

1.0. General.

As a senior noncommissioned officer, port operations is an important aspect of the munitions inspection job. It is a requirement in which both the military and civilian inspector must be proficient. Consideration must be given to receipt, storage, and shipment of munitions and other hazardous materials. Transportation regulations exist to minimize the dangers to life and property that are incidental to the transportation of all types of hazardous materials, including explosives. Hundreds of tons of munitions are transported daily by water, yet rarely does one hear of a disaster resulting from a shipment of these items. Since you will be involved in the handling and transportation of hazardous material, it is important that you have a working knowledge of the regulations governing these activities.

2.0. Shipboard terminology.

In order to function aboard a ship, it is important to know basic ship terminology. Study the following common terms used for location, position, and direction aboard ship. Understand them thoroughly and use them correctly.

- Bow: The forward end of the vessel.
- Ahead: When the whole ship moves forward.
- Forward: When someone on board moves towards the bow.
- Stern: The rear end of a vessel.
- Astern: When the whole vessel moves backward.
- Aft: When someone on board moves toward the stern.
- Starboard: The right side of the vessel.
- Port: The left side of the vessel.
- Amidships: The central or middle area of a vessel.
- Beam: Across the vessel, as in from port to starboard. Also, the structures that support the deck.
- Centerline: Line down the middle of a vessel from bow to stern.
- Outboard: From the centerline of the vessel to either port or starboard.
- Below: When you go down a ladder.

- Above: When you go up a ladder.
- Aloft: To go above the top deck as into the rigging.
- Deck: Different levels (floors) of the ship. The weather deck is the top deck, or the one exposed to the weather.
- Between deck: The space between decks, as from the floor of one deck to the bottom of the deck above; the area that can be filled with cargo.
- Hatch: A hatch is an opening in the deck through which cargo is loaded or discharged, or an opening used as a doorway. Cargo hatches are numbered from fore to aft. The square of the hatch is that area of the deck directly under the hatch opening.
- Hold: The lowest compartment under the cargo hatch.

STUDENT CHECK 1

1. What term is used when the whole ship moves forward?
2. What does it mean when someone on a vessel says to go aft?

3.0. Inspection Criteria (General Requirements).

3.1. Unacceptable for shipment.

Items not prepared for shipment IAW regulations and prohibited varieties of explosives (CFR 173.54) are unacceptable for shipment.

3.2. Packaging.

The packaging of hazardous materials for transportation by air, highway, rail or water must meet all hazardous requirements. Methods of manufacture, packaging and storage of hazardous materials, that affect safety in transportation, must be open to inspection by a duly authorized representative of the initial carrier or of the DOT.

3.3. Paperwork for vessel transport of hazardous materials.

Shippers must properly identify hazardous materials they want shipped (CFR 176.24). A dangerous cargo manifest prepared by the carrier, lists the vessel name, number nationality, who's in charge, and the full who, what, where, how much, and ownership, to include proper shipping names and UNO numbers, of all hazardous materials being carried on board that vessel

(CFR 176.30). If any hazardous items are being carried under an exemption, the carrier must have a copy of the exemption with the manifest.

The carrier must keep a supply of extra labels so that he can replace any that get wet or torn off. After the shipment is complete, the carrier must maintain a copy of everything on file in the company office for one year, and make it available to DOT on request.

STUDENT CHECK 2

1. Who prepares the dangerous cargo manifest?
2. How long must a carrier maintain a copy of the dangerous cargo manifest after completing a shipment?

3.4. Loading operations.

Hazardous material loading may only take place under the supervision of a responsible person to whom that duty has been assigned. The qualifications of that person, employment, ship duty positions, and holding a USCG license, vary with the nationality of the vessel and where it is taking the cargo (CFR 176.57).

3.4.1. Preparation of vessel.

Holds and compartments: Each hold or compartment that will contain hazardous materials must be free of debris before the hazardous materials are stowed. Bilges must be examined and all residue of previous cargo removed.

