TRAINING SUPPORT PACKAGE (TSP)

TSP Number/Title	55B40C11 Quantity-Distance Requirements for Port Operations
Task Number(s)/ Title(s)	None
Effective Date	21 August 1998
Supersedes TSP(s)	MP-02/C 645-55B40
TSP User	USAOMMCS, Redstone Arsenal, Alabama and Accredited Ordnance TASS Battalion
Proponent	US Army Ordnance Missile and Munitions Center and School, Munitions Training Department, Redstone Arsenal, AL 38597-6970
Comments/ Recommen-dations	Send comments and recommendations directly to: US Army CASCOM Training Directorate ATTN: ATCL, AO (Mr. Roy King) Bldg. 1109, 401 First Street Fort Lee, VA. 23801-1713 (e-mail Kingr1@Lee-dns1.army.mil) DSN: 539-1129, Commercial: 804-765-1129
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.

Preface

Purpose

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

LESSON TITLE:	Quantity-Distance Requirements for Port Operations
CONDITIONS:	In a classroom environment given TM 9-1300-206, and NAVSEA OP 5 Vol 1.
STANDARD:	Identify Quantity-Distance requirements pertaining to munitions management of port operations.

This TSP Contains

TABLE OF CONTENTS

(21 August 1998)

SECTION I. ADMINISTRATIVE DATA

All Courses Including this Lesson

COURSE NUMBER(S)	COURSE TITLE(S)
645-55B40	Ammunition Specialist, ANCOC

Task(s) Taught or Supported

TASK NUMBER	TASK TITLE
None	

Reinforced Task(s)

TASK NUMBER	TASK TITLE
None	

Academic Hours

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

	ADT HOURS/METHOD
Conference	3.0 / CO
Total Hours	3.0

Test Lesson Number

	Hours	Lesson No.
Testing:	4.0 TE2	55B40C21
Review Of Test Results:	1.0 CO	55B40C22

Prerequisite Lesson(s)

LESSON NUMBER	LESSON TITLE
55B40C09	Movement Regulations

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

Number	Title	Date	Additional Information
TM 9-1300-206	Ammunition and Explosives Standards	30 AUG 73	with changes 1-10
NAVSEA OP 5 Vol 1	Ammunition and Explosives Ashore Safety Regulations	12 JUN 97	with changes 1 and 2.

Related

None

Student Study Assignments

None

Instructor Requirements

One instructor

Additional Support Personnel Requirements

None

Equipment Required

None

Materials Required	INSTRUCTOR MATERIALS: References listed above STUDENT MATERIALS: TM 9-1300-206, Student Handout 55B40C09 - H01
Classroom, Training Area, and Range Requirements	One 30-person classroom
Ammunition Requirements	None
Instructional Guidance	Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

Proponent Lesson Plan Approvals

Name	Rank	Position	Date

SECTION II. INTRODUCTION

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

Motivator

Good morning/afternoon, class. I am _____. I will be your primary instructor for this lesson. As a senior noncommissioned officer, your safety, the safety of other personnel, and surrounding property rests in your hands. It is very important that you require and enforce safety as an everyday practice. Requiring safe practices to be in place at all times will ensure the mission is accomplished efficiently and effectively without injury to personnel or damage to munitions or equipment.

Terminal Learning Objective

Note: Inform the students of the following terminal learning objective requirements.

At the completion of this lesson, you (the student) will:

ACTION:	Identify Quantity-Distance requirements for port operations.
CONDITIONS:	In a classroom environment and given TM 9-1300-206, and NAVSEA OP 5 Vol 1.
STANDARD:	Identify Quantity-Distance requirements pertaining to munitions management of port operations.

Safety Requirements

None

Risk Assessment Level

Low

Environmental Considerations

None

Evaluation	On a written end of annex examination the student must score a minimum of 70 percent to achieve a GO.
Instructional Lead-in	Although the storage principles and storage compatibility grouping requirements are the same as those used at other locations, this lesson covers a brief review on those requirements before discussing the Quantity-Distance requirements for Port Operations.

SECTION III. PRESENTATION

1. Learning Step/Activity 1: Describe storage compatibility groups. (Reference TM 9-1300-206 chapters 4 and 5)

Method of instruction: CO
Instructor-to-student ratio: 1:12
Time of instruction: 1.0 hour
Media: None

Note: Review the terms and definitions listed below.

a. Terms.

(1) **Exposed Site:** Any site that will be exposed to blast or fragments in case of an accidental explosion.

(2) **Potential Explosion Site (PES):** A magazine or storage site that contains munitions or explosives, or is designed for storage of explosives.

