

SECTION 33

MUNITIONS AND EXPLOSIVES OF CONCERN ENCOUNTERED DURING USACE ACTIVITIES

33.A GENERAL

33.A.01 All Munitions and Explosives of Concern (MEC) or suspect MEC encountered on jobsites shall be treated as extremely dangerous. MEC can be Unexploded Ordnance (UXO), Discarded Military Munitions (DMM), or Munitions Constituents (MC). Follow the 3Rs: **RECOGNIZE, RETREAT, REPORT** and take the following actions:

a. **RECOGNIZE:** see examples in paragraph 33.B. Do not touch, disturb or move the item (munitions can become very unstable over time). They can detonate with movement or sometimes due to ground vibration. Munitions come in all shapes, sizes, and color but exposure to weather and time can alter or remove these markings.

b. **RETREAT:** Mark the general location of the MEC hazard 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.

c. Leave by the same route you entered the area if possible. Clear site of all workers and secure from unauthorized entry.

d. Do not transmit on any radio frequencies. Do not talk on a cell phone near a suspected MEC. Signals transmitted from items such as cell phones, short-wave radios, single side-band radios or other communications and navigation devices may detonate the MEC.

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e. Note the location where the suspect munitions is found, the direction, any landmarks or other features that would aid others in locating the munitions.

f. **REPORT:** Once area has been evacuated, notification shall be made immediately. Provide as much information as possible, including location, approximate size, shape, color, and any other distinguishing features such as nomenclature or writing, fins, etc.,

(1) If not on DoD installation, anytime suspected MEC is encountered, immediately call the local emergency response authority (e.g., local police, sheriff, or 911) to report the finding. GDA and Corps PM shall be notified immediately as well. Before work can begin, the District Commander will determine the level of construction support required at the project site by assessing the probability of encountering MEC.

(2) If on DoD installation, immediately notify supervisor, GDA and Corps PM, installation POC (who shall contact and facilitate Explosive Ordnance Disposal (EOD) response). Before work can begin, the Installation Commander will determine the level of construction support required at the project site by assessing the probability of encountering MEC.

33.A.02 The site is now considered a potential munitions response site (MRS). Further work shall proceed in accordance with requirements found in EM 358-1-97, ER 385-1-95, and EPs 75-1-2, 75-1-3, 385-1-95a and 385-1-95b.

33.A.03 Military munitions (MM), regardless of age or condition, shall be handled by trained UXO-qualified personnel, Government Ordnance and Explosives (OE) Safety Specialists, or Military Explosives Ordnance Disposal (EOD) personnel.

33.B MEC Examples (may be encountered on a USACE project site).

33.B.01 GRENADES. There are three types of grenades discussed here: hand grenades; rifle grenades; and projectile grenades.

a. 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 fuse and filler.
< See Figure 33-1.a.

FIGURE 33-1

GRENADES

FIGURE 33-1.A



Mk-II Fragmentation Grenade

Hazards: Cocked Striker, High Explosives (HE) & Fragmentation (Frag)

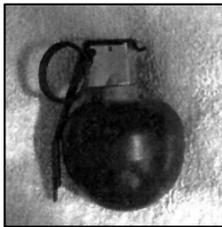
Weight: 1.3 lbs

Length: 4.5 in

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b. 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 fuse that functions 3 to 5 seconds after the safety lever is released, but some are activated instantly when the lever is released. **< See Figure 33.1.b below.**

FIGURE 33-1.B



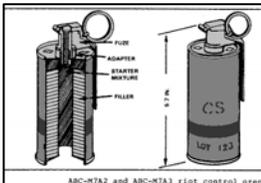
M33/67 Fragmentation Grenade
Hazards: Cocked Striker, HE & Frag
Weight: 0.875 lbs
Height: 3.530 in



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

c. Rifle grenades look like small mortars and range from 9 - 17 in (23 - 43 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. < See Figure 33.1.c.

