

A P P E N D I X E

S A F E T Y

This appendix discusses the three levels where safety awareness is most effective. The Army Safety Program and safety areas of concern, including the ammunition itself, explosives in general, and MHE are also discussed. Risk assessment and management are explored, and the various safety plans needed are presented. Finally, reports of malfunction are discussed.

SAFETY LEVELS

COMMAND

At all echelons, safety is a command responsibility. All commanders must take an active and aggressive leadership position toward safety. To this end, the commander must appoint a safety officer and organize a safety committee consisting of technical and supervisory personnel within the unit.

The safety officer must prepare a unit safety program and a safety field SOP that include the following:

- Safety committee activities and responsibilities.
- Safety training requirements and training schedule.
- Inspection procedures to detect safety violations and ensure that corrections are made.
- Proactive prevention and correction of unsafe conditions and practices,
- First-aid training requirements and training schedule.
- Safety education and promotion that keeps safety awareness levels high.
- Investigation of accidents to determine cause and corrective measures. (For example, determine the who, what, when, and how of an accident.)

The safety committee should review ASP operations for safety, formulate and recommend safety

rules, establish standards for safeguards, and outline methods for correcting violations during ammunition operations. The committee's recommendations are reviewed and adopted, where advisable, by the unit commander.

LEADER

Every soldier is a key to preventing accidents. Leaders ensure that soldiers perform duties safely. From first-line supervisors to middle- and upper-level managers, the leader must always stress safety. Keeping soldiers aware, ensuring that they are careful, halting unsafe operations, planning, and preparation are the proactive measures the leader takes to prevent accidents.

INDIVIDUAL

The key to a good safety program and the focus of the whole safety effort is to prevent individuals from having accidents. One of the greatest causes of accidents is an individual not doing something that should have been done. Usually, the individual thought it was more time consuming or too bothersome to go the extra step to ensure safety. If this one issue could be resolved, the Army would save hundreds of lives and millions of dollars. The prevention equation is simple: *Training + Equipment + Motivation + Execute with Caution = Safety*. A problem with any one of these elements can lead to an

accident. A problem with more than one of these elements often leads to disaster. The one who normally knows whether or not all elements are in the appropriate quantity is the individual.

UNIT SAFETY PROGRAM

The unit safety program is directed by AR 385-10 and DA Pamphlet 385-1. The program requires that unit safety personnel meet the following requirements:

- Be appointed in writing on orders.
- Be a commissioned officer at battalion and higher unit levels.
- Be in the rank of staff sergeant or higher at company level.
- Have completed, or will complete, a local unit safety officer course.
- Have one year or more retainability in the unit upon duty appointment.
- Give their safety officer duties proper priority.
- Report directly to the commander on safety-related matters.

The safety staff must also administer the unit safety program. This is accomplished by ensuring that practices and procedures that minimize accident risk, serious injury, or property loss are incorporated in directives, SOPs, LOIs, policy letters, and training plans.

Unit safety personnel perform required safety and accident prevention functions for the unit. AR 385-10 and DA Pamphlet 385-1 list these functions. Dependent on where a unit is located, or what its particular mission is, safety personnel may need to perform some or all of these functions. Part of the safety officer's initial assessment should be the suitability of these functions to the unit.

AREAS OF CONCERN

AMMUNITION AND EXPLOSIVES

Ammunition and explosives safety is covered by AR 385-64 and TM 9-1300-206. These two references prescribe the Army's general safety policies and standards for ammunition, explosives, liquid propellants, and related facilities and activities. Both references are based on DOD 5154.4-S.

These references cover the following:

- Responsibilities.
- Quantity-distance standards.
- Waiver authority and requests for waivers.
- Exemptions.
- Effects of explosions.
- Permissible exposures,
- Hazard classification.
- Compatibility groups.
- Personnel protection.
- Facilities construction and siting.
- Electrical standards
- Lightning protection.
- Fire fighting.
- Chemical-agent standards.
- Mishap reporting in relation to the storage, packing, shipping, maintenance, and destruction of ammunition and explosives.

Conventional ammunition unit commanders must ensure that all ammunition and explosives operations and activities are performed according to safety regulations, directives, and theater policy. Because of their destructive nature, ammunition and explosives demand constant safety awareness on the part of all personnel responsible for them, including the combat user. Carelessness, faulty equipment, hazardous working conditions, and unsafe practices may result in the loss of life, injury, or property damage. In wartime, these factors disrupt ammunition support. They could affect the success of a battle. After the battle of DS/S was over, the US lost more vehicles in one ammunition-related accident than it lost to enemy forces. This accident occurred when the ammunition and explosives in one vehicle ignited, and the resulting fire spread to adjacent vehicles that were parked too closely together. Many people were injured in the incident, and two soldiers were killed in the cleanup of the area afterwards.

