Chapter 8

Fire Protection, Prevention, and Safety Awareness

This chapter discusses fire protection and prevention programs and procedures. Topics covered include fire divisions, hazard classifications and fire symbols, common safety violations and hazards, and characteristics of munitions fires.

FIRE PROTECTION PROGRAM

8-1. Every Army activity must have a fire protection program that includes fire protection training, fire suppression, and fire prevention. The program's objective is to eliminate the causes of fire and reduce the potential for loss of life, injury, and property damage. This objective is consistent with peacetime, combat, and SASO.

8-2. The commander's awareness and involvement are the most critical components of an effective fire protection program. Preserving life and property is a fundamental duty of all levels of command and supervision.

FIRE PREVENTION COMPONENTS

8-3. Each Army installation must establish a well-planned fire prevention program that includes SOPs, fire prevention training, identification and elimination of hazards, enforcement of fire regulations, and adequate fire protection for facilities. This program requires strong command emphasis and support.

8-4. Frequent surveys and inspections help to establish the best standards and practices for preventing fires. Munitions fires are among the most feared because of the potential for casualties, destruction, and loss of property and equipment. Most fires involving munitions are preventable. Thus, fire safety awareness and training in prevention practices are especially important.

STANDING OPERATING PROCEDURES

8-5. The fire prevention procedures presented here are basic. They should be supplemented by whatever other standards the commander feels are needed to protect the ASA. At minimum, the unit SOP will contain the following rules and procedures to be enforced by everyone working around munitions:

- Strictly regulate and control smoking in areas where ammunition, explosives, highly combustible materials, or flammable items are kept. If smoking can be regulated safely, designate specific locations approved by the commander or safety officer and equip these areas with proper receptacles for butts or smoking residue. Do not allow smoking in vehicles passing through these areas.
- Locate the smoking area at least 50 feet from the area containing munitions and explosives if noncombustible walls do not separate these two areas. Also ensure that at least one serviceable fire extinguisher is placed in the area. Do not permit anyone whose

clothing is contaminated with explosive or hazardous material to use the smoking area.

- Do not permit use of matches or other flame-, heat-, or spark-producing devices in any magazine area or field storage activity. The only exceptions will be by written authority of the commander or safety officer.
- Use only flashlights or storage battery lamps approved by the US Bureau of Mines and listed by the UL or other recognized authority in structures that contain ammunition or explosives.
- Locate overhead transmission and power lines no closer to the storage location than the height of the pole or 50 feet, whichever is greater. If the cable is buried for at least 50 feet from the storage location, existing storage facilities may be modified with underground electrical service.
- Use dry cleaning solvent, not gasoline or other flammable liquids, for cleaning purposes. Ensure that adequate ventilation is available when using solvent. See TB MED-502 for guidance.
- Locate parking areas no closer than 100 feet outside storage areas. Control these areas to reduce fire hazards and provide easy access to firefighters.
- Police areas on a daily basis for combustible materials left over from operations. Stack and/or properly dispose of these materials. See DA Pam 385-64 for stacking guidelines and distance requirements.
- Use nonheat-producing equipment that will not exceed temperatures of 228 degrees.
- Control vegetation or undergrowth with weed killers or by mowing or plowing. Livestock grazing may be used under special, controlled conditions. Remove all cut vegetation and undergrowth. Ensure that weed killers do not contain substances that might spontaneously ignite in hot, dry conditions.
- Carefully consider controlled burning to eliminate vegetation and undergrowth. Allow no burns within 200 feet of any explosive location. Firefighting equipment and personnel will be standing by during these operations.

FIRE PLAN

8-6. Any activity that stores or handles munitions must have an effective safety program and prefire plan to help prevent and fight fires.

8-7. The fire plan serves as a tool for training and for implementing prevention and firefighting rules and procedures. It must cover all munitions areas and possible exposures of munitions to fire. The plan will describe the following:

- Emergency functions of responsible personnel.
- Organization of firefighting teams and alternates.
- Communications and alarm signal activity.
- Responsibilities and emergency functions of outside agencies.

8-8. Details of the plan may vary to suit the individual installation or field activity. It must include training requirements for all personnel and establish the following procedures:

- Reporting the fire.
- Evacuating nonessential personnel.
- Notifying nearby commands and locations of impending dangers.
- Extinguishing or controlling the fire.
- Using communications and alarm signals.
- Controlling the fire until firefighters arrive, and meeting and instructing firefighters on circumstances of the fire (i.e., types of munitions involved and hazards).

The fire plan includes a map that identifies storage locations, the road network, and munitions hazard/hazards at each location (including fire and chemical symbols). See AR 420-90 for additional guidance.

TRAINING

8-9. Training is a vital part of the fire protection and prevention program. All personnel and firefighters involved with munitions must be trained in the precautions and proper methods of fighting fires. Training will include an understanding of individual responsibilities as identified in the fire plan. It must also include instruction in the following:

- A system for reporting fires.
- Procedures for sounding alarms.
- Evacuation procedures.
- Application and meaning of each type of fire and hazard symbol.
- Type and use of appropriate firefighting equipment.

8-10. Fire drills encourage and increase safety awareness and must be conducted at least once every six months. Although fighting munitions fires is the primary responsibility of fire department personnel, munitions personnel must be trained to act quickly and to extinguish and/or control a fire. Every attempt must be made to control or contain a fire to prevent loss of life and reduce injuries, minimize property damage and loss of munitions, and protect mission-essential functions.

8-11. Instructions to supervisors and personnel will include steps that increase fire safety. All supervisors must be thoroughly familiar with fire hazards. They are responsible for ensuring that personnel are trained in alarm procedures and firefighting equipment, and that they know the locations of emergency exits other than the usual doors, gates, or roadways. Emergency exits must be clearly marked with visible exit signs. Personnel will be trained to use these exits automatically in case of fire or other emergency. An unannounced fire drill that involves the response of a fire department must never be conducted without coordinating with the fire chief.

SAFETY VIOLATIONS

8-12. Serious consequences often result from the lack of training or failure to follow instructions and written safety regulations and procedures. The most common safety violations are as follows:

- Smoking.
- Carrying and using matches and other flame- or heat-producing items in forbidden areas.
- Tampering or playing with munitions, particularly grenades, demolition materials, and pyrotechnics.

COMMON HAZARDS

8-13. A fire in the ASA can start in any number of ways. Most often, fires begin in vegetation and accumulated waste materials, wastepaper, scrap lumber, dunnage, broken pallets, and boxes. Causes include the following:

- Unauthorized use of spark-producing tools.
- Use of defective MHE and vehicles.
- Use of faulty or unapproved electrical equipment.
- Failure to provide proper barricades.
- Failure to provide firebreaks/proper firebreaks.
- Use of improper grounding techniques.
- Failure to provide lightning protection systems.

EQUIPMENT AND FIREBREAKS

8-14. A small fire involving ammunition or explosives may rapidly become intense and lead to an explosion. While personnel must not be exposed to the hazards of an imminent explosion, it is vital to attack a small fire at once using authorized equipment and firebreaks.

Fire Extinguishers

8-15. Hand-held portable fire extinguishers can be used to fight small fires. All fire extinguishers must be easily accessible and maintained in good operating condition. See Figure 8-1 for the appropriate extinguishing agent to use for fighting each class of fire.

Type of Fire	Extinguishing Agent
Class A–Combustible (materials such as wood, paper, rubbish, or grass).	Water.
Class B–Volatile flammables (materials such as oil, gasoline, grease, or paint).	Carbon dioxide, halon, foam, or dry chemical.
Class C–Electrical (electrical equipment).	Carbon dioxide, halon, or dry chemical.
Class D–Combustible metals (magnesium potassium and so forth).	Dry powder.

Figure 8-1. Fire Extinguishing Agents

Water Barrels and Sand

8-16. Water barrels and pails, sand boxes, and shovels provide a recognized means of combating Class A fires in ASAs where the combustible material consists primarily of grass, wood, dunnage, boxes, and empty containers. Barrels must be covered to prevent insect breeding and evaporation and will be winterized as necessary. At least two metal pails must be available for each barrel. Water barrels may not be needed if the ASA is located on an installation that meets the following conditions:

- Vegetation control measures are adequate, and the area is monitored regularly.
- A fire plan and an organized firefighting force with the equipment capable of combating grass and brush fires are in place.
- Updated fire maps are maintained at fire stations and storage areas. These maps indicate the location of each storage area and the hazard at each site.
- Storage area work crews are equipped with serviceable extinguishers.

Hand Tools and Other Larger Equipment

8-17. Rakes, shovels, picks, and other equipment needed to fight grass or vegetation fires must be in adequate supply. Also, plows, graders, and bulldozers should be available.

Firebreaks

8-18. Firebreaks may be both artificial and specific. Artificial firebreaks include roads, highways, cleared manmade areas, survey lines, and transmission lines. Specific firebreaks are cut in advance and maintained to prevent the progress of any fire. It may not be possible to cut firebreaks during tactical operations due to METT-TC factors. General guidelines for firebreaks can be found in DA Pam 385-64.

FIRE HAZARDS AND SYMBOLS

8-19. Depending on the materials involved, fires that occur in buildings and magazines containing ammunition and explosives vary in intensity and outcome. Certain explosives ignite on contact with a spark or flame or when subjected to frictional heat or concussion. Some substances burn freely. Others, such as solid or liquid propellants, explode while burning or develop heat so intense that firefighting efforts are nearly futile.

8-20. Firefighters must be well acquainted with the hazards in each fire hazard group. They must know which methods of fighting fires are most effective for the materials under their protection. Also, they must be proficient in using the personnel protective devices needed for fighting various types of fires.

FIRE DIVISIONS AND HAZARD CLASSES

8-21. Ammunition and explosives are separated into fire divisions based on the relative danger they present to firefighters (see Figure 8-2).

Fire Division 1 indicates the greatest hazard, with the hazard decreasing with each ascending number. Fire Divisions 1 through 4 correspond with Hazard Classes 1.1 through 1.4. See DA Pam 385-64 for further discussion of the Hazard Classification System.

8-22. Fire Divisions 1 and 2 include the ammunition and explosives in Hazard Classes 1.1 and 1.2 (excluding nuclear weapons). In a fire, these materials can be expected to detonate with moderate to severe fragmentation hazards. Make no attempt to fight fires involving Division 1 unless a rescue attempt is being made. Attempts to extinguish a Division 2 fire may be made if it is in an early stage, or to fight the fire until the risk becomes too great.

8-23. Fire Division 3 is comparable to Hazard Class 1.3 and presents a mass fire hazard. Personnel in the area will give the alarm and fight the fire if explosives are not directly involved.

8-24. Fire Division 4 consists of ammunition that presents a moderate fire hazard. Fires that involve this type of ammunition will be fought by firefighters with portable and mobile fire-extinguishing equipment until the fire is brought under control. See DA Pam 385-64 for more information on fighting fires.

FIRE DIVISION	HAZARD
1	Mass detonation
2	Explosion with fragments
3	Mass fire
4	Moderate fire

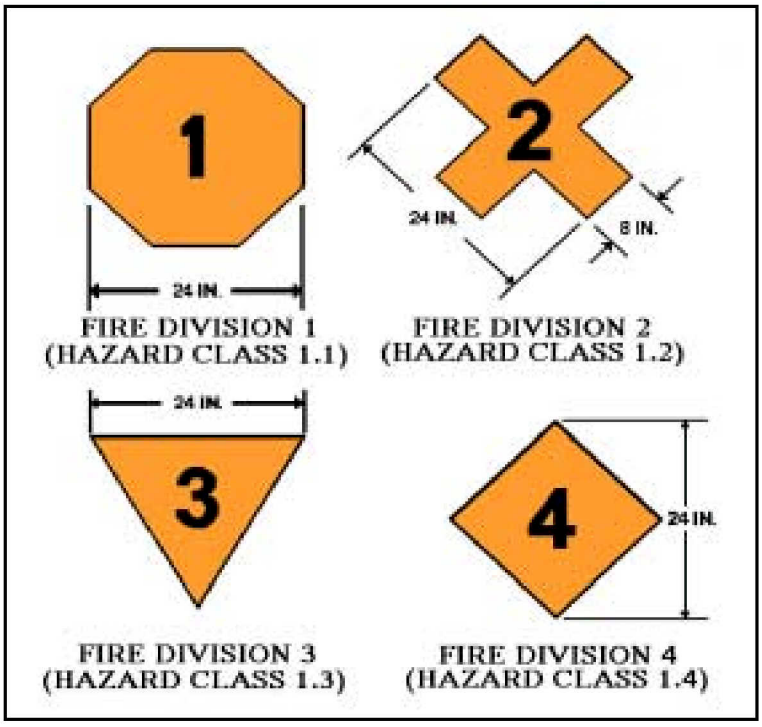
Figure 8-2. Fire Divisions and Hazards

FIRE DIVISION SYMBOLS

8-25. Each fire division is represented by a distinctive fire symbol. The shapes and dimensions for each symbol are identified in Figure 8-3 and Figure 8-4. These symbols enable firefighters to recognize possible hazards as they approach the fire scene. The applicable fire division number is shown on the symbol. To facilitate long-range identification, these symbols have different shapes.

