UNEXPLODED ORDNANCE CONSIDERATIONS IN THE PLANNING, DESIGN AND CONSTRUCTION OF RANGES

Supplement to CEHNC 1110-1-23

Prepared by:

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1.0 EXECUTIVE SUMMARY

1.1 Background

In May of 2002 the Assistant Chief of Staff for Installation Management (ACSIM) confirmed the policy regarding responsibility for the investigation, documentation, and remediation/cleanup efforts associated with environmental contaminants on MILCON sites. In accordance with the policy, environmental remediation/cleanup shall not be identified on DD Forms 1391 as MILCON funded. This policy includes MILCON sites contaminated with unexploded ordnance (UXO). *Therefore, no MILCON funding will be provided for remediation of UXO for FY2004 or later projects.* The proponent of the MILCON project must fund for the remediation of UXO; in the case of live fire ranges, the proponent is Department of the Army, Deputy Chief of Staff for Operations (DA DCSOPS).

1.2 Purpose

This document provides guidance for managing MILCON construction of live fire ranges. The scope ranges from DD Form 1391 stage through construction completion. EP 75-1-2 should also be consulted in conjunction with the information contained in this document. Particularly, Chapter 6 of EP 75-1-2 contains guidance for determination of the appropriate level of UXO support for the project.

1.3 Critical Omission

If a project in the project approval and funding system on a site that has UXO contamination but that does not include any cost in the DD Form 1391 for UXO remediation, immediately contact the RTLP MCX, U.S. Army Engineering and Support Center, Huntsville, (256) 895-1534, mail to: RTLP@HND01.usace.army.mil

2.0 POINTS OF CONTACT

The U.S. Army Engineering and Support Center, Huntsville (HNC) is the mandatory center of expertise (MCX) for the Range and Training Land Program (RTLP) and the center of expertise (CX) for Ordnance and Explosives (OE). If any questions arise please contact one of the following.

2.1 RTLP MCX

mail to: RTLP@HND01.usace.army.mil, (256) 895-1534

2.2 OE CX

mail to: OEDirectorate@HND01.usace.army.mil, (256) 895-1563

3.0 REFERENCES

3.1 EP 75-1-2, Unexploded Ordnance (UXO) Support During Hazardous, Toxic and Radioactive Waste (HTRW) and Construction Activities

3.2 ER 1110-1-8153, Engineering and Design - Ordnance and Explosive Response

4.0 PROJECT PLANNING

4.1 Background

UXO contamination on a proposed range construction site can add significant cost to a project. Failure to properly program funding for ordnance support during construction could adversely affect, or cause the loss of a project. The first opportunity to communicate the funding requirement is in the initial submittal of the DD Form 1391. As stated above, this cost can no longer be part of the MILCON estimate, but must still be discussed elsewhere in both Tab A and Tab E of the DD Form 1391.

4.2 DD Form 1391

4.2.1 Tab A

Include a sentence in the Description of Proposed Construction stating the expectation and proposed disposition of UXO on the project site. Recommend using one of the following as applicable.

4.2.1.1 No unexploded ordnance contamination is expected on the project site.

4.2.1.2 Unexploded ordnance contamination is expected on the project site. Surface clearance will be performed prior to construction start; subsurface clearance will be performed during construction using funding other than MILCON.

4.2.2 Tab E, Furnishings and Equipment

To set aside funding for UXO removal and support during construction of the project, a line item with OMA as the PROC APPR must be included in Tab E. This line item must include the costs for the construction contractor to locate and/or avoid/clear subsurface UXO as well as for onsite support UXO Safety personnel. The Footnote for the applicable line item should list assumptions and contain the following standard statement:

4.2.2.1 No unexploded ordnance contamination is expected on the project site.

4.2.2.2 Unexploded ordnance contamination is expected on the project site. Surface clearance will occur on ____ acres at an assumed cost of $_____ per acre. Subsurface clearance will occur on ____ acres at an assumed cost of $_____ per acre. Government oversight will be provided at an assumed cost of $_____. Total Costs of Surface and Subsurface clearance for this project is $_____. The following assumptions apply to this estimate: clearance depth surface to ___feet, [low][medium][high] contamination density, [heavily][moderately][open to sparsely] wooded, [steep][moderate][level] terrain, and [light][medium][heavy] brush density.

4.2.3 Cost Estimate

The cost of UXO clearance and support during construction is a function of several factors including the types of UXO, contamination density, required clearing depth, terrain, ground cover and vegetation, and soil properties. Attachment (1) is a spreadsheet that can be used as a guideline for determining preliminary costs of UXO clearance. For the DD 1391 stage it is recommended that the estimate be quite

conservative as there are so many unknowns with regards to the extent of clearance required and contamination levels. Normally, the entire range footprint is surface cleared for UXO; while subsurface clearance is only completed for areas that will be disturbed during construction (building foundations, grubbing operations, areas to be excavated, trenches, etc.). Government oversight (OE Safety Specialist) labor and travel cost for on-site support during all potential UXO encounters must also be included in the DD Form 1391 cost estimate (not included as part of Attachment 1 costs). Further assistance and updates to the estimating guide may be obtained from the RTLP MCX.

5.0 PROJECT DESIGN

5.1 Background

When a project site is suspected of UXO contamination the installation has the option of requesting military EOD personnel for site clearance before and during construction operations. Often these military forces are not available or may not have the necessary equipment for subsurface clearance operations. Another option is including construction support ordnance clearance as part of the construction contract (OMA funded, not MILCON). The following is guidance for inclusion of the OMA funded effort in the construction contract.

