ISSI Unexploded Ordnance, Inc.
ORDNANCE & EXPLOSIVE REMEDIATION
Huntsville, Alabama

ORDNANCE & EXPLOSIVES SUPPORT SERVICES

LAKE ONTARIO ORDNANCE WORKS TNT PIPELINE REMOVAL PROJECT, LEWISTON, NEW YORK WORK PLAN

CONTRACT NUMBER:	DACW49-00-D-002
DELIVERY ORDER NUMBER:	0002
SEVENSON PROJECT NUMBER:	G-139
CLIENT NAME:	U.S. Army Corps of Engineers, Buffalo District
PRIME CONTRACTOR:	Sevenson Environmental Services, Inc.
PROJECT TITLE:	OE Support Services
PROJECT LOCATION:	Lewiston, New York

USAED, BUFFALO
Approved ✓
Approved As Noted
Signature
8/24/00
Date

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LIST OF ABBREVIATIONS AND ACRONYMS

AGA	American Gas Association
ANSI	American National Standards Institute
APP	Accident Prevention Plan
ASME	American Society of Mechanical Engineers
ASR	Archives Search Report
BZ	Breathing Zone
CEHNC	U.S. Army Engineering & Support Center, Huntsville
CERCLA	Comprehensive Environment Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CPR	Cardiopulmonary Resuscitation
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
CWM	Chemical Warfare Material
DERP-FUDS	Defense Environmental Restoration Program-Formerly Used Defense Sites
DRMO	Defense Reutilization Marketing Office
EE/CA	Engineering Evaluation/Cost Analysis
EEDS	Electrical Explosive Devices
EMM	Earth-Moving Machinery
EOD	Explosive Ordnance Disposal
ESS	Explosive Safety Submission
EZ	Exclusion Zone
F	Fahrenheit
FUDS	Formerly Used Defense Sites
GFCI	Ground Fault Circuit Interrupters
HAF	Hazard Analysis Form
HBV	Hepatitis B Vaccinations
HE	High Explosives
HEAT	High Explosive Anti-Tank
HTRW	Hazardous, Toxic, and Radioactive Waste
HSM	Health and Safety Manager
IAW	In accordance with
IDLH	Immediately Dangerous to Life or Health
MSDS	Material Safety Data Sheets
mm	Millimeter
NA	Not Applicable
NAD	North America Datum
NCP	National Contingency Plan
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code

LIST OF ABBREVIATIONS AND ACRONYMS (CONTINUED)

NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
OE	OE Ordnance and Explosive
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
PM	Project Manager
PZ	Piezoelectric
QC	Quality Control
QCO	Quality Control Officer
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
OE PERSON	Senior UXO Supervisor
SOP	Standing Operating Procedures
SSO	Site Safety Officer
SSHP	Site Specific Safety and Health Plans
SZ	Support Zone
TCRA	Time-Critical Removal Action
TERC	Total Environmental Restoration Contract
TEU	Technical Escort Unit
TO	Task Order
TWA	Time-weighed Average
USACE	U.S. Army Corps of Engineers
USAESC	U.S. Army Engineering & Support Center, Huntsville
USATHAMA	U S. Army Toxic and Hazardous Material Agency
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Administration
UST	Underground Storage Tank
UXO	Unexploded Ordnance
UXOS	UXO Supervisor
WWII	World War II

CHAPTER I
OVERVIEW

1.1 INTRODUCTION

1.1.1 ISSI Unexploded Ordnance, Inc. (ISSI UXO) has been contracted by Sevenson Environmental Services, Inc. (Sevenson) to provide ordnance & explosives (OE) services under their contract with the Buffalo District, U. S. Army Corps of Engineers. This Work Plan (WP) and Site Safety and Health Plan (SSHP) describe the OE services required to support Sevenson.

1.2 OBJECTIVE

1.2.1 ISSI UXO will provide the OE services necessary to support Sevenson's removal of the TNT pipelines. The OE services to support Sevenson will include the following:

- Standby Technical Support - ISSI UXO will provide onsite technical guidance to the Sevenson team during the presampling phase of the project.

NOTE - Depending upon the quantity of explosives and other (at this time) unknown site conditions, it may be necessary to augment the OE person with additional OE personnel.

ISSI UXO will have a two man UXO team on stand-by to travel to the site. To supplement the Senior UXO Supervisor on site. As preparations for actual disposal of any discovered crystalline TNT will take a period of at least 3-5 days (obtaining clearances, securing dunnage and initiation items etc.) This should not unduly delay the project.

If necessary, removal and destruction of OE - OE contaminated sections of the TNT pipelines and any bulk OE encountered during the removal of the pipelines will be transported to the designated open burn area and thermally treated.

1.3 ADDENDA AND CHANGES

1.3.1 This plan has been written based upon the available site information. Varying and at this time unforeseen site conditions may require Addenda or Changes to be written and incorporated into this plan.

CHAPTER 2
BACKGROUND

2.1 The Former Lake Ontario Ordnance Works (LOOW) site originally encompassed approximately 7,500 acres with actual U.S. Department of Defense site activities having occurred on 2,500 acres. During the early 1940s, the LOOW site was used as a manufacturing plant producing TNT for use during WWII. Once completed, the complex contained a power plant, hospital, fire department, a water supply system adequate for a population of 100,000, and water supply and wastewater treatment system of underground water, sewage, acid, and TNT pipelines.

2.2 The manufacturing portion of the plant was situated in the central southwestern section of the LOOW site, south of Balmer Road. Wastewater from the TNT manufacturing operation, as well as storm water and sanitary sewage, was transferred through an underground sewer network to a wastewater treatment plant located in the western portion of the TNT plant. The TNT pipelines ran as one pair of east-west trending lines across the TNT production area before being routed south to the water treatment plant at the west end of the production line.

2.3 An overestimation of the need for TNT during WWII resulted in the closure of the TNT plant in July 1943, after only 9 months of operation. Following the decontamination of the TNT plant, the majority of the LOOW facility was sold to private citizens, with the government retaining the former active 2,500-acre portion of the site.

2.4 Several branches of DOD and the U.S. Department of Energy (DOE) have used portions of the LOOW site for various manufacturing and storage activities, including the pilot production of high-energy fuels. In 1955, the Navy and Air Force acquired 360 and 200 acres, respectively, of the former TNT plant. The acquisition of the properties by the Navy and Air Force was for the joint development of a boron- and lithium-based high-energy rocket fuel production plant. The Air Force subsequently assumed responsibility for the project, which was identified as Air Force Plant 68 (AFP-68). Part of the construction of AFP-68 involved tying in the AFP-68 sanitary, storm water, and Chemical Waste Sewer systems into the former TNT wastewater treatment plant located approximately 1,000-ft southwest of AFP-68. AFP-68 was decommissioned in 1959 while still in pilot-plant status.

2.5 In 1972, Chem-Trol Pollution Services, Inc. (Chem-Trol) acquired portions of the LOOW for the development of a hazardous waste treatment, storage, and disposal (TSD) facility. Chem-Trol was acquired by SCA Chemical Services, Inc. (SCA) in 1973 and was subsequently acquired by Chemical Waste Management (CWM) in the early 1980s. In 1969, the Somerset Group (Somerset) obtained a 100-acre section of the former LOOW property that contained AFP-68. Around 1979, the southern half of the former AFP-68 (about 50-acres) was sold to SCA. This section is currently owned by CWM. The portions of the former TNT and AFP-68 site relevant to this project are situated on property currently owned by CWM and the Town of Lewiston. CWM operates the site as a Resource Conservation and Recovery Act (RCRA) TSD facility. The portion of the site owned by the Town of Lewiston is currently unused.

