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SAFETY

BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) RESPONSE ACTION OPERATIONS

ENGINEER PAMPHLET

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BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) RESPONSE ACTION OPERATIONS

1. Purpose. This pamphlet establishes U.S. Army Corps of Engineers (USACE) operating procedures for dealing with military munitions at Formerly Used Defense Sites (FUDS), Base Realignment and Closure (BRAC), and Installation Restoration projects. There are no absolutely safe procedures for dealing with military munitions, merely procedures considered to be the least dangerous; therefore, it is essential that a planned and systematic approach to dealing with such items be established.

2. Applicability. This pamphlet applies to all Headquarters, USACE elements and all USACE commands having responsibility for performing munitions response to munitions and explosives of concern (MEC) response action operations.

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

4. References. References are at Appendix A.

5. Explanation of Acronyms and Terms. Acronyms and special terms used in this document are explained in the glossary.

6. Policy. The policy of USACE is to produce products and services that fully meet customers' expectations of quality, timeliness, and cost effectiveness, within the bounds of legal responsibility. There will be no compromise of functional, health, or safety requirements. Adherence to the principles outlined in ER 5-1-11 and ER 1110-1-12 will contribute to achieving this goal. Procedures for munitions response to MEC will be formulated to ensure harmony with the USACE Strategic Vision and should be executed in concert with activities presented in other USACE guidance.

7. Responsibilities. Personnel performing munitions response to MEC projects are responsible for safely executing these operations in accordance with the approved Safety Program including the Site Safety and Health Plan, Accident Prevention Plan, approved Work Plan, and all applicable laws, regulations, and policies. A detailed discussion of USACE organizational responsibilities for Military Munitions Response Program (MMRP) projects is presented in ER

This EP supersedes EP 385-1-95a, dated 29 June 2001

1110-1-8153. Safety and health requirements, responsibilities, and procedures for MEC operations are defined in ER 385-1-95 and EM 385-1-1.

8. General Safety Concerns and Procedures.

a. As a general rule, all unexploded ordnance (UXO) and discarded military munitions (DMM) will be detonated in the original position found. This is the safest method to effect final disposition of munitions. Engineering controls may be required based on site-specific conditions. If authorized by the approved Work Plan, UXO and DMM may be moved to a consolidated area for demolition in accordance with EP 1110-1-17.

b. All UXO will be destroyed daily unless circumstances beyond the contractor's control (e.g., unexpected weather storms, unavailability of donor explosives, etc.) preclude their destruction. If a UXO cannot be destroyed on the day of discovery, then the item will be secured and guarded until destruction can be accomplished. Under no circumstances will UXO be left unsecured overnight.

c. MEC operations will not be conducted until all applicable plans for the project in question are prepared and approved. Plans will be approved in accordance with ER 1110-1-8153. These plans will be based upon the concept of limiting exposure to the minimum number of personnel, for the minimum amount of time, to the minimum amount of military munitions consistent with safe and efficient operations.

d. Only UXO-qualified personnel will perform MEC procedures. As an exception, a UXO Technician I may assist in the performance of MEC procedures when under the supervision of a UXO Technician III or higher. Non-UXO-qualified personnel who have been determined to be essential for the operations being performed may be utilized to perform MEC-related procedures when supervised by a UXO Technician III or higher. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III or higher. Contact the Military Munitions Center of Expertise (MM CX) for current UXO Technician ratings.

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

f. Prior to any action being performed on an ordnance item, all fuzing will be definitively identified if it is possible to safely do so without disturbing the ordnance item This identification

will consist of fuse type by function and condition (armed or unarmed) and the physical state/condition of the fuse, i.e., burned, broken, parts exposed/sheared, etc.

g. MEC operations will be conducted only during daylight hours.

h. In accordance with the requirements of EP 1110-1-18, UXO-qualified personnel involved in performing MEC procedures will be limited to a 40-hour work week, either four 10-hour days or five eight-hour days. Two consecutive work weeks will be separated by 48 hours of rest. A waiver to the 40-hour work week requirement may be granted for conventional munitions response to MEC projects using the following protocols:

(1) The contractor will be required to submit to the Contracting Officer for approval a comprehensive risk assessment for the work that is to be accomplished, taking into account a wide array of factors (e.g., fatigue, health, environment, type of work, etc.). This requirement must be met before an increase in the established 40-hour work week can commence.

(2) For those work schedules exceeding 40 hours, but not exceeding 60 hours, concurrence will be required by the USACE Project Manager, the Ordnance and Explosives Safety Specialist (OESS) supporting the Project Delivery Team, and the Ordnance and Explosives (OE) Safety Manager/Administrator, if assigned. Two (2) consecutive work weeks should be separated by 48 hours of rest.

(3) For proposed work schedules exceeding 60 hours, concurrence will be required by the District Commander and OE Director prior to approval by the Contracting Officer.

9. MEC Procedures Safety Precautions.

a. Every effort will be made to identify a suspect military munition. Under no circumstances will any MEC be moved in an attempt to make a definitive identification. The military munition will be visually examined for markings and other external features such as shape, size, and external fittings. If an unknown military munition is encountered, the onsite USACE representative will be notified immediately. If there is no onsite USACE representative, the Military Munitions (MM) Remedial Action District or the U.S. Army Engineering and Support Center, Huntsville (USAESCH) Chief of OE Safety will be notified as soon as possible. If research of documentation is required, it will be initiated by the MM CX. Following is additional guidance for the safe handling of military munitions:

(1) Projectiles containing base-detonating fuses are to be considered armed if the round has been fired.