5.2 Design Recommendations

During design on a range site that potentially contains UXO; it is imperative that all efforts be made to minimize disturbance of existing grade due to the expense of subsurface UXO detection and removal. The following are recommendations for minimizing, but not eliminating, impacts:

5.2.1 As feasible, all roads and target emplacements should be built up on top of existing grade or fill with geotextile material versus the undercut-spoil-backfill technique.

5.2.2 Clearing should be at existing grade level with a minimized amount of grubbing.

5.2.3 Trenching routes should be designed to minimize additional intrusion into UXO contaminated areas beyond those already disturbed by other range features.

5.2.4 The designer should question the Installation personnel on the type of UXO expected to be encountered on the range site. This information is required for purposes of informing the construction contractor of potential UXO encounters and also to ensure that munitions with special requirements are identified early in the design process. For example: Improved Conventional Munitions (ICM) require Department of the Army level permission/waiver/documentation for anyone (including installation EOD personnel) to enter within a large safety distance of the munitions.

5.3 Predesign Site Studies and Investigations

If ordnance contamination is suspected, UXO safety support is mandatory during topographic surveying, geotechnical investigation and other onsite operations gathering design data. The safety support is will function primarily in the capacity of UXO avoidance.

5.4 Site Characterization

At the earliest stages of design process the site must be characterized so that the proper (safest and most cost effective) UXO procedures will be employed. This characterization must determine if UXO contamination is present and if so, the type and estimated density. Estimated densities should include expected numbers of anomalies as well as expected numbers of UXO.

If there is no expectation of encountering UXO, notification of the probability and procedure instructions in the event of an UXO encounter should be included in the contract specifications (UXO standby/avoidance), see the sample below. When a determination is made that there is a probability of encountering UXO (visual observation and/or current or previous land use leads to a determination that OE was employed or disposed of in the area of concern), UXO qualified personnel must conduct a subsurface clearance of the areas accessed or disturbed during construction operations and avoid or remove all discovered UXO within stated limits.

5.5 Clearance Responsibility

5.5.1 Surface Contamination

In the past, a surface sweep has been performed by the installation prior to construction. This is still the preferred procedure; however, in the event that it cannot be accomplished by the installation, surface clearance can also be included in the construction contract (OMA funded).

5.5.2 Subsurface Contamination

As stated above, EOD forces or qualified contract personnel can perform subsurface clearance. Clearance by personnel that are not UXO qualified is prohibited. The U.S. Army Engineering and Support Center, Huntsville, center of expertise for Ordnance and Explosives (OE) maintains a current roster of all qualified UXO personnel.

5.6 Specifications

If encountering UXO is unexpected the following text should be added to the construction contract summary of work. Note that the text will have to be revised if the installation does not have access to EOD personnel, to require the construction contractor to have a qualified UXO subcontractor available.

RANGE SITE ORDNANCE CONTAMINATION

During the range construction contract, ordnance may be found in the area. Inert practice ordnances may also be encountered. When a UXO is discovered, the contractor shall immediately notify the Contracting Officer's Representative and the Contracting Officer and cease work in the vicinity of the UXO.

Once notified of an UXO, the Contracting Officer's Representative will notify the installation Explosive Ordnance Disposal (EOD) team. The EOD personnel will

normally leave their unit within 30 minutes during duty hours; after duty hours, within one hour to respond to the UXO item.

During the course of work on this project, the contractor may encounter ordnance fragments and debris. It shall be the responsibility of the construction contractor to move or dispose of such non-UXO items to the extent necessary to accomplish the work under this construction contract.

It shall also be the responsibility of the construction contractor to move or dispose of ordnance fragments and debris as required after detonation of the UXO items by the EOD personnel.

Excavation on this project will not be allowed until each field employee has attended the safety course given by the EOD personnel. Subsequent new field employees shall also attend the safety course.

The Safety Officer for the contractor shall be notified by the Contracting Officer's Representative prior to each detonation. Cooperation with the EOD personnel during UXO removal is essential.

If encountering UXO is expected the specification section in Attachment (2) should be included in the construction contract package. This specification section is provided as a guide and may be adjusted to fit the specific project and appropriate level of UXO support. The specification section is also available in SISGML format and can be obtained from the RTLP MCX.

5.7 Drawings

The contract drawings must show the extent of clearance for all UXO clearance associated with a MILCON design. The recommended format is a special section in the drawing package specifically for UXO removal. The drawings in this section should delineate limits of UXO removal (similar to limits of construction, tree clearing, etc.) to indicate type of clearance required in the marked area. The details, sections and specifications further describe the depth and limits of clearance required. For firm-fixed price bidding, the bid package must include all information necessary for the contractors to estimate the cost of all UXO work.

6.0 CONSTRUCTION

6.1 Background

The objective of UXO support activities is to ensure the safety of construction personnel by employing techniques by trained UXO personnel. The guiding principle of explosives safety is to limit the potential exposure to a minimum number of personnel for a minimum time to a minimum amount of explosives consistent with safe and efficient operations.

6.2 Safety Oversight

6.2.1 Required Submittal Review

When contract personnel conduct clearance, the OE MCX reviews and provides comments and written concurrence or non-concurrence on UXO support-related submittals to ensure compliance with Federal, DOD, DA and USACE OE safety and

OE environmental regulations. These required submittals are listed in the construction specification found in Attachment (2).

6.2.2 On-Site

If a subsurface clearance is being conducted by contract personnel in support of construction activities, a Government OE Safety Specialist must be present to provide safety oversight. The OE Safety Specialist has final on-site authority on OE safety matters. If an OE Safety Specialist is not present on-site, the Senior UXO supervisor has final on-site authority for OE matters.

