



DEPARTMENT OF THE ARMY
HUNTSVILLE DIVISION, CORPS OF ENGINEERS
P. O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REF ID: A67800

April 24, 1991

Programs and Project Management (CEHND-PM)

SUBJECT: Defense Environmental Restoration Program -
Formerly Used Defense Sites (DERP-FUDS); Ordnance
Safety Concerns at the Former West Virginia Maneuver
Area, Davis, West Virginia

Ms. Nancy R. F. Feakes, District Ranger
U.S. Department of Agriculture
Forest Service
Potomac Ranger District
Route 3, Box 240
Petersburg, West Virginia 26847

Dear Ms. Feakes:

Reference your letter of April 10, 1991 to UXB
International (#2320).

In the referenced letter you outlined a series of
limitations and exclusions that must be met in order to
perform our ordnance contamination study at the subject
site. We completely agree with those limitations and
exclusions. During the course of our contract nego-
tiations we, and our contractor, were fully aware of
these restrictions and negotiated accordingly.

Our contractor will not install any type of tem-
porary roads or access into the various study sites,
nor will he use any type of motorized vehicles or
equipment within the Wilderness Area. The contractor
will backpack all equipment and supplies into the study
sites.

Enclosed for your information is a copy of the con-
tract scope of work (SOW). The SOW provides specific
details on the type of work to be performed within the
Wilderness Area. If you so desire we will provide you
with copies of our contractor's field work plans and
site safety plans for your review. These draft plans
are due from the contractor in late June 1991.

Per your request in the referenced letter, we will
provide you with a copy of our contractor's Final
Engineering Report upon conclusion of the project.

We are concerned about your request to be prepared
to brief hikers and campers in our study sites. For
their own safety as well as the contractor's, hikers,

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campers, and other unofficial visitors must be excluded from the study areas. Any found ordnance is potentially life-threatening and must be dealt with accordingly. During our site intrusive work request you provide notices or fact sheets to any Wilderness visitors restricting access to the study sites. We will provide you with maps of the areas to be studied, the fact sheets, and a schedule for the field work. We would be happy to meet with you at any time to discuss our site safety concerns and the overall project.

The Huntington District of the Corps of Engineers will be requesting a Right-of-Entry (ROE) from you in the near future to enable this study to begin.

We are looking forward to working with you on this project and appreciate your interest. Thank you for providing us with permission to destroy on-site any found munitions. Any assistance you can provide to help secure the study sites would be appreciated.

Your point of contact is Mr. Walt Perro, DSN 645-5142 or commercial 205-955-5142.

Sincerely,



Vincent J. Guarin
Director of Programs and
Project Management

Enclosure

Copies Furnished:

Commander, U.S. Army Corps of Engineers, ATTN: CEMP-RF
(Jim Coppola), 20 Massachusetts Avenue, NW.,
Washington, DC 20314-1000

Commander, US Army Engineer Division, Ohio River, ATTN:
CEORD-DL-MS (Mello), P.O. Box 1159, Cincinnati, Ohio
45201-1159

↓ Commander, U.S. Army Engineer District, Huntington,
ATTN: CEORH-ED (Frank Albert), 502 8th Street,
Huntington, West Virginia 25701-2070

Metcalf & Eddy, Inc. ATTN: Mr. Bill Mooney, P.O. Box
4043, Woburn, Massachusetts 01888

26 Mar 91

ANNEX A

**FEASIBILITY STUDY
DOLLY SODS WILDERNESS AREA
(FORMER WEST VIRGINIA MANEUVER AREA), DAVIS, WEST VA**

1.0 BACKGROUND AND GENERAL STATEMENT OF WORK

1.1 The work required under this Scope of Work (SOW) falls under the Defense Environmental Restoration Program (DERP). Ordnance and Explosive Wastes (OEW) exist on property that was formerly owned by Department of Defense (DOD). This SOW addresses the OEW that exists on the Dolly Sods Wilderness Area which contains 10,215 acres.

1.1.1 OEW is a safety hazard and constitutes an imminent and substantial endangerment to site personnel and the local populace. During this feasibility study, it is the government's intent that the contractor remove all OEW encountered.