(2) Arming wires and pop out pins on unarmed fuses should be secured prior to moving military munitions.

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

(4) Do not attempt to remove any fuse(s) from military munitions. Do not dismantle or strip components from any military munitions.

(5) UXO personnel are not authorized to render inert any military munitions found onsite.

(6) Military munitions will not be taken from the project property as souvenirs/training aids.

(7) Civil War era ordnance will be treated in the same manner as any other military munition.

b. Prior to entering a Munitions Response Area or Munitions Response Site (MRS) that contains Improved Conventional Munitions (ICMs) or submunitions, a Department of the Army (DA) waiver will be obtained by the affected installation or the executing MM Remedial Action District for FUDS properties. The waiver will be obtained in accordance with the requirements listed in DA Pam 385-64. The waiver will be routed through the MM CX for concurrence. If an ICM or submunition is found at a project property not previously known to contain ICMs or submunitions, work will cease. If the item is found as a result of a munitions response to MEC project, then the team that discovered the item will perform the disposal. If the item is found as a result of some other activity (e.g., construction support), then the notification and disposal procedures identified in the approved Work Plan will be used to dispose of the item. The discovered item will be identified, then properly disposed of (including guarding the item if disposition is to be delayed). Work will resume only when an ICM waiver has been obtained. For guidance on the preparation of waiver requests, contact the MM CX.

c. Any time munitions with unknown fillers are encountered during conventional munitions response to MEC project activities, all work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel will secure the area in accordance with the provisions identified in the approved Work Plan to prevent unauthorized access. Personnel should position themselves as far upwind as possible while still maintaining security of the area. Personnel who could have been exposed to the unknown filler will not be released from the site until the presence of contamination has been verified by the U.S. Army Technical Escort Unit (TEU).

(1) On FUDS properties, the UXO team will notify the local Point of Contact (POC) designated in the Work Plan. The local POC will facilitate the Explosive Ordnance Disposal

(EOD) response, and two personnel will secure the location until the EOD unit's arrival. If the local POC designated in the Work Plan is not the local law enforcement agency, then the local POC will inform the local law enforcement agency of the discovery if necessary. The EOD unit will notify the TEU and secure the area until TEU's arrival. After notifying the local law enforcement agency (when necessary), the executing MM Remedial Action District will notify their safety group and the MM CX of the actions taken. Refer to EP 75-1-3 for more detailed instructions on the procedures to take in the event munitions with unknown fillers are encountered on FUDS properties.

(2) Do not have munitions with unknown fillers exposed to direct sunlight after it has been excavated. Some fillers can detonate with the temperature change.

(3) On active or BRAC installations, the UXO team will notify the POC designated in the Work Plan.

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

e. UXO are the most dangerous military munitions that may be encountered. All military munitions, regardless of their appearance or condition, will be considered dangerous and managed as UXO until assessed otherwise by an UXO-qualified individual. Military munitions that have experienced abnormal environments, such as demilitarization by open burning, open detonation, accidents, fires or where components have been armed or affected by certain tests (e.g., fuse arming tests, jolt and jumble tests), are very unstable.

f. Do not rely on the color coding of military munitions for definitive identification. Military munitions having incomplete or improper color codes have been encountered.

g. Avoid approaching the forward area of a military munition until it can be determined whether or not the item contains a shaped charge. The explosive jet, which is formed during detonation, can be lethal at great distances. Assume that all shaped-charge munitions contain a piezoelectric (PZ) fuzing system until investigation proves otherwise. PZ fuzing systems are extremely sensitive, can function at the slightest physical change, and can remain hazardous for an indefinite period of time. In some cases, merely casting a shadow across a PZ fuse can cause it to detonate.

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

i. Do not expose unfired rocket motors to any electromagnetic radiation (EMR) sources. See DA Pam 385-64 for safe separation distances from various sources of EMR.

j. Consider an emplaced landmine to be armed until proven otherwise. It may be intentionally booby trapped. Many training mines contain spotting charges capable of inflicting serious injury.

k. Assume that a practice military munition contains a live charge until investigation proves otherwise. Expended pyrotechnic and practice devices can contain red or white phosphorus (WP) residue. Due to incomplete combustion, this residue may re-ignite spontaneously if the crust is broken and exposed to air.

l. Do not approach a smoking WP munition. Burning WP may detonate the explosive burster charge at any time.

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

10. Military Munitions and Commercial Explosives Storage.

a. On Department of Defense (DOD) installations, DOD 6055.9-STD and Service requirements (Army – AR 385-64; Navy – NAVSEA OP 5; Air Force – AFM 91-201) will be met. For the remainder of this pamphlet, reference to DOD standards (i.e., DOD 6055.9-STD) also implies that Service explosives safety publications will be adhered to. Generally, the contractor may be able to use an existing explosives storage facility on an installation that meets DOD standards. If not, the contractor will establish a temporary storage facility. The compatibility of explosives defined in DOD 6055.9-STD, will be followed. Recovered munitions awaiting final disposition will not be stored with serviceable explosives. Commercial explosives will be assigned a DOD hazard classification (e.g.., 1.1, 1.2, etc.) and storage compatibility grouping by the U.S. Army Technical Center for Explosives Safety prior to being stored on a military installation. Contact the MM CX for a current listing of commercial explosives that have been assigned a DOD hazard classification.

b. Off DOD installations, the contractor will be responsible for establishing a temporary explosives storage area. This temporary explosives storage area will meet local, state, 27 CFR 55, 29 CFR 1910.1201, and DOD 6055.9-STD requirements to the greatest extent practicable.

c. Temporary Explosives Storage Area.