FIRE SYMBOL	SHAPE	NSN
1	Octagon	7690-01-082-0290 7690-01-081-9581
2	Cross	7690-01-082-0289 7690-01 087-7340
3	Inverted triangle	7690-01-081-9583 7690-01-081-9582
4	Diamond	7690-01-081-9584 7690-01-082-6709

Figure 8-3. Fire Symbol Shapes and NSNs



Background: Orange No. 12246 (Fed Std 595A or GSA Catalog).
Numbers: Black No. 170338 (Fed Std 595A or GSA Catalog 10 inches high and 2 inches thick.
NOTE: Small symbols may be used where appropriate. See DA Pam 385-64.

Figure 8-4. Fire Symbols

POSTING SYMBOLS

8-26. The fire symbol that applies to the most hazardous material present will be posted at or near all non-nuclear explosive locations. Backing material for the symbols will be made from a noncombustible material of the same

shape. Symbols must be visible from all approach roads. When all munitions within the ASA are covered by one fire symbol, it may be posted at the entry control point.

8-27. When different HC/D of munitions are stored in individual multicubicle bays or module cells, appropriate fire symbols will be posted on each bay or cell. Only one fire symbol is be displayed at the entrance of a row where facilities containing munitions and requiring the same fire symbol are located in a row or on one service road.

8-28. Fire symbols must be placed on entrances to arms rooms that are licensed for holding and storing quantities of explosives. Also, the appropriate fire symbol must be displayed on a locker or similar type container where licensed explosive munitions are stored. However, symbols are not required on the exterior of a building if the building is exempt from Q-D requirements contained in DA Pam 385-64.

Exceptions When Posting Fire Symbols

8-29. It is not required to post fire symbols on locations having 1,000 rounds or less of HC/D 1.4 small arms ammunition (.50 caliber or less). Unless HN symbols differ and, by agreement, HN symbols are required, fire symbols must be used. The ASA commander may remove fire symbols for security purposes. In this case, the commander must emphasize giving prompt and exact information to the firefighters regarding any changes in the status of explosives.

8-30. If vehicles and aircraft are parked in a designated explosives parking area, fire symbols need not be posted providing the area is described in a local SOP or vehicle and/or aircraft parking plan.

8-31. Fire symbols are not required on individual structures used to store, maintain, or handle nuclear weapons or components or on aircraft and/or vehicles loaded with nuclear weapons. See DA Pam 385-64 for more information.

CHEMICAL HAZARDS AND SYMBOLS

8-32. Chemical agent or agent-filled munitions storage and operational facilities must be identified with appropriate hazard symbols as shown in Figure 8-5. The type of hazard symbol selected for this purpose depends not only on the type of chemical agent in the item of ammunition but also on the absence or presence of explosive components in the item.

8-33. Appropriate clothing and equipment are essential when fighting fires involving chemical agents. The protective clothing and apparatus in Figure 8-6 are for firefighting purposes and do not necessarily apply to normal operations. The symbols presented in this figure are described as follows:

- *Symbol I, Wear Full Protective Clothing.*
  - Set 1. Red rim and figure. Indicates the presence of highly toxic chemical agents that may cause death or serious damage to body functions. Includes the M9 self-contained protective gas mask with applicable hood, or approved equivalent (i.e., M40 series

mask); impermeable suit; hood; gloves; explosives handler's coveralls; and protective footwear, as applicable. A fire blanket should also be available in case of a fire.

- Set 2. Yellow rim and figure. Indicates the presence of harassing agents (riot control agents and smokes). Includes M9 series protective gas mask or self-contained breathing apparatus, explosive handler's coveralls, and protective gloves.
- Set 3. White rim and figure. Indicates the presence of white phosphorus and other spontaneously combustible material. Includes M9 series protective gas mask or self-contained breathing apparatus, flame-resistant coveralls, and flame-resistant gloves.

- *Symbol 2, Wear Breathing Apparatus.* Indicates the presence of incendiary and readily flammable chemical agents that present an intense heat hazard. This hazard and sign may be present with any of the other fire or chemical hazards/symbols. Protective masks that prevent the inhalation of smoke from burning incendiary mixture will be used.
- *Symbol 3, Apply No Water.* Indicates a dangerous reaction will occur if water is used in an attempt to extinguish the fire. This symbol may be posted together with any of the other hazard symbols.

See DA Pam 385-64 for information on the types of chemical hazards associated with the symbols in this figure. Refer to Table 8-1 to determine clothing and equipment required when dealing with specific chemicals and fillers.

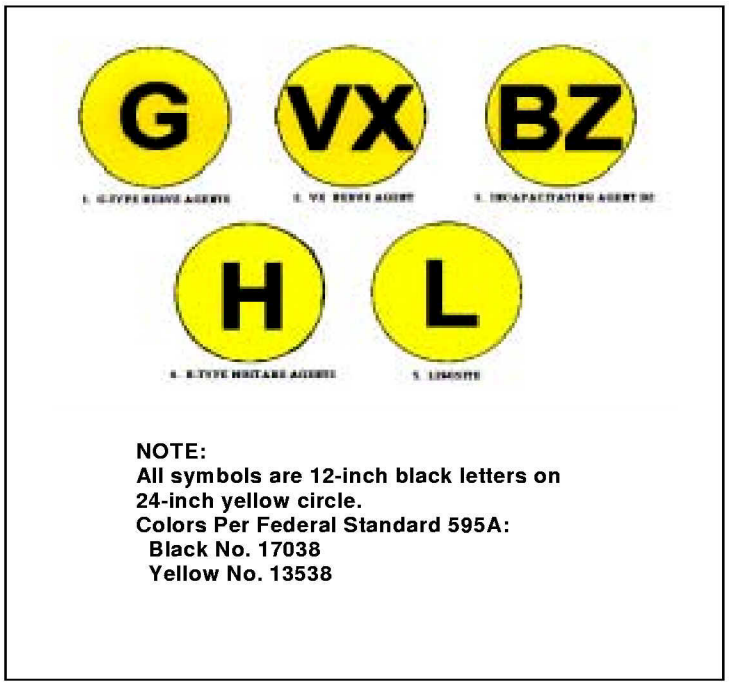


Figure 8-5. Supplemental Chemical Hazard Symbols

1. WEAR FULL PROTECTIVE CLOTHING—

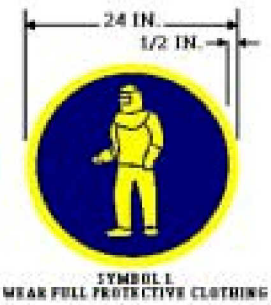
Background in blue.

Figure & rim are:

Red for Set 1 protective clothing.

Yellow for Set 2 protective clothing.

White for Set 3 protective clothing.



2. WEAR BREATHING APPARATUS—

Background in blue.

Figure and rim are white.

3. APPLY NO WATER—

Background in white.

Circle and diagonal line are red.

Figures are black.

Note: Colors per Federal Standard 595A or GSA Catalog
Red No.11105
Blue No. 15102
Yellow No. 13538
White No. 17875
Black No. 17038

Figure 8-6. Protective Clothing and Apparatus

Table 8-1. Chemical Agents/Fillers and Hazard Symbols

Chemical Agents & Fillers in Munitions	Full Protective Clothing			Breathing Apparatus	Apply No Water	G	VX	BZ	H	L
	Set 1	Set 2	Set 3							
GB	X					X				
VX	X						X			
H, HD, HT	X								X	
L	X									X
CL, CG, CK, CN, CNS, CS, BBC, DA, DC, DM, FS, FM		X								
HC				X	X					
BZ		X						X		
WP, PWP			X							
TH, PT				X	X					
IM, NP				X						
TEA, TPA			X		X					
COLORED SMOKES				X						

POSTING SYMBOLS

8-34. When chemical or pyrotechnic munitions are assembled with explosive components, chemical hazard and fire hazard symbols are used together. Chemical munitions without explosive components are identified by chemical hazard symbols only.

8-35. Requirements for posting chemical symbols are similar to those for posting fire symbols. Chemical symbols must be removed, covered, or reversed as soon as chemical agents are removed from a location.

RESPONDING TO MUNITIONS FIRES

8-36. Personnel must take immediate action when fires occur in a munitions area. If fire is discovered in grass or other combustible material surrounding a magazine, structure, or FSU, the following steps must be taken as quickly as possible:

- Sound the alarm.
- Do everything possible, using available firefighting tools, to extinguish or control the fire until firefighters arrive.
- Evacuate nonessential personnel to a well-protected area.

EMERGENCY WITHDRAWAL DISTANCES

8-37. All nonessential personnel must be evacuated to the appropriate emergency withdrawal distance as shown in Table 8-2. The commander is responsible for alerting civilian authorities of any imminent explosive accident that may affect the local community and for providing those authorities with the correct emergency withdrawal distances. See DA Pam 385-64 for more information.

Table 8-2. Minimum Withdrawal Distances

HAZARD CLASS/DIVISION	UNKNOWN QUANTITY NEW	KNOWN QUANTITY NEW
Unknown truck, tractor-trailer and/or facility	4,000 ft (approx .75 mi)	4,000 ft (approx .75 mi)
Unknown railcar	5,000 ft (approx 1 mi)	5,000 ft (approx 1 mi)
HC/D 1.1 (see Note 1)	Same as unknown HC/D above	For transportation use: • 2,500-ft min distance for 500 lb NEW and below. • 5,000-ft min distance for railcars above 500 lb NEW. • 4,000-ft min distance otherwise. • 4,000-ft min distance for bombs and projectiles with caliber 5-in (127mm) or greater. For facilities use: • 2,500-ft min distance for 15,000 lb and below. • 4,000-ft min distance for more than 15,000 and less than 50,000 lb. • Above 50,000 lb, D=105W to the 1/3 power.
HC/D 1.2 (see Note 1)	2,500 ft	2,500 ft
HC/D 1.3 (see Note 2)	600 ft	Twice the IBD with a 600-ft min distance.
HC/D 1.4	300 ft	300 ft

Notes:

1. For HC/D 1.1 and 1.2 items, if known, the maximum range fragments and debris will be thrown (including interaction effects of stacks of items, but excluding lugs, strongbacks, and/or nose and tail plates) may be used instead of minimum range given here.

2. For accidents involving propulsion units, it is not required to specify emergency withdrawal distances based on potential flight ranges of items.

PROCEDURES FOR MUNITIONS-LADEN VEHICLES

8-38. When any part of a vehicle, other than its cargo, catches fire, try to get the vehicle to a clear, isolated area and use a handheld fire extinguisher to fight the fire. Also, ask someone to notify the fire department or engineer firefighting force. Fight the fire until the flames reach the cargo. At that point, evacuate all personnel and equipment to the safe distances listed on DD Form 836. Give firefighters complete information about the cargo as provided on DD Form 836.

SUMMARY

8-39. Fire protection, prevention, and safety awareness during munitions operations is every soldier's responsibility. Commanders are responsible for command and technical supervision of a well-planned, effective fire protection and prevention program at facilities under their command. Supervisors must emphasize quality, routinely schedule training, and ensure that the commander's policies are implemented. Demonstrated performance is the quality control element of an effective fire protection and prevention training program.

