

# CHAPTER 6

## SAFETY AND HAZARDOUS MATERIALS INFORMATION FOR THE PETTY OFFICER

Personnel safety is the responsibility of all hands. Without personnel safety, many injuries and deaths would occur. The Navy has lost many man hours and good people because safety procedures were not practiced continuously. As you study this topic, you will see the various aspects of personnel safety. Personnel safety is important to each of us, and this topic explains why.

### SAFETY

**Learning Objectives:** Recognize the necessity for work center and job site safety. Recall how to perform duties of a divisional safety petty officer. Recall the purpose and function of the command's safety council. Recall how to conduct safety awareness training. Identify the procedures to audit the tag-out log.

*...out of this nettle, danger, we pluck this  
flower, safety.*

—William Shakespeare  
Henry IV, I.3

Safety rules and regulations concern all of us, regardless of the job to which we are assigned. All types of tasks, from the simplest to the most hazardous, have safety regulations. We often will not observe safety precautions unless we are fully aware of the dangers involved. Therefore, as a petty officer, you are responsible for ensuring that other personnel are aware of the dangers and know the safety precautions to combat these dangers.

The objective of any safety program is to improve operational readiness by reducing personnel deaths and injuries and by decreasing material loss and damage. To achieve that objective, you should ensure safety is an all-hands effort that is set in motion and monitored by the entire chain of command.

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### REVIEW QUESTION

- Q1. The objective of any safety program is to improve operational readiness.
1. True
  2. False

### ORGANIZATIONAL SAFETY RESPONSIBILITIES

Ultimate responsibility for the safety of the unit lies with the commanding officer, and each individual plays a part in that safety. The commanding officer can enhance the safety program of the ship or unit, but you are also important to the success of the program. Specific safety responsibilities of the commanding officer, safety officer, department and division safety officers, and master-at-arms/safety force can be found in *Basic Military Requirements*, NAVEDTRA 14277. You may be involved in the program at many different levels. For example, you may be assigned the duty of division safety petty officer early in your career. Later, you may be responsible for training others in safety.

### Division Safety Petty Officer

The division safety petty officer reports directly to the division safety officer in all matters concerning division safety. In performing this duty, the division safety petty officer is responsible for the following:

- Becoming thoroughly familiar with all safety directives and precautions concerning the division
- Conducting assigned division mishap prevention training and maintaining appropriate records
- Assisting in mishap investigations as directed
- Making recommendations about the safety program to the division safety officer
- Assisting the division safety officer in the execution of assigned safety duties
- Acting as a technical adviser on matters of mishap prevention within the division
- Serving on the safety committee or council

## REVIEW QUESTION

- Q2. Who is responsible for mishap prevention training and maintaining appropriate records?
1. Executive officer
  2. Command master chief
  3. Division safety petty officer
  4. All hands
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### Safety Council

Some large commands may have a safety organization, which starts with a departmental safety council that sends a representative to a command level safety council. As the division safety petty officer, you may serve as the representative of your division to a department or command safety council. Members of the department safety council will consist of the department head or department representative, department safety officer, and divisional representatives.

On the command level, the safety council convenes monthly to develop recommendations for policy on safety matters and to analyze progress of the overall safety program. The command's safety council is composed of the commanding officer or executive officer (chairperson), the unit safety officer (recorder, when not the executive officer), department heads, senior enlisted adviser/command master chief, and a medical department representative. The safety officer prepares an agenda in advance of each meeting. The agenda reflects the extent of any problem(s) and documents the need to take action. The safety council suggests ways to resolve problems submitted by the safety committee or any other unit members. The safety council also reviews all statistics compiled by the safety officer and hears medical department representative's reports on injuries. The council also hears from department heads on all other mishaps that occur within their departments. Further, the safety council reviews the recommendations of the enlisted safety committee and, by endorsement of the commanding officer, indicates which actions are being considered.

## REVIEW QUESTION

- Q3. What is the purpose of the command safety council?
1. Mandate safety policy
  2. Enforce safety policy
  3. Develop recommendations on safety policy
  4. Conduct safety training
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### Individual Responsibilities

**SAFETY IS AN ALL-HANDS RESPONSIBILITY.** So what are *your* responsibilities for safety? Your personal responsibilities for safety—everywhere and at all times—are as follows:

- Observe all the precautions related to your work or duty. You may have gotten by with being careless with safety rules in the past, but your luck will not hold out forever. If you continually cross a street without looking, eventually a vehicle will hit you.
- Report unsafe conditions or any equipment or materials you think might be unsafe. Do not just walk by an open manhole or turn in a cracked tool without saying anything. **REPORT IT AND FOLLOW UP WITH CORRECTIONS!**
- Warn others of hazards. If you see persons knowingly, or unknowingly, placing themselves or others in danger, say something. If necessary, report the situation to your supervisor.
- Report any injury or ill health to your supervisor. A splinter in your finger or a scratch on your leg, if treated immediately, usually will cause no further trouble. However, if an injury is left untreated, infection may set in. A 10-minute trip to sick bay may save you a 10-day stay there. A person who keeps working while feeling dizzy or nauseated is risking injury or death.
- Wear or use protective clothing or equipment. If you are issued a hard hat for work, wear it. The same rule applies to safety shoes, goggles, respirators, hearing protectors, rubber gloves, and similar safety equipment.

- Be safety conscious. Always remain alert to possible danger. Use your senses of sight, smell, touch, and hearing.

- Always inspect equipment and associated attachments for damage before using the equipment. Check the safety precautions that pertain to each piece of equipment. Be sure the equipment is suited to the job. For example, never use a 10,000-rpm grinding wheel on a grinder that operates at 15,000 rpm.

### Master-at-arms/Safety Force

The master-at-arms (MAA)/safety force is a vital link in the unit safety organization. You may be assigned as a division safety petty officer or as a member of the safety force because you are a petty officer. The MAA/safety force acts as a roving inspector for hazards and risks (unsafe work practices) that could result in injury to personnel or damage to equipment. The safety force also assists the safety officer in keeping the safety program visible to all personnel as well as ensuring that the program is a workable system.

A good safety program is improved through MAA/safety force inspections and through a system of internal reporting. These inspections focus command attention on material deficiencies and operating practices that may harm personnel and equipment. As a division safety petty officer, you should make every effort to support the members of the MAA/safety force, as they are the key to a safe working environment.