(1) It is required that each contractor establish a temporary explosive storage area for each project when explosives will be stored for the purpose of disposing of military munitions onsite. Recovered military munitions may have to be stored onsite depending on the final disposal method selected.

(2) Magazines must meet the requirements of 27 CFR 55 and each magazine must have a Net Explosive Weight (NEW) and hazard classification established for the explosives to be stored. The NEW is calculated in accordance with the procedures identified in DA Pam 385-64.

(3) EM 1110-1-4009 provides the criteria for establishing temporary storage areas using Bureau of Alcohol, Tobacco, and Firearms (ATF), Type II Magazines.

(4) When a project is being conducted on an installation, the installation has an approved storage facility, and permission to store the demolition explosives in an approved storage facility is obtained from the installation and/or Major Army Command (MACOM), as applicable, the explosives will be stored in accordance with the approved procedures used by the installation. Otherwise, the contractor will establish a temporary storage area using ATF, Type II magazines. Installations require MACOM approval for storage of commercial explosives. Contact the MM CX for procedures to be used to obtain MACOM approval.

(5) A log of the stored material will be maintained at the storage facility and at the project administrative office.

d. Temporary Explosives Storage Area Explosives Siting Requirements.

(1) EM 1110-1-4009 provides guidance for siting an explosives storage magazine.

(2) Compliance with 29 CFR 1910.1201 and DOD 6055.9-STD is required.

(a) The following facilities will be located at the Inhabited Building Distance (IBD) from the storage magazines. For any magazine (ATF Type II, Earth Covered, Aboveground, etc.) use the standards identified in DOD 6055.9-STD (Revision 3).

- Office facilities occupied by administrative support personnel.

- Quantity-Distance (Q-D) from Explosive Storage Magazines to Scrap Vendor Pickup Points. Scrap pickup points will be positioned as far as possible from project magazines, consistent with operational needs. At a minimum, the scrap pickup point will be sited at the Public Traffic Route (PTR) from the magazines.

- The distances identified in DOD 6055.9-STD apply to all inhabited buildings.

(b) There is no Minimum Separation Distance (MSD) required from the explosives storage area to a MEC work area where MEC procedures are ongoing. The explosives storage area will be sited at a MSD of one hazardous fragment per 600 square feet based on the Munition with the Greatest Fragmentation Distance (MGFD) from the MEC work area boundary.

(c) Siting of Magazines to PTRs. The type of distance (IBD, PTR, etc.) required to a PTR depends on the traffic density. The criteria, defined in DOD 6055.9-STD include:

- For PTRs, the minimum fragment and debris distance for Hazard Division 1.1 ammunition and explosives will be based on the traffic density considered at three levels: high traffic density, medium traffic density, and low traffic density. The traffic density will be averaged over a normal (non-holiday) week in terms of the number of passengers during a 24-hour period.

- High Traffic Density. If routes have 10,000 or more car and/or rail passengers per day, or 2,000 or more ship passengers per day, then the IBD criteria apply.

- Medium Traffic Density. If routes have 400 or more, but less than 10,000 or more car and/or rail passengers per day, or 80 or more, but less than 2,000 ship passengers per day, then 60 percent of the specified minimum fragment distance for the IBD applies.

- Low Traffic Density. If routes have less than 400 cars and/or rail passengers per day, or less than 80 ship passengers per day, then no minimum fragment distance is required. Minimum distance will be based on the blast criteria (K24/K30) only.

(3) In cases where the facility cannot meet the intermagazine, IBD, and PTR Q-D requirements specified in DA Pam 385-64 and DOD 6055.9-STD, a barricading plan or other engineering controls to protect the public from accidental detonation will be submitted to the MM CX for approval.

(4) Material Potentially Presenting an Explosive Hazard (MPPEH) Processing Areas. For MPPEH that has been inspected in the MEC work area and brought to a processing area for metals segregation, certification, verification, containerization, etc., apply the intraline distance from the storage magazines to the scrap processing area, based on the quantity of explosives at the magazine. See the appropriate tables in DOD 6055.9-STD.

(5) Siting Magazines at Operational Installations.

(a) On-Post Roads. For magazines supporting munitions response to MEC work at operational installations, on-post roads are normally not considered PTRs and no Q-D applies from the magazine to them. Exceptions are as follows:

- On-post roads open to the public are PTRs.

- On-post roads that are closed to the public, but are used by installation personnel who are unrelated to the installation’s ammunition mission are considered PTRs.

(b) Installation Personnel and Operations.

- Installation ammunition personnel and operations. Site the magazine at the intraline distance to these exposures (note: magazine distance applies from installation explosives locations to magazines supporting munitions response to MEC projects).

- Installation non-ammunition personnel and operations. Site the magazine at the IBD to these exposures.

e. Lightning Protection for Explosives Storage Areas.

(1) Each magazine will be provided lightning protection in accordance with DA Pam 385-64. The provisions of the National Fire Protection Association (NFPA) 780, which are consistent with Army guidance, may be used to supplement Army guidance where necessary.