Chapter 9

Munitions Storage Procedures

The purpose of field storage in combat and SASO environments is to provide safe munitions storage for tactical units. This chapter contains information on types of munitions storage areas. Also, it discusses planning for and storing of munitions during combat and SASO, with emphasis on meeting safety and storage criteria to the maximum extent possible.

OVERVIEW

9-1. Peacetime explosive standards in DA Pam 385-64 must be followed if possible. However, peacetime standards may not be fully met or maintained because threat level, mission, mobility requirements, and physical condition of facilities vary greatly among theaters of operation. Even with variability in conditions, munitions can be satisfactorily and safely stored in the theater. Regardless of conditions in the theater of operations, a single, basic tenet must be followed; that is, *take all measures possible to minimize risk to personnel, materiel, facilities, and stocks.*

AMMUNITION STORAGE ACTIVITIES

9-2. Unlike permanent ammunition storage areas, munitions assets in a tactical ASA are most often stored on the ground and on unimproved surfaces. Munitions are placed in storage compatibility categories separated from each other by the minimum Q-D. This is based on NEW; NEQ; or total gross tonnage per individual storage unit, depending on the storage system selected. Munitions are likely to be stored in one of four types of field storage areas: TSA, CSA, ASP, or ATP. The different types of tactical ASA compatibility categories, Q-D standards, storage systems, and storage planning procedures are discussed later in this chapter.

THEATER STORAGE AREA

9-3. The TSA is located within the COMMZ in the theater's rear AO. The modular ammunition company's HLPs generally operate the TSA. These platoons may receive added support from MLPs. The TSA is usually the largest ASA in the TO. Its mission is to receive, store, and ship containerized and break-bulk munitions. It also issues, inspects, configures, manages and maintains theater reserve munitions. The TSA also provides area ammunition support to units operating in the COMMZ.

9-4. To facilitate shipment, TSAs are located where there is direct access to airfields, railheads, ports, road networks, and facilities. If this is not feasible, the TSA should be located within a short line-haul distance of such facilities. The TSA can be either a fixed, semifixed, or open outdoor storage area, or a combination of these.

9-5. In peacetime, the TSA may be a permanent storage facility (e.g., igloo, magazine, bunker, or other fixed or semifixed explosives storage building). Unless the TO has existing fixed explosives storage facilities, the TSA is usually an open outdoor storage area in SASO/wartime.

9-6. The area selected for the TSA should have as much hard surface as possible. Also, it must have adequate drainage and a road network capable of supporting heavy vehicle traffic. It should be designed to move break-bulk and containerized munitions onto and off of railcars, line-haul vehicles, and PLS. Other logistical units (i.e., transportation and terminal support) may be available to assist munitions units in conducting railhead and other transload operations.

9-7. A TSA may expand to about 40 square kilometers to meet its stockage objective (see Table 9-1). If the stockage objective exceeds 25,000 STs, a second TSA should be established. The ASCC and METT-TC determine the stockage objective of TSAs. The TSA receives 100 percent of its stockage objective from the POD.

Table 9-1. ASA Types

ASA	Days of Supply	Stockage Objective
TSA	30 Days	25,000 STs
CSA	7 Days	25,000 STs
ASP	3 Days	NA

9-8. Munitions arrive at the TSA on theater transportation assets. They are usually containerized but may include break-bulk or a combination of both. Because a high percentage of TSA receipts are containerized, munitions and transportation personnel must manage containers to guarantee accountability and to retrograde them for reuse. See FM 9-6 for a discussion of the flow of munitions in the theater of operations.

CORPS STORAGE AREA

9-9. The CSA is located in the corps rear AO. The modular ammunition company's MLPs generally operate the CSA. If the CSA is receiving containerized munitions, HLPs may support the MLPs. The CSA mission is to receive, store, issue, inspect, configure, manage, and maintain the corps reserve munitions stocks.

9-10. The CSA supports the munitions requirements of all assigned or attached corps units. It is also the primary source for the division's munitions. It stocks 10 to 15 DOS to meet initial combat requirements; thereafter, it maintains about 7 DOS. At least one CSA is required to support ASP and ATP operations for each committed division. The CSA may be fixed, semi-fixed, or open storage depending on the tactical situation. It is more fixed than the forward storage areas it supports. Usually in SASO or wartime environments, it consists of open storage.

9-11. The CSA should be located near MSRs and railheads to allow easy access for theater and corps transportation assets. The site must have an improved road that can handle heavy vehicle traffic.

9-12. The CSA receives about 50 percent of its munitions from the POD and 50 percent from the TSA. These munitions may be in either break-bulk or containerized loads. Munitions shipped from the CSA to an ASP may be in single-DODIC, break-bulk, or configured loads. Munitions shipped from the CSA to the ATPs are in MCLs.

9-13. The CSA can expand to about 40 square kilometers. When the stockage objective reaches 25,000 STs, a second CSA should be established. The COSCOM establishes the CSA stockage objective, which is based on projected theater combat rates and METT-TC.

9-14. The COSCOM ordnance/corps support battalion analyzes workload requirements and synchronizes operations with corps transportation assets. See FM 9-6 for a discussion of the flow of munitions in the theater of operations.

AMMUNITION SUPPLY POINT

9-15. The ASP is another source of munitions for the division. It is located in the division's rear AO. The modular ammunition company's MLPs operate the ASP. The ASP provides munitions support to corps and nondivisional units in the division's AO.

9-16. The ASP normally stores 3 DOS to meet routine, surge, and emergency requirements of supported units. Tactical plans, availability of munitions, and the threat to resupply operations are the basis for stockage levels.

9-17. ASPs should be considered as temporary, open storage sites. ASPs are located near MSRs and rails (if feasible) to allow easy access for theater and corps transportation assets. It is essential that ASPs have good road networks that can support heavy vehicle traffic. Thus, commanders will focus on locations that minimize the need for engineer support. The ASP receives 100 percent of its munitions shipments from the CSA on flatracks in single, mixed DODIC, or configured loads.

AMMUNITION TRANSFER POINT

9-18. The ATP is a temporary site from which munitions are transferred from corps transportation assets to the organic vehicles of the big six combat units (i.e., armor, aviation, infantry, artillery, air defense artillery, and combat engineers.) The DAO controls all division ATPs.

9-19. Each maneuver brigade has an FSB that operates an ATP in the BSA. The ammunition sections of the following units operate the ATPs:

- Supply company, FSB in a heavy or light division.
- S&T company, support battalion in a separate brigade.

They support all units in the brigade support sector and receive mission guidance from the DAO. Their mission is critical since they logistically support the maneuver commander's tactical plan to ensure that munitions are available for combat.

9-20. The MLP (ATP section) of the modular ammunition company operates an ATP located in the DSA of the division AO. It supports corps, divisional, and nondivisional units operating within the division support AO. The DAO provides mission guidance to the ATP and establishes its priorities.

9-21. Using either unit vehicles with MHE (e.g., HEMTT), PLS, or organic ATP MHE, munitions are transferred from corps trailers or PLS flatracks to vehicles organic to the using unit. Departing empty tractors/PLS vehicles backhaul the empty trailers and flatracks. Corps transportation should always drop a trailer or flatrack and take one in return. This practice is called *one-for-one exchange* and also applies to using units, tactical situation permitting. Without this exchange, a shortage of trailers and flatracks occurs that may critically impact resupply of munitions. S&P trailers or flatracks are also used for retrograde of unserviceable munitions and CEA. Also, these vehicles may transport fatalities and POWs, if necessary. See FM 55-10 for more information.

9-22. Shipments from the CSA and ASP together make up 100 percent of the ATP stockage level. About 75 percent of the ATP munitions requirements are throughput from the CSA in MCLs. The other 25 percent are received from the supporting ASP in single, mixed DODIC, or configured loads.

9-23. The ATP is located near an MSR or adequate road network to provide access for corps transportation assets and combat user vehicles. The ATP must be on firm ground with good drainage and offer easy access for vehicles. Also, it must allow for easy recovery of pallets, S&P trailers, and PLS flatracks.

9-24. The site must be large enough to allow MHE to maneuver. Flatracks and trailers must be placed so the MHE has adequate space to transfer munitions. As with any other tactical site, good cover and concealment are extremely important. See Chapter 4 of this manual for a complete description of ATP organizational structure and munitions operations and procedures.

STORAGE SAFETY PRINCIPLES

9-25. The highest degree of safety in munitions storage will be achieved if each item is stored separately. However, this is not feasible. Observing the following principles will ensure safety of munitions storage regardless of the type of facility:

- Balance safety, environmental, and other factors when storing a mix of munitions. Certain munitions must not be stored together.
- Do not store munitions and explosives with dissimilar materiel or items that present positive hazards to the munitions. Examples include flammable or combustible materiel, acids, or corrosives.
- If compatible, different types of munitions and explosives may be mixed in storage.
- Mix compatible munitions and explosives in storage when such mixing facilitates safe operations and promotes overall storage efficiency.

- Do not store munitions with an assembled initiating device as they present a significant storage risk. Exceptions include–
  - If the device is packaged in a manner that eliminates risk of accidental detonation.
  - If fuzed items are configured/packaged to prevent arming of the item.
  - If safety features prevent accidental initiation or detonation of the item.
- Protect munitions from the elements by providing appropriate dunnage and adequate shelter and ventilation. This practice reduces maintenance and ensures maximum serviceability and shelf life of stocks.
- Place munitions in appropriate SCG or FSC and separate by minimum Q-D as determined by DA Pam 385-64.

COMPATIBILITY

9-26. All munitions and explosives are assigned to an appropriate SCG for storage at Army activities. See Appendix I for more on SCGs.

9-27. During wartime and contingencies, logistical considerations and combat situations may warrant more risk-taking. When warranted, the MACOM commander may authorize relaxation of storage compatibility requirements. The FSCs listed below simplify field storage compatibility while maintaining an appreciable safety level. Compatibility requirements do not apply when storing configured loads in the theater of operation. Another safety element, Q-D classification, further separates munitions and explosives into hazard classes.

FIELD STORAGE CATEGORIES

9-28. For storage in the field, munitions are segregated into primary groups referred to as storage categories. Groupings are based on the desirability to store components of complete rounds in adjacent stacks and consideration of the hazards of propagation of explosion, range of fragments, spread of fires, and chemical contamination.

9-29. Listed below are the FSCs of conventional ammunition. (See DA Pam 385-64 for more information on field storage.)

- *Category A.* Fixed and semifixed artillery munitions, except incendiary and chemical.
- *Category B.* Propelling charges, fuzes, primers, flash reducers, and separate loading artillery projectiles, including HE and AP but not incendiary and chemical projectiles.
- *Category C.* Mortar ammunition and hand grenades, except incendiary and chemical.
- *Category D.* All pyrotechnics and chemical ammunition, including chemical-filled rockets; gas, smoke, and incendiary bombs; gas and smoke artillery ammunition; incendiary and chemical grenades; smoke pots; VX-filled mines; bulk-packed incendiary and small arms tracer cartridges.

- *Category E.* All demolition explosives, antitank and antipersonnel mines (except VX-loaded), and components (i.e., blasting caps, firing devices, detonating cord, and safety fuses).
- *Category F.* Rockets, rocket motors, and rifle grenades, except chemical.
- *Category G.* The following items of USAF Class V supply: all unfuzed HE bombs, aircraft mines, aircraft torpedoes, and fragmentation bombs; fuzes and/or primer-detonators for the above items; fragmentation bomb clusters, fuzed and unfuzed. The remainder of USAF Class V items must be stored in other applicable categories.

QUANTITY-DISTANCE

9-30. Q-D hazard classifications are designed to protect personnel and property in areas adjacent to storage facilities, to limit the quantity of stocks that may be lost in an explosion, and to reduce the possibility of any explosion involving large quantities of explosives and munitions.

9-31. Q-D relationships for specific classes of munitions and explosives are based on levels of risk considered acceptable for that item. During peacetime, the Q-D tables set forth in Chapter 5 of DA Pam 385-64 must be strictly followed unless a waiver is obtained. The tables apply generally to exposures involving nonmilitary personnel, family housing, and health and morale facilities.

9-32. During SASO, contingency, and wartime operations, military requirements may make full compliance with safety regulations difficult. Compliance with Q-D regulations is of great importance to commanders since their purpose is to minimize losses of personnel and stocks and to maintain the full operational capability of facilities. Normal explosives safety criteria, procedures, Q-D separations, and methods of application in DA Pam 385-64 apply except where waivers are granted.

