

**TRAINING SUPPORT PACKAGE (TSP)**

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**TSP Number/Title** 55B40C03 Plan Munitions Storage Operations

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**Task Number(s)/ Title(s)** Plan Munitions Storage Operations

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**Effective Date** 21 August 1998

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**Supersedes TSP(s)** MP-04/C 645-55B40 and MP-05/C 645-55B40

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**TSP User** USAOMMCS, Redstone Arsenal, Alabama and Accredited Ordnance TASS Battalion

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**Proponent** US Army Ordnance Missile and Munitions Center and School, Munitions Training Department, Redstone Arsenal, AL 38597-6970

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**Foreign Disclosure Restrictions** If Allied students are scheduled to attend this class, coordination with Security Division (ATSK-AS) is required to determine if the information can be released to Allied students.

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## Preface

### Purpose

This training support package provides the instructor with a standardized lesson plan for presenting instruction for:

LESSON TITLE:	Plan Munitions Storage Operations
CONDITIONS:	In a classroom environment given: Catalog Data Stockage Objective Appropriate SOP DA PAM 385-64 TM 9-1300-206 FM 9-13 FM 9-6 A Calculator
STANDARDS:	Plan munitions storage operations without violation of explosive safety standards or environmental guidelines.

### This TSP Contains

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(21 August 1998)

**SECTION I. ADMINISTRATIVE DATA**


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<b>All Courses Including this Lesson</b>	<u>COURSE NUMBER(S)</u>	<u>COURSE TITLE(S)</u>
	645-55B40	Ammunition Specialist, ANCOC

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<b>Task(s) Taught or Supported</b>	<u>TASK NUMBER</u>	<u>TASK TITLE</u>
		Plan Munitions Storage Operations

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<b>Reinforced Task(s)</b>	<u>TASK NUMBER</u>	<u>TASK TITLE</u>
	None	

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**Academic Hours**      The academic hours required to teach this lesson are as follows:

	ADT <u>HOURS/METHOD</u>
Conference	1.0 / CO
Practical Exercise	4.0 / PE2
<hr/>	
Total hours	5.0

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<b>Test Lesson Number</b>		<u>Hours</u>	<u>Lesson No.</u>
	Testing:	2.0 TE2	55B40C07
	Review of test results:	1.0 CO	55B40C08

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<b>Prerequisite Lesson(s)</b>	<u>LESSON NUMBER</u> 55B40C01  55B40C02	<u>LESSON TITLE</u> Ammunition/Explosive Storage Standards Inspect Munitions Storage Facilities
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**Clearance and Access**      Unclassified - If Allied students are scheduled to attend this class, coordination with Security Division (ATSK-AS) is required to determine if the information can be released to Allied students.

**References Required.**

<u>Number</u>	<u>Title</u>	<u>Date</u>	<u>Additional Information</u>
TM 9-1300-206	Ammunition and Explosives Standards	30 AUG 73	with changes 1-10
DA PAM 385-64	Ammunition and Explosives Safety Standards	Draft	
FM 9-6	Munitions Support In the Theater of Operations	20 MAR 98	
FM 9-13	Ammunition Handbook	4 NOV 86	

**Related**      None

**Student Study Assignments**      None

**Instructor Requirements**      One instructor

**Additional Support Personnel Requirements**      None

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**Equipment Required** Overhead Projector

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**Materials Required** INSTRUCTOR MATERIALS: References listed above, Viewgraphs 55B40C03 VG#01 - VG#17

STUDENT MATERIALS: TM 9-1300-206, FM 9-13, FM 9-6, DA PAM 385-64, appropriate SOP, catalog data, stockage objective, and a calculator

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**Classroom, Training Area, and Range Requirements** One 30-person classroom

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**Ammunition Requirements** None

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**Instructional Guidance** Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

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**Proponent Lesson Plan Approvals**

<u>Name</u>	<u>Rank</u>	<u>Position</u>	<u>Date</u>
_____			
_____			
_____			
_____			
_____			
_____			

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**SECTION II. INTRODUCTION**

Method of instruction: CO  
 Instructor-to-student ratio: 1:12  
 Time of instruction: 0.1 hour

**Motivator** Good morning/afternoon, class. I am \_\_\_\_\_. I will be your primary instructor for this lesson. As an ammunition specialist, the requirement for relocating munitions from one storage location to another will arise. Some situations which establish a requirement for relocating munitions are results of an explosive safety survey, convenience of issue, maintenance of storage facilities, and changes to the explosive standards requirements.

**Terminal Learning Objective** Note: Inform the students of the following terminal learning objective requirements.  
 At the completion of this lesson, you (the student) will:

<b>ACTION:</b>	Plan Munitions Storage Operations
<b>CONDITIONS:</b>	In a classroom environment given: Catalog Data Stockage Objective Appropriate SOP DA PAM 385-64 TM 9-1300-206 FM 9-13 FM 9-6 A Calculator
<b>STANDARD:</b>	Plan munitions storage operations without violation of explosive safety standards or environmental guidelines.

**Safety Requirements** None

**Risk Assessment Level** Low

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**Environmental Considerations**    None

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**Evaluation**    On a mid-annex written examination, the student must score a minimum of 70 percent to achieve a GO.

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**NOTE:**    **Show VG01 (Title Slide).**

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**Instructional Lead-in**    This class is designed to provide you with the knowledge necessary to plan munitions storage operations.

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## SECTION III. PRESENTATION

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**Note:** Show VG02 (Enabling Learning Objectives).

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**Note:** Inform the students of the Enabling Learning Objective requirements:

ELO 1: Verify Storage Plan

ELO 2: Determine Quantity Distance Class and Division

ELO 3: Determine Quantity Distance Storage Requirements

ELO 4: Identify Types of Storage Facilities To Be Used

ELO 5: Determine Barricade Requirements

ELO 6: Determine NEW, NEQ, Or Gross Tonnage Limits

ELO 7: Determine Requirements For Waivers Or Exemptions

Inform students that you will review the process and/or requirements of each enabling objective, and that they will perform a practical exercise at the end of the lesson.

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**Note:** Show VG03 (ELO 1).