The OE CX coordinates safety specialist support on a cost reimbursable basis, which should have been budgeted in the OMA funding during the DD 1391 phase. The cost for this service includes labor, travel and per diem.

7.0 ATTACHMENTS

(1) UXO Clearance Cost Estimating Guide

(2) Specification Section 01576 Construction Support Ordnance Clearance

Attachment (1)

RANGE UXO(C) DETECTION TECHNIQUES

MANUAL DGM TECHNOLOGIES (assumes 2.5 acres/day)

CLEARANCE DEPTH	ACRES	ESTIMATED OE/UXO ITEMS/ACRES	BEFORE DGM ANOMALIES/ACRE TO DIG	AFTER DGM ANOMALIES/ACRE TO DIG	DGM COST/ACRE	DIG COST/ACRE	TOTAL COST/ACRE
	10	< 10	LOW (< 100)	LOW (< 25)	$2,000.00	$2,200.00	$4,200.00
		10 - 30	MEDIUM (100 - 300)	MEDIUM (25 - 75)	$2,200.00	$6,400.00	$8,600.00
		>30	HIGH (> 300)	HIGH (> 75)	$3,360.00	$12,000.00	$15,360.00
SURFACE	100	< 10	LOW (< 100)	LOW (< 25)	$900.00	$600.00	$1,500.00
TO 1 FOOT		10 - 30	MEDIUM (100 - 300)	MEDIUM (25 - 75)	$1,000.00	$2,800.00	$3,800.00
		>30	HIGH (> 300)	HIGH (> 75)	$2,200.00	$7,500.00	$9,700.00
	1000	< 10	LOW (< 100)	LOW (< 25)	$800.00	$200.00	$1,000.00
		10 - 30	MEDIUM (100 - 300)	MEDIUM (25 - 75)	$900.00	$1,800.00	$2,700.00
		>30	HIGH (> 300)	HIGH (> 75)	$2,100.00	$5,600.00	$7,700.00
	10	< 10	LOW (< 100)	LOW (< 25)	$2,000.00	$5,000.00	$7,000.00
		10 - 30	MEDIUM (100 - 300)	MEDIUM (25 - 75)	$2,200.00	$10,000.00	$12,200.00
		>30	HIGH (> 300)	HIGH (> 75)	$3,360.00	$14,800.00	$18,160.00
SURFACE	100	< 10	LOW (< 100)	LOW (< 25)	$900.00	$2,500.00	$3,400.00
TO 2 FEET		10 - 30	MEDIUM (100 - 300)	MEDIUM (25 - 75)	$1,000.00	$4,100.00	$5,100.00
		>30	HIGH (> 300)	HIGH (> 75)	$2,200.00	$9,200.00	$11,400.00
	1000	< 10	LOW (< 100)	LOW (< 25)	$800.00	$1,400.00	$2,200.00
		10 - 30	MEDIUM (100 - 300)	MEDIUM (25 - 75)	$900.00	$2,900.00	$3,800.00
		>30	HIGH (> 300)	HIGH (> 75)	$2,100.00	$6,700.00	$8,800.00
	10	< 10	LOW (< 100)	LOW (< 25)	$2,000.00	$8,500.00	$10,500.00
		10 - 30	MEDIUM (100 - 300)	MEDIUM (25 - 75)	$2,200.00	$8,800.00	$11,000.00

Attachment (1)

		>30	HIGH (> 300)	HIGH (> 75)	$3,360.00	$18,900.00	$22,260.00
SURFACE	100	< 10	LOW (< 100)	LOW (< 25)	$900.00	$4,100.00	$5,000.00
TO 4 FEET		10 - 30	MEDIUM (100 - 300)	MEDIUM (25 - 75)	$1,000.00	$5,900.00	$6,900.00
		>30	HIGH (> 300)	HIGH (> 75)	$2,200.00	$11,400.00	$13,600.00
	1000	< 10	LOW (< 100)	LOW (< 25)	$800.00	$2,900.00	$3,700.00
		10 - 30	MEDIUM (100 - 300)	MEDIUM (25 - 75)	$900.00	$4,100.00	$5,000.00
		>30	HIGH (> 300)	HIGH (> 75)	$2,100.00	$8,300.00	$10,400.00

TERRAIN/VEGETATION MODIFIERS

VEGETATION	TERRAIN	MULTIPLIER
HEAVILY WOODED (60 - 100%)	STEEP (> 20%)	2.00
HEAVILY WOODED (60 - 100%)	MODERATE (5 - 20%)	1.75
HEAVILY WOODED (60 - 100%)	LEVEL (< 5%)	1.50
MODERATELY WOODED (5 - 60%)	STEEP (> 20%)	1.50
MODERATELY WOODED (5 - 60%)	MODERATE (5 - 20%)	1.35
MODERATELY WOODED (5 - 60%)	LEVEL (< 5%)	1.20
OPEN, SPARSELY WOODED (< 5%)	STEEP (> 20%)	1.30
OPEN, SPARSELY WOODED (< 5%)	MODERATE (5 - 20%)	1.20
OPEN, SPARSELY WOODED (< 5%)	LEVEL (< 5%)	1.00

BRUSH CLEARING ADDITIVE

DESCRIPTION	COST/ACRE
LIGHT DENSITY (low grass and/or few shrubs)	$500
MEDIUM DENSITY (heavy grass, numerous shrubs and/or some trees)	$2,500
HEAVY DENSITY (heavy shrubs with trees or forest)	$5,000

** The information provided above may not be accurate for all types of areas of concern due to the vast variety of conditions that are common on many Ordnance and Explosive (OE) sites. Assumptions were made in order to derive the values listed above. It is recommended that this information be used for Rough Order of Magnitude (ROM) estimates only. The Huntsville Center Corps of Engineers should be solicited to provide a more detailed and accurate estimate for specific conditions and areas of concern.

