



**NONRESIDENT
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COURSE**

Naval Safety Supervisor

NAVEDTRA 14167F

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PREFACE

About this course:

This is a self-study course. By studying this course, you can improve your professional/military knowledge, as well as prepare for the Navywide advancement-in-rate examination. It contains subject matter about day-to-day occupational knowledge and skill requirements and includes text, tables, and illustrations to help you understand the information. An additional important feature of this course is its references to useful information to be found in other publications. The well-prepared Sailor will take the time to look up the additional information.

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CHAPTER 1

DEVELOPMENT OF THE NAVY SAFETY PROGRAM

We designed this training manual to help acquaint you with the Navy's safety and occupational health programs, their setup, management, and supervision. In addition to the Safety and Occupational Health (SOH) Program, we will discuss the Shore Safety Program, the Afloat Safety Program, the Aviation Safety Program, and your duties as a naval safety supervisor. We have provided the appropriate references for specific safety standards throughout this manual and various safety terms and acronyms. You will also find information on the following program elements:

- Safety program promotion and attitudes
- Mishap causes and prevention
- Mishap investigation and reporting
- Safety program evaluation
- SOH Program elements
- Traffic safety
- Explosives safety
- Athletic, recreation, & home safety programs

In this chapter, we cover the history and development of the Navy Safety and Occupational Health Program and its current organization. We also describe the role of safety supervisors, their responsibilities, and the criteria for their selection as safety supervisors.

HISTORY OF NAVY SAFETY PROGRAM

As your employer, the Navy is obligated by law to provide you with a safe and healthy work environment. Shipboard life, shipyard industrial activities, and aviation maintenance areas, especially, are inherently dangerous. We must keep our crewmembers, as well as civilian workers, healthy and ready to perform their missions.

The Navy has conducted safety and occupational health programs for many years. Historically, general and off-duty safety has been an element of the overall Navy safety program managed by Navy line functions. The Bureau of Medicine and Surgery (BUMED) conducts the occupational health program element.

The following is a brief listing of the milestones in the Navy's safety program:

- 1917 Safety engineers were assigned to each naval shipyard.
- 1922 Safety programs for civilian employees were introduced at all naval activities.

1929 Enlisted personnel on shore duty were included in safety programs.

1947 The Navy Department Safety Council was organized under the Director of Safety of the Office of Industrial Relations (OIR). Its original mission was to coordinate safety procedures and to provide communications between the bureau safety engineers and the technical staff of the OIR safety branch. In 1967, the council's mission was expanded to include the development and maintenance of the *U.S. Navy Safety Precautions Manual*, OPNAV 34P1.

1951 The transition from propeller to jet aircraft helped the Secretary of the Navy (SECNAV) to establish the Naval Aviation Safety Council. In 1955, the name was changed to the Naval Aviation Safety Center.

1963 The Navy was shaken by the sudden loss of the USS *Thresher* (SSN-593), in which 129 sailors were lost. The Navy convened a court of inquiry to examine the circumstances leading up to and surrounding the incident. The court's findings resulted in the creation of the Submarine Safety Program. Its purpose was to impose high standards of quality control on submarine construction and operations. In 1964, the Chief of Naval Operations (CNO) established the Submarine Safety Center at the submarine base in Groton, Connecticut, to examine and coordinate all matters of submarine safety.

1966-1967- SECNAV tasked CNO with reviewing the entire Navy Safety Program after a series of fires, collisions, and other mishaps involving surface ships resulted in more than 200 deaths and \$100 million in damages. On 3 May 1968, as a result of the CNO's findings, SECNAV established the Naval Safety Center.

1970 The Occupational Safety and Health Act (OSHA) of 1970 became law.

1973 The Commander, Naval Safety Center, was designated as the CNO's Safety Coordinator (N09F), reporting directly to the Vice Chief of Naval Operations. This designation made the

Naval Safety Center's mission more specific and all encompassing.