Decks: Gangways, hatches, and cargo ports, over or through which hazardous materials must be passed or handled in loading or unloading, must be free of all loose materials before cargo handling operations begin.

Weather Deck: Debris that creates a fire hazard or a hazardous condition for a person engaged in handling hazardous materials may not be on the weather deck of a vessel during loading or unloading operations.

No Smoking: Smoking is prohibited during the loading, stowing, storing, transportation, or unloading of hazardous materials. The carrier and the master of the vessel are jointly responsible for posting "NO SMOKING" signs in conspicuous locations.

STUDENT CHECK 3

1. The weather deck should be free of what?

3.4.2 Stowage locations.

(CFR Table 172.101 may specify where a given hazardous material may be stowed.)

Deck stowage: refers to the weather deck. If a housing of some sort is used to protect the cargo, that housing must have a permanent opening to the atmosphere, and no opening to people, spaces, or other cargo compartments.

Under deck stowage: refers to a hold or some other compartment below the weather deck. It must be bound by steel walls and be used entirely for cargo and be protected from the weather.

Under deck, away from heat: means an under deck area with a built-in means of ventilation where hazardous material may be stowed.

STUDENT CHECK 4

1. What does “under deck, away from heat” mean?

3.4.3. Material Handling Equipment (MHE).

Break-bulk: (CFR 176.72) A metal bale hook may not be used for handling any package of hazardous material. Some cargo lifting devices are designed to grip and lift boxes by squeezing them. Do not use these devices on boxes of hazardous material unless the boxes are designed to withstand it. Slings and nets must support cargo packages to make sure nothing is dropped.

Power-operated trucks: (CFR 176.78) A power-operated truck (including a power-operated tractor, forklift, or other specialized truck used for cargo handling) may not be used on board a vessel in a space containing a hazardous material, unless the truck conforms to the requirements of the CFR Sec 176.78. The Captain of the Port (COTP) may suspend or prohibit the use of cargo handling vehicles or equipment when the use constitutes a safety hazard.

Restrictions on forklifts are mainly due to additional hazards presented by electrical or chemical energy systems used on the trucks.

Recognized sets of standard are designated by code letters. Nine sets of standards are listed; of these, two are always accepted for Class 1, four more are conditionally acceptable, three are forbidden. ‘EE’ and ‘EX’ are proper, and ‘LPS’, ‘GS’, ‘D’ and ‘DS’ may be used if the COTP agrees.

In addition to the construction and design safety features required, each truck must have at least the following minimum safety features:

- Noise maker
- Overhead guard (exceptions exist)
- Cargo load backrest
- Steering wheel spinner (unless steering system is designed to prevent kick)
- Steering controls are far enough inboard to prevent hand injury when passing close to objects
- One 5 BC or USCG 1B fire extinguisher
- Inspection is done before use by the ship's master or senior deck officer
- Shipboard fire fighting equipment is handy and ready

A truck using gasoline as fuel may not be refueled in the hold or on the weather deck of a vessel unless a portable non-spilling fuel handling system of not over five gallons capacity is used. LPG powered equipment is fueled by fuel tank exchange only. Diesel powered equipment may be refueled by five gallon cans only. Electric powered equipment may be recharged only if connected to a positive vent system. The vent system must be designed so that if the vent is disconnected, charging stops. At no time will five gallon fuel cans be refueled on board.

Trucks may be stowed in any location on board a vessel if the fuel tank has been run dry. If not, they must be stowed on the weather deck.

STUDENT CHECK 5

1. Who may suspend the use of power operated equipment?

3.4.4. Hazardous Materials.

Hazardous materials must be segregated from each other and must be properly segregated from other hazardous materials.