9-33. To meet readiness requirements, certain units may have their ABL uploaded on organic vehicles or stored near the unit in a BLAHA. DA Pam 385-64 defines Q-D requirements. BLAHAs outside and inside the US have different standards, which must meet the Q-D standards of this publication.

9-34. Applicable Q-D terms for field storage safety purposes include the following:

- *Storage subdivisions.* Field storage areas are divided into storage sections and further subdivided into FSUs and stacks to ensure adequate dispersion for operational safety purposes.
- *Dispersion.* If assets are adequately dispersed, the ASP is not an inviting target from the air. When possible, quantities of each type of ammunition should be stored in two or three widely separated sections. If the contents of one section are destroyed, the entire supply of any one item will not be lost. When space is not sufficient to disperse the ammunition, construct earthen barricades to help reduce the hazard.
- *Barricades.* The effect of sympathetic detonation can be reduced using man-made barricades constructed IAW DA Pam 385-64.

- *Interstack distance.* Interstack distance is the minimum distance between the near edge of adjacent stacks. Stacks are required to be separated by minimum distance of 50 feet to inhibit the spread of fire. However, be aware that interstack distances do not always provide protection from propagation of detonation by blast overpressure or missile fragments. Aggressive fire fighting usually helps to prevent the spread of fire from one stack to another at this distance. The greater the distance between stacks, the less likely fire will spread from stack to stack. When possible, separate stacks by a distance greater than that prescribed.
- *Inter-FSU distance.* The inter-FSU distance, which is the distance between the nearest edge of the nearest stacks in adjacent FSUs, can also help prevent the spread of fire (see Table 15-2 of DA Pam 385-64). When these distances cannot be met, use extra care in setting up and maintaining fire protection, fire guards, and firefighting measures.
- *Optimum safety distance.* The optimum safety distance is the limit inside which structural damage from a blast or missile fragments will be serious. Consider this distance if ASAs, ATPs, or BLAHAs have to be located near gasoline or other storage facilities, hospitals, permanent radio transmitters, railroads, and highways.

9-35. Special storage requirements must be met for certain categories of munitions. Safety and environmental considerations make it essential to comply with the following guidelines:

- *Nontoxic Chemical Ammunition.* Store chemical-filled ammunition so that each container, item, or bomb can be inspected and easily removed. Keep projectiles containing phosphorus out of the direct sun and store them bases down. Locate water-filled barrels for immersing leakers within the toxic ammunition site.
- *Toxic Chemical Ammunition.* Store toxic chemical ammunition in the part of the ASP with the lowest elevation and at least 1 mile downwind from inhabited ASP buildings or other storage areas. Make sure no inhabited buildings or storage areas are within 2 miles downwind of the storage site. Also, ensure maximum security for this type area.
- *Rockets.* Safety requirements for storing rockets are stricter than for most other types of conventional munitions. Store small- and large-caliber rockets and large-caliber, free-flight rockets on the outer edge of any storage area. Point the noses away from all other stored munitions and away from all inhabited areas. Locate the rockets so that only their own containers are between the rockets and the barrier. Do not make stacks more than one row deep.
- *Bombs.* Category G ammunition (bombs) is usually stored and issued by the USAF. In emergencies, however, depot and ASP commanders may store bombs. For this reason, it is important to be aware of the following restrictions:
  - The FSU is the smallest storage unit authorized.

- Fuzed fragmentation bombs in the same FSU may not be stored with other bombs.
- Components of bombs (i.e., fins, fuzes, primer-detonators) can be stored between FSUs. If that is done, remember to protect fuzes and primer-detonators from heat and moisture.

SITE SELECTION

9-36. Safety and efficiency must be top priorities when selecting a field storage site. Site selection and layout of an ATP are discussed in Chapter 4 of this manual. It is essential that explosives experts be involved early in this process to preclude possible future disruptive, safety-driven relocations of established Class V facilities.

9-37. A primary and an alternate site should be selected. Alternate sites provide relocation options in case the primary site is unavailable for operational reasons, or if enemy action or the effects of weather on the terrain make evacuation necessary.

9-38. A map and ground reconnaissance of the proposed sites should be made. Reconnaissance ensures that the sites are suitable for performing safe operations and providing efficient support to using units. A map recon provides information on the terrain and the possibility of natural cover and concealment. A ground recon supports the information gathered from the map recon and further reveals terrain features. Also, it reveals other conditions that may have changed or may not be identifiable on a map.

9-39. Based on reconnaissance information, site recommendations are submitted to higher headquarters for approval. The sites selected may not be approved for operational and/or tactical reasons. The selection process may have to be repeated, or higher headquarters may identify an area for the location of the storage area. See Appendix J for information on FARPs.

ASSESSING TACTICAL REQUIREMENTS

9-40. Tactical conditions and METT-TC factors must be reviewed to reduce conflict between the tactical and safety requirements of an ideal site. Often, these requirements are not compatible, and defense risks must be weighed against the operational mission.

9-41. The tactical situation may require that procedures be modified or supplemented. Other tactical considerations are found in FM 71-100 and FM 100-15. The following considerations apply to all storage and supply sites:

- *Transportation.* Sites should be located near the MSR and supported units to allow easy access. The distance to supported units must be reduced in keeping with security constraints.
- *Facilities.* Sites should have ready access to (but be located as far as possible from) hospitals, important military installations, airfields, docks, factories, fuel storage and/or distribution activities, and similar facilities. This is especially true for sites subject to enemy attacks. If chemical munitions are stored, downwind distances to populated areas must be considered.

- *Defense.* Sites should be easy to defend against ground attack using the fewest personnel and materials possible. The site must be large enough to allow for dispersion of stocks to protect against heavy loss by fire or explosion. As with any other tactical site, good cover and concealment are critical.
- *Road network.* In addition to access and exit roads, sites must contain a good internal road network. Roads must easily allow large vehicle passage under all weather conditions and should require as little maintenance as possible. A one-way traffic pattern is preferred to minimize confusion and congestion.
- *Railhead.* Sites with potential for expansion into larger, more permanent sites should have a railhead nearby.
- *Terrain.* Sites will be established on firm, level ground. Drainage patterns and soil conditions must be studied carefully. A level site that does not drain adequately during wet weather may result in unsafe and inefficient operations. The site must provide easy access for using unit vehicles and for recovery of PLS flatracks, pallets, and trailers. Natural barriers at proper intervals are desirable to segregate field FSUs and categories of munitions.
- *Fire safety.* The site must be inspected for fire hazards. A low level of flammable vegetation and an adequate water supply are favorable considerations.

STORAGE SYSTEMS

9-42. Once the site has been selected and approved, the selection of a munitions storage system must be made. Four storage systems may be used for field storage of munitions and explosives:

- Area storage.
- Roadside storage.
- Combination area/roadside storage.
- Modular storage.

9-43. Consider the following factors when choosing a storage system:

- Physical characteristics of the site.
- Location of hostile forces.
- Weather expectations for area.
- Time and resources available.
- Expected life of the site.
- Available space and type of operation that most readily comply with Q-D requirements.
- Freedom of vehicle movement throughout the storage site. Vehicles must be able to pass other vehicles being loaded/unloaded. There should be no dead-end roads that require backing up or turning around.
- Roads should be improved, if possible, to withstand traffic up to fully loaded trailers and PLS trucks.

Area Storage System

9-44. The area storage system is divided into three sections and subdivided into FSUs and stacks. Stacks of munitions are arranged in a checkerboard pattern and spaced according to the Q-D requirements in DA Pam 385-64. This system provides efficient use of the total area, but may require significant road and pad construction and stabilization of earth.

Roadside Storage

9-45. Roadside storage allows munitions to be stored in stacks along the edges of existing roadways. FSUs and sections are spaced according to Q-D requirements in AR 385-64. Effective use of this method requires a larger road network and more total area than the area storage system. However, little construction is necessary.

9-46. A variation of roadside storage, known as *"storage in depth,"* is very useful if the existing road network is limited. With this method, one or more additional stacks of ammunition is stored behind the roadside stack, away from the road. The use of this system is restricted in wet climates or in areas with poor soil conditions or heavy forests. Under those conditions, the stacks of ammunition would be difficult to reach.

Area and Roadside Storage

9-47. A combination of area and roadside storage is often used to lessen the bad aspects of both systems. It allows the most effective use of the existing road network in a limited area. While this combination does not require as much land as roadside storage, it does involve some road and pad construction.

Modular Storage System

9-48. The modular storage system is used for storage of high-explosive bombs and other conventional ammunition. Munitions are stored on pads within earth-barricaded areas called cells. The cells are joined to form modules, which may, in turn, be arranged to form module blocks. See DA Pam 385-64 for modular storage system requirements.

9-49. The modular storage system is used in a combat zone where limited security and inadequate real estate/operational limitations make it impossible to store munitions IAW Q-D and compatibility regulations for area, roadside, or area/roadside storage. It may be the only solution for storing large quantities in rear areas where there is insufficient real estate.

9-50. This system does not provide the same degree of protection for personnel or munitions stocks afforded by regular Q-D dispersion. Before deciding to use the modular system, compare its advantages and disadvantages to those of the other field storage systems as defined in DA Pam 385-64.

9-51. DA Pam 385-64 contains information on where, when, and how to use the modular storage system. Also, it discusses physical and construction characteristics, explosives limitations, barricade requirements, and site selection criteria.

9-52. Special Guidelines for Modular Storage. In peacetime, modular storage is limited to HE bombs (fuzed or unfuzed, with or without fins), similarly cased HD 1.1 ammunition (e.g., HE projectiles), and the following contained in nonflammable or metal shipping containers: 30mm and smaller ammunition, cluster bomb units, inert munitions components, and HD 1.4 munitions. By design, modular storage can redirect some of the blast overpressure from an explosion but provides little to no protection against fragment debris or the spread of fire. In a combat zone, there are no restrictions on the type of ammunition authorized for modular storage. In this case, mixing ammunition in modular storage is authorized.

9-53. Certain munitions require special storage consideration when stored in a modular system. Ensure safe storage by complying with the following guidelines:

- All storage and safety considerations will be followed for CS and CN (riot control agents) chemical munitions and WP/PWP ammunition. Cells containing these items must be in a separate module, away from other types of ammunition.
- Chemical munitions (except WP/PWP and CS/CN) and rockets will be stored in end cells of modules. Store rockets and missiles pointing into barricades.
- Blasting caps can be stored in a separate bunker built inside the cell containing all other compatible munitions. Ensure the bunker has adequate side/overhead cover to protect other explosives in the cell.
- Propellant charges must be stored in a separate module. The module may have one or more cells, depending on the required stockage.
- ICM must be stored alone in a separate module. The module may have one or more cells, based on the required stock objective.
- Munitions and CEA awaiting destruction must be stored in a separate module. The module may have one or more cells, based on requirements.

Urban/Built-up Areas

9-54. Structures in urban or built-up areas may also be used to temporarily store or protect munitions. The possibility of setting up an ASA in a village or other built-up area may be realistic and requires consideration when planning wartime operations. With this system, the real estate could be in an existing small city, a village, or a structure in the outlying countryside. The physical configuration layout is based on the safety requirements for munitions storage found in DA Pam 385-64.

STORAGE AREA PLANNING

9-55. After the site has been selected and the system of storage is known, a storage plan and SOPs must be written for the operation. Good planning helps ensure that operations are safe and efficient. The following checklist will be used when developing the storage plan/concept of operations:

- What is the expected maximum tonnage of each SCG?
- What are the expected average daily receipts and issues?

- How much time is available before the first munitions shipment arrives?
- What is the expected lifetime of the storage area?
- Which storage system will be used?
- What physical characteristics of the terrain can be used as natural barricades? What characteristics deny or restrict use of certain areas?
- What natural cover and concealment are available?
- What engineer construction and support are available or necessary?
- What is the total stockage objective for the site?
- What special security requirements are needed for classified and sensitive items based on the CIIC? See the FEDLOG or JHCS for a detailed explanation of CIICs and the CIIC for any munitions item.
- What section, FSU, and stack numbering system are needed to ensure that location and retrieval of stocks are fast and accurate?