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**A.** ENABLING LEARNING OBJECTIVE A

Action: Verify storage plan.

Condition: In a classroom environment, given catalog data, stockage objective, appropriate SOP, DA PAM 385-64, TM 9-1300-206, FM 9-13, FM 9-6, and a calculator.

Standard: Verify storage plan meets all storage requirements.

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1. Learning Step/Activity 1: Describe the requirements for verifying a storage plan. (Reference FM 9-13, Chapter 2)

Method of instruction: CO

Instructor-to-student ratio: 1:12

Time of instruction: 0.1 hours

Media: Viewgraphs

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**Note:** Show VG04 (Storage Plan Requirements).

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**Storage Plan.** Ensure the storage plan agrees with the area layout plan. Use the following checklist to ensure the following areas were considered and implemented as appropriate in the storage plan.

- What is the maximum tonnage expected to be in each storage category?
- What are the expected average daily receipts and issues?
- What is the time available before the first shipments of munitions arrive?
- What is the expected lifetime of the ASP?
- What is the system of storage that will be used?
- What are the physical characteristics of the terrain that can be used as natural barricades, or that deny or restrict using certain areas?
- What natural cover and concealment are there?
- What engineer construction and other required support is available and necessary?
- What are the area security problems and requirements?
- What are the special security requirements needed for classified munitions?
- What section, FSU, and stack numbering sequences are needed to be sure placement and retrieval of stocks is fast and accurate?
- Are all storage areas clearly marked?
- Are signs posted showing traffic direction, entrances, and exits?
- Has a map of the storage area been produced?

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**Note:** Show VG05 (ELO 2).

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**B.** ENABLING LEARNING OBJECTIVE B

Action: Determine quantity-distance class and division.

Condition: In a classroom environment, given catalog data, stockage objective, appropriate SOP, DA PAM 385-64, TM 9-1300-206, FM 9-13, FM 9-6, and a calculator.

Standard: Determine quantity-distance class and division without error.

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**1.** Learning Step/Activity 1: Review the requirements for determining quantity-distances class and division. (Reference TM 9-1300-206, chapter 5)

Method of instruction: CO

Instructor-to-student ratio: 1:12

Time of instruction: 0.1 hours

Media: Viewgraphs

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**Note:** Refer students to TM 9-1300-206 pages 5-16 through 5-37. Remind students that the details on how to use the tables in Chapter 5 were discussed in detail in Lesson C01.

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**Quantity-Distance Class and Division.** The hazard classification system is based upon the system recommended for international use by the United Nations Organization (UNO), which consists of nine classes for dangerous goods, with munitions and explosives included in UNO Class 1, Explosives.

- (1) Munitions without explosive components which contain toxic chemical agents and containers of toxic chemical agents in bulk are included in UNO Class 6, Poisonous (Toxic) and Infectious Substances.
- (2) The munitions and explosives hazard classes are further subdivided into divisions based on the character and predominance of the associated hazards and of the potential for causing personnel casualties or property damage, not upon compatibility groups or intended use.
- (3) Fragment distance category numbers are used for some items of Class 1, Divisions 1, 2, and 3 as shown in Table 5-2, page 5-17, column 2.

- (4) The list of items for each division are contained in Tables 5-3 through 5-16, TM 9-1300-206, and contain examples of the type of product in that division.

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**Note:** Inform students that the tables do not enumerate all articles which may be included in the division.

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**Note:** **Show VG06 (ELO 3).**

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**C.** ENABLING LEARNING OBJECTIVE C

Action: Determine quantity-distance storage requirements.

Condition: In a classroom environment, given catalog data, stockage objective, appropriate SOP, DA PAM 385-64, TM 9-1300-206, FM 9-13, FM 9-6, and a calculator.

Standard: Determine quantity-distance storage requirements without error.

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- 1.** Learning Step/Activity 1: Review the requirements for determining quantity-distance storage requirements. (Reference TM 9-1300-206 paragraph 5-3)

Method of instruction: CO

Instructor-to-student ratio: 1:12

Time of instruction: 0.1 hours

Media: Viewgraphs

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**Note:** **Show VG07 (Q-D Distances).**

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- a. Measuring Distance.** Measure the distance to or from the outside of the nearest wall of the structure or room containing explosives. When a structure is subdivided so that mass detonation between compartments will not occur, measure from the outside of the nearest wall of the compartment containing the greatest explosives hazard. Measurements for open storage, such as modules and revetments, are made from stack face to stack face. (Reference DA PAM 385-64, paragraph 5-3)

- (1) Whether explosives are outdoors or on a vehicle parked in the open, distances are measured to the explosives. In protective shelters, distances are measured from the external wall of the shelter or stall containing the explosives or explosives-loaded vehicle. Distances are measured from the center of large missiles, launchers, or launch pads.

- (2) Measure to the nearest point of a non-explosive location, building, vehicle, aircraft, or taxiway.
  - (3) Measure to the centerline of the runway or the runway extended to the limit of the “explosives prohibited zone” (approach departure zone).
  - (4) Measure to the nearest edge of open recreational areas. For golf courses, measure to the nearest edge of the tee or green or to the centerline of the fairway.
  - (5) Distances are expressed in feet or meters as applicable and measured along a straight line. Exception: When measuring distances for the purpose of providing blast protection from 1.1 materials, large intervening hills may be taken into account. Measure distance over or around the hill, whichever is shorter. This exception applies only for 1.1 blast protection purposes and not to 1.1 and 1.2 fragment hazards nor to 1.3 and 1.4 fire hazards. Consideration of intervening hills to reduce distances to protect from fragment or fire hazards must be supported by analysis.
- b. Inhabited Building Distance (IBD).** Inhabited building distance is the minimum permissible distance between an inhabited building and a munitions or explosives location. Inhabited building distances are also used between explosives locations and administration areas, between adjacent operating lines, and between explosives locations and other exposures within an establishment. IBD distances are found in Table 5-4, TM 9-1300-206.
- c. Public Traffic Route Distance.** This distance is the minimum permitted between a public traffic route and an explosives hazard. The distance at which motor vehicles or rail cars are considered safe from the blast effects of explosions has been fixed at 60 percent of the IBD.
- (1) The use of lesser distances is based on the smaller height and area of motor vehicles and rail cars exposed to blast.
  - (2) For public traffic routes, the fragment distance minimum for Classes 1.1 and 1.3 may be reduced to 60 percent of the minimum fragment distance which is appropriate for the explosion source under consideration. However, in no case may a public traffic route distance be used that is less than that required by the applicable Class 1.1 or 1.3 quantity-distance table.
- d. Intraline Distance.** This distance is the minimum permitted between any two buildings with one operating line except for separate facilities servicing a single explosives operating building which may be located at less than intraline distances.
- (1) Intraline distances are also used for separating certain specified areas, buildings, and locations even though actual line operations are not involved. All unpackaged munitions and explosives except Classes 1.3 and 1.4 in such a line are considered Class 1.1.

