DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

CESO-E

Manual
No. 385-1-97

12 April 2013

Safety - Explosives
SAFETY AND HEALTH REQUIREMENTS MANUAL

1. This Change 1 to EM 385-1-97, 15 September 2008, rescinds and consolidates duplicative information currently in EM 385-1-1, 15 September 2008, Section 33; incorporates explosives safety aspects currently in EP 75-1-2, 1 February 1990; and rescinds EP 75-1-2. These changes are effective immediately. For contractual work, all contracts whose date of solicitation is 12 April 2013 or later shall consider this change in effect. All underlined wording is specific to this change.

2. See complete changes and updates in paragraphs 3 and 4 below.

3. The changed information is annotated as follows:

Chapter	Page(s)	Paragraph(s)
III	147-171	III.A.03-III.B.07
	172	Table III.1
Appendix H	H-1	Replaced in its entirety
Appendix Z	Z-1-Z-3	New Appendix

4. Make corrections/changes as follows:

a. Underline Chapter III changes.

b. Replace Appendix H in its entirety.

c. Insert new Appendix Z.

This Change 1 to EM 385-1-97 supersedes EP 75-1-2, dated 1 February 1990.

5. File this change sheet in front of the publication for reference purposes.

FOR THE COMMANDER:

2 Appendixes
H- Points of Contact
Z- MEC Probability Assessment

C. DAVID TURNER
Colonel, Engineer
Chief of Staff

CHAPTER III

MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) ENCOUNTERED DURING USACE ACTIVITIES

III.A REQUIREMENTS.

III.A.01 All Munitions and Explosives of Concern (MEC) encountered on jobsites shall be treated as extremely dangerous and must be reported immediately. MEC is Unexploded Ordnance (UXO), Discarded Military Munitions (DMM), or Munitions Constituents (MC) in sufficient amounts or concentrations to pose an explosive hazard.

III.A.02 Activities performed by Corps employees or its contractors could be subject to encountering MEC if the land was used for military activities. These hazards may be found on land surface or subsurface, or in bodies of water, including:

a. Areas where military activities include or has included weapons training, testing, manufacturing and demilitarization (including areas for open burn/open detonation [OB/OD]) activities.

b. Areas currently or formerly under DoD jurisdiction [Formerly Used Defense Sites (FUDS)] used by the military (ranges, ammunition storage locations, munitions manufacturing areas, demilitarization and disposal sites or facilities).

c. In waters of the US [e.g., dredging, beach replenishment, clam harvesting (or recycled for use as roads and landscaping)].

d. Unauthorized disposal sites.

e. On private property (e.g. souvenirs or buried in private residence yards).

f. Other Federal Lands (transferred from DoD control).

g. Combat operation areas (civil war, e.g., cannon balls).

h. Recycling companies (e.g., lead smelters).

III.A.03 If you encounter or suspect you have encountered MEC, *STOP WORK, DON'T TOUCH IT. Follow the 3Rs: RECOGNIZE, RETREAT AND REPORT*. Project personnel will withdraw along cleared path upwind from the discovery until appropriate responders arrive. Mark the location, keep people out of the area and report it.

> *Note: The general location of the MEC hazard should be marked with tape, colored cloth, or colored ribbon. If available, attach the marker to a branch, structure or other existing object so that it is about 3 ft (.9 m) off the ground and visible from all approaches. Place the marker no closer than the point where you first recognized the MEC hazard and do not drive stakes into the ground or otherwise disturb the surface.*

III.A.03.01 If on a DoD installation, immediately notify your supervisor, Government Designated Authority (GDA) and Corps PM, or installation POC (who shall contact the appropriate response authority). Then notify the Environmental and Munitions Center of Expertise (EM CX) who can assist in determining path forward and support the development of a probability assessment (see below).

III.A.03.02 If not on a DoD installation, anytime suspected MEC is encountered, immediately notify the land owner and request that they call the local emergency response authority (e.g., local police, sheriff, or 911) to report the finding. The GDA and Corps PM shall also be notified immediately. Then notify the EM CX who can assist in determining path forward and support the development of a probability assessment (see below). An exception to this process is when planned environmental response activities are conducted under an approved explosive or chemical safety submission (ESS/CSS), see Chapter I, Section 2).

III.A.03.03 Appendix H Contains Emergency POCs.

III.B PROBABILITY OF ENCOUNTERING MEC AND RELATED PROCEDURES

III.B.01 In accordance with DA Pam 385-64, Chapter 19, the responsible authority (for example, installation or district commander or a designated representative) will determine whether construction support is required and the level of such support required based on site-specific data prior to beginning construction operations or other activities. Every effort shall be made to determine whether munitions-related activities ever occurred on the land/waters where operations or activities will take place. This is called a MEC Probability Assessment. Installation or responsible authority will, based on available historical documents or prior environmental response actions, conduct an assessment to determine the probability for encountering MEC (see Appendix Z). The Probability Assessment will consider the past or current use of the property where military or munitions-related activities occurred, as well as the anticipated project action and associated activities. Upon these considerations, a determination will be made to the probability of encountering MEC with the successful execution of the project. Supplemental information, such as that provided by a geophysical assessment, may also be included to support historical summaries and findings of probability. This

determination will be documented and used to plan the level of support required (e.g., no support, on-call support, or a removal action within the affected footprint).