GENERAL LAYOUT

9-56. Fundamental rules apply to the layout of all types of munitions supply and storage facilities. General safety procedures must be considered first in any site layout. Basic operating procedures are also very similar. Munitions survivability software is being developed by the Army and should be available in the near future. This software is designed to assist the user in preparing the safest storage plan possible for the designated terrain.

9-57. Key differences between CSA/TSA field sites and ASP/ATP sites are that the CSA and TSA generally have larger, more stable storage areas and better road networks.

9-58. All storage areas should be arranged into separate sections to enhance safety. The arrangement of stocks in each section should make receipt, issue, and inventory/rewarehousing/configuration as easy as possible.

9-59. Each section consists of a number of storage locations or modules, depending on the type of storage system used. Storage locations within each section are separated according to the Q-D requirements in DA Pam 385-64, METT-TC permitting.

9-60. The following guidelines should be observed to maintain efficient operations and prevent units from unnecessary waiting:

- Ensure signs are posted showing traffic direction, entrances, and exits.
- Draw maps of storage areas and provide copies to using units.
- Ensure there is enough dunnage near storage locations.
- Arrange for one-way traffic whenever possible; when not possible, provide turn-around points. Also ensure adequate space for vehicle holding and assembly areas.
- Ensure the use of ground guides is strictly enforced.

TACTICAL LAYOUT

9-61. Layout requirements for each site vary according to the tactical situation, the terrain, the proximity to forward areas, and the type and

amount of materiel handled. A good layout is one that achieves the following:

- Provides for easy, efficient work flow.
- Minimizes movement of munitions, tools, and equipment.
- Permits easy entry and exit for heavy traffic.
- Provides effective control of unit operations.
- Permits defense of the area.

Proper positioning of weapons, construction of defensive works and obstacles, and organization of unit defense and security are other prime considerations.

9-62. A map overlay will be prepared to include the defense plan and operational layout for the new area. If needed, a route overlay will also be prepared. The advance, main, and rear parties use overlays, and copies must be submitted to higher headquarters. When HNS is available, the layout will incorporate coordination of services between US and HNS activities. See Figure 9-1 for a typical ASP layout.

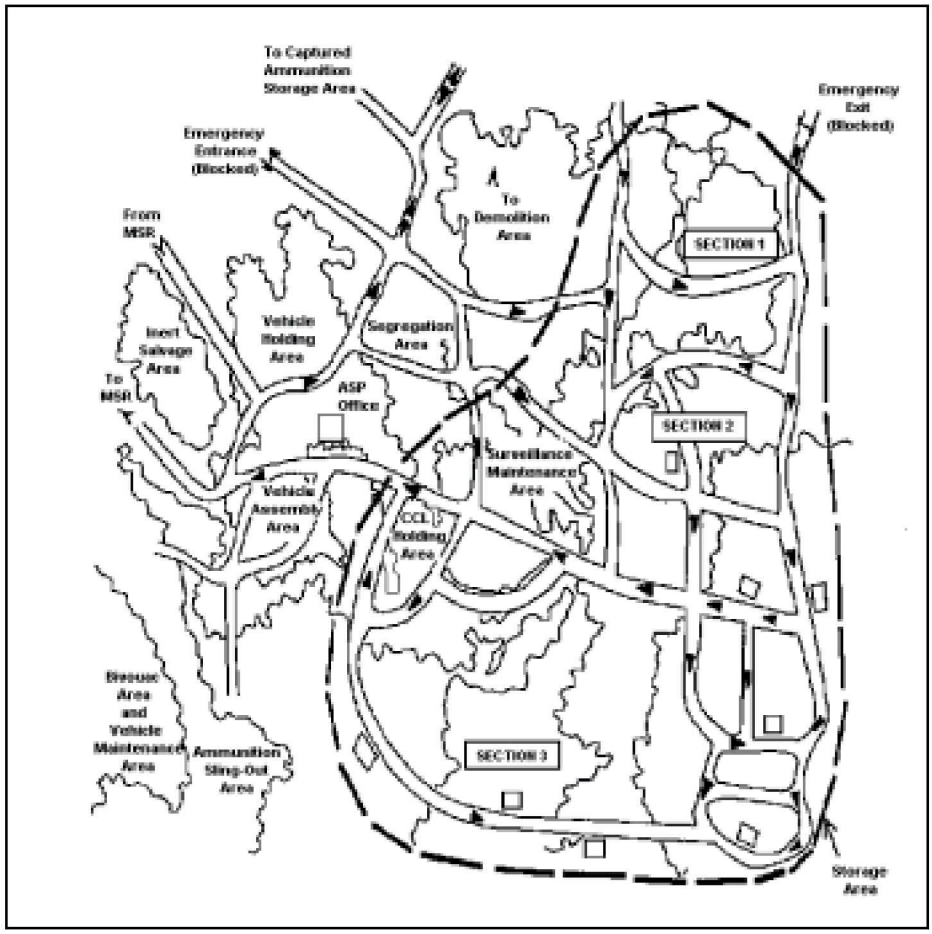


Figure 9-1. Typical ASP Layout Plan

AREA LAYOUT

9-63. The *operations office* is the nerve center of a storage activity. It is normally the control section of an ordnance company or modular platoon. It should be located inside the main entrance where all incoming customers can reach it easily. Also, it should be located near the administrative section but a safe distance from the main ASA. Vehicle holding areas for inbound munitions shipments and vehicle assembly areas for outbound munitions vehicles will be within walking distance. The operations office must have adequate parking for customer and ordnance company vehicles.

9-64. Parking for inbound, ammunition-laden vehicles or unit vehicles scheduled for loading is provided in the *vehicle holding area*. It must have enough maneuver room for large vehicles, and its size must be sufficient to accommodate the largest convoy of vehicles that the site may expect to receive. It is a transit area, and vehicles remain only long enough to be processed for storage or issue.

9-65. The *segregation area* is a temporary storage area for segregating ammunition turn-ins and mixed munitions shipments. It must be located near the salvage area to allow convenient storage or usage of packing materials.

9-66. Nonexplosive munitions, such as munitions residue and salvage materiel, are stored in the *inert salvage area*. It should be located near the segregation area and the surveillance and maintenance area.

9-67. The *demolition area* is set aside for the destruction of unserviceable munitions. A good access road is necessary to facilitate the delivery and unloading of munitions. Because S&P trailers and rough-terrain forklifts may be needed to conduct demolition operations, both the road network and the area must be able to support these vehicles. Land selected for the demolition area will not be used for other purposes. Also, it will have scarce vegetation to minimize the fire hazard. Demolition operations are to be conducted only after munitions disposition instructions have been received from higher headquarters.

9-68. The *vehicle assembly area* provides parking for all outbound vehicles, including empty/loaded ammunition vehicles being assembled into a convoy. The assembly area must be within walking distance of the operations office and meet all requirements of the vehicle holding area.

9-69. Emergency aerial resupply operations are conducted at the *sling-load operations area*. It will be located at least 1,800 feet or 550 meters from munitions storage locations, working areas, and inhabited areas. When planning sling-load operations, the allowable gross weight for cargo aircraft must be considered. See FM 10-450-3, and TM 38-250, for more information on sling load operations.

9-70. The *bivouac area* is the living area for personnel operating the site. It must be located nearby but outside the fragmentation and blast areas. When locating this site, personnel safety distances from the ASA and the physical security of the bivouac area will be the primary considerations.

9-71. Unit vehicles and MHE are maintained in the *maintenance area*. A separate section within this area may be designated for refueling vehicles.

9-72. The *surveillance and maintenance area* is used for performing munitions inspection, repack, and maintenance. For efficiency, it should be located between the operations office and the storage areas.

9-73. Live munitions are stored in the a*mmunition storage area*.

9-74. The *captured enemy ammunition area* is used to store all CEA turned into the storage facility. CEA is always stored separately; once identified and classified, it is stored using the same principles required for storing US munitions.

SPECIAL LAYOUT

9-75. *Munitions stacks* should be positioned far enough off the road to allow trucks to be loaded or unloaded without interfering with traffic. Containers must be stacked so that munitions markings are visible and all containers can be accessed easily. Munitions stacked on an inadequate or unstable foundation may topple or sag. Inspectors should look for settling or shifting stacks so that corrections can be made before damage results. See DA Pam 385-64 for more information.

9-76. Some units use a *standard identification system* to identify and locate munitions. Such systems use lettered or numbered locations that always contain certain types of munitions. For example: Sub-depots are designated by letter; storage sections by number; FSUs by letter; and stacks by number (i.e., munitions may be stored in sub-depot A, section 1, FSU-A, stack 1 [A1A1]).

9-77. Whenever a site is established and similar stocks are required, they are placed in the same relative locations; however, ground features may preclude this. When a standard identification system is used, a major road or prominent landmark may be referenced. If a road or landmark is not available, the system should follow a logical alphabetical or numerical progression as personnel enter and move through a specific section of the site.

9-78. *Lot number separation* divides and stores all munitions by lot number. The manufacturer numbers and identifies munitions by lot. The lot number is vital for accountability, issue, and storage. Ensure individual lots are segregated in each storage location, clearly separated from other lots.

9-79. *Climatic considerations* such as adequate shelter, dunnage, good drainage, and good ventilation are necessary to protect stored munitions. Tarpaulins can be used to protect munitions stacks from the effects of rain and intense sunlight. Tarps must never be placed directly on ammunition; doing this raises the temperature underneath the tarp. Ensure a minimum 18-inch clearance between the tarp and the munitions. Tarps can be used as improvised shelters for VT fuzes and pyrotechnics. Cotton tarpaulins, 16 feet by 16 feet, NSN 8340-00-817-2126, provide both shade and cover.

9-80. In desert and tropical climates, munitions must be shielded from the direct rays of the sun. To minimize exposure to sunlight, position containers

with long axes pointed in an east-west direction. Priority for shade is as follows:

1. Guided missiles and rockets.
2. Propelling charges.
3. Fuzes.
4. Pyrotechnics.
5. Projectiles.

When containers are used for storage, doors may be left open or opened periodically so that air can circulate. Blowing sand should not accumulate around containers or pallets.

9-81. The proper use of *dunnage* increases stack stability. Generally, stacks must be at least 4 to 6 inches off the ground to prevent munitions from getting wet and to ensure adequate circulation. Empty munitions boxes or ration boxes filled with sand or dirt may be used to elevate the stacks if lumber is not available. Dunnage must be checked frequently for rotting and deterioration. See DA Pam 385-64 for more information.

9-82. If *drainage* threatens to be a problem, ditches must be dug around stacks of munitions. If propellant charges are stacked, lids will be turned down slightly so water does not seep in or accumulate.

9-83. *Storage of guided missiles and rockets* requires special care. Guided missile assemblies should be stored in permanent structures because the missile bodies have delicate electronic components that must be protected. If stored in the open, protect the containers with tarps or other suitable cover. In either case, storage areas should have hard, level surfaces, and all humidity indicators must be accessible. Guided missiles and rockets must be stored on the perimeter of any storage location, with all nose ends pointing in the safest direction, normally outward.

9-84. Security is a major concern when handling classified or sensitive missile and rocket components. Classified or sensitive components must not be stored with unclassified components. Guards and access control must be employed if these components are stored in the open. An accurate check must be kept on personnel who enter classified or sensitive storage areas or structures. See AR 190-11 for more detailed security information.

9-85. Natural cover and concealment must be used whenever possible to *camouflage* munitions storage areas. Camouflage requirements may conflict with requirements for firebreaks and munitions shelter. The use of camouflage must be consistent with explosive safety and munitions storage procedures. See FM 20-3 for general information on the use of camouflage.

9-86. MHE is essential to the receipt, storage, issue, and maintenance of munitions. The type of MHE available must be considered when planning operations. Certain MHE may not be suited to the terrain. See FM 9-6 for information on MHE assigned to ordnance units.

UNSERVICEABLE MUNITIONS STORAGE

9-87. Unserviceable munitions are those either manufactured with defects or made unserviceable by improper storage, handling, packaging, or

transportation. Shipments of munitions received from other supply facilities will be inspected for serviceability. Unit turn-ins not inspected at the time of receipt must be stored in a segregated area for later inspection. Ammunition specialists must be trained to recognize indications of unserviceability and report them. Refer to Figure 3-2 of this manual for information on turn-in procedures.