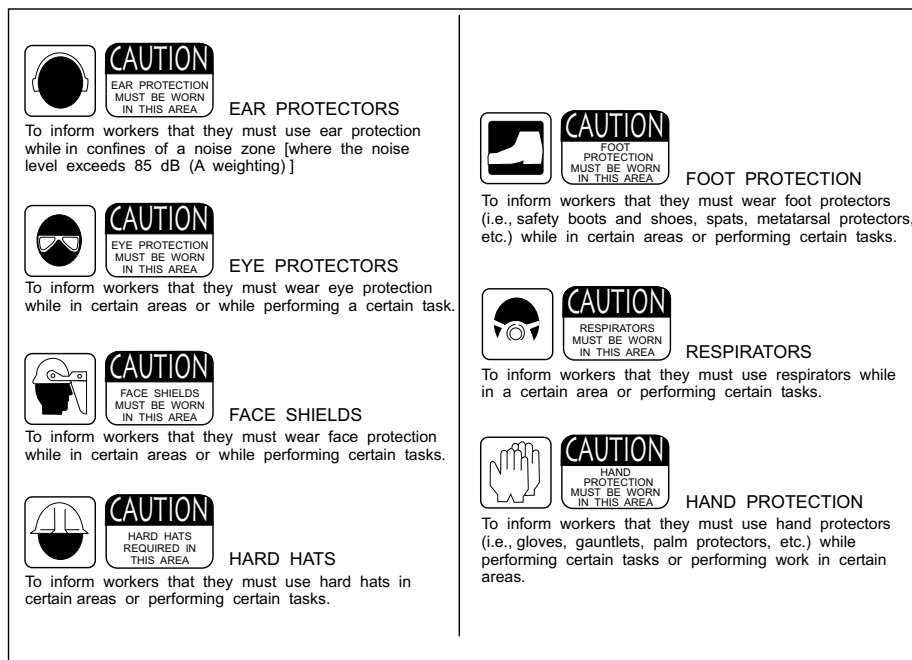
### Promoting Safety

Why do we always promote safety? The Navy wants to keep you as safe as possible for as long as possible. That's where the safety program comes in. By promoting safety on and off the job, you improve your chances of living a long life and having a fulfilling naval career.

You can promote safety within your division in various ways. One way is through the use of posters. A picture is said to be worth a thousand words; but, in this case, a picture may be worth a thousand lives. Use posters as safety reminders. Change or rotate safety posters regularly to different workspaces to draw attention to them. When personnel see the same posters in the same place for months, they start to view them as part of the bulkhead. They then begin to ignore the posters; write on them; and cover them with notices, schedules, and watch bills.

Warning and caution signs are also effective in promoting safety. For example, figure 6-1 shows signs indicating the type of personal protective equipment a person should use when involved in a potentially hazardous operation. Other signs are shown in figures 6-2 and 6-3.

Another helpful method of promoting safety within a division is periodic safety patrols or inspections made by the division safety petty officer.



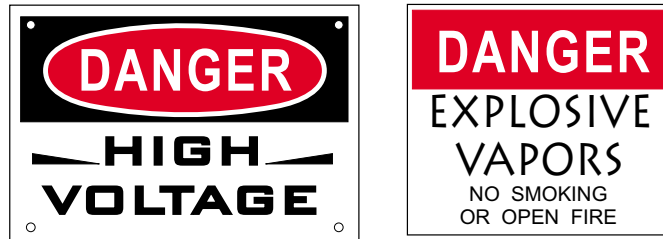
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Figure 6-1. Personal protective caution signs.



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Figure 6-2. Laser warning signs.



MRP310603

Figure 6-3. Typical warning signs.

## REVIEW QUESTION

- Q4. Which of the following items promotes safety awareness?
1. Posters
  2. Caution signs
  3. Inspections
  4. All of the above

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## EQUIPMENT TAG-OUT PROCEDURES

Post DANGER tags, CAUTION tags, and instrument OUT-OF-COMMISSION tags or OUT-OF-CALIBRATION labels following authorized procedures. Those tags and labels will help ensure the safety of personnel and prevent improper operation of equipment. Do not remove or break posted safety tags without proper authorization. Chapter 6 of *Standard Organization and Regulations of the U.S. Navy*, OPNAVINST 3120.32, contains basic guidelines and standardized procedures for tag-out procedures. *Basic Military Requirements*, NAVEDTRA 14277, discusses the tag-out procedures in detail. In this topic the purpose of the tag-out bill, tag-out logs, record sheets, and audits will be presented.

### Purpose

An equipment tag-out bill has three purposes. The first purpose is to provide a procedure for personnel to use to prevent the improper operation of a component, piece of equipment, a system, or portion of a system that is isolated or in an abnormal condition. The second purpose is to provide a procedure for personnel to use in operating an instrument that is unreliable or not in a normal operating condition. This procedure is similar to the tag-out procedure except that it requires the use of labels instead of tags to indicate instrument status. The last purpose is to provide separate procedures for personnel to use when accomplishing certain planned maintenance system (PMS) maintenance actions. These procedures apply only to non-nuclear surface ships and craft and non-nuclear, non-propulsion areas of nuclear surface ships. PMS tag-out procedures are not authorized aboard submarines, submarine tenders, submarine rescue vessels, in propulsion areas of nuclear surface ships, or within submarine support facilities.

All U.S. Navy ships and repair activities must use standardized tag-out procedures.

## Tag-out Logs

Tag-out logs are used to control the entire tag-out procedure. The number of tag-out logs required depends on ship size. For example, a minesweeper may only require one tag-out log for the whole ship, while a major surface combatant may require a separate log for each department. Individual force commanders specify the number of logs that various ship classes must maintain and what areas of the ship must maintain them.

On ships maintaining more than one tag-out log, authorizing officers must exchange information concerning tag out actions. When a tag out affects other authorizing officers, the initiating party obtains verbal permission from those officers to tag out the system or equipment in question before the tag out is authorized. Examples of systems that may require such coordination are ship service electrical distribution, hydraulics, air, ventilation, and air conditioning chill water systems.

The tag-out log is a record of authorization of each effective tag out action. It contains the following documents:

- A copy of the main instruction and any other amplifying directives for administering the system. (These documents are kept in the front of the log.)
- A DANGER/CAUTION tag-out index and record of audits (index/audit record). (The index/audit record provides a sequential list of all tag outs and ensures serial numbers are sequentially issued. They also are used in audits of the log to provide a ready reference of existing tag outs. The cognizant department head may remove the index pages with all tag outs listed as cleared.)
- Cleared DANGER/CAUTION tag-out record sheets that have been cleared and completed. (These sheets are kept in the log until received and removed by the cognizant department head.)