III.B.02 No Probability. If the assessment results indicate a "no probability" of encountering MEC (e.g., current or previous land use leads to an initial determination that MEC is not present), no support is required. However, if MEC is subsequently discovered, STOP WORK, mark the location, retreat from the area and report it to the appropriate personnel. Once MEC is found, a new probability assessment will be conducted and documented.

III.B.03 Low Probability. If the assessment results indicate a "low probability" of encountering MEC, only on-call support will be required. If MEC is discovered – RECOGNIZE, STOP WORK, mark the location, RETREAT from the area and REPORT it to the appropriate personnel. If MEC is found, a new probability assessment will be conducted and documented.

III.B.03.01 On-Call Support means coordination with either EOD personnel or UXO-qualified personnel to ensure their availability, advised about the project, and placed "on call" to assist if suspected UXO are encountered during construction. Discoveries of UXO or DMM on such sites require reassessment of the level of support required. Assistance can be provided from offsite when called, or onsite.

III.B.04 Moderate to High Probability. If the assessment results indicate a "moderate to high probability" of encountering MEC, the activity must be conducted using anomaly avoidance techniques or EOD/UXO-qualified personnel must attempt to identify and remove any explosive or chemical agent hazards in the construction footprint prior to any activities. Before the removal action begins, an ESS (see Chapter I, Section 2) will be prepared and approved. Contact the USACE EM CX, Military Munitions Division (see Table III.1) for guidance or assistance processing the ESS. Any actions requiring a physical removal in a construction footprint must be designed by an authorized USACE Military Munitions Design Center (MMDC), and executed by an MMDC or Remedial Action District (MM RAD) (see Table III.1)

III.B.05 Anomaly Avoidance. "Anomaly avoidance" is the avoidance of surface MEC and any subsurface anomalies where the specific activity can be moved to another location. Anomaly avoidance techniques are implemented for activities that include, but are not limited to, surveying and mapping, environmental and natural resource assessments, surface and subsurface sampling, boring and drilling, groundwater monitoring, installation of signs and fences, etc. UXO escort support is required and must be provided by UXO-qualified or OESS personnel.

III.B.05.01 Responsibilities. The UXO escort (UXO-qualified or OESS personnel) has the following responsibilities:

a. Provide MEC recognition, location, and explosives safety functions.

b. Conduct explosives safety briefings for all site personnel and visitors.

c. Initiate MEC reporting procedures in accordance with the approved work plan.

III.B.05.02 Anomaly Avoidance Planning. Anomaly avoidance procedures shall be addressed and incorporated into the site Work Plan. Plans will detail the management and operational approach that will be used to execute anomaly avoidance procedures. Explosives safety precautions and emergency procedures will be addressed in the APP/SSHP for the site. Since the purpose is anomaly avoidance, the UXO *escort* is not tasked to perform MEC disposition. MEC disposition will not be covered in the planning documents for the project, and, therefore, the UXO *escort* is not *authorized* or equipped to perform MEC disposition. In the event that MEC is encountered that cannot be avoided or, based on its fuzing or current condition, presents an imminent hazard requiring immediate attention, the UXO escort will notify the local POC designated in the Work Plan. The UXO escort will not destroy any of the MEC encountered. The local POC will notify the appropriate authority of the MEC discovery, and the UXO escort will safeguard the site pending arrival of the appropriate authority.

III.B.05.03 Anomaly Avoidance Procedures

Access Surveys. The UXO escort must conduct a surface access survey and a subsurface survey for anomalies before any type of activities commence, including foot and vehicular traffic. Depending on site dynamics and length of project, surveys may need to be conducted more than once.

a. Personnel must be escorted by UXO-qualified or OESS personnel at all times in areas potentially containing MEC until the UXO escort has completed the access surveys and the anomaly free areas have been marked. Escorted personnel will follow behind the UXO escort. If anomalies, or MEC are detected, the UXO escort will halt escorted personnel in place, and select a course around the item.

b. The UXO escort will conduct an access survey of the footpath and/or vehicular lanes approaching and leaving work areas with known or suspected

MEC. Typically, the access route will be at least twice as wide as the widest vehicle that will use the route.

c. The UXO escort must also complete an access survey of an area around the proposed work site that is large enough to support all planned operations. The size of the surveyed area will be site-specific and will take into account, for example, maneuverability of required equipment (e.g., drill rigs, excavation equipment, etc.), parking of support vehicles, and establishment of decontamination stations. As a minimum, the surveyed area will have a dimension in all directions equal to twice the length of the longest vehicle or piece of equipment to be brought on-site.

d. Geophysical instrumentation capable of detecting the smallest known or anticipated military munitions will be used to locate anomalies just below the surface that may be encountered through erosion from rain or continual vehicular traffic. If the emplacement depth is greater than the geophysical instrument's detection capabilities, then the UXO escort must complete the geophysical survey at specified depths/intervals until excavation is complete, i.e., every 6 inches, 1 foot, 2 feet, etc.

e. If anomalies or surface MEC are encountered, they will be marked with flagging and the work/investigation area will be relocated to an anomaly free area to avoid contact. The UXO escort will clearly mark the boundaries of the surveyed area using survey flagging and pin flags. The UXO escort will establish a system of flagging colors that will distinguish anomalies, surface MEC, and route boundaries from each other as well as from any utility markings that have been used at the site.

f. No personnel will be allowed outside the surveyed areas.

g. If anomalies are detected at a proposed work/investigation location or too many anomalies are detected in a general area of interest, the work/investigation area will be moved to an anomaly free location.

