All site personnel exposed to noise levels exceeding 85 dBA 8-hour TWA will be provided with training which addresses the following topics:

1. Physical and psychological effects of high noise exposure.
2. Noise exposure limits.
3. Elements of the Hearing Conservation Program.
4. Selection, use, and limitations of hearing protection devices.

#### **5.1.6 FIRE EXTINGUISHER TRAINING**

All UXB site personnel will be trained in the general principles of fire extinguisher selection, use, and the hazards associated with incipient stage fire fighting.

#### **5.2 TAILGATE SAFETY BRIEFINGS**

Each day, before starting work onsite, all employees, including Parsons ES, UXB SSO, and government employees, will be given a safety briefing by the UXB SSO that identifies potential hazards and risks that may be encountered during that day's activities. Additional training in the use of safety equipment, emergency medical procedures, emergency assistance notification procedures, and accident prevention, as well as discussion of the WP will ensure that work



accomplishments can be carried out in a safe and effective manner. At the conclusion of each day's work, a debriefing for all employees will be held, if needed.

5.2.1 Records of all tailgate safety briefings documenting date, attendance, and topics covered will be maintained on UXBs documentation of training form as part of the project documents.

### **5.3 VISITOR TRAINING**

Site visitors are defined as persons: (1) who are not employed at the project site, (2) who do not routinely enter restricted work areas, and (3) whose presence is of short duration (i.e., 1 to 2 days at one time or per month). Visitors are required to meet the requirements of Sections 5.3.1 and 5.3.2. These visitors may include client personnel; Parsons ES and UXB personnel; commercial vendors; political representatives; and auditors or inspectors from local, district, or federal agencies.

#### **5.3.1 GENERAL VISITOR REQUIREMENTS**

The following requirements apply to visitors whose purpose is to observe site conditions or field activities:

1. The Senior UXO Supervisor will be notified of the nature and duration of the visit before visitors are permitted to enter the work site.
2. The visitor's log will be completed including the individual's name, date, and the name of the company or agency represented.
3. The site visitor will be escorted by a UXB representative, preferably the site supervisor, at all times.
4. Visitors will comply with specific safety and health requirements, as applicable.
5. Visitors entering work zones must have current HAZWOPER training.
6. Visitors will NOT be allowed in the work zones during UXO identification, handling, or disposal operations.

### **5.3.2 VISITOR TRAINING REQUIREMENTS**

All visitors will receive site-specific training to ensure that potential hazards and risks are identified. This training will consist of a safety briefing by the UXB SSO that will include the following:

1. Location and description of potential hazards and risks.
2. Required PPE (Level D)
3. Areas of the site that are closed to visitors.
4. The site evacuation plan and emergency procedures.
5. Other topics, as deemed appropriate.

### **5.4 SUPPLEMENTAL TRAINING**

Supplemental training (e.g., confined space, HAZCOM, and OSHA chemical-specific requirements), as determined by the UXB SSO, may be required for site-specific contaminants and/or changes in site conditions.

### **5.5 WEEKLY TRAINING**

At the start of each work week (which is normally Monday), a site-specific safety topic will be selected and discussed in detail. All site personnel are required to attend the training, and the UXB SSO will document this training on the training form. The training will consist of site-specific hazards (e.g., known chemicals, ordnance, and cold stress) and will be given in conjunction with the tailgate safety briefing.

### **5.6 BUDDY SYSTEM TRAINING**

Workers shall be instructed that all site work will be performed using the buddy system. Team members will keep in visual contact with each other at all times, when practical. Team members will be made aware of any slip, trip, and all lifting hazards, as well as any potential exposure to chemical substances, cold stress, and general hazards within their work area.

## **6.0 SITE CONTROL AND LAYOUT**

### **6.1 SITE ZONES**

Parsons ES will establish work areas as required for the field effort. The boundaries of each work area, regardless of its configuration, will be clearly identified to prevent accidental intrusion by personnel not immediately involved with site operations. Each work site will have a Support Zone (SZ) that will be used as a staging area for personnel and equipment to support operations in the Work Zone (WZ). The SZ will include the site access control point, an area for visitors and a break area for site workers. The Senior UXO Supervisor will delineate and increase or decrease these zones based on site conditions and activities.

#### **6.1.1 SUPPORT ZONE**

The SZ will be used as the staging area for site operations and for other support functions necessary or required to maintain smooth operations onsite. The SZ includes the change area, lunch and break areas, and supply storage areas. The SZ is designated as the tobacco product use, eating, and drinking area.

#### **6.1.2 WORK ZONE**

The WZ will be the area where actual site activities related to the investigation of OE contamination will be conducted. Each WZ will be clearly marked with flagging, and entry into these areas will be controlled by the the UXO Supervisor in charge of that work zone. Non-UXO qualified personnel entering the WZ will be limited to cleared areas or escorted by UXO qualified personnel at all times.

### **6.2 UXO AREAS**

Areas potentially contaminated by OE will be identified by evaluating the results of the geophysical surveys. In accordance with the SOW, UXB personnel will excavate geophysical anomalies to identify the anomalies and confirm the presence of OE. Excavations will be performed in accordance with 29 CFR 1926 and Section 25 of EM 385-1-1. Excavations less

than 5 feet in depth and which a competent person (UXO Supervisor) examines and determines there to be no potential for cave in do not require protective systems.

**6.2.1** UXB shall dispose of any OE encountered in accordance with Appendices C (Explosive Safety Precautions) and E (OE Operational Plan) of the WP.

### **6.3 SITE SECURITY**

Site security will be maintained during working hours. The Senior UXO Supervisor will assist the PES SSO with access controls. He shall monitor personnel entering a given WZ for proper PPE and that they have been trained and medically cleared to enter the area. The Senior UXO Supervisor will also ensure that all other safety and health precautions are in place prior to entry by site personnel.

### **6.4 BUDDY SYSTEM**

The buddy system is an important element in controlling personnel exposure to site hazards. These procedures ensure that no site personnel are allowed to work without another qualified worker there to provide assistance if needed. At all times each buddy should be able to:

1. Observe his or her buddy for signs of chemical or extreme temperature exposure,
2. Periodically check the integrity of his or her buddy's protective clothing,
3. Observe the site area in which they are working for hazards,
4. Remain within verbal or visual contact with his or her buddy, and
5. Notify the personnel in the SZ if emergency assistance is needed.

The access control point to the WZ will be used as the location where the UXO Supervisor in charge of that WZ will enforce the buddy system.

### **6.5 SITE COMMUNICATIONS**

Effective on- and offsite communication is an integral part of site control and will be established prior to initiating site activities. Offsite communication is required to ensure effective

communication with offsite management and emergency response personnel. Onsite communication will be used to coordinate site operations, maintain site control, pass along safety information such as monitoring results and work/rest periods, and alert site personnel to emergency situations. All site personnel will be familiar with the different methods of off- and onsite communication. The methods of site communication that may be used on this project are:

1. Communication offsite:
  - a. Two-way radio, and
  - b. Cellular telephone.
2. Communication onsite:
  - a. Two-way radio,
  - b. Air horn, and
  - c. Hand signals.

## **6.6 STANDING ORDERS, STANDARD OPERATING PROCEDURES (SOPS), AND SAFE WORK PRACTICES (SWPs)**

### **6.6.1 INTRODUCTION**

This paragraph outlines the site standing orders that site personnel will obey at all times. The SWPs that address the health and safety precautions related to specific hazards which may be encountered during site operations are listed in Section 8 of this SSHP.

## **7.0 HYGIENE AND SANITATION**

### **7.1 PERSONNEL HYGIENE**

Hygiene facilities will be established onsite to ensure that personnel maintain good personal hygiene. These facilities shall include a personnel washing area, toilet facilities, and a lunch/break trailer for all site personnel. The personnel hygiene facilities will conform to the requirements specified in 29 CFR 1910.120.

**7.1.1** Personnel are required to wash hands, face, and other exposed skin areas prior to leaving the site for breaks or lunch. Towels, washcloths, liquid soap, or disposable towels will be provided for personnel.

### **7.2 ROUTINE EQUIPMENT DECONTAMINATION**

Tools and equipment used in the WZ will be kept free of soil and other debris and will be cleaned at the end of each day to ensure that equipment is maintained in a safe operating condition. In addition, all workers on site should wear orange safety vests because the general Camp Croft area is open to public hunting and this field work will be performed during the hunting season.

### **7.3 PPE REQUIREMENTS.**

Site personnel will wear EPA Level "D" PPE (e.g., gloves and safety glasses). Equipment will be kept in good working condition

### **7.4 SANITATION**

Site sanitation will be established and maintained IAW 29 CFR 1910.120(n) and EM 385-1-1, Section 2.

#### **7.4.1 POTABLE WATER SUPPLY**

An adequate supply of potable (drinkable) water shall be provided onsite at all times, and will be supplied IAW the following provisions:

1. Containers used for potable water shall be capable of being tightly closed, equipped with a tap and maintained in a clean sanitary condition;
2. A container used for distribution of drinking water shall be clearly labeled as to its contents and not used for any other purpose;
3. Water shall not be dipped from the container and use of a common cup will not be allowed; and
4. Where single service cups are provided, separate sanitary containers will be provided for the storage of the unused cups and for the disposal of the used cups.

#### **7.4.2 NON-POTABLE WATER**

Outlets and storage containers for non-potable water, such as water for fire fighting or for cleaning equipment will be clearly labeled to indicate that the water is not suitable for drinking, washing or cooking. There shall at no time be a cross connection or open potential between a system furnishing potable water and a system furnishing non-potable water.

#### **7.4.3 TOILET FACILITIES**

Under field conditions where a sanitary sewer system is not available, temporary toilet facilities will be located at the site, unless toilet facilities are readily available nearby. Chemical, recirculating, combustion, or flush toilets may be used to fulfill this requirement and will be serviced every week. Each temporary toilet will be naturally lighted, have ventilation, be lockable from the inside, and will be serviced weekly. To ensure sanitary and adequate facilities, Parsons ES will provide toilet facilities (at least two portable toilets) IAW *EM 385-1-1, Section 2*.

#### **7.4.4 WASHING FACILITIES**

Hand and face washing facilities will be set up in the SZ and will be used by all personnel exiting the WZ prior to eating, drinking, tobacco use, or other hand to face activities. When

feasible, washing facilities will consist of hot and cold running water, soap, and drying towels. If this is not feasible, disposable towels or an equivalent will be provided.

#### **7.4.5 SITE HOUSEKEEPING**

All work areas will be maintained in a clean/neat fashion, free of loose debris and scrap. Any materials/equipment not being used will be removed and stored or disposed of accordingly. All work areas will be supplied with a trash receptacle with lid, the contents of which will be emptied daily.



## **8.0 GENERAL SITE SAFETY PROCEDURES**

### **8.1 GENERAL**

Hazards due to normal site activities can be reduced by using common sense and following safe practices. The following practices are not allowed:

1. Running and horseplay.
2. Smoking, eating, or chewing tobacco while in the WZ or any potentially contaminated area.
3. Igniting flammable materials in the WZ. Equipment will be bonded, grounded, and explosion resistant, as appropriate.
4. Performing tasks in the restricted area individually (working alone).  
Personnel will be required to work using the buddy system at all times.

**8.1.1** Personnel must keep the following guidelines in mind when conducting field activities:

1. Hazard assessment is a continuous process; personnel must be aware of the surroundings and constantly aware of the chemical and physical hazards that are or may be potentially present.
2. Team members will be familiar with the physical characteristics of each site, including site access and the location of communication devices and safety equipment.
3. The location of overhead power lines and underground utilities must be established.

### **8.2 HEAVY EQUIPMENT OPERATION**

Heavy equipment used onsite will be operated under strict adherence to the applicable OSHA regulations found in 29 CFR 1910; 29 CFR 1926; the requirements of EM 385-1-1, Section 16; and the following guidelines;

1. The operation of heavy equipment will be limited to authorized personnel specifically trained in its operation;

2. The operator will visually inspect heavy equipment daily prior to operation and report any abnormalities/deficiencies to the Senior UXO Supervisor;
3. The operator will use the safety devices provided with the equipment, including seat belts, and backup warning indicators and horns will be operable at all times;
4. While heavy equipment is in operation, all personnel not directly required in the area will keep a safe distance from the equipment;
5. The operator's cab will be kept free of all nonessential items, and all loose items will be secured;
6. Personnel will avoid moving into the path of operating equipment and areas blinded from the operator's vision;
7. When heavy equipment must negotiate in tight quarters, or if operators of earth-moving equipment cannot see the bucket, a secondary person will be stationed to guide the operator;
8. Additional riders will not be allowed on equipment unless it is specifically designed for that purpose (i.e., there is an additional seat with a seat belt); and
9. Personnel operating heavy equipment will use hearing protection.

#### **8.2.1 USE OF EARTH MOVING MACHINERY (EMM) TO EXCAVATE UXO.**

Earth moving machinery (EMM) may be used to excavate buried UXO, if the UXO is estimated to be deeper than 12 inches. EMM shall not be used to excavate within 12 inches of an UXO. When excavation gets within approximately 12 inches of an UXO, hand excavation shall be used to uncover the UXO. EMM may be operated by non-UXO personnel, under the direct supervisor of UXO personnel. The following general guidelines shall be followed:

1. During excavation operations, only those personnel absolutely necessary for the operation shall be within the restricted area/exclusion zone.
2. Excavation and trenching shall comply with the provisions of 29 CFR 1926 subpart P.

### **8.3 POWER AND HAND TOOL OPERATION**

#### **8.3.1 POWER TOOLS**

Power tools have great capability for inflicting serious injury if they are not used and maintained properly. To control the hazards associated with power tool operation, the requirements outlined in EM 385-1-1, Section 13 and the following safe work practices shall be observed when using power tools:

1. Operation will be conducted by authorized personnel familiar with the tool, its operation, and safety precautions;
2. Power tools will be inspected prior to use, and defective equipment will be removed from service until repaired;
3. Power tools designed to accommodate guards will have such guards properly in place prior to use;
4. Loose fitting clothing or long hair will not be permitted around moving parts;
5. Hands, feet, etc., will be kept away from all moving parts;
6. The power will be disconnected prior to maintenance and/or adjustments to equipment;
7. An adequate operating area will be provided, allowing sufficient clearance and access for operation;
8. Electrical tools will be operated IAW the applicable specifications outlined in paragraph 11.6 of this section; and
9. Good housekeeping practices will be followed at all times.

### **8.4 EXCAVATIONS AND CONFINED SPACES**

#### **8.4.1 EXCAVATIONS**

General safety precautions are listed in EM 385-1-1, Section 25, Subpart P of 29 CFR 1926. The following guidelines are intended to reflect minimum requirements to be followed on this site.

1. Prior to initiation of any excavation or trenching activity, the location of underground installations will be determined;

2. When the excavation/trench achieves a depth of greater than 4 ft, a competent person will determine the type of soil being excavated and designate the slope which will be used;
3. The excavation(s) will be inspected daily by a competent individual prior to commencement of work activities;
4. Evidence of cave-ins, slides, sloughing, or surface cracks will be cause for work to cease until necessary precautions are taken to safeguard workers;
5. Excavations 5 ft or deeper, which cannot be sloped at a 1 to 1 ratio, will require a competent individual, with the aid of a registered civil engineer or soils specialist, to design and install a protective system;
6. Protective systems shall be selected from OSHA 29 CFR 1926 Subpart P and/or designed by a registered professional civil engineer;
7. Spoils and other materials will be placed 2 ft or more from the edge of the excavation;
8. Materials used for sheeting, shoring, or bracing will be in good condition.
9. Timbers will be sound, free of large or loose knots, and of appropriate dimensions for the excavation;
10. Safe access will be provided into the excavation(s) by means of a gradually sloped personnel access/egress ramp, or ladders or stairs will be provided;
11. Ladders used will extend 3 ft above grade level and be secured from movement;
12. Excavations 4 ft or more in depth will have a means of egress at a frequency such that lateral travel to the egress point does not exceed 25 ft;
13. Walkways or bridges with standard guardrail will be provided where employees are required or permitted to cross over excavations;
14. If the depth of an excavation is greater than 4 ft, it will be inspected by the Senior UXO Supervisor to determine if it meets the criteria for a confined space;

15. If an excavation is determined to be a confined space, the requirements set forth in the Confined Space Program found in UXBs Corporate Safety and Health Plan (CSHP) shall be followed; and
16. IAW the requirements of 29 CFR 1926.651(g), if an excavation is greater than 4 ft deep, and the potential for having a hazardous atmosphere inside the excavation exists, then the atmosphere shall be tested for oxygen deficiency and toxicity prior to entry by site personnel.

#### **8.4.2 CONFINED SPACES**

According to 29 CFR 1910.146, a confined space is defined as having all of the following criteria:

1. It is large enough and so configured that an employee can bodily enter and perform assigned work,
2. It is not designed for continuous human occupancy; and
3. It has limited or restricted means for entry or exit.

**8.4.2.1** If an excavation meets all three of the previously listed criteria, it must be defined as a confined space, and the provisions and safety precautions of UXB's CSHP will apply.

**8.4.2.2** To avoid classifying an excavation as a confined space, it is imperative that one of the previously listed requirements be removed or avoided. The easiest requirement to remove is the one related to limited means of entry and exit. Entry/exit points must be designed and maintained which allow for easy entry and exit from the excavation. This can be accomplished by constructing gently sloping entry and exit ramps which are located such that lateral travel to an exit is no greater than 25 ft from the work area in the excavation. If this cannot be accomplished, then the excavation must be classified as a confined space and the appropriate safety precautions implemented.

**8.4.2.3** All confined spaces will be monitored prior to and during all entries using a calibrated lower explosive limit (LEL) and oxygen meter. Entry will not be made into any confined space

in which LEL is found to be greater than 20 percent, or when the oxygen content is less than 21 percent.

## **8.5 MATERIAL LIFTING**

### **8.5.1 GENERAL REQUIREMENTS**

Many types of objects are handled in normal daily operations. Care should be taken in lifting and handling heavy or bulky items because they are the cause of many joint and back injuries. The following fundamentals address the proper lifting of materials to avoid joint and back injuries:

1. The size, shape, and weight of the object to be lifted must be considered. Site personnel will not lift more than they can handle comfortably. Individual workers should not normally lift loads in excess of 40 pounds.
2. A firm grip on the object is essential; therefore, the hands and object shall be free of oil, grease, and water which might prevent a firm grip.
3. The hands and fingers shall be kept away from any points that cause them to be pinched or crushed, especially when setting the object down.
4. The item shall be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces, and pinch points, and gloves shall be used, if necessary, to protect the hands.
5. The feet shall be placed far enough apart for good balance and stability.
6. Personnel will ensure that solid footing is available prior to lifting the object.
7. When lifting, personnel shall get as close to the load as possible and bend the legs at the knees, making sure that the back is kept as straight as possible.
8. To lift the object, the legs are straightened from their bending position.
9. Personnel shall not carry a load that cannot be seen over or around.
10. When placing an object down, the stance and position are identical to that for lifting, with the back kept straight, the legs bent at the knees, and the object lowered.

11. If needed, UXB will provide back support devices to aid in preventing back injury during lifting activities.
12. If an object to be lifted is too heavy for one person to handle, ask a co-worker for assistance or if a piece of materials handling equipment is available that will do the job, use it.

### **8.5.2 TWO-PERSON LIFTING**

When two or more people are required to handle an object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each person, if possible, shall face the direction in which the object is being carried.

### **8.6 ELECTRICAL HAZARDS**

Electrical wiring and apparatus safety procedures will be conducted in accordance with OSHA Standard 29 CFR 1910.137(a)(2), and EM 385-1-1, Section 11. These requirements include, but are not limited to:

1. All electrical wiring and equipment will be of a type listed by Underwriters Laboratories (UL) or Factory Mutual Engineering Corp. (FM) for the specific application;
2. All installations will comply with the National Electrical Safety Code (NESC) or the NEC regulations;
3. All work will be accomplished by personnel familiar with and qualified for the class of work to be performed;
4. Live parts of wiring or equipment will be guarded to protect all individuals or objects from harm;
5. Electric wire or flexible cord passing through work areas will be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, or pinching;

6. Temporary power lines, switch boxes, receptacle boxes, metal cabinets, and enclosures around equipment will be marked to indicate the maximum operating voltage;
7. Patched, oil-soaked, worn, or frayed electric cords or cables will not be used;
8. Portable hand lamps will be of the molded composition or other type approved for the purpose, and hand lamps will be equipped with a handle and a substantial guard over the bulb that is attached to the lamp holder or the handle.
9. Extension cords or cables will not be fastened with staples, hung from nails, or suspended by wire;
10. All electrical circuits will be grounded in accordance with the NEC and NESC unless otherwise noted in the reference manuals;
11. Portable and semi-portable electrical tools and equipment will be grounded by a multi conductor cord having an identified grounding conductor and a multi contact polarized plug-in receptacle;
12. Semiportable equipment, floodlights, and work lights will be grounded, and the protective ground will maintained during moving unless supply circuits are de-energized;
13. Tools protected by an approved system of double insulation, or its equivalent, need not be grounded;
14. UL listed ground fault circuit interrupters (GFCIs), calibrated to trip within the threshold values of  $5 \text{ ma} \pm 1 \text{ ma}$ , are required on all circuits used for portable electric tools;
15. In instances where the GFCI is sensitive to equipment vibration, the Senior UXO Supervisor will ensure proper equipment grounding prior to the equipment being used;
16. Flexible cord sets will be UL listed, contain the number of conductors required for the service plus an equipment ground wire, and will be



classified as hard usage or extra hard usage (identified by "outdoor" or "WA" printed on the jacket);

17. Bulbs attached to festoon lighting strings will be protected by wire guards or equivalent unless deeply recessed in a reflector; and
18. Temporary wiring will be guarded, buried, or isolated by elevation to prevent accidental contact by workers or equipment.

### **8.6.1 FIRE PREVENTION**

Explosions and fires not only pose the obvious hazards of intense heat, open flames, smoke inhalation, and flying objects, but may also cause the release of toxic chemicals into the environment. Such releases can threaten personnel onsite and members of the general public living or working nearby. Site personnel involved with potentially flammable material or operations will follow the following guidelines and EM 385-1-1, Section 9, to prevent fires and explosions:

1. Potentially explosive/flammable atmospheres involving gases or vapors will be monitored using a combustible gas indicator, as required;
2. Entry will not be made into any confined space in which the LEL is found to be greater than 20 percent, or when the oxygen content is less than 21 percent;
3. Prior to initiation of site activities involving explosive/flammable materials, all potential ignition sources will be removed or extinguished;
4. Non-sparking and explosion-proof equipment will be used whenever the potential for ignition of flammable/explosive gases/vapors/liquids exists;
5. Dilution or induced ventilation may be used to decrease the airborne concentration of explosive/flammable atmospheres;
6. Smoking will be prohibited at, or in the vicinity of, operations which may present a fire hazard, and the area will be conspicuously posted with signs stating "No Smoking or Open Flame Within 50 Feet";

7. Flammable and/or combustible liquids must be handled only in approved, properly labeled metal safety cans equipped with flash arresters and self-closing lids;
8. Transfer of flammable liquids from one metal container to another will be done only when the containers are electrically interconnected (bonded);
9. Motors of equipment being fueled will be shut off during the fueling; and
10. Metal drums used for storing flammable/combustible liquids will be equipped with self-closing safety faucets, vent bung fittings, grounding cables and drip pans, and will be stored outside buildings in an area approved by the Senior UXO Supervisor.

#### **8.6.2 FIRE PROTECTION**

The following safe work practices will be used to protect the site and site personnel against the hazards of fires:

1. Flammable/combustible liquid storage areas will have at least one 4A:20:B:C fire extinguisher located within 25 to 75 ft;
2. All earth moving equipment (e.g., back hoes, bulldozers, and drill rigs) and equipment will be equipped with a fire extinguisher of not less than 10:B units or higher;
3. All vehicles used in the transport of explosives will be equipped with two fire extinguishers of not less than 10:B units or higher, with one fire extinguisher mounted/placed inside the cab of the vehicle and one mounted outside by the driver's side door, if possible;
4. Temporary offices will be equipped with a fire extinguisher of not less than 10:B units or higher; and
5. At least one portable fire extinguisher having a rating of not less than 20:B units will be located at each work site.

## **8.7 ILLUMINATION**

To ensure adequate lighting, personnel will only work during daylight hours, and no field activities will be scheduled during the period of 30 minutes before dusk to 30 minutes after dawn.

## **8.8 BIOLOGICAL HAZARDS**

Biological hazards which are usually found onsite include insects, such as ticks, mosquitoes, spiders, and centipedes; poisonous snakes; and hazardous plants. Employee awareness and the SWPs outlined in the following paragraphs should reduce the risks associated with these hazards.

### **8.8.1 HAZARDOUS PLANTS**

During the conduct of site activities, the number and variety of hazardous plants that may be encountered is large and extensive. The ailments associated with these plants range from mild hay fever to contact dermatitis, to carcinogenic affects. However, the plants which present the greatest degree of risk to site personnel (i.e., potential for contact vs. affect produced) are those which produce skin reactions and skin and tissue injury.

#### **8.8.1.1 Plants Causing Skin and Tissue Injury**

Contact with splinters, thorns, and sharp leaf edges is of special concern to site personnel, as is the contact with the pointed surfaces found on branches, limbs, and small trunks left by site clearing and grubbing crews. This concern stems from the fact that punctures, cuts, and minor scrapes caused by accidental contact may result in noninfectious skin lesions, and the introduction of fungi or bacteria through the skin or eye. This is especially important because the warm, moist environment created inside impermeable protective clothing is ideal for the propagation of fungal and bacterial infection. Personnel receiving any of the injuries listed previously, even minor scrapes, should report immediately to the Senior UXO Supervisor for initial and continued observation and care of the injury.

### **8.8.1.2 Plants Causing Skin Reactions**

The poisonous plants of greatest concern are poison ivy, poison sumac, and poison oak. Poison ivy thrives in all types of light and usually grows in the form of a trailing vine. However, it can also grow as a bush and can attain heights of 10 ft or more. Poison ivy has shiny, pointed leaves that grow in clusters of three. Poison sumac is a tall shrub or slender tree that usually grows along swampy areas or ponds in wooded areas. Each poison sumac leaf stalk has 7 to 13 leaflets which have smooth edges. Poison oak is mostly found in the southeast and west. Poison oak resembles poison ivy, with one important difference: poison oak leaves are more rounded rather than jagged like poison ivy and the underside of poison oak leaves are covered with hair.

**8.8.1.2.1** The skin reaction associated with contacting these plants is caused by the body's allergic reaction to toxins contained in oils produced by the plant. Contamination can be achieved through contact with the leaves, branches, stems or berries, or contact with contaminated items such as tools and clothing. The allergic reaction associated with exposure to these plants will generally cause the following signs and symptoms:

1. Blistering at the site of contact, usually occurring within 12 to 48 hours after contact;
2. Reddening, swelling, itching and burning at the site of contact;
3. Pain, if the reaction is severe; and
4. Conjunctivitis, asthma, and other allergic reactions if the person is extremely sensitive to the poisonous plant toxin.

**8.8.1.2.2** If the rash is scratched, secondary infections can occur. The rash usually disappears in 1 to 2 weeks in cases of mild exposure and up to 3 weeks when exposure is severe. Preventive measures which can prove effective for most site personnel are:

1. Avoid contact with any poisonous plants onsite, and keep a steady watch to identify, report, and mark poisonous plants found onsite;
2. Wash hands, face, or other exposed areas at the beginning of each break period and at the end of each work day;

3. Avoid contact with, and wash on a daily basis, contaminated tools, equipment, and clothing;
4. Try barrier creams, detoxification/wash solutions and orally administered desensitization to find the best preventive solution.

### **8.8.2 SNAKES**

Work is scheduled to commence during the winter of 1996; therefore, snakes should be in hibernation and not pose a threat to workers. Snakes in hibernation can still cause serious injury to personnel. If disturbed, while cold, they move very slowly but may blindly strike at anything with movement or heat. Venom glands are full and bites are generally more severe. If a snake is unearthed during excavation, immediately back away, and if possible place soil back on the snake. The team leader must be notified immediately and no further excavation may take place in that immediate area. Should the project be delayed until warmer weather or an unanticipated warming occurs snakes may be found outside of their dens. During warm weather the potential for contact with poisonous snakes becomes a real danger. Normally, if a person is approaching a snake, the noise created by the person is usually sufficient to frighten the snake away. However, during the warm months, extreme caution must be exercised when conducting site operations around areas where snakes might be found (i.e. rocks, bushes, logs, or in holes, crevices, and abandoned pipes). If poisonous snakes are identified onsite, UXB will issue protective clothing, such as snake leggings, to site personnel. The rules to follow if someone is bitten by a snake are:

1. Do not cut "Xs" over the bite area because this will intensify the effect of the venom;
2. Do not apply suction to the wound since this has a minimal effective in removing venom;
3. Do not apply a tourniquet since this will concentrate the venom and increase the amount of tissue damage in the immediate area;
4. If it can be done safely, kill the snake, bag it, and transport it with the victim or try to get a good look at it so it can be identified for proper selection of anti-venom. Snakes will NOT be killed unless an eminent threat to life exists or a bite has occurred;

5. Do not allow the victim to run for help since running increases the heart rate and will increase the spread of the venom throughout the body;
6. Keep the victim calm and immobile;
7. Have the victim hold the affected extremity lower than the body while waiting for medical assistance; and
8. Transport the victim to medical attention immediately.

### **8.8.3 TICK BITES**

#### **8.8.3.1 General Information**

The Centers for Disease Control (CDC) has noted the increase of Lyme disease and Rocky Mountain Spotted Fever (RMSF), which are caused by bites from infected ticks that live in and near wooded areas, tall grass, and brush. Ticks are small, ranging from the size of a comma up to about one-quarter inch. They are sometimes difficult to see, and, when embedded in the skin, they may look like a freckle. The tick season extends from spring through summer.

**8.8.3.1.1** Lyme disease has occurred in 43 states, with the heaviest concentrations in the northeast (Connecticut, Massachusetts, New Jersey, New York, Pennsylvania), the upper Midwest (Minnesota and Wisconsin), and along the northern California coast. It is caused by deer ticks and lone star ticks that have become infected with spirochetes. Female deer ticks are about one-quarter inch in size and are black and brick red in color. Male deer ticks are smaller and completely black. Lone star ticks are larger and chestnut brown in color.

**8.8.3.1.2** RMSF has occurred in 36 states, with the heaviest concentrations in Oklahoma, North Carolina, South Carolina, and Virginia. It is caused by Rocky Mountain wood ticks and dog ticks which have become infected with rickettsia. Both are black in color.

**8.8.3.1.3** The first symptoms of either disease are flu-like chills, fever, headache, dizziness, fatigue, stiff neck, and bone pain. If immediately treated by a physician, most individuals recover fully in a short time period. If not treated, more serious symptoms can occur.

**8.8.3.1.4** If a team member believes he/she has been bitten by a tick, or if any of the signs and symptoms previously noted appear, the team member should contact the Senior UXO Supervisor, who will authorize a visit to a physician for an examination and possible treatment.