(2) DOD 6055.9-STD requires functional lightning protection for all explosives storage areas.

(3) Approved explosives storage areas on active installations will have a Lightning Protection System (LPS) installed.

(4) Temporary explosives storage areas used to support an on-going project will have a LPS. Existing earth-covered magazines at a FUDS project property will have a LPS.

(5) Prior to storing explosives in any magazine with an installed LPS, the system will be inspected and tested to ensure it is functional. Existing facilities without a LPS will have a LPS installed and tested to ensure it is functional prior to storing explosives. Inspection and testing criteria are contained in DA Pam 385-64.

(6) NFPA 780 allows the metal walls of the magazine to act as both the air terminal and down conductor of a LPS, provided the portable magazine meets the following criteria: magazines manufactured entirely from metal that are at least 3/16 inches thick and that have doors bonded to the side of the magazine. ATF-approved, portable Type II magazines meet these criteria. Lightning protection is completed by grounding the magazine in accordance with EM 1110-1-4009; however, the grounding system will be inspected and tested in accordance with DA Pam 385-64. The Interim Holding Facilities (IHF) used for Recovered Chemical Warfare Materiel (RCWM) projects do not meet these criteria; therefore, they will have a LPS designed, installed, and tested prior to use, if the IHF is to be sited for explosively-configured RCWM. If the IHF is not sited for explosively-configured items, a LPS is not required.

(7) When more than one portable magazine is used on a project property, they will be separated by a minimum of 2 meters (6.5 feet) if they are grounded separately, or they will be bonded to a common grounding system if the 2 meter (6.5 foot) criteria cannot be met. Fences installed around magazines will be at least 2 meters (6.5 feet) from the magazine or bonded into the grounding system.

f. Munitions Debris Storage Inside the Fenced Explosives Storage Area. Certified, verified, containerized munitions debris may be stored in the fenced explosives storage area. However, the munitions debris containers will be made of non-flammable materials. Wood or cardboard containers are not acceptable as they constitute a fuel source in case of fire near the magazine.

g. Fire Protection.

(1) A fire plan for either an on-installation or off-installation explosives storage facility will be prepared and coordinated with the local fire department.

(2) Clear all combustible material a minimum of 15.25 meters (50 feet) around portable magazines. Do not store any combustible materials within 15.25 meters (50 feet) of any magazine.

(3) Placarding.

(a) On DOD Installations. Affix a fire symbol to the magazine in accordance with DA Pam 385-64.

(b) FUDS and Other Munitions Response to MEC Projects Not on DOD Operational Installations. Placarding of magazines will be performed in accordance with local rules and regulations.

(c) Routine emergency response drills will be conducted in accordance with the approved Work Plan to familiarize the response personnel with the hazards.

h. Physical Security. A physical security survey will be conducted in accordance with AR 190-11 to determine if fencing or guards are required. For BRAC or active installations the physical security survey will be coordinated through the Provost Marshall's office. For FUDS, this survey will be coordinated with local law enforcement agencies. See EP 1110-1-18 for additional details on physical security.

(1) Generally, a fence around the magazine is not needed, in accordance with 27 CFR 55. However, the degree of protection needed to prevent the theft of the military munitions will be provided.

(2) USACE contractors must be aware of 49 CFR 172, Subparts H and I concerning the offering, preparing, or transporting of designated hazardous materials, as well as the necessary security requirements.

i. Magazines for Storage of RCWM. Refer to EP 75-1-3 and EP 1110-1-18 for RCWM IHF siting requirements.

j. Requirements for the physical security of a RCWM IHF are contained in EP 75-1-3.

11. Military Munitions Transportation, Offsite. In the event that military munitions will be transported offsite, the provisions of EP 1110-1-18 will be followed. In addition, USACE contractors are prohibited from transporting UXO offsite for destruction until the provisions of Technical Bulletin 700-2 have been met.

12. Military Munitions Transportation, Onsite. The following safety procedures will be followed for the transportation of military munitions that are acceptable to be moved/transported onsite:

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

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

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

d. If an unfired rocket motor will be transported, it will be positioned in the vehicle parallel to the rear axle and secured in place with sandbags. This will afford maximum protection for the personnel operating the vehicle.

e. If a base-ejection projectile will be transported to a disposal facility, the longitudinal axis of the projectile will be oriented parallel to the rear axle and secured in place with sandbags. This will afford maximum protection for the personnel operating the vehicle.

f. Military munitions with exposed hazardous fillers, such as High Explosive, will be placed in appropriate containers with packing material to prevent migration of the hazardous fillers. Padding will be added to protect the exposed filler from heat, shock, and friction.

13. Exclusion Zone Operations. On munitions response to MEC projects, it is the responsibility of the contractor's Unexploded Ordnance Safety Officer (UXOSO) to establish the exclusion zone (EZ) for each MRS.

a. The purpose of the EZ is to protect nonessential personnel from blast overpressure and fragmentation hazards. Calculating EZs with respect to intentional and unintentional detonations is discussed below. Approved engineering controls may be used to reduce the EZ for either intentional or unintentional detonations.

(1) Intentional Detonations. The minimum separation distances specified in DOD 6055.9-STD will be used unless lesser distances have been calculated using TP Number 16.