CHAPTER 3
SITE CONDITIONS

3.1 LOCATIONS -The LOOW site is located within the Town of Lewiston and the Town of Porter in Niagara County, New York. The site is located approximately 10 miles north of the City of Niagara Falls, New York.

3.2 RESULTS OF PREVIOUS INVESTIGATIONS - Test site excavations to date have indicated that the pipelines comprising the LOOW TNT pipeline waste sewer system are concrete encased with approximate outside dimensions of 2-ft wide by 3-ft high (including the concrete encasement). The pipelines found during the test pit excavation activities were at the approximate locations as shown on available drawings of the original TNT facility layout. According to the drawings and site observations, the pipelines encased within the concrete are vitreous clay pipe and range in diameter from 10 to 18 inches. It is estimated that approximately 10,400 linear feet of pipeline exists, including laterals.

3.3 TNT and explosive compounds (including TNT intermediates) were found at varying concentrations throughout the length of the TNT pipeline investigated. The concentration of total secondary explosives did not approach the 35% by weight concentration previously reported by SCA for samples analyzed by Hazards Research in 1982. The highest concentration of total secondary explosives detected during recent investigations was approximately 8% in the sediment sample collected from the North pipeline in TP-7. Based on these previous investigations, if high concentrations of explosives contamination exist, the occurrences of these elevated concentrations are in isolated areas.

3.4 PROJECT CONDITIONS: The intent of the removal action for the TNT Waste Pipelines is to physically remove the pipeline from the ground to ensure no explosive hazards remain and to remove a potential migrations pathway for other contaminants. This project is a continuation of the interim removal action conducted in 1999. The pipelines were found to be full of water with very little sediments. The concrete encasement was intact except where damaged during earlier construction or excavation. During the 1999 removal operations, over twenty samples were taken of soil, water, sludge, and pipeline sediment. The maximum concentration of explosives detected are shown in the following table:

1999 TNT LINE ANALYSES (MAXIMUM CONCENTRATIONS)		
	TOTAL EXPLOSIVES (parts per million)	TOTAL EXPLOSIVES (% by volume)
SOIL	63	<0.006
SLUDGE	<8.0 (non-detect)	0
WATER	4.1	<0.001
PIPE SEDIMENT	0.051	<0.001

Previous investigations into the TNT pipeline contents have found explosives in varying concentrations. The only reported concentration of TNT in excess of 10% is a single sample from a 1982 investigation. It is not known whether this sample was taken from the TNT waste pipeline or from TNT process/waste piping. The laboratory analysis for this sample is not available.

PREVIOUS TNT LINE ANALYSES (MAXIMUM CONCENTRATIONS)		
	TOTAL EXPLOSIVES (parts per million)	TOTAL EXPLOSIVES (% by volume)
PIPELINE SEDIMENT (1990)	507	0.05
WATER (1990)	9.8	<0.001
PIPELINE SEDIMENT (1989)	25,079	2.5
SOIL (1989)	6.52	<0.001
PIPELINE SEDIMENT (1982 – Location unknown, no lab analyses available)	Not Available	35.0

CHAPTER 4
OE OPERATIONAL PLAN

4.1 TNT PIPELINE REMOVAL AND THERMAL TREATMENT

4.1.1 All OE operations will be performed in accordance with this WP, CEHNC's Safety Concepts & Basic Considerations for UXOs *[see Appendix A]* and the Site Safety and Health Plan.

4.1.2 PRECONSTRUCTION SAMPLING – The first phase of the TNT waste pipeline remediation removed approximately 1,500 feet of line. This was done with a combination of power washing and direct removal. Approximately 3,500 feet of line remains to be remediated. To date, no samples with the exception of the 1982 sample, indicate potentially detonable material remains in the pipeline. The validity of this sample is difficult to assess since no direct evidence exists regarding the sample location or laboratory analysis.

Sevenson will implement the following course of action with respect to project sequencing and explosives safety:

a. Sevenson will excavate down to the top of the concrete encasement at each of the 13 sample locations predetermined by the USACE.

b. Sevenson will expose the terracotta pipe using hand held pneumatic or compressed air jackhammer, backhoe-mounted breaker attachment, and/or hand held hammer.

c. Sevenson will chisel a hole in the pipe to obtain samples of the water and any sediments or deposits found.

d. During steps a – c, an explosives safety expert will be on-site to observe the entry operation and visually examine the exposed pipeline. He would also instruct site personnel how to identify suspected crystalline TNT deposits and sample the sediment and/or water.

e. If the laboratory analyses indicate explosives concentrations below 10%, the pipeline will be removed without on-site explosives safety supervision. Should suspected crystalline TNT be discovered, the operation will be terminated until an explosives expert can be retained to supervise the handling and disposal of the potentially detonable material and the remainder of the work plan can be implemented. ISSI UXO will have a two man UXO team on stand-by to travel to the site. To supplement the Senior UXO Supervisor on site. As preparations for actual disposal of any discovered crystalline TNT will take a period of at least 3-5 days (obtaining clearances, securing dunnage and initiation items etc.) This should not unduly delay the project.

f. If the laboratory analyses indicate explosive concentrations exceeding 10%, then the section of pipe adjacent to the sampling location will be treated as potentially detonable and handled as such.

g. If the laboratory analyses determines that explosive concentrations are below 10% and no crystalline TNT detected, then the pipeline will be considered to be nonexplosive, the OE person will be dismissed, and the removal of the pipe will take place as a regular removal using the construction techniques and methods as outlined in the Site Safety and Health Plan.

4.1.3 INTERIOR INSPECTION - the interior of the pipe will be inspected for loose or bonded materials. Pipes containing loose materials will be inverted and gently shaken to slide the material onto plastic sheeting. The loose material will then be inspected to determine if it contains explosive contamination. If the material is suspected of being explosive contaminated, it will be desensitized with mineral oil and placed in yellow hazardous waste buckets. The ends of all pipes will be closed with plastic sheeting held in place by tape. Each section of pipe will be placed in segregated holding areas pending thermal treatment procedures.

4.1.4 PIPE WASHOUT PROCEDURES - Working with the Sevenson crew, the ISSI UXO OE will attempt to washout materials that may be bonded to the pipe interior. All material that is washed out of the pipe will be collected and stored in yellow hazardous waste buckets. The water used for wash out will be collected and processed by Sevenson as contaminated waste. All washed out pipe will be cut into manageable sections. After cutting operations have been completed, pipe will be tagged for thermal treatment. The ends of all pipes will be closed with plastic sheeting held in place by tape. Each section of pipe will be placed in segregated holding areas pending thermal treatment procedures.

4.1.5 PERSONAL PROTECTIVE EQUIPMENT

4.1.6.1. Personal Protective Equipment (PPE) will be maintained by ISSI UXO at a level deemed appropriate to protect ISSI UXO personnel only. Normal work clothing will be worn, including long trousers, shirts, leather gloves, and leather work boots. Initial PPE requirements are provided in the SSHP. Hardhats will be worn during heavy equipment operations. Steel toed boots shall be worn on or around heavy equipment or if a foot hazard exist.