1983 The first *Navy Safety & Occupational Health Program Manual, OPNAVINST 5100.23 Series* was implemented.

Safety programs gained special prominence after passage of the Occupational Safety and Health Act on 31 December 1970. The primary thrust of the act was directed at the private-sector employer. However, section 19 of the act and several later Executive orders directed federal agencies to set up and maintain comprehensive and effective occupational safety and health programs.

On 26 July 1971, Executive Order (EO) 11612, the Occupational Safety and Health Programs for Federal Employees, was signed. This EO stated that the federal government, as the nation's largest employer, has a special obligation to set an example for safe and healthful employment. In that regard, the head of each federal department and agency was directed to establish an occupational safety and health program.

Over the next 3 years, federal agencies made only moderate progress. Congress received considerable criticism for a perceived double standard in occupational safety and health requirements between the private sector and federal agencies. As a result, EO 11807 replaced EO 11612 in 1974.

This new order more clearly defined the scope, requirements, and responsibilities of federal agency programs. In addition, EO 11807 tasked the Secretary of Labor to issue guidelines designed to help federal agencies in establishing their programs. These "guidelines" were issued on 9 October 1974 as Title 29, Code of Federal Regulations, Part 1960 (29 CFR 1960), Safety and Health Provisions for Federal Employees.

Some critics were still not satisfied by the actions described above. Several federal agencies questioned the regulatory authority of the Department of the Labor guidelines (29 CFR 1960). On 26 February 1980, EO 12196, Occupational Safety and Health programs for Federal Employees, superseded EO 11807. In addition, the Department of Labor guidelines (29 CFR 1960) were revised on 21 October 1980. They were reissued as Basic Program Elements for Federal Employee Occupational Safety and Health Programs.

During the past 10 years, the Department of Defense (DOD) has issued many directives and instructions to carry out the federal guidance outlined in the above paragraphs. Prominent among those directives and instructions is the *Safety and Occupational Health Policy for the Department of Defense*, DOD Directive 1000.3. This directive outlines

general DOD policy and procedures for carrying out the Occupational Safety and Health Act and its associated Executive order. Another prominent instruction is DOD Instruction 6055.1, *Department of Defense Occupational Safety and Health Program*. This instruction provides the guidance needed to carry out the basic occupational safety and health program elements specified in 29 CFR. It also provides for variances in equipment standards that are unique to the military.

DOD Directive 1000.3 designates the Assistant Secretary of the Navy (Installations and Environment) as the safety and occupational health official for the Department of the Navy. He or she establishes, maintains, and modifies safety and occupational health programs. These programs carry out the requirements of DOD policy issuances and provide protection for both civilian employees and military personnel.

SECNAVINST 5100.10H, *Department of the Navy Policy for Safety, Mishap Prevention and Occupational Health Programs*, delegates the authority for the operational aspects of the SOH Program to the Chief of Naval Operations (CNO). The CNO's responsibility includes issuing directives to enact program policies and defining specific safety standards and criteria.

SAFETY POLICY

The Navy's policy is to enhance operational readiness and mission accomplishment by establishing an aggressive occupational safety and health program. This program reduces occupational injuries, illnesses or deaths, and material loss or damage. It also maintains safe and healthy working conditions for personnel. The program addresses the elimination or control of hazards that can result in injury or death. The occupational health aspects concern the effects of long-term exposures to toxic chemicals and harmful physical agents (for example, noise, heat, and radiation). The occupational health aspects involve the monitoring and treatment of work-related injuries and illnesses as well.

Each safety program, whether it concerns safety afloat, ashore, or in aviation, uses the chain of command to carry out the program. Safety programs apply to all military and civilian personnel (including off-duty military personnel). In addition to personnel, the program also applies to material afloat and ashore, on and off naval installations. The program requires Navy dependents and all other civilian personnel while embarked in naval ships or aircraft or while on naval shore installations to follow program directives.