- CFR Table 176.83(b) is a basic guide for segregation. Enter table with Class and Division of hazardous materials involved. The intersection of row and column indicates a footnote number. The footnote specifies type of separation required.
- CFR Sec 176.83(c) illustrates segregation requirements terminology.
- Use CFR Table 176.83(f) for container ships.
- Use Table 176.83 (g) for trailerships or trainships.

STUDENT CHECK 6

1. Name the minimum safety features of a forklift?
2. Can a gasoline powered forklift be refilled on board a vessel?

4.0. Inspection Criteria (Detailed Requirements).

The COTP may assign a USCG supervisory detail to any vessel to supervise the loading, handling, or unloading of Class 1 explosive materials.

The owner, agent, charterer, master, or person in charge of the vessel, and all persons engaged in the handling, loading, unloading, and stowage of Class 1 explosive materials, shall obey all orders that are given by the officer-in-charge of the supervisory detail.

If Class 1 explosive materials are loaded onto or unloaded from a vessel at a facility that is operated or controlled by the Department of Defense, the commanding officer of that facility may decline the USCG supervisory detail. Whenever the supervisory detail is declined, the commanding officer of the facility shall ensure compliance with the regulations.

4.1. Handling precautions for Class 1.

A cargo net with a pallet, shipboard, tray, or pie plate, must be loaded so that only a minimum displacement of packages occurs when it is lifted. A cargo net must completely encompass the bottom and sides of the draft. The mesh of the cargo net must be of a size and strength that will prevent a package in the draft from passing through the net. When a tray is used in handling packages, no packages may extend more than one-third its vertical dimension above the sideboard of the tray. A landing mat must be used when a draft of Division 1.1 or 1.2 (Class A and B explosive) materials is deposited on deck. The landing mat must have dimensions of at least 1 m (3 feet) wide, 2 m (7 feet) long and 10 cm (3.9 inches) thick, and be made of woven hemp, sisal, or similar fiber, or foam rubber, polyurethane, or of a similar resilient material.

4.1.2. Stowage Condition.

Heat and sources of ignition: Class 1 explosive materials must be stowed in a cool part of the ship and must be kept as cool as practicable while on board. Stowage must be well away from all sources of heat, including steam pipes, heating coils, sparks, and flame.

Except where the consignment of Class 1 explosive materials consists only of explosive articles, the wearing of shoes or boots with unprotected metal nails, heels, or tips of any kind is prohibited.

4.1.3. Wetness.

Spaces where Class 1 explosive materials are stowed below deck must be dry. In the event of the contents of packages being affected by water when on board, immediate advice must be sought from the shippers; pending this advice handling of the packages must be avoided.

STUDENT CHECK 7

1. Who may assign USCG supervisory detail to any vessel to supervise the loading?
2. What must be used when a draft of Division 1.1 or 1.2 (Class A and B explosive) materials are deposited on deck?

4.1.4. Electrical Requirement.

Electrical equipment and cables installed in compartments in which Class 1 explosive materials are stowed and do not need to be energized during the voyage must be isolated from their supply so that no part of the circuit within the compartment is energized. The method of isolation may be by withdrawal of fuses, opening of switches or circuit breakers, or disconnection from bus bars. The means, or access to the means, of disconnection/reconnection must be secured by a locked padlock under the control of a responsible person.

Electrical equipment and cables that are energized during the voyage in a cargo space in which Class 1 (explosive) materials are stowed must meet the requirements of loaded aboard a vessel for the safe operation of the ship. All cables must be tested by a skilled person to ensure that they are safe and to determine satisfactory grounding, insulation resistance, and continuity of the cable cores, metal sheathing or armoring.

4.1.5. Lightning Protection.

A lightning conductor grounded to the sea must be provided on any mast or similar structure on a vessel on which Class 1 (explosive) materials are stowed, unless effective electrical bonding is provided between the sea and the mast or structure from its extremity and throughout to the main body of the hull structure. (Steel masts in ships of all welded construction comply with this requirement).