1.2 Definitions: The definitions contained in Appendix A apply plus the following.

1.2.1 OEW: OEW is defined as explosive ordnance (see Appendix A) and soils with explosive constituents if the concentration in the soil is sufficient to present an imminent safety hazard. Soils contaminated with explosives which do not constitute an imminent safety hazard will be evaluated following Hazardous and Toxic Wastes (HTW) procedures. Surface and groundwater contaminated with explosives will be evaluated following HTW procedures.

1.2.2 Inert ordnance: An item which has functioned as designed, leaving an inert carrier; an item manufactured inert to serve a specific training purpose; and fragments from OEW.

1.2.3 EOD Specialist: An active duty military Explosive Ordnance Disposal (EOD) qualified person.

1.3 Description of project area.

1.3.1 The site is located in Grant, Tucker and Randolph Counties, W.VA.

1.3.2 The maneuver area consisted of approximately 2,181,000 acres and was used by the Army for military exercises, including mountain training and maneuvering during WWII. The exercises included firing of artillery into a designated area.

1.3.3 The former maneuver area is owned by the Western Maryland Railroad and the U.S. Forest Service. The Forest Service operates a wilderness and scenic area for the general public, while the railroad restricts access to its property. The wilderness area is open to the public at all times and contains 10,215 acres. The public discovers abandoned ammunition on an annual basis and personal injuries have occurred.

2.0 OBJECTIVES

2.1 Identify the contaminated areas and determine the extent and magnitude of OEW contamination.

2.2 Determine remedial action alternatives which will alleviate OEW contamination.

3.0 DESCRIPTION OF SERVICES

3.1 (TASK A-1) RECORDS REVIEW, EVALUATION, AND SITE VISIT The contractor shall obtain, review, and evaluate existing records, studies, and data concerning the former Dolly Sods Wilderness Area. Data available within the Huntsville Division will be provided to the contractor by mail by the Contracting Officer (CO). Other data may exist in the files of Government agencies such as USACE, Huntington District, Federal Records Center, General Services Administration, and other appropriate agencies. Points of contact will be provided by the CO to the contractor as a starting point.

3.1.1. A site visit is authorized to complete the records review and assist in the development of the work plan. An UXO Specialist shall be included in the site visit team. An approved site safety plan is not necessary for the initial site visit. The site visit shall include a liaison visit to the DRMO-Chambersburg, Letterkenny Army Depot PA to arrange details for turn-in of inert ordnance located during *Tasks A-3 and A-4*.

3.2 (TASK A-2) WORK PLAN. The contractor shall prepare and submit a detailed Work Plan which describes the methods and procedures to accomplish the objectives and remaining tasks. As a part of this work plan, detailed information shall be submitted to describe the contractor's safety program, engineering controls, work practices, personal protective equipment, the technical approach to performing the tasks, and the management plan describing organizational functions, assignments, quality control system, individual qualifications, names of UXO personnel and their qualifications, functional relationships and responsibilities among the organizational elements that will participate in this SOW.

3.2.1 The Site Specific Safety Plan shall address responsibilities, hazard communication and training, medical surveillance and exposure monitoring, internal and external communications, and standard operating procedures (SOP), to include completion of ENG Form 3394 in the event of an accident.

3.2.2 The contractor shall submit a draft Work Plan for review IAW paragraph 4.0, this SOW.

3.2.3 The contractor shall submit a final Work Plan for review and approval IAW paragraph 4.0, this SOW.

3.2.4 No access, recovery, or disposal of OEW shall be performed until the final Work Plan has been approved by the government.

3.3 (TASK A-3) DETERMINE EXTENT OF SURFACE CONTAMINATION.

3.3.1 The contractor shall furnish all personnel and equipment necessary to determine the extent of surface OEW contamination and dispose of any encountered non-chemical OEW. If toxic chemical OEW is encountered, operations in that area shall cease and the CO shall be notified, who will inturn notify military EOD for appropriate action.

3.3.2 Based on the data from *Task A-1*, the contractor shall select a total of 250 acres for surface sampling/clearing.

3.3.2.1 A planned, systematic approach shall be utilized to search and clear the sample area. This methodology shall be addressed in the work plan.