(3) **Target Site:** An exposed site that could be damaged by an explosion at a PES; the existence of a target site affects the amount of explosive that can be stored at a PES, and/or the safety distance required between the storage site and the target site (Ex: An inhabited building or a public traffic route).

(4) **Public Traffic Route (PTR):** Any public street, road, highway, navigable stream, or passenger railroad.

(5) **Intraline Distance (ILD):** The minimum distance permitted between any two buildings within any one operating line.

(6) **Magazine Distance:** The minimum distance permitted between any two storage magazines.

b. General.

(1) Safe storage is determined by the quantity of explosives at the potential explosion site and the distance from the potential explosion site to the target site. To properly store munitions, explosives, or chemical munitions, the following must be considered:

(a) Storage principles.

(b) Storage compatibility group.

(c) Quantity-distance requirements.

(d) Separation of auxiliary areas and buildings.

(2) Quantity-distance (Q-D) is a measurement that consists of the quantity of explosive material and the distance separation relationships that provide for defined types of protection. These relationships are based on levels of risk considered acceptable for the stipulated exposures and are tabulated in the appropriate Q-D tables found in NAVSEA OP 5 Volume 1.

(3) Explosive limits must never exceed the minimum required for an efficient, safe operation. Operations and personnel must be arranged (consistent with efficient, safe operation) to minimize their exposure to any one explosion or fire hazard.

(4) Explosives safety distance tables prescribe necessary separations and specify maximum quantities of the various classes of explosives permitted in any one location. These tables list the minimum criteria for storage and handling of explosives. Such criteria provide reasonable safety within specified limits compatible with the risk of accidental explosions. Limits established locally must be no greater than necessary for an efficient operation. Operations and personnel must be arranged to minimize exposure to hazards.

Note: Refer students to TM 9-1300-206 Pages 5-38, and 5-39, and discuss the description of each compatibility group.

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c. Storage Compatibility Groups (SCG). Conventional ammunition and explosives are assigned to one of twelve storage compatibility groups (A through H, J, K, L, and S).

(1) **Group A** - Bulk initiating explosives. Not commonly found in an ASP; this type of explosive is normally found at depots or munitions plants.

(2) **Group B** - Detonators and other similar initiating devices.

(3) **Group C** - Bulk propellants, and propelling charges without their own means of initiation. Main hazard is mass fire.

(4) **Group D** - Black powder, high explosives, and munitions containing high explosive without means of initiation or propellant.

(5) **Group E** - High explosive munitions without its own means of initiation, but with a propelling charge.

(6) **Group F** - HE munitions with its own means of initiation, with or without a propelling charge.

(7) **Group G** - Fireworks, illuminating, incendiary, and smoke munitions except WP.

(8) **Group H** - White phosphorus with or without explosive components.

(9) **Group J** - Flammable liquids or gels.

(10) **Group K** - Munitions containing toxic chemicals.

(11) **Group L** - Munitions not included in other groups, including damaged or suspect munitions.

(12) **Group S** - Munitions presenting no significant hazard.

(13) **SCG listings.** Q-D Class, Division, and Compatibility Group listings are found in the Joint Hazard Classification System, the DOD Consolidated Ammunition Catalog, Ammunition Data Sheets, and TM 9-1300-206 (Table 5-21).

(a) Even though munitions may be stored in any of the previously mentioned compatibility groups, keep in mind that these compatibility groups are for serviceable ammunition.

(b) If at any time munitions become unserviceable; it must then be stored in compatibility group L.

(c) Munitions that are unserviceable and present similar hazards may be stored together.

(d) Toxic chemicals and toxic chemical munitions may be stored with other toxic chemical munitions as long as only one chemical hazard is present at each storage location.

(e) Mixing of SCGs is allowed only for groups C, D, E, F, G, H, J, and S, and is permitted only as long as the total quantity of explosives does not exceed 1000 lbs per storage site. This is commonly referred to as the 'Thousand Pound Rule'. (Ref: TM 9-1300-206, para 5-18e(2)).

Note: Refer students to TM 9-1300-206, page 5-40, explain the notes, and show students how to use the mixing chart. (Use munitions examples.)

Note: Conduct check on Student Learning.

QUESTION: Under normal storage conditions, may 750 lbs of 105mm smoke projectiles be stored with 310 lbs of bulk propellant?

ANSWER: No. IAW Note 2 on page 5-40 of TM 9-1300-206, storage compatibility groups G & C may be stored together only if warranted by operational considerations, or magazine non-availability, and then only when safety is not sacrificed.

EXPLANATION: 105mm smoke projectiles are SCG G; bulk Propellant is SCG C. Where lines C and G intersect on the chart on page 5-40 of TM 9-1300-206, the character 'Z' is displayed. Note 2 below the chart explains the meaning 'Z'.