### **8.8.3.2 Protective Measures**

Standard field gear (i.e., work boots, socks, and light-colored coveralls) provide good protection against tick bites, particularly if the joints are taped. However, even when wearing field gear, the following precautions should be taken when working in areas that might be tick infested:

1. When in the field, check often for ticks, particularly on lower legs and areas covered with hair.
2. Spray outer clothing, particularly pant legs and socks, **BUT NOT YOUR SKIN**, with an insect repellent that contains permethrin or permethrin;
3. When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible;
4. If you find a tick, remove it by pulling on it gently with tweezers;
5. If the tick resists, cover the tick with salad oil for about 15 minutes to asphyxiate it, then remove it with tweezers;
6. Do not use matches, a lit cigarette, nail polish or any other type of chemical to coax the tick out;
7. Remove all parts of the tick's body, and disinfect the area with alcohol or a similar antiseptic after removal; and
8. For several days to several weeks after removal of the tick, look for the signs of the onset of Lyme disease, such as a rash that looks like a bulls-eye or an expanding red circle surrounding a light area, frequently seen with a small welt in the center; and
9. Also look for the signs of the onset of RMSF, such as an inflammation which is visible in the form of a rash comprising many red spots under the skin, which appears 3 to 10 days after the tick bite.

#### **8.8.4 BEES, HORNETS, AND WASPS**

Contact with stinging insects like bees, hornets, and wasps may result in site personnel experiencing adverse health effects that range from being mildly uncomfortable to life threatening. Therefore, stinging insects present a serious hazard to site personnel, and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. Some of the factors related to stinging insects that increase the degree of risk associated with accidental contact are as follows:

1. The nests for these insects are frequently found in the type of remote wooded, grassy areas where many waste sites are located;
2. The nests can be situated in trees, rocks, bushes, or in the ground and are usually difficult to see;
3. Accidental contact with these insects is highly probable, especially during warm weather conditions when the insects are most active;
4. If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention; and
5. Some people are hypersensitive to the toxins injected by a sting and, when stung, experience a violent and immediate allergic reaction resulting in a life-threatening condition known as anaphylactic shock.

Anaphylactic shock manifests itself rapidly and is characterized by extreme swelling of the body, eyes, face, mouth and respiratory passages. The hypersensitivity needed to cause anaphylactic shock can in some people, accumulate over time and exposure. Therefore, even if someone has been stung previously and has not experienced an allergic reaction, there is no guarantee that he/she will not have an allergic reaction after being stung again.

**8.8.4.1** Because of the high probability of contact with stinging insects, all site personnel will comply with the following safe work practices:



1. If a worker knows that he/she is hypersensitive to bee, wasp, or hornet stings, he/she must inform the Senior UXO Supervisor of this condition prior to participation in site activities;
2. All site personnel will be watchful for the presence of stinging insects and their nests and will advise the Senior UXO Supervisor if a stinging insect nest is located or suspected in the area;
3. Any nests located onsite will be flagged, and site personnel will be notified of its presence;
4. If stung, site personnel will immediately report the Senior UXO Supervisor to obtain treatment and to allow the Senior UXO Supervisor to observe them for signs of allergic reaction; and
5. Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times.

### **8.8.5 BITING INSECTS**

Many types of biting insects such as mosquitos, flies and fleas may be encountered onsite. The use of insect repellents will be encouraged by the Senior UXO Supervisor if deemed necessary. The biting insects of greatest concern are spiders, especially the black widow and the brown recluse, because of the significant adverse health effects their bites can cause.

**8.8.5.1** The black widow is a coal-black bulbous spider 3/4 to 1 1/2 inches in length, with a bright red hour-glass on the under side of the abdomen. The black widow is usually found in dark, moist locations, especially under rocks and rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

1. Sensation of pinprick or minor burning at the time of the bite;
2. Appearance of small punctures (but sometimes none are visible); and
3. After 15 to 60 minutes, intense pain is felt at the site of the bite, which spreads quickly and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor

coordination, dilated pupils, and generalized swelling of the face and extremities.

**8.8.5.2** The brown recluse is brownish to tan in color, rather flat, and ½ to 5/8 inches long with a dark brown violin shape on the underside. It may be found in trees or in dark locations.

Victims of a brown recluse bite may exhibit the following signs or symptoms:

1. Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite;
2. Formation of a large, red, swollen, pustulating lesion with a bull's-eye appearance;
3. Systemic affects such as a generalized rash, joint pain, chills, fever, nausea, and vomiting; and
4. Possibly severe pain after 8 hours, with the onset of tissue necrosis.

**8.8.5.3** There is no effective first aid treatment for either of these bites. Except for very young, very old, or weak victims, these spider bites are not considered to be life threatening. However, medical treatment must be sought to reduce the extent of damage caused by the injected toxins.

**8.8.5.4** If either of these spiders are suspected or known to be onsite, the Senior UXO Supervisor will brief the site personnel as to the identification and avoidance of the spiders. As with stinging insects, site personnel should report to the Senior UXO Supervisor if they locate either of these spiders onsite or notice any type of bite while involved in site activities.

## **8.9 OE**

OE may be present and located during site activities. If OE is located onsite, its location will be marked, and the onsite government representative will be notified of the presence of the OE.

## **8.10 COLD STRESS**

The affects experienced by site personnel when working in cold environments depend on many environmental and personal factors, such as ambient air temperature, wind speed, duration of exposure, type of protective clothing and equipment worn, type of work conducted, level of physical effort, and health status of the worker. In cold environments, overexposure can cause significant stress on the body, which can lead to serious and permanent injury. Cold may affect just the exposed body surfaces and extremities, or the deeper body tissues and the body core. The following paragraphs contain information about the most common cold stress disorders and their signs, symptoms, affects, and control techniques.

### **8.10.1 COLD STRESS DISORDERS**

#### **8.10.1.1 Immersion Foot or Trench Foot**

These two cold injuries occur as a result of exposure to cool or cold weather and persistent dampness or immersion in water. Immersion foot usually results from prolonged exposure when air temperatures are above freezing, whereas trench foot normally occurs from shorter exposure at temperatures near freezing. The symptoms for each disorder are similar and include tingling, itching, swelling, pain in some cases or numbness in others, lack of sweating, and blisters.

#### **8.10.1.2 Frostbite**

Frostbite occurs when water contained in the body tissues freezes. This usually occurs when temperatures are below freezing, but excessive wind can result in frostbite even at ambient temperatures that are above freezing. Frostbite can occur from several types of cold exposure, such as: exposure of bare skin to cold and wind, exposure to extremely cold ambient temperatures, or skin contact with objects whose temperatures are below freezing. The extremities are usually affected first since they experience reduced blood flow and heat loss. The tissue damage caused by frostbite can be superficial; near the surface of the skin; or extend to deeper body tissues, which can cause severe tissue damage. The skin may first have a prickly or tingling sensation and later become numb with cold, and the appearance may range from superficial redness of the skin to white, hard, frozen-looking tissues.

### **8.10.1.3 Hypothermia**

Hypothermia results when the body loses heat faster than it can produce it. When this occurs, the blood vessels in the skin and extremities constrict, reducing the flow of warm blood to those areas, thereby reducing the rate of heat loss. This reduction in blood flow usually affects the peripheral extremities first. Ears, fingers, and toes begin to experience chilling, pain, and then numbness due to loss of blood flow and heat. Shivering begins as the body's core temperature begins to drop, and the body uses the shivering to compensate and create metabolic heat. Shivering is often the first sign of hypothermia. The pain and numbness in the extremities is an indication that the heat loss is increasing, and, when shivering becomes uncontrollable, the heat loss in the body core has become extreme. Further heat loss produces speech difficulty, forgetfulness, loss of manual dexterity, collapse, and finally death.

### **8.10.2 TREATMENT OF COLD STRESS DISORDERS**

The intent of all cold stress treatment is to bring the deep body core temperature back to its normal temperature of about 98.6°F. Work performed in cold environments should be discontinued for any worker who exhibits the signs or symptoms associated with hypothermia or frostbite. Workers exhibiting those symptoms should be brought to a warm area and allowed to rest and warm up. If a worker's clothing becomes wet, which reduces its insulation effect, it should be removed and replaced by dry clothing, or allowed to dry before resuming work. A warm, non-alcohol, decaffeinated drink (not coffee) or soup may be given. Rewarming should be gradual. For frostbite, the victim should be sheltered from the wind and cold and given warm drinks. If the frostbite is superficial, the frozen part should be covered with extra clothing or blankets or warmed against the body. **Do not use direct heat, and do not pour hot water over or rub the affected area.** Warming should be gentle and gradual. Failure to do this could lead to bleeding in the tissues and increase the possibility of infection. If the frostbite is deep (i.e., the affected area is frozen and hard to the touch) immediate medical attention should be obtained. The safe thawing of deep frostbite is beyond the expertise and facilities found onsite.

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### **8.10.3 PREVENTION OF COLD STRESS DISORDERS**

#### **8.10.3.1 Preventive Measures Taken By Site Personnel**

During work in cold environments, UXB will use the tailgate safety briefing to inform site personnel of the measures to be used to prevent and control cold stress. Prevention methods which site personnel will use include the following:

1. Wear adequate, appropriately layered clothing, including a water repellent outer layer if precipitation is forecasted. Layered clothing should include an innermost layer, such as cotton or silk to trap heat and absorb perspiration; an insulating layer of wool or synthetic fiberfill (such as polypropylene); a layer of work weight clothing; and an outer protective layer designed to be wind/water proof, such as nylon or Gortex®.
2. Wear a hat, gloves, and socks that are synthetic or wool insulated to retain body heat.
3. Remove outer layers of clothing during breaks in heated shelters to prevent excessive sweating;
4. In windy, cold conditions, cover all exposed skin;
5. Eat well-balanced meals and maintain adequate intake of non-alcoholic, decaffeinated fluids;
6. Seek shelter in a warm protected area when signs and symptoms of cold stress become evident; and
7. Protect clothing from getting wet, this includes keeping clothing from getting wet with sweat, so remove outer layers if work activities cause excessive sweating.

#### **8.10.3.2 Preventative Measures Taken By Parsons ES And UXB**

Parsons ES and UXB will assist in preventing cold stress by providing sheltered, warm areas where site personnel can rest and regain body heat during breaks. Parsons ES and UXB will also provide the following to assist site personnel in abating cold stress:

1. Warm fluids, such as soup or decaffeinated tea and cocoa; and

2. A minimum of one 15-minute break in a heated shelter every 2 hours. The UXO Supervisor will determine the actual break schedule of his team, based on his assessment of the site and work practices.

## **9.0 EMERGENCY RESPONSE PLAN AND EQUIPMENT**

### **9.1 GENERAL**

Emergency situations can be minimized through proper implementation of the SSHP. If an emergency situation develops, the PES SSO shall act as the on-scene Incident Commander, and the initial response will be to handle it in a calm, deliberate manner so that the situation is controlled and the safety and health of the site workers and surrounding community are not jeopardized.

### **9.2 EMERGENCY PROCEDURES**

Evacuation, assembly, site control, hospital route map, and emergency numbers will be posted in the office/break area. Hospital route maps shall also be maintained in the designated emergency vehicle, as well as all other site vehicles, and all personnel will be aware of the location of the closest telephone and/or radio communications.

**9.2.1** An air horn will be carried by the work team and one kept at the office/break trailer. One long blast on the air horn will be the signal to evacuate the site immediately. Personnel in the WZ will evacuate to the assembly point specified during the tailgate safety briefing. If the assembly point used by WZ personnel is different than that used by SZ personnel, the PES SSO will use radio communication to coordinate accounting of all site personnel. Once all personnel are accounted for, the PES SSO will outline the actions to be taken as determined by the situation. Two short blasts is the **ALL CLEAR** signal.

**9.2.2** During an emergency, the following actions will be taken, with some actions conducted concurrently. No one will attempt emergency response/rescue until the situation has been assessed and the appropriate response outlined by the Senior UXO Supervisor. Rescue/response may include the following:

1. **Enforcing the Buddy System:** Allow no one to enter a contaminated area or hazardous area without a partner. At all times, personnel in the WZ

should be in line-of-sight or communications contact with the supervisor or designated appointee.

2. Survey Casualties:
  - a. Locate all victims and assess their condition.
  - b. Determine resources needed for stabilization and transport.
3. Assessment: Assess existing and potential hazards to site personnel and the offsite population. Determine:
  - a. Whether and how to respond,
  - b. The need for evacuation of site personnel and offsite population, and
  - c. The resources needed for evacuation and response.
4. Request Aid: Contact the required offsite/onsite personnel or facilities, such as the ambulance, fire department, police, etc. (See Appendix D, Table 5.1 for emergency contacts).
5. Allocate Resources: Allocate onsite personnel and equipment to rescue and initiate incident response operations.
6. Control: Assist in bringing the hazardous situation under complete or temporary control and use measures to prevent the spread of the emergency (e.g., cover hole with tarp/plastic or wood, control fire, and secure site).
7. Extricate: Remove or assist victims from the area.
8. Stabilize: Administer any medical procedures that are necessary before the victims can be moved. Stabilize or permanently fix the hazardous condition. Attend to what caused the emergency and anything damaged or endangered by the emergency (e.g., drums and tanks).
9. Transport: No one will be transported without being decontaminated. Take measures to minimize chemical contamination of the transport vehicle, ambulance, and hospital personnel.
10. Casualty Logging: Record who, time, destination, and condition at transport.
11. Casualty Tracking: Record disposition, condition, and location.



### **9.3 ACCIDENT/INCIDENT REPORTING**

In the event of an accident and/or incident, the Parsons ES Site Manager will be immediately notified. Within 2 working days of any reportable accident, the Parsons ES Project Manager will complete and submit an accident report on ENG Form 3394, in accordance with AR 385-40 and USACE supplement to that regulation.

### **9.4 HOSPITAL ROUTE**

Since activities for this project will be conducted at multiple locations within the former CCATF, the SSHO will give site-specific instructions for departing each site and exiting the former CCATF. The main exit point for the area will be via Union Street. After turning left onto Union Street, travel approximately 8 miles west on Union. Turn left (west) onto Main Street and go a short distance to North Church Street. Turn right onto North Church Street and keep to the right as you pass Wofford College. Turn right (east) onto East Wood Street. Spartanburg Regional Medical Center is on the right.

### **9.5 FIRES AND EXPLOSIONS**

#### **9.5.1 FIRE EXTINGUISHERS**

A dry-chemical-type 4A:20B:C fire extinguisher will be available at each individual work site. Dry chemical fire extinguishers will be provided at any other site location where flammable materials may present a fire risk [e.g., petroleum, oil, and lubricant (POL) storage area]. Additionally, a fire extinguisher rated at least 1A:10B:C will be located with each piece of heavy equipment and in each site vehicle.

#### **9.5.2 SMALL FIRES**

A small fire is defined as a fire that can be extinguished with a 4A:20B:C type fire extinguisher. In the event of a small fire, site personnel will take the following actions:

1. Evacuate all unnecessary personnel from the area, preferably to an upwind location;

2. Attempt to extinguish fire using portable fire extinguishers or by smothering from an upwind location;
3. Request emergency response assistance (i.e., ambulance, fire, and police), as needed, for any injuries or exposures to hazardous chemicals; and
4. Do not attempt to extinguish a fire involving explosives.

### **9.5.3 LARGE FIRES**

In the event of a large fire or small fire which cannot be extinguished, the following actions will be taken:

1. Evacuate all unnecessary personnel from the site, preferably to an upwind location.
2. Notify the fire department or other emergency response service (i.e., police, fire, ambulance, and hospital), as needed.
3. Order the appropriate level of protective clothing to be worn by personnel fighting the fire. Try to fight the fire from an upwind location.
4. Do not attempt to extinguish a fire involving explosives.

### **9.5.4 EXPLOSION**

In the event of an explosion, all nonessential personnel will evacuate the site, required support equipment and personnel will be requested, and the CEHNC Contracting Officer or designated representative will be notified.

### **9.6 FIRST-AID KITS**

The size and number of kits, which include first-aid and eye wash supplies, a CPR mask, and a burn blanket, will be sufficient to accommodate the maximum number of people (including government personnel and visitors) onsite at any given time. The kits will be located at each work site and the location will be made known to all personnel. Kit locations will be provided with adequate water and other supplies necessary to clean burns, wounds, or lesions.

## **9.7 FIRST-AID PROCEDURES**

The following first aid procedures will be followed when onsite first aid personnel must render assistance for individuals injured onsite:

1. For minor injuries, use routine first aid procedures;
2. For major injuries, call an ambulance immediately and administer the appropriate first aid while awaiting arrival of the ambulance;
3. Use Red Cross approved measures for treatment;
4. Wash/rinse affected area thoroughly with copious amounts of soap and water, then provide appropriate medical attention if required;
5. If chemicals have been splashed into the eyes, rinse eyes for at least 15 minutes;
6. If illness/injury involves the inhalation of hazardous materials, move victim to fresh air, and if necessary transport to hospital;
7. For any injury/illness involving exposure to hazardous chemicals, and transport victim to the hospital for professional medical attention; and
8. The Senior UXO Supervisor will provide personnel data sheets to appropriate medical personnel as requested.

## **9.8 INCLEMENT WEATHER**

In the event of inclement weather, electrical storms, or extremely cold weather (>32°F), it may be necessary to cease operations and evacuate the site. The Senior UXO Supervisor will be responsible for contacting the U.S. Weather Service on a daily basis and advising site personnel of the forecast. If necessary, the weather service will be contacted on a more frequent basis.

**9.8.1** In the event of adverse weather, the Parsons ES Site Supervisor will determine if work can continue without sacrificing the health and safety of site personnel. Some of the items to be considered prior to determining if work should continue are the following:

1. Heavy rainfall,
2. Potential for heat stress,
3. Potential for cold stress,

4. Tornadoes,
5. Limited visibility,
6. Electrical storms,
7. Potential for accidents, and
8. The malfunctioning of monitoring equipment.

**9.8.2** Severe weather with thunderstorms and associated lightning and tornadoes is a common feature of the region. Therefore, meteorological conditions will be closely watched.

Thunderstorms and tornadoes often occur late in the afternoon on hot days but can occur at any time of the day in any season of the year. Tornadoes are usually preceded by severe thunderstorms with frequent lightning, heavy rains, and strong winds.

**9.8.3** A severe thunderstorm or tornado watch announcement on the radio or television indicates that a severe thunderstorm or tornado is possible or tornado watches. A severe thunderstorm or tornado warning signifies that a severe thunderstorm or a tornado has been sighted or detected by radar and may be approaching. All onsite work will cease during a thunderstorm, severe thunderstorm warning, or tornado warning.

**9.8.4** Personnel onsite during a tornado will take the following steps:

1. Evacuate office trailers or vehicles;
2. If outdoors, lie flat in a nearby ditch;
3. Stay away from power poles, electrical appliances, and metal objects; and
4. Do not try to outrun a tornado.

## **9.9 SPILL RESPONSE**

Site operations will not involve handling large containers of hazardous waste which could be easily spilled. However, small containers [5 gallons (gal) or less] of gasoline or diesel fuel may be used and stored onsite. If material from these containers is spilled, UXB personnel will follow these steps:

1. Evacuate the immediate area and extinguish ignition sources.

2. The Senior UXO Supervisor will evaluate the situation to ensure it is safe for personnel to begin cleanup operations.
3. Using Non-sparking tools, UXB personnel will collect the contaminated soil and place it in a plastic bag, which will then be placed in a 55-gal Department of Transportation (DOT)-approved drum.
4. PES Site Manager will notify the CEHNC safety specialist that the spill occurred and await guidance on disposal of the drummed contaminants.

## **10.0 LOGS, REPORTS, AUDITS, INSPECTIONS, AND RECORD KEEPING**

### **10.1 LOGS**

The following logs and records will be completed, retained, and submitted to the Parsons ES Site Supervisor..

1. Safety log,
2. Training log, and
3. Visitor logs.

#### **10.1.1 SAFETY LOG**

The Senior UXO Supervisor will maintain a safety log of all safety-related activities. The Senior UXO Supervisor is responsible for ensuring that safety and health activities for the day, as well as tailgate safety briefing minutes, are part of the log. When safety and health deficiencies are noted during daily inspections, the measures, timetable, and individual responsible for correcting the deficiencies will be noted in the safety log.

#### **10.1.2 TRAINING LOG**

The Senior UXO Supervisor is responsible for ensuring that all training conducted relative to job site activities is documented appropriately in the training log and the documentation form is completed.

#### **10.1.3 VISITOR LOG**

A visitor log will be maintained at the entrance to all work sites to record visitations to the job site.

### **10.2 REPORTS**

The following reports will be submitted as required by applicable CEHNC and OSHA regulations:

1. Eng Form 3394, in accordance with AR 385-40 and USACE supplement to that regulation. A copy of the form is included in Attachment B.

2. Medical Monitoring Records of employee(s) obtained after site investigations begin.
3. If a reportable injury/illness/accident occurs at the job site, the appropriate form will be completed and forwarded by UXB within 48 hr to Parsons ES and CEHNC. If a near miss occurs, the accident form will be completed.

### **10.3 RECORD KEEPING**

All record keeping will be in accordance with applicable OSHA and CEHNC standards and regulations.

**ATTACHMENT A**  
**MATERIAL SAFETY DATA SHEETS**



MOBIL OIL CORPORATION MATERIAL SAFETY DATA BULLETIN

REVISED: 11/09/94

\*\*\*\*\* I. PRODUCT IDENTIFICATION \*\*\*\*\*  
 MOBIL UNLEADED

SUPPLIER:	MOBIL OIL CORP.	24-HOUR EMERGENCY (CALL COLLECT):	609-737-4411
CHEMICAL NAMES AND SYNONYMS:	HYDROCARBONS AND ADDITIVES	CHEMTREC:	800-424-9300 202-483-7616
USE OR DESCRIPTION:	UNLEADED MOTOR FUEL	PRODUCT AND MSDS INFORMATION:	800-662-4525 703-849-3265

\*\*\*\*\* II. TYPICAL CHEMICAL AND PHYSICAL PROPERTIES \*\*\*\*\*

APPEARANCE: Yellow to Orange Liquid ODOR: Hydrocarbon PH: NA  
 VISCOSITY AT 40 C, CS: < 1.0  
 VISCOSITY AT 100 C, CS: NA  
 FLASH POINT F(C): -40(-40) (ASTM D-56)  
 MELTING POINT F(C): NA POUR POINT F(C): NA  
 BOILING POINT F(C): > 73(23) VOC: NE  
 RELATIVE DENSITY, 15/4 C: 0.7-0.76 SOLUBILITY IN WATER: Slight  
 VAPOR PRESSURE-mm Hg 20C: > 400.0  
 NA=Not Applicable NE=Not Established D=Decomposes  
 FOR FURTHER INFORMATION, CONTACT YOUR MARKETING REPRESENTATIVE.

\*\*\*\*\* III. POTENTIALLY HAZARDOUS INGREDIENTS \*\*\*\*\*

	Wt. %	Source	-- EXPOSURE LIMITS --		NOTE
			---TWA---	----STEL---	
	-----		ppm mg/m3	ppm mg/m3	
GASOLINE (8006-61-9)	100%				
		MOBIL	300	890	
		OSHA	300	900	500 1500
		ACGIH	300	890	500 1480

COMPONENTS OF MIXTURE

XYLENE (1330-20-7)	10%				
		MOBIL	100	434	
O, M, P, -Isomers		OSHA	100	435	150 655
		ACGIH	100	434	150 651
ISOPENTANE (78-78-4)	9%				
		MOBIL	600	1770	
TOLUENE (108-88-3)	5%				
Skin		MOBIL	50	188	
		OSHA	100	375	150 560
Skin		ACGIH	50	188	
PSEUDOCUMENE (95-63-6)	5%				
		MOBIL	25	125	

BUTANE (106-97-8)	4%	MOBIL	800	1900		
		OSHA	800	1900		
		ACGIH	800	1900		
2-METHYLPENTANE (107-83-5)	4%	MOBIL	500	1760		
Isomer of N-Hexane		ACGIH	500	1760	1000	3500
PENTANE (109-66-0)	4%	MOBIL	600	1770		
		OSHA	600	1800	750	2250
		ACGIH	600	1770	750	2210
ETHANOL (64-17-5)	3%	MOBIL	1000	1880		
		OSHA	1000	1900		
		ACGIH	1000	1880		
TRIMETHYL BENZENE (25551-13-7)	3%	MOBIL	25	123		
		OSHA	25	125		
		ACGIH	25	123		
BENZENE (71-43-2)	2%	MOBIL	1	3.2		
		OSHA	1		5	
		ACGIH	10	32		
ETHYL BENZENE (100-41-4)	2%	MOBIL	100	434		
		OSHA	100	435	125	545
		ACGIH	100	434	125	543
N-HEXANE (110-54-3)	2%	MOBIL	50	176		
N-Hexane		MOBIL	500	1760		
Other Isomers		OSHA	50	180		
N-Hexane		ACGIH	50	176		
Other Isomers		ACGIH	500	1760	1000	3500
3-METHYLPENTANE (96-14-0)	2%	MOBIL	500	1760		
Isomer of N-Hexane		ACGIH	500	1760	1000	3500

2,3-DIMETHYLBUTANE (79-29-8)	2%				
Isomer of N-Hexane		MOBIL	500	1760	
		ACGIH	500	1760	1000 3500
3- METHYLHEXANE (589-34-4)	2%				
		MOBIL	400	1640	
METHYLCYCLOHEXANE (108-87-2)	1%				
		MOBIL	400	1610	
		OSHA	400	1600	
		ACGIH	400	1610	
2- METHYLHEXANE (591-76-4)	1%				
		MOBIL	400	1640	

NOTE: The concentration of the components shown above may vary substantially. Because of volatility considerations, gasoline vapor may have concentrations of components very different from those of liquid gasoline. The major components of gasoline vapor are: butane, isobutane, pentane and isopentane. Oxygenates such as MTBE or ethanol may or may not be present depending on regional environmental requirements. The reportable component percentages, shown in the Regulatory Information section, are based on API's evaluation of a typical gasoline mixture.

See Sections XII and XIII for regulatory and further compositional data.

NOTE: Limits shown for guidance only. Follow applicable regulations.

\*\*\*\*\* IV. HEALTH HAZARD DATA \*\*\*\*\*

--- INCLUDES AGGRAVATED MEDICAL CONDITIONS, IF ESTABLISHED ---

EFFECTS OF OVEREXPOSURE: Eye irritation, respiratory irritation, dizziness, nausea, loss of consciousness. Skin irritation. Studies (sponsored by API) conducted in the U.S. examining the mortality experience (causes of death) of distribution workers with long-term exposure to gasoline have not found any gasoline-related health effects. Case reports of chronic gasoline abuse (such as gasoline sniffing) and chronic misuse of gasoline as a solvent or as a cleaning agent have reported a range of neurological effects (nervous system effects), sudden deaths from cardiac arrest (heart attacks), hematologic changes (blood effects) and leukemia. These effects are not expected to occur at exposure levels encountered in the distribution and use of gasoline as a motor fuel.

\*\*\*\*\* V. EMERGENCY AND FIRST AID PROCEDURES \*\*\*\*\*  
--- FOR PRIMARY ROUTES OF ENTRY ---

EYE CONTACT: Flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT: Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse.

INHALATION: Remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance and call a physician. If breathing has stopped, use mouth to mouth resuscitation.

INGESTION: Not expected to be a problem. However, if greater than 1/2 liter(pint) ingested, immediately give 1 to 2 glasses of water and call a physician, hospital emergency room or poison control center for assistance. Do not induce vomiting or give anything by mouth to an unconscious person.

NOTE TO PHYSICIANS: Material if ingested may be aspirated into the lungs and can cause chemical pneumonitis. Treat appropriately.

\*\*\*\*\* VI. FIRE AND EXPLOSION HAZARD DATA \*\*\*\*\*

FLASH POINT F(C): -40(-40) (ASTM D-56)

FLAMMABLE LIMITS. LEL: 1.4% UEL: 7.6%

EXTINGUISHING MEDIA: Carbon Dioxide, Foam, Dry Chemical, Water Fog.

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate area. For large spills, fire fighting foam is the preferred agent and should be applied in sufficient quantities to blanket the gasoline surface. Water spray may be used to flush spill away from exposures, but good judgement should be practiced to prevent spreading of the gasoline into sewers, streams or drinking water supplies. If a leak or spill has not ignited, apply a foam blanket to suppress the release of vapors. If foam is not available, a water spray curtain can be used to disperse vapors and to protect personnel attempting to stop the leak.

SPECIAL PROTECTIVE EQUIPMENT: For fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Extremely flammable. Vapor accumulation could flash and/or explode if in contact with open flame.

NFPA HAZARD ID: Health: 1, Flammability: 3, Reactivity: 0

\*\*\*\*\* VII. REACTIVITY DATA \*\*\*\*\*

STABILITY (Thermal, Light, etc.): Stable

CONDITIONS TO AVOID: Heat, sparks, flame and build up of static electricity.

INCOMPATIBILITY (Materials to Avoid): Halogens, strong acids, alkalies, and oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide.

HAZARDOUS POLYMERIZATION: Will not occur.

\*\*\*\*\* VIII. SPILL OR LEAK PROCEDURE \*\*\*\*\*

ENVIRONMENTAL IMPACT: Report spills as required to appropriate authorities. U. S. Coast Guard regulations require immediate reporting of spills that could reach any waterway including intermittent dry creeks. Report spill to Coast Guard toll free number (800) 424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED: Eliminate all ignition sources. Runoff may create fire or explosion hazard in sewer system. Adsorb on fire retardant treated sawdust, diatomaceous earth, etc. Shovel up and dispose of at an appropriate waste disposal facility in accordance with current applicable laws and regulations, and product characteristics at time of disposal.

WASTE MANAGEMENT: Product is suitable for burning for fuel value in compliance with applicable laws and regulations.

\*\*\*\*\* IX. SPECIAL PROTECTION INFORMATION \*\*\*\*\*

EYE PROTECTION: If splash with liquid is possible, chemical type goggles should be worn.

SKIN PROTECTION: Impervious gloves should be worn. Good personal hygiene practices should always be followed.

RESPIRATORY PROTECTION: Approved respiratory equipment must be used when airborne concentrations are unknown or exceed the TLV.

VENTILATION: Use in well ventilated area with local exhaust ventilation. Ventilation required and equipment must be explosion proof. Use away from all ignition sources.

\*\*\*\*\* X. SPECIAL PRECAUTIONS \*\*\*\*\*

HANDLING: NEVER SIPHON GASOLINE BY MOUTH. GASOLINE SHOULD NOT BE USED AS A SOLVENT OR AS A CLEANING AGENT. Use non-sparking tools and explosion-proof equipment. Avoid contact with skin. Avoid inhalation of vapors or mists. Use in well ventilated area away from all ignition sources.

STORAGE: Drums must be grounded and bonded and equipped with self-closing valves, pressure vacuum bungs and flame arresters. Store away from all ignition sources in a cool area equipped with an automatic sprinkling system. Outside or detached storage preferred. Storage containers should be grounded and bonded.

MATERIALS MUST BE LABELED AS FOLLOWS: Extremely Flammable. Vapor Harmful. See Appendix for Precautionary Label: MPL-304

\*\*\*\*\* XI. TOXICOLOGICAL DATA \*\*\*\*\*

---ACUTE TOXICOLOGY---

ORAL TOXICITY (RATS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

DERMAL TOXICITY (RABBITS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

INHALATION TOXICITY (RATS): Practically non-toxic (LC50: greater than 5 mg/l). ---Based on testing of similar products and/or the components.