The concern for the safety of personnel and property is paramount in Department of Defense (DOD) and DA safety regulations. These regulations prescribe universally applicable standards and practices. They require that safety programs be prepared and implemented to include fire plans (prevention, protection, and fighting), destruction plans, accident and incident control, and reporting plans. These regulations impose special safety requirements for high explosives, chemical agents, electro-explosive devices, and exposure to volatile liquids and corrosives.

Whenever and wherever ammunition and explosives are handled, stored, or moved, rigid enforcement of safety regulations and strict observance of safety practices are mandatory. The TA commander announces policies and, through the TAACOM and COSCOM, prescribes safety procedures for ammunition and explosives in the theater of operations.

General Hazards

Ammunition and explosives are relatively safe to handle as long as consideration is given to the characteristics of each type of munition or explosive involved, how it is assembled, the nature of the operation being performed, and normal safety precautions. Safety requirements for explosives and ammunition are in AR 385-64 and TM 9-1300-206, as are procedures to waive safety standards for ammunition and explosives.

Storage Hazards

Ammunition and explosives storage hazards include, but are not limited to, fire, explosion, fragmentation, and contamination. Fires in ammunition and explosives storage areas may be spread by hot fragments from one stack to another or by fire spreading along the ground through undergrowth, dry wood, and debris. Incompatible ammunition and explosives when stored together present another hazard. The appropriate WCTO quantity-distance and compatibility tables in AR 385-64 and TM 9-1300-206 must be used to determine those components that may be stored together and to make certain that safe distances are maintained between all Class V materiel in storage. In WCTO, and depending on the tactical situation, quantity-distance requirements should be followed to the greatest extent possible. Ammunition that contains DU requires special storage and handling procedures. Refer to AR 385-11 for additional information.

Transportation Hazards

In view of the hazards associated with traffic accidents or saboteur incidents, the commander of the shipping unit is responsible for ensuring safe transit. Local practices applicable to circumstances in the theater of operations are developed in unit field SOPs from the fundamentals prescribed in TM 9-1300-206. Special emphasis should be placed on safety precautions for night operations. BOE Tariff No. 6000, AR 55-355, and regulations of the host nations dictate the procedures to be followed when transporting hazardous ammunition. The governing regulations and publications for specific types of shipments follow.

Rail. TM 9-1300-206 and BOE Tariff No. 6000 cover safety precautions, loading, blocking and bracing, certification of railcars, spotting of loaded railcars, and inspection of railcars.

Vehicular. TM 9-1300-206 covers safety requirements, inspection criteria, and technical escort standards. This technical manual provides inspection criteria for WCTO. FM 55-60 covers the responsibilities of the shipper and the carrier.

Air. TM 9-1300-206, TM 38-250, and BOE Tariff No. 6000 cover safety precautions, aircraft specifications, operating standards, loading and unloading procedures, and special handling certification.

Water. TM 9-1300-206 and BOE Tariff No. 6000 cover technical information on water vessel shipments.

UNEXPLODED ORDNANCE

All soldiers must be able to recognize and then react to a UXO hazard. Reaction includes avoiding the UXO (if mission permits) and marking and reporting the hazard. If the UXO cannot be avoided, it may be necessary to take protective measures to reduce the risk to personnel and to minimize damage to equipment or facilities. All soldiers need to be trained on the above tasks to ensure that no soldier is exposed to any unacceptable risks.

The reporting of UXOs on the modern battlefield will require timely and accurate information. The UXO Spot Report starts with the soldier on the battlefield and moves through the chain of command to the unit CP. It then passes through operational channels until it reaches the DISCOM, the CSG, or the area support group (ASG). These commands task the assets needed to respond to the UXO. The report initiated by the soldier who finds the UXO supplies the necessary information to task UXO response resources and to prioritize the UXO response. The format for this report (a logic tree), safety considerations, guidance on protective measures, and drawings of various ordnance may be found on GTA 9-12-1. Additional UXO guidance will be in FM 21-16 when it is published in fiscal year 1994.

EQUIPMENT

Electrical

Electrical equipment is a safety hazard by its very nature. Many explosive devices are sensitive to electricity. When using electrical equipment, soldiers must follow operating instructions exactly. Electrically powered equipment should never be used where prohibited. To prevent electrical sparking, all electrical switches, sockets, plugs, and outlets should be of the standard explosion-proof type.