3.3.2.2 The surface clearance shall be accomplished in 5 acre plots scattered throughout the project site. Fifty 5-acre plots shall be delineated in the work plan with the rational for selection and shall be approved by the CO before clearance operations begin.

3.3.3 The contractor shall identify the cleared/contaminated areas. The areas shall be clearly defined and drawn on a topographic or planimetric map at a scale no smaller than one inch equals two thousand feet (1 inch = 2000 feet), to show their location with respect to all surface features within the project area. Each corner of each five acre plot shall be identified by state plane grid coordinates to the closest one foot and shown on the maps. The maps shall be included in the engineering report.

3.3.4 The contractor shall maintain a detailed accounting of all materials encountered on the 250 acres. This accounting shall include the amounts of OEW, their identification/condition, and disposition. The accounting shall include all non-OEW related metallic debris that is present and which will interfere with a subsurface clearance. The non-OEW related metallic debris shall be detailed in pounds per acre. The contractor shall plot location and leave on-site all large non-OEW debris. OEW-related metallic debris shall be identified and detailed in pounds per acre. This accounting shall be a part of the Engineering Report.

3.3.5 Inert OEW, to include fragments, shall be collected, the inert filler explosively vented, and then placed in a contractor established holding area pending turn-in by the contractor.

3.4 (TASK A-4) DETERMINE EXTENT OF SUBSURFACE CONTAMINATION.

3.4.1 The contractor shall furnish all personnel and equipment necessary to determine the extent of subsurface OEW contamination and dispose of encountered non-chemical OEW. If toxic chemical OEW is encountered operations in that area shall cease and the CO notified, who will inturn notify military EOD for appropriate action.

3.4.2 Based on the results of *Task A-3*, the contractor shall select 10 acres for subsurface examination and clearance.

3.4.2.1 The subsurface clearance shall be accomplished in 1 acre plots scattered throughout the project site. Ten 1-acre plots shall be recommended to the CEHND Safety Office for approval.

3.4.2.2 A planned, systematic approach shall be utilized to search the sample areas. This methodology shall be addressed in the work plan.

3.4.3 A detailed accounting of the OEW, OEW-related debris and non-OEW related metallic debris encountered shall be maintained. This accounting shall include the identification of the OEW, its condition, depth encountered, and disposition. The OEW related debris and the non-OEW related metallic debris shall be accounted for in pounds per acre. This accounting shall be a part of the Engineering Report.

3.4.4 The contractor shall utilize geophysical techniques to detect subsurface UXO. Techniques, which may include seismic methods, metal detection, magnetometer, ground penetrating radar, resistivity, geophysical diffraction topography, and electromagnetic induction shall be considered and addressed in the work plan.

3.4.4.1 The two systems proposed shall be capable of detecting a 105mm projectile to a depth of six feet and shall be addressed in the work plan.

3.4.4.2 Access shall be gained to suspect subsurface UXO to perform diagnosis and appropriate disposal procedures. All access holes shall be refilled upon completion of the investigation.

3.4.4.3 Diagnosis and disposal procedures of UXO shall be accomplished by an UXO Supervisor.

3.4.5 Inert OEW, to include fragments, which interferes with the operation of the contractor shall be collected and placed in a contractor established safe holding area at the project site for turn-in. The contractor shall vent the inert filler prior to the inert OEW being placed in the holding area.

3.5 (TASK A-5) TURN-IN RECOVERED INERT ORDNANCE ITEMS AND METAL SCRAP

3.5.1 The contractor shall furnish all necessary personnel and equipment to turn-in all recovered inert ordnance items to the Defense Property Disposal Office (DPDO), located at DRMO-Chambersburg, Letterkenny Army Depot PA. The contractor shall coordinate with the DRMO-Chambersburg during the site visit in *Task A-1*.

3.5.2 The contractor shall segregate inert ordnance items from other types of metal scrap. The inert fillers of ordnance items shall be exposed. This shall be accomplished in any way necessary to preclude rupture due to confined pressure.

3.5.3 The contractor shall complete a DD Form 1348-1 as turn-in documentation. Instructions for completing this form are contained in DOD 4160.21-M.

3.5.3.1 The contractor shall prepare a Certificate signed by the Project Senior UXO Supervisor 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."