EYE IRRITATION (RABBITS): Practically non-irritating. (Draize score: greater than 6 but 15 or less). ---Based on testing of similar products and/or the components.

SKIN IRRITATION (RABBITS): Irritant. (Primary Irritation Index: 3 or greater but less than 5). ---Based on testing of similar products and/or the components.

OTHER ACUTE TOXICITY DATA: Inhalation of vapors/mists may cause respiratory system irritation. HAZARDS OF COMBUSTION PRODUCTS: Exposure to high concentrations of carbon monoxide can cause loss of consciousness, heart damage, brain damage and death. Exposure to high concentrations of carbon dioxide can cause simple asphyxiation by displacing oxygen.

### ---SUBCHRONIC TOXICOLOGY (SUMMARY)---

90-day oral gavage studies with rats resulted in kidney effects at 1200 mg/kg MTBE, but these effects are not considered significant to humans. Thirteen week inhalation studies with rats on MTBE resulted in increased organ weights and decreased body weight and anaesthetic effects at levels > 800 ppm.

### ---NEUROTOXICOLOGY (SUMMARY)---

No significant adverse effects were observed at 8000 ppm MTBE in a 90-day neurotoxicity study with rats.

### ---REPRODUCTIVE TOXICOLOGY (SUMMARY)---

Inhalation teratology studies with mice at 8000 ppm MTBE during gestation resulted in maternal and fetal toxicity, reduced viable implantations and an increased incidence of cleft palate. The NOEL was 1000 ppm. In another study, mice showed some evidence of fetotoxicity at 250 ppm, but no significant adverse effects occurred in rats exposed to 2500 ppm during gestation. In a single-generation inhalation reproductive/fertility study with rats, no significant effects were observed at 2500 ppm. Two-generation reproductive/fertility studies in rats showed no reproductive effects at 8000 ppm MTBE.

### ---CHRONIC TOXICOLOGY (SUMMARY)---

An increased incidence of kidney and liver tumors was observed in laboratory animals exposed to > 3000 ppm MTBE. These effects are not considered significant to humans.

### ---SENSITIZATION (SUMMARY)---

\*\*\*\*Skin sensitization: Negative guinea pig test.

## ---OTHER TOXICOLOGY DATA---

Gasoline and Refinery Streams: Studies conducted by the American Petroleum Institute examined a reference unleaded gasoline for mutagenic, teratogenic and sensitization potential; no evidence of these hazards was found. However, isolated constituents of gasoline may display these or other potential hazards in laboratory tests. There were no significant adverse effects in three-month subchronic inhalation studies in rats or monkeys, or in a two-year skin cancer study in mice. Studies with laboratory animals have shown that gasoline vapors administered at high concentrations over a prolonged period of time caused kidney damage and kidney cancer in male rats and liver cancer in female mice. Studies carried out by Mobil's Environmental and Health Sciences Laboratory on some of the major refinery streams from which gasoline is formulated support the results of the API studies. There was no evidence of significant adverse systemic or reproductive effects for light catalytic cracked naphthas and reformed naphthas. Components: Gasoline consists of a complex blend of petroleum/processing derived paraffinic, olefinic, naphthenic and aromatic hydrocarbons which include up to 5% benzene (with 1-2% typical in the U.S.), n-hexane, mixed xylenes, toluene, ethylbenzene and trimethyl benzene. Repeated exposures to low levels of benzene have been reported to result in blood abnormalities including anemia and, in rare cases, leukemia in both animals and humans. Prolonged exposure to n-hexane may result in nervous system damage, including numbness of the extremities and, in extreme cases, paralysis. The adverse effects associated with these components have not been observed in studies with gasoline or the refinery streams from which it is formulated. Generally, human exposures to gasoline vapors are considerably less than those used in the animal toxicity studies. As far as scientists know, low level or infrequent exposures to gasoline vapor are unlikely to be associated with cancer or other serious diseases in humans.

\*\*\*\*\* XII. REGULATORY INFORMATION \*\*\*\*\*  
 GOVERNMENTAL INVENTORY STATUS: All components comply with TSCA, and EINECS/ELINCS.

Transport Information: Please see Section XIV.

EEC LABEL CLASS: F+ T (R12-45-38-22 S53-45-2-23-24-29-43-62)

US OSHA HAZARD COMMUNICATION STANDARD: Product assessed in accordance with OSHA 29 CFR 1910.1200 and determined to be hazardous.

RCRA INFORMATION: The disposal of the unused product may be subject to RCRA regulations per 40 CFR Part 261 for the reasons including but not limited to ignitability, corrosivity, reactivity or formulation with the contaminants listed in the Toxicity Characteristic (TC) Rule as determined by the Toxicity Characteristic Leaching Procedure (TCLP). Disposal of the used product may be regulated.

BENZENE: 2.3200 PCT (TCLP)

FLASH: -40(-40) F(C)

U.S. Superfund Amendments and Reauthorization Act (SARA) Title III: This product contains no "EXTREMELY HAZARDOUS SUBSTANCES".

SARA (311/312) REPORTABLE HAZARD CATEGORIES:  
FIRE CHRONIC ACUTE

This product contains the following SARA (313) Toxic Release Chemicals:

BENZENE (COMPONENT ANALYSIS)	71-43-2	2.32%
PSEUDOCUMENE (COMPONENT ANALYSIS)	95-63-6	4.55%
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	1.6%
TOLUENE (COMPONENT ANALYSIS)	108-88-3	4.65%
XYLENES (COMPONENT ANALYSIS)	1330-20-7	9.9%
METHYL-TERT-BUTYL ETHER (COMPONENT ANALYSIS)	1634-04-4	2.7%

THE FOLLOWING PRODUCT INGREDIENTS ARE CITED ON THE LISTS BELOW:



CHEMICAL NAME	CAS NUMBER	LIST CITATIONS
ETHYL ALCOHOL (COMPONENT ANALYSIS)	64-17-5	1, 10, 17, 18, 19, 20, 21, 23, 24, 25, 26
BENZENE (COMPONENT ANALYSIS) (2.32%)	71-43-2	1, 3, 4, 6, 9, 10, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
ISOPENTANE (COMPONENT ANALYSIS)	78-78-4	19, 21, 24, 25
2,3-DIMETHYLBUTANE (COMPONENT ANALYSIS)	79-29-8	19, 21, 24, 25
PSEUDOCUMENE (COMPONENT ANALYSIS)	95-63-6	11, 15, 20, 24, 25
PENTANE, 3-METHYL- (COMPONENT ANALYSIS)	96-14-0	19, 25
METHYL CYCLOPENTANE (COMPONENT ANALYSIS)	96-37-7	11, 15, 19, 21, 24, 25, 26
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	1, 10, 18, 19, 20, 21, 23, 24, 25, 26
BUTANE (COMPONENT ANALYSIS)	106-97-8	1, 10, 19, 20, 21, 23, 24, 25, 26
PENTANE, 2-METHYL- (COMPONENT ANALYSIS)	107-83-5	19, 23, 25
METHYLCYCLOHEXANE (COMPONENT ANALYSIS)	108-87-2	1, 10, 18, 19, 20, 21, 23, 24, 25, 26
TOLUENE (COMPONENT ANALYSIS) (4.65%)	108-88-3	1, 10, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
PENTANE (COMPONENT ANALYSIS)	109-66-0	1, 10, 18, 19, 20, 21, 23, 24, 25, 26
N-HEXANE (COMPONENT ANALYSIS)	110-54-3	1, 10, 11, 15, 18, 19, 20, 21, 23, 24, 25, 26
2-METHYL 2-BUTENE (COMPONENT ANALYSIS)	513-35-9	19, 25
3-METHYLHEXANE (COMPONENT ANALYSIS)	589-34-4	19, 25
HEXANE, 2-METHYL- (COMPONENT ANALYSIS)	591-76-4	19, 25
1-HEXENE (COMPONENT ANALYSIS)	592-41-6	19, 24, 25
XYLENES (COMPONENT ANALYSIS) (9.90%)	1330-20-7	1, 10, 18, 19, 20, 21, 22, 23, 24, 25, 26
METHYL-TERT-BUTYL ETHER (COMPONENT ANALYSIS)	1634-04-4	11, 15, 24, 25
GASOLINE	8006-61-9	1, 10, 18, 19, 20, 21, 23, 24, 26
TRIMETHYL BENZENE (COMPONENT ANALYSIS)	25551-13-7	1, 10, 19, 20, 21, 23, 24, 25, 26

--- REGULATORY LISTS SEARCHED ---

1 = ACGIH ALL	6 = IARC 1	11 = TSCA 4	17 = CA P65	22 = MI 293
2 = ACGIH A1	7 = IARC 2A	12 = TSCA 5a2	18 = CA RTK	23 = MN RTK
3 = ACGIH A2	8 = IARC 2B	13 = TSCA 5e	19 = FL RTK	24 = NJ RTK
4 = NTP CARC	9 = OSHA CARC	14 = TSCA 6	20 = IL RTK	25 = PA RTK
5 = NTP SUS	10 = OSHA Z	15 = TSCA 12b	21 = LA RTK	26 = RI RTK

CARC = CARCINOGEN; SUS = SUSPECTED CARCINOGEN

NOTE: MOBIL PRODUCTS ARE NOT FORMULATED TO CONTAIN PCBS.

\*\*\*\*\* XIII. INGREDIENTS \*\*\*\*\*

INGREDIENT	PERCENT	CAS NUMBER
GASOLINE	100.00	8006-61-9

## \*\*\*\*\* XIV. TRANSPORT AND LABEL INFORMATION \*\*\*\*\*

## USA DOT:

SHIPPING NAME:	Gasoline
HAZARD CLASS & DIV:	3
ID NUMBER:	UN1203
ERG NUMBER:	27
PACKING GROUP:	PG II
STCC:	4908178
DANGEROUS WHEN WET:	No
POISON:	No
LABEL(s):	Flammable Liquid
PLACARD(s):	Flammable
PRODUCT RQ:	NA
MARPOL III STATUS:	NA

## IMO:

HAZARD CLASS & DIV:	3.1
UN NUMBER:	1203
PACKING GROUP:	PG II
SHIPPING NAME:	Gasoline
LABEL(s):	Flammable Liquid
MARPOL III STATUS:	NA

## ICAO/IATA:

HAZARD CLASS & DIV:	3
ID/UN Number:	1203
PACKING GROUP:	PG II
SHIPPING NAME:	Gasoline
SUBSIDIARY RISK:	NA
LABEL(s):	Flammable Liquid

## Precautionary Label Text:

GASOLINE.

DANGER!

EXTREMELY FLAMMABLE LIQUID AND VAPOR.  
VAPORS MAY CAUSE FLASH FIRE; EYE, NOSE, THROAT OR LUNG IRRITATION,  
DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS.  
LIQUID MAY CAUSE SKIN IRRITATION.  
LOW VISCOSITY MATERIAL, IF INGESTED, MAY BE ASPIRATED AND CAN  
CAUSE SERIOUS OR FATAL LUNG DAMAGE.  
LONG-TERM EXPOSURE TO GASOLINE VAPOR HAS CAUSED KIDNEY AND LIVER  
CANCER IN LABORATORY ANIMALS.

KEEP AWAY FROM HEAT, SPARKS AND FLAME.  
AVOID PERSONAL CONTACT AND PROLONGED EXPOSURE TO VAPOR.  
KEEP CONTAINER CLOSED.  
USE IN WELL VENTILATED AREA.

MISUSE MAY CAUSE SERIOUS INJURY OR ILLNESS.  
FOR USE AS A MOTOR FUEL ONLY.  
DO NOT USE AS A SOLVENT OR CLEANING AGENT.  
NEVER SIPHON BY MOUTH.

FIRST AID: IF INHALED AND SYMPTOMS DEVELOP, REMOVE TO FRESH AIR.  
IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-  
TO-MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN. GET MEDICAL  
ATTENTION.  
IF SWALLOWED, DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL  
ATTENTION. ONLY INDUCE VOMITING AT THE INSTRUCTION OF A PHYSICIAN  
NEVER INDUCE VOMITING OR GIVE ANYTHING BY MOUTH TO AN UNCONCIOUS  
PERSON.  
IN CASE OF CONTACT, WASH SKIN WITH SOAP AND PLENTY OF WATER.  
REMOVE CONTAMINATED CLOTHING AND WASH BEFORE REUSE. IF IRRITATION  
OCCURS, GET MEDICAL ATTENTION.

EMPTY CONTAINERS MAY CONTAIN PRODUCT RESIDUE, INCLUDING FLAMMABLE  
OR EXPLOSIVE VAPORS, DO NOT CUT, PUNCTURE OR WELD ON OR NEAR  
THE CONTAINER. ALL LABEL WARNINGS AND PRECAUTIONS MUST BE  
OBSERVED UNTIL CONTAINER HAS BEEN THOROUGHLY CLEANED OR  
DESTROYED.

THIS WARNING IS GIVEN TO COMPLY WITH CALIFORNIA HEALTH AND  
SAFETY CODE 25249.6 AND DOES NOT CONSTITUTE AN ADMISSION OR  
A WAIVER OF ANY RIGHTS.

DETECTABLE AMOUNTS OF CHEMICALS KNOWN TO THE STATE OF CALIFORNIA  
TO CAUSE CANCER, BIRTH DEFECTS, OR OTHER REPRODUCTIVE HARM MAY  
BE FOUND IN THIS PRODUCT. READ AND FOLLOW LABEL DIRECTIONS AND  
USE CARE WHEN HANDLING OR USING THIS PRODUCT.  
REFER TO PRODUCT MATERIAL SAFETY DATA BULLETIN FOR FURTHER SAFETY  
AND HEALTH INFORMATION.

MPL-304 (10/94)

F+ T - Extremely flammable . Toxic .

R12-45-38-22 - Extremely flammable. May cause cancer. Irritating to skin. Harmful if swallowed.

S53-45-2-23-24-29-43-62 - Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Keep out of the reach of children. Do not breathe vapor. Avoid contact with skin. Do not empty into drains. In case of fire use foam/drypowder/CO2/Halon. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

FOR MOBIL USE ONLY: MHC: 1\* 1\* 1\* 1\* 2\*, MPPEC: C, PPEC:, US931216  
APPROVE CCODE:2 11/09/94 REQ: US - MARKETING

\*\*\*\*\*  
INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.  
\*\*\*\*\*

PREPARED BY: MOBIL OIL CORPORATION  
ENVIRONMENTAL HEALTH AND SAFETY DEPARTMENT, PRINCETON, NJ  
FOR FURTHER INFORMATION, CONTACT:  
MOBIL OIL CORPORATION, PRODUCT FORMULATION AND QUALITY CONTROL  
3225 GALLOWES ROAD, FAIRFAX, VA 22037 (800) 227-0707 X3265

MATERIAL SAFETY DATA SHEET

EM SCIENCE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Manufacturer.....: Preparation Date.: 03/01/91  
Date MSDS Printed.: Jan 13, 1995  
EM SCIENCE  
A Division of EM Industries  
P.O. Box 70  
480 Democrat Rd.  
Gibbstown, N.J. 08027  
Information Phone Number.: 609-354-9200  
Hours: Mon. to Fri. 8:30-5  
Chemtrec Emergency Number: 800-424-9300  
Hours: 24 hrs a day

Catalog Number(s):  
EX0564 EX0565

Trade Name.....:  
Glycol; 1,2-Ethanediol  
Chemical Name.....:  
Ethylene Glycol  
Chemical Family..: Polyalcohol  
Formula.....:  
HOCH<sub>2</sub>CH<sub>2</sub>OH

Molecular Weight.: 62.07

2. COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS #	Appr %
Ethylene Glycol	107-21-1	100%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

HARMFUL OR FATAL IF SWALLOWED.  
May Be Harmful If Inhaled or Absorbed.  
May Cause Damage To Kidney, Liver and Central Nervous System.

Appearance.....:  
Colorless, odorless liquid

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

Symptoms of Exposure:

Harmful if swallowed (100 ml can be fatal).  
Causes abdominal pain, dizziness, lumbar pain, nausea, vomiting, diarrhea.  
May be harmful if inhaled or absorbed.  
May cause liver and central nervous system damage and possibly fatal kidney damage.  
Irritating to skin, eyes, and mucous membranes.

Medical Cond. Aggravated by Exposure:

Data not available.

Routes of Entry.....:

Inhalation, ingestion or skin contact.

Carcinogenicity.....:

The material is not listed as a cancer causing agent.

4. FIRST AID MEASURES

Emergency First Aid:

GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.

Skin: Wash thoroughly with soap and water.

Eyes: immediately flush thoroughly with large amounts of water

Inhalation: Remove to fresh air; give artificial respiration if breathing has stopped.

Ingestion: If conscious, drink water and induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

5. FIRE FIGHTING MEASURES

Flash Point (F).....: 232F (tcc)

Flammable Limits LEL (%): 3.20

Flammable Limits UEL (%): 15.30

Extinguishing Media.....:

Water spray, dry chemical, foam, CO<sub>2</sub>

Fire Fighting Procedures.:

Wear self-contained breathing apparatus.

Fire & Explosion Hazards.:

Thermal decomposition produces acrid fumes

6. ACCIDENTAL RELEASE MEASURES

Spill Response:

Evacuate the area of all unnecessary personnel.  
Wear suitable protective equipment listed under Exposure / Personal Protection.  
Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards.  
Contain the release and eliminate its source, if this can be done without risk.  
Take up and containerize for proper disposal as described under Disposal.  
Comply with Federal, State, and local regulations on reporting releases. Refer to Regulatory Information for reportable quantity and other regulatory data.

EM SCIENCE recommends Spill-X absorbent agents for various types of spills. Additional information on the Spill-X products can be provided through the EM SCIENCE Technical Service Department (609) 354-9200.

The following EM SCIENCE Spill-X absorbent is recommended for this product:

SX0863

Solvent Spill Treatment Kit

## 7. HANDLING AND STORAGE

### Handling & Storage:

Keep container closed.  
Store in a cool area away from ignition sources and oxidizers.  
Do not breathe vapor.  
Do not get in eyes, on skin, or on clothing.  
Retained residue may make empty containers hazardous; use caution!

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

Ventilation, Respiratory Protection, Protective Clothing, Eye Protection  
Material should be handled or transferred in an approved fume hood or with adequate ventilation.  
Protective gloves (Natural rubber, PVC or equivalent) should be worn to prevent skin contact  
Safety glasses with side shields should be worn at all times.  
Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce



exposure.

Work / Hygenic Practices:

Wash thoroughly after handling.

Do not take internally.

Eye wash and safety equipment should be readily available.

-----  
EXPOSURE GUIDELINES

OSHA - PEL:

Component	PPM	TWA MG/M <sup>3</sup>	PPM	STEL MG/M <sup>3</sup>	PPM	CL MG/M <sup>3</sup>	Skin
Ethylene Glycol					50	125	

-----  
ACGIH - TLV:

Component	PPM	TWA MG/M <sup>3</sup>	PPM	STEL MG/M <sup>3</sup>	PPM	CL MG/M <sup>3</sup>	Skin
Ethylene Glycol					50	127	

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (C 760 mmHg): 197C  
Melting Point (C): -12.7C  
Specific Gravity (H2O = 1): 1.113  
Vapor Pressure (mm Hg): 0.08 20C  
Percent Volatile by Vol (%): N/A  
Vapor Density (Air = 1): 2.1  
Evaporation Rate (BuAc = 1): 0.01  
Solubility in Water (%): Miscible  
Appearance: Colorless, odorless liquid

10. STABILITY AND REACTIVITY

Stability: Yes  
Hazardous Polymerization:  
Does not occur  
Hazardous Decomposition:

CO<sub>x</sub>  
Conditions To Avoid.....:  
Extreme heat; open flames; sparks

Materials To Avoid.....:

- ( ) Water
- (X) Acids
- ( ) Bases
- ( ) Corrosives
- (X) Oxidizers
- (X) Other :

Chromium trioxide, potassium permanganate, silver peroxide

## 11. TOXICOLOGICAL INFORMATION

Toxicity Data:

ihl-hmn TCLo: 10000 mg/cu.m.  
orl-hmn LDLo: 398 mg/kg  
orl-rat LD50: 4700 mg/kg

Toxicological Findings:

Tests on laboratory animals indicate material may produce adverse mutagenic and reproductive effects.  
Cited in Registry of Toxic Effects of Substances (RTECS)

## 12. DISPOSAL CONSIDERATIONS

EPA Waste Numbers:

Treatment:

Material does not have an EPA Waste number and is not a listed waste, however consultation with a permitted waste disposal site (TSD) should be accomplished.

ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

## 13. TRANSPORT INFORMATION

DOT Proper Shipping Name...:  
non-regulated

## 14. REGULATORY INFORMATION

TSCA Inventory.....:

The CAS number of this product is listed on the TSCA Inventory.

Component	SARA EHS (302)	SARA EHS TPQ (lbs)	CERCLA RQ (lbs)
Ethylene Glycol			1

Component	OSHA Floor List	SARA 313	DeMinimis for SARA 313 (%)
Ethylene Glycol	Y	Y	1.0

15. OTHER INFORMATION

Comments:

None

NFPA Hazard Ratings:

Health : 1  
 Flammability : 1  
 Reactivity : 0  
 Special Hazards:

Revision History:

11/01/81 09/01/83 01/29/87 10/27/87 06/20/89

N/A = Not Available

N/E = None Established

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## Material Safety Data Sheet

May be used to comply with  
OSHA's Hazard Communication Standard,  
29 CFR 1910.1200. Standard must be  
consulted for specific requirements.

## U.S. Department of Labor

Occupational Safety and Health Administration  
(Non-Mandatory Form)  
Form Approved  
OMB No. 1218-0072



IDENTITY (As Used on Label and List)  
MANTELEC, INSTANTANEOUS ELECTRIC DETONATOR

Note: Blank spaces are not permitted. If any item is not applicable, or no  
information is available, the space must be marked to indicate that.

## Section I

Manufacturer's Name EXPLO-INDUSTRIAS QUIMICAS E EXPLOSIVOS S.A.	Emergency Telephone Number 011 55 125 521811
Address (Number, Street, City, State, and ZIP Code) AV. INDUSTRIA QUIMICA MANTIQUEIRA, 317 LORENA S.P. BRAZIL	Telephone Number for Information (817) 478-8888
	Date Prepared MAY 1986
	Signature of Preparer (optional)

## Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
PENTAERYTHRITE TETRANITRATE 500 mg	n/a	1.5mg/m3	n/a	
LEAD AZIDE STYPHNATE 300 mg	n/a	1.5mg/m3	n/a	

## Section III — Physical/Chemical Characteristics

Boiling Point	n/a	Specific Gravity (H <sub>2</sub> O = 1)	1.7
Vapor Pressure (mm Hg.)	n/a	Melting Point	n/a
Vapor Density (Air = 1)	n/a	Evaporation Rate (Butyl Acetate = 1)	0%
Solubility in Water	NEGLECTIBLE		
Appearance and Odor	ODORLESS WHITE SOLIDS		

## Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	n/a	Flammable Limits	n/a	LEL	n/a	UEL	n/a
Extinguishing Media	ELECTRIC DETONATORS WILL EXPLODE WHEN SET ON FIRE. DO NOT ATTEMPT TO						
Special Fire Fighting Procedures	EXTINGUISH THE FIRE. EVACUATE PERSONNEL TO A SAFE DISTANCE.						

## Unusual Fire and Explosion Hazards

DETONATORS WILL EXPLODE WITH VIOLENT RELEASE OF GASES AND DEBRIS  
WHEN SET ON FIRE OR SUBMITTED TO VIOLENT IMPACT OR EXPOSED TO ELECTRIC CURRENT.

**Section V — Reactivity Data**

Stability	Unstable	X	Conditions to Avoid SEVERE IMPACT, FIRE, EXTREME HEAT, ELETROSTATIC DISCHARGE.
	Stable		

Compatibility (Materials to Avoid) NO KNOWN CHEMICAL INCOMPATIBILITIES

Hazardous Decomposition or Byproducts PRODUCE NITROGEN OXIDES WHEN DETONATED

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	

**Section VI — Health Hazard Data**

Route(s) of Entry: Inhalation? n/a Skin? n/a Ingestion? n/a

Health Hazards (Acute and Chronic) n/a

Carcinogenicity: NTP? n/a IARC Monographs? n/a OSHA Regulated? n/a

Signs and Symptoms of Exposure n/a

Medical Conditions Generally Aggravated by Exposure n/a

Emergency and First Aid Procedures IN CASE OF INJURIES SUSTAINED BY DETONATION, SEEK EMERGENCY MEDICAL CARE IMMEDIATELY.

**Section VII — Precautions for Safe Handling and Use**

Steps to Be Taken in Case Material is Released or Spilled REVIEW FIRE AND EXPLOSION SAFETY PROCEDURES BEFORE STARTING CLEANUP OPERATION. WEAR APPROPRIATE PERSONAL PROTECTION CLOTHING.

Waste Disposal Method USE ONLY PROPERLY TRAINED PERSONNEL AND RECOMMENDED PROCEDURES. CONSULT AN EXPLOSIVES MANUFACTURER OR CONSULTANT IN CASE AN EXPERT PERSONNEL IS NOT AVAILABLE.

Precautions to Be Taken in Handling and Storing STORAGE OF DETONATORS MUST COMPLY WITH ATF REGULATIONS. PACKAGING, MARKING AND LABELING OF BOXES MUST COMPLY WITH 49 CFR DEPT. OF TRANSPORTATION

Other Precautions REGULATIONS.

**Section VIII — Control Measures**

Respiratory Protection (Specify Type) n/a

Ventilation	Local Exhaust	n/a	Special	n/a
	Mechanical (General)	n/a	Other	n/a

Protective Gloves n/a Eye Protection n/a

Other Protective Clothing or Equipment n/a

Work/Hygiene Practices n/a

**Material Safety Data Sheet**

May be used to comply with  
OSHA's Hazard Communication Standard,  
29 CFR 1910.1200. Standard must be  
consulted for specific requirements.

**U.S. Department of Labor**

Occupational Safety and Health Administration  
(Non-Mandatory Form)  
Form Approved  
OMB No. 1218-0072



**IDENTITY (As Used on Label and List)**  
Manticord RD15 (80 grain RDX det. cord)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

**Section I - Explo-Industrias Quimicas e Explosivos S**

Manufacturer's Name Explo-Industrias Quimicas eExplosivos S.A.	Emergency Telephone Number (55)(125) 52-18-11
Address (Number, Street, City, State, and ZIP Code) Av. Industria Quimica Mantiqueira, 317	Telephone Number for Information (817) 478-8888
12.600- Lorena S.P.	Date Prepared March 1986
Brazil	Signature of Preparer (optional)

**Section II - Hazardous Ingredients/Identity Information**

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Cyclotrimethylene Trinitramine - RDX, Hexogen-	n/a	1.5mg/m3	n/a	80

**Section III - Physical/Chemical Characteristics**

Boiling Point	n/a	Specific Gravity (H <sub>2</sub> O = 1)	1.7
Vapor Pressure (mm Hg.)	n/a	Melting Point	200 C
Vapor Density (AIR = 1)	n/a	Evaporation Rate (Butyl Acetate = 1)	0%
Solubility in Water	Negligible		
Appearance and Odor	Fuse covered with black nylon containing a core of RDX which is a odorless solid with white/peach color		

**Section IV - Fire and Explosion Hazard Data**

Flash Point (Method Used)	n/a	Flammable Limits	n/a	LEL	n/a	UEL	n/a
Extinguishing Media	Do not try to extinguish the flames- isolate the area and evacuate personnel.						
Special Fire Fighting Procedures	DO NOT FIGHT THE FIRE						

**Unusual Fire and Explosion Hazards**  
It might explode with violent release of gases when submitted to severe impact, extremely high temperature. It will always detonate when primed with a blasting cap.

**Section V — Reactivity Data**

Stability	Unstable	X	Conditions to Avoid Extreme heat, impact and electrostatic discharge
	Stable		

Incompatibility (Materials to Avoid)

No known chemical incompatibilities

Hazardous Decomposition or Byproducts

Produces nitrogen oxides when detonated

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur		
None			

**Section VI — Health Hazard Data**

Route(s) of Entry:	Inhalation?	Skin?	Ingestion?
	n/a	n/a	n/a

Health Hazards (Acute and Chronic)

n/a

Carcinogenicity:	NTP?	IARC Monographs?	OSHA Regulated?
	n/a	n/a	n/a

Signs and Symptoms of Exposure

n/a

Medical Conditions Generally Aggravated by Exposure

none

Emergency and First Aid Procedures

For eye and skin contact it is recommended to flush and wash with water. For accidental ingestion induce vomiting and call a physician.

**Section VII — Precautions for Safe Handling and Use**

Steps to Be Taken in Case Material is Released or Spilled

Review fire and explosion safety procedures before starting the clean up. Wear appropriate personal protection attire.

Waste Disposal Method

Consult an explosives manufacturer for proper guidance. Use properly trained personnel and recommended procedures. In case of emergency call fire dept. or police

Precautions to Be Taken in Handling and Storing

Must comply with ATF (Alcohol, Tobacco and Firearms) regulations for storage and Dept. Of Transportation regulations for packaging and transportation

Other Precautions

Refer to instructions and warning labels and literature provided by the manufacturer.

**Section VIII — Control Measures**

Respiratory Protection (Specify Type)

Filter respirator Niosh certified dust respirator

Ventilation	Local Exhaust	n/a	Special	n/a
	Mechanical (General)	n/a	Other	n/a

Protective Gloves: Butyl gloves      Eye Protection: Goggles

Other Protective Clothing or Equipment

none

Work/Hygiene Practices

n/a



# SLURRY EXPLOSIVE CORPORATION

## T-100 Solid Safety Data

SPORTSMEN PIT ROAD • HALLOWELL • P.O. BOX 348 • COLUMBUS, KS 66725 • (316) 597-2552

### SECTION I - PRODUCT IDENTIFICATION

TRADE NAME: Slurran T-100 Solid  
SYNONYM: Yellow or Green Sticks  
CHEMICAL FAMILY: Ammonium Nitrate  
FORMULA: Mixture  
CAS NUMBER: None  
UN/NA NUMBER: UN1942  
DOT HAZARD CLASS: Oxidizer

### SECTION II - HEALTH ALERT

DANGER - If misused or disposed of improperly material could explode and cause death or serious injury.

DO NOT HANDLE WHEN IN DOUBT

See Section VIII - Personal Protection  
CHEM-TELL, INC. (800) 255-3924

### SECTION III - HEALTH HAZARD INFORMATION

EYE: May cause moderate irritation.

SKIN: May cause moderate irritation characterized by redness and pain.

INHALATION: Inhalation of decomposition products may irritate the respiratory tract. Prolonged exposure to these fumes may result in respiratory difficulties (shortness of breath, etc.) and possible more severe toxic effects.

INGESTION: Swallowing large quantities may cause toxicity characterized by dizziness, bluish skin coloration, methemoglobinemia and unconsciousness, abdominal spasms, nausea, and pain.

### SECTION IV - EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT: Flush with large amounts of water. Seek medical aid.

SKIN CONTACT: Remove contaminated clothing. Wash skin thoroughly with soap and water.

INHALATION: Remove from exposure. If breathing stops or is difficult, administer artificial respiration or oxygen. Seek medical aid.

INGESTION: Give 1-2 large glasses of milk or water. Induce vomiting. Seek medical aid.