Grounding dissipates accumulated electrical charges. Sandy soil should be made wet and the ground stake driven further into the ground for a better ground. Charges of static electricity can accumulate on a person and on explosive materiel. Black powder is especially sensitive to static charges. Static electricity is also considered a serious hazard to certain exposed explosives, dust-and-air mixtures, flammable vapor-and-air mixtures, and electrically actuated devices. In these circumstances, electrical equipment must not be used. TM 9-1300-206, Appendix B, and TB 385-4 give guidance on the wear, use, and testing of conductive and spark-proof footwear.

Ammunition Tools and Equipment

A wide variety of tools and equipment is used in ammunition maintenance, care, and preservation, as well as in storage operations. These range from simple hand tools, such as hammers and screwdrivers, to specialized hand tools, such as banding equipment. They may also be sophisticated machine tools that are manufactured for the sole purpose of maintaining ammunition. These tools are called APE. All APE is listed in TM 43-0001-47.

Although standard hand tools are widely used by ammunition personnel, there is a special category of hand tools that is manufactured from nonsparking materials. These tools are to be used when working with or near exposed explosives. They are made of such materials as bronze, lead, beryllium, K-monel, or polymers. Specialized materials, such as copper wool (instead of flammable steel wool) and nonflammable solvents, are often used with nonsparking tools. Such hand tools should be used for repair work in buildings that may contain exposed explosives or hazardous concentrations of flammable gases or vapors. Hand tools and other implements used in the vicinity of hazardous materials must be handled carefully and kept clean. When iron or steel hand tools are required,

the immediate area should be free of explosives and other highly combustible materials.

Ammunition tools and equipment are designed to be safe when operated in a prescribed manner and when properly maintained. The problems associated with tools and equipment used in the maintenance of ammunition are usually the result of operator misuse or error. All training programs must stress instruction on the proper use and maintenance of tools. Supervisors must continuously inspect the condition of tools and equipment and ensure that spot corrections are made.

Materials Handling Equipment and Lifting Devices

MHE is equipment that helps personnel store, handle, and ship ammunition. Included are forklift trucks, towing tractors, cranes, pallet jacks, platform trucks, and conveyor systems. Forklift trucks and cranes are the most common MHE used in ammunition units. Forklift trucks range from the 4,000-pound warehouse model to the 6,000-pound rough-terrain, variable-reach forklift that is standard TOE issue in all ammunition units. Cranes vary in size from the standard 7.5-ton model used in DS units to the 65-ton model used in GS units.

Due to the limited field of vision of the operator (even more limited when the MHE is moving a load), there is one very important safety precaution to take when working around or with forklift trucks and cranes. That precaution is that the MHE should never be operated without ground guides and seat belts. Also, persons other than ground guides should assume that the operator cannot see them and should stay out of the area where the MHE is operating. Forklifts require one ground guide and cranes require two. Personnel shortages have prompted supervisors and crew chiefs to violate this rule, often a disastrous mistake.

Size and load limits for MHE must be established and enforced, and operators must be aware of the danger and responsibility involved. The following basic rules should be observed:

- Keep hazardous material moving uniformly through the process steps.
- Minimize rehandling.
- Eliminate heavy manual lifting.
- Reduce transportation distances whenever possible.
- Provide special handling equipment where practicable.

Pallet jacks and conveyors present special hazards to all personnel. Pallet jacks must be handled with care. Inexperienced personnel may not realize how hard it is to stop a moving pallet jack when it is loaded with a 1-ton pallet. Conveyors are a danger because they may have heavy ammunition boxes moving rapidly along them. Because of a shortage of stands (supports), personnel may mistakenly use ammunition boxes as substitute stands. Boxes should not be used because they are unstable and might overturn.

A lifting device is any device or component used to raise, lower, hold, position, or pull a load from one location to another. Examples are forklift trucks, cranes, and manual and motorized pallet jacks. Every lifting device has a load rating. The load rating is the maximum authorized load that a particular lifting device is allowed to lift. The load rating is established through local testing. However, it must not exceed the manufacturer's rated load.

The manufacturer's rated load is the maximum load that a piece of equipment or its accessories is allowed to lift. The manufacturer's rated load is shown on the equipment capacity data plate or is stated in the operating instructions. An inspection is performed by maintenance personnel after initial receipt to ensure that the MHE has applicable load instructions. Refer to TB 43-0142 for further information.