Tags in a common system (for example, ship's radar or a fire-control system) are logged on one DANGER/CAUTION tag-out record sheet. Subsequent sheets on the same system are kept together.

**RECORD SHEETS.**—Some ships going through an overhaul have used between 2,000 and 3,000 DANGER/CAUTION tags. Ship's personnel use the record sheets to keep track of all these tags. The front of the record sheet contains the name of the system or component, serial number of the tag out, date/time of tag out issue, and reason for the tag out. The sheet also contains a place for documentation (blueprints, rip outs, etc.) and authorizing signatures. On the back of the

record sheet, you will find a record of the numbers of the tags, the persons hanging the tags, and the persons second checking all the tags. It also contains the authorization for clearance of the tags by the authorizing officer and the repair activity representative. The record includes the date and time of removal of the tags along with the initials of the person(s) removing them. After the tags have been cleared and the record sheet is properly filled out for the removal of the tags, place the sheet in the back of the tag-out log in the cleared section for destruction at a later time. Record the date and time cleared in the tag-out index/audit record.

**AUDITS.**—Audits are an important part of the tag-out system. Audits are required at least every 2 weeks; nuclear-powered ships require audits weekly under some conditions. Audit all outstanding tag-out sheets against the index/audit record section. As part of the audit, check each tag-out record sheet for completeness and check the installed tags. Make sure the positions of valves or switches haven't been changed from the description on the tag, the label, and the record sheet. Log the date and time on each tag-out record sheet. Note any discrepancies you found (if you found none, note that also) followed by your signature. Your signature verifies the log is up to date and tags and/or labels have been visually inspected.

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### REVIEW QUESTIONS

- Q5. The number of tag-out logs required depends on the size of the ship.
1. True
  2. False
- Q6. After the tags are cleared and the record sheet is filled out, where should you place the sheet?
1. At the front of the tag-out log
  2. At the back of the tag-out log in the cleared section
  3. In the index/audit record
  4. In the documentation file

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### HAZARDOUS MATERIALS

**Learning Objectives:** Define hazardous material and recall the sources of information for using, handling, and disposing of hazardous material. Recognize the importance of instructing personnel in work-related

hazards, safety precautions, and in the use and maintenance of personal protective equipment and clothing. Recall the types of cleaning solvents and the safety precautions for handling and using solvents. Recognize proper safety, handling, and inspection procedures when disposing of hazardous materials.

We use hazardous materials (HAZMATS) daily, afloat and ashore, in maintenance, repair, and cleaning. We could not maintain our operational effectiveness without using hazardous materials. In using HAZMATS, however, we may also produce hazardous waste.

We can use hazardous materials effectively and safely if we take care in their handling, storage, and disposal. To help ensure our safety, the Occupational Safety and Health Administration (OSHA) passed a regulation called *Hazard Communication Standard*, 29 CFR 1910.1200. Since DoD and SECNAV have adopted that regulation, all civilian and military employees of the federal government must comply with the regulation.

If handled improperly, the hazardous materials you must use to do your job can be hazardous to your health, the health of others, and the environment. Therefore, you have the right to be trained in the use of HAZMATS and to know any information about those materials that could threaten your safety or health.

To protect your rights and to ensure personnel comply with OSHA and Environmental Protection Agency (EPA) regulations, the Navy has developed a hazardous material control and management program. The *Environmental and Natural Resources Program Manual*, OPNAVINST 5090.1(Series); *Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat*, OPNAVINST 5100.19 (Series); and *Navy Occupational Safety and Health (NAVOSH) Program Manual*, OPNAVINST 5100.23 (Series), contain hazardous material control and management information.

The Naval Supply Systems Command manages the overall program for hazardous material control and management for the Navy. The program's objectives are as follows:

- Minimize the amount of hazardous materials in use.
- Use hazardous materials safely.
- Decrease the amount of hazardous waste we produce.

## DEFINITION OF HAZARDOUS MATERIAL

What is hazardous material? “Hazardous material” can be defined as any material that, because of its quantity, concentration, or physical or chemical characteristics, may pose a real hazard to human health or the environment. Hazardous materials include the following categories:

- Flammable and Combustible Material
- Toxic Material
- Corrosive Material
- Oxidizers
- Aerosols
- Compressed Gases

Separate directives cover some materials considered hazardous. They include mercury; asbestos; propellants; bulk fuels; ammunition; medical waste; and chemical, biological, and radiological materials.

Afloat units turn in used or excess HAZMATS to Public Works Centers or other shore collection sites. The shore site then restores, recycles, or disposes of the used or excess hazardous materials.

## HAZARDOUS MATERIALS INFORMATION SYSTEM

The Hazardous Materials Information System (HMIS) is a computerized database of material safety data sheets (MSDSs). It provides information for people working in hazardous material management. The system provides basic technical information required for all levels of hazardous materials to aid in their proper handling, storage, transportation, and disposal. In addition, HMIS provides information about safety, health, and environmental functions.

The HMIS database provides useful information on more than 70,000 hazardous materials used by DoD. The Naval Supply Systems Command distributes the database quarterly as part of the *Hazardous Material Control and Management (HMC&M)* CD-ROM, which contains the following materials:

- HMIS database with MSDSs and labels
- *Ship Hazardous Material List (SHML)*
- *Shelf Life Management Chart*
- *Hazardous Material User’s Guide (HMUG)*
- *Shipboard Safety Equipment Shopping Guide*

- *Glossary of Hazardous Terms*
- *HMIS/HMC&M Feedback Form*
- *Navy Inventory Control Point SHML Feedback Report*
- *DOT Guides*
- *Tutorial for hardware and software*

Each ship and most shore stations have been issued a computer compact disk (CD) player and are on distribution for *HMC&M* updates.

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## REVIEW QUESTION

- Q7. Occupational Safety and Health Administration passed a regulation that requires all civilian and military employees of the federal government to comply with what regulation?
1. *Hazardous Material Control and Management*
  2. *Hazard Material and Refuse Management*
  3. *Hazard Communication Standard*
  4. *Hazardous and Toxic Material Disposal*

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## WORK CENTER SUPERVISORS RESPONSIBILITIES

Work center supervisors have the following responsibilities when working with HAZMATS:

- Ensure that approved personal protective clothing and equipment are maintained and used.
- Ensure that prior to initial use or handling any hazardous materials, workcenter personnel have been trained on the hazards associated with that material and are familiar with what an MSDS is, what it contains, and where a copy is available for review.
- Ensure that, prior to using any hazardous material, personnel under their supervision are trained on the hazards associated with that material, and that they have been provided with necessary protective clothing and equipment (i.e., eye protection, respirators, gloves).
- Ensure that adequate supply and exhaust ventilation is maintained in all spaces where hazardous materials are used, that such systems are in good operating condition, and that they have been evaluated as adequate by the industrial hygiene survey team. Keep ventilation intakes clear of hazardous material at all times.