4.1.6 DEMOLITION OPERATIONS

4.1.6.1. To ensure that piping removed is free of explosive contaminants, each pipe will be thermally treated to destroy explosive contaminants.

4.1.6.1.1 Components Used In Thermal Treatment – The two methods used for thermal treatment are using liquid propane torches to flash the item or placing the item on a bed of wooden dunnage material and filling the pipe interior with loose dunnage materials, which is then burned. The liquid propane (LP) flashing procedure requires LP bottles, gas lines, and various torches. The dunnage burning procedures requires wooden (preferably pallets) dunnage material, kerosene, and a remote ignition system.

NOTE: Personnel performing this procedure must be protected from missile hazards which might occur when small quantities of the explosive contaminant explode during the flashing process. They must also wear protective clothing such as Nomex coveralls, hoods, and gloves.

NOTE: Closed containers will not be flashed. Residual explosive materials in a closed container may have sufficient explosive energy to burst the container creating a fragmentation problem.

4.1.6.1.1.1 Liquid Propane Flashing Procedures - This procedure can be employed on items which have very limited surface explosive contamination.

- The torch operator will ensure that the flame from the torch reaches all of the surface areas of the item being burned.

- After the item has been allowed to cool, the surface will be tested to ensure that no explosive contaminants are present. If explosive contaminants are detected, the item will be reflashed.

NOTE: If significant quantities of explosive contaminants are visible on the item that is going to be thermally treated, the suspected explosive contaminant should be desensitized with mineral oil and removed prior to the burning procedure.

NOTE: Closed containers will not be burned. Sufficient explosive residue may be present and generate enough explosive energy to fragment the item.

NOTE: Closed end pipes will not be burned due to the fact that a mortar effect could be caused by the explosive residue in the pipe if it detonated causing the pipe top to be propelled.

4.1.6.1.1.2 Dunnage Burning Procedures - This procedure will be used on items requiring thermal treatment.

- A 2 foot layer of dunnage material will be placed on the ground prior to placement of the pipe for thermal treatment . Additional dunnage will be placed around, over, and inside (for large diameter pipe) the item being burned.

- Kerosene will be sprayed on the dunnage material to ensure ignition of the material throughout the burn pan.

- Two ignition charges (one at each of the dunnage material) will be placed in the dunnage material. These charges will be initiated remotely.

- Each burn will be allowed to cool for 24 hours before they are inspected.

- After visual inspection of the burn, the pipes will be removed and stored in a designated area pending testing for residual explosive contamination.

- The ash from the burn will be placed in drums pending chemical analysis of the ash.

4.1.6.1.1.3 Accumulated Explosive Residue - All of the explosive residue collected during the TNT pipeline removal will be burned on a layer of dunnage material.

- A 2-foot layer of dunnage material will be placed in the burn.
- The contents of one 5-gallon bucket of explosive residue will be placed in an even layer on the dunnage material.
- Kerosene will be sprayed on the dunnage material to ensure ignition of the material.
- Two ignition charges (one at each end of the burn material) will be placed in the material. These charges will be initiated remotely.
- Each burn area will be allowed to cool for 24 hours before they are inspected.
- The ash from the burn pan will be placed in drums pending chemical analysis of the ash.

4.1.6.1.2 SOP for Electric Match Firing

4.1.6.1.2.1 Materials:

- Electric Matches (model rocket igniters)
- Smokeless Powder
- l2-volt vehicle battery (24 volt or two 12-volt in series preferred) or alternate if electric power is available would be a 24 volt, 6-8 amp, continuous battery charger.
- Galvanometer
- Electrical Tape
- Pliers/Side Cutters
- Diagonal Pliers
- Plastic Baggies
- Plastic grocery bags

4.1.6.1.2.2 Procedures

- Strip each leg of the electric match and test continuity with galvanometer.
- Wire two electric matches in parallel and check continuity

Caution - Follow electrical and static electricity precautions. Static electricity can be generated while placing smokeless powder into plastic baggies. Use grounding procedures while placing smokeless powder into plastic baggies. Use grounding procedures.

- Place approximately three ounces of smokeless powder in a baggie and insert electric matches. Tape mouth of bag closed.

- Crumple up newspaper and place in plastic grocery bag. Insert a baggie with smokeless powder into the newspaper and tape the grocery bag closed.

- Layout trunk line and check continuity.

NOTE: These electric matches are high voltage and static electricity resistant. They are not instantaneous. It takes approximately two to three seconds to ignite.

- Check continuity of both trunk line and electric matches and wire in.

- Touch trunk line to sufficient power source (24 volt); leave connected to the power source until ignition occurs (two to three seconds).

4.2 NOTIFICATION

4.2.1 All affected personnel will be notified of the open burning operation.

4.3 ORGANIZATION

- Brian Moore - USACE, COR
- Becky Zayatz – CWM
- John Archbold – Niagara County Health Department

4.3.1 PERSONNEL REQUIREMENTS: During the presampling phase, there will be an OE person present on site. If the pipe is determined to be contaminated at least one other OE person will be added for the burning procedures.

4.3.2 RESPONSIBILITIES

4.3.2.1.1 The ISSI UXO OE person will be responsible for:
NOTE in event bullets 2 thru 4 are to be accomplished the ISSI UXO OE person will be supplemented by at least one additional UXO Specialist.

- Providing onsite technical guidance to Sevenson's crew during the TNT presampling phase.
- If necessary, preparing the TNT pipe material for transportation to the open burn site.
- If necessary, setting up and conducting the open burn of the pipes and any OE material that may be located during the pipeline removal project
- If necessary, inspecting the pipe following the open burn to ensure all OE material has been consumed.

4.3.2.2 The OE person will maintain a detailed accounting of all pipe and OE material excavated transported, and thermally treated during this project.

CHAPTER 5
TECHNICAL & MANAGEMENT PLAN

5.1 APPROACH, METHODS, AND OPERATIONAL PROCEDURES

5.1.1 METHOD OF TRANSPORTING CONTAMINATED PIPE TO THE OPEN BURN AREA

5.1.1.1 Contaminated pipe will be wet down with water prior to being transported by truck to the designated burn area.

5.1.1.2 The contracting officers representative will direct Sevenson on the approved transportation route to move contaminated pipe to the burn area at the Niagara Falls Storage Site.

5.1.2 PROTECTIVE MEASURES TO BE EMPLOYED

5.1.2.1 Several methods of protecting people and structures will be employed while providing OE support to Sevenson.

5.1.2.2 An exclusion area (EA), which is based upon the blast distance, will be maintained during the thermal treatment of the contaminated pipes and any OE material collected during the pipe removal project. Only OE qualified persons will be authorized within this area while thermal treatment operations are underway. Exclusion of all but OE personnel from this zone is the most effective method of protecting people from the effects of an unplanned explosion. The radius of the safety zone will be based on the estimated quantity of bulk OE to be thermally treated.

5.1.3 REQUIRED REPORTS

5.1.3.1 A Daily Operations Journal will be completed by the OE person at the close of business each day and turned over to the Sevenson Project Manager.

5.2 DESIGNATED BURN AREA

If burning is required, the Niagara Falls Storage Site is designated as the burn area. Sevenson/ISSI will conduct burn operations at a specific location as directed by the USACE.