Requirements of the Occupational Safety and Health Act (OSHA) of 1970 govern inspecting and testing of lifting devices. These requirements apply to HQ DA and to major commands, subordinate commands, installations, and other activities that report directly to HQ DA. For detailed guidance on the OSHA, refer to TB 43-0142.

Operator monitoring is essential for correct lifting-device use. The equipment operator, in conjunction with the safety officer, must ensure the following:

- Operator selection and training programs are effective. Operators must be carefully selected, thoroughly trained, and tested before they are permitted to operate powered MHE under actual working conditions.
- A maintenance inspection or testing program is conducted on all lifting devices. All MHE are inspected daily. Lifting devices are inspected prior to use.
- Lifting devices that fail inspections and appropriate tests are removed from service immediately.

- Load tests are performed after disassembly, overhaul, or replacement of any part of the load-bearing system. These tests must be performed before the system is returned to service.

The chief of the organization responsible for inspection, test, and maintenance must ensure that only qualified personnel are assigned to inspect, test, and maintain lifting devices. Historical records for each item should be initiated and maintained properly. Tests are scheduled using DD Form 314 or DA Form 2409, or facsimile-formatted paper documents. If automatic data processing services are available, the records may be automated. Historical records include the following information:

- Nomenclature.
- Identifying markings.
- Acceptance certification (test operators and test directors sign appropriate spaces on forms).
- Location.
- Schedule for, and record of, periodic inspections.
- Schedule for tests and record of results.
- Schedule for maintenance services.
- Record of parts replaced.
- Any additional identification or safe operation data.

A marking system according to AR 746-1 and this manual should be established for all equipment. The load rating and the date of the next test should be stenciled on the equipment or put on tags and attached to the crane boom and to the basic unit. Hoists, chains, slings, and hooks must be marked or a tag attached to show the item identification number, load rating, and the next periodic inspection or test date. A-frames, shop-floor cranes, hoist beams, jacks, and safety stands must be stenciled or have a tag attached with the load rating and the date of the next inspection. Forklifts must be stenciled or have a tag attached on the side of the mast, to the operator's left, with the load rating and the date of the next periodic inspection. Under no circumstances may these markings or tags be painted over or removed except for maintenance, testing, or to change the equipment's rated load. In these instances, the item must be retagged or restenciled.

A maintenance inspection or test should be performed when the equipment is received and at prescribed intervals thereafter. Preventive maintenance should be scheduled and performed according to pertinent technical publications. Test loads for all types of cranes and hoists are made using weights that

may be built locally, by using a calibrated load indicator, a dynamometer, or any available item of the proper weight. All load-testing devices must have a valid calibration label displayed in a conspicuous place. Attachments, such as slings, chains, and spreader bars, may be tested together. Test loads for forklift trucks are made using pallet loads that correspond to the manufacturer's rated load data and supplemented by factors stated in the operator's manual for the vehicle.

Protective Clothing

Individual protective clothing and equipment should be used as appropriate to enhance safe operations. Safety equipment must be in good working order. The user should understand how to use and maintain it. Maintenance of safety equipment, in addition to ensuring proper functioning and use, prolongs the useful life of the equipment and of the user. For further information on the use and availability of protective clothing and equipment, refer to DA Pamphlet 385-3 and AR 385-10.

MAINTENANCE OPERATIONS

Protection from lightning is an essential part of ammunition maintenance operations. Lightning rods are easy to construct in the field. Refer to TM 9-1300-206. They should be inspected visually semiannually. The system should be tested annually according to TM 9-1300-206.

Other hazards associated with ammunition maintenance include high-pressure air, vapors, and toxic fumes. While high-pressure air is not particularly dangerous to ammunition, using high-pressure air can cause an explosion. To prevent this, refer to the appropriate operator's manual. Vapors and toxic fumes are hazardous if there is not enough ventilation.

RISK ASSESSMENT AND MANAGEMENT

Personnel responsible for ammunition must be reminded continually that their safety, as well as that of others, depends upon the care they use in performing their assigned duties. They must ensure the following:

- The minimum number of personnel are exposed for the minimum amount of time to the smallest quantities of explosives consistent with safety and efficiency.

- Only required personnel work on an operation.
- Safety precautions are observed and enforced rigorously.
- Careless workers are disciplined and careful workers are rewarded.
- No unauthorized operations are performed.
- All operations are supervised properly.
- Tasks not necessary to an explosive operation are not performed within the immediate vicinity of the hazard.
- Unnecessary personnel are prohibited from visiting the operation.
- Where it is essential to perform concurrent operations in a single building or field site, the layout of operations is planned to separate dissimilar operations to prevent propagation of fire or explosion. Such operations shall be protected by dividing walls, barricades, or other means to minimize personnel exposure.