## REVIEW QUESTION

Q8. When personnel are working with hazardous material, supervisors are NOT responsible for ensuring that approved personal protective clothing and equipment are maintained.

1. True
2. False

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## CLEANING SOLVENTS

As a petty officer third class, you may be assigned the task of supervising a cleanup detail. No matter what the job—from paint removal to swabbing the decks—precautions must be taken to guard against the careless use of cleaning solvents. Take for example the Sailor who did not read the labels on the cleaning materials he was using to clean a commode. While using a chlorine-based cleaner to clean the commode, he decided to clean the drains at the same time. Therefore, he added a granulated drain cleaner to the commode containing the chlorine-based cleaner and then left the head. A few minutes later, he heard a loud explosion. The chemical reaction of the drain cleaner and the chlorine-based cleaner caused an explosion in the commode. Luckily, no one was hurt, but the head was a mess.

### Precautions

Solvents used in paints, adhesives, rubber and plastic materials, and in degreasing solutions can be hazardous to your health. Most solvents are toxic and, with a few exceptions, are flammable. Appropriate measures must be taken to reduce their toxic and flammable effects. In addition, solvents that come in contact with your skin can cause serious skin problems. When using solvents, always observe the following precautions:

- MAKE sure the space in which you are working has adequate ventilation.
- WEAR protective clothing, goggles, respirators, gloves, and other appropriate equipment.
- MAKE sure accessible fire-fighting equipment is nearby.
- TAKE every precaution to prevent excessive vapors from contaminating the air.

- CHECK the labels on all containers of liquids.
- WIPE up spilled solvents immediately.
- AVOID contact with your eyes, skin, or clothing. You should NEVER swallow solvents and should always avoid breathing the vapors.
- KEEP solvent containers tightly closed when you are not using them.
- CHECK containers for leakage; if a container is defective, transfer the solvent to a new container.
- MAKE sure containers are empty before you discard them. You must observe the approved practices for disposal of solvents, cleaners, and their containers.
- LABEL all containers used to store solvents.
- READ and comply with all instructions and precautions on the label.

For information on cleaning solvents, refer to *Naval Ships' Technical Manual (NSTM)*, chapter 631.

When working with solvents, you must stress safety precautions to your people. Solvents should NEVER be used in an unventilated space under any circumstances. Special clothing requirements also must be observed when using some solvents. As a petty officer, you MUST make sure all safety precautions are observed at all times. Laxity on anyone's part could cause a mishap, resulting in injuries or even deaths. By observing safety precautions, you and your people will reduce mishaps and save lives.

Damage to containers, including dents, pitting, rust, creases, cracks, and damage to closures and gaskets, may lead to leakage and dangerous spills. Containers in flammable liquid stowage facilities will be inspected weekly. Containers of other hazardous materials will be inspected monthly and inventoried quarterly. *OPNAVINST 5100.19 (Series)* describes proper stowage, handling, container inspection, and disposal of hazardous general-use combustibles.

### Types of Solvents

As mentioned throughout this topic, the Navy uses many types of solvents for a multitude of cleaning assignments. Many of these solvents are highly toxic and some are highly flammable. You must take special care when using many of these solvents; make sure you store them in cool, dry areas. *NSTM*, chapter 631, contains a list of approved solvents and their flash



points (lowest temperature at which vapors ignite in air when exposed to flame). Figure 6-4 shows a list of commonly used solvents approved by the Navy and the flash points of these solvents. *OPNAVINST 5100.19 (Series)* describes proper stowage, handling, and disposal of these solvents.

Most cleaning solvents contain toxic substances. These substances can cause injuries if they are inhaled, absorbed by the skin, or ingested. All toxic materials must be handled carefully to prevent injury. The following paragraphs contain information about two general categories of toxic cleaning solvents. There is another type—fluorocarbon refrigerants and solvents; however, special approval is required to obtain and use them. If you have any questions about the solvent you are going to use, check the maintenance requirement cards (MRCs) for the task; ask your supervisor; or check the *NSTM*, chapters 631 and 670.

**CHLORINATED - CLEANING SOLVENTS.**—Chlorinated-cleaning solvents can be highly toxic if used improperly. They may be irritating to the skin and toxic if ingested. Toxic vapors may cause damage to the lungs, eyes, and nervous system when the vapors are present in confined spaces, in spaces with inadequate ventilation, or when the vapor concentration is increased by heating. Solvents decompose at high temperatures and produce gases more toxic than the solvents themselves. Solvents react with alkalis, oxidizers, and powdered metals to produce toxic gases.

Common types of chlorinated-cleaning solvents are trichloroethane (inhibited methylchloroform), trichloroethylene, tetrachloroethane, and tetra-chloroethylene (perchloroethylene, dry-cleaning solvent). Because of the extreme dangers involved, the Navy severely restricts the use of these solvents. For detailed restriction information on solvents, refer to *NSTM*, chapter 670, section 3.

Solvent	Flashpoint (closed up)
Acetone	-17.8 °C (0 °F)
Amyl acetate	28.9 °C (84 °F)
Butyl acetate	28.9 °C (84 °F)
n-Butyl alcohol	35.0 °C (95 °F)
Butyl carbitol (diethylene glycol monobutyl ether)	101.0 °C (214 °F)
Butyl cellosolve (ethylene glycol monobutyl ether)	60.0 °C (140 °F)
Carbitol (diethylene glycol monoethyl ether)	95.5 °C (204 °F)
Cellosolve (ethylene glycol monoethyl ether)	42.0 °C (108 °F)
Cellosolve acetate (ethylene glycol monoethyl ether acetate)	51.1 °C (124 °F)
Cyclohexanone	43.9 °C (111 °F)
Diacetone alcohol	47.2 °C (117 °F)
Ethyl acetate	-4.4 °C (24 °F)
Ethyl alcohol	12.8 °C (55 °F)
High-flash naptha	43.3 °C (110 °F)
Isobutyl acetate	17.8 °C (64 °F)
Isobutyl alcohol	27.8 °C (82 °F)
Isophorone	81.7 °C (179 °F)
Isopropyl alcohol	11.7 °C (53 °F)
Methyl n-butyl ketone	22.8 °C (73 °F)
Methyl cellosolve (ethylene glycol monomethyl ether)	41.7 °C (107 °F)
Methyl cellosolve acetate (ethylene glycol monomethyl ether acetate)	49.4 °C (121 °F)
Methyl ethyl ketone	-1.1 °C (30 °F)
Methyl isobutyl ketone	15.6 °C (60 °F)
Mineral spirits (paint thinner)	42.8 °C (109 °F)
SOLVATONE solvent M	25.6 °C (78 °F)
Dry cleaning solvent, type II	58.9 °C (138 °F)
Styrene	32.2 °C (90 °F)
Toluene	4.4 °C (40 °F)
Turpentine	35.0 °C (95 °F)
VM&P naptha	-6.6 °C (20 °F)
Xylene	17.2 °C (63 °F)

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Figure 6-4. Approved Navy solvents.