### SECTION V - RECOMMENDED OCCUPATIONAL EXPOSURE LIMIT/HAZARDOUS INGREDIENTS

EXPOSURE LIMIT (PRODUCT): None required for product.

HAZARDOUS INGREDIENTS	PERCENT	EXPOSURE LIMIT	PPM	MG/M3
Ammonium Nitrate	195	NONE		
Sodium Nitrate	120	NONE		
Urethane Prepolymer	15	8 hours	0.1	100

### SECTION VI - REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: Heat (confinement); Stacking (burning).

INCOMPATIBILITY: Can react violently or explode, with reducing agents and organic materials. Avoid amines, strong alkalis & acids.

HAZARDOUS REACTION/DECOMPOSITION PRODUCTS: At high temperatures, especially 374 F, may emit severe toxic fumes of nitrogen oxides.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION: Not applicable.

### SECTION VII - FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT & METHOD: NA

AUTOIGNITION TEMPERATURE: EXPLODES

FLAMMABLE LIMITS (% BY VOLUME/AIR): LOWER: NA

UPPER: NA

EXTINGUISHING MEDIA: Water

FIRE-FIGHTING PROCEDURES: When explosive is burning, EVACUATE AREA. Avoid breathing vapor.

FIRE AND EXPLOSION HAZARDS: Dangerous when exposed to heat or flame. Can support combustion of other materials involved in a fire and is capable of undergoing detonation if heated to high temperatures especially under any confinement including being piled on itself in a burning fire. When heated to decomposition, highly toxic fumes may be emitted. Do not return to area of explosion until smoke and fumes have dissipated. Dry alkali or amine salts are explosive.

THE BEST PRODUCT MADE

-----  
SECTION VIII - PERSONAL PROTECTION INFORMATION  
-----

EYE PROTECTION: Safety goggles approved for the handling of explosives materials.

SKIN PROTECTION: Neoprene, natural rubber, polyethylene or polyvinyl chloride gloves. Use barrier creams, hand protection and protective clothing.

RESPIRATORY PROTECTION: Not normally required. Mechanical filter or supplied air type respirator as required for concentrations exceeding the occupational exposure limit.

VENTILATION: Maintain adequate ventilation. Use local exhaust if needed.

-----  
SECTION IX - PERSONAL HANDLING INSTRUCTIONS  
-----

HANDLING: Explosives should not be abandoned at any location for any reason. Do not handle during electrical storms.

STORAGE: Store in a cool, dry, well-ventilated area remote from operations. Storage area should be of non-combustible construction. Organic materials, flammable substances and finely divided metals should be stored separately. Flames, smoking and unauthorized personnel are prohibited where this product is used or store. Protect against physical damage, static electricity and lightning.

WARNING: Use of this product by persons lacking adequate training, experience and supervision may result in death or serious injury.

Obey all federal, state and local laws/regulations applicable to transportation, storage, handling and use of explosives.

DISTANCE: Always stay from area of explosion or disposal sites. Stay behind suitable barriers.

-----  
SECTION X - SPILL AND LEAK PROCEDURES  
-----

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED (IN ADDITION SEE SECTION VIII): Isolate area. Eliminate ALL sources of ignition. Avoid skin contact. Scrape up. Remove soiled clothing.

WASTE DISPOSAL - USE APPROPRIATE METHOD(S): Disposal of unexploded or deteriorated explosives material can be hazardous. Expert assistance is positively recommended in destroying explosives. Accidents can be prevented by thorough planning and handling in accordance with approved methods. Consult your supervisor, or the nearest SEC Regional Office for assistance. If improperly disposed of, material could explode and cause death or serious injury.

In all cases, follow facility emergency response procedures. Contact Facility Environmental Manager for assistance. Report any discharge of oil or hazardous substance that may enter surface waters to the National Response Center (800) 424-8802.

Observe all applicable local, state and federal environmental spill and water quality regulations.

-----  
SECTION XI - PHYSICAL DATA  
-----

BOILING POINT:	NA	BULK DENSITY:	0.91 g/cc
MELTING POINT:	170 C (338 F)	VOLATILE BY VOLUME:	NA
VAPOR PRESSURE:	NA	EVAPORATION RATE (ETHER=1):	NA
VAPOR DENSITY (AIR=1):	NA	VISCOSITY:	NA
SOLUBILITY IN WATER:	110g/100/g H <sub>2</sub> O @ 0 C		
APPEARANCE/ODOR:	Cast white or yellowish-white powder enclosed in plastic container.		

-----  
SECTION XII - COMMENTS  
-----

This product is classified as an oxidizer and need not be stored in a high explosive magazine, except where required by local regulations. Storage should be in a well constructed, well ventilated, dry structure located to conform with local, state and federal regulations.

Normal operating conditions are assumed unless otherwise stated. If any given information is not clear or does not apply to your situation, STOP, store the material suitable, and seek correct help from your supervisors, Institute of Makers of Explosives or Slurry Explosive Corporation. Disposal sites must be clear of people at the time of disposal.

NOTICE: The data and recommendations presented herein are based upon data which are considered to be accurate. However, Slurry makes no guarantee or warranty, either expressed or implied, of the accuracy or completeness of these data.

# SLURRY EXPLOSIVE CORPORATION

# T-100 Liquid Safety Data

SPORTSMEN PIT ROAD • HALLOWELL • P.O. BOX 348 • COLUMBUS, KS 66725 • (316) 597-2552

## SECTION I - PRODUCT IDENTIFICATION

TRADE NAME: Slurran T-100 Liquid  
SYNONYM: Blue to Green explode  
CHEMICAL FAMILY: Nitromethane  
FORMULA: CH<sub>3</sub>NO<sub>2</sub>  
CAS NUMBER: 75-52-5  
UN/NA NUMBER: UN1261  
DOT HAZARD CLASS: Flammable Liquid

## SECTION II - HEALTH ALERT

DANGER - If misused or disposed of improperly material could and cause death or serious injury.

DO NOT HANDLE WHEN IN DOUBT  
\*See Section. VIII - Personal Protection

CHEM-TELL, INC. (800) 255-3924

## SECTION III - HEALTH HAZARD INFORMATION

EYE: May cause moderate irritation.

SKIN: May cause moderate irritation characterized by redness and pain.

INHALATION: Inhalation of decomposition products may irritate the respiratory tract. Prolonged exposure to these fumes may result in respiratory difficulties (shortness of breath, etc.) and possible more severe toxic effects.

INGESTION: Swallowing large quantities may cause toxicity characterized by dizziness, bluish skin coloration, methemoglobinemia and unconsciousness, abdominal spasms, nausea, and pain.

## SECTION IV - EMERGENCY AND FIRST AID PROCEDURES

E CONTACT: Flush with large amounts of water. Seek medical aid.

SKIN CONTACT: Remove contaminated clothing. Wash skin thoroughly with soap and water.

INHALATION: Remove from exposure. If breathing stops or is difficult, administer artificial respiration or oxygen. Seek medical aid.

INGESTION: Give 1-2 large glasses of milk or water. Induce vomiting. Seek medical aid.

## SECTION V - RECOMMENDED OCCUPATIONAL EXPOSURE LIMIT/HAZARDOUS INGREDIENTS

EXPOSURE LIMIT (PRODUCT): None required for product.

HAZARDOUS INGREDIENTS

Nitromethan

PERCENT

Min. 95-100

EXPOSURE LIMIT

8 Hours

PPM

100

MG/M3

## SECTION VI - REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: Heat (confinement); Stacking (burning).

INCOMPATIBILITY: Can react violently or explode, with reducing agents and organic materials. Avoid amines, strong alkalis & acids.

HAZARDOUS REACTION/DECOMPOSITION PRODUCTS: At high temperatures, especially 1374 F, may emit severe toxic fumes of nitrogen oxides.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION: Not applicable.

## SECTION VII - FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT & METHOD: 36 C (96 F) Tag Closed Cup

AUTOIGNITION TEMPERATURE: EXPLODES

FLAMMABLE LIMITS (% BY VOLUME/AIR): LOWER: 7.3

UPPER: NA

EXTINGUISHING MEDIA: Water, Foam, CO<sub>2</sub>

FIRE-FIGHTING PROCEDURES: When explosive is burning, EVACUATE AREA. Avoid breathing vapor.

FIRE AND EXPLOSION HAZARDS: Dangerous when exposed to heat or flame. Can support combustion of other materials involved in a fire and is capable of undergoing detonation if heated to high temperatures especially under any confinement including being piled on itself in a burning fire. When heated to decomposition, highly toxic fumes may be emitted. Do not return to area of explosion until smoke and fumes have dissipated. Dry alkali or amine salts are explosive.

-----  
SECTION VIII - PERSONAL PROTECTION INFORMATION  
-----

EYE PROTECTION: Safety goggles approved for the handling of explosives materials.

SKIN PROTECTION: Neoprene, natural rubber, polyethylene or polyvinyl chloride gloves. Use barrier creams, hand protection and protective clothing.

RESPIRATORY PROTECTION: Not normally required. Mechanical filter or supplied air type respirator as required for concentration exceeding the occupational exposure limit.

VENTILATION: Maintain adequate ventilation. Use local exhaust if needed.

-----  
SECTION IX - PERSONAL HANDLING INSTRUCTIONS  
-----

HANDLING: Explosives should not be abandoned at any location for any reason. Do not handle during electrical storms.

STORAGE: Store in a cool, dry, well-ventilated area remote from operations. Storage area should be of non-combustible construction.

Organic materials, flammable substances and finely divided metals should be stored separately. Flames, smoking and unauthorized personnel are prohibited where this product is used or store. Protect against physical damage, static electricity and lightning.

WARNING: Use of this product by persons lacking adequate training, experience and supervision may result in death or serious injury.

Obey all federal, state and local laws and regulations applicable to transportation, storage, handling and use of explosives.

DISTANCE: Always stay from area of explosion or disposal sites. Stay behind suitable barriers.

-----  
SECTION X - SPILL AND LEAK PROCEDURES  
-----

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED (IN ADDITION SEE SECTION VIII): Isolate area. Eliminate ALL sources of ignition. Avoid skin contact. Scrape up. Remove soiled clothing.

ASTE DISPOSAL - USE APPROPRIATE METHOD(S): Disposal of unexploded or deteriorated explosives material can be hazardous. Expert assistance is positively recommended in destroying explosives. Accidents can be prevented by thorough planning and handling in accordance with approved methods. Consult your supervisor, or the nearest SEC Regional Office for assistance. If improperly disposed of, material could explode and cause death or serious injury.

In all cases, follow facility emergency response procedures. Contact Facility Environmental Manager for assistance. Report any discharge of oil or hazardous substance that may enter surface waters to the National Response Center 800/424-8802.

Observe all applicable local, state and federal environmental spill and water quality regulations.

-----  
SECTION XI - PHYSICAL DATA  
-----

BOILING POINT:	101 C (219 F)	SPECIFIC GRAVITY:	1.13
MELTING POINT:	-28.6 C ±	VOLATILE BY VOLUME:	100
VAPOR PRESSURE:	36.6 mmg @ 25 C	EVAPORATION RATE (N-BUTYLACETATE=100):	139
VAPOR DENSITY (AIR=1):	2.1	VISCOSITY:	0.647 cp @ 20 C
SOLUBILITY IN WATER:	1.8% by wt. @ 20 C	APPEARANCE/ODOR:	Blue to Green Liquid, Aromatic Odor

-----  
SECTION XII - COMMENTS  
-----

This product is classified as a flammable liquid, ltd quantities, and need not be stored in a high explosive magazine, except where required by local regulations. Storage should be in a well constructed, well ventilated, dry structure located to conform with local, state and federal regulations.

Normal operating conditions are assumed unless otherwise stated. If any given information is not clear or does not apply to your situation, STOP, store the material suitable, and seek appropriate help from your supervisor, Institute of Makers of Explosives Corporation. Disposal sites must be clear of people at the time of disposal.

NOTICE: The data and recommendations presented herein are based upon data which are considered to be accurate. However, Slurry makes no guarantee or warranty, either expressed or implied, of the accuracy or completeness of these data and recommendations.

IN CASE OF EMERGENCY INVOLVING THIS SHIPMENT, CONTACT CHEM-TEL, INC. AT 1-800-255-3924 FOR ASSISTANCE.

UNIFORM BILL OF LADING  
- NOT NEGOTIABLE -

SHIPPER NO. 962810

SLURRY EXPLOSIVE CORPORATION

Shipping

Location XG - Columbus, KS

P.O. Box 348

Columbus, KS 66725

Telephone (316) 597-2552

Date 08/02/95

ATF No. 5 KS011206D00212

S	NAME	Ladshaw Explosives, Inc. 2603	S	NAME	Motlow Community College c/o UXB International
O	ADDRESS	P. O. Box 310510	II	ADDRESS	HWY 55
L	CITY	New Braunfels	I	COUNTY	
D	STATE	Texas 78131	P	CITY & STATE	Tulahoma, TN 37388

CUSTOMER PHONE:	CUST. P.O. NO.	DATE SHIPPED	CARRIER
615-393-1575	NB-1608	08/02/95	ABF
FOB:	TRUCK Round Trip Mileage	TRAIL FR #	CUSTOMER ATF NO.:
Hallowell		TRUCK #	N/A N/A

H. M.	Hazardous Material Descriptions and Proper Shipping Names	Hazard Class or Division	Identification Numbers	Packaging Group	Total Quantity Weight or Ea.	No. and Typ of Packages
	Explosive, Blasting, Type E	1.1D	UN0241	II		
	Explosive, Blasting, Type E	1.5D	UN0332	II		
	Explosive, Blasting, Type E	1.5D	UN0332	II		
	Ammonium Nitrate - Fuel Oil Mixture (containing only prilled ammonium nitrate and fuel oil)	1.5D	NA0331	II		
	Boosters, without detonator	1.1D	UN0042	II		
	Cord, Detonating, Flexible	1.1D	UN0065	II		
	Detonators, Electric, For Blasting	1.1B	UN0030	II		
	Detonators, Electric, For Blasting	1.4B	UN0255	II		
	Detonators, Electric, For Blasting	1.4S	UN0456	II		
	Detonator Assemblies, Non-electric, For Blasting	1.1B	UN0360	II		
	Detonator Assemblies, Non-electric, For Blasting	1.4B	UN0361	II		
XX	Ammonium Nitrate, with not more than 0.2 per cent of combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance	5.1	UN1942	III	275 lb.	6 cs.
	Oxidizing substances, solid, poisonous, n.o.s.	5.1	UN3087	III		
XX	Nitromethane	3	UN1261	II	157 lb.	14 cs.
	Articles, Explosive, n.o.s.	1.4S	UN0349	II		

SPECIAL INSTRUCTIONS: MSDS PROVIDED

Received By



# WD-40



## MATERIAL SAFETY DATA SHEET

### I. PRODUCT IDENTIFICATION

<b>Manufacturer:</b> WD-40 Company <b>Address:</b> 1061 Cudahy Place (92110) P.O. Box 80607 San Diego, California 92138-9021	<b>Telephone:</b> <b>Emergency Only:</b> 1 (800) 424-9300 (CHEMTREC) (619) 275-1400 <b>Information:</b> <b>Chemical Name:</b> Organic Mixture <b>Trade Name:</b> WD-40 Aerosol
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### II. HAZARDOUS INGREDIENTS

Chemical Name	CAS Number	%	Exposure Limit ACGIH/OSHA
Aliphatic Petroleum Distillates	8052-41-3	50	100 ppm (PEL)
A-70 Hydrocarbon Propellant	68476-85-7	25	1000 ppm (PEL)
Petroleum Base Oil	64742-65-0	> 15	5 mg/M <sup>3</sup> (TWA)
Non-hazardous Ingredients		< 10	

### III. PHYSICAL DATA

<b>Boiling Point:</b>	NA	<b>Evaporation Rate:</b>	Not determined
<b>Vapor Density (air = 1):</b>	Greater than 1	<b>Vapor Pressure:</b>	55±5 PSI @ 70°F
<b>Solubility in Water:</b>	Insoluble	<b>Appearance:</b>	Light amber
<b>Specific Gravity (H<sub>2</sub>O = 1):</b>	.710 @ 70°F	<b>Odor:</b>	Characteristic odor
<b>Percent Volatile (volume):</b>	80%		

### IV. FIRE AND EXPLOSION

<b>Flash Point:</b>	NA to aerosol cans
<b>Flammable Limits:</b>	(propellant portion) [Le] 1.8% [Uel] 9.5%
<b>Extinguishing Media:</b>	CO <sub>2</sub> , Dry Chemical, Foam
<b>Special Fire Fighting Procedures:</b>	None
<b>Unusual Fire and Explosion Hazards:</b>	Considered "extremely flammable" under Consumer Product Safety Commission regulations.

### V. HEALTH HAZARD / ROUTE(S) OF ENTRY

<b>Threshold Limit Value</b>	
Aliphatic Petroleum Distillates (Stoddard solvent) lowest TLV (ACGIH 100 ppm.)	
<b>Symptoms of Overexposure</b>	
<b>Inhalation (Breathing):</b>	May cause anesthesia, headache, dizziness, nausea and upper respiratory irritation.
<b>Skin Contact:</b>	May cause drying of skin and or irritation.
<b>Eye Contact:</b>	May cause irritation, tearing and redness.
<b>Ingestion (Swallowed):</b>	May cause irritation, nausea, vomiting and diarrhea.
<b>First Aid Emergency Procedures</b>	
<b>Ingestion (Swallowed):</b>	Do not induce vomiting, seek medical attention.
<b>Eye Contact:</b>	Immediately flush eyes with large amounts of water for 15 minutes.
<b>Skin Contact:</b>	Wash with soap and water.
<b>Inhalation (Breathing):</b>	Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.
<b>DANGER!</b>	
<b>Aspiration Hazard:</b>	If swallowed can enter lungs and may cause chemical pneumonitis. Do not induce vomiting. Call Physician immediately.
<b>Suspected Cancer Agent</b>	
Yes _____ No <u>X</u>	The components in this mixture have been found to be noncarcinogenic by NTP, IARC and OSHA.

## VI. REACTIVITY DATA

Stability:	Stable <u>X</u>	Unstable _____
Conditions to avoid:	NA	
Incompatibility:	Strong oxidizing materials	
Hazardous decomposition products:	Thermal decomposition may yield carbon monoxide and/or carbon dioxide. <u>S</u>	
Hazardous polymerization:	May occur _____	Will not occur <u>X</u>

## VII. SPILL OR LEAK PROCEDURES

### Spill Response Procedures

Spill unlikely from aerosol cans. Leaking cans should be placed in plastic bag or open pail until pressure has dissipated.

### Waste Disposal Method

Empty aerosol cans should not be punctured or incinerated; bury in land fill. Liquid should be incinerated or buried in land fill. Dispose of in accordance with local, state and federal regulations.

## VIII. SPECIAL HANDLING INFORMATION

Ventilation:	Sufficient to keep solvent vapor less than TLV.
Respiratory Protection:	Advised when concentrations exceed TLV.
Protective Gloves:	Advised to prevent possible skin irritation.
Eye Protection:	Approved eye protection to safeguard against potential eye contact, irritation or injury.
Other Protective Equipment:	None required.

## IX. SPECIAL PRECAUTIONS

Keep from sources of ignition, do not take internally. Avoid excessive inhalation of spray particles. Do not puncture, incinerate or store container above 120°F. Keep from children.

## X. TRANSPORTATION DATA

<b>Domestic Surface</b>	
Description:	Consumer Commodity
Hazard Class:	ORM-D
ID No.:	NONE
Label Required:	Consumer Commodity (ORM-D)
<b>Domestic Air</b>	
Description:	Consumer Commodity (Flammable Gas-Aerosol products)
Hazard Class:	ORM-D
ID No.:	NONE
Label Required:	Consumer Commodity (ORM-D-AIR)

SIGNATURE: R. Miles 

TITLE: Technical Director

REVISION DATE: March 1990

SUPERSEDES: January 1989

NA = Not applicable

NDA = No data available

< = Less than

> = More than

DETA

**DU PONT****MATERIAL SAFETY DATA SHEET****PRODUCT IDENTIFICATION**

NAME : DETAFLEX\* PRODUCTS

DETA

TRADE NAMES AND SYNONYMS :

DETAPRIME\* BOOSTERS: UF-4, UF, UAL, UA-4, UA-6, EB-6, EB-18  
WG, GA, S

DETAFLX\*

DETA SHEET\*

\*Du Pont Trademarks

MANUFACTURER/DISTRIBUTOR : E.I. du Pont de Nemours & Co., Inc.  
1007 Market Street  
Wilmington, DE 19898

PRODUCT INFORMATION PHONE : 1-800-441-7515

MEDICAL EMERGENCY PHONE : 1-800-441-3537

TRANSPORTATION EMERGENCY PHONE : CHEMTREC 1-800-424-9300

**PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES**

THE PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES IS A RESULT OF CAREFULLY PLANNING AND OBSERVANCE OF THE BEST KNOWN PRACTICES. THE EXPLOSIVES USER MUST REMEMBER THAT HE IS DEALING WITH A POWERFUL FORCE AND THAT VARIOUS DEVICES AND METHODS HAVE BEEN DEVELOPED TO ASSIST HIM IN DIRECTING THIS FORCE. HE SHOULD REALIZE THAT THIS FORCE, IF MISDIRECTED, MAY EITHER KILL OR INJURE BOTH HIM AND HIS FELLOW WORKERS.

**WARNING**

ALL EXPLOSIVES ARE DANGEROUS AND MUST BE CAREFULLY HANDLED AND USED FOLLOWING APPROVED SAFETY PROCEDURES EITHER BY OR UNDER THE DIRECTION OF COMPETENT, EXPERIENCED PERSONS IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS, REGULATIONS AND ORDINANCES. IF, AFTER CAREFULLY READING THE ENTIRE LEAFLET(S) "DO'S AND DON'TS" INSTRUCTIONS AND WARNINGS INSERTED IN EACH CASE OF THESE PRODUCTS, YOU HAVE ANY QUESTIONS OR DOUBTS AS TO HOW TO USE ANY EXPLOSIVE PRODUCT, DO NOT USE IT BEFORE CONSULTING YOUR SUPERVISOR, OR THE MANUFACTURER IF YOU DO NOT HAVE A SUPERVISOR. IF YOUR SUPERVISOR HAS ANY QUESTIONS OR DOUBTS, HE SHOULD CONSULT THE MANUFACTURER BEFORE USE. SEE "ADDITIONAL INFORMATION AND REFERENCES" BELOW.

\*\*\*\*\*  
**HAZARDOUS COMPONENTS****CHEMICAL****CAS NUMBER**

Pentaerythritol Tetranitrate

78-11-5

Acetyl Tributyl Citrate

77-90-7

Nitrocellulose

9004-70-0  
\*\*\*\*\*



DU PONT - DETA

**PHYSICAL DATA**

Specific Gravity : ~1.51 at 20 deg C  
Solubility in H<sub>2</sub>O : Insoluble  
Odor : Odorless  
Form : sheet, cord, tube  
Color : Red, white, or green  
Rubber-like consistency.

**HAZARDOUS REACTIVITY**

INSTABILITY : Unstable with heat. Unstable with shock. Unstable with static charges.  
INCOMPATIBILITY : Incompatible with acids, alkalies, oxidants.  
DECOMPOSITION : Decomposes with heat. Decomposes with shock.  
POLYMERIZATION : Polymerization will not occur.

**FIRE AND EXPLOSION DATA**

DETAPRINE: Thermal Stability, 24 hrs, 200 degF; DETAFLEX: Thermal Stability, 24 hrs, 250 degF.

**FIRE AND EXPLOSION HAZARDS**

Class A Explosive (DOT). Will detonate if suitably primed, with severe impact, or by heat or flame. Hazardous gases produced in fire are nitrogen oxides.

**EXTINGUISHING MEDIA**

None.

**SPECIAL FIRE FIGHTING INSTRUCTIONS**

Do not fight fire. Isolate area. Evacuate personnel to a safe area. Guard against intruders.

**HEALTH HAZARD INFORMATION****PRINCIPAL HEALTH HAZARDS**

DETAFLEX PRODUCTS are Class A Explosives and detonation may cause severe physical injury, including death. The products have not been tested for toxicity, but because of their physical state, exposure to the toxic effects of the components is unlikely. Based on the known toxicity of the components, anticipated health effects from excessive inhalation, skin or eye contact, or ingestion may include a drop in blood pressure, decreased weight and diarrhea.

Nitrogen oxides generated during detonation are skin, eye and respiratory system irritants. Systemic toxicity resulting from oxidation of lung tissue includes emphysema, bronchitis and bronchopneumonia. Acute exposure can lead to death from asphyxia or pulmonary edema. In animals, nitrogen oxide caused methemoglobinemia, was not carcinogenic, but caused embryotoxicity and reproductive effects.

**CARCINOGENICITY**

NONE OF THE COMPONENT(S) OF THIS MATERIAL IS LISTED AS A CARCINOGEN BY NTP, IARC, OR OSHA.

**SPILL, LEAK, OR RELEASE**

Review FIRE AND EXPLOSION HAZARDS and SAFETY PRECAUTIONS before proceeding with clean up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean up.

Remove source of heat, sparks, flame, impact, friction or electricity. Recover undamaged and minimally contaminated material for reuse or reclamation. Pick up by hand for disposal. Do not use power equipment. Control access to area. Use nonsparking tools.

**WASTE DISPOSAL**

Recover for reclamation. Do not burn. Consult an explosives manufacturer for recommended methods of destroying explosive materials. Comply with

**SECTION IV - FIRE AND EXPLOSION HAZARD DATA**

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Flash Point: N/A

Flammable Limits: N/A

Extinguishing Media: None

**Special Fire Fighting Procedures:** Do not fight fires involving explosive materials. Evacuate personnel to predetermined safe location.

**Unusual Fire and Explosion Hazards:** Can explode under fire conditions. Burning material may produce toxic vapors.

**SECTION V - HEALTH HAZARD DATA****Effects of Overexposure**

**Eyes:** No exposure to chemical hazards anticipated with normal handling procedures.

**Skin:** No exposure to chemical hazards anticipated with normal handling procedures.

**Ingestion:** No exposure to chemical hazards anticipated with normal handling procedures.

**Inhalation:** Avoid breathing the fumes from detonation.

**Systemic or Other Effects:** Accidental detonation of an explosive device can cause lacerations, punctures and/or traumatic injury. Severity of injuries is dependent on the number and the proximity of the detonations.

**Emergency and First Aid Procedures**

**Eyes:** Seek medical attention.

**Skin:** Seek medical attention.

**Ingestion:** Seek medical attention.

**Inhalation:** If detonation fumes are inhaled, remove to fresh air. If breathing stops, give artificial respiration.

**Special Considerations:** N/A

**SECTION VI - REACTIVITY DATA**

**Stability:** Stable under normal conditions, may explode when subjected to fire, supersonic shock, or high energy projectile impact especially when confined or in large quantities.

**Conditions to Avoid:** Keep away from heat, flame, ignition sources, strong shock, and electrical impulse. Do not attempt to disassemble.

**Materials to Avoid (Incompatibility):** Corrosives

**Hazardous Decomposition Products:** As a result of detonation only: N<sub>2</sub>, CO, H<sub>2</sub>O, NO<sub>x</sub>, Pb and various oxides and complex oxides of metals.

**Hazardous Polymerization:** Will not occur.

## SECTION VII - SPILL OR LEAK PROCEDURES

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**Steps to be taken in Case Material is Released or Spilled:** In case of fire evacuate area not less than 2500 feet from all ignition sources. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, repackage devices in original packaging, accounting for every device. Follow applicable Federal, State, and local spill reporting requirements.

**Waste Disposal Method:** Dispose of in accordance with Federal, State, and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR part 261.

## SECTION VIII - SPECIAL PROTECTION INFORMATION

**Ventilation:** Not required for normal handling.

**Respiratory Protection:** None normally required. Avoid breathing fumes from detonation.

**Protective Clothing:** Cotton clothing suggested.

**Eye Protection:** Safety glasses suggested.

**Other Precautions Required:** N/A

## SECTION IX - SPECIAL PRECAUTIONS

**Precautions to be taken in handling and storage:** Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources, and strong shock.

**Other Precautions:** It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

## SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

<u>Chemical Name</u>	<u>CAS Number</u>	<u>% By Weight</u>
Barium Chromate	10294-40-3	1.2

### **DYNO NOBEL INC Disclaimer**

The statements contained herein are offered for information purposes only and are intended only for persons having related technical skills. Because conditions and manner of use are outside our control, it is the user's responsibility to determine the conditions of safe use of the product. While the information is believed to be correct, IRECO Incorporated shall in no event be responsible for any damages whatsoever, directly or indirectly, resulting from the publication or use of or reliance upon data contained herein. No warranty, either expressed or implied, of merchantability, or fitness, of any nature with respect to the product, or to the data, is made herein.

## DISPOSAL INFORMATION - CONTINUED

applicable Federal Regulations under the authority of the Resource Conservation and Recovery Act (40 CFR, parts 260-271).

\*\*\*\*\*  
 SHIPPING INFORMATION

## DOMESTIC OTHER THAN AIR (DOT)

Shipping Name : High Explosive  
 Hazard Class : Class A Explosive  
 UN/NA no. : UN: 0084  
 DOT Label(s) : EXPLOSIVE A  
 DOT Placard : EXPLOSIVES A

## INTERNATIONAL WATER OR AIR (IMO/ICAO)

Shipping Name : IMO: Explosives, Blasting Type D  
 Hazard Class : 1.10  
 UN no. : 0084  
 IMO/ICAO Label : EXPLOSIVE  
 Special Information : IATA/ICAO: EXPLOSIVES, BLASTING, TYPE D; FORBIDDEN

\*\*\*\*\*  
 STORAGE CONDITIONS

Store in well ventilated area. Store in cool place. Do not store with other explosives. Store in accordance with National Fire Protection Assn regulations. Store in accordance with Federal Regulations. Do not store or consume food, drink, or tobacco in areas where they may become contaminated with this material. Store in approved type magazine.

\*\*\*\*\*

IT IS OBVIOUSLY IMPOSSIBLE TO INCLUDE WARNINGS OR APPROVED METHODS FOR EVERY CONCEIVABLE SITUATION. A LIST OF SUGGESTIONS TO AID IN AVOIDING THE MORE COMMON CAUSES OF ACCIDENTS IS SET FORTH IN THE "DO'S AND DON'TS" INSTRUCTIONS AND WARNINGS INCLUDED AS CASE INSERTS WITH THE PRODUCT. ADDITIONAL INFORMATION IS AVAILABLE IN THE BLASTERS' HANDBOOK, PUBLISHED BY E. I. DU PONT DE NEMOURS AND COMPANY, ORDNANCE SAFETY MANUAL, PUBLISHED BY THE U. S. ARMY ORDNANCE DEPARTMENT, AND IN THE INSTITUTE OF MAKERS OF EXPLOSIVES SAFETY LIBRARY PUBLICATIONS LISTED BELOW. COPIES OF THESE IME PUBLICATIONS MAY BE OBTAINED BY WRITING THE INSTITUTE OF MAKERS OF EXPLOSIVES, 1575 EYE STREET, N. W., SUITE 550, WASHINGTON, D. C. 20005, OR FROM YOUR EXPLOSIVES SUPPLIER: CONSTRUCTION GUIDE FOR STORAGE MAGAZINES (NO. 1); AMERICAN TABLE OF DISTANCES (NO. 2); SUGGESTED CODE OF REGULATIONS FOR THE MANUFACTURE, TRANSPORTATION, STORAGE, SALE, POSSESSION, AND USE OF EXPLOSIVES AND BLASTING MATERIALS (NO. 3); SAFETY GUIDE FOR THE STORAGE, HANDLING AND USE OF EXPLOSIVES MATERIALS (NO. 17); SAFETY GUIDE FOR THE PREVENTION OF RADIO FREQUENCY RADIATION HAZARDS (NO. 20); IME DESTRUCTION OF COMMERCIAL EXPLOSIVES (NO. 21); IME STANDARD FOR THE SAFE TRANSPORTATION OF CLASS C COMMERCIAL DETONATORS (BLASTING CAPS) IN A VEHICLE WITH OTHER CERTAIN EXPLOSIVES (NO. 22).