Attachment (2)

SECTION 01576

CONSTRUCTION SUPPORT ORDNANCE CLEARANCE
06/98

PART 1 GENERAL

1.1 GENERAL DESCRIPTION

1.1.1 Project Description

Brief description; low, high, moderate level; known ordnance shot into area.

1.1.2 Ordnance Contamination Profile

Expected anomalies per acre; expected UXO per acre; sampling/study results; types of ordnance found.

1.2 APPLICATION

Provisions of the Section apply to work within areas indicated and designated as a UXO Area. If unexploded ordnance (UXO) is found outside of the indicated areas work shall stop and the Contracting Officer notified for further action.

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CORPS OF ENGINEERS PAMPHLET (EP)

EP 385-1-95a	(2001) Basic CEHNC Safety Concepts and Basic Considerations for OE
EP 75-1-2	(2000) Unexploded Ordnance (UXO) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction

DEPARTMENT OF ARMY (DA)

DA PAM 385-64	(1999) Ammunition and Explosives Safety Standards

DEPARTMENT OF THE ARMY REGULATION (AR)

AR 190-11	(1998) Physical Security of Arms, Ammunition and Explosives

DEPARTMENT OF DEFENSE (DOD)

DOD 6055.9-STD	(1999) DOD Ammunition and Explosives Safety Standards

1.4 TERM DEFINITION

1.4.1 Unexploded Ordnance (UXO)

In addition to the definition for UXO found in EP 75-1-2, for purposes of this project the term also refers to inert, practice, or expended munitions items that resemble UXO.

1.4.2 Ordnance and Explosives (OE)

Refer to the glossary of EP 75-1-2 for the definition of OE.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES, except that all submittals in this section designated as "G, MCX" shall also be submitted to the attention of CEHNC-IS-SP (RTLP) and CEHNC-OE-CX at the ~~-~~U.S. Army Engineering and Support Center, ~~Attention CEHNC-IS-SP (Petty),~~ P.O. Box 1600, 4820 University Square, Huntsville, Alabama 35807-4301.~~:~~ CEHNC-OE-CX is the approval authority for submittals designated as "G, MCX".

SD-01 Preconstruction Submittals

Personnel Qualifications; G, MCX.

Submit resumes of UXO Technicians documenting that qualifications requirements are satisfied.

Work Plan; G, MCX.

SD-11 Closeout Submittals

Site Specific Removal Report.

1.6 UXO PERSONNEL

UXO personnel shall be U.S. citizens and graduates of one of the following schools or courses.

a. U.S. Army Bomb Disposal School, Aberdeen Proving Ground, Maryland.

b. U.S. Naval Explosive Ordnance Disposal (EOD) School, Indian Head, Maryland.

c. EOD Assistant's Course, Redstone Arsenal, Alabama; EOD Assistant's Course, Eglin Air Force Base, Florida; or a DOD certified equivalent course.

Credit for EOD experience in National Guard or Reserve Units will be based on the actual documented time spent on active duty, not on the total time of service.

1.6.1 Senior UXO Supervisor (SUXOS)

This individual shall be a graduate of a school listed above. This individual shall have at least 15 years UXO experience, which may be a combination of active duty military EOD and contractor UXO experience, and shall include 10 years in supervisory positions. A SUXOS must be able to fully perform all of the functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. In addition, the ability to perform the following functions is a requirement for the SUXOS: Planning, coordinating, and supervising all contractor on-site UXO activities; preparation of standard operating procedures (SOPs) for UXO operations ensuring compliance with DOD directives as well as local, state, and federal statues and codes; and certification of Ammunition, Explosives, and Dangerous Articles (AEDA) and/or range scrap as ready for turn-in or disposal in accordance with current policies. The SUXOS must also be fully capable of supervising multiple project teams which may be performing UXO and UXO related activities; e.g., vegetation clearance; land surveying; reconnaissance and classification of UXO, pyrotechnic items, and military explosives and demolition materials; locating surface and subsurface UXO; destroying UXO and OE by burning or detonation; and/or transporting and storing UXO and explosives material.

1.6.2 UXO Technician III

This individual, who supervises a project team, shall be a graduate of a school listed above. This individual shall have experience in OE clearance operations and supervising personnel, and shall have at least ten years combined active duty military EOD and contractor UXO experience. This individual must be able to fully perform all functions enumerated for UXO Sweep Personnel, UXO Technicians I and II. In addition, the ability to perform the following functions is a requirement for the UXO Technician III: Supervising and performing on-site disposal of Ordnance and Explosives; preparing explosives storage plans in accordance with all applicable guidance; preparing required OE administrative reports; preparing SOPs for on-site OE operations; performing risk hazard analyses; conducting daily site safety briefings; and supervising the conduct of all on-site evolutions directly related to OE operations.

1.6.3 UXO Technician II

This individual shall be a graduate of a school listed above. As an exception, a UXO Technician II may be an UXO Technician I with at least five years combined military EOD and contractor UXO experience. This individual must be able to fully perform all functions enumerated for UXO Sweep Personnel and UXO Technician I. In addition, the ability to perform the following functions is a requirement of the UXO Technician II: Properly

storing OE material in accordance with applicable guidance; identifying fuzes and determining fuze condition; determining a magnetic azimuth using current navigational/locating equipment; performing field expedient identification procedures to identify explosives contaminated soil; preparing an on-site holding area for OE material; and operating modes of transportation for transporting OE material, when appropriate.