CHAPTER 6
DATA RECORDING

6.1 DAILY RECORDING REQUIREMENTS

6.1.1 ISSI UXO will maintain a detailed accounting of all contaminated pipe and OE removed from the site for thermal treatment. This accounting will include the quantity, type, location, condition, and final disposition of all items.

6.2 LOGS, RECORDS AND REPORTING *[see Appendix B, ISSI UXO Forms]*

6.2.1 A daily journal for the site will be opened upon first arrival for field operations and closed after demobilization from the project site. It will contain a daily record of which listed areas are active and of all other OE activities on the site.

6.3 OE CLOSEOUT REPORT

6.3.1 An OE closeout report will be compiled at the end of OE operations. This report will include as a minimum the following data:

- Summary of Operations;
- Quantities of pipe treated for TNT destruction ;
- Summary of methods implemented;
- Problems/Corrective Actions employed;
- Lessons learned; and
- Photographs of TNT Treatment operations.

CHAPTER 7
ENVIRONMENTAL PROTECTION PLAN

7.1 ENVIRONMENTAL PROTECTION

7.1.1 ISSI UXO will follow the requirements of the following OE related environmental requirements.

7.1.2 All land areas on-site and outside of the specifically assigned OE work areas, storage areas, and access routes will be preserved in their original condition during the course of OE operations. OE work activities will be confined to the areas defined in the Sevenson Site Operation Plan. Trucks and equipment will be confined to the designated haul and access routes and the project work area. During site OE operations, every effort will be made to prevent damage to the roads, culverts, trees, shrubs, and grassed areas.

7.1.3 ISSI UXO will minimize the disturbance of soil surface areas. All excavations will be backfilled and tamped.

7.1.4 ISSI UXO will avoid disturbing trees, shrubs, and ground cover wherever possible.

7.2 ENDANGERED OR PROTECTED SPECIES

7.2.1 ISSI UXO will avoid disturbing the wildlife and will coordinate with local or U.S. Fish and Wildlife personnel for assistance as needed to ensure that the environment and wildlife are preserved. At this point, there do not appear to be any threatened or endangered species to consider.

7.3 CULTURAL OR HISTORICAL RESOURCES

7.3.1 ISSI UXO will avoid disturbing the local historical or archaeological sites. ISSI UXO will coordinate with the required agencies/personnel for assistance as needed to ensure that the environment is preserved. ISSI UXO will mark the locations of any item suspected of having historical significance and will report them to the appropriate authority.

7.4 WETLANDS

7.4.1 There is no anticipated effect on wetlands at this time. Should conditions change, ISSI UXO will not begin activities in an area until the proper protective measures have been determined and implemented.

7.5 TREES AND SHRUBS

7.5.1 All project site landscaping is the responsibility of Sevenson.

7.6 WASTE DISPOSAL

7.6.1 UNCONTAMINATED WASTE

7.6.1.1 ISSI UXO will maintain appropriate project on-site housekeeping practices during the course of the OE services project. All waste generated by ISSI UXO will be collected and properly disposed.

7.6.2 CONTAMINATED WASTE

7.6.2.1 Decontamination, contamination control, and contaminated waste disposal are the responsibility of Sevenson.

7.6.2.2 Sevenson will ensure the designated burn area is properly prepared to contain ash, debris, or other wastes generated during burning operations. Wastes generated by the burn operations will be cleaned up as soon as ISSI UXO determines it is safe to conduct cleanup operations.

7.7 BURNING

7.7.1 All burning operations will be confined to the designated open burn area.

7.8 DUST CONTROL

7.8.1 ISSI UXO's OE services will not normally generate any significant amounts of dust that require dust control measures.

7.9 SPILL CONTROL

7.9.1 To minimize the possibility of spilling any potentially hazardous unknown liquid, ISSI UXO personnel will not open, move, or otherwise handle any drums or containers. To control possible spills of liquids, such as gasoline or other petroleum used in the course of the work day, ISSI UXO will store such materials in suitable approved containers.

7.10 POST REMEDIATION CLEANUP

7.10.1 ISSI UXO will maintain a clean and unobstructed working environment at all times. No tools, equipment, materials, or rubbish will remain on-site following completion of OE operations. All rubbish and other materials brought onto the project site by ISSI UXO will be turned over to Sevenson for disposal.

7.10.2 ISSI UXO will perform a site walkover inspection to ensure that all of the rubbish and materials brought on-site by ISSI UXO have been collected and properly disposed of.

CHAPTER 8
QUALITY CONTROL

8.1 To ensure that effective OE services are performed, the quality and control procedures outlined below will be in effect during this project.

8.2 Equipment

8-2-1 All equipment will be inspected by ISSI UXO prior to placing it in service to ensure it meets the standards of the equipment ordered.

8.2.2 EMERGENCY EQUIPMENT

8.2.2.1 All emergency equipment or emergency items will be inspected daily, or as required by the manufacturer, to ensure that they are operating as designed and are in good repair.

8.2.3 HAND TOOLS

8.2.3.1 OE tools and demolition kits will be inspected prior to use, or at least weekly, to ensure they are complete and in good working order and repair.

8.2.4 SITE SPECIFIC ITEMS

8.2.4.1 Individual sites may require items that are not normally included in the site inventory. These items could include PPE or special tools. All site specific items will be inspected to ensure that they are in good repair.

CHAPTER 9
COMMUNICATIONS

9.1 ISSI UXO communications will be achieved at this site with a portable cellular telephone. Land line telephones will also be available in the Sevenson field office trailer.

9.2 CELLULAR TELEPHONES

9.2.1 Cellular telephones will be used as the primary means of communication between the field teams and headquarters. Emergency telephone numbers will be provided and kept with each cellular unit.

9.3 LAND LINE TELEPHONES

9.3.1 Land line telephone communications will be available from the Sevenson field office trailer to all emergency agencies. Emergency telephone numbers will be prominently displayed near each telephone. Telephones will be the primary form of communication between headquarters and supporting emergency agencies.

CHAPTER 10
GENERAL SITE REQUIREMENTS

10.1 SAFETY TRAINING

10.1.1 ISSI UXO Manager is responsible for implementing a rigorous training program covering safe and proper work practices. This will include occupational hazard training and familiarization with emergency procedures. Records will be maintained for training schedules, topics, and safety logs. Training will be conducted in accordance with the provisions of the Site Safety and Health Plan.

10.1.2 All personnel will attend the initial site safety and indoctrination briefing prior to being assigned any tasks in the field. This briefing is site-specific training conducted on-site and will outline specific procedures to be followed. The course will be broken down into the following areas:

10.1.3 PROJECT SCOPE

10.1.3.1 The project scope instructions will include staffing instructions; chain of command; climate; terrain; history of range; project objectives and deadlines; on-site facilities; PPE; and personal, rental, and company equipment.

10.1.4 MEDICAL AND EMERGENCY PROCEDURES

10.1.4.1 ISSI UXO medical, emergency, and safety procedures will comply with Sevenson's Site Safety and Health Plan for this project. The Sevenson's SSHP has been added as reference.

10.1.5 DEFINITION OF WORK SITE

10.1.5.1Definition of work site instructions will include access/egress and operations.

10.1.6 PROJECT COMMUNICATION

10.1.6.1 Communication instructions will include telephone familiarization and procedures.

10.1.7 ACCIDENT REPORTING

10.1.7.1 Accidents of any nature will be immediately reported to the Sevenson's Health and Safety Officer. Injuries requiring medical treatment or first aid will be reported and investigated in accordance with AR 385-40 and U.S. Army Corps of Engineers supplements.