Date of latest Revision : 02-Nov-85

Person Responsible for MSDS : Product Manager, EP. F & FF

Address : E. I. Du Pont de Nemours & Co., Inc.

Wilmington, DE 19898

Telephone : 302-774-3120



**DYNO**

Dyno Nobel Inc

MATERIAL SAFETY DATA SHEET  
 DYNO NOBEL INC  
 11TH FLOOR CROSSROADS TOWER  
 SALT LAKE CITY, UTAH 84144  
 801-384-4800 TELEX 388353  
 FOR 24 HOUR EMERGENCY CALL 800-424-9300

MSDS# 1076

DATE: 07/20/83

Supersedes MSDS  
 1076 04/14/93

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): Electric Super. LP, SP, Coal, Seismic  
 INSTADET  
 IREDET\* Super\* Coal, Instant, Gas, SP, LP  
 TRONA  
 VIBRODET

Product Class: Commercial Electric Detonators and Accessory Products

Product Appearance & Odor: Metal cylinder with varying length and diameter of attached plastic tubing.

DOT Hazard Shipping Description: Detonators, Electric (1.1B UN0030) or (1.4B UN0255) (1)

SECTION II - HAZARDOUS INGREDIENTS

Ingredients:	CAS#	MAXIMUM %	TLV-ACGIH
Galena	7440-33-7	.47	
Barium Chromate	10294-40-3	1.2	0.1 mg (Cr <sub>2</sub> O <sub>3</sub> )/m <sup>3</sup>
Ottawa Silica	7631-88-9	.07	0.5 mg (Ba)/m <sup>3</sup>
Lead Dioxide	1309-60-9	<.1	0.05 mg (Pb)/m <sup>3</sup>
Pentaerythritol Tetranitrate (PETN)	78-11-5	3.7	No Value Established
Boron	7440-42-8	.21	No Value Established
Potassium Perchlorate	7778-74-7	.50	No Value Established
DDNP (Diazodinitrophenol)*	4882-03-5	.26-1.3	No Value Established
Nitrocellulose	9004-70-0	<.1	No Value Established

\*1.3 found in Instadet and Vibrodet only.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations.

SECTION III - PHYSICAL DATA

Boiling Point: N/A

Vapor Pressure: N/A

Vapor Density: N/A

Density: N/A

Percent Volatile by Volume: N/A

Solubility in Water: N/A

Evaporation Rate (Butyl Acetate = 1): N/A

N/A = Not Applicable or Not Available.

**SSHP APPROVAL**

Project: **Camp Croft**

Site: **Former Camp Croft  
Army Training  
Facility**

Project Number:                     

Site Location:  
**Spartanburg, South  
Carolina**

We have reviewed the attached SSHP for the referenced site. We recognize that when this form is completed, the attached SSHP is approved for field activities on the referenced site. Changes to this SSHP will be documented in writing.

Prepared by:  
F. Johnson, Project Manager, UXB

Date:

Reviewed by:  
\_\_\_\_\_

Date:



**APPENDIX F**

**OE DEMOLITION/DISPOSAL SOPs**



## **1.0 INTRODUCTION**

**1.1** Experience and ongoing training programs have proven to be the best management tool for disposal operations. Every effort must be focused on personal and team performance and training. Adherence to policies and procedures will greatly enhance the overall success of any demolition task and will ensure the safety of all personnel involved. It is the responsibility of all personnel to follow this Standard Operating Procedure (SOP) and to bring to the attention of management personnel, any shortcomings that could jeopardize any facet of the project.

**1.2** This SOP will be followed by all UXB personnel engaged in explosive disposal operations. However, situations may exist that will warrant additional safety measures, such as fire trucks, medical personnel, and protective clothing. The Senior UXO Supervisor has the overall responsibility to comply with the minimum requirements and upgrade the requirements as needed. These will then be forwarded to the Parsons Site Manager for approval.

**1.3** The purpose of this SOP is to provide guidelines for the disposal of ordnance and explosives (OE) recovered during this project.

## **2.0 DEMOLITION RESPONSIBILITIES**

### **2.1 SENIOR UXO SUPERVISOR**

The Senior UXO Supervisor is responsible for complete assurance of adequate housekeeping at all times and will visit the location periodically to see that operations are carried out in a safe, efficient, and economical manner.

### **2.2 UXO SUPERVISOR/DISPOSAL TEAM LEADER**

All disposal activities will be under the direct control of an experienced and trained UXO supervisor that is familiar with and charged with the responsibility for all activities within the disposal area. The team leader is responsible for ensuring all operators are thoroughly familiar with the nature of the materials handled, the hazards involved, and the applicable precautions. The team leader will be present during all disposal operations.

### **2.3 SITE SAFETY OFFICER (SSO)**

The Site Safety Officer (SSO) is responsible for ensuring that safe disposal operations are being conducted and that all personnel are trained in the materials and equipment being used. The SSO will conduct periodic safety audits of the disposal team (demolition team) and assist them, as necessary.

### **3.0 GENERAL SAFETY PRECAUTIONS**

**3.1** This SOP will be maintained by the team leader and available to all personnel on request. There will be no deviation or change from this SOP without prior approval of the Senior UXO Supervisor and the SSO. Any conditions or circumstances that are identified and not covered within this SOP will be immediately reported to the team leader for necessary action. Each operator must read and be thoroughly familiar with this SOP to ensure that all general safety regulations and safe work practices are observed. All personnel assigned to disposal operations are required to read and adhere to the requirements contained in this SOP.

**3.2** The explosive limits within the boundaries of the former Camp Croft Army Training Facility have not been established. The explosive limit must be based on the net explosive weight of the OE being destroyed and its proximity to inhabited buildings, utilities (above and below ground), public access areas, livestock, and environmental interest. Explosive detonations shall not exceed 10 lbs net explosive weight without approval of the CEHNC Safety Specialist.

**3.3** In the event of an electrical storm, all disposal operations will immediately cease.

**3.4** In the event of a fire, extinguish it with available equipment if possible; if unable to do so, notify the City of Spartanburg Fire Department and evacuate the area. Fires involving explosives/munitions/UXOs will not be fought. Personnel will evacuate the area at least 1,250 feet and seek frontal and overhead protection until the all clear is issued by the Parsons ES Site Manager.

**3.5** All safety regulations applicable to materials involved will be complied with.

**3.6** Methods of demolition will be in accordance with this SOP and approved changes thereto.

**3.7** Adequate fire protection and first aid equipment will be provided at all times.

**3.8** Care will be taken to limit exposure to a minimum number of personnel, consistent with safe and efficient operations.

**3.9** Work locations will be maintained in a neat and orderly condition.

**3.10** All hand tools shall be maintained in a good state of repair.

**3.11** Equipment and/or vehicle operators will have in their possession a valid drivers license.

**3.12** Personnel will wash face and hands after handling explosives prior to eating, smoking, or drinking.

#### **4.0 EXPLOSIVE DISPOSAL SAFETY PRECAUTIONS**

**4.1** If practical and observable, a red warning flag will be displayed at the disposal area, and the area will be secured prior to demolition activities. If emergency personnel are summoned, they will be escorted into the area.

**4.2** An observer will be stationed at each corner of the disposal area, outside the fragmentation/blast zone, where there is a good view of the air and land approaches to the disposal area prior to any detonations. It will be the responsibility of the observers to alert the supervisor if any aircraft, vehicles, or personnel are sighted approaching the general demolition area.

**4.3** Two-way RF transmitters will be operated as stipulated in TM9-1375-213-12, Table 2.3, during all disposal operations.

**4.4** An area 10 feet (ft) in diameter will be cleared of dry grass, leaves, and other extraneous combustible materials around the demolition area, if possible.

**4.5** No demolition activities will be conducted if there is less than a 1,000 ft ceiling and/or if wind velocity is in excess of 20 miles per hour (mph).

## **5.0 VEHICLE SAFETY PRECAUTIONS**

**5.1** No more than two persons will ride in a vehicle transporting explosives. If explosives are being transported in an open bed truck or trailer bed, no person is allowed to ride in the bed.

**5.2** Vehicles will not be refueled when carrying explosives. Vehicles must be at least 100 ft from magazines or trailers containing explosives before refueling.

**5.3** Vehicles transporting explosives will be broom cleaned of visible explosive residue before releasing the vehicles for other duties.

## 6.0 SPECIAL SAFETY REQUIREMENTS FOR DISPOSAL ACTIVITIES

6.1 Explosives safety precautions (Appendix C of this WP) will be adhered to at all times.

6.2 Fragmentation zones will be calculated in accordance with EODB 60A-1-1-4. This publication shall be included as part of the basic reference material on site.

6.3 OE to be destroyed by detonation will be covered with not less than 3 ft of sand/soil, if possible. The disposal charges will be placed in contact with the item(s) to be detonated and secured in place by tape or earth packed over the charges.

6.4 Special requirements for using electric detonators and electric blasting circuits are as follows:

1. Electric detonators and electric blasting circuits may be energized to dangerous levels from outside sources such as static electricity, induced electric currents, and radio communication equipment. Safety precautions will be taken to reduce the possibility of a premature detonation of the electric detonator and explosive charges. Radios will not be operated during test of blasting caps, when disposal area is primed or during the priming process.
2. Care should be taken to remove all existing commercial radio and electrical hazards prior to the priming process.
3. The shunt will not be removed from the leg wires of the detonator until the moment of checking the circuit.

*NOTE: When testing the detonator, prior to connecting the detonator to the firing circuit, the lead wires of the detonator must be short circuited by twisting the bare ends of the wires together immediately after testing. The wires will remain short circuited until time to connect them to the firing circuit.*

4. When uncoiling/unwinding the leg wires of the electrical detonator, keep the detonator (explosive end) pointing away from the body and away from other personnel. Hold the detonator lead wires approximately 1 inch from the detonator body. Straighten the leg wires by hand, and do not throw or wave the wires through the air to loosen the coil.
5. At the power source end of the blasting circuit, the ends of the firing wires will be shorted or twisted together at all times, except when actually firing the charge or testing the circuit. The connection between the detonator and the circuit firing wires must not be made unless the power end of the firing wires are shorted.
6. Blasting or demolition operations will not be conducted during an electrical storm or when a storm is approaching. All operations will be suspended, detonator wires and firing wires will be short-circuited, all personnel will leave the disposal area and evacuate to a safe location.
7. Prior to making connections to the blasting machine, the firing circuit will be tested with a galvanometer for electrical continuity and ohmic resistance to ensure the blasting machine has the capacity to initiate the shot. The individual assigned to make the connections will not complete the circuit at the blasting machine and will not give the signal for detonation until satisfied that all personnel in the vicinity have been evacuated to a safe distance. When used, the blasting machine or its actuating device will be in the blaster's possession at all times.

**6.5** All weather information will be obtained from the U.S. Weather Service.

Windspeed and wind direction will be logged in before the start of the daily operations.

If any changes in the weather are noticed, an update will be obtained.

**6.6** A minimum of 30 seconds will be maintained between each detonation.



**6.7** On completion of disposal activities at the end of the project, surface exposed scrap metal, casings, fragments, and related items will be recovered from the disposal area and disposed of in accordance with contracted procedures. All scrap metal and debris will be inspected for explosive residue and certified inert by the SSO.

**6.8** When operating in accordance with the conditions of this procedure, the disposal operations should not present a noise problem to the surrounding community. However, if a noise complaint is received, the name, address, and phone number of the complainant should be recorded and reported to the Senior UXO Supervisor, who in turn, will report it to CEHNC. Every effort will be made to control noise.

**6.9** Materials generated from the disposal operation (i.e., packaging materials) must be disposed of in accordance with all applicable property disposal and environmental procedures.

**6.10** On completion of the project, the disturbed ground surface will be thoroughly inspected for OE. The site will be filled and leveled to inhibit erosion.

## **7.0 METEOROLOGICAL CONDITIONS**

**7.1** Disposal operations will not be conducted during electrical storms or thunderstorms.

**7.2** Disposal operations will be restricted to periods when surface windspeed is less than 20 mph.

**7.3** Disposal operations will not be conducted during periods of reduced visibility (full and unrestricted view of disposal area) caused by, but not limited to rain, dense fog, blowing snow, sand, or dust storms.

**7.4** Disposal operations will not be carried out on extremely cloudy days, which are defined as overcast days (more than 90 percent cloud cover) or a ceiling of less than 1,000 ft.

**7.5** Demolition operations will not be initiated until at least ½ hour after sunrise and will be concluded by at least ½ hour before sunset.

**7.6** Disposal operations will not be conducted during heavy inversion conditions. If any weather condition is not acceptable, operations will be postponed.

**7.7** The disposal team leader will ensure that the Daily Activities Log and the Ordnance Accountability Log are properly filled out for each day of operations.

**7.8** No disposal operation will be left unattended.

## **8.0 PRE-DEMOLITION/DISPOSAL PROCEDURES**

The success of any operation is dependent on a thorough briefing, covering all phases of the task.

### **8.1 TEAMLEADER BRIEFING**

Prior to each day of activities, UXO Supervisor will brief all personnel involved in explosive disposal operations in the following areas and assign specific tasks to individuals:

1. Type of OE being destroyed,
2. Type of counter charge or explosive being used,
3. Placement and quantity of counter charge,
4. Method of initiation (electric or non electric),
5. Means of transporting and packaging explosives,
6. Route to the disposal site,
7. Equipment being used to effect detonation,
8. Misfire procedures, and
9. Post shot clean up of area.

### **8.2 DAILY SAFETY BRIEFING**

The SSO will conduct a daily safety brief for all personnel involved in explosive disposal operations in the following areas:

1. Care and handling of explosive materials,
2. Personal hygiene,
3. Two-man rule,
4. Potential trip/fall hazards,
5. Horse play,
6. Remain alert for any explosive hazards,
7. Location of emergency shelter (if available),

8. Parking area for vehicles (vehicles must be positioned for immediate departure with engines running),
9. Wind direction (toxic fumes),
10. Location of first aid kit and fire extinguisher(s),
11. Route to nearest hospital or emergency aid station,
12. Type of communications in event of an emergency, and
13. Storage location of counter charges and detonators.

### **8.3 PERSONNEL ASSIGNMENTS**

The following specific tasks will be assigned to the disposal team and completed prior to completing disposal activities. These tasks may or may not have to be accomplished for each shot. It is the responsibility of the disposal team leader to ensure that all tasks are performed.

1. Contact local police, fire department, and Federal Aviation Administration (FAA), as required;
2. Contact hospital/emergency response personnel;
3. Secure all access roads and paths to the disposal area;
4. Visually check area for any unauthorized personnel;
5. Check firing wire for continuity and shunt;
6. Prepare designated area, as required;
7. Check continuity of detonators;
8. Designate technician to maintain custody of blasting machine or fuze igniters;
9. Secure detonators in a safe location; and
10. Place counter charge in desired location on OE.

### **8.4 PREPARING EXPLOSIVE CHARGE FOR INITIATION**

1. Ensure firing wire is shunted;
2. Connect detonator to the firing wire;
3. Isolate or insulate all connections;
4. Prime the counter charge (place detonator in counter charge);

5. Depart to firing point and conduct head count (if using non-electric firing system, obtain head count, yell "**Fire in the Hole**" three times using bull horn, pull igniters and depart to designated safe area);
6. Take cover; (if using electric firing system) connect firing wires to blasting machine and initiate charge; and
7. Remain in designated safe area until the team leader announces "**All Clear.**"

## 9.0 POST DEMOLITION/DISPOSAL PROCEDURES

Do not approach a smoking hole or allow personnel out of the designated safe area until cleared to do so. The Senior UXO Supervisor will give the clear signal.

1. After the "**All Clear**" signal, check area for low orders or kickouts;
2. Backfill hole as necessary; and
3. Police all equipment.

## **10.0 MISFIRE PROCEDURES**

A thorough check of all equipment, firing wire, and detonators will prevent most misfire situations.

### **10.1 ELECTRIC MISFIRES**

To prevent electric misfires, require one technician to be responsible for all electrical wiring in the circuit. If a misfire does occur, it must be cleared with extreme caution. The technician that is most familiar with the circuit is the logical choice to investigate and correct the situation.

1. Check blasting machine connections and make a second attempt to initiate charge;
2. If unsuccessful, disconnect firing wire and connect to another blasting machine (if available) and attempt to initiate charge;
3. If unsuccessful, disconnect the firing wire from the blasting machine shunt and commence a 30-minute wait period;
4. After the wait period has expired, a designated technician will proceed down range to inspect the firing system; a safety observer must watch from a protected area;
5. Disconnect and shunt the detonator leg wires, connect a new detonator to the firing circuit and prime the charge without disturbing the original detonator; and
6. Follow normal procedures for effecting initiation of the charge.

## **11.0 RECORD KEEPING REQUIREMENT**

**11.1** The disposal site team leader will ensure that accurate accountability of all OE disposed of is completed and that an inventory record of all explosives used as disposal charges is maintained.

**11.2** The Senior UXO Supervisor will monitor the entries in the log for completeness, accuracy, and compliance with meteorological conditions.

**11.3** The disposal team leader will enter all data in the Ordnance Accountability Log. The quantities recovered should be equal to the quantities destroyed. An accurate accountability of explosives expended for disposal operations will be maintained.

**11.4** UXO subcontractor will retain a permanent file of all disposal records, including permits, magazine data cards, training records, inspector reports, waste manifests, if applicable, and operating logs.



## **12.0 STORAGE AND TRANSPORT OF EXPLOSIVES**

### **12.1 STORAGE AREA**

All explosives and detonators will be stored in approved explosive magazines located in a secure area, in an approved storage configuration. The proposed location of the magazine storage area is depicted on Figure 3-2 in Section 3 of the Parsons ES work plan. No explosives will be picked up prior to sunrise. All unused explosives will be returned to storage prior to sunset. The storage bunkers will remain double locked at all times. No single individual will have access to both keys. The Senior UXO Supervisor and a designated UXO Supervisor will retain keys within their possession. This procedure will ensure that two man control of all explosives is maintained. The contractor shall provide the storage area location in the WP and on a site map prior to mobilization.

### **12.2 TRANSPORT**

Explosives will be transported to the disposal areas via a pickup truck or similar vehicle containing a first-aid kit, fire extinguisher, and non-sparking wood or vinyl lined truck bed; or the explosives will be placed in a wood or plastic container.

### **13.0 EMERGENCIES**

**13.1** All emergency facilities including fire support can be reached via telephone by dialing the numbers indicated in Appendix D, Table 5-1 of this Work Plan.

**APPENDIX G**

**FIELD INVESTIGATION EQUIPMENT PLAN**

**APPENDIX G  
FIELD INVESTIGATION EQUIPMENT PLAN**

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## 1.0 FIELD INVESTIGATION EQUIPMENT PLAN

1.1 The purpose of this field investigation equipment plan is to provide a list of equipment that will be used to complete the field investigation activities. The list of equipment is presented in Table 1.

**TABLE 1  
LIST OF EQUIPMENT**

Nomenclature	Quantity
Motorola HT-1000 Radios - (UXB)	4
Cellular Phone	1
Field Computer	2
Computer Printer	2
Backhoe	1
Tractor and Bush Hog Mower	1
Foerster FEREX (MK 26)	1
Schonstedt Ord Locator (GA-52B and GA-72C/V)	7
Brushcutter, gas	2
Chain Saw	2
All Terrain Vehicle	1
Vehicle - Pickup 4X4	1
Vehicle - Pickup 4X2	2
PPE Brush Clearance	4
Demolition Kit, complete	1
Donor Explosives	TBD
Explosive Storage Magazine	3
CAD/GIS Workstation	1
Carrier Phase GPS	2
Surveyor's Kit	1
Fax Machine	1
Office Trailer	1
Office trailer phone/answering machine	1
Geonics EM-61	2
Motorola SP-50 Radio - (Parsons ES)	4

**APPENDIX H**

**ENVIRONMENTAL RESOURCES PROTECTION PLAN**

**APPENDIX H**  
**ENVIRONMENTAL RESOURCES PROTECTION PLAN**

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## **1.0 ENVIRONMENTAL RESOURCES PROTECTION PLAN**

This Environmental Resources Protection Plan (ERPP) has been prepared as requested in the Statement Of Work (SOW) for the Engineering Design at Ordnance Operable Unit 6 (OOU6) at the former Camp Croft Army Training Facility (CCATF), Spartanburg, South Carolina. The purpose of the ERPP is to ensure compliance with the National Environmental Policy Act (NEPA) and Army Regulation (AR) 200-2 such that proposed activities at the site avoid or minimize potential adverse environmental impacts.

### **1.1 FIELD ACTIVITIES INVOLVING ENVIRONMENTAL RESOURCES**

The Engineering Design site characterization field investigation is designed to identify and remove/dispose ordnance, including fragments, within the boundaries of the OOU6 sampling site. The current plan includes detailed field investigations at areas of potential impact where public activities may occur, and where sensitive natural and historic environments may exist.

#### **1.1.1 VEGETATIVE SPECIES REMOVAL**

1.1.1.1 The Engineering Design field investigation will include brush clearing involving perennial species (3 inches in diameter or smaller). This action is required to operate and maneuver field equipment which will be used to conduct geophysical surveys. Specific field sampling sites will be reviewed with the State Historic Preservation Officer (SHPO) to ensure that critical habitat and known cultural resources are avoided. A botanist and/or biologist familiar with the species found in Croft State Park will be onsite for two days to assist in the identification of protected species prior to commencement of any brush clearing.

1.1.1.2 If any larger specimens (trees) are determined to impact the investigation, Parsons ES will advise CEHNC and CESAC. No further site action will be taken without full coordination and approval of CEHNC and CESAC.

#### **1.1.2 SOIL DISPLACEMENT**

1.1.2.1 During ordnance removal activities, soil may be displaced by intrusive excavation of small areas (typically 2-ft by 2-ft or less).

1.1.2.2 This Work Plan will be reviewed by the South Carolina SHPO prior to conducting any intrusive excavation procedures at OOU6. Where request is made by the agency, an agency official will be allowed to visit sampling sites with the field investigation team, and to indicate where excavation may not be permitted without prior agency approval. Any sites identified as potential preservation sites will be staked in the field and alternative sampling sites will be investigated in the immediate area under the same property ownership. If alternative sampling sites cannot be located by this method,



coordination with the SHPO will be completed to determine conditions under which intrusive excavation can be completed.

1.1.2.3 All excavations will be restored by backfilling with the displaced soil. Each site will be regraded to its former condition so that local drainage is not modified. Backfilling and regrading will be accomplished manually with shovels and rakes.

### 1.1.3 STREAMBED SEDIMENT DISTURBANCE

Sampling activities will not be performed in streambeds or stream banks.

## 1.2 KNOWN SENSITIVE ENVIRONMENTAL RESOURCES

Numerous streams, ponds, wetlands, and bottomland hardwood forests occur throughout the site. Preservation of these communities will be accomplished by avoiding intrusive assessment methods.

### 1.2.1 ENDANGERED ANIMAL SPECIES HABITAT

Wildlife species of concern known to occur or having potential for occurrence at or near the site are presented in Table G-1. These data reflect the most recent United States Fish and Wildlife Service (USFWS) listing. Species listings for Spartanburg County and the state are included in Attachment A. Both lists were confirmed current by the Natural Heritage Program coordinator for South Carolina on September 14, 1994.

### 1.2.2 ENDANGERED PLANT HABITAT

Plant species of concern known to occur or having potential for occurrence at or near the site are presented in Table G-2. These data reflect the most recent USFWS listing. Species listings for Spartanburg County and the state are included in Attachment A. Both lists were confirmed current by the Natural Heritage Program coordinator for South Carolina. Verification of the lists was performed verbally during a phone conversation on September 14, 1994. Helianthus laevigatus and Carex gracilescens are mentioned in the Croft State Park Management Plan as confirmed sightings and are listed in the plan as threatened or endangered. Helianthus laevigatus is listed on the Spartanburg County list provided by Natural Heritage, but its legal status is undetermined. Carex gracilescens is not currently on the county list, but it is on the current state list; however, its status is undetermined. Currently, federal, state, and county lists do not qualify Carex gracilescens as threatened or endangered. Neither of these two species appeared on the USFWS lists.

### 1.2.3 ARCHAEOLOGICAL RESOURCES

Information provided in the Croft State Park Management Plan (South Carolina Department of Parks, Recreation, and Tourism, Division of State Parks, 1989) provides detailed accounts of the archaeological resources present throughout the CCTAF. Homesites, foundations, road and agricultural remnants, artifacts, and natural history landmarks of historical significance can be found in abundance. Sampling activities will not be conducted in known or suspected archaeological sites.

Table H-1. Endangered and Threatened Wildlife (50 CFR 17.11 & 17.12, July 15, 1991)

Species		Historic Range	Status
Common name	Scientific name		
Bat, gray	<i>Myotis grisescens</i>	Southeastern US	E
Cougar, eastern	<i>Felis concolor couguar</i>	Eastern North America	E
Panther, Florida	<i>Felis concolor coryi</i>	USA (LA & AR east to SC & FL)	E
Crane, whooping	<i>Grus americana</i>	USA (Rocky Mtns east to Carolinas)	E
Eagle, bald	<i>Haliaeetus leucocephalus</i>	N. America south to N. Mexico	E
Falcon, peregrine	<i>Falco peregrinus</i>	Worldwide	E
Pelican, brown	<i>Pelecanus occidentalis</i>	USA (Carolinas to TX)	E
Plover, piping	<i>Charadrius melodus</i>	USA (Atlantic & Gulf coasts)	E
Stork, wood	<i>Mycteria americana</i>	USA (TX to Carolinas)	E
Tern, least	<i>Sterna antillarum</i>	USA (Atlantic & Gulf coasts)	E
Tern, roseate	<i>Sterna dougallii dougallii</i>	Coasts of Atlantic Basin	E
Woodpecker, ivory-billed	<i>Campephilus principalis</i>	USA (southeastern)	E
Woodpecker, red-cockaded	<i>Picooides (=Dendrocopos) borealis</i>	USA (southeastern)	E
Alligator, american	<i>Alligator mississippiensis</i>	Southeastern USA	E
Snake, eastern indigo	<i>Drymarchon corais couperi</i>	USA (SC)	T
Tortoise, gopher	<i>Gopherus polyphemus</i>	USA (SC)	T
Beetle, American burying (=Giant carrion beetle)	<i>Nicrophorus americanus</i>	USA (Eastern states south to FL)	E
Treefrog, pine barrens	<i>Hyla andersonii</i>	USA (FL, AL, NC, SC)	E

Source: ESE, 1996.

Table H-2. Endangered and Threatened Plants (50 CFR 17.11 & 17.12, July 15, 1991)

Species		Historic Range	Status
Common name	Scientific name		
Bunched arrowhead	<i>Sagittaria fasciculata</i>	USA (NC, SC)	E
Michaux's sumac	<i>Rhus michauxii</i>	USA (NC, SC, GA)	E
Canby's dropwort	<i>Oxypolis canbyi</i>	USA (MD, SC, NC)	E
Harperella	<i>Ptilimnium nodosum</i>	USA (AL, GA, SC, NC)	E
Dwarf-flowered heartleaf	<i>Hexastylis naniflora</i>	USA (NC, SC)	T
Schweinitz's sunflower	<i>Helianthus schweinitzii</i>	USA (NC, SC)	E
Black-spored quillwort	<i>Isoetes malanospora</i>	USA (GA, SC)	E
Pondberry	<i>Lindera melissifolia</i>	USA (AL, FL, NC, SC)	T
Swamp pink	<i>Helonias bullata</i>	USA (GA, MD, NC, SC)	T
Relict trillium	<i>Trillium reliquum</i>	USA (AL, GA, SC)	E
Small whorled pogonia	<i>Isotria medeoloides</i>	USA (DC, DE, GA, SC)	E
Rough-leaved loosestrife	<i>Lysimachia asperulaefolia</i>	USA (NC, SC)	E
Mountain sweet pitcher-plant	<i>Sarracenia rubra</i> ssp. <i>jonesii</i>	USA (NC, SC)	E
Micosukee gooseberry	<i>Ribes echinellum</i>	USA (FL, SC)	T
Little amphianthus	<i>Amphianthus pusillus</i>	USA (AL, GA, SC)	T

Source: ESE, 1996.

### **1.3 POTENTIAL ENVIRONMENTAL RESOURCE IMPACTS**

The primary potential environmental resources impacts of the OOU6 site characterization field investigation will result from limited vegetative clearing and ordnance excavation activities. Procedures outlined in this plan will be strictly followed to avoid violation of any federal, state, or local environmental statutes or regulations, or unnecessary disturbance of natural habitats.

### **1.4 REQUIRED MITIGATION PROCEDURES**

Field investigation activities at OOU6 have been developed to avoid impacts to sensitive resources. For this reason, extensive mitigation is not anticipated. However, the following general mitigation procedures will be followed during all field activities:

1. Impacts to sensitive species will be minimized during the field investigation activities by avoiding known or suspected sensitive wildlife habitats identified during the previous CCATF Environmental Assessment (EA) effort and the proposed site visit by the Parsons ES biologist.
2. Areas that receive brush clearing treatment will be allowed to revegetate naturally after field survey activities are completed. Ordnance excavation activities will not disturb local drainage patterns.
3. Wetland impacts will be minimized by avoiding work in mapped wetlands and wetlands identified during the grid selection process.
4. Key field team members (for example, the Parsons ES Site Manager and biologist) will request applicable information from Croft State Park biologists prior to initiating this study to receive guidance regarding environmental resources to be protected.
5. If major mitigation is required, it will be accomplished by CEHNC and US Army Corps of Engineers, Charleston District.

**APPENDIX I**  
**REGULATORY COMPLIANCE PLAN**

**APPENDIX I  
REGULATORY COMPLIANCE PLAN**

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## **1.0 REGULATORY COMPLIANCE PLAN**

### **1.1 INTRODUCTION**

1.1.1 This Regulatory Compliance Plan (RCP) is prepared in accordance with Army Regulation (AR) 200-2. The purpose of this RCP is to establish procedures for avoiding, minimizing, and mitigating potential impacts to environmental and cultural resources at OOU6 during UXO field survey and removal activities.

1.1.2 OOU6 is located within the boundaries of former Camp Croft, but outside Croft State Park. It is situated off of Mimosa Lake Road and is adjacent to the south of U.S. Highway 176 Bypass. OOU6 contains an area of 397.80 acres, as per the Division of Tract 'A' "Whitestone Tract" boundary survey map, dated January 24, 1994. The property is privately owned and is used for agricultural and industrial purposes including tree planting and industrial landfills. Existing development at OOU6 include a site operation building, landfills, compost area, pine farms, several access roads, and several clearings.