(2) Unintentional Detonations. If the identity of the military munitions to be found is unknown, the minimum separation distance specified in DOD 6055.9-STD will be used to establish the EZ. If the identity of the military munitions to be found is known, use TP Number 16 to determine the criteria for establishing the EZ.

b. When multiple teams are working onsite, a Team Separation Distance (TSD) will be established. The minimum TSD will be the greater of 61 meters (200 feet), the hazardous fragment distance of the MGFD (lesser distance authorized if supported by a hazard assessment), or the K50 (0.9 pounds per square inch) overpressure distance.

c. While MEC procedures are being conducted, only personnel essential for the operation and authorized visitors will be allowed to enter a MRS EZ. When nonessential personnel enter the EZ, all MEC procedures will cease. In addition to this work stoppage, the following actions will be taken:

(1) The individual(s) will receive a safety briefing and sign the visitors log prior to entering the EZ.

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

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

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

(2) There will be no open fires for heating or cooking (gas stoves, grills, etc.) within the EZ, except where authorized by the UXOSO. If open fires for heating or cooking are to be allowed on the project property, then the appropriate fire fighting measures and plans need to be established in the approved Work Plan.

(3) During geophysical detection operations, personnel will not wear any metal (e.g., rings, watches, keys, etc.) that would interfere with the instrument's operation.

e. On RCWM project properties, EZs will be established in accordance with EP 75-1-3.

14. Authorized Visitors.

a. Explosives Safety Policy.

(1) In accordance with DOD 6055.9-STD and DA Pam 385-64, it is DOD and DA policy to limit the exposure to a minimum number of persons, for a minimum time, to the minimum amount of ammunition and explosives (i.e., MEC) consistent with safe and efficient operations.

(2) DA Pam 385-64 provides the following discussion concerning personnel limits:

(a) Tasks not necessary to the operation will be prohibited within the immediate area of the hazard produced by the operation. (For USACE MMRP projects, multi-discipline and multiple MEC project teams performing tasks required to execute the project may be in the EZ while MEC procedures are being performed as long as minimum team separation distances are maintained.)

(b) Personnel limits, to include authorized visitors, will be clearly posted for each operation and must not be exceeded during the operation. (For USACE MMRP projects, personnel limits are based on the approved Work Plan designating the number and types of teams that may be required to complete the field operations.)

(c) Personnel not needed for the operation will be prohibited from visiting. (For USACE MMRP projects, essential personnel and authorized visitors, as defined in this guidance, may visit the EZ while MEC procedures are being conducted.)

(3) DA Pam 385-64 and ER 385-1-95 require the contractor to establish an EZ around each work area where MEC procedures are being performed. The EZ is established to protect non-essential personnel from the damaging effects of blast overpressure and fragmentation should an unintentional detonation occur. The EZ will be delineated in the approved Work Plan, Explosives Siting Plan, and Explosives Safety Submission.

b. Responsibilities.

(1) Authorized visitors will obtain written approval from the executing district's Safety and Occupational Health Office (SOHO).

(2) Project team members listed in the Quality Assurance Surveillance Plan (QASP) do not require additional SOHO approval. They will be considered as authorized visitors when performing assigned quality assurance functions. If a QASP is not available, or personnel are not listed in the QASP, SOHO approval is required.

(3) The contractor is responsible for considering all explosives safety policies and principles when making determinations regarding EZ operations and personnel limits.

(4) The contractor is responsible for posting personnel limits and ensuring all personnel are aware of and comply with the posted limits.

(5) All personnel entering, or working in, EZs are responsible for ensuring personnel limits are not exceeded.

c. Requirements and Procedures.

(1) All requests for approval as an authorized visitor for entry into the EZ during MEC procedures will be submitted through the Project Manager (PM). The PM will provide the request to the project OE safety Specialist for review prior to transmitting it to the executing district's SOHO for approval. An exception to this is provided in paragraph 14.b.(2) above. All visitor authorization requests will:

(a) Describe the purpose of the visit and the tasks to be performed.

(b) Explain why the tasks must be performed during MEC procedures.

(c) Specify whether the visit will be a single visit or one in a series of visits.

(d) State the frequency of the visits and the time required to perform the task.

(2) The on-site UXOSO will ensure:

(a) The documentation approving the authorized visitors is reviewed for adequacy based on this guidance and the tasks to be performed. This documentation will become part of the project file.

(b) Non-essential personnel, which include unauthorized visitors, are prohibited within the EZ where MEC procedures are being performed.

(c) All authorized visitors are provided a safety briefing prior to entering the EZ and a UXO-qualified escort regardless of their qualifications.

(d) Posted personnel limits are not exceeded while MEC procedures are being conducted. If more than the posted number of personnel are in the EZ while MEC procedures are being performed, MEC procedures must cease and the required number of personnel must leave before they may continue.

(e) Personnel limits are posted at or near the contractor's on-site office. As a minimum, the limits should be posted at a central site accessible to all personnel.

(f) Personnel limits are a topic covered during the contractor's daily safety briefings.

(3) Once the personnel limits are established, the contractor has the flexibility to manage team sizes to accomplish the mission provided the personnel limits are not exceeded.

Munitions Response Excavation Operations.

a. By their nature, MEC procedures/anomaly excavations are hazardous and certain calculated risks will be taken. Ingenuity, judgment, common sense, and above all, the mastery of EOD techniques and observance of EOD principles will determine success or failure. UXO-qualified technicians will be alert at all times and be in observance of EOD safety precautions. EOD/UXO-qualified personnel are the most experienced and best qualified to perform these operations.

b. Hand excavation is the most reliable method for uncovering a military munition. However, hand excavation exposes personnel to the hazard of detonation. Only EOD or UXO-qualified personnel are to perform these operations.

c. Specific Procedures for Anomaly Excavation.