3.5.4 The contractor shall propose the methodology to accomplish this task in the Work Plan.

3.6 (TASK A-6) SUBMIT ENGINEERING REPORT

3.6.1 At the conclusion of the field work, the contractor shall submit an Engineering Report which consists of the following:

3.6.1.1 Map of Cleared/Contaminated Areas

3.6.1.2 Detailed accounting of found OEW/debris and estimate of extent/amount of contamination.

3.6.1.3 Remedial Action Alternatives

3.6.1.3.1 Environmental Consequences of each alternative.

3.6.1.3.2 Economic analysis of the alternatives.

3.6.1.4 Data Summary

3.6.1.5 Correspondence Summary

3.6.1.6 Lessons Learned

3.6.1.7 Color 5"x7" photographs depicting field effort and any found OEW/debris.

3.6.2 The Engineering Report presenting all data, analyses, and recommendations shall be prepared in a standard format for A-E reports and include all the items above. All site drawings shall be of engineering quality with sufficient detail to show interrelations of major features on the site map. The report shall consist of 8 1/2 by 11 inch pages with drawings folded, if necessary, to this size. The report covers shall be durable binders which hold pages firmly while allowing easy removal and/or addition of pages. A report title page shall identify the A-E, the Corps of Engineers Huntsville Division and the date. This SOW shall be incorporated in the draft report. At least 20 original 5"x7" color photographs shall be included in each copy of the draft and final Engineering Report. Photocopies of photographs are unacceptable.

3.6.3 Identify Remedial Action Alternatives. Based on the results of the investigation and contamination encountered, the A-E shall identify remedial actions for OEW at this site and include in the Engineering Report. The A-E shall select from, but not be limited to, the following alternatives:

3.6.3.1 No Action

3.6.3.2 On-site disposal

3.6.3.3 Off-site disposal

3.6.3.4 Any combination of the above.

3.6.4 Based on the analyses of alternatives, the A-E shall recommend by separate letter, recommendations and justifications for the optimum corrective measure. If separate corrective measures are recommended by the A-E for different areas within the project site, the A-E shall so specify and justify.

3.6.5 The Engineering Report shall include a recapitulation of exposure data. This shall include total number of man-hours worked on-site, total motor vehicle mileage, total number of flying hours, and number of flights.

3.7 CONTRACTOR QUALIFICATIONS: The contractor shall furnish a staff that is qualified through education, training, and experience that will accomplish the objectives and tasks of this SOW.

3.7.1 The contractor shall have experience in architect-engineering and managing multi-facet operations involving Formerly Used Defense Sites-OEW projects.

3.7.2 Minimum qualifications for the UXO Team Members:

3.7.2.1 The senior UXO Specialist on-site shall be detailed as the Senior UXO Supervisor. In addition to being a graduate of the USN EOD School, Indian Head MD, the Senior UXO Supervisor shall have served at least 15 years in active duty military EOD assignments, of which at least six years shall have been in supervisory positions. This individual shall have supervised multiple UXO Teams involved in UXO land clearance operations. Up to 3 years of active duty military experience may be substituted by contractor UXO experience on a one-day to one-day basis for the Senior UXO Supervisor. This substituted experience may be approved on a case-by-case basis by the Safety Specialists, CEHND-ED-SY.

3.7.2.2 UXO personnel designated as Team Leaders, shall be detailed as UXO Supervisors. In addition to being a graduate of the USN EOD School, Indian Head MD, the UXO Supervisor shall have served at least 10 years in active duty military EOD assignments, of which 3 years shall have been in supervisory positions.

3.7.2.3 UXO Specialists, in addition to being a graduate of the USN EOD School, Indian Head MD, shall have at least 2 years experience in active duty military EOD assignments.

3.7.2.4 Detailed resumes for all UXO personnel, to include EODS certificates, all EOD assignments, and in the case of the Senior UXO Supervisor, a detailed listing of contractor UXO experience, shall be included as part of the work plan.

3.7.3 Minimum qualifications for Non-UXO Specialist, Non-management Project personnel:

3.7.3.1 Shall have the necessary education, training and experience to accomplish assigned tasks, as certified by the contractor.