III.B.06 Dredging projects. Planning for dredging projects must also consider the possibility of encountering MEC during operations (see paragraph III.B.01 above for conducting a probability assessment). Plans shall include equipment (maintenance), material screening, and disposal procedures. The selected MM Design Center should be contacted to determine requirements on a case-by-case basis. General considerations include:

a. If a hydraulic dredge is used, it shall be equipped with a screen on the suction/intake end to prevent unwanted objects from reaching the removed sediment. The screen shall be capable of removing the smallest MEC item expected to be encountered. Additionally, screening mechanism of the same or smaller size is recommended at the outfall point of the dredge material.

b. If a mechanical dredge is used in a moderate to high probability dredging area, a plan to screen the oversize material shall be developed and approved.

c. Blast protection and shielding of equipment and personnel may be required.

III.B.07 Training.

a. Various training opportunities exist for increasing personal knowledge of general explosives safety policy and guidance. Contact CESO or the EM CX for further information.

b. Specific training for project engineers and safety professionals regarding USACE construction activities is available through the HQ USACE Environmental and Construction Community of Practice (E&C CoP), respectively at https://eko.usace.army.mil/usacecop/environmental/subcops/mmr/?syspage=Documents&id=255528 and https://ten.usace.army.mil/TechExNet.aspx?p=s&a=Events;364

III.C *EXAMPLES of MEC ITEMS***.** This section contains examples of MEC items that may be found on a USACE project site. These items include**:**

III.C.01 Grenades. There are three types of grenades discussed here: hand grenades; rifle grenades; and projectile grenades.

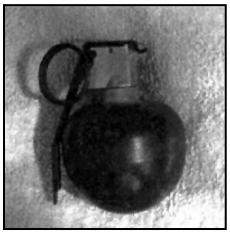
Figure III.1-a
Hand Grenades

Hand grenades are small explosives or chemical-type munitions that are designed to be thrown at a short distance. Various types of hand grenades may be encountered as UXO, including fragmentation, smoke, and illumination grenades. All hand grenades have three main parts: a body, a fuze and filler.

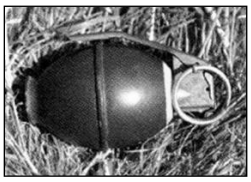
Mk-II Fragmentation grenade
Hazards: Cocked Striker, High Explosives (HE) & Fragmentation (Frag)
Weight: 1.3 lbs
Length: 4.5 in

Figure III.1-b
Fragmentation Grenades

Fragmentation grenades are the most common type of hand grenade used. They have metal or plastic bodies filled with an explosive material. Other types of hand grenades may be made of metal, plastic, cardboard, or rubber and may contain, white phosphorus (WP), chemical agents (CA), or illumination flares, depending on their intended use. Most use a burning (pyrotechnic) delay fuze that functions 3 to 5 seconds after the safety lever is released, but some are activated instantly when the lever is released.

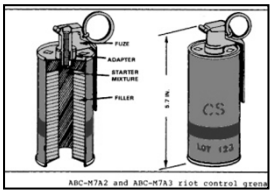


M33/67 Fragmentation Grenade
Hazards: Cocked Striker, HE & Frag
Weight: 0.875 lbs
Height: 3.530 in



M-26 Fragmentation Grenade
Hazards: Cocked Striker, HE & Frag
Weight: 1.00 lb
Length: 3.33 in

M34 - WP Grenade
Hazards: Cocked Striker, HE & Frag, WP, Smoke & Fire
Weight: 1.5 lbs
Length: 5.5 in

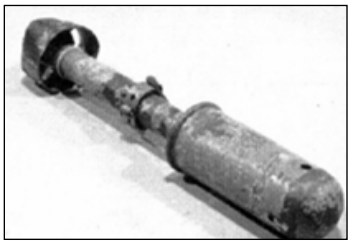


M7 Chemical Grenade (Riot Control) CS-Filled
Hazards: Cocked Striker, Chemical & Fire
Weight: 1.2 lbs
Length: 4.5 in

Figure III.1-c
Rifle Grenades

Rifle grenades look like small mortars and range from 9 to 17 in (22.86-43.18 cm) in length. They may be filled with high explosives (HE), WP, CS, illumination flares, or chemicals that produce colored screening/signal smoke. Rifle grenades are fired from standard infantry rifles. They have an opening at the tail end of a fin assembly that allows the rifle grenade to be placed on the barrel of a rifle.

M17 Fragmentation Rifle Grenade
Hazards: Impact/Inertia, HE & Frag
Weight: 2.2 lbs
Length: 9.4 in



M19 Rifle Grenade, Smoke WP
Hazards: HE, Frag, Fire, WP, Smoke/Incendiary, & Impact/Inertia
Weight: 1.50 lbs
Length: 11.31 in

Figure III.1-d
Projected Grenades

The most commonly used projected grenade is the 40 mm grenade. This grenade is also among the most commonly found UXO item. The 40mm grenade is about the same size and shape as a chicken egg. It can contain a variety of fillers such as HE, CS, illumination flares, or various colored screening/signal smoke mixtures. Because of their relatively small size, they are easily concealed by vegetation. They are extremely dangerous because of their sensitive internal fuzing systems and can be detonated by simple movement of if handled.