Never stow chlorinated-cleaning solvents near heat sources or open flames. Do not allow them to come in contact with hot surfaces. Make sure stowage areas are well ventilated and monitored regularly by the gas-free engineer. Additionally, do not stow these solvents near incompatible materials. Incompatible materials include strong alkalis, such as sodium hydroxide; oxidizers, such as calcium hypochlorite and sodium nitrate; and powdered metals, such as aluminum.

When handling chlorinated-cleaning solvents, wear the following personal protective equipment (PPE):

- Neoprene gloves
- Safety goggles that will protect against splashes or a face shield
- A chemical cartridge respirator for protection against small amounts of organic vapors or for protection for a short duration; or an air line respirator (or some other type of supplied-air respirator) if use is extensive or in a confined space

- Coveralls

Make sure work areas in which you use chlorinated-cleaning solvents have proper ventilation. For enclosed spaces, an air change every 3 minutes is recommended. Consult the gas-free engineer to determine if the ventilation is adequate.

#### **ORGANIC-CLEANING SOLVENTS.—**

Organic-cleaning solvents include toluene, xylene, some alcohols, acetone, methyl ethyl ketone, ethyl acetate, dry-cleaning solvent (PD-680, Type II), kerosene, petroleum, ether, turpentine, morpholine, and other related compounds. These compounds are highly flammable and moderately to highly toxic. Some also cause corrosion. Inhalation of concentrated vapors may cause dizziness, nausea, or vomiting.

Stow organic-cleaning solvents in a flammable liquid storeroom, or flammable liquid lockers, according to *OPNAVINST 5100.19 (Series)*, Chapter C23, Appendix C23-C. Keep the solvents away from heat, open flames, or spark-producing devices. Stow them away from oxidizers, such as calcium hypochlorite, sodium nitrate, and hydrogen peroxide.

When handling organic-cleaning solvents, wear the following PPE:

- Neoprene gloves
- Safety splash goggles
- Coveralls (recommended)

In addition, if vapors accumulate over 100 parts per million (ppm), wear an oxygen-breathing apparatus (OBA) and notify the gas-free engineer.

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### **REVIEW QUESTIONS**

- Q9. When working with solvents, which of the following actions should you take?
1. Make sure the space in which you are working does not have adequate ventilation
  2. Remove protective clothing if it gets too hot
  3. Leave spilled solvents on the deck
  4. Check the labels on all containers of liquid
- Q10. Most cleaning compounds do NOT contain toxic substances.
1. True
  2. False

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#### **DISPOSAL OF HAZARDOUS MATERIAL.—**

When it becomes necessary to dispose of any hazardous material, it is important to consult with the command's hazardous material control authority. Containers of unused, contaminated, toxic, corrosive, and so forth, material have different guidelines for disposal. Absorbents used in cleaning, applying, or packing HAZMATS should be treated using the same precautions followed for the hazardous material they absorbed. The many procedures and directives that govern the disposal of hazardous material are constantly changing and being updated. As mentioned earlier, supervisors are charged with following established safety procedures. *OPNAVINST 5100.19 (Series)*, gives further details on disposal of hazardous material.

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### **REVIEW QUESTION**

- Q11. Absorbents used in cleaning, applying, or packing hazardous materials will be treated and disposed of using the same precautions followed for the material they absorbed.
1. True
  2. False

## CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL (CBR) DEFENSE

**Learning Objectives:** Recall the types of risk assessments used to evaluate the appropriate levels of Mission Oriented Protective Posture (MOPP). Recall the four levels of MOPP and the associated countermeasures. Identify the use of chemical, biological, and radiological (CBR) protective clothing and equipment for each level of MOPP. Recall how to instruct personnel on entering, exiting, and personal cleaning in the collective protective system (CPS) decontamination station.

This topic will present the use of chemical, biological, and radiological (CBR) protective clothing and equipment for each level of Mission Oriented Protective Posture (MOPP) and the types of risk assessments used to evaluate the appropriate levels of MOPP. For basic information on CBR you should study the *Basic Military Requirements*, NAVEDTRA 14277.

### MISSION ORIENTED PROTECTIVE POSTURE

MOPP procedures are used to establish levels of readiness for a chemical agent attack. The procedures are flexible. They allow the commanding officer (CO) to adapt the requirements for protective clothing and equipment to the degree of the threat and working conditions at any given time. As an example, personnel doing heavy work in hot weather may suffer heat exhaustion in heavy protective clothing and gas masks. Therefore, unless an attack is actually under way, the CO may relax the protective clothing requirements to prevent certain injury or sickness from heat. Other examples include personnel who cannot do their work wearing protective gear, those who need to eat or attend to body functions, and those who must meet other requirements not possible in protective clothing. The command decision to implement each level of MOPP must be the result of a risk assessment.

### RISK ASSESSMENT

Risk is defined as the assessed difference between the threat level and the activation of appropriate levels of shipboard countermeasures. The risk of casualties and contamination must be evaluated and weighed against the ability of personnel to perform their duties while being hindered by individual protective equipment and the effects of heat stress.

## CBR PROTECTIVE EQUIPMENT AND CLOTHING

Personnel protective equipment used in chemical warfare (CW)/biological warfare (BW) defense includes masks, clothing, decontamination kits, and antidotes for certain chemical agents. Depending on your duty station and actual combat assignment, you may be issued certain items of this equipment. Knowing the correct procedures for the use of the equipment is vital. *Chemical, Biological, and Radiological Defense, Handbook for Training*, S-5080-AA-HKB-010, and *NSTM*, chapter 470, list detailed procedures for the use and maintenance of CW/BW protective equipment. However, only practice can assure that you execute the procedures properly.