3.7.4 Certification IAW 29 CFR 1910.120(e) is not required for this site.

4.0 SUBMITTALS

4.1 Submittals. The contractor shall furnish copies of the plans and reports as identified in paragraph 4.3 to each addressee listed below in the quantities indicated. The contractor shall utilize express mail services for delivering these plans and reports. Following each submission, comments generated as a result of their review shall be incorporated. A reproducible copy shall be furnished with the final Engineering Report submittal only to CEHND-PM-OT. At the discretion of the Contracting Officer (CO), the contractor shall turn over to the CO all working papers, maps, and documents relating to this project at the end of the contract. Throughout the contract, the contractor shall make available all working papers, maps, and documents relating to this project to the CO.

ADDRESSEE	COPIES OF EACH SUBMITTAL
U.S.Army Engineer Division, Huntsville ATTN: CEHND-PM-OT (Walt Perro) 106 Wynn Drive Huntsville AL 35805-1957	6
HQ, USACE Department of the Army ATTN: CEMP-EB 20 Massachusetts Ave Washington, DC 20314-1000	3
US Army Engineer District, Huntington ATTN: CEORH-ED 502 8th St. Huntington WV 25701-2070	3
Commander 549th Ordnance Detachment (EODCC) Fort Meade MD 20755-5320	2

4.2 Correspondence. The contractor shall make a record of each phone conversation and written correspondence regarding information related to the performance of this contract. A summary of the phone conversations and written correspondence shall be submitted to the CO with the Engineering Report.

4.3 Due Dates, Submittals, and Action Items.

<u>Submittals</u>	<u>Date</u>
1. Draft Work Plan	21 Jun 91
2. Draft Work Plan reviewed by CEHND	8 Jul 91
3. Final Work Plan	29 Jul 91
4. Final Work Plan reviewed/approved by CEHND	12 Aug 91
5. Draft Engineering Report	18 Nov 91
6. Draft ER reviewed by CEHND	2 Dec 91
7. Final Engineering Report	23 Dec 91

All work and services under this delivery order shall be completed by 23 Jan 1992.

5.0 PUBLIC AFFAIRS

5.1 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 CO. When approached by any person or entity requesting information about the subject of this contract, the contractor shall refer to the CO 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 CO.

5.2 The contractor shall incorporate a similar condition in all subcontracts, which states as follows:

The subcontractor shall not make available or publicly disclose any data generated or reviewed under this subcontract unless specifically authorized by the prime contractor. When approached by any person or entity requesting information about the subject of this subcontract, the subcontractor shall refer to the prime contractor for response. Reports and data generated under this contract shall become the property of the prime contractor and distribution to any other source by the sub-contractor is prohibited unless authorized by the prime contractor.

6.0 REFERENCES

- 6.1 AR 75-14, Interservice Responsibilities or Explosive Ordnance Disposal.
- 6.2 EM 385-1-1, CE Safety and Health Requirements Manual
- 6.3 AR 358-40, Accident Reporting and Records dtd Apr 87 with USACE Supplement dtd Mar 90.
- 6.4 TM 9-1300-206, Ammunition and Explosive Standards
- 6.5 DOD 4160.21-M, Defense Utilization and Disposal Manual
- 6.6 TM 9-1300-214, Military Explosives (Paragraph 13-2)
- 6.7 CEHND UXO Safety Concepts and Basic Considerations (11 Jan 91)

7.0 SPECIAL INSTRUCTIONS

7.1 If an unmovable UXO is encountered that cannot be detonated on site because of the closeness of inhabited areas, structures, or facilities, the CO shall be notified, who will inturn contact military EOD for applicable procedures.

7.2 The safety concepts and basic considerations outlined in reference 6.7 shall be complied with, unless exceptions are granted by the CO.

7.3 If suspected pieces of explosive are encountered, color tests shall be conducted in accordance with reference 6.6 above to provide an immediate clue to the possible identification of an energetic material.

7.4 The government shall arrange right-of-entry permits.

7.5 29 CFR 1926.100(a) requires employees to wear protective helmets in areas where there is a possible danger of head injury from impact, or from falling or flying objects, or from electrical shock or burns. During the accomplishment of this SOW, hardhats need be worn only when the above possibilities are present.