Projected Grenade M406 – 40MM HE
(New Unfired)
Hazards: HE, Frag & Movement
Weight: 0.503 lbs
Length: 3.894 in

Projected Grenade M406 – 40MM HE
(Fired)
Hazards: HE, Frag & Movement
Weight: 0.31 lbs
Length: 3.08 in

III.C.02 Projectiles. Projectiles can range from approximately 1 in (2.54 cm) to 16 in (40.64 cm) in diameter and from 2 in (5.08 cm) to 4 ft (1.22 m) in length. Projectiles can be fuzed either in the nose or the base of the projectile. A wide variety of fuzes and fillers can be found in the various types of projectiles. Some projectile fuzes are extremely sensitive to movement and will detonate if jarred or accidentally moved.

Figure III.2
Projectiles

Miscellaneous Projectile Fuzes
Hazards: Electromagnetic Radiation (EMR), HE, Frag, Cocked Striker, Movement & Static

Projectiles Ranging from 20MM and Up
Hazards: EMR, HE, Frag, Movement & Missile

M1 105MM HE Projectile
Hazards: HE & Frag
Weight: 39.92 lbs
Length: 28.60 in

Figure III.2
Projectiles (Continued)

M456 105MM Heat Projectile
Hazards: EMR, HE, Frag, Jet (Shaped Charge), Lucky (Piezoelectric), Movement & Static
Weight: 20 lbs
Length: 26 in

Miscellaneous Spin Stabilized Projectiles
Hazards: EMR, HE, Frag, Jet (Shaped Charge), Cocked-Striker, Movement & Static

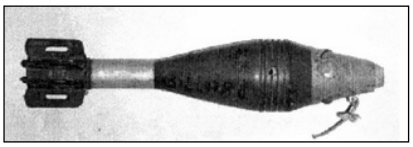
M371 90MM HEAT Recoilless Rifle Projectile

Hazards: EMR, HE, Frag, Jet (Shape Charge), Lucky (Piezoelectric), Movement & Static
Weight: 9.25 lbs
Length: 27.78 in

III.C.03 Mortars. Mortars range from approximately 2 in (5.98 cm) to 11 in (27.94 cm) in diameter and can by filled with explosives, WP, or illumination flares. Mortars generally have thinner metal casing than artillery projectiles. They normally use fin stabilization but, some types can be found that use spin stabilization.

Figure III.3
Mortars

M374 81MM HE Mortar
Hazards: HE, Frag & Movement
Weight: 9.340 lbs
Length: 20.838 in



M49 60MM HE Mortar (New)
Hazards: HE, Frag & Movement
Weight: 3.07 lbs
Length: 9.61 in

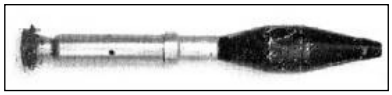
M3 4.2", 107MM HE Mortar
Hazards: HE, Frag & Movement
Weight: 26.20 lbs
Length: 23.05 in

81 mm M301A3 Illumination Mortar Projectile
Hazards: Ejection & Fire
Weight: 10.1-10.7 lbs
Length: 24.73 in

III.C.04 Rockets. A rocket uses gas pressure from rapidly burning material (propellant) to propel a payload (warhead) to a desired location. Rockets can range from 1 ½ (3.81 c m) to more than 15 in (38.1 cm) in diameter, and that can vary from 1 ft (.3 m) to over 9 ft (2.74 m) in length. All rockets consist of a warhead section and a motor section. Rockets are unguided after launch and are stabilized during flight by fins attached to the motor section or by canted nozzles built into the base of the motor section. The warhead section can be filled with explosives, WP, submunitions, or illumination flares.

Figure III.4
Rockets

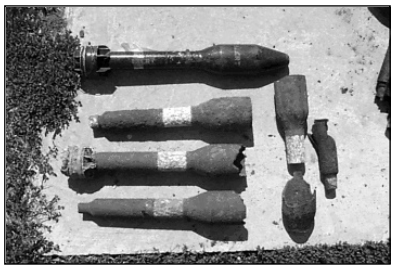
Warning: Fired rockets may still contain residual propellant that could ignite and burn violently!



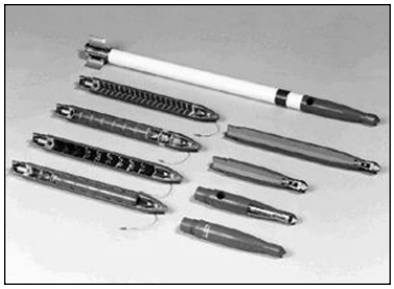
M72 Law 66MM Rocket
Hazards: Cocked Striker, HE, Frag, Jet (Shaped Charge), Lucky (Piezoelectric) & Missile
Weight: 2.300-lbs
Length: 19.987-inches

M7A2 2.36" Rocket Heat (Bazooka)
Hazards: EMR, HE, Fire, Frag, Jet (Shaped Charge), & Movement
Weight: 3.5 lbs
Length: 21.5 in

Figure III.4
Rockets (Continued)



M28 3.5 in Heat Rocket
Hazards: EMR, HE, Frag, Jet (Shaped Charge), & Movement
Weight: 9 lbs
Length: 23.55 in

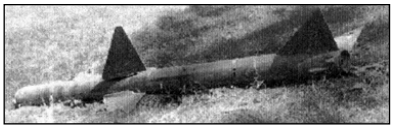


2.75 in Aerial Rocket System
Hazards: EMR, HE, Frag, Jet (Shaped Charge), Static, Movement, Missile, Cock Striker, Submunitions, White Phosphorus, & Fire
Weight: 18.1 lbs
Length: 70 in

III.C.05 Guided Missiles. Guided missiles are similar to rockets; however, they are guided to their target by various guidance systems. Some are wire-guided, and internal or external devices guide others. Fins controlled by internal electronics usually stabilize guided missiles. Guided missiles vary in size from man-portable, shoulder launched to very large intercontinental ballistic missiles.