(1) Start all excavations from the side of the anomaly. Carefully dig from the side until identification of the anomaly is made. Excavation operations, whether by hand or Earth-Moving Machinery (EMM), will employ a step-down or offset access method. Under no circumstances will any excavation be made directly over suspected military munitions.

(2) Clear debris/dirt from the subsurface anomaly only enough to permit identification of the anomaly and to apply the necessary MEC procedure.

(3) All UXO will be blown in place, when possible.

(4) Move with slow, deliberate motions; avoid abrupt moves.

(5) Avoid impacting, jarring, or striking UXO.

(6) Do not subject UXO to shock, rough handling, heat, or any other force.

(7) Observe EMR precautions in accordance with DA Pam 385-64.

d. EMM may be used to excavate overburden from suspected military munitions. EMM will not be used to excavate within 12 inches of a suspected military munition. Once the EMM is within 12 inches of the suspected military munition, the excavation will be completed by hand excavation methods. Personnel who are not UXO-qualified may operate EMM only when supervised by a UXO Technician III or higher.

(1) If more than one earth-moving machine is to be used onsite, the same minimum separation distances required for multiple work teams apply.

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

16. Procedures for Assessing Munitions with Unknown Fillers.

a. Background.

(1) For explosives and chemical safety reasons, the complete identification of recovered munitions is required before destruction or disposal. This is particularly true with regard to munitions that can be filled with chemical warfare materiel (CWM) and could present a downwind chemical vapor hazard.

(2) Many munitions have sufficient physical properties (e.g., design characteristics, markings) that allow USACE OESS and UXO personnel to positively identify the munition and the filler. However, the design or physical condition of some munitions may not allow their complete identification by visual inspection.

(3) Munitions whose external design does not always allow for positive identification of their filler include: 4.2-inch mortars (M1, M2, and the M2A1 models) and Livens projectiles (MK II (M1) and MKIIAI).

(a) Because the 4-inch Stokes mortar's physical dimensions (see Appendix B) clearly indicate whether or not it contains a suspect chemical filler, it is not included in this list.

(b) Because this list is not all inclusive, the MM CX should be contacted about other munitions when questions arise.

(4) The identification of the filler of some munitions is very difficult, if not impossible, through visual inspection when the munition has been used or otherwise impacted (e.g., disposed

of after ineffective treatment) or exposed to the environment (e.g., buried as a means of disposal) for years.

(5) Only EOD or TEU will be allowed to determine the most likely filler of these munitions.

b. Procedures. When performing munitions responses on USACE project properties and the filler of a munition listed above cannot be determined, the following procedures will be followed. Refer to EP 75-1-2 for additional details on procedures to be followed in the event that munitions with unknown fillers are identified on conventional munitions response to MEC project properties.

(1) On conventional munitions response to MEC project properties, contact the POC identified in the approved Work Plan for performing the assessment or response (i.e., military EOD or TEU). Typically, the Work Plan will address how to "safe the hole / item" to mitigate the possible downwind hazards pending the arrival of the appropriate response personnel.

(2) On RCWM projects, TEU will normally be present at the project property and will perform the assessment as part of their daily routine and per their procedures.

(3) If the assessment has ruled out RCWM as a filler, then the item will be returned to USACE for disposal operations as specified in the approved conventional munitions response to MEC Work Plan.

(4) If the assessment indicates RCWM as a filler:

(a) On a RCWM project, TEU will package and secure the item per the approved Chemical Safety Submission, usually on site.

(b) On a conventional munitions response to MEC project, TEU will assume control of the item. (Note: TEU may require some logistical support during the assessment process.)

(5) The use of these procedures is a precautionary measure to confirm that the munition can be safely destroyed; to help ensure that an uncontrolled, unintentional release of CWM does not occur; and to validate site-specific information.

c. It is important that terminology used not cause unnecessary public or regulatory concern. Generally, these munitions should be referred to as munitions with unknown fillers, rather than suspect chemical munitions.

17. Military Munitions Disposal Operations. All disposal operations will be conducted in accordance with TM 60A-1-1-31, EP 1110-1-17, and the unnumbered USAESCH publication

entitled Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites.

a. As a general rule, all disposal operations will be accomplished by electrical means to ensure maximum safety. There are exceptions to this requirement in situations where static electricity or EMR hazards are present. Unintentional detonations can occur because of these induced currents (or lightning). The following precautions from DA Pam 385-64 are to be followed:

(1) Premature detonation of electric blasting caps by induced current from radio frequency signals is possible. Refer to DA Pam 385-64 for minimum safe distance with respect to transmitter power and indication of distance beyond which it is safe to conduct electric blasting even under the most adverse conditions.

(2) Lightning is a hazard with respect to all field activities. Lightning strikes, even at distant locations, may cause extremely high local earth currents. Effects of remote lightning strikes are multiplied by their proximity to conducting elements such as those found in buildings, fences, railroads, bridges, streams, and underground cables or conduits. The only safe procedure is to suspend all field activities when an electrical storm approaches to within 5 miles of the project location.