### **1.2 FEDERAL REGULATIONS**

1.2.1 Specifically, the activities of this project are conducted in accordance with the DERP Formerly Used Defense Site (FUDS) program and Section 104 of the CERCLA. Under these regulations, the Secretary of Defense is authorized to conduct response actions at sites which were contaminated while under the jurisdiction of the Department of Defense (DoD) or its predecessor agencies. The Secretary of the Army, acting through the Corps of Engineers, acts as the DoD executive agent for the cleanup of sites which were contaminated while under the jurisdiction of DoD, but which subsequently have been transferred out of DoD control.

1.2.2 Because this project falls under CERCLA federal, state and local permits are not reported for actions at this site. This exemption is found in the National Contingency Plan, Paragraph 300.400(e). Nevertheless, every effort will be made to comply with the intent of all applicable federal, state, and local permit requirements. This RCP has been prepared to list other Applicable or Relevant and Appropriate Requirements (ARARs) which may have an impact on the project.

1.2.3 Formerly Used Defense Site Program. A FUDS is real property that was formerly owned by, leased by, possessed by, or otherwise under the operational control of the Secretary of Defense or other military components that predate the DoD. Accordingly, FUDS sites are either areas where real property accountability previously rested with DoD irrespective of current ownership or current responsibility for accountability within the federal government; areas previously used by DoD components under lease or other agreements; or areas previously occupied by DoD components over which significant control was exercised without the benefit of a formal real estate instrument or other agreements. The fact that this site is open to the public led to an exception to ownership eligibility requirements for DERP-FUDS due to eminent danger from OE contamination. Currently, several parcels of land within OOU6 are privately owned.

1.2.4 For a site to be listed as a FUDS, the Department of the Army must undertake a two step process. First, a Findings and Determination of Eligibility Study (FDES) is performed. This study entails extensive research of historical real estate deeds and documents to determine if the site was owned, leased, or used by the DoD. Second, an Inventory Project Report (INPR), which is similar to a preliminary assessment, must be completed. This report identifies the potential hazards that may be present at the site as a result of past DoD activities.

### 1.3 SITE CHARACTERIZATION

1.3.1 The majority of land that made up the site has been established in timber with dense underbrush. Several varieties of hardwood and pines are the most prominent trees in the area. Wetlands are present at the site and in adjoining areas. Several small parcels of land have been cleared and used for agricultural purposes. The following is a summary of site characterizations of OOU6 based on previous investigations for CEHNC and the ASR.

1.3.2 Topography. The topography is highly variable at the site.

1.3.3 Hydrology/Wetlands. (See Appendix H)

1.3.4 Vegetation. (See Appendix H)

1.3.5 Threatened and Endangered Species. (See Appendix H)

1.3.6 Cultural Resources. (See Appendix H)

1.3.7 Underground Utilities. OOU6 may have underground utilities located near the operation building on the site. As a result, the utility companies will be contacted and worked with closely throughout the project to ensure that subsurface utilities are not inadvertently damaged during the investigation.

1.3.8 Land Resources Management. All activities associated with this project will be conducted in a manner to minimize any impact to the existing area. In particular, damage to trees, shrubs, and the native wildlife habitat will be minimized to the greatest extent possible. Areas that have been impacted by the project will be restored, to every extent practicable, to the previously existing condition at the completion of the project.

1.3.9 Water Resources Protection. All project activities will be conducted in a manner to prevent discharge of any groundwater contaminants. All OE/UXO that are recovered will be placed in a temporary holding magazine on site to eliminate contamination of soils from surface run-off during rainy periods.

1.3.10 Soil Erosion and Sediment/Siltration Control. All soil removal will be placed in the vicinity and once actions are complete, the soil will be returned to the area from which it came. If needed, fabric silt fencing will be installed to adequately control erosion problems. If necessary, diversion dikes and ditches will be installed and regarding conducted to control sediment migration. The area of soil exposed at any given time during soil disturbance will be kept to a minimum. The spoils pile



will be covered with plastic/tarp to minimize any soil run-off. Reseeding will be initiated as soon as possible to minimize erosion potential.

#### **1.4 FIELD ACTIVITIES AND POTENTIAL ENVIRONMENTAL IMPACTS**

1.4.1 Areas to be Surveyed. The survey activities will take place within OOU6 as detailed in previous sections of the work plan. Based on data from the ASR, TCRA, and EE/CA investigations, 300 specific sampling grids will be investigated. These sample areas will be dispersed systematically throughout the area. The methodology and sample locations are outlined in Section 3 of this Work Plan. Each sampling location grid will generally be 50'x 50'.

1.4.2 Geophysical Survey Activities. All of the established survey grids will be subject to non-intrusive geophysical surveys to detect subsurface UXO. The EM-61 will be utilized for the geophysical survey. To ensure effective survey coverage, brush clearing will be necessary for grids that are densely vegetated with shrubs. Brush clearing will be limited to clearing of undergrowth and selective pruning to minimize potential impacts to the site vegetation.

1.4.3 Intrusive Investigation. As detailed in previous sections of the work plan, results of the geophysical survey will be evaluated to identify geophysical anomalies that will be subject to intrusive investigation. Intrusive investigations will involve selective manual excavation to a depth no greater than four feet for detection of subsurface UXO. To the extent possible, disturbance to vegetation will be avoided during the intrusive investigations. If disturbance to vegetation is unavoidable, attempts will be made to remove vegetation with the root system in tact. Any disturbed areas will be restored to original grade and contour and, where possible, the existing ground cover will be replaced.

1.4.4 UXO Detonation. Positively identified UXO will be detonated in-place at the site. Detonation effort will be performed in a manner that minimizes potential impact to the environment.

**APPENDIX J**

**KEY PROJECT PERSONNEL RESUMES**

**PARSONS ES PERSONNEL**

**Biographical Data****ROBERT A. MENKE**

Program Manager/Senior Project Manager

**EXPERIENCE SUMMARY**

Over twenty-four years experience in program/project management, and facilities operations related to pollution controls, pollution prevention, ordnance removal, industrial plant upgrades, and design and construction of environmental protection facilities. Responsibilities on these multi-million dollar, multi-facility projects include: program administration; supervision of project managers; execution of program plans involving design, specifications, construction; and operations and maintenance.

**EXPERIENCE RECORD**

October 1988    Parsons Engineering Science. **Program Director/Department Manager** (1993 - Date).  
Date

**Program Director** for the Navy's Implementation of Pollution Prevention Technologies. Manages all aspects of the contractual administrative requirements on multi-task 30 million contract as well as ensures Navy's satisfaction with Parsons ES's deliverables. This work includes work at any Naval installation and includes work on the Navy's Environmental Leadership Program installations. Tasks included field assessment, data reduction, opportunity evaluations, economic assessments, priority developments, design procurement installation, construction, acceptance and training.

**Project Manager.** Responsible for the U.S. Army Corps of Engineers, Huntsville Center (CEHNC) OEW Investigation, Evaluation, and Prioritization and EE/CA projects, i.e., Fort Monroe, Virginia, and Camp Simms, Washington, D.C. Responsible for all CEHNC, Army and client interface. Also responsible for all administrative requirements including cost schedule, reports, subcontracts and quality control for all deliverables on the project. These projects include geophysical surveys, geophysical information system development, intrusive investigations, and risk and cost assessments.

**Project Manager** for the U.S. Army Huntsville (CEHNC) Engineering Evaluation and Cost Analysis (EE/CA) project at Duck, North Carolina. Responsible for providing direct support to the Program Manager and for coordinating all elements of the project including management; reviewing project objectives and background information; preparation of the scoping documents and technical reports; coordination of subcontract services; providing input from the Duck project into CEHNC's GIS Knowledgebase; coordinating and organizing field work; assuring that project health and safety requirements are fulfilled; interfacing with local officials (Waterways Experiment Station-Field Research Facility Staff), COE Public Affairs Officer (COE Wilmington), and the CEHNC PM and project Safety Officer (COE Huntsville); and assisting in public/media presentation.

**Project Manager** for the U.S. Army Corps of Engineers, Huntsville Center (CEHNC) GIS Knowledgebase delivery order. Responsible for the administration and execution of the project, which included field testing and technical peer review.

**Program Manager/Project Manager** for the subcontractor on the Model Cleanup Project for Kaho'olawe Island, Hawaii. Responsible for all project data collection, subsurface anomaly data collection and investigation, data analysis and intrusive investigation recommendations. Final products included maps of all anomalies integrated into the Intergraph GIS with all data

ROBERT A. MENKE  
 Program Manager/Senior Project Manager  
 Page 2

in the Microsoft access database. Responsible for all management, schedules, cost and production to ensure project stayed on schedule with extremely tight deadlines.

**Program Director** for Naval Supply Systems Command's "Hazardous Material Control and Pollution Prevention Programs" subcontract. Manages all aspects of the contractual administrative requirements on multi-task contract as well as ensures Navy's satisfaction with Parsons ES's deliverables.

**Project Manager** responsible for the administration and execution of Pollution Prevention Plans for the Navy. The project scope includes preparing generic scopes of work and prototyping and refining standard operating procedures for Navy's Pollution Prevention Program. It also includes conducting two pollution prevention evaluations for one Naval Station on the East Coast and one on the West Coast. The evaluations include field assessment, data reduction, opportunity evaluations, economic assessments, and priority developments.

**Project Manager (1991-1995).** Project Manager for the engineering study for the expansion of the Lower Potomac Pollution Control Plant (LPPCP) beyond 54 mgd. Mr. Menke provided administrative guidance and direction which enabled this project to be delivered to the client on schedule and under budget. Mr. Menke also provided technical input as the study moved from the water quality analyses and biomonitoring phase into the treatment process alternatives evaluation, the preliminary engineering design, and the environmental assessment. This process selection was an enhanced nitrification process with alkalinity and energy recovery to enable the LPPCP to meet an anticipated ammonia limit in the effluent of 1 mg/l.

**Manager, Operations Services (1988-1991).** Responsible for Operations activities for \$100 million upgrade and expansion of Lower Potomac Pollution Control Plant to 54 mgd. Managed construction/operation interface to coordinate the contractor's work on existing facilities and maintain plant operations and permit compliance. Conducted equipment startup and performance testing, develops interim operating procedures, coordinated contractor vendor training. Conducted overall technical and administrative tasks associated with facility start-up, troubleshooting, O&M manuals, budgets, staffing, and constructibility reviews.

October 1985 Maryland Environmental Service, Annapolis, Maryland. **Chief of Operations and**  
 October 1988 **Maintenance.** Responsible for the Operations and Maintenance of over 120 Water and Wastewater Treatment Plants in the State of Maryland. Facilities were located in small towns, state parks, state prisons, state hospitals, etc. Overall responsibility included budget and contractual contact with all clients (town and county councils), and conducting public hearings. Supervised support staff in the fields of operations, mechanical, electrical and instrumentation maintenance, laboratory analyses, and sludge management (including land application, composting, and incineration).

October 1981 U.S. Navy, Naval Facilities Engineering Command, Washington, District of Columbia.  
 October 1985 **Project Manager.** Provided technical and project management services on numerous environmental projects on military installations in the Maryland, Virginia and D.C. area. These projects included sanitary and industrial wastewater treatment as well as design/construction of several other types of environmental protection facilities.

July 1972 Washington Suburban Sanitary Commission, Hyattsville, Maryland. **Project Manager and**  
 October 1981 **Plant Superintendent.** Responsible for major projects in the Washington, D.C. area including Project Manager of a major upgrading of the 400 mgd Potomac Water Filtration Plant. Plant Superintendent of the 30 mgd Piscataway AWT Plant and the 5 mgd Piscataway AWT Model Plant. Wastewater process expertise included activated sludge, nitrification, filtration, carbon adsorption, lime precipitation, mineral addition for phosphorus removal,

ROBERT A. MENKE  
Program Manager/Senior Project Manager  
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gravity and flotation thickening, anaerobic and aerobic digestion, and incineration.

#### **EDUCATION**

B.S., Civil/Sanitary Engineering, June 1972, University of Maryland, College Park, Maryland

#### **PROFESSIONAL AFFILIATIONS**

Registered Professional Engineer (Virginia 1979, No. 011502; Maryland 1982, No. 12794)  
Former Member State of Maryland Board of Waterworks and Waste Systems Operators (Chairman - Regulations Committee)  
Water Environment Federation

#### **PUBLICATIONS**

- "Start-up and Operation of Dewatered Sludge Screw Conveyors and High Pressure Cake Pumps," FL WPCF, 1992.
- "Start-up and Operation of a Dewatered Sludge Receiving Storage and Transfer Facility," VA WPCF Conference, 1991.
- "Operations and Maintenance Manuals, Not Just a Door Stop," VA WPCF Conference, 1989.
- "Coordinate Plant Start-ups Early," Water and Waste Engineering Magazine, June 1980 (coauthor).
- "Results of In-Vessel Pilot Composting," Proceedings, National Conference on Municipal and Industrial Sludge Composting, 1980 (coauthor).
- "Operational Results for the Piscataway Model 5 AWT Plant," EPA Publication 600/2/-78-172, 1978 (coauthor).
- "Design Guidelines for Sewerage Facilities" Member Technical Panel Technical Publication State of Maryland, 1978.

**Biographical Data**

**ROBERT L. THOEM**

**Civil/Environmental Engineer**

**EXPERIENCE SUMMARY**

Extensive management, planning, study and design experience during 32 years of professional practice. Considerable experience directing large, multidiscipline project teams. Specialized experience in studies and preliminary designs for water, wastewater, sludge, solid waste, and hazardous waste projects throughout the U.S. and overseas.

**EXPERIENCE RECORD**

1983-Date Parsons Engineering Science, Inc. **Senior Program Director** (1995-Date). Responsible for managing large programs that involve multiple offices within Parsons ES and for providing guidance/training to other Program/Project Managers.

**Office Director of Operations/Group Manager** (1988-1995). Direction of a multidiscipline staff responsible for hazardous waste, hydrogeology, hydrology, industrial and municipal waste process, wastewater operation and maintenance, thermal process, regulatory permitting, industrial hygiene, geochemistry, and other environmental projects for industrial, military, and governmental clients.

**Department Manager** (1986-1988). Supervised a staff of engineers responsible for conducting hazardous waste preliminary assessments (PA), site inspections (SI), remedial investigations (RI), feasibility studies (FS), and remedial designs (RD) for active industrial facilities, inactive disposal sites (PRP groups) and military installations. Responsible for corporatewide coordination of a multimillion dollar contract for hazardous waste cleanup projects at 14 military facilities throughout the U.S.

**Section Manager** (1985-1986). Responsible for supervising engineers involved with management of hazardous waste PA/SI/RI/FS/RD projects for industrial and military clients.

**Senior Project Manager** (1983-Date). Project Manager for a multimillion dollar 10-year remedial oversight program aimed at PCB and other contaminant cleanup at compressor sites along an interstate gas pipeline. Also, responsible for managing a variety of environmental projects including RI/FS/RD of 11 hazardous waste and 21 underground tank sites at a U.S. Air Force base; hazardous waste audits/preliminary assessments (IRP) at 28 U.S. Air Force installations to identify the potential migration of contaminants resulting from past disposal practices; plans and specifications for extracting and treating contaminated groundwater at two industrial plants; plans and specifications for removing underground storage tanks (UST) and pipelines; evaluation of alternatives for excavating, transporting, storing and preprocessing landfilled hazardous wastes before incineration; hazardous waste site investigations and remedial programs at five industrial sites, including a national priorities list (NPL) site; preliminary engineering evaluations for upgrading and expanding a municipal advanced wastewater treatment plant (nitrification, phosphorus removal, filtration) to 54 mgd; solid waste collection, disposal and resource recovery at a U.S. Army post; regulatory audits at two NASA facilities; cost study for allocating financial responsibilities among major users of a wastewater treatment plant; and a land use plan and site prospectus for two industries.

1966-1983 Stanley Consultants, Inc., Muscatine, Iowa and Atlanta, Georgia. **Operations Group Head and Branch Office Manager** (1982-1983). Directed multidiscipline staff responsible for planning and design of steam generation, utilities, bridge, water and wastewater, solid waste

ROBERT L. THOEM  
Civil/Environmental Engineer  
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and resource recovery, water resources, site development and recreational projects for industrial, domestic, and foreign government clients. Administered branch office support activities.

**Associate Chief Environmental Engineer (1980-1983).** Corporatewide quality assurance responsibilities on environmental engineering planning projects.

**Resource Management Department Head (1976-1982).** Responsible for multidiscipline staff engaged in planning and design of water and wastewater systems, solid waste and resource recovery, water resources, bridge, site development, and recreational projects for industrial, domestic, and foreign governmental clients.

**Environmental Engineering Department Head (1973-1976).** Supervised staff involved in studies of water and wastewater systems, solid waste and resource recovery programs, and water resources projects for industry and government.

**Project Manager and Project Engineer (1966-1983).** Responsible for managing environmental studies and preparing reports for over 25 industrial projects, 25 city and county projects, 10 regional (multicounty) planning/operating agency projects, 5 state agency projects, 10 projects for federal agencies, and 5 projects for foreign governments. Typical projects included: industrial service water, recirculation and waste treatment systems (to 47,000 gpm); water supply, treatment, storage, pumping, and distribution using computer modeling (to 32 mgd); high-pressure water transmission lines (to 48-inch diameter); wastewater collection and treatment (plants to 120 mgd); wastewater sludge processing and disposal systems (including 450 dry tpd at 290 mgd plant); solid waste collection, disposal and energy/resource recovery systems (to 4500 tpd); environmental audits and assessments (including a \$1.7 billion wastewater system); areawide water quality management plans (point sources, nonpoint sources, institutional/financial); statewide programs for waste load allocations, sludge disposal guidelines and solid waste resource recovery; and storm drainage systems. Industries included iron and steel, coke, distillery, tannery, poultry, meat, automotive, forging, plating, paper, plastic and aluminum operations. Municipal study area populations ranged from 1,400 to 9,000,000.

1962-1965 U.S. Public Health Service, New York, New York. **Chief, Water Resources Section (1964-1965).** Supervised preparation of regional water supply and pollution control reports.

**Staff Engineer, Construction Grants Section (1962-1964).** Technical and administrative management of grants for municipal wastewater facilities.

#### EDUCATION

B.S., Civil Engineering, 1962, Iowa State University, Ames, Iowa

M.S., Sanitary Engineering, 1967, Rutgers University, New Brunswick, New Jersey

#### PROFESSIONAL AFFILIATIONS

Registered Professional Engineer (Alabama 1974, No. 10580; Georgia 1976, No. 10391; Illinois 1974, No. 62-32684; South Carolina 1982, No. 9178)

American Academy of Environmental Engineers (Diplomate)

American Society of Civil Engineers (Fellow)

National Society of Professional Engineers

Water Environment Federation



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**HONORARY AFFILIATIONS**

*Who's Who in Engineering*  
*Who's Who in the South and Southwest*  
U. S. Public Health Service Traineeship

**PAPERS AND PUBLICATIONS**

"Analysis of Dissolved Oxygen and the Application of Artificial Aeration in the Upper Passaic River," M.S. Thesis, Rutgers University, January 1967.

"Solid Waste System Cost Evaluation and Financing," presented at the Eleventh Annual Water Resources and Design Conference, Iowa State University, February 1973 (coauthor L. J. Larson).

"Financing Sanitary Landfills," *Iowa Municipalities*, September 1973.

Discussion of "Basic Data for Solid Waste Pilot Study," *ASCE Journal of the Environmental Engineering Division*, October 1973.

"Sludge Handling and Disposal Comparisons in the Minneapolis-St. Paul Area," presented at the ASCE Environmental Engineering Division National Specialty Conference, July 1974.

"Planning Solid Waste Management for an Urban County," *Public Works*, November 1974 (coauthor L. J. Larson).

"Project Cost Evaluation Using Probability Concepts," *Consulting Engineer*, November 1974 (coauthor K. A. Smith).

"Using Probability Concepts for Project Cost Evaluation," *Modern Government/National Development*, January-February 1978 (coauthor K. A. Smith).

"New Potable Water Supply for Jordan," presented at the Fiftieth Annual Georgia Water and Pollution Control Association Conference, August 1981.

"New Potable Water Supply for Jordan," presented at the ASCE Water Resource Planning and Management Division National Specialty Conference, March 1983 (coauthors L. L. Pruitt and R. F. Haskins).

"Jordan Meets Water Supply Challenges," presented at the AWWA Annual National Conference, June 1983 (coauthor L. L. Pruitt).

"Steel Pipeline Provides New Water Supply for Jordan," presented at the ASCE Specialty Conference on Pipelines in Adverse Environments II, November 1983 (coauthors C. L. Meyer and M. C. Boner).

"Jordan Meets Water Supply Challenges," *Journal of the American Water Works Association*, June 1984 (coauthor L. L. Pruitt).

**Biographical Data****KENNETH J. STOCKWELL****Environmental Engineer****EXPERIENCE SUMMARY**

Extensive experience in planning, managing, conducting, and directing projects involving hazardous waste management and site remediations under both CERCLA and RCRA requirements. Technical direction and project management experience includes remedial investigations, feasibility studies, and remedial designs under CERCLA and facility investigations and corrective measure studies under RCRA. Provides advice and support to clients on regulatory compliance issues and technology reviews. Other experience has included facility and property assessments for potential environmental liabilities, requiring in-depth knowledge of technical issues, regulatory requirements and responsible professional judgment.

**EXPERIENCE RECORD**

1985-Date Parsons Engineering Science, Inc. **Manager, Hazardous Waste Engineering Department** (1988-Date). Responsibilities include technical direction, program management, project management, and staff development. Provides program management for large, multitask programs in both the government and private sector. Responsibilities include overall quality assurance, consistency in performance, technical guidance, administrative coordination and cost management. Provides senior project management and technical review, support and guidance to staff engineers and scientists involved in remedial designs and investigations and assessments of environmental impacts from hazardous waste management practices. Responsibilities also include review and familiarity with current evolving regulations applicable to hazardous waste management, particularly in determining regulations and requirements applicable to hazardous waste remediation. Specific project experience (1985-Date) has included the following:

**Technical Director** for hazardous waste site characterizations and remedial alternative assessments under both CERCLA and RCRA. Activities include support to project managers in project scoping, planning and implementation and review of project deliverables. Provides technical support to project managers and clients for project regulatory reviews and meetings.

**Project Manager** for a remedial design at a National Priorities List site in Florida. The remedial action involves biological treatment of PCP and PNA contaminated soils and sludges. Project activities included preparation of the remedial design plans as well as plans for interim site maintenance and additional site characterization. Preparation of contractor solicitation documents, bid review and contractor selection. This project was conducted for an industrial potentially responsible party (PRP) group.

**Project Manager** for a remedial design at a National Priorities List site in Ohio. This remediation involved on-site incineration of RCRA, TSCA, and hazardous wastes under CERCLA/SARA regulations and procedures. The site also included dioxin contamination as well as asbestos. Unique aspects included handling all the various type wastes, addressing land disposal delisting requirements for ash, and destruction and decontamination of dioxin and asbestos contaminated structures, including boilers and a brick stack. Plans for sampling, quality assurance, health and safety, contingencies, operations, security, and regulatory compliance were prepared, as well as performance specifications and drawings. This project was conducted for an industrial potentially responsible party (PRP) group.

**Project Manager** for remedial investigations and feasibility studies at four hazardous waste sites on the National Priorities List. Clients have included both potentially responsible party

KENNETH J. STOCKWELL

Environmental Engineer

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(PRP) groups and federal agencies (DOD).

Support responsibilities included liaison between the client, the USEPA and applicable state agencies during preparation of remedial investigation plans, implementation of the studies and selection of remediation under the requirements of CERCLA and SARA. Directly responsible for staffing, coordinating and conducting field investigations and preparing remedial investigation reports and feasibility studies. Site evaluations included hydrogeologic site assessments and preparation of public health risk assessments and contaminant transport evaluations. Media investigated have included groundwater, soils, sludges and surface water.

**Project Manager** for numerous site investigations and remedial action plan developments (feasibility studies) for non-NPL hazardous waste sites. Responsibilities included support through preparation of plans and implementation of field investigations. Data evaluation and evaluation of potentially-applicable remedial alternatives was conducted.

**Project Manager** for construction oversight and start-up of a groundwater recovery and treatment system for the removal of jet fuel from an aquifer on a U.S. Air Force base. Project activities included oversight of the installation of 16 recovery wells according to specifications prepared by Engineering-Science and preparation of an operations and maintenance manual for start-up and system operation.

**Technical Support** to industrial clients for evaluation of potential liabilities from acquisition or divestiture of real property and facilities. Support included assessment of potential environmental liabilities from past waste management practices, applicability of U.S. federal and state regulations to potential site problems and assessment of costs associated with possible environmental liabilities.

**Program Manager and Project Engineer** responsible for administrative coordination and technical review for four multiple project task order hazardous waste site investigation contracts. Responsibilities included contract administration, implementation, and general oversight of multiple delivery orders. Specific activities included preparation of work plans, budgets, schedules and reports.

- 1983-1985 Applied Biology, Incorporated, Decatur, Georgia. **Staff Environmental Engineer**. Responsible for providing engineering evaluation in the preparation of NEPA related studies such as environmental impact statements and assessments.
- 1981-1983 Old Dominion University, Norfolk, Virginia - **Graduate School Research Assistant**. Served as graduate assistant in charge of water chemistry laboratory and conducted research on chemical treatment of surface potable water source.
- 1976-1981 U.S. Navy, **Commissioned Officer**.

#### EDUCATION

B.S., 1976, United States Naval Academy, Annapolis, Maryland

M.E., Environmental Engineering, 1983, Old Dominion University, Norfolk, Virginia

#### PROFESSIONAL AFFILIATIONS

Registered Professional Engineer (Georgia 1987, No. 16705)

#### PAPERS AND PUBLICATIONS

"A Comparison of the Effectiveness of Emerging In-Situ Technologies and Traditional Ex-Situ Treatment of Solvent Contaminated Soils", *American Chemical Society, I & EC Division Symposium*, October 1991 (coauthor S. Just)

**Biographical Data****OLA A. AWOSIKA**

Senior Geological Engineer/Geophysicist

**EXPERIENCE SUMMARY**

Extensive experience in hazardous waste studies including planning and management of CERCLA site investigations, remedial investigations and feasibility studies and RCRA facility investigations, corrective measure studies, remedial actions, engineering evaluation/cost analysis for OE investigations, and UST investigations. Other areas of experience include providing support in design and construction of groundwater and soil remediation systems, rehabilitation, operation and maintenance and monitoring of groundwater recovery and treatment systems, analysis and interpretation of geophysical data, environmental assessment studies, geotechnical evaluation of soils, design of landfill caps, analysis of earthwork, property audits/assessments, preparation and review of technical reports and providing support to client on regulatory compliance issues.

**EXPERIENCE RECORD**

1985 - Date Parsons Engineering-Science. **Section Manager (Engineering Studies) - Hazardous Waste Engineering and Earth Sciences Department.** Responsibilities include providing technical direction, managerial and supervisory support, assisting in staff development, and furnishing engineering, geotechnical, geophysical and hydrogeological information on several Installation Restoration Programs (IRP) for the U.S. Air Force, Ordnance Explosives (OE) investigation for COE facilities and CERCLA/RCRA hazardous waste investigations for industrial clients. Current assignments include assisting in administrative coordination, consulting with state and federal regulatory agencies on issues that require regulatory compliance at sites under investigation or remediation; review of project work and sampling plans, quality assurance project plans, and technical reports for CERCLA and RCRA programs and environmental assessment studies; evaluation of natural attenuation enhancement technologies; preparation and review of bid packages for subcontract services (drilling, chemical and geotechnical laboratory analyses, land surveying, UXO, GIS, and geophysical services); and managing hazardous waste remediation and OE investigation projects. Specific project experience include the following:

**Assistant Project Manager** for a \$0.5 million U.S. Army Huntsville (CEHNC) Engineering Evaluation and Cost Analysis (EE/CA) project at Duck, North Carolina. Responsible for providing direct support to the Program Manager and the Project Manager and for coordinating specific elements of the project including staff management, review of project objectives and background information, providing support in preparation of the scoping documents and technical reports, coordination of subcontract services (UXB International, S. Cohen & Associates and QuantiTech) for Ordnance and Explosives (OE) work, providing input to the GIS knowledge base for Duck, coordinating and organizing field work including mobilization, logistics, and demobilization effort, organizing and supervising the field geophysical team, assuring that project health and safety requirements are met, interfacing with site officials (Waterways Experiment Station-Field Research Facility Staff), COE Public Affairs Officer (COE Wilmington), and the CEHNC PM and project Safety Officer (COE Huntsville), assisting in public presentation and ensuring that field activities are implemented consistent with the work plan for the project, coordinating preparation

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Senior Geological Engineer/Geophysicist  
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and review of all project deliverables, and ensuring project tasks are completed on budget and on schedule.

**Deputy Program Manager** for Architect-Engineer Services for environmental services under the Defense Environmental Restoration Program, Southern Region of CONUS, for US Army Engineer Center, Huntsville, Alabama. Responsibilities include assisting the Program Manager in providing administrative coordination and technical review of multiple project task orders for Ordnance Explosive (OE) investigation and ordnance related HTRW investigations/studies. Delivery orders under program includes Duck, NC, EE/CA; Modlow, TN, EE/CA; Redstone, AL, HTRW; and Camp Croft OOU6 Engineering Design.

**Project Engineer** for Huntsville (CEHNC) GIS Knowledge base delivery order. Responsible for acquisition, consolidation, and evaluation of UXO related field data for the Duck EE/CA project as an input to the GIS KB project and for furnishing applicable site specific information pertinent to Duck.

**Project Manager** on a bioventing study aimed at determining the feasibility of bioventing to aid in remediating JP-5 contaminated soil at a fuel unloading facility on a Department of Defense facility in Marietta, Georgia. The study will assess the potential for supplying oxygen throughout the contaminated soil, to determine the rate at which microorganisms will degrade fuel when stimulated by oxygen rich soil gas, and to evaluate the potential for sustaining the rates of biodegradation to achieve regulatory standards. This study is being conducted in compliance with a consent order issued by the Georgia Environmental Protection Division (EPD) RCRA branch.

**Project Manager** for a \$0.8 million RCRA Facility Investigation and Corrective Measure Study (RFI/CMS) at two large hazardous waste disposal sites at a DoD facility in Florida. Project activities include planning, designing, coordinating and supervising a multidisciplinary team of environmental professionals to perform the field work, evaluate and analyze field and laboratory data, determine nature and extent of contamination, fate and transport of contaminants detected and perform a baseline risk assessment for each site. The results of this study will be evaluated to determine if remedial action is warranted.

**Project and Site Manager** on natural attenuation enhancement technology studies involving several pilot tests and full scale remedial action using insitu bioventing technology at several petroleum hydrocarbon contaminated sites at Eglin AFB, Florida. Project involved; design, construction, startup and operation and maintenance of bioventing systems to remove VOCs in the soils. One of these units includes a vapor recirculation component designed to minimize emission of soil gas and effectively distribute oxygenated air throughout the contaminated soils - Full scale bioventing at one of these sites has been in operation since spring 1992 and has been effective in addressing remediation of site soil. Preliminary results from pilot tests at the other sites have indicated a strong potential for accomplishing remedial objectives using this technology.