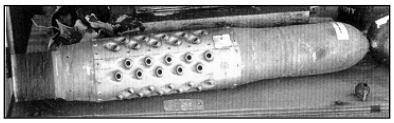
Figure III.5
Guided Missiles

Warning: Some guidance systems contain toxic materials, do not touch or handle missile components!
Warning: Fired guided missiles may still contain residual propellant that could ignite and burn violently!



AIM-7 Sparrow Missile (Air to Air)
Hazards: EMR, HE, Frag, Fire, High Pressure (Accumulator), Mechanical, Electrical & Missile
Weight: 319 lbs
Length: 12 ft

BGM-71 TOW (Surface to Surface)
Hazards: EMR, HE, Frag, Fire, High Pressure (Accumulator), Mechanical, Electrical & Missile
Weight: 39.60 lbs
Length: 45.67 in



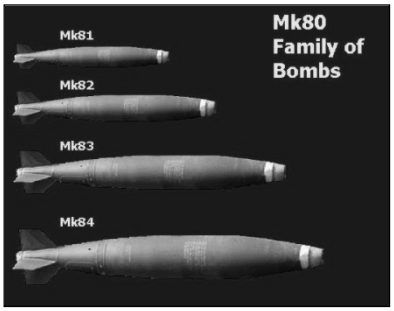
M47 Dragon Missile
Hazards: EMR, HE, Frag, Fire, High Pressure (Accumulator), Electrical, Missile, Static, & Unexpended Rocket Motors May Exist After Impact
Weight: 22.1 lbs
Length: 33.3 in

III.C.06 Bombs. Bombs are dropped from aircraft and vary in weight from 100 (45.36 kg) to 20,000-lbs (9.07 MT), with lengths ranging from 6 in (15.24 cm) to 10-feet (3.05 m). Bombs consist of a bomb body and some form of stabilizing device (fin assembly) and may be fuzed in either the nose or the tail. There are two general types of bombs, “Old-Style” which date from the early 1920’s to the 1950’s and what are know as “Mk-80-Series” which date from the late 1950’s to the present.

Figure III.6
Bombs

Bomb Fuzes
Hazards: EMR, HE, Frag, Electrical, & Movement

Old Style Series of Aerial Bomb
Hazards: HE, Frag, Movement, & Cock-Striker
Weight: From 100 to 2000-lbs
Length: Varied



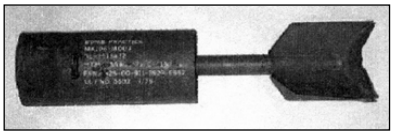
Mk-80 Series New Style Aerial Bombs
Hazards: HE, Frag, Movement, EMR, Static, Cock-Striker, & Influence (Magnetic/Acoustic)

Weight: 250 lb, 500 lb, 2000-lb, & 3000 lb
Length: Varied

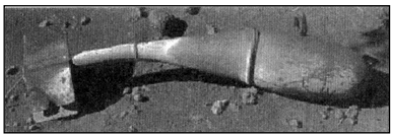
III.C.07 Practice Bombs. Practice bombs are used to simulate the explosive filled bomb and will duplicate the same weight and dimensions of those bombs. They can also be found with very distinctive shapes and sizes. All practice bombs contain a "Spotting Charge" consisting of in some cases up to 23-lbs (11.34 kg) of HE. Most practice bombs contain pyrotechnic charges that consist of red/white phosphorus and a propellant such as smokeless or black powder.

Figure III.7
Practice Bombs

Warning: Practice bombs contain very dangerous pyrotechnic charges!



MK106 5 Practice Bomb
Hazards: Ejection, HE, Movement, & Smoke/Incendiary
Weight: 4.56 lbs
Length: 8.25 inches



BDU-33 Practice Bomb
Hazards: Ejection, HE, & Smoke/Incendiary
Weight: 23.8 lbs
Length: 22.5 in

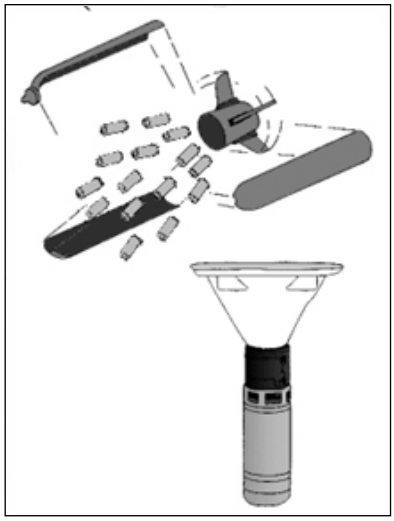
Mk 5 Mod 0 Practice Bomb
Hazards: Ejection, Smoke, & Incendiary
Weight: 2.68 lbs
Length: 8 in

III.C.08 Dispensers. Dispensers are used to carry and dispense submunitions payloads. They can be found either as aircraft dispensers or as artillery projectiles that eject (dispense) their submunitions payloads.

a. Aerial dispensers generally look like medium size aerial bombs, except the construction of dispenser body is normally out of lightweight aluminum.

b. Projectiles that are designed to eject their submunitions payload generally appear like any other projectile except there are some design features that allow the projectile body to eject its payload.