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### REVIEW QUESTIONS

- Q12. MOPP procedures used to establish levels of readiness for a chemical agent attack are flexible.
1. True
  2. False
- Q13. The command decision to implement each level of MOPP must be the result of a risk assessment.
1. True
  2. False

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### MOPP LEVELS AND ASSOCIATED COUNTERMEASURES

The risk of a CBR threat can be categorized into four levels of probability:

1. **SUSPECTED.** An adversary who has CBR-capable delivery systems within the operations area (OPAREA) presents a suspected threat. Implementation of MOPP-1 countermeasures is indicated.

2. **POSSIBLE.** The expressed affirmation or assessed political will of an adversary to use CBR warfare increases the threat potential to a possible involvement in a CBR environment. Implementation of MOPP-2 countermeasures is indicated.

3. **PROBABLE.** Statements of intent to employ CBR warfare, directed at U.S. forces or allies, changes in political or military posture of an adversary possessing CBR capabilities, or use of CBR warfare within the OPAREA present a chance of probable involvement in a CBR environment. This threat level requires an estimate of the earliest time the CBR environment will be encountered. This estimate must be based on the strike ranges of delivery systems and the time it takes the strike to arrive at the nearest range limits. Implementation of MOPP-3 countermeasures is indicated.

4. **IMMINENT.** Confirmation of increased activity involving delivery systems, recognized platform attack patterns, electronic or visual indication of employment of delivery systems, or the immediate proximity of known CBR hazard areas present an imminent danger of contamination and/or casualties. Implementation of MOPP-4 countermeasures is essential.

## **RISK MANAGEMENT AND IMPLEMENTATION OF MOPP**

The decision to initiate or upgrade the ship's MOPP begins with determining the threat level, ship's mission, and corresponding MOPP-level countermeasures that provide the minimum acceptable degree of risk. An increase in the threat level does not necessarily justify immediate execution of all countermeasures included in the corresponding MOPP level.

The next step is to determine the time at which the countermeasures comprising that MOPP level should begin. The time required to take countermeasures must be compared to the time remaining until either the threat level increases or the risk becomes unacceptable. Waiting too long to start countermeasures increases the risk to the ship's mission because of the risk to personnel survivability. Alternately, starting countermeasures too early will degrade the crew's performance for sustained operations in the CBR environment and will ultimately limit the ship's ability to complete the mission. All countermeasures must be in effect immediately before the ship becomes involved in a CBR environment.

Immediately following the attack, an assessment of the ship's involvement in the CBR hazard is required to determine which countermeasures should remain in effect to enhance survivability and sustain operation. Frequent reassessments should be made to identify the earliest practical time(s) to secure the countermeasures and upgrade crew performance for optimum mission capability.

## **REVIEW QUESTIONS**

- Q14. The risk of a CBR threat can be categorized into how many levels of probability?
1. One
  2. Two
  3. Three
  4. Four
- Q15. The term *MOPP* stands for Mission Organization Protective Plan.
1. True
  2. False

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### **MOPP Level-1 (Suspected Threat) Protection**

During MOPP level-1 the following actions must be taken:

1. Individual protection — Issue the following individual protective equipment and medical supply items to shipboard personnel and maintain them at respective battle stations:
  - Protective masks (fitted for immediate use)
  - Chemical protection
    - Protective masks (with new, unopened canister)
    - Chemical protective overgarments (2 piece)
    - Chemical protective overboots
    - Chemical protective glove set
    - Personnel decontamination kit
  - Medical supply items
    - Atropine auto-injectors (3)
    - Auto-injectors (2)
    - Pyridostigmine pretreatment tablets (21)
  - Biological protection — Consists of the same protective equipment required for chemical protection, minus the medical items. Chemical threat is assumed to be “worst case,” unless reliable intelligence indicates otherwise.

- Radiological protection — Requires the mask only (with new, unopened canisters).
2. Collective activities — Review survival standards and basic operating standards for CBR environments as described by the ship's CBR defense bill.
    - Verify that personnel are assigned to CBR defense teams and review required procedures.
    - Inventory stowed detection and monitoring equipment, as applicable, for maximum authorized levels, current shelf life, presence of all components, and function within normal limits.
    - Inventory stowed supplies for personnel decontamination stations, shipboard decontamination teams, and biological sampling.
    - Inventory stowed water canteens to ensure adequacy of allowance serviceability.
    - Replace expired, missing, or consumed equipment, components, and supplies to maximum authorization levels.
    - Set readiness Condition III (wartime steaming). Set material condition YOKE.
  3. Shipboard systems:
    - Operationally test collective protection systems, where available.
    - Test installed detection and monitoring systems.

### **MOPP Level-2 (Possible Threat) Protection**

During MOPP level-2 the following actions must be taken:

1. Individual protection — For all CBR threats, maintain protective mask in carrier and on person.
2. Collective activities:
  - Designate primary and secondary personnel decontamination stations with respective weather-deck and internal access/exit routes.
  - Pre-position decontamination supplies in decon stations and at respective repair lockers as required by the ship's CBR defense bill.

- Pre-position stowed detection, monitoring equipment, and supplies at locations designated by the ship's CBR defense bill.
  - Pre-position empty canteens at staging areas as designated by the ship's CBR defense bill.
  - Set material condition ZEBRA (modified).
3. Shipboard systems — Operationally test countermeasures washdown system. Test shipboard alarms.

### **MOPP Level-3 (Probable Threat) Protection**

During MOPP level-3 the following actions must be taken:

1. Individual protection:
  - For all CBR threats, install new filter canisters on protective masks; maintain in carrier and on person.
  - Provide wet-weather gear for donning over other protective clothing and equipment for all weather-deck activities.
- Chemical:
  - Don chemical protective overgarments (CPOs) (jumper and trousers) with hood down.
  - Don chemical protective overboots.
  - Stow personnel decontamination kit in mask carrier.
  - Stow chemical protective glove set and medical supply items in the jumper cargo pocket.
  - Initiate pyridostigmine pretreatment regimen.
- Biological:
  - Don chemical protective overgarments (jumper and trousers) with hood down.
  - Don chemical protective overboots.
  - Stow personnel decontamination kit in mask carrier.

- Radiological:
  - Don battle dress.
  - Issue individual dosimeters and dose indicators (DT-60, etc.).

2. Collective activities:

- Direct the ship to general quarters (readiness Condition I may be relaxed and readiness Condition II set at CO's discretion).
- Fill pre-positioned canteens with potable water.
- Assign personnel to decontamination stations and assure operability.
- Post CBR detection and monitoring teams equipped with required instruments and supplies designated by the ship's CBR defense bill for readiness Condition I or II.
- Strike below, as appropriate, vulnerable flammable and absorbent weather-deck materials.
- Set material condition ZEBRA.
- Limit weather-deck activities to essential functions.
- Post and monitor installed CBR detection equipment and materials as designated by the ship's CBR defense bill.