**Project Manager** for a \$1.3 million multi-tasked IRP investigations at Eglin AFB, Florida. Project involved several CERCLA/RCRA site investigation efforts, including PA/SI for Herbicide orange sites to supplement information from previous studies and to gather data to evaluate potential risks; preparation of Technical Reports to Support No Further Action (TDSNFA) for nine sites; preparation of a baseline risk assessment for a site, underground storage tank (UST) investigation at nine sites culminating in preparation of PCAR; and an RFI investigation at a sanitary landfill to determine if a corrective measure study (CMS) is warranted.

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**Project Manager** for rehabilitation, startup, operation and maintenance (O&M), and monitoring of two groundwater recovery and treatment systems for the removal of petroleum hydrocarbons from an aquifer at Eglin AFB, Florida. One of the treatment systems includes operation of an airstripper and a carbon adsorption unit. Project objectives included evaluation of the groundwater recovery and treatment systems for conformance with regulatory consent orders. To accomplish the objectives, repairs, modifications and upgrade of system's components, and rehabilitation of the recovery wells were conducted. In addition, evaluation of the capture zone for recovery wells and evaluation of system performance were also conducted. An operation and maintenance manual for startup and operation of each of the systems was prepared. Startup, operation and maintenance, and monitoring of the systems were conducted for 30 months. Deliverables for this project included monthly reports for the O&M and monitoring efforts. Data management was accomplished using the data loading and formatting tools for IRPIMS data base developed by the U. S. Air Force Center for Environmental Excellence (AFCEE).

**Project Manager** on an environmental assessment project for a major industrial gases manufacturing company in South Carolina. Supervised a soil removal action and multi-phased environmental investigations to evaluate migration of chlorinated solvents in the groundwater at the site. Investigation work included a potable water well inventory survey for residential areas within 1 mile radius of the site, well construction and installation, aquifer tests, hydropunch sampling and on-site gas chromatography analytical work to evaluate contaminant migration rates, delineate the contaminant plume, and to determine if a remedial action is warranted. A site monitoring plan was submitted to the regulators after a detail review of results concluded a remedial action was not warranted. Currently, a monitoring program is being implemented at the site.

**Technical Director** for an NFADDs/SI study. Under this project, NFADDs were prepared for eight sites and site investigation study was conducted for nine sites. Responsibilities included providing support to the project manager in project scoping, planning and implementation and in review of project deliverables. Also coordinated project activities with client.

**Technical Director** for RCRA facility investigation at two sites at Eglin AFB, Florida. Provided technical direction in project management, including planning and implementation of all investigating work and coordination of entire project team. Played a major role in establishing dialogues between client and regulators to accelerate the decision making process and expedite review efforts.

**Project Manager** for two U.S. Air Force IRP projects at Minneapolis, St. Paul AFR Minnesota; the first was a \$5 million RI/FS/PP/ROD work at a landfill on the National Priorities List and the second was a \$5 million RI/FS/DD/RD work at five sites which included an underground tank leak site, jet fuel spill sites, and other suspected hazardous waste contaminated sites. Responsibilities included design, planning, and organization of project work, project staffing, coordination with Air Force, local, state and federal agencies to include permitting, execution of field investigation, development of remedial alternatives and report preparation. Project specific activities included tracking of project work progress and budget, cost estimating, and subcontracting. The RI/FS project included preparation of a Proposed Plan and a Record of Decision sequel to the FS. Employed cost effective investigation approaches that saved client up to \$25,000.

**Project Engineer** on a Concept Base Development Plan project designed for the

OLA A. AWOSIKA  
 Senior Geological Engineer/Geophysicist  
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reconstruction of Homestead AFB. The Plan outlines general guidelines for the reconstruction and future development of Homestead AFB, Florida. The Plan documents existing conditions of the Base and the development of three land use concept plans for consideration. Provided information on past and recent IRP studies on the Base and potential impacts to reconstruction efforts. Information provided was used in planning siting of new facilities and/or relocation of existing infrastructure.

**Project Manager** for an environmental support and field investigation oversight work for a major Battery Manufacturing Company in North Carolina. Support provided included scientific evaluation of proposed investigation sites; review of plans, activities, reports; and oversight of work during execution of the field investigation. A property audit was also performed to evaluate potential environmental liabilities on a property the client was interested in purchasing.

**Technical Reviewer** on Work Plans, Quality Assurance Project Plans and reports on Site Investigation Studies (SI) and RI/FS studies for U.S. Air Force and National Guard projects and on environmental studies for industrial clients.

**Technical Director** on a geophysical investigation study for an industrial client in Georgia. The study was aimed at delineating subsurface areas consisting of Underground Storage Tanks for subsequent removal to comply with regulatory requirements.

**Project Manager** for a Drum Sampling and Waste Characterization project for a client in the Transportation Industry in Atlanta, Georgia. Project requirements included preparation of a Work Plan and Health and Safety Plan. The work performed included drum sampling, waste characterization, evaluation of analytical data, and determination of waste disposal options.

**Project Geophysicist/Hydrogeologist** on several RI/FS projects for DOD and DOE facilities. Geophysical work included magnetic, electromagnetic terrain conductivity (EM-31, EM-34), electrical resistivity, borehole logging and ground penetrating radar surveys. Designed, planned and performed hydrogeologic investigations involving design and installation of shallow groundwater monitoring wells and multiple cased deep wells (> 250 feet) to investigate vertical and lateral extent of contamination emanating from shallow sources, aquifer pumping tests and slug tests and analyses to evaluate aquifer characteristics at sites studied.

1983-1985

Recra Research Inc., Buffalo, New York. **Project Geophysicist.** Coordinated and supervised geophysical field activities at over 12 hazardous waste disposal sites (New York State D.E.C. Superfund sites). Responsibilities included preparation of geophysical investigation proposals, planning, organizing, and supervising geophysical surveys. Also, coordinated subcontracting of geophysical services.

Geophysical surveys conducted include seismic refraction, magnetic, electromagnetic terrain conductivity (EM-31 & EM-34), electrical resistivity, and borehole logging (Gamma, SP and Resistivity). Objectives of these surveys at sites investigated included delineation of waste site boundaries, subsurface stratigraphic relationship, characterization of site wastes and fill materials, and tracking of groundwater contaminant plumes. Performed data reduction, analyzed and interpreted acquired field data, and prepared technical reports of the surveys.

Assisted in supervising installation of groundwater monitoring wells, performing general assessment of sites hydrogeology, media sampling and evaluation of analytical data, evaluation of geotechnical properties of soils, and design and analysis of earthwork. Other assignments involved applications of statistical analyses to evaluate

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Senior Geological Engineer/Geophysicist  
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- environmental data.
- 1981-1983 Department of Geological Sciences (Geophysics Section) State University of New York, Buffalo. Graduate School Research Assistant. Research focused on evaluation of Upward and Downward Continuation analyses pertinent to enhancing resolution of observed magnetic anomaly fields.
- 1979-1981 Consulted for small foreign businesses interested in state-of-the-art well drilling techniques, purchase and sales of drilling equipment, potential services for constructing surface water reservoirs and partnership in groundwater supply ventures and in design and analysis of earthwork. Services provided also included furnishing information on geophysical exploratory equipment, in particular for shallow subsurface mineral exploration and oil exploration work.

#### EDUCATION

- B.S., Geological Engineering, 1980, University of Mississippi, Oxford, Mississippi  
M.A., Geology (Geophysics), 1983, State University of New York at Buffalo, Buffalo, New York

#### PROFESSIONAL AFFILIATIONS

- Registered Environmental Manager (1994, No. 7054)  
Registered Professional Geologist (Tennessee 1989, No. 1043; South Carolina 1988, No. 836)  
Licensed Geologist (North Carolina 1987, No. 645)  
Engineer-in-Training (Mississippi, 1980, No. T-2876)  
National Society of Professional Engineers  
Society of Exploration Geophysicists  
National Water Well Association

#### CERTIFICATION

- OSHA's Trenching and Excavation Standard Competent Person Training.

#### PAPERS AND PUBLICATIONS

"Geophysical Interpretation of Magnetic Data from the Northeastern United States and Adjoining Part of Canada," research paper submitted in partial fulfillment of the requirement for Masters degree program, 1983.

"Innovative Technique to Confirm Presence and Migration of Free Product in a Complex Subsurface Condition," presented at the Department of Energy (DOE) Model Conference, October 1989.

"Geophysical Sensing on a Lake to Determine Subsurface Geological Conditions and Possible Presence of Lead Deposit," presented at the Department of Energy (DOE) Model Conference, October 1989.

"Initial Results from a Bioventing System with Vapor Recirculation" to be presented at the Second International Symposium on In Situ and On-Site Bioreclamation, April 1993 (coauthors D. Downey, E. Staes).

"Fuel Biodegradation Rates from a One Year Full Scale Bioventing Study for Cleanup of Petroleum Contaminated Soils" Superfund XIV Conference and Exhibition, HMCRI, November 1993 (coauthors D. Downey, Carl W. Scharfe, and Jim Williams).



**Biographical Data****RANDY L. ADAMS**

Civil Engineer

**EXPERIENCE SUMMARY**

Civil engineer with fifteen years of diversified management, decision making, and problem solving experience in the engineering and intelligence fields. Extensive background in project and personnel management. Five years construction and environmental engineering experience with a major oil company, including underground storage tank system replacement and upgrade; and environmental site assessments and remediation.

**EXPERIENCE RECORD**

- Feb. 1993  
Date Parsons Engineering Science. **Program Manager** (1993-Date). Principal program manager of underground storage tank (UST) services for major oil clients. Supervise all phases of UST work performed by the office including UST system design; supervision of UST excavation, closure, and replacement; performance of site assessments; aquifer testing; remedial system design, installation, and operation; groundwater monitoring; and preparation of state reimbursement packages. Provide technical guidance and assistance to project managers on UST projects. Serve as the primary point of contact with clients for technical, financial, and scheduling aspects of all UST projects.
- Assistant Project Manager** (1995-Date). Deputy project manager for the U.S. Army Corps of Engineers, Huntsville Center (CEHNC) Ordnance and Explosives (OE) investigation at Duck, North Carolina. Responsible for the coordination and scheduling of the GIS and UXO subcontractors and for the scheduling and preparation of the Engineering Evaluation/Cost Analysis (EE/CA) and EE/CA Action Memorandum for the site.
- Assistant Project Manager** (1995-Date). Assistant project manager for the Army's Engineering Evaluation/Cost Analysis (EE/CA) ordnance investigation at Camp Simms, a former US Army base in Washington, D.C. Responsible for the technical, budget, and scheduling aspects of this \$1 million US Army Corps of Engineers project. Specific activities performed include the preparation of a work plan, health and safety plan, site investigation reports, and an EE/CA report for the ordnance clearance investigation of the site.
- Project Manager** (1993-1995). Project manager responsible for the administration and execution of the EE/CA ordnance removal project at the US Army's Spring Valley site in Washington, D.C. Planned, coordinated, and managed the technical, budget, and schedule aspects of this \$650,000 US Army Corps of Engineers project. The project included the preparation of a work plan, health and safety plan, site investigation reports, and an EE/CA document. Served as the primary point of contact with the client for all technical and administrative aspects of the project. Ensured that all in-house and subcontract work was performed on schedule, within budget, and was of high quality.
- April 1990  
Feb. 1993 Mobil Oil Corporation, Reston, Virginia. **Environmental Project Manager**. Planned, coordinated, and managed environmental engineering projects at Mobil Oil's marketing outlets and terminals over a three state area. Successfully managed over 115 environmental projects worth over \$6 million, which included emergency response, site investigations, remediation, and monitoring. Saved company over \$600,000 through competitive bidding of projects and streamlining internal procedures. Initiated new multi-year contract for recycling of contaminated soils that will save the company millions in the coming years. Recipient of

RANDY L. ADAMS  
 Civil Engineer  
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Mobil Oil's outstanding achievement award for 1990.

May 1988  
 April 1990  
 Mobil Oil Corporation, Fairfax, Virginia. **Construction Project Manager.** Planned, coordinated, and managed construction projects for Mobil Oil's Marketing Operations Division. Successfully completed over \$17 million in construction projects over a two-year period. Projects included complete ground up construction, as well as modifications to existing facilities. All projects completed within limited dollar constraints, under strict time tables, and with excellent quality. Cross trained in design, layout, and estimating of construction projects. Developed new computerized spreadsheet for estimating construction jobs. Initiated critical path planning and implementation of construction projects to speed up construction times and minimize costs.

Feb. 1985  
 May 1988  
 US Army, Arlington, Virginia. US Army Intelligence and Security Command. **Plans Officer.** Developed and coordinated the INSCOM Plan - the keystone document for the command's program plan. Initiated and developed planning procedures to provide resources for over 60 percent of the command's units. Conceived and instituted a system to integrate over one third of the command's units into the planning process. Managed a \$150K contract providing computer-supported analysis to the planning process.

Feb. 1983  
 Feb. 1985  
 US Army, Republic of Panama. **Battalion Staff Intelligence Officer** (1983-1985). Organized, directed, and coordinated all intelligence operations for an airborne infantry battalion. Provided all intelligence analysis for the battalion's operations. Restructured and redirected the day-to-day operations of the intelligence section to enhance the accuracy, timeliness, and responsiveness of the section to the unit. Provided briefings to the unit's leadership on the latest developments in the region.

**Support Platoon Leader** (1982-1983). Led a support platoon for an independent intelligence company. Managed all the unit's maintenance and support for over 50 vehicles and over \$50 million of communications and electronic warfare equipment. Developed and implemented new maintenance procedures which decreased by over 65 percent of the company's equipment downtime. Led the unit through its first successful annual inspection in three years.

**EDUCATION**

- B.S., Engineering Management, June 1981, U.S. Military Academy, West Point, New York
- Military Intelligence Officer's Advanced Course, 1985
- Mobil Construction Engineering Training Program, 1988
- Mobil Environmental Engineering Training Program, 1990
- Mobil Total Quality Management Training Program, 1992
- 40-Hour OSHA Hazardous Waste Training, 1993

**Biographical Data****DON M. SILKEBAKKEN****Environmental Engineer****EXPERIENCE SUMMARY**

Experienced in the management and implementation of hazardous waste preliminary site assessments, site investigations, feasibility studies, and remedial actions utilizing the applicable procedures and guidelines of CERCLA, RCRA, USEPA, and local regulatory agencies. Experienced in the preparation and review of Sampling Analysis Plans (SAPs); including Work Plans, Health and Safety Plans, and Quality Assurance Project Plans (QAPPs); and technical reports including treatability study reports, site closure reports, Storm Water Pollution Prevention Plans (SWPPPs), Site Investigation (SI) Reports, Preliminary Contaminant Assessment Reports (PCARs), Feasibility Study (FS) Reports, and RCRA Facility Investigation (RFI) Reports. Proficient in environmental sampling protocols, monitoring well installation techniques, low temperature thermal volatilization (LTTV) operations, bioventing, and landfill degradation chemistry.

**EXPERIENCE RECORD**

1990-Date Parsons Engineering Science, Inc. **Project Manager** for an Installation Restoration Program (IRP) site investigation of an active industry painting facility located within Eglin Air Force Base (AFB), Florida and designated as a solid waste management unit (SWMU) under part II of the Base's RCRA/HSWA Permit. Directed and supervised iterative field efforts involving extensive area reconnaissance, monitoring well installations, and environmental sampling of soils, groundwater, surface water, and sediments. Low-flow groundwater sampling techniques were utilized to provide representative inorganic concentrations (elevated by excessive turbidity) following approval of USEPA Region IV and Florida Department of Environmental Protection (FDEP). Developed, negotiated, and prepared subcontractor documents for laboratory, surveyor, and driller. Following evaluation of the analytical data, inclusive of contaminant fate and transport models and identification of applicable or relevant and appropriate requirements (ARARs), a qualitative ecological survey/evaluation and a quantitative public health evaluation were conducted. A technical document to support No Further Action was submitted to the regulators and approved.

**Project Manager** for large IRP site investigation consisting of multiple monitoring well installations, advancement of confirmatory soil borings, and environmental sampling of various media at seven landfills and two industrial shops. Directed the field efforts, selected and coordinated subcontractors, and interpreted analytical data. Prepared a comprehensive SI report and five technical documents to support No Further Action. Remedial actions were developed for sites where contaminant migration posed a threat to human or environmental receptors. Supervised preparation of an electronic data deliverable (IRPIMS).

**Project Engineer** for multimillion dollar IRP Low Temperature Thermal Volatilization (LTTV) treatability study of approximately 75,000 tons of petroleum-contaminated soils from 14 underground storage tank (UST) CERCLA sites at Chanute AFB, Illinois. The project involved mobilization of one of the largest direct-fired LTTV units in operation with a feed rate of 80 to 120 tons of soil per hour. Responsible for coordinating field activities involving multiple subcontractors to maintain efficiency and minimize down time, providing guidance and oversight to the field sampling team, conducting daily briefings for the Air Force Base Conversion Agency (AFBCA) staff, and communication with the analytical laboratory. Other project activities included ambient air monitoring, innovative sample collection techniques, and Level C personal protection. **Task Manager** for coordination and

DON M. SILKEBAKKEN  
Environmental Engineer  
Page 2

preparation of a Treatability Study Evaluation Report (TSER) detailing site activities, describing the effectiveness of the process, and evaluating the feasibility of remediation by this technique at other Air Force sites.

**Project Engineer.** Directed field activities for a hazardous waste removal action involving the excavation, management, disposal, and restoration of a CERCLA landfill site located in Walker County, Georgia. Interacted with EPA on-scene coordinator during the voluntary removal of over 66,000 cubic yards of contaminated soil and drummed chemical waste. The project also involved the removal of two USTs and numerous drums from the site. Contaminants of concern at the site included pesticides and a variety of chemical manufacturing by-products.

**Project Engineer** for installation of a bioventing system to remediate petroleum-contaminated soils at a former gasoline station site at Gunter AFB in Alabama using oxygen to stimulate the growth of indigenous microbes. Supervised installation of air injection and monitoring point wells, performed permeability tests to assess radius of influence, and conducted respiration tests to evaluate biological activity.

**Project Engineer** for the development of a SWPPP for Robins AFB, Georgia. Conducted tracer dye tests to map stormwater routes, identified industrial waste discharges, collected discharge samples during rain events, and assisted in preparation of the final plan. The SWPPP was prepared in conformance with the regulatory compliance requirements of the State of Georgia's general permit for authorization to discharge stormwater associated with industrial activity under the NPDES program.

**Project Engineer.** Coordinated preparation of a Herbicide Orange (HO) SI Report detailing the status of eight known sites where herbicide orange was either handled or disseminated at Eglin AFB, Florida. Responsible for data evaluation and interpretation as well as development of recommendations consistent with requirements for CERCLA sites. Conducted field sampling activities (including biota sampling) and identified and removed HO drums submerged in Base surface waters.

**Project Engineer.** Responsible for development of Petroleum Contamination Assessment Report (PCAR) for seven former UST sites at Eglin AFB, Florida, following site visits, personal interviews, and records search.

**Project Engineer.** Prepared an RFI Report documenting the investigation of a RCRA permitted SWMU consisting of a closed landfill at Eglin AFB, Florida, known to have received various hazardous materials. Contaminants of concern included pesticides, herbicides, and PCBs.

**Project Engineer.** Comprehensive project involvement in preparation of a multimillion dollar Preliminary Assessment (PA) Report to evaluate 200 potential hazardous waste sites ranging from drum disposal areas, landfills, industrial shops, HO sites, fire training areas, and bombing ranges at Eglin AFB, Florida. Provided technical and Base specific support to the field team. Developed recommendations for elimination of sites from further investigations or continuation to the site investigation phase based on site reconnaissance efforts, review of pertinent reports and Base records, personnel interviews, and interpretation of archival aerial photographs.

**Project Engineer.** Responsible for preparation of a SAP, associated scoping documents, and RI/FS report for USEPA Region VI Superfund site in Arkansas consisting of a sludge pit containing metal plating waste. Established criteria for selection of monitoring well locations, developed guidelines for data quality objectives, and performed subcontractor negotiations. Conducted environmental sampling and aquifer pump testing to characterize hydrologic conditions at the site. Researched and prepared a detailed FS Report for

DON M. SILKEBAKKEN  
Environmental Engineer  
Page 3

remediation of both soils and groundwater at the site.

**Project Engineer** responsible for coordination of an RI Report for six IRP sites including four landfills and two fire training areas at Chanute AFB, Illinois. Tasks included validation of analytical data based on HAZWRAP guidelines, evaluation of the data based on ARARs, and development of recommendations for remedial actions. Prepared an FS for the four landfills detailing the selection of a capping alternative.

**Project Engineer** responsible for preparation of eight "No Further Action" Decision Documents for IRP sites investigated during a limited SI at Eglin AFB, Florida. Interpreted and presented data to the regulators to reflect the validity of the proposed no further action objective.

1989-1990 University of South Florida, Tampa, Florida. **Research Assistant** in environmental engineering. Emphasis on landfill degradation parameters and recycling technologies. Operated pilot scale landfill leachate recirculation cells for the State of Florida to evaluate waste degradation potential. Diversified course studies included urban water and industrial wastewater treatment, physiochemical processes, hazardous waste treatment and management, fate of contaminants, and air pollution.

Selected to represent new environmental engineering graduates at the "Municipal Solid Waste Landfills: Problems and Issues" workshop presented by the Center for Solid and Hazardous Waste Management. Actively participated in brainstorming sessions with regulators, consultants, landfill operators, and academia. Results published in conference proceedings.

#### EDUCATION

B.S., Industrial and Systems Engineering, 1986, Georgia Institute of Technology, Atlanta, Georgia  
M.S., Environmental Engineering, 1990, University of South Florida, Tampa, Florida

#### PROFESSIONAL AFFILIATIONS

Registered Professional Engineer (Georgia, No. 22173)

#### PAPERS AND PUBLICATIONS

"Method for Screening Right of Way for Hazardous Materials" Field Handbook on property and easement acquisitions for the State of Florida Department of Transportation and interactive computer database, November 1989 (coauthors R. J. Murphy, and R. I. Stessel).

"Paper Waste: Reduction/Recycle/Incineration", M.S. Thesis/Project, University of South Florida, July 1990.

"Waste Reduction/Recycle of Plastic and Paper Waste" Florida Center of Solid and Hazardous Waste, July 1990 (coauthors R. J. Murphy, and T. Chatchupong).

"Reduction of Polycyclic Aromatic Hydrocarbons (PAHs) from Petroleum - Contaminated Soil using Thermal Desorption Technology," presented at Hazardous Materials Control Resources Institute Superfund XVI Conference, Published in Proceedings November 1995 (coauthor H. Allen Davis)

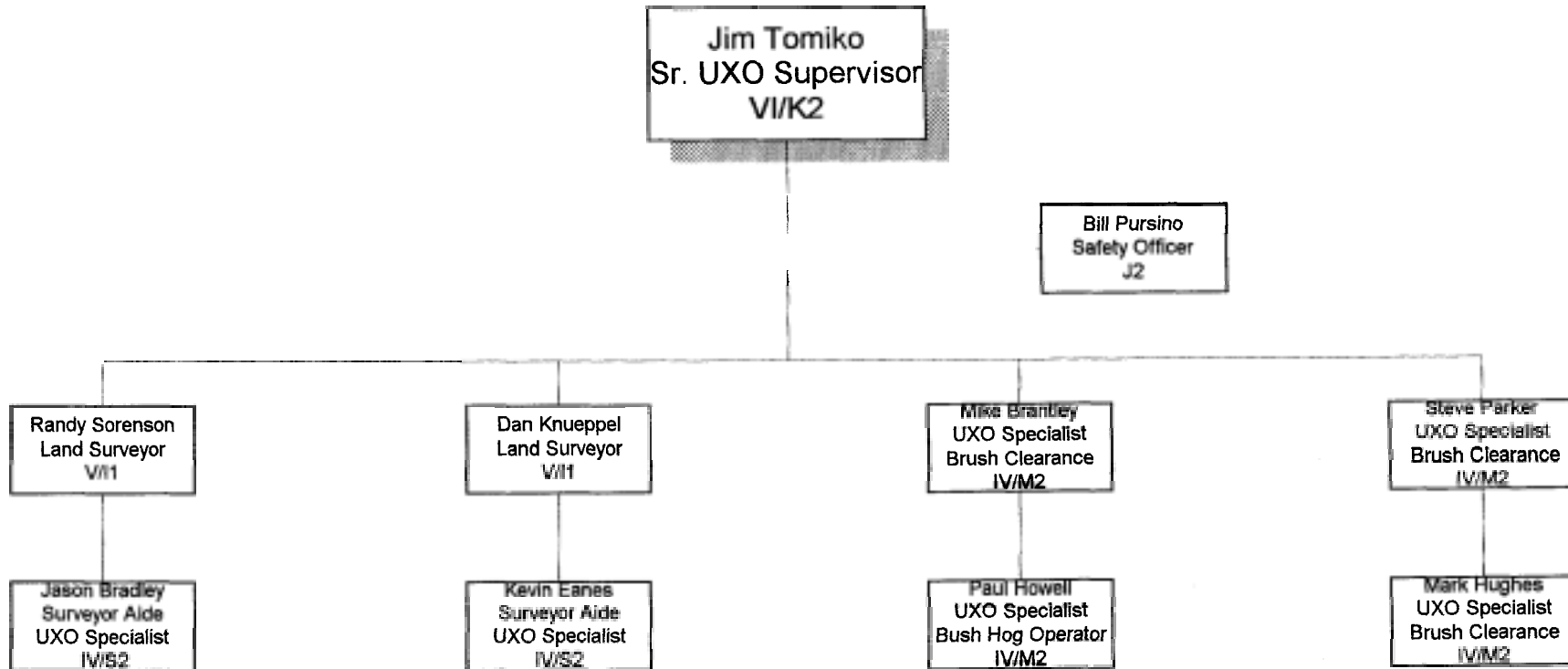
"Large Scale Soil Remediation Using Low Temperature Thermal Volatilization Technology at the Chanute Air Force Base." Published in Proceedings of Hazardous Materials Control Resources Institute Superfund XVI Conference, November 1995 (coauthor H. Allen Davis)

**UXB PERSONNEL**

# Camp Croft

## **BRUSH CLEARING EFFORT**

November 22, 1996

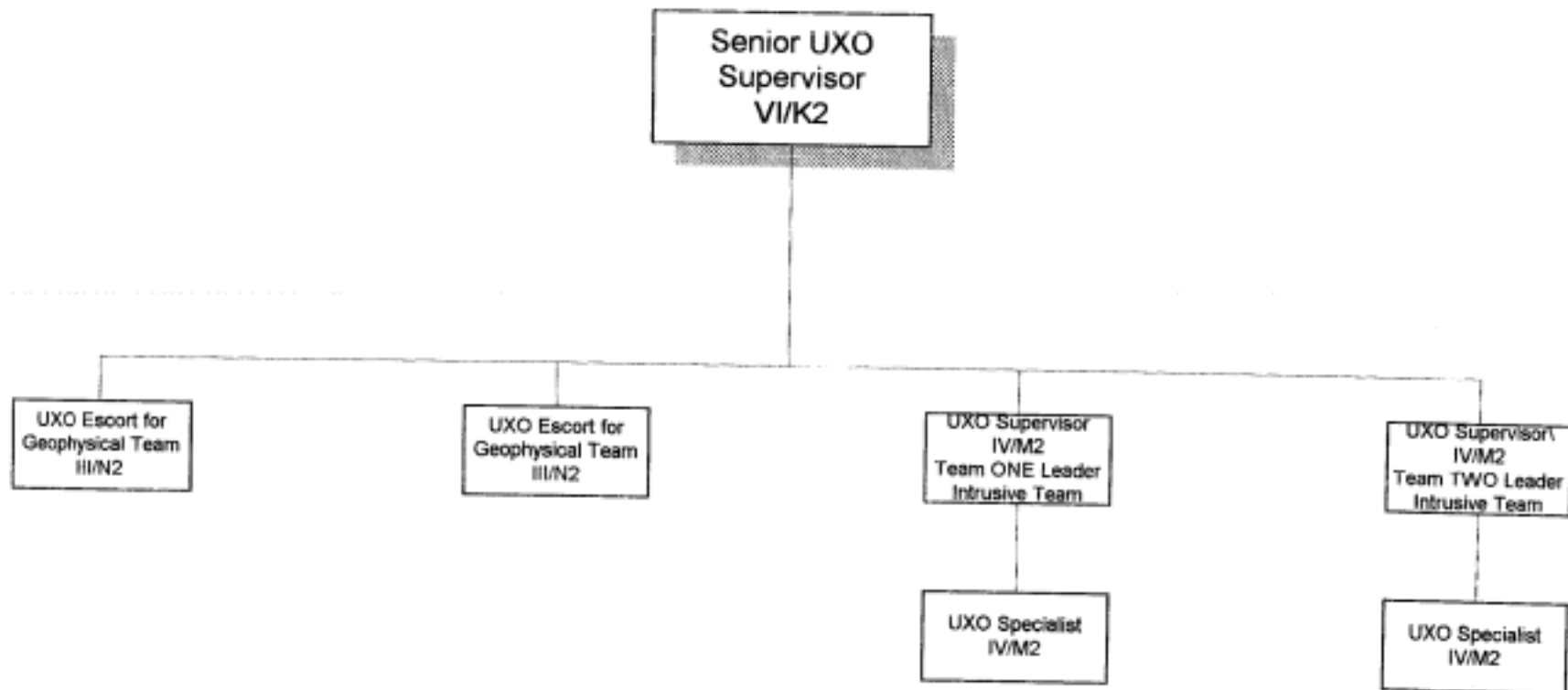


- Brush Clearance is budgeted for 13 Working Days
- Work Week consist of five 8-hour days
- 210 (50' X50') Grids are to be cleared

# Camp Croft

## **INTRUSIVE INVESTIGATION EFFORT**

November 21, 1996



- Investigation is budgeted to last 13 Working Days
- Work Week consist of five 8-hour days
- 240 (50' X50') Grids are to be investigated



**JAMES TOMIKO**  
**SENIOR UXO SUPERVISOR**

**Years of Civilian UXO Experience: 3 years, 5 months**

**CIVILIAN UXO EXPERIENCE:**

03/93-Present      UXB International Inc., UXO Supervisor and Senior UXO Supervisor. Participated in the ordnance location, identification, and disposal at Ft. Meade, MD; Raritan Arsenal, NJ; former Morgan Depot, NJ.

**Years of Military EOD Experience: 17 years, 3 months**

**MILITARY EOD EXPERIENCE:**

01/92-01/93      EOD Mobile Unit Six, Charleston, South Carolina, Master EOD Tech. Manager of 18 personnel Preventative Maintenance Work Center and Supervisor of a 7-man mine/countermeasure team.

12/88-12/91      Naval School EOD, Indian Head, MD, EOD Instructor.

07/85-11/88      EOD Fleet Liaison Unit, Indian Head, MD, EOD Technician. Performed render safe procedures of unknown hazardous ordnance.

10/83-06/85      EOD Mobile Unit Two, Ft. Story, VA, Master EOD Technician. Provided surface and underwater EOD services to Navy bases and ships.

12/78-08/83      EOD Detachment, Keyport, WA. EOD Technician. Performed range clearances and diving operations.