Figure III.8
Dispensers



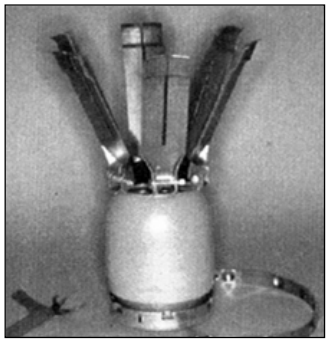
When the fuze in the dispenser functions above the target area, a length of explosive det-cord opens the dispenser container. When that occurs the individual submunitions within the container are spread-out over a large area.

SUU-30H/H (Dispenser) loaded on the wing of an attack aircraft.

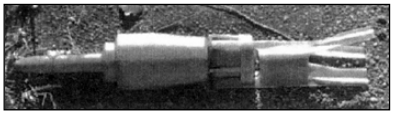
III.C.09 Submunitios. Submunitions are delivered in a container such as a projectile body or a dispenser that will dispense the submunitions in-flight over a target area. Submunitions come in a variety of sizes and shapes. Submunitions include bomblete, grenades, and mines that can be filled with explosives or chemical agent. They may be anti-personnel, anti-material, anti-tank, dual-purpose, incendiary, or chemical submunitions. Submunitions are activated in a variety of ways, depending on their intended use. Some are activated by pressure, impact, or movement/disturbance. Others are activated in flight or when they come near metallic objects. Some submunitions contain a self-destruct fuze as a backup. The self-destruct time can vary from a couple of hours to several days.

Figure III.9
Submunitions

Warning: Submunitions are extremely hazardous because even very slight movement can cause them to detonate.



BLU-3 Aerial Dispersed Anti-Personnel Frag Bomb (New)
Hazards: HE, Frag, & Movement

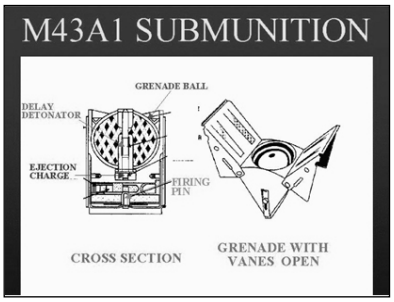


MK118 Aerial Dispersed Anti-Tank Shape Charge (Field)
Hazards: EMR, HE, Jet (Shaped Charge), Lucky (Piezoelectric), & Movement

Figure III.9
Submunitions (Continued)

BLU-26 Aerial Dispersed Anti-Personnel Submunitions.
Hazards: HE, Frag, & Movement

M42 Projectile Dispersed Dual-Purpose Submunitions.
Hazards: HE, Frag, Jet (Shape Charge), & Movement

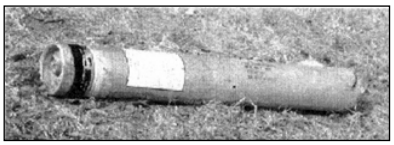


Projectile Dispersed M43 Anti-Personnel Submunitions
Hazards: HE, Frag, Ejection, & Movement

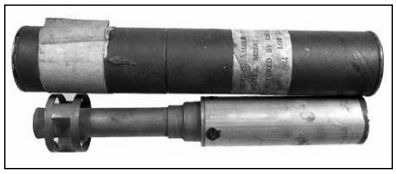
III.C.10 Pyrotecnics. Pyrotechnics and pyrotechnic devices contain chemical compounds that when ignited will burn at extreme temperatures. They are primarily designed to produce either illumination (light) and/or various colors of smoke for signaling or screening purposes. Pyrotechnic devices can be found in a wide variety of sizes and shapes ranging from small hand held signal flares to large aerial illumination flares.

Figure III.10
Pyrotechnics

155MM Illumination Candles
Hazards: Ejection, EMR, HE, & Smoke/Incendiary
Weight: 4.3 - 5.8 lbs
Length: 23 in



MK-45 Parachute Flare (Field)
Hazards: Ejection, EMR, HE, & Smoke/Incendiary
Weight: 28.6 lbs
Length: 3 ft



M18A1 White Star Cluster
Hazards: Ejection, & Incendiary
Weight: 17.49 oz
Length: 10.14 in

III.C.11 Items that might Contain Chemical Warfare Materiel.

Figure III.11-a
4 in (10.16 cm) Stokes Mortar

4 in (10.16 cm) Stokes mortar, an example of a round that could have unknown filler. The differences between the chemical mortar and the smoke-filled and the high explosive filled mortars are in the length.

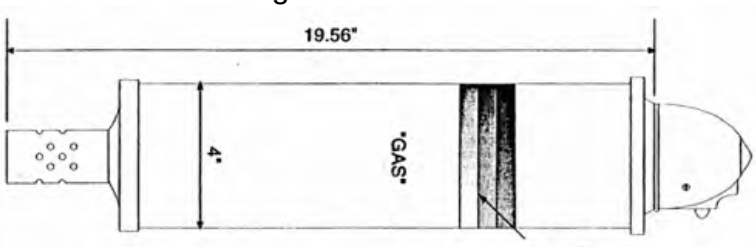


Figure III.11-b
8 in (20.32 cm) Livens Projectile

8 in (20.32 cm) Livens projectile, an example of a round that could have unknown filler. There are virtually no external differences between the chemical projectile and the smoke-filled projectile.