To ensure a safe operation, individuals must be properly trained before being assigned to a particular task. Periodic training sessions and briefings by the commander or the supervisor are effective methods of keeping the safety awareness level high,

Safety education and training must include those individuals of outside organizations who support the ammunition unit. For example, truck drivers of a supporting transportation unit, terminal service unit personnel, crews of aircraft and of water vessels, and the combat user should all be included in the safety training program. Coordinating the unit's safety training with supported and supporting units should enhance safe operations and mission accomplishment as well. The external safety SOP prepared by the ammunition unit should be provided to these units. Refer to AR 385-40 for accident reporting procedures.

REPORTS OF AMMUNITION AND EXPLOSIVE MALFUNCTIONS

A malfunction is the failure of an ammunition item to function as expected when fired, launched, tactically employed, or subjected to functional tests. Malfunctions include abnormal or premature functioning of explosive ammunition items when normally handled, maintained, stored, transported, and tactically deployed. Malfunctions do not include accidents or incidents resulting from negligence, malpractice, vehicular accidents, fires, and so on.

When there is a malfunction, that lot of ammunition is suspended for use (based on METT-T). The

commander of the using unit immediately reports all available facts to the ammunition officer of the issuing unit. At the same time, immediate action is taken to ensure that all of the remaining rounds and any fragments or residue from the malfunctioning round are kept until disposition is indicated by the investigating officer. This may not be required if, in the opinion of the local officer, the preservation or shipment of such materiel could endanger life or property. All ammunition malfunctions are investigated, and preliminary as well as detailed written reports are submitted according to AR 75-1.

FIRE PLAN

Each installation, activity, or field storage area storing or handling ammunition must have an effective safety program to help prevent and fight fires. Considerable attention must be given to fire hazards when establishing an ammunition storage site. Vegetation control is critical in reducing fire hazards. Smoking areas must be controlled. Flame-producing devices or matches are prohibited around or near ammunition and explosive operations, including explosive-laden vehicles. There must be an up-to-date fire plan for each ammunition storage area. The commander appoints a qualified fire marshal who administers the program. The fire marshal also reviews all plans and SOPs for the placement of equipment in field storage sites, changes of work processes, and the detection and correction of fire hazards before ammunition operations are conducted.

A detailed fire plan must be prepared. The overall plan should describe the emergency function of each section, activity, or supporting outside agency. The details of the plan may vary to suit the individual installation or field activity. The plan should also specify responsible personnel and the organization of fire-fighting teams, to include team members, team alternates, equipment, and fire-fighting training requirements. The responsibilities of everyone concerned should be described. At least the following procedures or methods should be included in the fire plan:

- Procedures for reporting a fire.
- Procedures for an orderly evacuation of nonessential personnel.
- Procedures to tell nearby commands of the impending danger.
- Methods for extinguishing or controlling the fire.

Every attempt must be made to control or contain a fire to prevent the loss of ammunition. Although fire

fighting is the responsibility of engineers, unit personnel must be trained to act quickly and to extinguish and/or control the fire. Instructions to supervisors and personnel should include steps that increase fire safety. Each person in a supervisory position should be thoroughly familiar with the fire hazards associated with an operation. Instructions to personnel working in the storage site must include the proper manner of giving the alarm. They must also be familiar with methods used to extinguish ammunition fires.

A detailed map showing the types of ammunition stored at different locations and any specific hazards associated with the ammunition should also be prepared. Copies of this map should be made available to supporting fire-fighting personnel when they arrive at the ammunition storage site. If the tactical situation allows, all storage locations should be marked with the appropriate fire symbol. See TM 9-1300-206 for further guidance on fire safety requirements (such as symbols).

ACCIDENT/INCIDENT CONTROL PLAN

Each activity handling or storing ammunition must develop plans for controlling accidents and incidents. These plans are part of the command accident/incident control plan. The accident/incident control plan includes procedures for reporting accidents, getting assistance from other emergency forces, and supporting other military and civilian agencies in the area. The plan also provides training plans so that the personnel assigned to the teams remain proficient in individual and team duties. Such training includes simulated emergency exercises to maintain team efficiency and readiness. The accident/incident control plan provides for the following:

- Establishment of emergency technical escorts.
- Radiation controls.
- Munitions safety control.
- Disarmament.
- Fire fighting.
- Decontamination teams within the organization.

In addition to the safety hazards associated with the ammunition items in storage, protection from the elements and physical security must be considered. Items must also be stored where they are easily accessible to ship, issue, and move.