3. Shipboard systems — Activate counter-measures washdown system intermittently. Ensure collective protection systems are fully operational and access/exit procedures are in effect.

**MOPP Level-4 (Imminent Threat) Protection**

During MOPP level-4 the following actions must be taken:

1. Individual protection:
  - For all CBR threats, don protective mask.
  - Chemical/Biological:
    - Secure jumper hood over head and around mask.
    - Don chemical protective glove set.
  - Radiological — Don battle dress.

2. Collective activities:

- Direct the ship to general quarters (if not previously in effect).
- Implement mandatory water-drinking regimen.
- Initiate continuous monitoring and operation of detection equipment.
- Set Circle WILLIAM on ventilation systems (except CPS).
- Radiological — Secure sea chests for underwater nuclear detonations, as directed by the ship's CBR defense bill.
- Prepare NBC Warning and Reporting system (NBCWRS) messages for transmission.
- Shipboard systems — Activate counter-measures washdown system to operate continuously.

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**REVIEW QUESTION**

- Q16. Readiness condition III (wartime steaming) is set during what MOPP level?
1. 1
  2. 2
  3. 3
  4. 4

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**PERSONNEL DECONTAMINATION STATIONS**

To instruct personnel on entering, exiting, and personal cleaning in the CPS decontamination station, we must review the basics of the procedure. If you work at a command with nuclear facilities, you will be trained in further detail by qualified personnel. For the situation of nuclear attacks and blasts, review the basic information contained in the *Basic Military Requirements*, NAVEDTRA 14277.

Personnel decontamination stations differ somewhat from ship to ship, but the basic requirements of the stations are the same. Each decontamination station is divided into two parts: (1) a contaminated or unclean section containing a washing area and (2) a

clean section. This prevents recontamination of personnel and ship locations. If possible, the unclean and clean sections have separate access routes or entrances. The decontamination station provides showers with warm water (if possible); cleansing agents, such as ear syringes and eye bath cups; hair and nail clippers; scissors; surgeon's hand soap; towels; and brushes. Radiation instruments for monitoring personnel and clothing and supplies of clean clothing are on hand at each station.

A decontamination (decon) station should be about 8 feet by 9 feet. It should have an entrance from the outside and an exit into an uncontaminated area near the showers. If exposed to contamination, you should use proper decontamination procedures. Do not remove your mask until a monitor tells you it is safe to do so. In general, personnel decontamination does not take priority over urgent battle requirements, but it should be accomplished as soon as possible. The following is a list of decontamination procedures:

1. Remove rain gear and battle dress just outside the decon station. Place it in the trash cans, bags, or other storage provided. Now you will be monitored for contamination. If there is no contamination, go to an uncontaminated space through another route. If there is contamination, go through the process described in paragraphs 2 through 5 below.

2. Enter the first part of the decon station in pairs. Use the buddy system to do gross decon of masks and gloves with the M258A1 personnel decon kits. Decon boots by immersing them in the 2- by 2- by 6-inch pans filled with a 9 percent high test hypochlorite (HTH) and water solution.

3. Move to the second part of the decon station where attendants will cut away your smock and help remove your trousers and boots. Place the contaminated clothing in trash bags for disposal.

4. Move to the showers, soap and wash your entire body thoroughly, and rinse well. Pay special attention to fingernails, hairy parts of the body, and hidden parts where contamination tends to concentrate.

5. You are now ready to enter the clean part of the ship where you will put on new clothing. Before you enter the clean area, a monitor with a long-range radiac will check to ensure that you no longer carry contamination. Turn over your DT-60 dosimeter to this monitor. The monitor will take the readings and enter them in the log. You will be told if you can remove your gas mask.

## REVIEW QUESTION

- Q17. Each decontamination station is divided into how many parts?
1. One
  2. Two
  3. Three
  4. Four

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## DAMAGE CONTROL PETTY OFFICER

**Learning Objectives:** Recall the procedures for making damage control closure log entries. Recall the procedures for maintaining damage control fittings and equipment.

The safety of the ship and its crew is of utmost importance in carrying out the command's mission. The damage control organization plays a critical part in ensuring this safety function. An essential person assigned the responsibilities to oversee the material condition of areas of damage control at the division level and upward throughout the chain of command is the Damage Control Petty Officer (DCPO). These responsibilities may be assigned as a Divisional Damage Control Petty Officer (DDCPO) and you should know them or a Divisional Damage Control Petty Officer (Duty) when you may have to perform them.

## DESIGNATION

A petty officer who has completed his or her personnel qualifications standards (PQS) can be designated as the DCPO in each work center based on type commanders (TYCOM) instructions. Division officers nominate DCPOs and duty DCPOs for endorsement by the chain of command. The executive officer gives the final approval for nomination, replacement, and rotation of all DCPOs. DCPOs normally serve for a period of 6 months. They check in with the fire marshal and damage control assistant (DCA) when first assigned to or relieved from this duty.

## RESPONSIBILITIES

Two specific responsibilities of the DCPOs and duty DCPOs are making damage control closure log entries and maintaining damage control fittings and equipment. The following information pertains to the performance of these duties.

## Damage Control Closure Log Entries

The closure log is maintained at all times, whether the ship is in port or under way. The closure log is used to show the following:

- The location where the existing material condition of readiness has been modified
- The type, number, and classification of the fitting; the name, rate, and division of the person who requested permission to open or close the fitting
- The date and time the fitting was opened or closed; the date and time the fitting was returned to its specified material condition of readiness setting
- The name and rate/rank of the person granting permission

The commanding officer prescribes the limit to which the DCA or OOD may approve the modification of a material condition of readiness. Reporting the temporary closing of a fitting that should be open is just as important as reporting the opening of one that should be closed. For example, a ZEBRA watertight hatch that is secured at the time general quarters is sounded could seriously interfere with personnel trying to get to their battle stations.

The damage control closure log is normally kept on the quarterdeck in port, on the bridge at sea, and in damage control central (DCC) during general quarters. However, if your ship has a 24-hour watch in DCC at all times, the closure log will be kept there regardless of the ship's location. The closure log is updated when there is a change in the status of a classified closure or fitting. If a classified closure is to remain open for several days, it must be logged open each day. The maximum time a closure or fitting may be logged open is 24 hours.