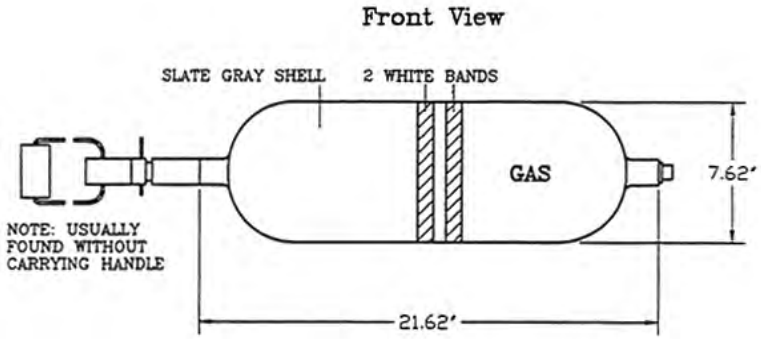


Figure III.11-c
4.2 in (10.67 cm) Gas Mortar

4.2 in (10.67 cm) Gas Mortar, an example of an item that might have unknown filler. This model of mortar can have CA, WP smoke, and tearing agent, to mention a few. There are virtually no external differences, except possible fuzing combinations.

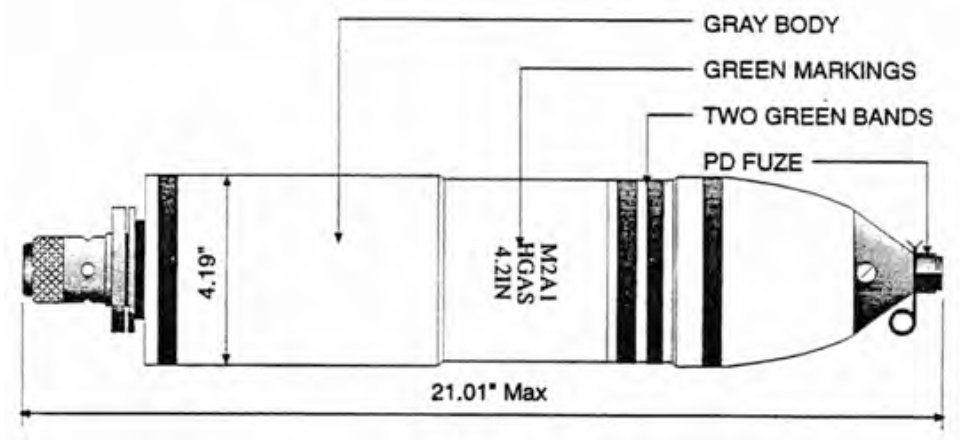


Figure III.11-d
K941 Chemical Agent Identification Set (CAIS)

This is an example of a suspect chemical item. It typically contains 24 bottles (2.5 liters (2500 ml) total weight) of distilled mustard (HD) or mustard (H and HS) agent.

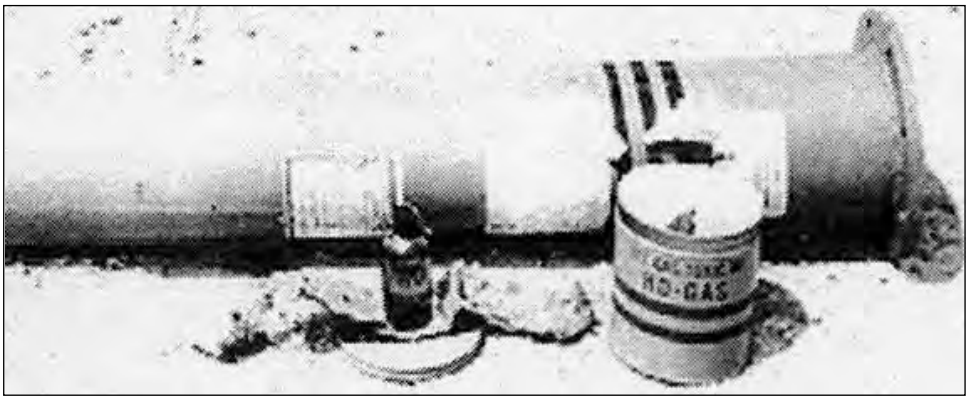


Figure III.11.e
K951/K952 CAIS

This is an example of a suspect chemical item. This could typically contain 48 pyrex, flame sealed ampules, 12 each containing 1.4 oz (2.66 ml) Zunce solution of mustard (H), a 5% solution in chloroform, Lewisite (L), a 5% solution in chloroform, Chloropicrin (PS), 50% solution in chloroform, and Phosgene (CG), 40 ml, full strength.