10.1.8 SUPERVISORY PERSONNEL

10.1.8.1 OE Supervisory personnel will receive additional training, which will include OE refresher training, range control, and medical evacuation procedures.

10.1.9 SAFETY MEETINGS

10.1.9.1 Safety meetings will be at least daily, and more frequently if conditions warrant. All safety meetings will be documented on the Site Safety Meeting Attendance Log.

10.1.10 NON-OE PERSONNEL

10.1.10.1 Non-OE personnel will also receive OE recognition and training prior to beginning work on-site.

10.1.11 SAFETY TRAINING AND OTHER SITE HAZARDS

10.1.11.1 OE safety and hazards training will be continually reinforced throughout the project and will be a daily topic for each morning's Tailgate Safety Meetings.

10.2. VISITOR CONTROL

10.2.1 All visitors are required to comply with Sevenson's visitor control procedures. Visitors to sites must meet all of the provisions of the SSHP prior to entering or visiting any site. All subcontractor work and/or visitor tours will be closely coordinated with to ensure safety of all personnel, and all OE work will cease while the visitor is in the area.

10.3 INCLEMENT WEATHER

10.3.1 ISSI will monitor the weather and determine if it is safe to conduct operations in inclement weather. Lightning storms shall cancel all field operations until the storm passes. In all instances, personnel safety is foremost.

10.4 PERSONNEL SAFETY

10.4.1 At no time will personnel conduct OE operations unless accompanied by a least one other person. A two-man policy or "buddy system" shall be in effect during operations. The only exception will be when traversing in a vehicle along access roads which have been positively cleared.

10.5 PHYSICAL QUALIFICATIONS

10.5.1 All persons will be physically, medically, and emotionally qualified for performing the duties to which they are assigned. Some factors to be considered in making work assignments are strength, endurance, agility, coordination, and visual and hearing acuity. All site employees are enrolled in the ISSI UXO Medical Surveillance Program and will be screened and certified by a qualified Occupational Health Physician.

10.6 DRUG/ALCOHOL ABUSE PREVENTION

10.6.1 Substance abuse will not be tolerated. ISSI UXO has a comprehensive Drug and Alcohol Abuse Policy and Program. All employees are screened for drugs during initial and annual physical and all employees are required to read and acknowledge receipt of a copy of the ISSI UXO Drug and Alcohol Policy. Personnel exhibiting irregular or unusual actions will not be permitted on the work site. Personnel identified as substance abusers will be dismissed.

10.7 PERSONAL PROTECTIVE EQUIPMENT

10.7.1 All personnel will be dressed to protect themselves from job related hazards. Initial PPE will be modified level "D". Additional protective equipment will be provided as required by site conditions. All contaminated PPE will be turned over to Sevenson for disposal in accordance with the provisions of 29 CFR 1910.120.

10.8 PROJECT EQUIPMENT

10.8.1 Only licensed drivers will be allowed to drive vehicles owned or leased by ISSI UXO. Drivers will obey all traffic laws, whether driving on or off the site. Persons who receive traffic tickets or summonses will be personally responsible for any fines incurred.

10.8.2 Vehicle drivers are responsible for conducting safety inspections prior to operation of the vehicle. Items to be inspected include, but are not limited to, fuel level, tires, belts, trailer hitches, fluid levels, and gauge operation. All vehicles will be equipped with fire extinguisher and first aid kits. All discrepancies will be reported to the OE PERSON.

10.8.3 Any special or heavy equipment owned or leased by ISSI UXO will only be operated by personnel that have received training on that specific type of equipment. Training will be documented in the individual's personnel folder.

10.9 NON-PERSONNEL ACCIDENTS

10.9.1 Accidents involving damage to equipment or property will be immediately reported. The Health and Safety Officer will conduct an investigation of the accident to attempt to ascertain the facts and, if possible, determine responsibility for the accident. Preventative measures will be instituted to avoid future occurrences. All accidents which occur on this project will be reported and investigated in accordance with paragraph 01.D of EM 385- 1 - 1.

10.10 FIRE

10.10.1 In the event of a fire, help will be summoned by calling 911 which will provide nearest fire department support.

10.11 SAFETY INSPECTION SCHEDULE

10.11.1 Continuous monitoring of all safety aspects of this contract in accordance with these plans will be carried out by the OE person and the Site Safety Officer. Daily worker inspections are the responsibility of the Site Safety Officer.

10.12 ACCIDENT INVESTIGATION/REPORT

10.12.1 The following procedures will be used to investigate all accidents.

10.12.1.1 A sequence of events will be established leading to the accident.

10.12.1.2 The accident scene and all involved property will be observed. Sketches or photographs will be used, if necessary, to clearly present the sequence of events and possible contributing factors.

10.12.1.3 The cause of the accident or contributing factors will be determined.

10.12.1.4 Interviews will be conducted of people involved and witnesses. Each witness and those involved will be identified.

10.12.1.5 The accident scene will be photographed as soon as possible.

10.12.1.6 The collected information will be analyzed and a corrective action/plan will be developed to eliminate future accidents, if possible.

10.12.1.7 Copies of the accident report will be provided to the USACE Site Representative and Sevenson Site Supervisor.

10.12.1.8 All accidents which occur incident to the project will be investigated, reported, and analyzed as prescribed in paragraph 01.D of EM 385-1-1.

10.12.1.9 Accidents of any nature will be immediately reported to the Director of Operations.

10.13 FORMS

10.13.1 Appendix B contains examples of some of the forms ISSI UXO expects to use during the life of this project. These examples are not necessarily all inclusive, and forms may be added or deleted as required.

10.14 REFERENCES

American National Standards Institute (ANSI Z39.18-1987)

USACE EM 381-1-1 Safety and Health Requirements Manual

U.S. Army Regulation AR 385-40 with USACE Supplement (1987) Accident Reporting and Records

ISSI UXO Site Operations Safety Manuals

ISSI UXO Comprehensive Drug Free Work Place Program

U.S. Army Corps of Engineers, Huntsville Division, Safety Concepts and Basic Considerations of Unexploded Explosive Ordnance (UXO)

FM 5-250 Explosives and Demolition - TM 60A-1-1-3 1

APPENDIX A
SAFETY CONCEPTS AND BASIC CONSIDERATIONS FOR UXO

BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR ORDNANCE AND EXPLOSIVES OPERATIONS

U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE

7 Mar 2000

TABLE OF CONTENTS

BASIC SAFETY CONCEPTS AND CONSIDERATIONS
FOR ORDNANCE AND EXPLOSIVES (OE) OPERATIONS

CHAPTER 1

INTRODUCTION

1-1. Purpose. This pamphlet establishes the safe operating procedures for dealing with ordnance and explosives (OE) and unexploded ordnance (UXO) items on formerly used defense sites (FUDS), base realignment and closure (BRAC) and installation restoration (IR) projects. Because there are no absolute safe procedures for dealing with OE, merely procedures considered being least dangerous, it is essential that a planned and systematic approach be established.

1-2. Applicability. This pamphlet applies to all Headquarters, United States Army Corps of Engineers (HQUSACE) elements, United States Army Corps of Engineers (USACE) commands, and their contractors having the responsibility for performing OE response activities. For the purpose of this document, all references to OE include UXO.