(2) Intraline distance is expected to protect buildings from propagation of explosion due to blast effects and substantially protect against propagation due to missiles if properly designed barricades are used for unbarricaded intraline distance.

**e. Magazine Distance.** This distance is the minimum permitted between any two storage magazines. Distance required is determined by the type(s) of magazine and also the type and the quantity of munitions or explosives stored therein. Magazine distance is also used for certain quantity-distance computations where other than two magazines are involved.

**f. Fragment Distance.** The fragment distance for a particular munitions/explosives item is based on the range to which a hazardous fragment density may be created by an explosion of the particular item involved. A hazardous fragment is one having an impact energy of at least 58 foot-pounds, and a hazardous fragmented density is constituted by at least one hazardous fragment impacting in an area of 600 square feet or less. Fragment distances do not indicate the maximum range to which fragments may be projected.

(1) Fragment distances applicable to Class/Division 1.1 through 1.3 are indicated by a numerical figure in parentheses placed to the left of the class/division designators such as (18) 1.1, (08) 1.2, and (06) 1.3, when required. This number is used to indicate the fragment distance in hundreds of feet.

(2) A minimum distance number shall be used for all items in Class 1.2, as shown in Tables 5-10 through 5-13, TM 9-1300-206.

(3) Table 5-8, TM 9-1300-206 lists nine munitions for which special detailed fragment studies have been made. For these nine items, the application of Class 1.1 distance for protection against blast effects is only permitted for amounts of high explosive which require distances greater than those specified for 10 of the units (column 5) in the table for protection against fragment hazards.

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**Note:** Inform the students that specific quantity-distance computations are contained in pages 66-188, Chapter 5, DA PAM 385-64.

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**Note:** Show VG08 (ELO 4).

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**D.** ENABLING LEARNING OBJECTIVE D

Action: Identify types of storage facilities to be used.

Condition: In a classroom environment, given catalog data, stockage objective, appropriate SOP, DA PAM 385-64, TM 9-1300-206, FM 9-13, FM 9-6, and a calculator.

Standard: Correctly identifies all required storage facilities.

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**1.** Learning Step/Activity 1: Review the types of storage facilities.  
(Reference TM 9-1300-206, paragraph 4-3c)

Method of instruction: CO

Instructor-to-student ratio: 1:12

Time of instruction: 0.1 hours

Media: Viewgraphs

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**Note:** Show VG09 (Storage Facilities).

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- a. Storage Facilities.** Explosives and munitions should be stored in buildings designed, designated, and isolated for that specific purpose. When specially constructed magazines are not available, the buildings used must afford suitable protection against moisture and excessive changes in temperature. They must also have means for adequate approved materials.
- b. Magazines.** The following types of magazines are used for storage of munitions and explosives:
- (1) **Earth-Covered Magazines.** This group includes igloo, steel-arch type, hillside, and subsurface type magazines. Earth-covered magazines are preferred for the storage of all munitions and explosives which require special protection for reason of explosive and/or security.
  - (2) **Standard Ammunition Magazines (commonly called “standard magazines”), classified as above-ground magazines.** These magazines were designed for the storage of fixed rounds or separate loading projectiles. For future use, they should be restricted to the storage of Classes (04) 1.2, (08) 1.2, (12) 1.2, 1.3, and 1.4 materials (excluding rockets and rocket motors). The storage capacity of the magazine is not stated in definite figures since the number of items which can be stored is regulated by the appropriate quantity-distance tables.

- (3) **High Explosives and Black Powder Magazines, classified as above-ground magazines.** These magazines were designed for the storage of bulk explosives, such as black powder, TNT, Tetryl, and Explosive D, and may be used for this purpose when more desirable storage space cannot be obtained. The magazines were originally designed for the storage of 250,000 pounds of explosives, but by virtue of aisle space for inspection and shipping and convenient height of piles, the amount of storage is usually limited to approximately 100,000 pounds.
- (4) **Prime and Fuze Type Magazines, classified as above-ground magazines.** These magazines were designated for storing primers, primer detonators, adapters and boosters, and fuzes of all types. In the future, when it is necessary to use magazines of this type, they should be restricted to the storage of Class (04) 1.2, 1.3 (except rockets and rocket motors), and 1.4 munitions and explosives.
- (5) **Service Magazines and Service Storage Buildings.** These buildings are used for intermediate storage of the minimum amount of explosives necessary for safe and efficient processing operations.
- c. **Outdoor Storage Sites.** Outdoor storage of munitions is neither desirable nor recommended and should be utilized only as an emergency expedient. Pilferable items should not be stored in outdoor sites, but should be afforded inside storage in locked magazines whenever possible.

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**Note:** Show VG10 (ELO 5).

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**E.** ENABLING LEARNING OBJECTIVE E

Action: Determine barricade requirements.

Condition: In a classroom environment, given catalog data, stockage objective, appropriate SOP, DA PAM 385-64, TM 9-1300-206, FM 9-13, FM 9-6, and a calculator.

Standard: Identifies all barricade requirements without error.