Rev 11 Jan 91
U.S. ARMY CORPS OF ENGINEERS, HUNTSVILLE DIVISION
SAFETY CONCEPTS AND BASIC CONSIDERATIONS
UNEXPLODED EXPLOSIVE ORDNANCE (UXO)

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 and a preplanned approach. Plans shall be based upon the minimum possible exposure, consistent with efficient operations and maximum safety. All personnel engaged in UXO operations shall be thoroughly trained in explosive safety and be capable of recognizing hazardous explosive exposures. Safety must become a firmly established habit when working with UXO.

I. Care must be observed in probing for, moving, and handling UXO. Operations on the UXO should be conducted only after the establishment of a complete plan for the operation involved and careful preparation to insure its implementation.

II. As a general rule, UXO will be detonated in place when the situation allows. All detonation-in-place shall be conducted by electrical means to assure maximum control of the site. No UXO shall be destroyed until it has been positively identified.

A. Make every effort to identify the UXO. Carefully 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, photographs shall be taken and express-mailed to CEHND-ED-SY, which has access to the TM 60-Series publications.

B. Foreign UXO were returned to the United States for exploitation and disposal. Records search should indicate the possibility of foreign UXO being on the site.

C. If the records search indicates UXO containing military toxic chemical agents may be on the site, a decontamination plan shall be approved prior to entry onto the site.

(1) Any time a suspected chemical UXO is encountered, the 2-man concept is immediately implemented and notification shall be made through proper channels. The UXO shall be secured until the military arrives and assumes ownership.

D. If the situation dictates, protective measures to reduce shock, blast, and fragmentation damage shall be taken. Army Technical Manual (TM) 5-855-1, Fundamentals of Protective Design for Conventional Weapons and associated software program "CONWEP" contains data on blast effects, groundshock, cratering, ejecta, and fragmentation.

(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 and/or strongbacks and nose and/or tail plate sections should be oriented away from personnel locations.

E. Consideration shall be given to tamping the UXO to control fragments, if the situation warrants. Fragments shall be minimized not only to protect personnel but property such as buildings, trees, etc.

F. 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.

(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.

G. Coordination with the appropriate airspace representative shall be conducted and the appropriate notification procedures arranged.

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

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

(1) If loose explosives are to be disposed of by detonation, detonate only one kind of explosive in any one given shot.

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

(3) 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.

(4) When disposing of high explosives by detonation, do not approach the disposal site for at least 30 minutes in the event of a misfire.

III. UXO which penetrates 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 records search indicates the site was used as an impact area.

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

V. Consider UXO which has been exposed to fire 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.

VI. Do not depress plungers, turn vanes, or rotate spindles, levers, setting rings, or other external fittings on the UXO. Such action may arm, actuate, or function the UXO.

A. DO NOT dismantle, strip, or subject any UXO to unnecessary movement, except in response to a valid requirement.

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

(1) In general, the condition of a BD fuze in an unexploded projectile cannot be determined through examination of its external features. When there is evidence that the projectile has been fired, the BD fuze is considered to be in the armed condition.

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

C. Perform any initial movement of an armed fuze remotely and avoid any unnecessary movement of an armed fuze.

D. When transporting a possible armed fuze, position the fuze in the most neutral orientation possible.

E. Do not subject a mechanical time fuze to any unnecessary movement.

F. Do not unscrew a fuze from a fuze well that does not contain a fuze cavity liner. High explosives may be on the threads.

VII. Do not allow unauthorized or unnecessary personnel to be present in the vicinity of UXO. Limit personnel exposure time. Operations shall always be based upon minimum exposure consistent with efficient operations.

VIII. Do not rely on the color coding of UXO for positive identification of contents. Munitions having none, incomplete, or improper color coding have been encountered.

IX. Avoid the area forward of the nose of a munition until it can be determined that the item is not a shaped charge and High Explosive Anti-tank (HEAT) UXO. The explosive jet can be fatal to great distances forward of the longitudinal axis of the item.

A. Assume any shaped charge munition to contain a piezoelectric (PZ) fuzing system until the fuzing is otherwise identified. A PZ fuze is extremely sensitive, can fire at the slightest physical change, and may remain hazardous for an indefinite period of time.