1-3. References. Required and related publications are listed in appendix A.

1-4. Distribution. Approved for public release; distribution is unlimited.

1-5. Policy. It is the policy of the USACE to produce products and services that fully meet the customers' expectations of quality, timeliness and cost effectiveness. All OE response procedures must be formulated to ensure harmony with the USACE Strategic Vision and should be in concert with activities presented in other USACE guidance. There should be no compromise of health and safety requirements to meet production or quality goals. Safety is the leading edge of quality.

1-6. Responsibilities. It is the responsibility of all USACE and contractor personnel involved with OE response projects to safely execute them in accordance with (IAW) the approved plan, (SSHP), Work Plan (WP), and all applicable laws, regulations, and policies.

1-7. Terms and Definitions.

a. Ordnance and Explosives. Ammunition, ammunition components, chemical or biological warfare materiel, or explosive that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried or fired. Such ammunition components and explosives are no longer under accountable record control of any DOD organization or activity.

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

c. Unexploded Ordnance (UXO). Military Munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to the operations, installations, personnel, or material, and remain unexploded either by malfunction, design, or any other cause.

d. UXO Qualified Personnel. The term UXO Qualified Personnel applies only to personnel meeting the requirements for the positions of UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, and the Senior UXO Supervisor.

e. OE Procedures. These procedures include, but are not limited to, the following actions preformed by a UXO qualified individual.

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

(2) Identifying and assessing the condition of surface OE.

(3) Recovery and final disposal of all OE.

f. OE Related procedures: These OE related procedures include, but are not limited to, the following and can be performed by a non-UXO qualified individual:

(1) Location and marking of subsurface anomalies.

(2) Location and marking of suspected surface OE.

(3) Transportation and storage of recovered OE.

(4) Utilizing earth-moving machinery (EMM). Earth-moving machinery may be used to excavate overburden within 12 inches of a suspected OE.

1-8. General Safety Concerns and Procedures.

a. OE operations will not be conducted until a complete plan for the site is prepared and approved. These plans will be based upon limiting exposure to the minimum number of personnel, for the minimum time, to the least amount of OE consistent with safe and efficient operations.

b. Only UXO qualified personnel will perform OE procedures. Non-UXO personnel may be utilized to perform certain OE related procedures when supervised by UXO qualified

personnel, i.e., mag/flag operations and gaining access using heavy equipment. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III.

c. Personnel who will be handling OE items will not wear outer or inner garments having static electricity generating characteristics. Materials made of 100 percent polyester, nylon, silk and wool, are highly static producing. Refer to DA Pam 385-64 for more information regarding non-static producing clothing.

d. Prior to any action being performed on an ordnance item, all fuzing will be positively identified. This identification will consist of fuze type by function, condition (armed or unarmed), and the physical state/condition of the fuze, i.e., burned, broken, parts exposed/sheared etc.

CHAPTER 2

OE SAFETY PRECAUTIONS

2-1. OE Safety Precautions.

a. Every effort will be made to identify a suspect OE item. Under no circumstances will any OE be moved in an attempt to make a positive identification. The OE item will be visually examined for markings and other external features such as shape, size, and external fittings. If an unknown OE item is encountered, the on-site USACE representative will be notified immediately. If there is no USACE personnel on-site, the District or Design Center's OE Safety representative will be notified as soon as possible. If external research is required, it will be initiated by the U.S. Army Engineering and Support Center, Huntsville. The following are additional considerations for the safe handling of OE items.

(1) Projectiles containing Base Detonating (BD) fuzes are to be considered armed if the round is fired.

(2) Arming wires and pop-out pins on unarmed fuzes should be secured prior to any movement.

(3) Do not depress plungers, turn vanes, rotate spindles, levers, setting rings or other external fittings on OE items. Such actions may arm or activate the OE.

(4) Do not attempt to remove any fuze(s) from the OE. Do not dismantle or strip components from any OE items.

(5) UXO Personnel are not authorized to inert any OE items found on-site.

(6) OE /UXO items will not be taken from the site as souvenirs/training aids

(7) Civil War ordnance will treated as any other OE.

b. Prior to entering areas/ranges contaminated with Improved Conventional Munitions (ICM) an approved DA weaver must be obtained. The District and/or Design Center's OE Safety representative must be notified.

c. Anytime during site activities a suspected chemical munition (CWM) is encountered, all work will cease, workers will evacuate upwind. A minimum of two UXO qualified individuals will position themselves upwind as far as possible to prevent unauthorized personnel from accidental exposure. The on site USACE OE Safety Specialist will be notified immediately. If a USACE OE Safety Specialist is not present the PM will contact the District or Design Center's OE Safety

representative. The area will be secured until properly relieved, i.e., active duty Explosive Ordnance Disposal (EOD) personnel, Technical Escort Unit (TEU) or local authority.

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

e. Consider OE items, which may have been exposed to fire and detonation, as extremely hazardous. Chemical and physical changes may have occurred to the contents, which might render it more sensitive than its original state.

f. Do not rely on the color coding of OE for positive identification. Munitions having incomplete or improper color codes have been encountered.

g. Avoid approaching the forward area of an OE item until it can be determined whether or not the item contains a shaped charge. The explosive jet, which is formed during detonation, can be lethal at great distances. Assume that all shaped charge munitions contain a piezoelectric (PZ) fuzing system until identified. PZ fuzing is extremely sensitive. They can function at the slightest physical change and can remain hazardous for an indefinite period of time.

h. Approach an unfired rocket motor from the side at a 45-degree angle. Accidental ignition can cause a missile hazard and hot exhaust.

i. Do not expose unfired rocket motors to any Electromagnetic Radiation (EMR) sources.

j. Consider an emplaced landmine armed until proven otherwise. It may be intentionally booby-trapped to deceive.

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

(2) Exercise extreme care with wooden mines that have been buried for long periods of time. Certain soil conditions can cause the wood to deteriorate and any inadvertent movement or pressure may initiate the fuze.

k. Assume that practice OE contains a live charge until it can be determined otherwise. Expended pyrotechnic and practice devices can contain red or white phosphorus residue. Due to incomplete combustion, the phosphorous residue may re-ignite spontaneously if the crust is broken and exposed to air.

l. Do not approach a smoking white phosphorous (WP) munition. Burning WP may detonate the explosive burster charge at anytime.

m. Foreign ordnance was returned to the United States for exploitation and subsequent disposal. Every effort will be made to research the applicable documentation and publications prior to commencement of a project.

n. Anomaly Avoidance Operations. Anomaly Avoidance procedures are detailed in ETL 385-1-2, (Draft) Generic Scope of Work for Ordnance Avoidance Operations, August 1996, and Ordnance and Explosives (OE) Center of Expertise (CX) Interim Guidance Document 99-01, Unexploded Ordnance (UXO) Support for Other Activities, 5 February 1999. These documents can be located on the OE Home Page at: http://www.hnd.usace.army.mil/oew/policy/regpro.html.