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1. Learning Step/Activity 1: Review barricade requirements.  
(Reference TM 9-1330-206, page 5-10.16, paragraphs 5-5 and 5-6)

Method of instruction: CO

Instructor-to-student ratio: 1:12

Time of instruction: 0.1 hours

Media: Viewgraphs

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**Note:** **Show VG11 (Barricades).**

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- a. Barricades.** Properly constructed separate artificial or substantial natural barricades are an effective means for protecting structures or operations.
- (1) Barricades shall not be used to reduce distances for fire hazard materials such as Class 1.3 propellants and fragment-producing items such as Class 1.2 munitions.
  - (2) Protection is considered effective when a line drawn from the top of any side wall of the explosives building to all parts of the other location to be protected will pass through the intervening barricade.
  - (3) For railroads and highways to be considered barricaded, such a line must pass 12 feet above the center of the highway or railroad.
  - (4) A barricade must be separated from both the building it is to screen and the building containing the hazard. The nearest toe of the barricade must be not less than 4 nor more than 40 feet from the building except in the case of igloo-type magazines. The separation should be as near to the 4 foot minimum as practicable. Although it is permissible to locate a barricade adjacent to either the building to be protected or the building containing the hazard, the former is recommended.
  - (5) Barricades may be natural or artificial earth mounds having natural sloping sides, or an earth mound of a minimum width of 3 feet at the top and having a natural slope on one side. Single riveted barricades are preferred. Barricades in excess of 20 feet in height will have a minimum width of not less than 5 feet at the top. The earth fill or artificial barricades should contain not more than 15 percent stone or gravel, all of which should pass through a 1-inch screen. The reverted sides of barricades may be concrete, masonry, or timber walls.
  - (6) Existing double reverted artificial barricades of a minimum width of 3 feet at the top with sides sloped, and with proper anchorage to give stability against overturning forces are approved for reducing quantity-distance requirements for a maximum of 50,000 pounds of high explosives. For quantities in excess of 50,000 pounds, natural or single-reverted barricades as described above are the only types approved, the one exception being the barricade incorporated in the design of existing ammonium nitrate graining buildings.

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**Note:** **Show VG12 (Barricade Requirements).**

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**b. Barricade Requirements.** Properly constructed separate artificial barricades or undisturbed natural earth are an effective means of protecting munitions and explosives, structures, or operations against high-velocity, low-angle fragments, although the barricades may be destroyed in the process. Since such fragments do not move along perfectly linear trajectories, reasonable margins in barricade height and length must be provided beyond the minimum dimensions which block lines of sight. Barricades also provide limited protection against blast in the immediate vicinity. They do not provide any protection against high angle fragments and are ineffective in reducing the blast pressure in the far-field area (inhabited building or public traffic route distance).

(1) Requirements. Protection is considered effective when barricades meet the following minimum requirements:

(a) The slope of the barricade shall not be steeper than 1 ½ to 1; 2 to 1 is preferred. The crest of the barricade shall be at least 3 feet wide and higher than the top of the stack of stored munitions.

(b) Earth barricades shall be made of material as indicated in Section c below.

(c) The height and length of the barricade shall be determined as follows:

1 **Height.** Establish a reference point at the top of the far edge (i.e., the edge remote from the barricade under consideration) of one of the two stacks under consideration between which the barricade is to be constructed. This reference point, if the tops of the stacks are not at the same elevation, shall be on the stack whose top is at the lower elevation. Draw a line from the reference point to the highest point of the other stack. Draw a second line from the reference point forming an angle of 2 degrees above the line.

2 **Length.** The barricade length is determined by extending the barricade 3 feet, exclusive of the end slope, beyond a line between the extremes of the two stacks of munitions or buildings to be protected.

(d) Earth barricades meeting the above requirements may be modified by substituting a retaining wall, preferably of concrete, for the slope on one side. The remaining side shall be of such slope and thickness as necessary to assure that the width of earth required for the top is held firmly in place.

(e) Other intervening barriers meeting the requirements of this paragraph and as proven by test may also be used; e.g., earth-filled steel bin barricades for explosives loaded aircraft.

- c. Earth Cover for Magazines.** Material for earth-covered magazines shall be reasonably cohesive and free from deleterious organic matter, trash, debris, and stones heavier than 10 pounds or larger than 6 inches in diameter. The larger stones should be predominantly limited to the lower cent of fills and, to the extent practicable, restricted from earth-covered magazines. Compaction and surface preparation shall be provided as necessary to maintain structural integrity and avoid erosion.
- (1) Solid or wet clay and similar types of soil should not be used as they are too cohesive.
  - (2) Where it is impossible to use a cohesive material (for example in sandy soil), the barricade or the earth cover over magazines should be finished with a suitable material to ensure structural integrity.
  - (3) The minimum depth of earth cover to be maintained over magazines shall not be less than 2 feet.

**Note:** Show VG13 (ELO 6).

**F. ENABLING LEARNING OBJECTIVE F**

- Action: Determine NEW, NEQ, or gross tonnage limits.
- Condition: In a classroom environment, given catalog data, stockage objective, appropriate SOP, DA PAM 385-64, TM 9-1300-206, FM 9-13, FM 9-6, and a calculator.
- Standard: Determines NEW, NEQ, or gross tonnage limits without error.

- 1.** Learning Step/Activity 1: Review NEW, NEQ, and gross tonnage requirements. (Reference DA PAM 385-64 paragraph 5-2)

Method of instruction: CO  
 Instructor-to-student ratio: 1:12  
 Time of instruction: 0.1 hours  
 Media: Viewgraphs

**Note:** Show VG14 (Quantity of Explosives).

**New.** The total NEW of munitions in a magazine, operating building, or other facility shall be calculated from the NEW listed in the Joint Hazard Classification System (JHCS) listing, or other similar listing approved by the MACOM. The JHCS microfiche is the preferred source and the recognized authority when data varies between sources.

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**Note:** Refer students to the DOD Consolidated Catalog and discuss how to determine NEW/NEQ from the information found in the consolidated catalog.

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**Note:** **Show VG15 (ELO 7).**

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**G.** ENABLING LEARNING OBJECTIVE G

Action: Determine requirements for waivers or exemptions.

Condition: In a classroom environment, given catalog data, stockage objective, appropriate SOP, DA PAM 385-64, TM 9-1300-206, FM 9-13, FM 9-6, and a calculator.

Standard: Identifies all waiver or exemption requirements without error.