1.6.4 UXO Technician I

This individual shall be a graduate of a course listed above. A UXO Technician I can advance to the UXO Technician II category after five years combined active duty military EOD and contractor UXO experience. This individual assists fully qualified personnel (UXO Technician II and above) in the following functions: Conducting reconnaissance and classification of UXO and other OE materials; identifying all munitions including bombs and bomb fuzes, guided missiles, projectiles and projectiles fuzes, rockets and rocket fuzes, land mines and associated components, pyrotechnics items, military explosives and demolition materials, grenades and grenade fuzes, and submunitions; locating subsurface UXO using military and civilian magnetometers and related equipment; performing excavation procedures on subsurface UXO; locating surface UXO by visual means; transporting UXO and demolition materials; preparing firing systems, both electric and non-electric, for destruction operations; operating Personnel Decontamination Stations (PDS); inspecting salvaged OE related material and erection of UXO related protective works; and donning and doffing personnel protective equipment.

1.6.5 UXO Sweep Personnel

UXO Sweep personnel assist UXO technicians and supervisory personnel in the clearance of UXO, operating only under the direct supervision of qualified UXO technicians and/or UXO supervisors. This position requires site and job specific contractor training (which may include ordnance recognition, safety precautions, donning and doffing personnel protective equipment, etc.) but does not require UXO technician qualifications. UXO Sweep Personnel conduct visual and/or instrumented UXO search activities in the field; perform field maintenance on military and civilian magnetometers; operate ordnance detection instruments and other similar equipment to include digital geophysical mapping instruments; and remove OE scrap after such items have been certified/verified safe for handling by a qualified UXO technician. UXO sweep personnel are not involved in the execution of explosives operations.

1.6.6 UXO Safety Officer (UXOSO)

This individual shall have the same minimum qualifications as a UXO Technician III. In addition, this individual shall have the specific training, knowledge, and experience necessary to implement the SSHP and verify compliance with applicable safety and health requirements. This individual must be able to perform all functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. In addition, the UXOSO must have the ability to implement the approved UXO and explosives safety program in compliance with all DOD, federal, state, and local statutes and codes; analyze UXO and explosives operational risks, hazards, and safety requirements; establish and ensure compliance with all site specific safety requirements for UXO and explosives operations; enforce personnel limits and

safety exclusion zones for UXO clearance operations, UXO and explosives transportation, storage, and destruction; conduct safety inspections to ensure compliance with UXO and explosives safety codes; and operate and maintain air monitoring equipment required at site for airborne contaminates.

1.6.7 UXO Quality Control Specialist (UXOQCS)

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

1.7 WORK UNIT

1.7.1 Team Composition

Only UXO qualified personnel shall perform OE procedures. Non-UXO qualified personnel may be utilized to perform OE related procedures when supervised by UXO qualified personnel. In no case shall one person work alone in disposal operations. All personnel engaged in construction operations shall be thoroughly trained in explosive safety and be capable of recognizing hazardous explosive exposures.

a. For work in areas not already cleared of ordnance, each UXO team shall consist of one UXO Technician III and six or less team members. Teams shall have a minimum of two UXO qualified personnel, one of which shall be the UXO Technician III. When the UXO operations are limited to surface removals using UXO Sweep Personnel, personnel ratios shall NOT exceed six (6) UXO Sweep Personnel to one (1) UXO Technician II, or three (3) UXO Technicians II to one (1) UXO Technician III.

b. For work in areas that have already been designated cleared of ordnance, a team consisting of a UXO Technician III and a UXO Technician II or UXO Technician I shall be readily available on site within the range construction limits.

c. The minimum team separation distance for all teams is the greater of 200 feet or the K50 distance of the most probable munition (MPM) for the OE area.

d. The UXO Technician III shall supervise all OE tasks and UXO teams. This individual may supervise other than UXO teams such as brush-clearing teams. When non-UXO teams are under the direct supervision of someone other than a UXO Technician III, the teams shall be accompanied by a UXO Technician II who will provide UXO avoidance support.

e. UXO Sweep Personnel shall not excavate anomalies nor handle UXO.

1.7.2 Work Hours

All UXO work shall be performed during daylight hours with suitable visibility. UXO personnel shall perform UXO related tasks no more than 10 hours per day for a minimum of 40 hours per week. Two consecutive work weeks shall be separated by 48 hours of rest.

1.8 WORK PLAN

Provide details of the approach, methods, and operation procedures to be employed to perform ordnance clearance during construction. The plan shall be based upon limiting exposure to a minimum number of personnel, for a minimum time, to the minimum amount of UXO consistent with safe and efficient operations. Chapter 1 of the work plan shall identify the project; provide a site description including site location, topography, vegetation; a brief site history; and a project management approach including coordination of prime and sub-contractors. As minimum, all of the following plans shall be included as separate chapters in the work plan.

1.8.1 Technical Management Plan

Detail the approach, methods, and operational UXO procedures to be employed at the construction site. Prepare the plan containing, as a minimum, the following:

1.8.1.1 General

a. Identify guidance, regulations or other policy under which the OE operations will be conducted.

b. Procedures to be employed in the event that unexploded ordnance (UXO) cannot be destroyed on site, if planned; and if an unidentified UXO is located.

c. Technical scope of the project, grid sizes, grid layout, and software to be used in sampling and removals.

1.8.1.2 Organizational Chart

Provide an organization chart specific to the project. Indicate assignment of functions, duties and responsibilities and functional relationships among the organizational elements participating in the work. Address the composition and management of sweep teams.

1.8.1.3 Site Preparation

Procedures for site preparation and activities such as brush cutting, geophysical test plots, and surface sweeps.