10/75-11/78      EOD Mobile Unit One, West Loch, HI, EOD Technician. Provided EOD emergency services, range clearance support, and diving operations.

**MILITARY EOD EDUCATION:**

U.S. Naval EOD School Basic	26 weeks	10/75
EOD Refresher	3 weeks	12/78
EOD Refresher	9 weeks	10/83

**PHYSICIAN'S STATEMENT**

FOR APPLICANT OR EMPLOYEE OF UXB INTERNATIONAL, INC

NAME: JAMES TOMIKO

DATE OF EXAM: 4/18/96

TYPE OF EXAM (pre-employment, annual, or other) ANNUAL-HAZMAT

DATE OF BIRTH: 3/14/49 SOC. SEC.#: 074-38-5301

The individual named above has:

1). Undergone a physical examination per OSHA (29 CFR 1910.120) and has been found medically:

qualified for hazardous site work  
 not qualified for hazardous site work\*

2). Undergone a physical examination per OSHA (29 CFR 1910.120) and has been found medically:

qualified to use respiratory equipment  
 not qualified to use respiratory equipment\*

Physician's Signature: James T Bellamy M.D.

Printed Name of Physician: JAMES BELLAMY, DO

Address: 135 RARITAN CTR PKWY, EDISON, NJ 08837

Phone Number: 908-225-5454

Physician's State License Number: MB42789

Copies of test results are maintained and available at:  
same address as above

Address

OSHA 1910.120 states that persons should not be assigned to tasks requiring the use of respiratory equipment unless it has been determined that they are physically able to perform the work and use the equipment safely.  
\* The physician should append his report detailing the reasons for this opinion.

# Naval School

## Explosive Ordnance Disposal



This certifies that

AVIATION ORDNANCEMAN SECOND CLASS JAMES M. TOMIKO, USN, 074-38-5301

having successfully completed  
the prescribed course of study for

NAVY BASIC EXPLOSIVE ORDNANCE DISPOSAL

is awarded this  
Certificate

this 17TH day of OCTOBER A.D. 1975

*D. L. Schatble*  
D. L. SCHATBLE, CDR, USN

COMMANDING OFFICER

# Certificate of Training



this certifies that

***James Tomiko***

has completed the requirements for  
**8 Hour Refresher** Hazardous Waste Operations  
in accordance with **OSHA 29 CFR 1910.120 (e) (8)**

  
Certifying Official

12-31-95  
Date

# *Certificate of Training*

**HazTrain, Incorporated**

*proudly presents this award for  
educational achievement to*

*James M. Tomiko*

*for satisfactorily completing the course of*

**40 Hour Health and Safety Training for Hazardous  
Waste Operations and Emergency Response**

**June 21-25, 1993**



**HazTrain, Inc.**

P. O. BOX 2206 LA PLATA, MARYLAND 20646 (301) 932-0994

*James R. Harris*  
Instructor

*Jerry L. Smith*  
President

# CERTIFICATE OF TRAINING

UXB INTERNATIONAL, INC.

*proudly presents this award for  
educational achievement to*

**James Tomiko**

*for satisfactorily completing the course of*

8 Hour Site Supervisor  
23 July, 1993

  
Certifying Official

**WILLIAM F. PURSINO  
SITE SAFETY OFFICER**

**Years of Civilian UXO Experience: 2 years, 11 months**

**CIVILIAN EOD EXPERIENCE:**

09/93-Present UXB International, Inc. Performed duties as UXO Specialist at Fort Drum, NY, Michaelsville Landfill, MD, Raritan Arsenal, NJ, and Aberdeen Proving Grounds, MD. Quality Control Specialist/Site Safety Officer, Raritan Arsenal, NJ. Conducted ordnance sweeps and geophysical searches using the MK-26 ordnance detector and magnetometers.

**Years of Military Experience: 15 years**

**MILITARY EOD EXPERIENCE:**

12/90-06/93 EOD Training and Evaluation Unit Two, Ft. Story, VA, Master EOD Technician; Curriculum Instructional Standards Officer; Command Senior Chief; Special Operations/Low Intensity Conflict Program Coordinator. Scheduled, tracked and monitored all training plans for the entire Atlantic Fleet EOD community.

06/88-12/90 EODGRUTWO Detachment Guantanamo Bay, Cuba, Master EOD Technician. Duties involving detection, identification, render safe and disposal of all explosive ordnance (foreign and domestic), nuclear weapons and biological munitions. Detachment Leading Chief Petty Officer. Supervised the safe removal and disposal of over 6,500 armed anti-tank and anti-personnel mines from the world's largest operating minefield. Supervised the safe disposal of over 70,000 ordnance items and 25,000 pounds of smokeless powder. Demolition Supervisor; Diving Supervisor.

02/85-05/88 EODMUTWO, Ft. Story, VA, Master EOD Technician. LCPO Detachment 18 embarked in USS Mt. Baker and LCPO Detachment 26 embarked in USS Seattle. Provided leadership and technical assistance in rendering safe the armed Exocet warhead on-board USS Stark. Diving Supervisor; Demolition Supervisor; Small Arms Instructor.

01/80-02/85 EODTEUTWO, Ft. Story, VA, Senior/Master EOD Technician. Diving department instructor for MK VI and SCUBA, underwater department division supervisor and instructor, EODTEUTWO Emergency Response team member, hydrostatic test equipment operator. Developed a render safe procedure for underwater ordnance now in use by the EOD community.

06/78-12/79 COMEODGRUTWO, Ft. Story, VA, EOD Technician. Leading Petty Officer Detachment "W" embarked in USS Independence. Cleared over 30 tons of munitions.

**MILITARY EOD EDUCATION:**

U.S. Naval EOD School            06/78  
U.S. Army Chemical Phase I    06/78

**PHYSICIAN'S STATEMENT**

(Includes diving clearance)

FOR APPLICANT OR EMPLOYEE OF UXB INTERNATIONAL, INC.

NAME: PURSINO, William

DATE OF EXAM: 8 MAR 96

TYPE OF EXAM (pre-employment, annual, or other): Minimum level

DATE OF BIRTH: 02 Oct 1957 SOCIAL SECURITY NO.: 128-44-9084

The individual named above has:

1.) Undergone a physical examination per OSHA (29 CFR 1910.120) and has been found medically:

- qualified for hazardous site work
- not qualified for hazardous site work\*

2.) Undergone a physical examination per OSHA (29 CFR 1910.134 (b) (10)) and has been found medically:

- qualified to use respiratory equipment
- not qualified to use respiratory equipment\*

3.) Undergone a physical examination per OSHA (29 CFR 1910, subpart L, EM 385 1.1, and U.S. Navy Diving Manual; NAVSEA 0994-LP-001-9010) and been found medically:

- qualified to perform surface supplied/ SCUBA diving operations to 130 feet (salt water)
- not qualified to perform surface supplied/ SCUBA diving operations

Physician's Signature: [Signature] S. K. YDWEIL

Printed Name of Physician: CAPT, MC, USN  
O FP 510-58-4864

Address: B. Ct Sewall Point 1721 TAUSSIG BLVD, NORVA 23571

Phone Number: 804 ~~688-6346~~ (804) 677-6346 / 6395

Physician's State License Number: Ohio 40044

Copies of test results are maintained and available at:

[Signature]  
Address

OSHA 1910.130 states that persons should not be assigned to tasks requiring the use of respiratory equipment unless it has been determined that they are physically able to perform the work and use the equipment safely.  
\* The physician should appear in report detailing the reasons for this opinion.

Previous records were obtained and reviewed. Finding was negative.

[Signature]

S. R. WARLICK  
CAPT, MC, USN  
N ED 100 07 9900



# Certificate of Training



this certifies that

***William Pursino***

has completed the requirements for  
**8 Hour Refresher Hazardous Waste Operations**  
in accordance with OSHA 29 CFR 1910.120 (e) (8)

  
Certifying Official

  
Date

# *Certificate of Training*

**HazTrain, Incorporated**

*proudly presents this award for  
educational achievement to*

*William F. Pursino*

*for satisfactorily completing the course of*

**40-Hour Health and Safety Training for  
Hazardous Waste Operations and Emergency Response**

**September 30, 1993**



**HazTrain, Inc.**

P. O. BOX 2238 LA PLATA, MARYLAND 20646 (301) 832-0664

*Instructor*

*President*



Naval School  
Explosive Ordnance Disposal

**Certificate of Completion**

*Presented To*

RADIOMAN SECOND CLASS  
W.M. PURSINO


---

For having successfully completed  
the prescribed course of study for

EXPLOSIVE ORDNANCE DISPOSAL PHASE II

02 June 1978

Date

  
JOHN J. WALSH, CDR, USN

Commanding Officer

**MICHAEL BRANTLEY  
UXO SPECIALIST**

**Years of Civilian UXO Experience: 2 years, 3 months**

**CIVILIAN UXO EXPERIENCE:**

- 08/94-Present UXB International, Inc., Supervised clearance operations at Superior Valley Gunnery Range, CA; Idaho National Engineering Labs, ID; Ft Drum, NY; Ft. Sheridan, IL; and Black Hills Army Depot, SD. Conducted UXO research and ordnance identification. Encountered Naval projectiles, bombs, and projectiles. UXO Specialist performing range clearances at American University, Washington, D.C., Longhorn Army Ammunition Plant, TX; Camp Siebert, AL; and Ft. Monroe, VA. Encountered cannon balls, projectiles, and small arms ammunition; UXO Specialist. Surface/Subsurface clearance at former Motlow Range, TN. Ordnance encountered: 37mm; Site Safety Officer at Ft. Irwin, CA.; BlackHills, SD.
- 08/91-09/91 Crane Army Ammunition Activity. Participated in "grass roots" project. Disposed of HE projectiles and assorted pyrotechnics.

**Years of Military EOD Experience: 6 years, 2 months**

**MILITARY EOD EXPERIENCE:**

- 08/92-08/93 Combat Development, OMMCS, Branch Chief. Supervised development and integration of organization and structure, and equipment requirements for U.S. Army EOD forces. Supervised 2 civilian and 3 military EOD action officers.
- 03/91-08/92 HHC Command and Staff, OMMCS, C&S EOD Liaison Officer. Instructed junior officers and senior NCOs in the identification, storage, transportation, and use of demolition materials and ammunition. Safety Officer on live fire demolition range.
- 02/91-03/91 EOD Center, OMMCS, Project Officer. Evaluate Army EOR program. Research and develop training package and training aids/training publication for ordnance safety program for Operations "Desert Shield/Desert Storm".
- 07/87-01/91 259th EOD Det., Commander. Provided EOD services to National Training Center and law enforcement agencies in California and Nevada. Supervised 20 EOD technicians on EOD incident response and ordnance destruct operations. Responded to incidents involving HE, WP, practice projectiles, rockets, dropped munitions, hand grenades, and pyrotechnics. Additional duty as EOD staff officer to 1990 Goodwill Games. Developed Army EOD support requirements including personnel, equipment, and training. Supervised 7 EOD response teams.

**MILITARY EOD EDUCATION :**

US Naval EOD School	6/87	EOD Refresher	4/89
Advanced Disablement	2/88	Advanced Demolitions	8/84



*Naval School*  
*Explosive Ordnance Disposal Detachment*

*Certificate of Completion*

*Presented to*

**ILT MICHAEL R. BRANTLEY, USA**

---

*For having successfully completed  
the prescribed course of study for*

**EXPLOSIVE ORDNANCE DISPOSAL - SURFACE**

---

**4 JUNE 1987**

---

*Date*

*M. N. Cerino*  
**M. N. CERINO, CDR, USN**

---

*Officer in Charge*

# Certificate of Training



this certifies that

*Michael Brantley*

has completed the requirements for  
**8 Hour Refresher Hazardous Waste Operations**  
in accordance with **OSHA 29 CFR 1910.120 (e) (8)**

  
Certifying Official

12-31-95  
Date

# Certificate of Training



this certifies that  
*Michael Brantley*

has completed the requirements for  
**40 Hour Training**  
**Hazardous Waste Operations**  
In accordance with OSHA 29 CFR 1910.120

*Tom Young*  
Certifying Official

15 Aug 94

PHYSICIAN'S STATEMENT

FOR APPLICANT OR EMPLOYEE OF UXB INTERNATIONAL, INC.

NAME: Michael Brantley

DATE OF EXAM: 7/23/90

TYPE OF EXAM (~~pre-employment~~/annual, ~~of~~/~~other~~): annual

DATE OF BIRTH: 6/30/61 SOCIAL SECURITY NO.: 502-02-6456

The individual named above has :

1.) Undergone a physical examination per OSHA (29 CFR 1910.120) and has been found medically :

- (  ) qualified for hazardous site work  
(  ) not qualified for hazardous site work\*

2.) Undergone a physical examination per OSHA (29 CFR 1910.134 (b) (10)) and has been found medically :

- (  ) qualified to use respiratory equipment  
(  ) not qualified to use respiratory equipment\*

Physician's Signature: Victoria Anderson

Printed Name of Physician: Victoria A. Anderson

Address: 130 N 14th 15th Str Hot Springs S.D. 57747

Phone Number: (605) 7455770

Physician's State License Number: 2688

Copies of test results are maintained and available at :

SHGH 209 N 16th Str Hot Springs S.D. 57747  
Address

OSHA 1910.120 states that persons should not be assigned to tasks requiring the use of respiratory equipment unless it has been determined that they are physically able to perform the work and use the equipment safely.

\* The physician should append his report detailing the reasons for this opinion.



**STEVEN D. PARKER**  
**UXO Specialist**

**Years of Civilian UXO Experience: 2 years, 10 months**

**CIVILIAN UXO EXPERIENCE:**

10/93-Present            UXB International, Inc., UXO Technician performing range clearance operations at various sites including Ft. Meade, MD, American University, Washington, DC and Seneca Army Depot, Seneca, NY. Sr. Site Supervisor at Spring Valley, Washington, DC. Responsible for geophysical and magnetometer investigations, supervised 4 man team sweeps. Surface UXO identification. Site Safety Officer at Ft. Ord, CA; UXO Specialist at Black Hills Army Depot, SD; Site Safety Officer at Crab Orchard, IL.

**Years of Military EOD Experience: 20 Years**

**MILITARY EOD EXPERIENCE:**

12/89-09/92            7015 EOD Flight , Hahn AB, Germany, Superintendent, supervised 12 men EOD unit. Responsible for QA, TO, training and equipment programs. Directed EOD team member deployments and responses to agencies requiring EOD services.

10/92-04/91            Desert Shield/Storm, NCIOC and Team Leader, deployed with 5 men EOD team into Iraq to destroy enemy airbases and collect munitions and items of intelligence value. Assigned to 3rd Special Forces Group (Airborne) Kuwait responsible to provide EOD services.

12/86-12/89            3246MMS (EOD) - Eglin AFB, FL., Team Leader and Units Training NCOIC. Supervised range clearance operations and EOD support to research and development missions. Provided EOD services to DOD, U.S. Secret Service, and law enforcement agencies.

04/83-12/86            DET 1 AFESC (EOD) - Eglin AFB, FL, EOD Contingency Instructor. Trained deployed EOD team in Base Recovery After Attack (BRATT) procedures. Trained students in recognition, hazards, safety precautions, RDP and disposal of munitions under simulated combat conditions.

09/80-04/83            2701 EOD SQ, Nill AFB, UT, Assistant Team Leader and Unit Operations NCOIC. Master EOD Technician Coordinated and supervised range clearance operations covering hundreds of square miles of test and training ranges.

10/73-09/80            7016 EOD Flight. Rafupper Heyford, UK, 60th Sup SQ (EOD), Travis AFB, CA, 5072nd ABG, Galena, AK, 1st MMS EOD, MacDill AFB, FL ; various duties and responsibilities as EOD technician and Team Leader.

**MILITARY EOD EDUCATION:**

U.S. Naval EOD School    10/73  
EOD Refresher            11/77  
Advanced Refresher       11/87



*Naval School  
Explosive Ordnance Disposal Detachment*

*Certificate of Completion*

*Presented to*

**SGT STEVEN D. PARKER, USAF**

---

*For having successfully completed  
the prescribed course of study for*

**EXPLOSIVE ORDNANCE DISPOSAL - SURFACE**

---

**26 OCTOBER 1973**

---

*Date*

*M. N. Cerino*  
**M. N. CERINO, CDR, USN**

---

*Officer in Charge*

# Certificate of Training



this certifies that

***Steven Parker***

has completed the requirements for  
**8 Hour Refresher Hazardous Waste Operations**  
in accordance with OSHA 29 CFR 1910.120 (e) (8)

*Ruffin Parks*  
EPA Training Official

12-31-95  
Date

**ENGINEERING-SCIENCE  
CERTIFICATE OF TRAINING**

*This Certifies That*

*Steven D. Parker*

Employee Number: 260-06-9784

*Has Successfully Completed a 40 Hour Course of Instruction in*  
**HAZARDOUS WASTE OPERATIONS**

**In Accordance with 29CFR Part 1910.120(e)**

*Prepared and Conducted By*

**ENGINEERING-SCIENCE, INCORPORATED**  
**Pasadena, California**

May 2-6, 1994

Dates of Instruction

Fairfax Virginia

Course Location

*Timothy Mustard*  
Coordinator/Instructor

**PHYSICIAN'S STATEMENT**

FOR APPLICANT OR EMPLOYEE OF UXB INTERNATIONAL, INC.

NAME : STEVEN D. PARKER

DATE OF EXAM : 12/05/95

TYPE OF EXAM (pre-employment, annual, or other) : \_\_\_\_\_

DATE OF BIRTH : 5/23/53 SOCIAL SECURITY NO. : 262-06-9784

The individual named above has :

1.) Undergone a physical examination per OSHA (29 CFR 1910.120) and has been found medically :

- qualified for hazardous site work
- not qualified for hazardous site work\*

2.) Undergone a physical examination per OSHA (29 CFR 1910.134 (b) (10)) and has been found medically :

- qualified to use respiratory equipment
- not qualified to use respiratory equipment\*

Physician's Signature : J. P. Ambrosio

Printed Name of Physician : UMBERTO D'AMBROSIO, MD

Address : 2260 N. FREMONT ST, MONTEREY C,  
DOCTORS ON DUTY 93940

Phone Number : (408) 372-6700

Physician's State License Number : e42403

Copies of test results are maintained and available at :

OSHA 1910.120 states that persons should not be assigned to tasks requiring the use of respiratory equipment unless it has been determined that they are physically able to perform the work and use the equipment safely.

\* The physician should append his report detailing the reasons for this opinion.

**PAUL L. HOWELL  
UXO SPECIALIST**

**Years of Civilian UXO Experience: 1 year**

**CIVILIAN UXO EXPERIENCE:**

08/95-09/96           UXB International, Inc. UXO Specialist. Subsurface/surface clearance at Motlow State Community College, TN; UXO Escort at former Illinois Ordnance Plant, Marion, IL. UXO Specialist at Fort Wingate, NM.

**Years of Military EOD Experience: 6 years, 5 months**

**MILITARY EOD EXPERIENCE:**

12/74-08/76           EOD Mobile Unit One, West Loch, HI. Senior enlisted EOD Team member on board USS Mount Hood (AE-29). Explosive ordnance safety inspector for all explosive loading, un-loading and handling operations both at-sea underway replenishing and pier side operations. Diving supervisor for all required ordnance recovery and ship board requirements.

05/70-05/72           EOD Training and Evaluation Unit, Pacific, West Loch, HI EODTEUPAC Team 82, senior enlisted advisor to the South Vietnamese Navy EOD. Field operations involving the identifying and rendering safe procedures of all know, unknown and clandestine explosive devices encountered during military operations. Diving supervisor for underwater ship inspection resulting in the location, removal and rendering safe procedures of underwater mines and other explosive ordnance devices.

05/68-01/69           EOD Mobile Unit, Pacific, Team 36, West Loch, HI. Provided EOD support to the local Hawaii areas law enforcement agencies. Made numerous support field trips to the Naval Bombing Range on the island of Kahoolawe, HI. Responsible as the range safety officer for locating, identification and rendering-safe or explosive safing on un-exploded, air-dropped or ship board launched ordnance.

12/67-07/68           EOD Support Unit, Pacific, Team 33. Senior enlisted EOD Diving Technician onboard the USS Enterprise(CVN-65). Responsible for all flight deck ordnance operations during the build-up phase, arming, launching and recovery operations. Directly responsible for the actual arming of all chemical delay fuzing of ordnance. Safety inspector for handling, replenishing and systems buildup. Diving supervisor for all required ordnance recovery and shipboard requirements.

07/66-08/67           Senior enlisted EOD Diving Tech. onboard USS Kitty Hawk (CVA-63). Responsible for all flight deck ordnance operations during the buildup, arming, launching and recovery operations. Directly responsible for the actual arming of the MK36 DST. Diving supervisor for all required ordnance recovery and requirements.

**MILITARY EOD EDUCATION**

US Naval EOD School           07/66  
EOD Refresher                 04/70, 11/74

# U.S. Naval School Explosive Ordnance Disposal



This certifies that

Gunner's Mate "G" 1st Class Paul L. HOWELL, 512 88 87, USN

having successfully completed the prescribed course of study

for Explosive Ordnance Disposal

is awarded this

Certificate

this 15th day of July A.D. 1966

*K. Ploof*

K. PLOOF, CDR., USN

COMMANDING OFFICER



# Certificate of Training



this certifies that

*Paul Howell*

has completed the requirements for  
**8 Hour Refresher Hazardous Waste Operations**  
in accordance with OSHA 29 CFR 1910.120 (e) (8)

*[Signature]*  
Certifying Official

*12-31-95*  
Date



# The Environmental Technology Center

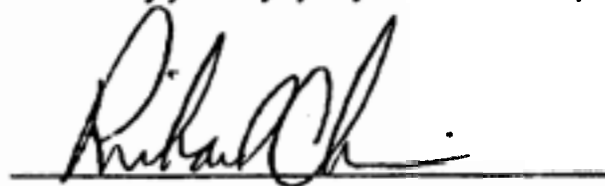
certifies that

**Paul L. Howell**

has successfully completed the

**40 Hour Initial Safety and Health training requirements for  
Hazardous Waste Operations and Emergency Response**

*In compliance with 29 CFR 1910.120(e)(3) and is awarded this Certificate No. 220  
Issued on this twenty-first day of July, 1995, in Tampa, Florida*



Richard Chinn, Director of Training



Environmental Technology Center  
9225 Bay Plaza Blvd., Suite 407, Tampa, FL 33619-4448  
PH: 813-621-8848 FAX: 813-621-0153

07-12-96 11:28 7037243525

UXB INTL INC

002

PHYSICIAN'S STATEMENT

FOR APPLICANT OR EMPLOYEE OF UXB INTERNATIONAL, INC.

NAME: Paul Howell

DATE OF EXAM: 7-11-96

TYPE OF EXAM (pre-employment, annual, or other): annual

DATE OF BIRTH: 9-20-39 SOCIAL SECURITY NO.: 058-30-7292

The individual named above has :

1.) Undergone a physical examination per OSHA (29 CFR 1910.120) and has been found medically :

- qualified for hazardous site work
- not qualified for hazardous site work\*

2.) Undergone a physical examination per OSHA (29 CFR 1910.134 (b) (10)) and has been found medically :

- qualified to use respiratory equipment
- not qualified to use respiratory equipment\*

Physician's Signature: [Signature]

Printed Name of Physician: Robert Dimusi DO

Address: 26812 US Hwy 19 N

Phone Number: 813 799-2727

Physician's State License Number: 000006208

Copies of test results are maintained and available at :

OSHA 1910.120 states that persons should not be assigned to tasks requiring the use of respiratory equipment unless it has been determined that they are physically able to perform the work and use the equipment safely.

\* The physician should append his report detailing the reasons for this opinion.

**MARK HUGHES  
UXO SPECIALIST**

**Years of Civilian UXO Experience : 2 years, 8 months**

**CIVILIAN UXO EXPERIENCE :**

8/94-present           UXB International, Inc. UXO Specialist

6/92-6/94                CMS, International, UXO Specialist. Conducted minefield range clearance operations in Kuwait with over 20,000 landmines rendered safe. Equipment included GPS, CAT 225 excavator, 926 front end loader and D-7 bulldozer modified for minefield operations. Experienced in quality assurance and demolition operations.

**Years of Military EOD Experience : 3 years, 5 months**

**MILITARY EOD EXPERIENCE :**

8/91-1/92               8th EOD, Korea; 74th EOD, Ft Riley, KS. EOD Specialist, conducted range clearances and provided EOD services.

10/88-4/90              259th EOD, Ft Irwin, CA. EOD Specialist responsible for range clearances at Ft. Ord, CA; Ft. Chaffie, AR; Camp Pendleton, CA. Performed a wide range of practical EOD procedures with daily range and demolition work. Responded to numerous off post incidents and VIP support calls.

**MILITARY EOD EDUCATION :**

U.S. Naval EOD School           10/88



*Naval School*  
*Explosive Ordnance Disposal Detachment*

*Certificate of Completion*

*Presented to*

MARK HUGHES, USA (SS# 137-64-6604)

*For having successfully completed  
the prescribed course of study for*

EXPLOSIVE ORDNANCE DISPOSAL PHASE II

1 AUG 91

Date

*M. N. Cerino*

M. N. CERINO, CDR, USN

Officer in Charge

# Certificate of Training



this certifies that  
*Mark Hughes*

has completed the requirements for  
**40 Hour Training**  
Hazardous Waste Operations  
In accordance with OSHA 29 CFR 1910.120

  
\_\_\_\_\_  
Certifying Official

*7/29/94*  
\_\_\_\_\_  
Date

# Certificate of Training

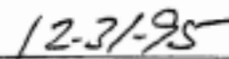


this certifies that

***Randy Sorenson***

has completed the requirements for  
**8 Hour Refresher Hazardous Waste Operations**  
in accordance with **OSHA 29 CFR 1910.120 (e) (8)**

  
\_\_\_\_\_  
Certifying Official

  
\_\_\_\_\_  
Date

UNIVERSITY OF CALIFORNIA EXTENSION, RIVERSIDE

This is to certify that

**Randy Jack Sorenson, Sr.**

has satisfactorily completed the requirements for the 40-hour course prescribed by 29 CFR 1910.120

**Health and Safety Training for Hazardous Waste Workers**

June 13-17, 1994



*Robert P. Tirkington, Instructor*



*Jon W. Kindschy, Director, Natural Sciences  
& Environmental Management*



# Certificate of Training

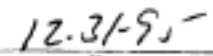


this certifies that

***Jason Bradley***

has completed the requirements for  
**8 Hour Refresher** Hazardous Waste Operations  
in accordance with OSHA 29 CFR 1910.120 (e) (8)

  
\_\_\_\_\_  
Certifying Official

  
\_\_\_\_\_  
Date



# CERTIFICATE OF TRAINING

UXB INTERNATIONAL, INC.

*proudly presents this award for  
educational achievement to*

**Jason Bradley**

*for satisfactorily completing the course of*

**40 Hour Health and Safety Training For  
Hazardous Waste Operations and Emergency Response**

17 February, 1992



Instructor

**PHYSICIAN'S STATEMENT**

(Includes diving clearance)

FOR APPLICANT OR EMPLOYEE OF UXB INTERNATIONAL, INC.

NAME: Jason BradleyDATE OF EXAM: 4-11-96TYPE OF EXAM (pre-employment, annual, or other): annualDATE OF BIRTH: 6-4-73 SOCIAL SECURITY NO.: 162-64 4768

The individual named above has:

1.) Undergone a physical examination per OSHA [29 CFR 1910.120] and has been found medically:

- qualified for hazardous site work  
 not qualified for hazardous site work\*

2.) Undergone a physical examination per OSHA [29 CFR 1910.134 (b) (10)] and has been found medically:

- qualified to use respiratory equipment  
 not qualified to use respiratory equipment\*

3.) Undergone a physical examination per OSHA [29 CFR 1910, subpart L, EM 385 1.1, and U.S. Navy Diving Manual, NAVSEA 0994-LP-001-9010] and been found medically:

- qualified to perform surface supplied/ SCUBA diving operations to 130 feet(salt water)  
 not qualified to perform surface supplied/ SCUBA diving operations

Physician's Signature: Printed Name of Physician: George L. Zimmerman PA-C Richard D. Stegg, M.D.Address: SEIDLE MEMORIAL HOSPITAL MECHANICSBURG, PAPhone Number: 717 295 6656Physician's State License Number: MA 000034 L PA MID 048637 L PA

Copies of test results are maintained and available at:

SEIDLE MEMORIAL HOSPITAL MECHANICSBURG, PA

Address: \_\_\_\_\_

OSHA 1910.120 states that persons should not be assigned to tasks requiring the use of respiratory equipment unless it has been determined that they are physically able to perform the work and use the equipment safely.

\* The physician should append his report detailing the reasons for this opinion.

**DANIEL KNUEPPEL**  
**Land Surveyor**

**Years of Civilian Experience: 2 years, 6 months**

**CIVILIAN UXO EXPERIENCE:**

- 06/94-Present      UXB International, Inc., UXO Specialist and Escort , Sioux Army Depot, NE; Baywood Park, CA; Fort Ord, CA; Camp Claiborne, LA; Camp Grant, IL ; Black Hills, SD; Kaho'olawe Island, HI; former Baywood Park, CA; UXO Specialist at Ft. Irwin, CA; UXO Specialist at Leach Lake, CA.
- 02/94-05/94      Human Factors Applications, Inc. UXO Specialist assisting in the range clearance operations at Ft. Ord, CA.

**Years of Military EOD Experience: 5 years, 2 months**

**MILITARY EOD EXPERIENCE:**

- 08/90-11/94      21st EOD Det., EOD Specialist. Team member responding to over 100 routine and unusual incidents. Provided support to Operation Silent Echo, the removal of all Army tactical nuclear weapons from Europe. Demilitarized over 220 tons of land mines and LAW rockets that had been deemed unserviceable.
- 09/89-08/90      White Sands Missile Range (EOD), EOD Assistant. Conducted range clearances involving MLRS M77 submunitions and BLU-98 combined effects munitions on a monthly basis. Range clearance and propagation test support for the Army tactical missile system. Provided range support for various missiles in the testing and evaluation phases of their development.

**MILITARY EOD EDUCATION :**

U.S. Naval EOD School      09/89



**Naval School  
Explosive Ordnance Disposal  
Certificate of Completion**

*Presented To*

**Specialist  
Daniel D. Knueppel, USA**

---

**For having successfully completed  
the prescribed course of study for**

**SURFACE BASIC EXPLOSIVE ORDNANCE DISPOSAL**

---

**8 September 1989**

**Date**

*M. G. Mathews*  
**M. G. MATHEWS, CDR, USN**

---

**Commanding Officer**

# Certificate of Training



this certifies that

***Daniel Knueppel***

has completed the requirements for  
**8 Hour Refresher Hazardous Waste Operations**  
in accordance with OSHA 29 CFR 1910.120 (e) (8)

*Keith M. Smith*  
Certifying Official

12-31-95  
Date

# Certificate of Training



this certifies that  
*Daniel Knueppel*

has completed the requirements for  
**40 Hour Training**  
**Hazardous Waste Operations**  
In accordance with OSHA 29 CFR 1910.120

A handwritten signature in black ink, appearing to read 'M. Dan', is written over a horizontal line.

Certifying Official

5/1/94

Date