(3) Electric power lines also pose a hazard with respect to electric initiating systems. It is recommended that any disposal operation closer than 155 meters (517 feet) to electric power lines be done with a non-electric system.

b. The only acceptable disposal method is the one stated in the appropriate TM 60 Series manual for specific ordnance types. Any commercial explosives being used will be equivalent to the military explosive required for the disposal operation.

c. If justified by the situation, protective measures to reduce shock, blast overpressure, and fragmentation will be taken. The MM CX will assist in any design work and will review for approval all proposed protective measures.

d. MSDs for personnel during MEC disposal operations will be in accordance with DOD 6055.9-STD, TP 16, or the distance provided by the MM CX.

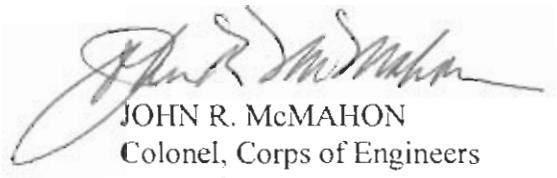
e. During open detonation operations, personnel will be located away from lifting lugs, strong backs, base plates, etc..

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

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

g. Inert ordnance will not be disposed of as scrap until the internal fillers/voids have been exposed and unconfined.

FOR THE COMMANDER:



JOHN R. McMAHON
Colonel, Corps of Engineers
Chief of Staff

2 Appendices
Appendix A - References
Appendix B – 4-inch Stokes Mortar Measurements

APPENDIX A
References

27 CFR 55, Commerce in Explosives.

29 CFR 1910.1201, Retention of DOT Markings, Placards, and Labels.

29 CFR 1926, Subpart P, Excavations.

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

DOD 6055.9-STD
Department of Defense Ammunition and Explosives Safety Standards, Latest Revision.

DODD 4715.11
Environmental and Explosive Safety Management on Operational Ranges Within the United States.

Department of Defense Explosives Safety Board Technical Paper No. 16
Methodologies for Calculating Primary Fragment Characteristics.

Technical Bulletin 700-2
Department of Defense Ammunition and Explosives Hazard Classification Procedures.

AR 190-11
Physical Security of Arms, Ammunition, and Explosives.

AR 385-64
U.S. Army Explosives Safety Program.

DA Pam 385-64
Ammunition and Explosives Safety Standards.

FM 3-09.21
Tactics, Techniques and Procedures for the Field Artillery Battalion.

TM 60A-1-1-31
Explosive Ordnance Disposal Procedures: General Information on Explosive Ordnance Disposal Procedures.

ER 5-1-11
Program and Project Management.

ER 385-1-95
Safety and Health Requirements for Ordnance and Explosives (OE) Operations.

ER 1110-1-12
Quality Management.

ER 1110-1-8153
Ordnance and Explosives Response

EP 75-1-2
Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities.

EP 75-1-3
Recovered Chemical Warfare Materiel (RCWM) Response.

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

EP 1110-1-18
Ordnance and Explosives Response.

EM 385-1-1
Safety and Health Requirements Manual.

EM 1110-1-4009
Ordnance and Explosives Response

U.S. Army Engineer and Support Center, Huntsville Document
Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites, U.S. Army Engineering and Support Center, Huntsville, Terminology Update March 2000. This document is available on the Internet at http://www.hnd.usace.army.mil/oew/proceddocs.asp.

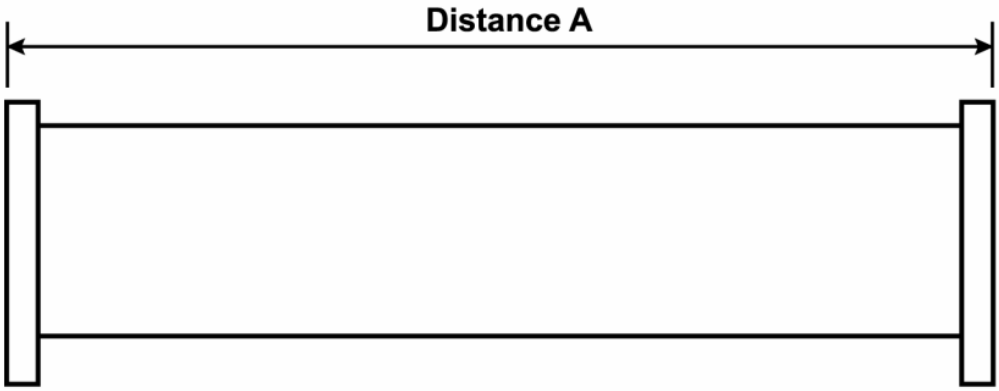
AFM 91-201
Explosives Safety Standards.

NAVSEA OP 5
Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation, and Shipping.

NFPA 780
Standard for the Installation of Lightning Protection Systems.

APPENDIX B
4-Inch Stokes Mortar Round Measurements

Distance A is measured from outside of the windage ring to outside of the windage ring without regard to fuze mounting location or tail boom.