FIGURE 33-1.C

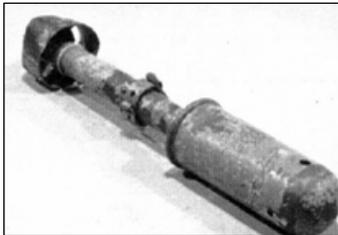


M17 Fragmentation Rifle Grenade

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

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d. 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 fusing systems and can be detonated by simple movement of if handled. **< See Figure 33.1.d.**

FIGURE 33-1.D



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

33.B.02 PROJECTILES. Projectiles can range from approximately 1 in (2.54 cm) to 16 in (40.6 cm) in diameter and from 2 in (5 cm) to 4 ft (1.2 m) in length. Projectiles can be fused either in the nose or the base of the projectile. A wide variety of fuses and fillers can be found in the various types of projectiles. Some projectile fuses are extremely sensitive to movement and will detonate if jarred or accidentally moved. **< See Figure 33.2.**

FIGURE 33-2

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

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FIGURE 33-2 (CONTINUED)

PROJECTILES



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

33.B.03 MORTARS. Mortars range from approximately 2 in (5 cm) to 11 in (28 cm) in diameter and can be 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. **< See Figure 33.3.**

FIGURE 33-3

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

FIGURE 33-3 (CONTINUED)

MORTARS



81 mm M301A3 Illumination Mortar Projectile

Hazards: Ejection & Fire

Weight: 0.10 lbs

Length: 24.73 in

33.B.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 (3.8 cm) to more than 15 in (38.1 cm) in diameter, and that can vary from 1 ft (.3 m) to over 9 ft (2.8 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 either, explosives, WP, submunitions, or illumination flares. < See Figure 33.4.

FIGURE 33-4

ROCKETS

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



M7A2 2.36" Rocket Heat (Bazooka)

Hazards: EMR, HE, Fire, Frag, Jet (Shaped Charge), & Movement

Weight: 3.5 lbs

Length: 21.5 in

FIGURE 33-4 (CONTINUED)

ROCKETS

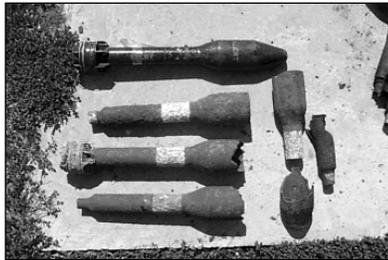


M72 Law 66MM Rocket

Hazards: Cocked Striker, HE, Frag, Jet (Shaped Charge), Lucky (Piezoelectric) & Missile

Weight: 2.300-lbs

Length: 19.987-inches



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

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33.B.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. < See Figure 33.5.

FIGURE 33-5

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

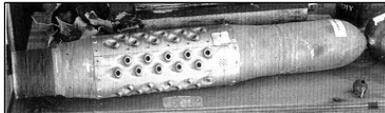
Weight: 319 lbs
Length: 12 ft



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

33.B.06 BOMBS. Bombs are dropped from aircraft and vary in weight from 100 - 20,000 lbs ((45.4 kg - 9.07 MT), with lengths ranging from 6 in – 10 ft (15.2 cm - 3 m). Bombs consist of a bomb body and some form of stabilizing device (fin assembly) and may be fused 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. < See Figure 33.6.

FIGURE 33-6

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

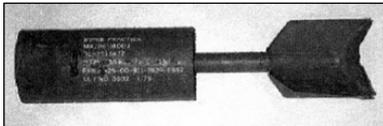
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33.B.07 PRACTICE BOMBS. Practice bombs are used to simulate the explosive filled bomb and will duplicate the same weight and dimensions of those bombs. They can also be found with very distinctive shapes and sizes. All practice bombs contain a “Spotting Charge” consisting of in some cases up to 23 lbs (11.3 kg) of HE. Although most practice bombs contain pyrotechnic charges that consist of red/white phosphorus and a propellant such as smokeless or black powder. < See Figure 33.7.

FIGURE 33-7

PRACTICE BOMBS

Warning: Practice bombs contain very dangerous pyrotechnic charges!