1.8.1.4 Disposition Reporting

Detailed procedures for reporting and disposition of UXO, including responsibilities of personnel, overall safety precautions, UXO identification, transportation, safe holding areas, operations in

populated/sensitive areas, and all demolition and post demolition operations and any required engineering controls for intrusive operations and intentional detonations. Detailed procedures for managing, reporting, venting, and disposing of OE scrap and non-OE scrap.

1.8.1.5 Related Procedures

Discussion of additional tasks and procedures to be followed in executing those tasks, if not addressed in subsequent chapters of the work plan (e.g., public affairs, community relations, dissemination of data, final report).

1.8.2 Explosives Management Plan

The contractor shall prepare a detailed plan for management of explosives in accordance with local and state laws and regulations, DA PAM 385-64, DOD 6055.9-STD, DOT regulations, and AR 190-11. Prepare the plan containing, as a minimum, the following.

1.8.2.1 Acquisition

a. A description and estimated quantity of explosives to be used.

b. The acquisition source.

1.8.2.2 Initial Receipt

a. Procedures for receipt of explosives from an installation ammunition supply activity, commercial vendor, or a previous contractor at a site.

b. Procedures for reconciling discrepancies in quantities shipped and quantities received.

1.8.2.3 Storage

a. Establishment of explosive storage facilities.

b. Physical security of explosive storage facilities.

c. Procedures for return to storage of any daily issued explosives not expended.

1.8.2.4 Transportation

a. Procedures for transportation from storage facility to disposal locations at the project site.

b. Requirements for vehicles transporting explosives at the project site.

1.8.2.5 Receipt Procedures

a. The contractor shall establish receipt procedures accounting for each item of explosives from initial delivery to the site until the item is expended or the contractor is relieved from accountability by the Contracting Officer.

b. The contractor shall identify individuals authorized to receive, issue, transport, and use explosives by contract position title and those individuals shall assume accountability by signing the receipt documents.

c. The end user of explosives shall certify in writing that the explosives were used for their intended purpose.

d. Procedures for reconciling receipt documents, and proposed intervals.

1.8.2.6 Inventory

a. Procedures for physical inventory of explosives in storage facilities.

b. Procedures for reconciling discrepancies resulting from inventories.

c. Inventories of explosives in stock shall be conducted weekly, at a minimum.

d. Procedures upon discovery of lost, stolen, or unauthorized use of explosives: Proper authorities shall be notified in writing within 24 hours of the event. Immediate telephonic notification to the Contracting Officer, followed up by a written report within 24 hours.

1.8.2.7 Final Disposition

Procedures for disposing of any remaining explosives at the end of the contractor's site activities.

1.8.3 Quality Control Plan

Detail additional quality control and maintenance procedures in excess of those specified in Section 01451, CONTRACTOR QUALITY CONTROL.

1.8.3.1 Document Processes

Audit procedures, corrective/preventive action procedures, data management, anomaly acquisition and reacquisition, field operations, equipment calibration/maintenance requirements, pass/fail criteria for all quality audits and records generated.

1.8.3.2 Process/Training Plan

The QC Plan shall include a process/training plan for all on-site personnel that ensures each employee meets the qualifications requirements (education, training, and/or experience), to perform the duties of the job for which they were hired. The QC Plan shall also address all site specific and routine training requirements for contractor personnel.

1.8.4 Site Specific Safety and Health Plan

The contractor shall prepare a site specific safety and health plan (SSHP) in accordance with the following guidelines.

1.8.4.1 Staff Organization, Qualifications, and Responsibilities

The operational and safety responsibilities of each key person shall be identified. The organizational structure, with lines of authority and overall responsibilities for the safety and health of the contractor employees and all subcontractors, shall be discussed. An organizational chart showing the lines of authority for safety shall be provided. Each person assigned specific safety and health responsibilities shall be identified and his/her qualifications and experience documented by a resume in the SSHP.

1.8.4.2 Site Description and Contamination Characterization

Provide a description of the site based on results of previous studies, site history, and prior uses and activities. Compile a summary of hazardous substances and safety and health hazards likely to be encountered onsite. Include ordnance and chemical/biological, concentration ranges, media in which found, locations onsite, and estimated quantities/volumes to be impacted by this work.

1.8.4.3 Hazard Analysis and Risk Assessment

In the SSHP, the contractor shall provide a complete description of the UXO work to be performed at each site. The contractor shall identify the chemical, physical, safety and biological hazards that are expected to be encountered for each task and/or site operation to be performed. Each task/operation is to be discussed separately. Routes and sources of exposure for chemical hazards anticipated onsite, along with chemical/biological names, concentration ranges, media in which found, locations onsite, estimated quantities/volumes, and the applicable regulatory standards (PELs) and recommended exposure limits (TLVs), shall be provided. Action levels shall be specified and justified for implementation of engineering controls and/or work practice controls, initial levels or changes in level of personal protective equipment, for emergency evacuation of onsite personnel, and for the prevention and/or minimization of public exposure to hazards created by onsite activities.

1.8.4.4 Training

All general site workers shall receive 40 hours of initial safety and health training (24 hours for workers occasionally onsite and whose tasks are limited and are unlikely to be overexposed) which is relevant to hazardous site activities including recognition of UXO, plus three days of supervised field experience (one day for workers occasionally onsite), in compliance with 29 CFR 1910.120(e). In addition, site-specific, supervisory, refresher and visitor training in accordance with the aforementioned regulations shall be addressed. The content, duration, and frequency of all training shall be described.