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**1.** Learning Step/Activity 1: Review waiver and exemption requirements. (Reference TM 9-1300-206, paragraph 1-5)

Method of instruction: CO

Instructor-to-student ratio: 1:12

Time of instruction: 0.1 hours

Media: Viewgraphs

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**Note:** **Show VG16 (Waivers/Exemptions).**

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**a. Waiver Authority.** The Chief of Staff, US Army (CSA), is the controlling authority for granting waivers of Q-D safety standards for munitions and explosives. This authority is redelegated by TM 9-1300-206 to:

- Commanders of major Army commands (MACOMs) in CONUS.
- Overseas MACOM Theater commanders.
- The Chief, National Guard Bureau.

This authority will not be redelegated further.

The commander to whom waiver authority is delegated will:

- Ensure the existence of necessary and compelling reasons before granting waivers to Q-D standards.
- Grant waivers to Q-D standards for installations and activities within their areas of authority.

**b. Requests for Waivers.** Commanders of installations, activities, and other munitions locations will submit requests for waivers through command channels. This will be done when Q-D standards cannot be achieved. When such waivers impact on other commands, initiating activities will coordinate requests with these local commands. Requests for waivers will include copies for intermediate commands. CONUS commanders will coordinate with other affected MACOM commanders before granting waivers.

(1) Requests for waivers will contain the following minimum information:

- Description of conditions. This will include maps showing distances to internal and external exposures, the location of personnel, exposed facilities, and the quantity and type or class of munitions or explosives.
- Safety regulations that will be violated, and reasons.
- Specific time period for the waiver.
- Safety precautions during the period of waiver.
- Development of a waiver plan. This will include milestones, resources, and actions planned to eliminate the need for the waiver.

(2) **Submission.** Requests for waivers will be forwarded as shown below:

- Within CONUS, through command channels to the CONUS MACOM commanders.
- Within overseas commands, through command channels to MACOM and theater headquarters.
- Within Army Reserve National Guard to Chief National Guard Bureau.

**c. Time Limitations.** Waivers normally will be limited to one year or less; no waiver will be in effect for more than 5 years. A waiver will be considered as rescinded on its expiration date. Installation or activity commanders will forward waiver renewal requests in time to permit investigation, evaluation, and reply. Waivers will not be renewed unless all practicable means for corrections have been exhausted.

- (1) Waivers granted for more than one year will be reviewed each year by the installation or activity commander. This will ensure that circumstances requiring the waiver have not changed. Results of this review (and a progress report regarding milestones that have been completed) will be forwarded through command channels to the MACOM commander granting the waiver.
  - (2) Request for amendments will be initiated when:
    - Factors or circumstances provide a basis for a change to the initial request for waiver.
    - New conditions arise to affect an existing waiver.
  - (3) When factors or circumstances prevent a waiver condition from being corrected within five years of an original request, the waiver becomes a candidate for exemption. Exemptions also will be reviewed each year by the installation commander. It will also ensure that a record of this review will be maintained locally.
- d. Exemptions.** Exemptions are relatively long-term exceptions to otherwise mandatory standards. They will be granted only under the following conditions:
- When immediate corrective measures are impractical.
  - When impairment of the overall defense posture would result.
  - When positive programs for eventual elimination of the exemptions need are being pursued.
- (1) Exemptions can be authorized only by the Secretary or Under Secretary of the Army, or higher authority. Requests for exemptions will be sent to HQDA (DAPE-HRS), WASH DC 20310. Exemption requests must include detailed information on the hazards involved in the operation. A hazard analysis must describe expected casualties and property losses on a worst case basis.
  - (2) Requests for waivers or exemptions within CONUS that cannot be resolved between MACOM commanders will be referred to HQDA (DAPE-HRS), WASH DC 20310, for resolution.
  - (3) Assistance needed in the determination of requirements and preparation of waiver/exemption submissions should be obtained or otherwise provided by qualified technical personnel (Safety, Ammunition, Quality Assurance Specialist, Ammunition Surveillance) assigned to respective commands or installations. When such expertise is not immediately available, assistance should be requested through channels (Reference AR 702-12). All waiver requests will be coordinated with the installation MACOM Safety Director's Office.

- (4) Copies of waivers and exemptions will be maintained in the safety offices of installations and MACOMs.
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2. Learning Step/Activity 2: Perform a practical exercise to reinforce the conference section of this lesson.

Method of instruction: PE2

Instructor-to-student ratio: 1:12

Time of instruction: 4.0 hours

Media: None

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**a. Directions to Instructor:**

- (1) Ensure each student has a copy of the Practical Exercise Worksheet 55B40C03-PE2.
- (2) Inform students of directions listed below.
- (3) Provide assistance as required.
- (4) Critique the exercise upon conclusion.

**b. Directions to Students:**

- (1) The purpose of this practical exercise is for you to demonstrate how well you have retained the material we have covered in this lesson.
- (2) Talking between students is not allowed during the practical exercise.
- (3) Raise your hand for assistance, if needed.
- (4) Using the reference material provided answer the questions and cite the reference where you found the answer.
- (5) You have 200 minutes to complete this Practical Exercise.

## SECTION IV. SUMMARY

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**Note:** Show VG17 (Summary).

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Method of instruction: CO  
Instructor-to-student ratio: 1:12  
Time of instruction 0.1 hours

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**Review/  
Summarize  
Lesson**

During this lesson, we have discussed the requirements for planning munitions storage operations and conducted a practical exercise to reinforce the instruction. You should now have the knowledge to plan storage operations in accordance with regulatory requirements.

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**Check on  
Learning**

Determine if students have learned the material presented by:

- a. Soliciting student questions and explanations.
  - b. Asking questions and getting answers from the students.
  - c. Correcting student misunderstandings.
- 

**Transition to  
Next Lesson**

Your next lesson will be Lesson C04, conduct explosive safety survey.

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## SECTION V. STUDENT EVALUATION

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**Testing Requirements** Upon completion of Part I of this annex, your performance will be evaluated by a written examination.

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- Feedback Requirement**
- a. Schedule and provide feedback on the evaluation and any information to help answer students' questions about the test.
  - b. Provide remedial training as needed.
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**Note:** Rapid, immediate feedback is essential to effective learning.