The CNO is responsible for implementing the safety and occupational health programs. The largest of these programs is the SOH Program. The SOH Program addresses the maintenance of safe and healthful conditions in the workplace or the

occupational environment. It applies to all Navy civilian and military personnel and operations ashore or afloat. OPNAVINST 5100.23 Series, *Navy Safety and Occupational Health Program Manual*, is the basic SOH document used to carry out the program. It refers to both afloat and shore commands. However, many unique and specific situations are associated with forces afloat as well as the aviation community. For that reason, the SOH information for forces afloat was separated into the *Navy Safety and Occupational Health Program Manual for Forces Afloat*, OPNAVINST 5100.19 Series, and directs forces afloat to use OPNAVINST 5100.19 Series for specific safety standards. OPNAVINST 3750.6R, *The Naval Aviation Safety Program*, is the reference for safety within the aviation community. These instructions are discussed in later chapters.

SAFETY IN TODAY'S MODERN NAVY

OBJECTIVE: The objective of the safety program is to enhance operational readiness and mission accomplishment by establishing aggressive safety and occupational health programs that will reduce injuries, illness, or death and material losses or damage and maintain safe and healthy working conditions for Navy civilian and military personnel. OPNAVINST 3120.32C, *Standard Organization and Regulations of the U.S. Navy*

Before we go any further, let us define some terms you will see throughout this chapter and book. We define safety as freedom from danger, risk, or injury. An unplanned event or a series of events that results in injury, death, or material damage is a mishap. A hazard is an unsafe or a dangerous condition that may exist before a mishap occurs. We measure a hazard according to its severity and probability of creating a mishap.

The overall objective of the SOH Program is mishap prevention. If a mishap occurs, we provide for investigation of that mishap to prevent recurrence. Mishap prevention involves identifying a hazard; evaluating the hazard; and correcting, controlling, or eliminating that hazard. Training is a critical element of mishap prevention. Safety supervisors play a critical role in mishap prevention and hazard awareness and identification.

Most mishaps are preventable. However, through ignorance or misunderstanding, many people have the common belief that mishaps are the inevitable result of unchangeable circumstances or fate. That belief is untrue because it fails to consider the basic law of "cause and effect" to which mishaps are subject. Thus, mishaps do not occur without a cause. Few mishaps are the result of material failure or malfunction; most mishaps are the direct result of some deviation from

prescribed safe operating procedures. Human error is cited as the most frequent cause of Navy mishaps.

How do we keep personnel and working conditions as safe as possible? We include safety rules in our everyday workplace. One purpose of safety rules is to remind people of the inherent dangers of their work. Your job as a safety supervisor will require you to identify hazards and apply appropriate or required safety rules. Training personnel to observe safety precautions helps them avoid preventable mishaps, maintain a safe work environment, and conduct mishap-free operations. Operating procedures and work methods that include mishap prevention keep personnel from being needlessly exposed to injury or occupational health hazards. An effective safety program depends on worker cooperation and supervisor involvement

THE NAVAL SAFETY CENTER

The Navy recognized the need for centralized management of all safety efforts many years ago. A single command to deal with all Navy safety ashore and afloat evolved from the original Naval Aviation Safety Center. With the passage of the Occupational Safety and Health Act (OSHA) in 1970, increased emphasis on shore and shipboard safety demanded expansion and increased awareness.

Commander, Naval Safety Center (COMNAVSAFECEN), advises and assists the CNO in promoting, monitoring, and evaluating the Department of the Navy safety program. The commander advises and assists the CNO in determining safety program goals and policies. COMNAVSAFECEN also has the responsibility of developing procedural guides and preparing directives to support and achieve program goals and policies.

RESPONSIBILITIES OF THE NAVAL SAFETY CENTER

The Naval Safety Center, located in Norfolk, Virginia, provides staff support to the CNO in executing the Navy safety program. The Safety Center also provides staff support to the Deputy Chief of Naval Operations (Logistics), N4. The staff support helps N4 carry out its overall Navy safety and occupational health coordination responsibilities. The Safety Center supports the Naval Inspector General and the President of the Board of Inspection and Survey.