CHAPTER 3

OE STORAGE

3-1. OE Storage. During OE projects, explosive storage falls into two categories, on-DOD installations and off-DOD installations.

a. On-DOD installations the provisions of DOD 6055.9 STD will be followed. Generally, the installation should have an explosive storage area that meets DOD standards. The permitting and compliance requirements are the responsibility of the installation. The compatibility of explosives found in Chapter 3, DOD 6055.9 STD will be followed. OE items waiting final disposition will not be stored with other explosives. Storage of commercial explosives require DOD hazard class storage compatibility group

b. In the event the installation does not have an existing storage facility, the provisions of paragraph c, in this section, will apply.

c. Off-DOD installations, the contractor will be responsible for the construction of a temporary explosive storage area. This temporary storage area will meet all local, state, and 27 CFR, Bureau of Alcohol Tobacco and Firearms (BATF) requirements and as much of DOD 6055.9 STD as is practical to implement. The establishment of a temporary explosive storage area must meet the following requirements.

(1) The area will, if possible, meet the inhabited building and public traffic route distances specified in DOD 6055.9 STD. If the distances are less than required by the DOD guidance, a proposed barricading plan to protect the public from accidental detonation must be submitted and approved by the Huntsville Center's Structures Branch.

(2) Magazines must meet the requirements of the BATF regulations, and each magazine must have a Net Explosive Weight (NEW) established for the explosives to be stored.

(3) Each magazine must be grounded as specified in NFPA 780 and must meet the inter magazine distances as define in the DOD guidance.

(4) A physical security survey will be conducted to determine if fencing or guards are required. This survey will be coordinated through local law enforcement agencies. Generally, a fence around the magazine is not needed IAW BATF regulations. However, it is the responsibility of the contractor for determining the degree of protection to prevent the theft of explosives and OE items.

(5) A fire plan for either on or off-installation explosive storage areas will be prepared and coordinated with the local fire department. All magazines will have placards IAW 27 CFR/ATF P 5400.7 or DOD 6055.9 STD.

CHAPTER 4

OE TRANSPORTATION

4-1. OE Transportation. In the event that OE items must be transported off-site, the provisions of 49 CFR, DA Pam 385-64 state and local laws will be followed. These additional considerations are provided for the safe transportation of OE items:

a. USACE contractors are prohibited from transporting OE off-site for destruction until the provisions of paragraph 1-9, TB 700-2 are followed.

b. Do not transport WP munitions unless they are immersed in water, mud or wet sand.

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

d. Incendiary loaded munitions should be placed on a bed of sand and covered with sand to help control the burn if a fire should start.

e. If an unfired rocket motor must be transported, it will be positioned in the vehicle parallel to the rear axle. This will afford maximum protection for the personnel operating the vehicle.

f. If a base-ejection projectile must be transported to a disposal area, the base will be oriented in the vehicle so that it is parallel to the rear axle. This will afford maximum protection for the personnel operating the vehicle.

g. OE with exposed hazardous fillers such as High Explosive (HE), will be placed in appropriate containers with packing material to prevent migration of the hazardous fillers. Padding should be added to protect the exposed filler from heat, shock and friction.

CHAPTER 5

EXCLUSION ZONE OPERATIONS

5-1. Exclusion Zone Operations. On OE project sites, it is the responsibility of the contractor's UXO Safety Officer (UXOSO) to establish the exclusion zone for each UXO team. This exclusion zone should not be confused with the safe separation distance, which is maintained between teams.

a. The purpose of the exclusion zone is for the protection of non-essential project personnel and the public from blast overpressure and fragmentation hazards. There are two criteria for calculating exclusion zones;

(1) Intentional Detonations. When destroying ordnance, both the hazards from fragmentation and overpressure must be considered. The minimum separation distances in DOD 6055.9 STD will be used unless otherwise stated. The maximum fragmentation and overpressure distances may also be calculated IAW HNC-ED-CS-S-98-1, Methods for predicting Primary Fragmentation Characteristics of Cased Munitions.

(2) Unintentional Detonations. If the identification of OE on an OE site is unknown, the minimum separation distance specified in DOD 6055.9 STD, chapter 5, paragraph C5.5.4, will be used to establish the exclusion zones. When the identification of OE items are known, the exclusion zones will be determined by the U.S. Army Engineering and Support Center, Huntsville, (USAESCH) Engineering Directorate using HNC-ED-CS-S-98-1.

b. When multiple teams are working on site, a safe separation distance will be established. The minimum distance maintained between teams will never be less than 200 feet or the K50 overpressure distance. The one that is greater will be used.

c. While OE operations are being conducted, only personnel essential for the operation will be allowed in the exclusion zone. When non-essential personnel enter the exclusion zone, all OE operations will cease. In addition to this work stoppage, the following actions will be accomplished:

(1) The individual(s) must receive a safety briefing and sign the visitor's log prior to entering the zone.

(2) The individual(s) will be escorted by a UXO qualified individual.

(3) All OE operations will cease within the radius of the exclusion zone for the areas to be visited.

d. All personnel working within the exclusion zone will comply with the following:

(1) There will be no smoking within the exclusion zone, except in areas designated by the UXOSO.

(2) There will be no open fires for heating or cooking (gas stoves, grills etc.) within the exclusion zone, except where authorized by the UXOSO.

(3) During magnetometer operations, workers will have no metal parts in or on their shoes that would cause the magnetometer to present false indications.

CHAPTER 6

OE EXCAVATION OPERATIONS

6-1. OE Excavation Operations.

a. Hand excavation is the most reliable method for uncovering OE provided the item is near the surface. Hand excavation exposes personnel to the hazard of detonation for longer periods of time than any other method. Taking this into consideration, only UXO personnel will be used to accomplish this task.

b. Earth-Moving Machinery (EMM) may be used to excavate buried OE. EMM will not be used to excavate within 12 inches of a suspected OE. Once the EMM is within the 12 inches of the OE, the excavation will be completed by hand excavation methods. Personnel who are not UXO qualified can operate EMM only when supervised by a UXO Technician III.

(1) If more than one EMM is to be used on site, they will observe the same safe separation distances required for multiple work teams.

(2) During EMM excavation operations, only those personnel absolutely necessary for the operation will be within the exclusion zone.

(3) EMM operations will be conducted with the guidelines of EM 385-1-1 and 29 CFR 1926 subpart P.

c. Excavation operations, whether by hand or EMM will employ a step down or offset access method. Under no circumstances will any excavation be made directly over the suspected OE.

CHAPTER 7

OE DISPOSAL OPERATIONS

7-1. OE Disposal Operations. All demolition operations will be conducted IAW TM 60A 1-1-31 and the USAESCH Procedures for Demolition of Multiple Rounds on OE Sites. No other publications are to be used for these operations. Open burning of explosives, propellants, incendiary materials, and pyrotechnics is unauthorized.

a. As a general rule, all demolition operations will be accomplished by electrical means to assure maximum safety. There are exceptions to this requirement in situations where static electricity or Electromagnetic Radiation (EMR) hazards are present. Unintentional detonations can occur because of these induced currents (or lightning). The following precautions from TM 9-1375-213-12 are to be followed.

(1) Premature detonation of electric blasting caps by induced current from radio frequency (RF) signals is possible. Refer to TM 9-1375-214 that shows the minimum safe distance in respect to transmitter power and indicates distance beyond which it is safe to conduct electric blasting even under the most adverse conditions.