STUDENT CHECK 8

1. How are the switches or circuit breakers secured?

4.1.6. Stowage arrangements under deck.

Ordinary stowage is authorized for most explosive articles carried by a vessel. The exceptions are those of “magazine” or “special” stowage, Class 1 explosive materials.

Magazine stowage is sub-divided into three different types of magazines designated by the letters A, B, and C. A magazine may be a fixed structure in the vessel, a closed freight container, or a portable magazine unit. Freight containers, portable magazines, and vehicles must be properly

secured in position. Magazines may be positioned in any part of the vessel, conforming to the general stowage conditions for Class 1 explosive materials, with the exception of magazines, which are fixed structures and must be constructed in a location in which their doors, where fitted, are easily accessible.

4.1.7. Portable magazine.

Each portable magazine is used for the stowage of Class 1 explosive materials on board vessels and must meet the following requirements:

- It must be weather-tight, constructed of wood or metal lined with wood at least 2 cm (0.787 inch) thick, and with a capacity of no more than 3.1 cubic m (110 cubic feet).
- All inner surfaces must be smooth and free of any protruding nails, screws or other projections.
- If constructed of wood, a portable magazine must be framed of nominal 5 cm X 10 cm (2 X 4 inch) lumber, and sheathed with nominal 20 mm (0.787 inch) thick boards or plywood.
- When constructed of metal, the metal must be not less than 3.2 mm (0.126 inch) thick.
- Runners, bearers, or skids must be provided to elevate the magazine at least 10 cm (3.9 inches) from the deck.
- Padeyes, ring bolts, or other suitable means must be provided for securing.
- If the portable magazine has a door or hinged cover, the door or cover must have a strong hasp and padlock or an equally effective means of securing.
- The portable magazine must be marked on its top and four sides, in letters at least 8 cm (3 inches) high.

4.1.8. Special stowage.

Special stowage is required for certain articles presenting both explosive and chemical hazards, such as smoke or lachrymatory (compatibility group G or H), toxic (compatibility group K), or substances and articles which present a special risk (compatibility group L). Except as permitted in Class 1 explosive, materials requiring special stowage must be stowed on deck unless such stowage is impracticable and the COTP authorizes special stowage below deck.

Class 1 explosive materials for which special stowage is required must be stowed as far away as practicable from living accommodations and working areas, and may not be overstowed. Steel portable magazines and freight containers in which such Class 1 explosive materials are stowed may not be located closer to the vessel's side than a distance equal to one-eighth of the vessel's beam or 2.5 m (8.2 feet), whichever is less.

4.1.9. Deck stowage for Class 1.

Class 1 explosive materials that are stowed on deck must be carried as close to the vessel's centerline as practicable. Class 1 explosive materials may not be stowed within a horizontal

distance of 6 m (20 feet) from any fire, machinery exhaust, galley uptake, locker used for combustible stores, or other potential sources of ignition. They must be clear of walkways and cargo working areas, fire hydrants, steam pipes, and means of access. They must be stowed away from all other facilities necessary for the safe working of the vessel, and not less than a horizontal distance of 8 m (26 feet) from the bridge, accommodation areas, and lifesaving appliances. Where vessels are fitted with container fastening arrangements, freight containers containing Class 1 (explosive) materials may be overstowed by containers of compatible Class 1 explosive materials or non-hazardous cargo. Where vessels are not fitted with container fastening arrangements, freight containers loaded with Class 1 explosive materials may be stowed only on the bottom tier of the stowage.

STUDENT CHECK 9

1. What are the three types of magazine stowage?

4.2. Segregation of Class 1 explosive material.

Class 1 explosive materials must be segregated from other packaged hazardous materials.

Class 1 explosive materials must be segregated from bulk solid dangerous cargoes in accordance with the General Introduction to the IMDG Code. Notwithstanding, ammonium nitrate and sodium nitrate may be stowed together with blasting explosives, except those containing chlorates, provided the mixed stowage is treated as blasting explosives or hazardous materials of extreme flammability.