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## PRACTICAL EXERCISE WORK SHEET

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NAME	RANK	CLASS	DATE
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1. You have been tasked to develop a rewarehousing plan within section 2 of ASP 501 to provide space for a receipt of munitions. The following information/aids are provided to assist you.
  - a. Magazines 12, 13, 14, and 15 are under renovation.
  - b. Quantity-distances for all stocks are adequate.
  - c. Compatibility must be maintained.
  - d. Use pages 2 and 3 of this practical exercise to determine the storage compatibility group, class and division, and net explosive weight of each munitions item.
  - e. TM 9-1300-206, DOD CONSOLIDATED CATALOG will be furnished.
  - f. Planographs will be reviewed to determine what you have in storage.

2. Munitions scheduled for receipt:

<u>DODIC</u>	<u>NOMENCLATURE</u>	<u>LOT #</u>	<u>QUANTITY</u>
1305-A549	Ctg, cal 50, API	LC-1-9	1,000 rds
1305-A071	Ctg, 5.56, Ball	RA-6-19	5,000 rds
1315-C445	Ctg, 105mm, HE	LOP-6-30	600 rds
1315-C445	Ctg, 105mm, HE	LOP-6-31	600 rds
1315-C449	Ctg, 105mm, ILL	IOP-7-48	48 rds
1320-D540	Chg, Prop 155mm M3	PXC-5-9	800 rds
1320-D544	Proj, 155mm HE	ZX-19-8	750 rds
1330-G890	Gren, Hand, Frag	NA-5-08	500 rds

3. Complete the “Rewarehousing Plan sheet” on the following page of this practical exercise including storage location for scheduled receipts.

**Plan Munitions Storage Operations  
Practical Exercise Work Sheet**

55B40C03-PE2

<u>NSN &amp; DODIC</u>	<u>NOMENCLATURE</u>	<u>LOT NUMBER</u>	<u>MAG #</u>	<u>QTY</u>	<u>SCG</u>	<u>CLASS/DIV</u>	<u>TOTAL NEW</u>
1. Empty		N/A	1				
2. 1320-00-028-4878 D541	Chg, prop 155mm	PXC 5-9	2	1200			
3. 1315-00-926-9299 C449	Ctg, 105mm ILL	IOP 7-48	2	450			
4. 1330-00-028-5839 G890	Gren, Hnd, Frag	NA 5-08	3	2,400			
5. 1375-00-724-7040 M0223	Chg, Demo C-4	MA 6-48	3	12,960			
6. 1305-00-892-2150 A131	CTG, 7.62mm LKD	PX 9-4	4	1,843,200			
7. 1340-00-689-4075 H826	Rkt, 2.75 HE	RDX 12-80	5	5,560			
8. 1320-00-986-9731 D684	Proj 8" HE M404	PXC 8-20	6	120			
9. 1320-00-542-0728 D680	Proj 8" HE M106		6	240			
10. 1320-00-782-5532 D544	Proj 155mm HE	AZ 18-9	6	120			
11. 1320-00-782-5532 D544	Proj 155mm HE M107	ZX 19-8	6	512			
12. 1305-00-028-6465 A549	Ctg Cal. 50 API		7	28,000			
13. 1305-00-926-3930 A071	Ctg 5.56mm Ball		7	1,209,600			
14. 1305-00-028-6619 A475	Ctg Cal 45 Ball	LC 9-18	7	300,000			
15.	Empty		10				

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## SOLUTION SHEET

<u>DODIC</u>	<u>NOMENCLATURE</u>	<u>LOT NUMBER</u>	<u>MAG #</u>	<u>QTY SCG</u>	<u>Class</u>	<u>TOTAL NEW</u>
1. Empty	N/A	N/A	1	N/A		
2. D541	Chg, prop 155mm	PXC 5-9	2	1,200 C	1.3	16,320
3. C449	Ctg, 105mm ILL	IOP 7-48	2	450 G	(08) 1.2	873
4. G890	Gren, Hnd, Frag	NA 5-08	3	2,400 F	(04) 1.1	888
5. M023	Chg, Demo C-4	MA 6-48	3	12,960 D	1.1	16,200
6. A131	CTG, 7.62mm LKD	PX 9-4	4	1,843,200 S	1.4	11,059
7. H826	Rkt, 2.75 HE	RDX 12-80	5	5,560 E	1.1	24,064
8. D684	Proj 8" HE M404	PXC 8-20	6	120 D	(18)1.2	588
9. D680	Proj 8" HE M106	PXC 5-60	6	240 D	1.1	8,662
10. D544	Proj 155mm HE	AZ 18-9	6	120 D	(18) 1.1	1,786
11. D544	Proj 155mm HE M107	ZX 19-8	6	512 D	(18) 1.1	7,619
12. A549	Ctg Cal. 50 API	LC 1-9	7	28,000 G	1.4	1,077
13. A071	Ctg 5.56mm Ball	RA 6-19	7	1,209,600 S	1.4	4,959
14. A475	Ctg Cal 45 Ball	LC 9-18	7	300,000 S	1.4	240
15. Empty	Empty		10			

1. Magazine #1 Leave empty for temporary storage of incoming stocks.
2. Magazine #2 Relocate D541, lot #1 PXC 5-9 to Magazine #10.
3. Magazine #3 Relocate G890, lot # NA 5-08 to Magazine #4.  
Relocate M023, lot # MA-6-48 to Magazine #6.  
(Magazine is now empty.)
4. Magazine #4 Receive G890 from Magazine #3.  
Receive A071 from Magazine #7.  
Receive A475 from Magazine #7.  
(Prepare for G890 and A071 from receipt notification.)
6. Magazine #6 Receive M023 from Magazine #3.  
(Prepare for D544 from receipt notification.)
7. Magazine #7 Relocate A549 to Magazine #2.  
Relocate A071 and A475 to Magazine #4.  
(Magazine is now empty.)