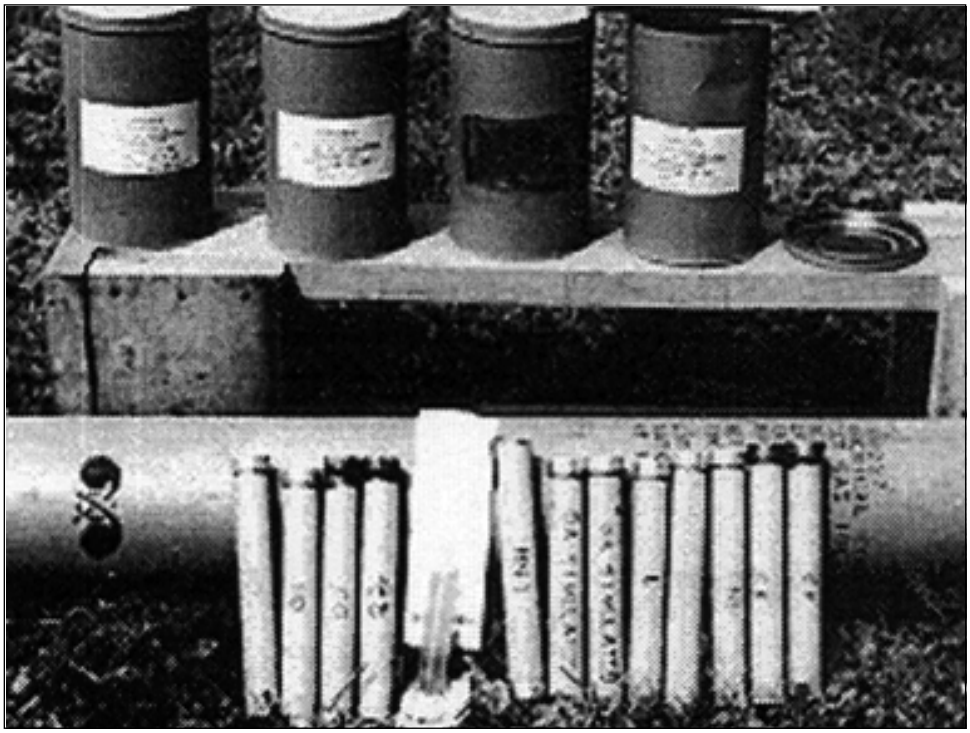


Table III.1: USACE Authorized MM Design Centers and Remedial Action Districts

Center of Expertise, MM Division, Huntsville Center, Phone: 256-895-1540.

Design Centers	Remedial Action Districts
South Pacific Division Phone: 505-235-4061	Sacramento District Phone: 505-235-4061
Omaha District Phone: 402-995-2286	Los Angeles District Phone: 505-235-4061
Baltimore District Phone: 410-962-6728	Honolulu District Phone: 808-438-6931
Huntsville Center Phone: 256-895-9052	Baltimore District Phone: 410-962-6728
Huntsville Center CWM Phone: 256-895-1290	Savannah District Phone: 912-652-5300
	Omaha District Phone: 402-995-2286
	Fort Worth District Phone: 817-739-5297
	Louisville District Phone: 502-315-6316
	Huntsville Center Phone: 256-895-9052

Military Munitions Support Services (M^2S^2), HQ USACE,
Phone: 202-761-0338

APPENDIX H

Points of Contact

Contact	*Telephone Number*
20th Support Command APG, MD (for requesting EOD Support)	410-436-6200 (24 Hour Number)
Chemical Warfare Materiel(CWM) Design Center (for reporting chemical events-USACE)	256-895-1290 256-990-1512 (cell) (Duty Hours)
Army Operations Center	703-697-0218
USACE Emergency Operations Center Washington, DC	202-761-1001

APPENDIX Z

MEC Probability Assessment

This assessment is used to determine the probability of encountering MEC during USACE projects. The probability will be scored as: “No probability”, “Low probability”, or “Moderate to High probability”. Results of the assessment will determine what action if any is needed. See Chapter III for appropriate response.

Site Name/Location:	*Project # (if applicable):*	*Date:*

Site History and Project Description (Brief description of site history that supports/justifies assessment scoring and project activities to be conducted):

TABLE Z.1

Munitions Type

Physical or historical evidence suggests High/low Explosives (i.e., pyrotechnics, Riot control filler, propellants, or Chemical Agent) regardless of configuration may be located on site.	10
Small Arms Ammunition. Physical or historical evidence supports that no military munitions other than small arms were used on the site.	2
Physical or historical evidence supports that no military munitions or small arms ammunition were used on site.	0

Circle the highest score that applies to the site.

TABLE Z.2

Hazard Source

Physical or historical evidence supports the site is a former or active range (practice or Live), for Open Burning/Open Detonation of Munitions, munitions burial pit, or the site is a former or active munitions maintenance, manufacturing, or demilitarization facility.	5
Physical or historical evidence supports the site was a firing point, munitions storage or transfer point, or small arms range.	2
Physical or historical evidence supports that no military munitions or small arms ammunition were used on site.	0

Circle the highest score that applies to the site.

TABLE Z.3

MEC Assessment

Total score from tables 1 and 2	
Combined score from tables 1 and 2 = 8-15	Moderate to High probability
Combined score from tables 1 and 2 = 1-7	Low probability
Combined score from tables 1 and 2 = 0	No probability

Circle the probability assessment.

*Safety Representative Concur Non-Concur

Name/Title *printed* *Signature*

**USACE/Installation Commander or Designee Concur Non-Concur

Name *printed* *Signature*

* On installations, the person designated or assigned safety functions will provide concurrence prior to Commander Signature. For USACE Military Munitions Response Program (MMRP) projects, this concurrence is provided by an OESS.
**On installations, the Commander or designated official provides concurrence. For FUDS, concurrence is provided by the USACE District Commander or designated official.