Distance A measurement for the following type of mortar fillers are:

Chemical Gas - MK I = 16 inches, MK III = 16 3/4 inches
Smoke Filled - MK I = 15 inches
Incendiary Filled - MK I = 14 inches

GLOSSARY

Section I
Acronyms

AFM.....Air Force Manual
AR.....Army Regulation
ATF.....Bureau of Alcohol, Tobacco, and Firearms
BRAC.....Base Realignment and Closure
CFR.....Code of Federal Regulations
CWM.....Chemical Warfare Materiel
DA.....Department of the Army
DA Pam.....Department of the Army Pamphlet
DMM.....Discarded Military Munition
DOD.....Department of Defense
EM.....Engineer Manual
EMM.....Earth-Moving Machinery
EMR.....Electromagnetic Radiation
EOD.....Explosive Ordnance Disposal
EP.....Engineer Pamphlet
ER.....Engineer Regulation
EZ.....Exclusion Zone
FUDS.....Formerly Used Defense Sites
HTRW.....Hazardous, Toxic, and Radioactive Waste
IBD.....Inhabited Building Distance
ICM.....Improved Conventional Munition
IHF.....Interim Holding Facility
LPS.....Lightning Protection System
MACOM.....Major Army Command
MC.....Munitions Constituents
MEC.....Munitions and Explosives of Concern

MGFD	Munition with Greatest Fragmentation Distance
MM	Military Munitions
MM CX	Military Munitions Center of Expertise
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard
MRA	Munitions Response Area
MRS	Munitions Response Site
MSD	Minimum Separation Distance
NAVSEA OP	Naval Sea Systems Command Ordnance Pamphlet
NEW	Net Explosive Weight
NFPA	National Fire Protection Association
OE	Ordnance and Explosives
OESS	OE Safety Specialist
pdf	Portable Document Format
POC	Point of Contact
PTR	Public Traffic Route
PZ	Piezoelectric
Q-D	Quantity-Distance
QAR	Quality Assurance Representative
QASP	Quality Assurance Surveillance Plan
RCWM	Recovered Chemical Warfare Materiel
SOHO	Safety and Occupational Health Office
STD	Standard
TEU	U.S. Army Technical Escort Unit
TM	Technical Manual
TP	Technical Paper
TSD	Team Separation Distance
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
UXO	Unexploded Ordnance
UXOSO	Unexploded Ordnance Safety Officer
WP	White Phosphorus

Section II
Terms

Authorized Visitors
DOD, DA, USACE, or other personnel (MM CX, Department of Defense Explosives Safety Board , HQ Safety, etc.) conducting project or mission related functions, e.g., Quality Assurance Representatives (QARs), safety and quality inspectors (including geophysicists performing quality assurance functions), and project management. Authorized visitors must be escorted while in the EZ and be approved for entry into the EZ in accordance with this guidance. No more than 2 authorized visitors will be permitted in the EZ at any given time.

Defense Sites
Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions. (10 U.S.C. 2710(e)(1))

Discarded Military Munitions (DMM)
Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Essential Personnel
USACE and contractor project personnel necessary for the safe and efficient completion of field operations conducted in an EZ. This is limited to: contractor work team members including the Unexploded Ordnance (UXO) Safety Officer (UXOSO), UXO Quality Control Specialist, Senior UXO Supervisor, and a USACE Ordnance and Explosives (OE) Safety Specialist.

Exclusion Zone (EZ)
A safety zone established around a MEC work area where MEC procedures are being conducted.

Improved Conventional Munition (ICM)
ICMs are delivered by 105 and 155 Howitzers and the Multiple Launch Rocket System (rockets and missiles). There are three types of ICM: 1) Antipersonnel (APICM); 2) Antipersonnel, Antimaterial (APAM); and 3) Dual Purpose (DPICM). (FM 3-09.21)

Material Potentially Presenting an Explosive Hazard (MPPEH)
Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or

disposal; and range-related debris); or material potentially contaminated with a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, ventilation ducts) associated with munitions production, demilitarization or disposal operations. Excluded from MPPEH are munitions within DOD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

MEC Procedures
Procedures which include, but are not limited to, the following actions performed by a UXO-qualified individual:

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

b. Identifying and assessing the condition of surface MEC.

c. Recovering and making final disposal of all MEC.

MEC-Related Procedures
Procedures which include, but are not limited to, the following actions which may be performed by a non-UXO-qualified individual:

a. Locating and marking subsurface anomalies.

b. Locating and marking suspected surface MEC.

c. Transporting and storing recovered MEC.

d. Utilizing EMM to excavate overburden from suspected MEC.

Military Munitions
Military munitions means all ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof.

The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 101(e)(4)).

Munitions Constituents (MC)
Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.
(10 U.S.C. 2710(e)(4)).

Munitions and Explosives of Concern (MEC)
This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means:

a. Unexploded Ordnance (UXO), as defined in 10 U.S.C. 2710(e)(9);

b. Discarded Military Munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or

c. Munitions Constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard.

Munitions Response
Response actions, including investigation, removal and remedial actions to address the explosives safety, human health, or environmental risks presented by unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC).

Munitions Response Area (MRA)
Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites.

Munitions Response Site (MRS)
A discrete location within a MRA that is known to require a munitions response.

Personnel Limits
The maximum number of personnel that may be in the EZ at any one time. This includes essential personnel as defined above, plus 2 authorized visitors.

Submunition
Any munition that, to perform its task, separates from a parent munition. (DODD 4715.11)

Unexploded Ordnance (UXO)
Military munitions that:

a. Have been primed, fused, armed, or otherwise prepared for action;

b. Have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and

c. Remain unexploded either by malfunction, design, or any other cause.
(10 U.S.C. 101(e)(5))

UXO-Qualified Individual
Individual meeting the requirements for the positions of UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, or Senior UXO Supervisor. For qualification requirements, refer to EP 1110-1-18.