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**STUDENT HANDOUT**  
**PLAN MUNITIONS STORAGE**  
**OPERATIONS**

## 1. REWAREHOUSING MUNITIONS

a. Rewarehousing is the art of using available space, personnel, and equipment to ensure efficient receipt, storage, and issue of munitions with minimum handling. One of the most important elements of rewarehousing is space layout. New storage problems arise constantly when a given lot number of munitions is not completely issued within two or three days after receipt. This makes the planned reuse of storage space difficult. Consolidation is the key to good rewarehousing, location control, and conservation of storage space, and is an ongoing process.

b. Often it is necessary to place a given quantity of munitions in a minimum amount of space, following quantity-distance tables contained in TM 9-1300-206. Where the storage and quantity-distance standards outlined in TM 9-1300-206 cannot be met, installation commanders will request waivers through command channels. Waivers will be granted for a specific period, normally not to exceed one year. Requesting agencies should first coordinate the request with affected local commands, where applicable. Requests for waivers will be forwarded with sufficient copies for retention by immediate command levels. Requests for waivers within the overseas theater will be forwarded through command channels to the major overseas commander. For complete information on waivers of munitions and explosives quantity-distance safety standards, refer to DOD Regulation 5154.4-S and DA PAM 385-64.

c. The safety hazard of munitions in storage has to be considered in addition to protection from the elements. Physical security may be required because of the type of material stored. Heavy, bulky items should be stored where they are easily accessible to transport vehicles and MHE.

## 2. STACKING MUNITIONS

a. When you are stacking munitions, consideration must be given to the storage location and the type of foundation upon which the stack will rest. Munitions may be stored inside or outside. It may be palletized or unpalletized. Foundations may be a hardstand, the floor of a magazine or building, or the earth in open-field storage. The firmness and ability of the foundation to sustain the weight of a stack under all weather conditions should be the prime consideration. Munitions stacked on an inadequate or improper foundation may topple or sag. Inspections should detect stacks that are settling or shifting so that corrections can be made before damage results. Whenever applicable, storage drawings as prescribed by DA PAM 75-5 should be used.

## 3. DUNNAGE

a. Inside Storage: Unpalletized munitions stored inside are stacked on 2- by 4-inch dunnage to ensure stability and to allow air to circulate around and under the stacks. Cleats are used on boxed or crated munitions to allow air to circulate between tiers. When cleats are not used, strips of 1- by 2-inch lumber are used. For long-term storage, cleats are used between each

layer of boxes. For short-term storage, cleats are placed on every fourth layer of boxes. Proper use of stripping will increase stack stability.

b. Outside Storage: Unpalletized munitions stored outside are normally stacked on 4- by 4-inch and/or 6- by 6-inch dunnage to ensure free air circulation. Stacks may have to be limited in height due to rough or unstable terrain. An overhead cover should be provided, if possible, while 18 inches of airspace is maintained between the top and sides of the munitions stack and the cover itself.

c. Shape of Stacks: All stacks should be such that the marking on each container can be seen without moving or climbing upon the stacks. Normally, only one lot of munitions should be placed in the same row. However, if it is necessary to place more than one lot in the same row, a separation between lots must be indicated and each lot marked clearly. The methods prescribed for stacking specific munitions are contained in TM 9-1300-206.

d. Height of Stacks: The height of a stack is determined by the size, weight, and height of packages; available storage space; quantity-distance requirements; height of the barricade; and the amount of MHE available. When stacking is done by hand, packages should be no higher than the average shoulder height. The foundation and the weight of the material to be stacked will also have a direct bearing on the height. For heavy material, care must be taken to ensure that the bottom row is not crushed and that there is enough dunnage to keep the bottom row off the ground.

e. Pallets: Palletized munitions help reduce personnel requirements, simplifies sorting and accounting, and aids in storage and stacking. Therefore, the banding on the pallets should not be broken as long as MHE is available to move the pallets. (Artillery ammunitions may go as far forward as the firing site before the pallet banding is broken.) Clearance around the stacks should be enough to allow MHE and transport vehicles to move.

f. Lot Number Segregation: Munitions in storage are segregated by lot number. Shipments should be made up with as few lot numbers as possible so that the receiver does not have to rehandle and sort the incoming shipment. However, small lots should not be permitted to accumulate. Segregating munitions by lot number permits easy marking of suspended lots, aids in making accurate inventories, and speeds issue operations.

### 3. STORAGE OF UNSERVICEABLE MUNITIONS

a. Unserviceable munitions are either manufactured with defects or they have been made unserviceable by improper storage, handling, packaging, or transporting. Shipments of munitions received from other supply installations should be inspected for unserviceable items. Unit turn-ins should be stored in a segregated area for later inspection when it is not possible to inspect the munitions at the time of receipt. Munitions handlers must learn to recognize indications of unserviceability and report them.

b. Segregation: Unserviceable hazardous munitions usually are segregated from serviceable munitions. Inspectors in the units should first, segregate for safety reasons and second, segregate to reduce rehandling. Next, the munitions should be segregated by caliber, type, DODIC, and lot number, followed by serviceability classification. Munitions that cannot be positively identified by lot number are automatically classified as unserviceable.

c. Munitions requiring maintenance should be segregated and worked on in a separate area. Normally, light maintenance is performed at all installations. When extensive maintenance is required, or the munitions are hazardous, a separate area is required. Extensive maintenance is usually performed at depot level only.

d. Unserviceable munitions are segregated, stored, and stacked by item, lot number, and storage category. The same safety precautions and principles used for storage of serviceable munitions are used for storage of unserviceable munitions. Proper records must be maintained on all unserviceable items stored within an installation.

e. Disposition: Unserviceable munitions that are repairable should be repaired if the maintenance is authorized and if it is within the unit's capability.

f. Hazardous munitions should be reported through proper channels to the installation commander so that orders can be issued to dispose of the munitions. The commanding officer will report the action taken on the munitions to the next higher headquarters. Technical assistance may be requested from explosive ordnance disposal (EOD) units when disposal of the items is beyond the unit's capability.

g. Munitions that have been abandoned by using units is treated as unserviceable until it has been inspected. The procedures that apply to unit turn-ins also apply to abandoned munitions.

h. Other unserviceable munitions should be reported to the supporting MMC for disposition instructions. DA Form 2415 (Ammunition Condition Report) is used for this purpose.

i. A demolition area is designated and cleared of unnecessary vegetation. The demolition area includes a powder-burning ground, a small arms munitions burning pit, and detonation pits. A pillbox or splinterproof shelter for demolition personnel is recommended, but not mandatory. Detailed procedures for the selection and use of a demolition area are covered in TM 9-1300-206.