MK106 5 lbs Practice Bomb

Hazards: Ejection, HE, Movement, & Smoke/Incendiary

Weight: 2.68 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

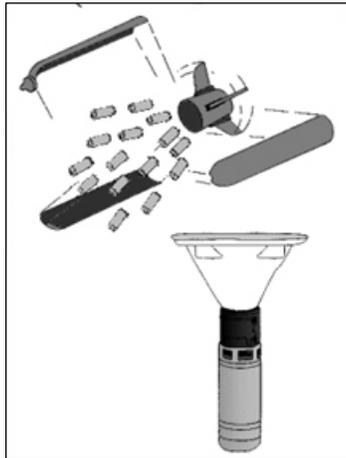
Weight: .5 lb
Length: 8 in

33.B.08 DISPENSERS. Dispensers are used to carry and dispense submunition payloads. They can be found either as aircraft dispensers or as artillery projectiles that eject (dispense) their submunition payloads. < See Figure 33.8.

- 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 submunition payload generally appear like any other projectile except there are some design features that allow the projectile body to eject its payload.

FIGURE 33-8

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 is spread-out over a large area.



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

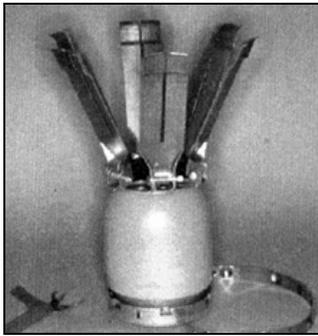
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33.B.09 SUBMUNITIONS. Submunitions are delivered in a container such as a projectile body or a dispenser that will dispense the submunitions in-flight over a target area. Submunitions come in a variety of sizes and shapes. Submunitions include bomblet, 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 fuse as a backup. The self destruct time can vary from a couple of hours to several days. < See Figure 33.9.

FIGURE 33-9

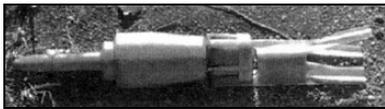
SUBMUNITIONS

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 33-9 (CONTINUED)

SUBMUNITIONS



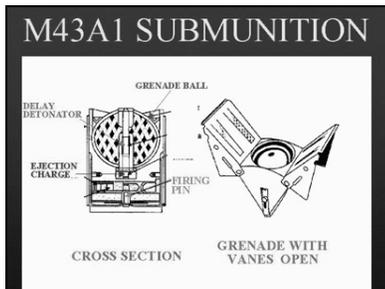
M42 Projectile Dispersed Dual-Purpose Submunitions.

Hazards: HE, Frag, Jet (Shape Charge), & Movement



BLU-26 Aerial Dispersed Anti-Personnel Submunition.

Hazards: HE, Frag, & Movement



Projectile Dispersed M43 Anti-Personnel Submunition

Hazards: HE, Frag, Ejection, & Movement

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33.B.10 PYROTECHNICS. Pyrotechnics and pyrotechnic devices contain chemical compound 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. < See Figure 33.10.

FIGURE 33-10

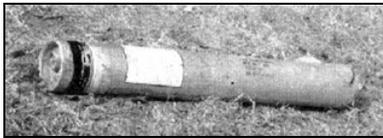
PYROTECHNICS



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

33.B.11 Items That Might Contain Chemical Warfare Materiel
< See Figures 33.11.a-e.

FIGURE 33-11.A

Figure 33-11.a 4 in (10.16 cm) Stokes mortar, an example of a round that could have an unknown filler. The differences between the chemical mortar and the smoke-filled and the high explosive filled mortars are in the length.