Except as allowed, certain hazardous materials of extreme flammability may not be transported in a vessel carrying Class 1 explosive materials.

This prohibition applies to the following hazardous materials:

Carbon disulfide.....	UN 1131	Class 3.
Diethyl zinc.....	UN 1366	Division 4.2.
Dimethyl zinc.....	UN 1370	Division 4.2.
Magnesium alkyls.....	UN 3053	Division 4.2.
Nickel carbonyl.....	UN 1259	Division 6.1.
Pyrophoric liquids, n.o.s.....	UN 2845	Division 4.2.

5.0. Fire safety precautions.

- During loading and unloading operations, no matches, lighters, etc. are allowed on or near Class 1 carrying vessels (unless COTP authorizes).
- Fire hose(s) must be laid out, connected, ready to use, and be sufficient to reach all parts of the loading area.
- Use electric lights only (no arc lights).

- Radios and radar off at main switch, and switch marked to prevent accidental closing during operations.
- Do not refuel the ship.
- Do not load damaged packages (Don't repair or repackage on board, either).
- Maintain adequate security against unauthorized entry.
- Welding, burning, flame cutting, hot riveting and the like are emergency only events. If the vessel is in port, the COTP must approve.
- Each explosives stowage compartment must have a built-in fire extinguishing system.
- Vessels must have two sets of breathing apparatus.
- There must be a fire pump with power source and connections that is outside the machinery space.

STUDENT CHECK 10

1. How many breathing apparatus must be on a vessel?

6.0. Loading Class 1 on Board Passenger Vessels.

Only the following Class 1 explosive materials may be transported as cargo on passenger vessels:

- Division 1.4 (Class C explosive) materials, Compatibility Group S. Explosive articles designed for lifesaving purposes if the total net explosive weight does not exceed 50 kg (110 pounds).
- Class 1 explosive materials in Compatibility Groups C, D, and E, if the total net explosive weight does not exceed 10 kg (22 pounds) per vessel.
- Articles in Compatibility Group G other than those requiring special stowage, if the total net explosive weight does not exceed 10 kg (22 pounds) per vessel.
- Articles in Compatibility Group B, if the total net explosive weight does not exceed 5 kg (11 pounds).
- Class 1 explosive materials which may be carried on passenger vessels. They must be stowed in accordance with the following table:

Table 176.166(b).—Stowage Arrangements in Passenger Vessels

Goods shipped under a specific proper shipping name

Class/Division	Samples, explosive	Goods, N.O.S.					Compatibility group												
		Class 1					A	B	C	D	E	F	G	H	J	K	L	N	S
1.1.....	d.....	d.....	c...	e...	e...	e...	e...	c...	e...	--.	c...	--.	c...	--.	--				
1.2.....	d.....	d.....	--.	e...	e...	e...	e...	c...	e...	c...	c...	c...	c...	--.	--				
1.3.....	d.....	d.....	--.	--.	e...	e...	--.	c...	e...	c...	c...	c...	c...	--.	--				
1.4.....	d.....	d.....	--.	b...	b...	b...	b...	c...	b...	--.	--.	--.	--.	--.	a				
1.5.....	d.....	d.....	--.	--.	--.	e...	--.	--.	--.	--.	--.	--.	--.	--.	--				
1.6.....	d.....	d.....	--.	--.	--.	--.	--.	--.	--.	--.	--.	--.	--.	--.	e...	--			

- a—As for cargo ships, on deck or under deck.
- b—As for cargo ships, on deck or under deck, in portable magazines only.
- c—Prohibited.
- d—As specified by the Associate Administrator for Hazardous Materials Safety, or the competent authority of the country in which the Class 1 (explosive) materials are loaded on the vessel.
- e—In containers or the like, on deck only.