9-88. Inspectors segregate unserviceable munitions from serviceable munitions for safety reasons and to reduce rehandling. The munitions must be segregated by DODIC and lot number, followed by serviceability classification. Munitions that cannot be positively identified by lot number are automatically classified as unserviceable. Exceptions may be made based on the type, quantity, and condition of the munitions and METT-TC.

9-89. Safety precautions and principles that apply to storage of serviceable munitions also apply to storage of unserviceable munitions. Proper records must be kept on all unserviceable items stored at a supply facility.

9-90. Munitions that require maintenance must be segregated and marked to prevent issue. While minor preservation and packaging are performed at field locations, extensive maintenance is usually performed at a depot storage facility.

9-91. The unit performs the packaging and preservation functions if that is all that is required (see Chapter 10). Time permitting, reparable unserviceable munitions are retrograded for repair.

9-92. Munitions abandoned by using units are treated as unserviceable until inspected. The procedures that apply to unit turn-ins also apply to abandoned munitions. Unserviceable munitions are reported through proper channels for disposition instructions. Unserviceable munitions must be disposed of as quickly as possible to preclude further deterioration and potentially unsafe conditions. DA Pam 738-750 provides guidance in requesting disposition of unserviceable munitions. Hazardous unserviceable munitions are reported immediately through proper channels to EOD detachments for destruction. A demolition area is designated and cleared for the safe destruction of munitions.

SUSPENDED AMMUNITION STORAGE

9-93. Specific lots of munitions and components are withdrawn from issue when they are determined to be unsafe or otherwise defective. The problem may be the result of a manufacturing defect, a firing malfunction, or the deterioration of components. Storing munitions by lot number enables the rapid withdrawal from issue of those items that are unsafe, defective, or suspected of being defective.

9-94. The authority to suspend any lot of conventional munitions is vested in the commander, OSC. However, the installation or area commander may place a local suspension on a suspect lot of munitions. A preliminary report and a later detailed report are forwarded through the supporting MMC to theater army headquarters. The munitions remain in local suspension unless higher headquarters changes its status. (See AR 75-1 for instructions for preparing suspension reports. Suspended lots of conventional munitions and

components are listed in TB 9-1300-385. Additional notices of suspensions or restrictions are by QANET updates to ASIS or by other electronic message formats as supplemental changes to TB 9-1300-385.)

9-95. Unless the suspension notice orders it, munitions lots that are stored and later placed under suspension need not be moved to a segregated area. However, stacks of suspended munitions must be clearly marked on all sides using DD Form 1575 and DA Form 3782, or facsimile-formatted documents (taped to the materiel), to show that the items have been suspended or restricted from issue. When foreign nationals are employed, bilingual tags should be produced locally. Suspended or restricted-issue items returned by the firing units, or items received from other supply facilities, must be segregated upon receipt.

CAPTURED ENEMY AMMUNITION STORAGE

9-96. Enemy ammunition is considered excess. IAW AR 381-26, one of three options must be taken when munitions are determined to be excess on the battlefield. These options are use, destroy, or secure and retrograde.

9-97. When an enemy munitions cache is secured for storage, it is first inspected to determine condition, type, and caliber. It is then analyzed and identified by EOD, QASAS/qualified military inspector, and technical intelligence specialists to ensure that it is safe to transport or retrograde to a rear storage area. Items of special interest are noted and quickly reported through intelligence channels. Hazardous enemy munitions must be segregated and disposed of.

9-98. If the cache is retrograded, corps munitions managers are notified to provide QA/QC personnel and transportation assets to support the retrograde operation. These personnel go to the cache to load and transport it to the designated ASA. QA/QC personnel assist in segregating and loading the munitions. The designated ASA places the cache into a designated secure area. CEA must not be stored with US munitions. If possible, it will be stored IBD from all other munitions. Information on the NEW or foreign munitions can be obtained from military intelligence elements. See Chapter 12 of this manual for more information on CEA.

SALVAGE AND PACKAGING STORAGE

9-99. Salvage material includes such items as boxes, crates, and steel containers. Packaging material includes nose plugs, grommets, metal links, clips, cartridge cases, and brass.

9-100. Based on METT-TC, salvage material is normally collected at ASAs and shipped to designated points within the theater of operations for reuse or retrograde. However, if salvage material is turned in at the ATP, the ATP NCO arranges to have it backhauled to an ASA via available transportation. Some salvage material may be used at field facilities to repack serviceable munitions and components. Salvage material is inspected for explosives, recorded on stock records, and reported to the MMC as directed by higher headquarters. The MMC receives disposition and shipping instructions, and gives the instructions to the storage facility based on these reports.

9-101. When inert salvage material is shipped from any munitions facility, the senior inspector must certify the shipment to be free of explosives. Empty chemical containers, boxes, and packaging material must be certified to be free of chemicals or chemical residue.

BINARY CHEMICAL MUNITIONS

9-102. When BCMs are deployed to a theater of operations, the theater commander directs their primary storage location. In wartime, effective measures must be implemented to maintain strict control and safe handling of BCMs. When in-transit, the nonlethal-component canisters are stored separately until higher headquarters gives the release order. Separate storage is imperative for the safety of personnel and facilities. Also, it prevents the possibility of a lethal accident or incident that the enemy could consider as first use.

9-103. BCMs must not be assembled until higher headquarters gives a properly authenticated release order. From the CSA, BCM components are *normally* shipped forward for assembly at the ASP. Depending on the tactical situation, the assembled BCMs are uploaded for issue at the ASP or transported to the ATP for issue. The tactical situation may dictate that the munitions be assembled at the CSA and shipped directly to the ATP. Also, under emergency conditions, unassembled BCMs may be issued directly to the firing unit. Ideally, assembly of BCMs should occur as far forward as possible. This minimizes handling and exposure to possible leaks and contamination. Procedures for storing, shipping, handling, and securing BCMs are discussed below.

Storing and Shipping

9-104. Storage considerations for BCMs apply to both CSA and ASP operations. Commanders of conventional ammunition companies must be prepared to assume custody of BCMs. Normally, the CSA receives BCMs directly from the port and ships these components forward for assembly at the ASP. The commander must ensure that the nonlethal-component canisters are stored in separate structures within the same storage area or in separate locations at different storage areas. Storage of BCMs must be IAW Q-D requirements in DA Pam 385-64. During convoy operations from the port to the CSA, and from the CSA to the ASP, the components are shipped on separate vehicles within the same convoy.

9-105. Upon receipt of an authenticated release order, units generally pick up their allocated BCMs at the same time they replenish their conventional munitions. If the tactical situation changes and uploaded or issued BCMs are no longer required, the units must return the BCMs to the supporting ASA. Munitions specialists disassemble the BCMs and place the component parts in their original packages. The components are then returned to a secure storage location. If there is any uncertainty about the disposition of BCMs, instructions must be requested from higher headquarters.

Handling

9-106. The fewest number of personnel possible must handle BCMs. Commanders must ensure that their units establish SOPs that provide

special handling procedures for BCMs. These procedures must emphasize safety and, at a minimum, must include the following:

- Chain of custody.
- Required MOPP gear.
- Required chemical detector kits and alarms.
- Emergency procedures and assistance for accidents and incidents.
- Monitoring and surveillance requirements.
- Inspection requirements for BCMs and related chemical operations.
- Disassembly procedures for assembled BCMs.
- Specific area for assembly and disassembly operations.

9-107. When handling unitary munitions (e.g., CEA), the conventional ammunition unit takes all necessary NBC precautions, especially if there has been an accident. These precautions include dressing in MOPP-4 gear and requesting EOD and chemical unit support from corps headquarters. See FM 9-20 for more information.

Securing

9-108. Generally, physical security principles that apply during peacetime apply during wartime. However, in emergency situations or intense combat conditions some peacetime requirements may have to be waived. Regardless of the degree of combat, commanders must ensure that qualified personnel provide physical security whenever and wherever chemical munitions are handled. From the time BCMs enter the theater, commanders are responsible for their security during handling, moving, and storage operations. Security personnel may include a combination of escort personnel, MPs, conventional ammunition personnel, and designated personnel from the combat user. Security personnel have the primary mission of preventing unauthorized or uncontrolled access to chemical munitions. Unit commanders must develop a detailed unit SOP that deals with the security of these munitions while in their custody. At a minimum, the SOP will include the following:

- Personnel qualifications for those guarding and having access to chemical munitions.
- Identification of authorized personnel.
- Security during transport of munitions. Details for security planning for chemical munitions are given in AR 50-6, AR 190-11, AR 190-14, AR 190-59, AR 380-67, and FM 19-30.

REWAREHOUSING MUNITIONS

9-109. Rewarehousing is the art of using available space efficiently to support receipt, storage, and issue of munitions with a minimum amount of handling. Space layout planning is one of the most important elements of rewarehousing. Consolidation, location, control, and conservation of storage space are key to good rewarehousing.

NIGHT OPERATIONS

9-110. During combat, ammunition units must be able to perform night operations. With the added disadvantage of darkness, safety must be

paramount in the completion of all issues, turn-ins, receipts, retrograde operations, and shipments. Factors and considerations that affect night operations include the following:

- Soldiers work slower in darkness. Allow more time than usual during night operations.
- A larger work force is necessary for night operations.
- Emphasis on accountability increases. Ensure that soldiers serving as checkers are familiar with the area layout and the locations of the stocks.
- Safety must be stressed to all individuals involved, especially MHE operators. Additional ground guides are needed for night operations.
- Based on the tactical situation, commanders must decide how much light discipline must be maintained. Ensure that proper batteries and blackout filters are available for lights.
- Use night-vision goggles as much as possible. Ensure that proper maintenance is performed to keep them operational.

SUMMARY

9-111. This chapter focuses on storage of munitions in combat/SASO environments. In the future, it is likely that munitions units will be deployed consistently for SASO where field storage conditions are prevalent. If deployed into a combat environment, a unit's storage requirements and considerations will be consistent with those identified in this chapter. Units that support either SASO or combat operations from a CONUS installation should consult DA Pam 385-64 for peacetime and wartime requirements.

Chapter 10

Munitions Maintenance and Surveillance Operations

Munitions maintenance encompasses all actions necessary to ensure that stocks are either serviceable, or that unserviceable stocks are restored to serviceable condition or disposed of properly. Maintenance responsibilities are assigned to ammunition units based on the unit's primary mission and the availability of skilled personnel, time, tools, equipment, and supplies. This chapter discusses maintenance and surveillance operations, procedures, and functions.

MAINTENANCE PLANNING

10-1. Munitions maintenance planning must be aligned closely with the operational needs of supported units. Maintenance planners must be realistic when considering the availability of supplies and maintenance resources. A reduction in munitions maintenance increases the amount of ammunition taken from the supply system. Conversely, the inability of the supply system to replace unserviceable munitions requires a greater maintenance effort. Proper maintenance, storage, and handling of munitions enhance readiness, reduce replacement requirements, and conserve resources. The maintenance planner must recognize the interdependence of maintenance and munitions support.

MAINTENANCE OPERATIONS

10-2. Units need a constant supply of serviceable munitions. Munitions maintenance is a vital task that must be performed to sustain readiness. Maintenance includes everything from minor packaging and preservation operations (i.e., cleaning, removing rust and corrosion, repairing boxes and crates) to major operations (i.e., complete renovation). Provisions must be made to conduct as much maintenance as possible at the storage location. In some cases, munitions must be retrograded for maintenance. Since the movement of munitions requires transportation and personnel assets, it is inefficient to adopt a maintenance program geared totally to evacuation.

10-3. DS, GS, and modular ammunition units assume a more active role in conducting maintenance operations when operating in the corps and theater areas during combat or SASO. The primary focus in hostile, forward locations is issue and receipt activities; therefore, maintenance may be limited to packaging and preservation.

CATEGORIES

10-4. Munitions maintenance is divided into four categories: organizational, direct support, general support, and depot. Generally, Army munitions personnel only perform the first three categories of maintenance.

Organizational

10-5. All activities that have munitions on hand perform organizational maintenance (generally packaging and preservation) to prevent deterioration from rough handling and exposure. Organizational maintenance in the using unit is usually performed with the technical assistance of ammunition units.