1.8.4.5 Personal Protective Equipment

A Personal Protective Equipment (PPE) Program shall be included in the SSHP. The contractor shall describe in detail and provide appropriate PPE to ensure workers, official visitors and government employees are not exposed

to levels greater than the action level for identified hazards for each operation and work zone. The program shall address all the elements of 29 CFR 1910.120(g)(5), 29 CFR 1910.134, and 29 CFR 1910.132. Minimum levels of protection necessary for each task/operation to be performed at each site based on probable site conditions, potential occupational exposure, and the hazard analysis/risk assessment required above. Include specific types and materials for protective clothing and respiratory protection. Establish and justify upgrade/downgrade criteria based upon the action levels established as required by paragraph 10.2.6 (as a minimum) and as appropriate. The following emergency and first aid equipment shall be immediately available for onsite use: (1) First aid equipment and supplies approved by the consulting physician; (2) Emergency eye-washes/showers which comply with ANSI Z-358.1; (3) Emergency use respirators (worst case appropriate and as identified by the hazards analysis); (4) Spill control materials and equipment as appropriate; and (5) Fire extinguishers (specify type, size and locations).

1.8.4.6 Environmental and Personal Monitoring

Where it has been determined that there may be employee exposures to and/or off site migration potential of hazardous airborne concentrations of hazardous substances, appropriate direct reading (real-time) air monitoring and integrated (time weighted average) air sampling shall be conducted IAW applicable federal, state, and local requirements. Air monitoring/sampling must accurately represent concentrations of air contaminants encountered onsite and leaving the site. The types and frequency of air monitoring/sampling to be performed shall be specified for onsite and perimeter locations, where applicable. Where perimeter monitoring is not deemed necessary, provide suitable justification for its exclusion. When applicable, NIOSH and/or EPA sampling and analytical methods shall be used. Personal samples, where necessary, shall be analyzed by laboratories successfully participating in and meeting the requirements of the American Industrial Hygiene Association's (AIHA) Proficiency Analytical Testing (PAT) or Laboratory Accreditation Program. Include, as appropriate, real time (direct-reading) monitoring and integrated Time Weighted Average (TWA) sampling for specific contaminants of concern, Meteorological, noise and radiation monitoring shall be conducted as needed depending upon the site hazard assessment. All monitoring and sampling protocol shall be specified to include instrumentation to be used and calibration of instruments. All monitoring results shall be compared to action levels to determine the need for corrective actions.

1.8.4.7 Site Control

The contractor shall describe site control measures which include site maps, the work zone delineation and access points, the on/off site communication system, general site access controls, and security procedures (physical and procedural).

1.8.4.8 Personnel and Equipment Decontamination

The contractor shall develop and specify decontamination procedures with 29 CFR 1910.120 for personnel, personal protective equipment, monitoring instruments, sampling equipment, and other equipment used onsite. Decontamination procedures shall address specific measures to ensure that contamination is confined to the work site. Necessary facilities and their locations, detailed standard operating procedures, frequencies, supplies,

and materials to accomplish decontamination of site personnel and to determine adequacy of equipment decontamination shall be discussed.

1.8.4.9 Emergency Response and Contingency Procedures (Onsite and Off-site)

An Emergency Response Plan, as required by 29 CFR 1910.120 shall be developed and implemented. As a minimum, it shall address the following elements: (1) Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposure, personal injuries, fire/explosions, environmental spills and releases, discovery of radioactive materials; (2) Personnel roles, lines of authority, communications; (3) Posted instructions and list of emergency contacts: physician, notified nearby medical facility, fire and police departments, ambulance service, state/local/federal agencies, CIH, and Contracting Officer; (4) Emergency recognition and prevention; (5) Site topography, layout and prevailing weather conditions; (6) Criteria and procedures for site evacuation, emergency alerting procedures/employee alarm system, emergency PPE and equipment, safe distance, place of refuge, evacuation routes, site security and control; (7) Specific procedures for decontamination and medical treatment of injured personnel; (8) Route maps to nearest pre-notified medical facility; (9) Criteria for initiating community alert program, contacts and follow-up; (10) Specific procedures any time suspect Chemical Warfare Materiel (CWM) is encountered. Material Safety Data Sheets (MSDS) for each hazardous substance anticipated to be encountered on site shall be made accessible to site personnel at all times and shall be submitted in an appendix to the SSHP.

1.8.4.10 SOPs, Engineering Controls, and Work Practices

The contractor shall develop Standing Operating Procedures (SOPs) to protect field personnel, prevent accidents, minimize hazards, and to take action to correct hazards where necessary. Site rules and prohibitions for safe work practices shall be discussed and shall include such topics as use of the buddy system, smoking restrictions, material handling procedures, confined space entry, excavation safety, physiological and meteorological monitoring for heat/cold stress, illumination, sanitation, daily safety inspections, etc. This list of topics is not intended to be all-inclusive.

1.8.4.11 Logs, Reports and Record Keeping

Record keeping procedures for training logs, daily safety inspection logs, employee/visitor registers, medical surveillance records and certifications, air monitoring results, and personal exposure records shall be specified. All personal exposure and medical monitoring records shall be maintained IAW applicable OSHA standards, 29 CFR 1904, 29 CFR 1910, and 29 CFR 1926. The contractor shall develop, retain, and submit, as part of the final report, all visitor registration logs, training logs, and daily safety inspection logs. The contractor shall maintain copies of the required training and medical certificates onsite and shall make them available for government inspection upon request. All recordable accidents/injuries/illnesses shall be telephonically reported to the Contracting Officer immediately.

1.9 SITE SPECIFIC REMOVAL REPORT

During construction, the contractor shall provide a weekly report documenting ordnance operations including, but not limited to, the following.

a. General characterization of the construction area (range) with emphasizing ordnance contamination.

b. Maps showing the ordnance clearance areas (grids) and records of ordnance found, designated by grid number, type, and quantity.