X. Examine a projectile for the presence or absence of an unfired tracer.

XI. Perform initial movement of an embedded projectile remotely. First movement of an embedded projectile may cause fuze functioning. During this remote operation, precautions shall be taken for a high-order detonation.

XII. 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.

A. Use sand to smother incendiary fires. Water may induce a violent reaction or be completely ineffective, depending on the mixture.

B. Bury incendiary-loaded munitions in sand when transporting them. This will smother any fire which should start until other corrective action can be taken.

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

D. Expended pyrotechnic/practice devices may contain red/white phosphorus residue. Due to incomplete combustion, red and white phosphorus may be present and reignite spontaneously if subjected to friction or if the crust is broken.

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

F. Do not transport a WP munition, unless it is immersed in water, mud or wet sand.

G. Extra care shall be taken when uncovering a buried UXO, if records search indicated WP munitions were fired or destroyed in the area. 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.

H. WP UXO shall not be detonated into the ground. The UXO shall be counter-charged on the bottom-center-line.

I. Photoflash powder will react with moisture and generate hydrogen gas, and this reaction may generate sufficient heat or pressure to detonate the UXO. Do not look directly at photoflash UXO during detonation.

J. If loose pyrotechnic, tracer, flare, and similiar mixtures are to be transported, they shall be placed in #10 mineral motor oil or equivalent to minimize fire and explosion hazard.

XIII. Assume a practice UXO contains a live charge until it can be determined otherwise.

A. Inert UXO 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 and air to expand and burst sealed casings. Venting or exposure may be accomplished in any way necessary to preclude rupture due to confined pressure.

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

A. Do not expose electrically fired rocket motors within 25-feet of any exposed electronic transmitting equipment or exposed antenna leads.

B. 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 accident ignition.

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

A. Many training mines contain firing indicator charges capable of inflicting serious injury.

B. 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 on top may initiate the fuze.

XVI. Do not pack a bomb fuze well with explosives unless it can be positively confirmed that the fuze well does not contain any fuze components.

A. Photoflash bombs must be handled with the same care as black powder, and with even greater care than explosive-loaded bombs.

B. Some practice bombs do not contain any positive safety features. Positively identify and review all safety precautions prior to handling practice bombs.

XVII. 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.

A. Earth moving machinery (EMM) may be used to excavate for 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 12 inches of an UXO, hand excavation shall be used to uncover the UXO.

(1) If more than one EMM will be used on the same site, they will be separated by at least 100m during excavation,

B. Excavation shall comply with the provisions of 29 CFR 1926 subpart P.

XVIII. The site shall be surveyed for electromagnetic radiation (EMR) radio frequency (RF) transmitters and appropriate action taken. Safe distances have been established for specific transmitter power and transmitters. These distances shall be made available to the contractor by CEHND-ED-SY, upon request.

XIX. Do not wear outer or undergarments made of wool, silk, or synthetic textiles such as rayon and nylon while working on UXO. These materials can generate sufficient static charge to ignite fuels or initiate explosives. Any person coming in contact with an UXO, shall ground himself prior to touching EEDs. This must be done to discharge any electrostatic charge accumulation from the body.

XX. If UXO must be transported off-site for disposal, the provisions of 49 CFR 100-199, TM 9-1300-206, and state and local laws shall be followed.

XXI. Personnel working with explosives and explosive ordnance shall comply with the following:

- A. Do not carry fire or spark-producing devices on-site.
- B. Do not smoke, except in authorized areas.
- C. Do not have fires for heating or cooking, except in authorized areas.
- D. Do not conduct operations without approved Standing Operating Procedures (SOP) and proper supervision.
- E. Do not become careless by reason of familiarity with ammunition.
- F. Do not conduct explosive operations during electrical, sand, dust or snow storms.
- G. Do not conduct explosive operations between sunset and dawn.

XX. Civil War projectiles shall be treated as any other UXO, especially projectiles with uncut Bormann time fuses and projectiles with percussion fuses, brass in particular. These have generally provided a watertight seal, even if they have been in the ground over one-hundred years. No projectile

should be exposed to excess heat, the ignition point of black powder, used as a bursting charge in all Civil War projectiles is 457 degrees F. Under no circumstances should an attempt be made to drill a hole in a projectile, either through the fuse or the body of the projectile.