Direct Support

10-6. DS conventional ammunition companies in the theater of operations perform limited DS maintenance and surveillance of stocks under their control. Limits are defined by the capability of the unit and METT-TC. Besides packaging and preservation, DS maintenance may include replacing readily removable external parts and components; these include fuzes of artillery and mortar munitions, propelling charges and primed cartridge cases for semifixed and mortar munitions, grommets, and nose plugs. Maintenance at the DS level is largely due to turned-in munitions.

General Support

10-7. Conventional ammunition companies in the theater of operations that have GS capabilities perform maintenance above the DS level. Modular companies are designed with the capability to perform both DS and GS maintenance. GS maintenance includes, but is not limited to, the following:

- Removal of extensive rust/corrosion; painting and stenciling of Class V materiel; and fabrication of or major repairs to boxes, containers, and crates.
- Replacement of internal/external components that requires the use of operational shields or barricades.
- Demilitarization of ammunition, when directed.

10-8. All DS and GS companies with storage and issue missions are equipped to perform maintenance functions. The tools, equipment, and supplies needed to support maintenance at that particular level are included in each unit's supply and equipment list.

Depot

10-9. Depots perform more complicated maintenance (such as modification, explosive component replacement, or complete renovation) of munitions that are packaged and/or evacuated.

CARE AND PRESERVATION

10-10. Care and preservation are terms often used to describe munitions maintenance at the organizational or DS level. Care stresses protection, and preservation stresses maintenance but includes protection. Care and preservation of munitions are essential for ensuring that stocks are available for combat missions.

10-11. Munitions returned by units can be held in the segregation area for up to 180 days. There, they are identified and segregated by type and lot number, checked for hazardous and nonstandard conditions, and repacked or

palletized. Q-D, explosive, and personnel limits must comply with DA PAM 385-64.

10-12. Care and preservation lines may be established, if METT-TC and capability permit, where loose or opened munitions are visually inspected and properly identified. Containers are inspected to ensure that the contents match the information on the outside. Contents are inspected for serviceability, incompatibility, and hazardous conditions. Precautions must be taken when handling depleted uranium items (see TB 9-1300-278). Serviceable items are palletized. Unserviceable but salvageable items are sent for repair. Disposition instructions must be requested for suspended and nonrepairable items. Scrap material is placed in suitable containers and sent to a salvage area.

10-13. If inspection results in the need to repair or replace a container, the contents must be removed unless a new stencil or marking is all that is necessary. Munitions are returned to the container with enough filler material to allow a tight fit. Stencils or markings identical to the originals are placed on the new container. Seals and bands are replaced, and the container is ready for the palletizing area.

10-14. Munitions must be palletized IAW proper USAMC drawings and appendices. Some drawings may be designated as DARCOM drawings. No more than one lot is permitted on any one pallet in storage. Once inspected, pallets are transferred to a storage or shipping area.

10-15. If an explosive hazard exists, the destruction of unserviceable munitions and packaging is carried out only by, or under the supervision of, EOD personnel. Disposition instructions must be requested from higher headquarters prior to destruction. See DA PAM 385-64, DA Pam 738-750, and TM 9-1375-213-12 for more information.

STANDING OPERATING PROCEDURES

10-16. All maintenance operations are performed IAW an approved maintenance SOP. TM 9-1300-250 contains guidelines for preparing maintenance SOPs and organizing maintenance activities. When local nationals are involved in maintenance operations, the SOP is written in their language as well as in English.

SURVEILLANCE OPERATIONS

10-17. Munitions surveillance is the observation, inspection, and classification of munitions and their components for movement, storage, and maintenance. It includes the inspection of all equipment, facilities, and operations. Surveillance activities are conducted by all theater activities that store, maintain, dispose of, or ship ammunition and its components. Surveillance ends only when munitions are expended or destroyed.

10-18. The TSC is normally responsible for general supervision of munitions surveillance in the theater. The COSCOM is responsible for supervision within the corps. The ordnance battalion and CSB or CSG supervise this function in their commands. In established theaters, surveillance activities are under the control of DAC QASAS who are assigned to the appropriate

Army headquarters IAW AR 702-6 and AR 740-1. In theater ammunition units, surveillance is performed by attached civilians and assigned military inspectors.

10-19. Battalion commanders must administer a quality assurance ammunition surveillance program that covers all munitions operations in their command. The QASAS in charge is responsible for this program and reports directly to the commander. Since the training required for the QASAS is more extensive than that of the military inspector, QASAS personnel perform most functional tests and the more complicated inspections. They certify the results of inspections and tests performed by the military inspectors. Some inspection results and functional test reports are signed only by a QASAS. Surveillance in an immature or developing theater is performed by 55Bs in a DS, GS, or modular ammunition company. Early deployment of QASAS personnel will ensure full surveillance capabilities.

SURVEILLANCE FUNCTIONS

10-20. Munitions inspectors are responsible for ensuring the reliability and serviceability of munitions. They perform their mission in plants, depots, storage areas, and on the battlefield. The surveillance mission encompasses the following duties:

- Inspecting storage facilities, field storage, and all types of storage sites to ensure compliance with storage standards.
- Inspecting surrounding areas for fire hazards and other nonstandard conditions.
- Checking for conditions that could speed up deterioration of items in storage.
- Teaching surveillance and munitions safety.
- Preparing and maintaining records and reports to cover all surveillance activities. (Surveillance records and reports are contained in SB 742-1.)
- Observing, inspecting, and investigating munitions and components for serviceability.
- Monitoring storage, handling, and maintenance operations and recommending changes to enhance safety and operational effectiveness.
- Recommending controls needed to maintain standards.
- Advising the commander on munitions surveillance matters.
- Inspecting munitions to determine quality, safety, and deterioration.
- Maintaining munitions drawings and specifications files and indexes.
- Maintaining munitions suspension files.
- Inspecting incoming and outgoing munitions shipments for compliance with existing instructions and regulations.
- Furnishing technical advice to the commander and supported units on munitions safety and compliance with munitions regulations.
- Ensuring that surveillance functions are performed according to SB 742-1 and applicable TMs and SBs.

10-21. Munitions inspectors provide an invaluable service to the commander and supported units. Inspectors assist in many activities including the following:

- Investigating ammunition malfunctions and accidents.
- Inspecting and testing lightning protection systems.
- Conducting unit basic load inspections.
- Preparing waivers for storage facilities.
- Planning construction of storage facilities.
- Planning field storage areas.
- Monitoring uploading/downloading of ammunition to/from combat vehicles.

10-22. Ammunition inspectors also help to plan, administer, and enforce the explosives safety program. This program includes the review, evaluation, and inspection of operations, procedures, equipment, and facilities used with munitions and explosives operations.

SURVEILLANCE INSPECTIONS

10-23. An active surveillance inspection program is vital to ensuring munitions reliability. IAW SB 742-1, the following surveillance inspections are performed by QASAS and military inspectors:

- Receipt, including depot transfers, field returns, and CEA.
- Periodic (cyclic).
- Storage monitoring.
- Special.
- Pre-issue.
- Verification.
- Munitions condition code.
- Ammunition in the custody of units.

Serviceability Standards

10-24. The purpose of an inspection is to find deterioration and determine the serviceability of items. The inspector must be familiar with all information on the items, including components and packaging, as well as the characteristics of the weapons in which they are used. Serviceability standards are contained in SB 742-1.

10-25. Inspection procedures include observation, tests (such as gauging or strength tests), and functional tests. As a rule, munitions must not have defects that alter their characteristics, make them unsafe, or prevent them from performing as designed. The inspector must determine if defects can be corrected and at what maintenance level it must be done. Serviceability is not assumed from the fact that the item can be fired in the weapon for which it was designed. It must function correctly when fired.

10-26. The prime enemies of munitions are heat, moisture, and rough handling. Deterioration is faster when moisture is combined with a rise in temperature. Inspectors must look for indications of moisture, rust, or

corrosion on projectiles and fuzes; corrosion and cracks on cartridge cases; deterioration of propellants; loose closing caps; and moisture or dampness inside containers.

Physical Defect Standards

10-27. Evaluating materiel that shows deterioration or damage is a decision based on the training, experience, and judgment of the inspector. Deterioration of materiel in storage is natural and varies depending on protective coating, packaging, and storage conditions. Deterioration is progressive. If maintenance is not performed, it progresses from an incidental stage, to minor, to major, and possibly to a critical stage. These four categories of deterioration are used to establish a uniform system of examination for deterioration or damage.

10-28. Further guidance on classifying metal, plastic, and rubber component deterioration; mixed ammunition; damaged packaging; and placing defects into one of the four defect categories can be found in SB 742-1 and other applicable SBs and TMs.

Guided Missile and Large Rocket Inspection

10-29. GMLR munitions, components, propellants (liquid and solid), protective clothing, packaging, and packing materials are inspected and tested using applicable SBs, TMs, drawings, and specifications.

10-30. Most mid-sized guided missiles are now certified as rounds and are maintained by the contractor at contractor facilities. Unit maintenance on guided missiles is limited to spot painting and replacement of items such as wings and elevons. Missile items identified by lot or serial number are inspected for serviceability. Materiel is sampled and inspected by individual lots. Missiles are inspected using the inspection table in the appropriate TM or SB.

10-31. Defects found in the sample are classified using the applicable SB, TM, or other specification. Where defects are not classified in these publications, the inspector classifies them according to SB 742-1. The results of the sample inspection are used to make serviceability decisions about the lot or group.

SURVEILLANCE RECORDS AND REPORTS

10-32. A technical history of each lot, serial number, or group of munitions is kept by surveillance personnel. This history includes results of all inspections, tests, investigations, and any unusual or changing conditions affecting the items. These records are used to evaluate the serviceability and reliability of munitions. Therefore, it is important that all information gathered be accurate and concise. The historical information needed for maintenance is usually more detailed as to the extent of the defect and the work required returning the item to service. The following information is needed to evaluate the reliability of the stockpile:

- Condition of the materiel.
- Quantity.
- Date of manufacture.

- Type of storage.
- Type of defects.
- Cause of defects.
- Results of tests.

10-33. Surveillance personnel are required to submit and maintain reports on materiel received or in storage. SB 742-1 provides guidance for preparing the following records and reports:

- DA Form 984, *Munition Surveillance Report—Descriptive Data of Ammunition Represented by Sample.*
- DA Form 2415, *Ammunition Condition Report.*
- DA Form 3022-R, *Army Depot Surveillance Record.*
- DA Form 3023, *Gage Record.*
- DA Form 3782, *Suspended Notice.*
- DA Form 4508, *Ammunition Transfer Record.*
- DD Form 250, *Materiel Inspection and Receiving Report.*
- DD Form 1575, *Suspended Tag-Materiel.*
- DD Form 1575-1, *Suspended Label-Materiel.*
- DD Form 1650, *Ammunition Data Card.*
- SF 361, *Transportation Discrepancy Report.*
- SF 364, *Report of Discrepancy.*
- Munitions inspection and lot number reports.
- Munitions suspension records, to include AMCCOM and MICOM suspension.
- Equipment logbooks and maintenance logs.
- Reports of explosions, chemical agent releases, serious accidents, and nuclear incidents.
- Small arms tracer reports.
- Storage monitoring records (local format).
- Others required by local/higher headquarters.

SAFETY

10-34. Safety in munitions maintenance is covered in AR 385-10, DA PAM 385-64, and maintenance manuals for specific munitions items. Explosives safety standards, the handling and storing of munitions, operational precautions, Q-D requirements, barricades, operational shields, personnel and explosives limits, and safety tools and equipment are discussed in Chapter 7 of this manual.

SUMMARY

10-35. This chapter has provided only general information and guidance for personnel responsible for the maintenance of munitions. Detailed maintenance and surveillance procedures for specific munitions items are in TM 9-1300 series publications. Surveillance procedures are covered in SB 742-1.

Chapter 11

Emergency Destruct Operations

When faced with the possibility of capture by the enemy, an ASA or ATP may be called upon to conduct ED operations on part or all of its stocks. This chapter discusses the reasons for emergency munitions destruction and provides guidance in aspects of planning and conducting safe operations. Also, it describes methods of destruction and elements of required training.