## Maintaining Damage Control Fittings and Equipment

DCPOs are charged with ensuring that the material condition of spaces assigned to them is maintained according to the command's damage control, fire fighting, and defense procedures. In assigned spaces, the DCPO performs the following:

- Conducts daily inspections of spaces for the elimination of fire hazards.
- Assists officers in charge in the inspection of spaces for cleanliness and preservation and assists in the preparation of required reports.

- Ensures the preparation and maintenance of damage control check-off lists for all spaces under their cognizance.

- Weighs portable CO<sub>2</sub> bottles, inspects and tests damage control and fire-fighting equipment, and prepares, for approval of the officer in charge, all required reports based on current instructions and planned maintenance system (PMS) requirements.

- Ensures all battle lanterns, dog wrenches, spanners, and other damage control equipment in all assigned spaces are in place and in usable condition.

- Ensures all compartments, piping, cables, and damage control equipment are properly stenciled or identified by color codes based on *NSTM*, chapter 079 and chapter 505.

- Ensures posting in required spaces of safety precautions and operating instructions.

In addition to these duties, the DCPO may be called upon to perform other actions in regard to damage control and maintenance of spaces that are directed by the leading petty officer, officer in charge, fire marshal, DCA, and executive officer.

## WATCH, QUARTER, AND STATION BILL

As a DCPO, you may be required to update and/or assign personnel to the watch, quarter, and station (WQS) bill. The contents of the WQS bill are described in the *Basic Military Requirements*, NAVEDTRA 14277. Personnel rely upon the WQS bill for manning situations for battle, lifeboat assignments, watch stations, and so on. To man certain stations, personnel must be qualified by means of a sign-off procedure outlined in the PQS program. Your job is to ensure you have qualified personnel assigned to each station. The DCPO, and all second class petty officers and above, must be very familiar with the WQS bill and how to prepare this bill.

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## REVIEW QUESTIONS

- Q18. The closure log is maintained at all times.
1. True
  2. False



- Q19. DCPOs are responsible for maintaining damage control fittings and equipment.
1. True
  2. False

---

## SUMMARY

The Navy has gone to great expense to train people like you to safely operate and maintain its ships. Without you and your shipmates, we would not have a Navy. In this chapter, you have been given information about personnel safety. Safety is not automatic; you must practice it constantly. The Navy still has injuries, but they are less frequent than in the past because crew members now practice good safety habits.

One of the items stressed in this chapter is the tag-out system. Without it, there would be a great increase in injuries and deaths. It is a working system that, when correctly used, saves many lives.

In this chapter you have been made aware that the Navy uses many HAZMATS especially cleaning solvents that may be toxic and highly flammable. As a petty officer, you must be familiar with all safety precautions dealing with HAZMATS and know the procedures for their handling, storage, transportation, and disposal. You must know how to inspect containers for leaks and when to reject them if they are damaged. The responsibilities are great; but as a leader and a supervisor, you must get the job done in a safe manner.

The responsibilities of the duty DCPO are both numerous and important. Training your division personnel in damage control, fire fighting, egress, and CBR defense could save their lives during a crisis situation. You must ensure that the material condition of your spaces is properly set and that fire-fighting and damage control equipment are in excellent condition. These precautions will provide your division with a fighting chance in the event of a fire or CBR attack. Knowing the procedures for decontamination stations is part of CBR and for those who work around nuclear facilities.

Damage control is an integral part of the safety of personnel and equipment. As a DCPO your job will be the safety of the ship during different conditions. The closure log must be maintained. The DCPO also has the responsibility to maintain fittings and equipment to ensure the material condition of readiness of the command. The WQS bill provides personnel with their

battle stations, lifeboat assignments, and watch stations. The whole command is set up as a supporting organization to ensure all aspects of safety in every division and department.

We are a safety-conscious Navy and will be that way as long as we have personnel like you working aboard our ships. Never let down in your effort to practice safety whether on or off ship. Because you are valuable to the Navy and your loved ones, we want you to be as safe as possible.

## REFERENCES

- Basic Military Requirements*, NAVEDTRA 14277, Naval Education and Training Professional Development and Technology Center, Pensacola, FL, 1999.
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- United States Navy Chemical, Biological, and Radiological Defense Handbook for Training*, NAVSEA S-5080-AA-HBK-010, Naval Sea Systems Command, Washington, DC, 1985.
- United States Navy Regulations*, Department of the Navy, Washington, DC, 1990.

## REVIEW ANSWERS

- A1. (1) True. The objective of any safety program is to improve operational readiness by reducing personnel deaths and injuries and by decreasing material loss and damage.
- A2. (3) The division safety petty officer is responsible for conducting assigned division mishap prevention training and maintaining appropriate records.
- A3. (3) On the command level, the safety council convenes monthly to develop recommendations for policy on safety matters and to analyze progress of the overall safety program.
- A4. (4) You can promote safety through the use of posters, periodic safety patrols or inspections, and through the use of warning and caution signs.
- A5. (1) True. The number of tag-out logs required depends on the ship size. For instance, larger ships may require a separate log for each department while a minesweeper may only require one tag-out log for the whole ship.
- A6. (2) After the tags have been cleared and the record sheet is properly filled out for the removal of the tags, place the sheet in the back of the tag-out log in the cleared section for destruction at a later time.
- A7. (3) The *Hazard Communication Standard* was passed to ensure the safety of every civilian and military employee of the federal government.
- A8. (2) False. As a supervisor you are responsible for the welfare and safety of your personnel. When handling HAZMAT, protective clothing and equipment must be used and maintained.
- A9. (4) Check the labels on all containers. In dealing with the hazards involved in solvents, you should always follow all safety precautions that pertain to hazardous material.
- A10. (2) False. Most solvents are toxic, and with a few exceptions, are flammable.
- A11. (1) True. Absorbents used in cleaning, applying, or packing HAZMATS should be treated using the same precautions followed for the hazardous material they absorbed.
- A12. (1) True. MOPP procedures allow the CO to adapt the requirements for protective clothing and equipment to the degree of the threat and working conditions at any given time.
- A13. (1) True. Risk is the assessed difference between the threat level and the activation of appropriate levels of shipboard countermeasures.
- A14. (4) There are four MOPP levels of probability.
- A15. (2) False. MOPP stands for Mission Oriented Protective Posture.
- A16. (1) A collective activity during MOPP level 1 is to set readiness condition III.
- A17. (2) Each decontamination station is divided into two parts: (1) a contaminated or unclean section and (2) a clean section.
- A18. (1) True. The closure log is maintained at all times, whether the ship is in port or under way.
- A19. (1) True. DCPOs are charged with ensuring that the material condition of spaces assigned to them is maintained according to the command's damage control, fire fighting, and defense procedures.