STUDENT CHECK 11

(1) Can Class 1 (explosive) materials in groups C, D and E be stowage on a passenger vessel if the NEW is 12kg (25 pounds) per vessels?

6.1. Inspection of cargo.

Manned vessels: The carrier, its agents, or any person they designate to inspect the cargo will inspect each hold or compartment containing hazardous materials after stowage is complete. Afterwards, there will be an inspection at least once every 24 hours, weather permitting, in order to ensure that the cargo is in a safe condition and that no damage has been sustained from shifting, spontaneous heating, leaking, sifting, wetting, or any other cause to the vessel or its cargo since loading and stowage. However, freight containers or individual barges need not be opened. A vessel’s holds that are equipped with smoke or fire detecting systems and have an automatic monitoring capability need not be inspected except after stowage is complete and after periods of heavy weather. There will be an entry in the vessel’s deck log book for each inspection of the stowage of hazardous materials performed.

Unmanned and magazine vessels: An inspection of the cargo must be made after stowage has been completed to ensure that stowage has been accomplished properly and that there are no visible signs of damage to any packages or evidence of heating, leaking, or sifting. This inspection must be made by the individual who is responsible to the carrier and who is in charge

of loading and stowing the cargo on the unmanned vessels or the individual in charge in the case of a magazine vessel.

The carrier, its agents, or any person they designate will inspect the cargo immediately prior to entering a port in the United States. When inspecting a cargo of hazardous materials capable of evolving flammable vapors, any artificial means of illumination must be of an explosion-proof type.

7.0. Summary.

This lesson covered the requirements for port operations involving vessels; the common terms used on a ship, inspection criteria, loading and unloading operations, fire safety, segregation requirements, and the regulations governing these activities.

STUDENT CHECK SOLUTIONS

STUDENT CHECK 1 SOLUTIONS

1. Answer: Ahead: When the whole ship moves forward.
Reference: Paragraph 2.0.
2. Answer: Aft: When someone on board moves toward the stern.
Reference: Paragraph 2.0.

STUDENT CHECK 2 SOLUTIONS

1. Answer: The carrier.
Reference: Paragraph 3.3.
1. Answer: One year.
Reference: Paragraph 3.3.

STUDENT CHECK 3 SOLUTION

1. Answer: Debris that creates a fire hazard or is a hazardous condition for persons engaged in handling hazardous materials.
Reference: Paragraph 3.4.1.

STUDENT CHECK 4 SOLUTION

1. Answer: Under deck area has a built-in means of ventilation where hazardous material may be stowed.
Reference: Paragraph 3.4.2.

STUDENT CHECK 5 SOLUTION

1. Answer: The Captain of the Port.
Reference: Paragraph 3.4.3.

STUDENT CHECK 6 SOLUTIONS

1. Answer:
 - Noise maker (bell, whistle, gong, horn).
 - Overhead guard (exceptions exist to this requirement).
 - Load cargo backrest.
 - Steering wheel spinner (unless steering system is designed to prevent kick).
 - Steering controls far enough inboard to prevent hand injury when passing close to objects.
 - One 5 BC or USCG 1B fire extinguisher.

Reference: Paragraph 3.4.3.

2. Answer: No.
Reference: Paragraph 3.4.3.

STUDENT CHECK 7 SOLUTIONS

1. Answer: The COTP.
Reference: Paragraph 4.0.
2. Answer: A landing mat.
Reference: Paragraph 4.1.

STUDENT CHECK 8 SOLUTION

1. Answer: Secured by a locked padlock under the control of a responsible person.
Reference: Paragraph 4.1.4.

STUDENT CHECK 9 SOLUTION

1. Answer: Special Stowage.
Deck Stowage
Portable Magazine
Reference: Paragraph 4.1.7.

STUDENT CHECK 10 SOLUTION

1. Answer: Two.
Reference: Paragraph 5.0.

STUDENT CHECK 11 SOLUTION

1. Answer: No.
Reference: Paragraph 6.0.