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

XXII. If an OEW, with exposed hazardous filler (HE, etc), has to be moved to a disposal area, the item shall be placed in a heavy duty plastic bag to prevent migration of the hazardous filler. Padding should also be added to protect the exposed filler from heat, shock, and friction.

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

XXIV. 29 CFR 1926.100(a) requires personnel to wear protective helmets in areas where there is a possible danger of head injury from impact, or from falling or flying objects, or from electrical shock or burns. During field activities on ordnance projects, hardhats need not be worn unless a head injury threat is present.

XXV. Soil samples, test pit excavation, and/or monitoring well installation are sometimes conducted in areas where subsurface UXO may be found. These intrusive activities must be preceded by a magnetometer survey to assure the safety of the sampling crews.

A. Prior to the drilling rig coming on site, a magnetometer and a hand-held auger shall be utilized to assure the drilling spot is clear of subsurface UXO.

1) After finding an area the magnetometer indicates is clear of detectable UXO, the hand-held auger should be used to start the drill hole. At not more than 2-foot depth, the hand-held auger shall be withdrawn and the magnetometer probe shall be lowered into the auger hole. This procedure will ensure small UXO items (20mm projectiles and grenades), undetectable from the surface, are now detectable. This procedure shall be repeated until the maximum depth of the hand-held auger.

(2) Borehole monitoring shall continue at 2-foot intervals until virgin soil is encountered.

XXVI. The detection and identification of suspect explosive materials shall be accomplished IAW Chapter 13, TM 9-1300-214, "Military Explosives".

ELECTROMAGNETIC RADIATION (EMR) HAZARDS
UNEXPLODED EXPLOSIVE ORDNANCE (UXO)

The use of electroexplosive devices (EED) susceptible to EMR devices in the radio frequency (RF) range, that is, radio, radar, and television transmitters, has become almost universal. Radio frequency electromagnetic radiation consists of waves of electrical energy at radio transmission frequencies. These waves are radiated in a line-of-sight from the antennas of electronic devices that transmit radio, radar, television, or other communication or navigation radio frequency signals. The energy is usually equally radiated in all directions; however, certain types of antennas focus the energy, transmitting it in a single direction or sector only. EMR (RF) can also be reflected from large metallic surfaces or objects into areas not directly reached by the line-of-sight-radiated electric energy.

Under highly undesirable conditions, enough of the energy may be picked up by portions of the EED*, associated circuitry, or related objects acting as receiving antennas, to initiate the EED.

*[An EED is used to ignite a limited quantity of explosive, propellant, or pyrotechnic material contained in the device. The actuation of the EED is produced by the application of electrical energy from an outside source across an internal conductor or spark gap. An EED is generally a subassembly used to trigger a larger assembly.] {EED's have extensive military applications. They are used to activate certain control devices, to arm many various ordnance items, and to initiate explosive trains. Examples are artillery/mortar proximity (variable time (VT)) fuzes, rocket motors, and electric blasting caps. }

Since the strength of the radiation decreases as the distance from the transmitter increases, the further away the ordnance item is, the less hazardous the situation. The energy can pass directly through materials that do not conduct electricity, such as wood or plastic. Therefore, using these materials as a barrier is of little value. The factors to be considered when evaluating the degree of hazard that the EMR (RF) energy represents are: 1) the strength of the field, that is, its power; 2) the nature of the frequencies transmitted; 3) the distance from the transmitter antenna to the ordnance, and; 4) the amount or type of protection available.

Hazards of Electromagnetic Radiation to Ordnance (HERO).

Some ordnance is particularly susceptible to EMR (RF) emission. This susceptibility is usually caused by the design of the ordnance item or the type of EED that is used. HERO categories have been established under which

ordnance is classified as safe, susceptible, and unsafe. A knowledge of ordnance that is normally unsafe in the presence of EMR (RF) is important so that preventive steps can be taken if the ordnance is encountered in a suspected EMR (RF) field.

In general, all ordnance items, even those normally safe when intact, are hazardous when extensively damaged. The damage may expose components, trailing wires, or breaks in shielding integrity that permit the entrance of EMR (RF) energy into the ordnance item and then into the EED.

The presence of antennas, communication and radar devices should be a point of interest on initial site visits and preliminary assessments.