(2) Lightning is a hazard to both electric and non-electric blasting caps. A strike or a nearby miss is almost certain to initiate either type of cap or other sensitive explosive elements such as caps in delay detonators. Lightning strikes, even at distant locations, may cause extremely high local earth currents that may initiate electrical firing circuits. Effects of remote lightning strikes are multiplied by proximity to conducting elements, such as those found in buildings, fences, railroads, bridges, streams, and underground cables or conduits. The only safe

procedure is to suspend all blasting activities during electrical storms and when one is impending.

(3) Electric power lines also pose a hazard for electric initiating systems. It is recommended that any demolition operation closer than 155 meters to electric power lines be done with a non-electric system such as NON-EL. This non-electric firing system provides the same amount of safety and control as electrical firing systems, but without the interference of EMR and static electricity hazards.

(4) Provisions of paragraph 1-9, TB 700-2 will be fully complied with prior to Corps contractors transporting OE off-site for destruction.

b. Personnel involved with demolition operations will not wear garments, which have static electricity generating characteristics. Materials such as polyester, nylon, silk or wool are highly static producing. No personnel handling demolition materials will wear any of these types of clothing. Refer to DA Pam 385-64 for more information regarding non-static producing clothing.

c. Only serviceable condition explosive material will be used for disposal operations.

d. The only acceptable disposal method is the one stated in the appropriate TM60 Series manual for specific ordnance types. Any commercial explosives being used will be equivalent to the military

explosive required for the disposal operation.

NOTE

Oil well perforators/conventional shape charges are not acceptable substitutes for bulk explosives and will not be used for disposal operations except where applicable, refer to TM 60A-2-1-51. Otherwise these items are to be used only for the venting OE items prior to their turn-in as scrap.

e. If a situation dictates, protective measures to reduce shock, blast overpressure, and fragmentation will be taken. The USAESCH Engineering Directorate will assist in any design work and will review and approve all proposed protective works. As a minimum requirement all demolition shots will be tamped with clean earth or sand. IAW DOD 6055.9 STD the following separation distances will be observed unless otherwise directed by the Structures Branch.

(1) Minimum separation distance for non-fragmenting explosive materials will be no less than 1250 feet.

(2) Minimum separation distance for fragmenting explosive ordnance will be no less than 2500 feet. For bombs and projectiles with a diameter of 5 inches or greater, use a minimum distance of 4000 feet.

(3) Ordnance items with lifting lugs, strong backs, base plates, etc., will be oriented away from personnel, as fragments from these items tends to travel farther than normal.

f. Once demolition operations are completed, a thorough search of the demolition area will be conducted with a magnetometer to ensure a complete disposal was accomplished.

g. Inert ordnance will not be disposed of for scrap until the internal fillers/voids have been exposed and unconfined. Heat generated during the reclamation process can cause the inert fillers, moisture or air to expand and burst the sealed casings. In this situation, Oil Well Perforators can be used for venting these ordnance items which require demilitarization.

Appendix A

27 CFR 55	Alcohol, Tobacco Products and Firearms
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
49 CFR 100-199	Hazardous Materials Transportation
DOD 6055.9 STD	DOD Ammunition and Explosive Safety Standards, August 1997
AR 190- 11	Physical Security
DA PAM 385-64	Ammunition and Explosive Safety Standards
TM 9-1375-213-12	Operators and Organizational Maintenance Manual; Demolition Materials,
TM 60A 1-1-22	EOD Procedures /General EOD Safety Procedures, April 1991
TM 60A 1-1-31	EOD Procedures/General Information on EOD Disposal Procedures, May 1994
EM 385-1-1	USACE Safety and Health Requirements Manual, September 1996
USAESCH	Procedures for Demolition of Multiple Rounds (consolidated shots) on Ordnance and Explosive Sites, August 1998.
ER 1110-1-8153	Ordnance and Explosives Response, 19 May 1998.
EP 1110-1-18	Ordnance and Explosives Response (Draft).
ATF P 5400.7	ATF Explosive Laws and Regulations, June 1990
HNC-ED-CS-S 98-1	Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives, January 1998
HNC-ED-CS-S 98-2	Methods for Calculating Range to No More Than One Hazardous Fragment Per 600 Square Feet on OE Sites, January 1998
HNC-ED-CS-S 96-8	Guide Selection and Siting of Barricades for Selected OE, September 1997

Memorandum of Agreement, U.S. Army Engineering and Support Center, Huntsville, and Headquarters Forces Command, 52nd Ordnance Group, 18July 1997.

APPENDIX B
FORMS

ISSI UNEXPLODED ORDNANCE		DAILY ACTIVITY REPORT
DATE:	LOCATION:	SITE:
SITE MANAGER:		UXO SUPV:

DAILY TASKS		
START TIME:	STOP TIME:	TOTAL HRS:
SAFETY BRIEF	TAIL GATE BRIEF	CALIBRATE INSTRUMENTS
ADDITIONAL TASKS:		

SURFACE AND GEOPHYSICAL SWEEPS				
ANOMALIES:	SCRAP:	OEW:	UXO:	
NOMENCLATURE:	QTY	FUZING	DEPTH	DISPOSITION

REMARKS:	
Vehicle Mileage: Start Stop Total	Gas:$

USE BACK OR CONTINUATION SHEET FOR ADDITIONAL INFORMATION OR SKETCHES

OEW OPERATIONS
DAILY REPORT

DATE	TIME
CONTRACT NUMBER	DELIVERY ORDER #
WEATHER CONDITIONS	

I WORK SUMMARY

A. WORK PLANNED

B. WORK ACCOMPLISHED

C. EXPLANATION OF DISCREPANCY

D. INSPECTION RESULTS

II INSTRUCTIONS RECEIVED FROM GOVERNMENT REPRESENTATIVE(S)

V. PERSONNEL/EQUIPMENT UTILIZATION		
A. PERSONNEL ON-SITE		
DESCRIPTION	NUMBER	MAN-HOURS
Civil Engineer		
Contract Administrator		
Draftsman CADD		
Environmental Engineer		
First Aid Specialist		
Heavy Equipment Operator		
Helper		
Magnetometer Operator		
Program Manager		
Quality Control Specialist		
Rodman		
Safety Engineer		
Secretary		
Security Guard		
Senior UXO Supervisor		
Site Safety officer		
Surveyor		
Technical Writer		
Truck Driver (Heavy)		
Typist		
UXO Assistant		
UXO Specialist		
UXO Supervisor		
Unskilled Labor		

SITE VISITOR'S LOG
OEW OPERATIONS

CONTRACT NUMBER: _____ DELIVERY ORDER #: _____

LOCATION: _____

DATE	NAME	COMPANY	Safety Briefing Received	TIME		Escort Required
				In	Out	

ISSI Unexploded Ordnance, Inc.

SAFETY MEETING ATTENDANCE LOG
OEW OPERATIONS

DATE	TIME
CONTRACT NUMBER	DELIVERY ORDER #
LOCATION	

I SAFETY MEETING TOPIC (Briefly describe)

II ATTENDEES

NAME (Print)	SIGNATURE	COMPANY

SAFETY INSPECTION LOG
OEW OPERATIONS

DATE	TIME
CONTRACT NUMBER	DELIVERY ORDER #
WEATHER CONDITIONS	

I AREAS INSPECTED (List by grid number, coordinates, or description)

II INSPECTION RESULTS

III CORRECTIVE ACTIONS RECOMMENDED

IV REINSPECTION RESULTS

V SIGNATURES

I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (if necessary)

Site Safety Officer

Sr. UXO Supervisor/Project Manager