QUESTION: What does the letter X at an intersection of the mixing chart lines mean?

ANSWER: The groups may be combined in storage.

QUESTION: What is the Compatibility Group of "Black Powder"?

ANSWER: Group D.

QUESTION: What is the Compatibility Group of "Illuminating Projectiles"?

ANSWER: Group G.

d. Chemical Munitions. Based on the action of the agent, the degree and type of hazard, and the type of protection required, chemical fillers and chemical munitions are divided into groups as follows:

(1) **Chemical Group A** - Includes highly toxic agents, which in either liquid or vapor form, may be absorbed through the respiratory tract, the skin, or the eyes. (Ex: Nerve agents and blister agents).

(2) **Chemical Group B** – Includes agents that are toxic or incapacitating by inhalation or ingestion. (Ex: Tear or vomiting agents or HC smoke). Wearing of a suitable protective mask is required for the protection of personnel against inhalation of these vapors.

(3) **Chemical Group C** - This group includes materials that are spontaneously combustible. (Ex: White phosphorus or plasticized white phosphorus).

(4) **Chemical Group D** - This group consists of signaling smokes and incendiary materials. (Ex: Thermite or colored smoke).

Note: Refer students to TM 9-1300-206, paragraph 4-9c and review the General Requirements for storage of chemical munitions.

Note: Refer students to TM 9-1300-206 Table 4-2, and review the Storage Information and Shipping Classification for Chemical Agents chart, emphasize Agent, Symbol and Chemical Group columns. Explain that this table will be used in conjunction with chapter 5 when determining storage requirements for chemical munitions.

Note: Conduct check on student learning.

QUESTION: WP is assigned to which chemical group?

ANSWER: Chemical Group C.

QUESTION: Which chemical group includes VX?

ANSWER: Chemical Group A.

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2. Learning Step/Activity 2: Describe the types of Q-D related distances. (Reference TM 9-1300-206 paragraph 5-3)

Method of instruction: CO
Instructor-to-student ratio: 1:12
Time of instruction: 0.5 hours
Media: None

Note: Refer students to TM 9-1300-206, Paragraph 5-3.

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a. Types of Distances. Review the following Q-D related distances.

(1) Inhabited Building Distance.

(2) Public Traffic Route Distance.

(3) Intraline Distance.

(4) Magazine Distance.

(5) Fragment Distance.

Emphasize that fragment distance is indicated in ( ) (parentheses) placed to the left of hazard class/division designators (Ex: (08) 1.2).

Note: Paragraph 5-3f(3), states that the minimum fragment distance indicated in parentheses corresponds to the Inhabited Building Distance.

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b. Separation of Miscellaneous Buildings.

Note: Point out to students that paragraph 5-3h(4) on page 5-6 is a handy reference for locating various ASP facilities in accordance with Q-D rules.

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c. Separation of Other Areas.

(1) Classification Yards.

(2) Holding Yards.

(3) Interchange Yards.

(4) Suspect Car Spur Track.

(5) Loading Docks.

(6) Gasoline Handling and Storage Facilities.

(7) Spacing of Ammunition and Explosives on Conveyers.

d. Barricades

(1) Barricades shall not be used to reduce distances for fire hazard materials such as class 1.3 propellants or fragment producing items such as class 1.2 munitions. (TM 9-1300-206, page 5-10-16)

(2) A barricade must be separated from both the building it is to screen and the building containing the hazard. Do not connect the barricade to either structure.

Note: Conduct check on student learning.

QUESTION: What type of distance corresponds to the minimum fragment distance as indicated in parentheses to the left of a hazard class/division designator?

ANSWER: Inhabited Building Distance. (TM 9-1300-206, para 5-3f(3), page 5-4).

QUESTION: What type of distance will be used between two storage magazines?

ANSWER: Magazine Distance. (TM 9-1300-206, para 5-3e, page 5-3).

QUESTION: What type of distance will be used between two buildings in the same operating line?

ANSWER: Intraline Distance. (TM 9-1300-206, para 5-3d, page 5-3).

QUESTION: What type of distance will be used between a lunchroom and a magazine?

ANSWER: Intraline Distance. (TM 9-1300-206, 5-3h(4)(b), page 5-6).

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3. Learning Step/Activity 3: Describe quantity distance classes.
(Reference TM 9-1300-206 paragraph 5-10)

Method of instruction: CO
Instructor-to-student ratio: 1:12
Time of instruction: 0.2 hours
Media: None

Note: Refer students to TM 9-1300-206 figure 5-2 and Table 5-2.