OPERATIONS OBJECTIVES

11-1. Emergency destruction of munitions is conducted for one of two reasons. The first is to prevent enemy use. The second is to prevent disclosure of information about classified munitions. The object of ED is to render munitions inoperable, destroy munitions and documents of value to the enemy, and render what is left too hazardous to use. By reducing the stockpile as much as possible, units ensure that the least amount of munitions is destroyed. Quantities can be reduced in several ways. One is to move as much of the munitions as possible to a safe location. Another is to issue excess amounts to using units.

AUTHORIZATION TO DESTROY

11-2. The authority to destroy munitions must be established in command operating procedures. The applicable OPLAN or SOP must specify who in the chain of command is authorized to order the ED of ASA or ATP stocks. Only divisional or higher level commanders have the authority to order destruction of munitions. The commander may delegate this authority to subordinate commanders when the situation demands. Also, the command may dictate when and how to conduct ASA or ATP ED, including the types of items authorized for destruction and the destruction methods.

11-3. The decision to destroy, the method to be used, and the items to be destroyed all depend on factors involving command policy and the logistical and tactical situation. Some of the more important things to consider include—

- Tactical situation.
- Location of the ASA or ATP.
- Amount of ammunition and the time required to destroy the ASA or ATP.
- Security classification of the munitions.
- Available materiel and trained personnel.
- Safety considerations.

These factors are discussed in the paragraphs that follow. Also, added precautions must be taken when depleted uranium munitions or armor must be destroyed (see TB 9-1300-278).

TACTICAL SITUATION

11-4. The current tactical situation provides input to the decision-making process. The various ED methods require different setup and execution times. Also, the different methods provide different possibilities for complete destruction. With more time available, more complete destruction methods can be used. If time allows, the decision to authorize ED must be made at a higher command level. However, the senior person at the ASA or ATP may be required to authorize ED to prevent enemy capture and use.

ASA OR ATP LOCATION

11-5. Where the ASA or ATP is located has a bearing on which method of destruction is used. If an ASA or ATP is near a populated area, demolition may not be practical. On the other hand, if the destroyed ASA or ATP would create an obstacle to oncoming enemy forces, demolition would be useful.

AMOUNT OF AMMUNITION/TIME REQUIRED

11-6. The amount of demolition resources and the time required to destroy an ammunition stockpile are directly related to the amount of ammunition to be destroyed and its degree of dispersion. The quickest ED method is by fire support. An ASA or ATP can be destroyed with an artillery or air attack. ED by burning or demolition requires a lot of preparation time. Burning is faster because demolition requires setting up and priming explosive charges and setting up an initiation system.

11-7. A tradeoff may need to be made. With an artillery strike, the munitions may not all be destroyed. By burning or explosive demolition, the possibility of complete destruction of the ASA or ATP is much greater.

MUNITIONS SECURITY CLASSIFICATION

11-8. Classified munitions must be evacuated if at all possible. If not possible, classified munitions will be the first to be destroyed. To ensure complete destruction, classified munitions are destroyed by the most reliable demolition method.

AVAILABLE MATERIEL AND TRAINED PERSONNEL

11-9. If the ASA or ATP has no demolition or flammable materiel, destruction methods are limited. Also, demolition materiel may be more critical for offensive purposes than for ASA or ATP ED. In this case, destruction must be carried out by burning or other available methods. Only personnel trained in ED operations and thoroughly familiar with the unit ED SOP should be permitted to conduct demolition operations.

PLANNING

11-10. Planning for ED must start immediately. It is difficult to establish SOPs because tactical and logistical situations in each combat zone vary. However, the methods of destruction are basic and flexible enough to serve as SOPs in combat emergencies. The ED plan must be either an annex to the unit SOP or a separate SOP. To ensure the plan is complete and feasible,

staff it through technically qualified personnel and division, corps, or theater staff elements (i.e., EOD, the safety office, G3, and G4).

11-11. The division, corps, and theater staff agencies must thoroughly prepare for ED. Plans must address destruction priorities and procedures.

11-12. When establishing an ASA or ATP, the DAO and MMCs must plan to push ED materiel to the site. ED materiel requirements can be based on the expected daily push to the ATP (RSR for supported elements) or on the stockage objective for the ASA. To support any increased munitions flow, the MMCs or DAO must ensure that additional ED materiel is pushed to the ASA or ATP. ED materiel should be kept on hand at all times during normal operations, relocations, or evacuations. ASA and ATP personnel must be trained in ED methods and procedures. All personnel must be thoroughly familiar with the unit ED SOP and methods of destruction.

PRIORITIES

11-13. Priorities for ED are based on the tactical situation and the types of munitions stored at the ASA or ATP. ED priorities must be established in OPLANs and SOPs. Priorities may change based on the logistical and tactical situation. Munitions vital to the defense of the unit will not be destroyed. See Table 11-1 below for a suggested priority list for munitions ED.

Table 11-1. Suggested Priority List for ED of Munitions

PRIORITY	ITEM
1	Classified and special (chemical) munitions; associated manuals, records, reports, test sets, and equipment.
2	Munitions that can be used in immediate retaliation and deployed without a weapons system (e.g., grenades, land mines, small rockets [AT4]); munitions for which the enemy has weapons system capability.
3	Casualty-producing munitions (e.g., HE, antipersonnel) not included in priorities 1 and 2.
4	Noncasualty-producing and pyrotechnic munitions (e.g., signal, illuminating projectiles).

SAFETY

11-14. Observance of safety precautions is mandatory, regardless of the ED method used or the urgency of the situation. Only trained, experienced personnel may conduct ED procedures. Safety requirements determine the number of personnel engaged in ED operations. Safety considerations include the amount and type of munitions being destroyed and the size of the ASA or ATP. A minimum of two personnel must be present during all operations.

11-15. Tactical situation permitting, coordination with and warning of those units endangered by the ED operation must be accomplished to prevent casualties.

11-16. No matter which ED method is used, special care must be taken when destroying ICM, rockets, missiles, and ejection-type munitions. ICM and

ejection-type munitions may expel their payload when detonated or burned. These submunitions must be treated as UXO. Rockets and missiles will be pointed away from friendly troops since they could be set off by accident during the ED process and propelled in the directions they were pointed.

11-17. When using electrical or remote firing devices during ED operations, a minimum distance of 400 meters must be maintained from radio transmitters.

BURNING

11-18. The type and quantity of munitions being burned determines the radius of the danger area around the burning site. A minimum 1,000-meter (0.6-mile) safe area must be established when surrounding units and personnel are warned and under protective cover.

DEMOLITION

11-19. The type and quantity of munitions being destroyed, the fragmentation hazard, and the protective cover provided to personnel in the area determine the radius of the danger area surrounding the destruction of munitions by demolition. The information in Table 11-2 is based on ballistic data and field experience and should be used as a guide. If there is any doubt about an item, the distance will be increased for reasons of safety. Distance may be adjusted based on the tactical situation, terrain, and available protective cover for exposed personnel.

METHODS OF DESTRUCTION

11-20. Choose methods of destruction that cause such damage that the munitions will not be restorable to a usable condition within the combat zone by repair or by cannibalization. Destruction should be planned to impede enemy troop movements without creating hazards to friendly troops.

11-21. The methods for destroying munitions listed below may be used either singly or in combination. The actual method or methods used in a given tactical situation depend on time, personnel, type of munitions, and available means of ED. These methods include firing, concealment, burning, and demolition, and are discussed below.

FIRING/FIRE SUPPORT

11-22. At the using unit, firing the munitions into enemy-held territory is the simplest and most effective way of preventing enemy capture. Another ED method is using fire support. An ASA or ATP can be effectively destroyed if it is shelled or bombed. This method is particularly useful to ensure complete destruction after burning or demolition. Also, it is quite useful as a primary means of ED when there is no time to evacuate or set up any other ED method. An advantage of ED by fire support is that it can be used even after the ATP has been occupied by enemy forces.

CONCEALMENT

11-23. Concealment is the least desirable ED method. It is viable when the lack of time precludes using other methods. If the terrain provides adequate

covering, or if bodies of water are available for dumping munitions, concealment may be an excellent ED method. Puncture hermetically sealed metal cans before throwing them into water if time permits. Concealment of components such as fuzes can prevent or at least delay use by the enemy.

BURNING

11-24. Burning is less time-consuming than demolition. However, it is not recommended for all types of munitions because it rarely accomplishes total destruction. When time is a major consideration, burning may be used to destroy boxed munitions. When burning, munitions must be surrounded with combustible/flammable materiel. To guarantee an extremely brisk fire, diesel fuel, gasoline, paint thinner, or other suitable combustible or flammable liquid should be used

Table 11-2. Minimum Safe Evacuation Distance (in Meters) for Demolition Operations

Explosive Weight (pounds)	Evacuation Distance (meters)
27 and less	300
30	310
35	330
40	350
45	360
50	375
100	475
150	550
200	600
250	625
300	675
400	725
500	800

NOTES:

1—When using this table, Pounds of Explosive equals the total NEW of the munitions being destroyed plus the demolition materiel being used.

Example: 3 each Projectile 155mm HE, ADAM, D501 (NEW=1.8885x3=5.6655 NEW), 2 each demolition charge blocks, M112 (NEW=1.3x2=2.6 NEW), totaled 5.6655+2.6=8.2655 Total NEW, minimum safe evacuation distance is 300 meters.

2—When the munitions NEW is unknown, a general rule for estimating the amount of explosives is as follows: Assume that 50 percent of the total munitions weight equals the NEW.

3—When the NEW exceeds 500 lbs, use the formula below:
$100 \times 3\sqrt{\text{pounds of explosives.}}$

11-25. For maximum destruction, munitions-laden trailers should be pulled close together. Fuel, wood, paper, scrap boxes, propellant charges, or any

combustible materiel can be used for burning. Fuel is especially useful. Fuel-soaked munitions boxes are excellent for ensuring a fire strong enough to destroy munitions.

11-26. Combustible materiel will be placed under and over the munitions to be destroyed. An initiation train of combustible materiel can be used to ignite the fire; it must be 8 meters (26 feet) in length, long enough to allow soldiers to evacuate to a safe area. If time fuse is used as the initiation train, enough fuse must be used based on the burn rate to permit evacuation to a safe area. See FM 5-250 for more information. An alternate initiation method is to shoot a full fuel can with an incendiary bullet. If it becomes necessary to use gasoline or other highly volatile, flammable liquid, extreme caution must be taken to prevent premature ignition. For greater safety, ignition should be made by electrical means or by a remote-firing device.

DEMOLITION

11-27. The way in which a demolition charge is placed can make the difference between minor damage and complete destruction. For this reason, ED demolition teams must be trained on basic demolition procedures and on all available firing systems (see FM 5-250). Demolition materiel can be saved when planning ED operations by using HE-filled munitions in conjunction with demolition charges.

11-28. ED demolition teams must understand how and where to place demolition charges on different munitions to achieve complete destruction or to make the item unusable by the enemy. Demolition teams must be familiar with the preferred procedures for destruction of munitions in applicable TM 43-0002-series manuals.

11-29. Placements of demolition charges vary for different types of munitions. Also, placement of the charge may be different for items while in shipping and storage configurations versus when they are removed from the containers.

TRAINING

11-30. Rehearsal of responsible personnel in all phases of destruction is mandatory with special emphasis on training in demolition techniques. The training program should also include instruction in selecting sites, blocking communication routes, and impeding enemy movement.

11-31. Demolition explosives afford an effective means of destroying munitions to prevent enemy use. Demolition personnel must be familiar with pertinent provisions of DA Pam 385-64, FM 5-250, TMs 9-1375-200/2 and 9-1375-213-12, and TM 43-0002-series manuals.

11-32. Local EOD units can be contacted to provide technical assistance during hands-on training sessions and to assist in developing ED SOPs. The munitions unit commander must provide training munitions for all hands-on sessions. The STRAC manual provides the munitions allocations for demolitions training.

SUMMARY

11-33. The authority for ED, whether direct or delegated, must be identified in the appropriate OPLAN and SOP. The decision to destroy munitions is based on safety, logistical, and tactical considerations that may have implications beyond what appears to be an imminent enemy threat. ED operations should be considered as an option of last resort and should always receive planning and safety emphasis.