#### 4. STORAGE OF SUSPENDED MUNITIONS

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

b. Suspension Authority: The authority for suspension of any lot of conventional munitions is vested in the Commanding General, IOC. However, a local suspension may be placed on a suspected lot of munitions by the installation or area commander. A preliminary report, and later a detailed report, will be forwarded through the supporting MMC to the TAACOM headquarters. Instructions for preparing a suspension are contained in AR 75-1. A listing of suspended lots of conventional munitions and components is contained in TB 9-1300-385. Additional notices of suspensions or restrictions will be by teletype message as a supplemental change to TB 9-1300-385.

c. Marking and Storing Items: Munitions lots that are stored and later placed under suspension need not be moved to a segregated area unless the suspension notice orders it. Stacks of suspended munitions will be clearly marked on all sides; use DD Form 1575 (Suspension Tag-Material) and DA Form 3782 (Suspension Notice) to show that the items have been suspended or restricted from issue. Suspended or restricted issue items returned by the firing units, or received from other supply installations, should be segregated upon receipt; marked, using the forms mentioned; and stored in the unserviceable munitions area. Magazine data cards should be posted showing the suspension date, the suspension number, and the authority.

#### 5. STORAGE OF UNIT BASIC LOAD

a. Tactical units are required to be in a combat ready status. To achieve this status, ammunition units or organizations must keep their basic load munitions in a serviceable and ready-to-fire condition. Ammunition units must be prepared to give technical assistance and advice to these tactical units on storage, safety, and security of their munitions. Local command policies and security requirements must be followed in securing basic load storage areas. Classified items are secured and handled according to the procedures contained in AR 190-11 and AR 380-5.

b. On Vehicle Storage: The following guidance will be met when basic loads are stored on vehicles:

- A minimum of 3 inches of dunnage will be used under the stacks of munitions stored on vehicles. When the munitions are palletized, the pallet must satisfy the dunnage requirement.

- Drain plugs on all motor vehicles should be opened.
- The load will be distributed evenly over the entire bed of the motor vehicle.
- The load will be properly blocked and braced according to the approved transportation outload drawing according to DA PAM 75-5.
- Ridge poles will be placed along the center of the bows and underneath the tarpaulin of motor vehicles to prevent water pockets from forming.
- Tarpaulin end curtains will be used on the rear of all motor vehicles.
- Adequate ventilation will be provided in loaded vehicles and the motor vehicle will be aired periodically by removing the tarpaulins.
- All munitions will be removed from the motor vehicles scheduled for support maintenance or maintenance involving the disassembly of the fuel system, the electrical system, or any bodywork involving welding. Operator and minor organizational maintenance may be performed outdoors without unloading the vehicles. Motor vehicles loaded with munitions that are undergoing minor maintenance, other than operator maintenance, will be parked a minimum of 50 meters from other motor vehicles loaded with munitions.
- Motor vehicles will have their brakes set and their wheels chocked.

In certain instances, it may be better to store part of the basic load of munitions on the ground or in buildings. When this occurs, the munitions may be stacked by vehicle load and earmarked for a specific vehicle.

c. Inside Storage: The following guidance will be met when basic loads of munitions are stored inside:

- Dunnage will be thick enough to allow at least 2 inches of air space between the munitions and the floor of the building.
- Stripping is desirable if boxes are not cleated on the top. Stripping should be no less than 1-inch thick and 2-inches wide to provide air circulation and increase stack stability.
- Munitions will be segregated one lot per stack with the markings facing outward, and all boxes should be aligned to aid in the inventory and inspection.
- Stacks should be at least 6 inches from the wall and stacked no higher than 18 inches from the ceiling.

- Munitions will be packaged and marked properly and adequately.

d. Outside Storage: This type of storage for Unit Basic Load munitions is neither desirable nor recommended and should be utilized only as an emergency expedient. Pilferable items should not be stored in outdoor sites, but should be afforded inside storage in locked magazines whenever possible. When existing circumstances necessitate outside storage, the following priority listing for covered storage shall apply. Priority listing for covered storage:

- Fuzes, Primers, Boosters
- Pyrotechnics
- Propelling Charges
- Combustible Cartridge Case Ammunition
- Demolition Priming Devices
- Illuminating and Other Rounds with Black Powder Expulsion Charges
- Chemical Munitions
- Rocket Munitions
- Small Arms Munitions
- Grenades
- Mines
- Demolition Items
- Fixed and Semi-Fixed Ammunition (smallest caliber first)
- Separate-Loading Projectiles
- Bombs

\*\*\*\* When local security conditions require, this list may be changed.

The following guidance will be met when basic loads of munitions are stored outside:

- Dunnage will be high enough to allow at least 3 inches between the stack and the ground.
- The storage site will be well drained and free from readily ignitable and flammable materials.
- The supporting timbers or platform upon which the munitions are stored shall be well constructed to prevent falling, sagging, and shifting of the munitions.
- Steel dunnage should be used where practicable, especially in storing Class/Division 1.1 munitions.
- Non-flammable or fire-resistant, waterproof overhead covers should be provided for all munitions.

- An air space of not less than 18 inches should be maintained between the top of the stack and the cover. If adequate ventilation is assured, overhead covers are also desirable for outdoor stacks of bombs and projectiles.
  - Sides of covered stacks also may be protected by nonflammable, fire-resistant, waterproof covers, provided air space is maintained between the cover and the munitions.
  - Frequent inspection shall be made to detect unstable stacks and accumulations of trash between or under stacks.
  - Other applicable procedures listed for inside storage should also be followed for outside storage.
- e. Unit Arms Room Storage: The following guidance will be met when small arms ammunition is stored in unit arms rooms:
- These storage rooms should be situated as far from the inhabited sections of the billet area as possible.
  - The munitions must be secured according to the procedures contained in AR 190-11.