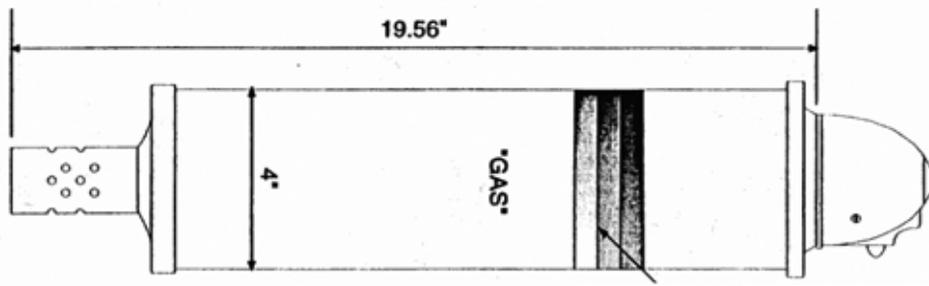
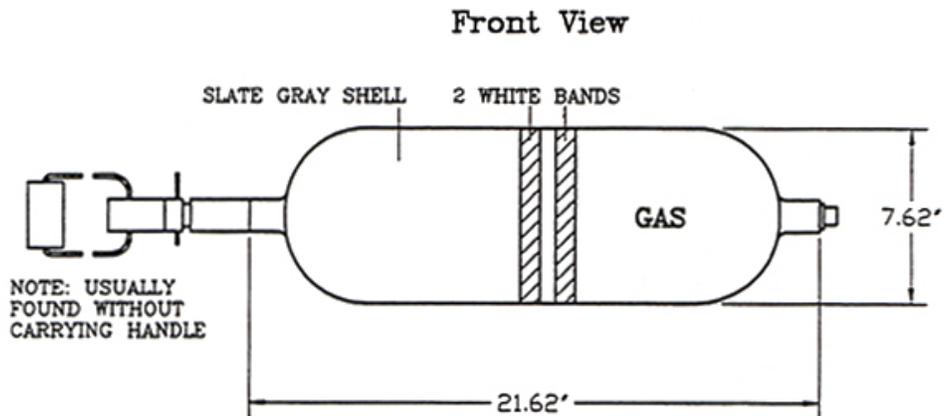


FIGURE 33-11.B

Figure 33-11.b 8 in (20.32 cm) Livens projectile, an example of a round that could have an unknown filler. There are virtually no external differences between the chemical projectile and the smoke-filled projectile



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FIGURE 33-11.C

Figure 33-11.c 4.2 in (10.67 cm) Gas Mortar. This is an example of an item that might have an 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 fusing combinations.

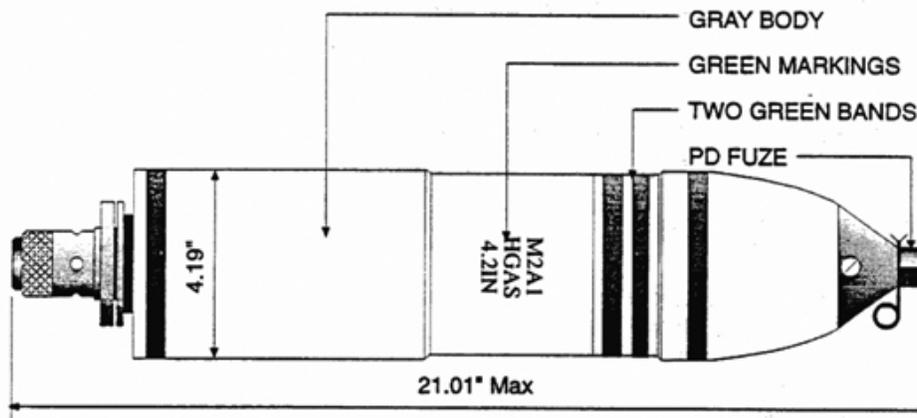


FIGURE 33-11.D

Figure 33-11.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.

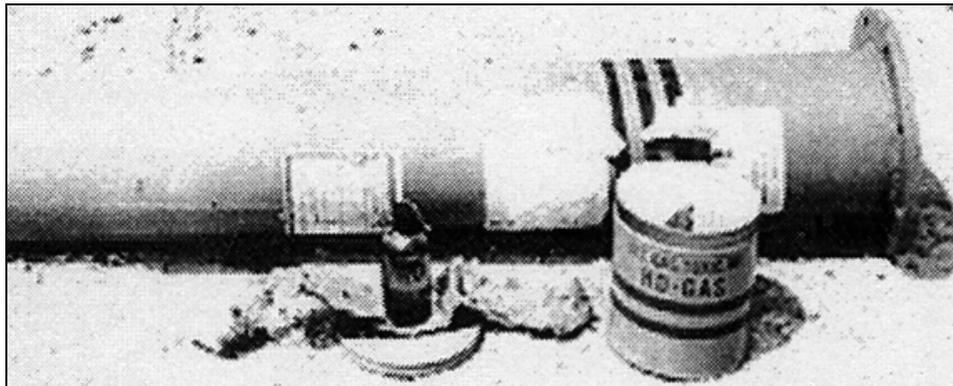


FIGURE 33-11.E

Figure 33-11-e. K951/K952 CAIS. This is an example of a suspect chemical item. Typically it could 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



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