After completing construction, provide a final removal report that summarizes a. and b. above and includes the following:

c. Description of methods used to clear ordnance, including lessons learned and advice for future construction support operations.

d. Color photographs of major activities and UXO discoveries.

e. Daily journals.

f. Certification of clearance, signed by the Senior UXO Supervisor.

PART 2 PRODUCTS

2.1 EXPLOSIVES TRANSPORT, DISPOSAL AND STORAGE

The contractor shall provide a temporary explosive storage area in compliance with DA PAM 385-64, state and local requirements. Explosives transport and disposal shall be in compliance with Federal, state, and local requirements. At each project site, the contractor shall have and, upon request, make available to any local, state, or federal authority a copy of any license/permit obtained authorizing the contractor to purchase, store, transport, and use explosives. The establishment of an explosive storage area must also meet the following requirements.

2.1.1 Separation Distance

The area shall meet the inhabited building and public traffic route distances specified in DOD 6055.9-STD.

2.1.2 Net Explosive Weight

Each magazine must have a net explosive weight established for the explosives to be stored.

2.1.3 Lightning Protection

Each magazine must have lightning protection in accordance with Chapter 7 of DOD 6055.9-STD and must meet intramagazine distances as defined in Chapter 9 of DOD 6055.9-STD.

2.1.4 Security

The contractor is responsible for providing physical security to prevent the theft of explosives. The degree of physical security shall comply with installation requirements.

2.1.5 Fire Plan

A fire plan, in coordination with the installation fire department, shall be prepared. Placarding of magazines shall be in accordance with local, state and federal requirements.

PART 3 EXECUTION

3.1 CONSTRUCTION SUPPORT

The Contractor shall utilize UXO qualified personnel to assure all aspects of this construction contract are performed safely and in accordance with Contract Requirements. UXO personnel shall remain on site during all construction activities.

3.1.1 UXO Avoidance for Non-Intrusive Activities

The Contractor shall utilize UXO qualified personnel to escort all survey crews, brush-cutting crews, geotechnical crews and similar crews as they access the construction areas to perform work required under this contract. The UXO qualified personnel shall, for this type of work, provide UXO avoidance support. UXO avoidance consists of on-site UXO-qualified personnel escorting the Contractor's non-UXO qualified personnel, and identifying safe work locations and safe work practices within areas potentially containing hazardous surface or subsurface UXO. If, after a site inspection the Contractor's UXO qualified personnel determine that UXO Avoidance support is not necessary in a specific area, this area can be clearly marked by the Contractor and UXO avoidance support within that area terminated.

3.1.2 UXO Avoidance for Incidental Intrusive Activities

For all the Contractor's activities that require incidental, shallow excavation, including but not limited to, placing survey stakes into the ground, setting fence and sign posts, pile driving, trenching, or setting silt fences, the Contractor shall first investigate the specific location to be disturbed with an approved magnetometer. If an apparent metallic anomaly is detected by the magnetometer, a different, nearby location free of apparent metallic anomalies shall be selected and designated. The incidental shallow excavation shall be moved to that location.

3.1.3 Vehicular Traffic Areas

UXO avoidance techniques shall be employed in establishing vehicle access throughout UXO contaminated areas.

3.2 UXO CLEARANCE

UXO clearance activities need only clear UXO and inert/expended munition items that resemble UXO. Frag and other metallic litter that does not represent a safety hazard shall not be removed as part of the UXO Clearance.

3.2.1 Surface Clearance

The Contractor shall utilize UXO qualified personnel to clear all indicated areas within the construction limits of any surface UXO or items which resemble UXO that may be on-site.

3.2.2 Non-Intrusive Construction

The Contractor shall practice UXO avoidance procedures for performing activities to include the following:

a. Fill in areas where no stripping is required
b. Tree clearing
c. Demolition of existing concrete pads
d. Pole removal

3.2.3 Intrusive Construction Within UXO Surface Clearance Areas

3.2.3.1 Roadways and Parking Areas

The Contractor shall utilize UXO qualified personnel to clear all UXO to a depth of 600 mm below maximum construction excavation along all roadways, including drainage structures, defilades and the MAT constructed under this contract. The ordnance clearance shall extend for the entire length of all roadways to the width of excavation or fill plus 1.5 meters.

3.2.3.2 Downrange Structures and Target Emplacements

The Contractor shall utilize UXO qualified personnel to clear all UXO to a depth of 600 mm below maximum construction excavation at each structure or target emplacement. The clearance shall include the entire footprint plus an additional 3 meters beyond the construction footprint at each of the sites.

3.2.3.3 Trenching, Ditching and Grading for Line of Site

The Contractor shall utilize UXO qualified personnel to clear all UXO to 600 mm below the depth of the construction excavation.

3.2.3.4 Pile Driving

The Contractor shall pre-drill holes at each pile location. The hole shall be large enough to accommodate a down-hole magnetometer but not larger than 100 mm in diameter. Each hole shall be drilled or augered in 600 mm increments to a final depth of 3 m. After each 600 mm increment, the down-hole magnetometer shall be used and any detected anomalies shall be cleared before proceeding.

3.3 DISPOSAL

UXO shall be destroyed in place after all personnel have been withdrawn in accordance with DOD 6055.9-STD, Table C5.T1 or C5.T2 or the calculated frag distance. No ordnance or scrap may be removed from the site. If UXO is encountered that is not readily identifiable or cannot be moved due to its condition and the location prevents disposal in place, the contractor shall notify the EOD unit used by the installation for assistance.

3.4 AREAS CLEARED OF ORDNANCE

The contractor shall mark the limits of OE cleared areas for construction operations as required for construction safety purposes.

-- End of Section --