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a. United Nations Organization (UNO) Q-D Class system. The UNO system organizes hazardous materials into nine (9) classes and further subdivides some of those classes into various divisions. Hazard class and division for a given item are usually expressed together, with a period between them, such as: 1.1, or 1.4, or 6.1.

(1) Munitions and explosives are assigned to hazard class 1, and are subdivided into divisions 1, 2, 3, 4, 5, and 6. This is the source of the familiar 1.1, 1.2, 1.3, and 1.4 designations encountered in munitions work. Although 1.5 and 1.6 exist, they are rarely used in association with military explosives.

(2) Gasses are class 2.

(3) Flammable and combustible liquids are class 3.

(4) Flammable, spontaneously combustible, and dangerous-when-wet solids are class 4.

(5) Oxidizers are class 5.

(6) Poisons and infectious materials are class 6. This class also includes chemical munitions without explosive components.

(7) Class 7 is for radioactive material.

(8) Class 8 is corrosives.

(9) Class 9 is miscellaneous hazardous material.

(10) Consumer items (ORM-D) are not assigned to a hazard class.

b. Hazard classes and divisions are based on an item's character and predominant hazards and its potential for causing personnel casualties or property damage. They are **not** based on compatibility groupings or intended use.

c. Fragment Distance Category Numbers are used for some items of Class 1, Division 1, 2, and 3 munitions.

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4. Learning Step/Activity 4: Describe quantity distance for pier and wharf facilities. (Reference NAVSEA op 5 vol. 1 chapter 7)

Method of instruction: CO
Instructor-to-student ratio: 1:12
Time of instruction: 1.0 hour
Media: None

Note: Refer students to Student Handout C09, NAVSEA OP 5 Vol. 1 figure 7-2.

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a. Measurement of Separation Distance. Figure 7-2 provides a quick reference to which table and column is used for determining Q-D requirements for port operations.

(1) **Ships at a pier.**

(a) **Between ships:** Measurement shall be from the nearest point of each ship.

(b) **Between berths at a single pier:** It is generally impracticable to separate berths at single pier by enough distance to prevent mass detonation of 1.1 munitions. In this case, all such ships are grouped together as one large Possible Explosion Site (PES).

(c) Careful scheduling should limit the number of multiple ship explosion sites.

(2) **Between Piers.** Distance shall be measured between the nearest point of the ship at the first pier to the nearest point of the ship at the second pier.

(a) Between explosives piers use Table 7-27 col 4.

(b) Between explosives piers and non-explosives piers use Table 7-27 col 5.

(3) **Between Anchorages:** Separation distances to targets outside an anchorage are based on:

(a) Location of each ship and the amount of explosive on board each.

(b) Distances are calculated in accordance with the equation: dist = 11W^1/3, (Table 7-15 col 11).

(4) **Between Fixed Targets:** Measurement of separation distance from moored ships to fixed targets on land shall be from the nearest point of the ship or barge unit to the nearest point of the fixed target.

b. Site Criteria and Application of Q-D Separation Standards. (Reference 7-10.8)

(1) Separation of Ships at Explosive Anchorage.

(a) Explosive ships being loaded or unloaded shall be separated from non-explosive carrying ships **not underway** by distances calculated using Table 7-27 col 5 (para 7-10.8.5).

(b) Table 7-9, column 9 distances shall be used for protection of ships that are underway.

(2) Explosive Anchorage to Inhabited Buildings or Public Traffic Routes. NAVSEA OP 5, Vol 1, para 7-10.8.7 governs Q-D relationships between explosive anchorages and inhabited buildings.

(a) For inhabited buildings use Table 7-9, column 5.

(b) For Public Traffic Routes use Table 7-9, column 9.

c. Q-D Requirements for Wharf Yards.

(1) Wharf yards are sited at piers or wharves for short term staging of trucks and rail cars prior to delivery to the piers.

(2) A wharf yard shall be separated from the pier it serves IAW distances determined by the equation dist = 11W^1/3 (listed in Table 7-15, column 11, of the 55B40C09 Student Handout), and from other inhabited facilities by at least 1,800 feet. (7-12.14.)

SECTION IV. SUMMARY

Method of instruction: CO
Instructor-to-student ratio: 1:12
Time of instruction: 0.2 hours

Review/ Summarize Lesson

During this lesson, we have discussed quantity-distance requirements for port operations to include separation distances for ships, explosives piers and wharf yards.

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 on inspecting munitions maintenance facilities.

SECTION V. STUDENT EVALUATION

Testing Requirements	Upon completion of Part II of this annex, your performance will be evaluated by a written examination.
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.
Note:	Rapid, immediate feedback is essential to effective learning.

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