As directed, the Naval Safety Center assists N4 in preparing and maintaining basic safety program manuals. The Safety Center does not issue Navy wide safety directives. However, when requested, the staff helps the appropriate offices, commands, or agencies prepare general or specific safety-related operating

instructions. It also conducts safety surveys of the naval operating forces and shore commands as requested by the CNO.

Unless otherwise directed, the Safety Center's responsibilities do not include safety related to nuclear propulsion and nuclear weapons.

The Naval Safety Center receives and analyzes all mishap and injury reports submitted by aviation, ship, submarine, and shore commands. The staff indexes this information by phase of operation, material failure, personnel action, or cause factors. It then incorporates the information into the mechanized data bank, through which it can retrieve the mishap and injury records of any specific incident. In that way, the Naval Safety Center can monitor mishap trends and pinpoint areas requiring corrective action. Additionally, the Naval Safety Center maintains operational or exposure data such as the Individual Flight Activity Report and the Diving Log. It uses data from those documents with mishap data to determine the significance of factors involved in mishaps.

The Naval Safety Center conducts the required safety surveys every 3 years. The purpose of each survey is to identify and analyze hazards and potential mishap situations to determine preventive action. The Naval Safety Center provides a team of officers and chief petty officers to conduct surveys. These personnel are experts in their fields, and most have been associated with mishap prevention for several years. The survey is informal. Only the commanding officer of the unit involved, and not superiors in the unit's chain of command, receives the survey results. The Naval Safety Center enters the results into its database to help analyze and predict potential mishap areas. It also conducts safety surveys of high-risk courses at training commands.

The Naval Safety Center also guides the incorporation of mishap prevention "lessons learned" with new construction and conversion for shipboard improvement and system safety. The center uses the safety recommendation (SAFEREC) system, ship safety information database, and mishap and injury reports. In addition, it uses casualty reports (CASREPs) and maintenance data system (MDS) reports submitted according to the 3-M system. The center uses these data to recommend improvements in shipboard and system safety.

SAFETY PERIODICALS PUBLISHED BY THE NAVAL SAFETY CENTER

The Naval Safety Center advises and informs the operating forces, shore commands, and other commanders on mishap prevention through the following periodicals (fig. 1-1):

- **Approach-** the Naval Aviation Safety Review, is published bimonthly for the professional benefit of all levels of naval aviation. It contains articles, commentaries, and short features about mishap prevention as well as articles about flight operations.
- **Mec-**, the Naval Aviation Maintenance Safety Review, is published quarterly for the naval aviation maintenance community.
- **Sea&Shore**, is published quarterly, combines our two award-winning magazines, **Ashore** and **Fathom**
- **Safetyline-** the Naval Safety Journal, presents information available on various shore safety subjects. These subjects include environmental and occupational safety, hazardous material, recreation, athletics, home safety, motor vehicle safety & ordnance safety, occupational health. ***Safetyline*** is published six times a year.
- ***Ships Safety Bulletin*** - contains articles on shipboard safety problems, trends, mishap briefs, and statistics. Although it is published quarterly, it is occasionally published as a special issue on one topic.
- ***FLASH-*** contains factual lines about submarine hazards. It is a quarterly, mishap-prevention bulletin that provides a summary of research from selected reports of submarine hazards. It gives advance coverage of safety-related information.
- ***Diving Safety Lines-*** is a mishap-prevention publication that provides a quarterly summary of research that provides a quarterly summary of research from selected reports of diving hazards.

OTHER PUBLICATIONS PUBLISHED BY THE NAVAL SAFETY CENTER

In addition to the periodicals listed above, the Naval Safety Center also publishes the following materials:

- Posters concerning the drive-safe program and general, aviation, submarine, and surface ship safety
- Stickers informing people of foreign object damage (FOD), tower signals, and other topics
- Safety inspection checklists
- Naval Safety Center advisories
- Summaries of mishaps
- Safety program management guides
- Mishap investigation handbooks

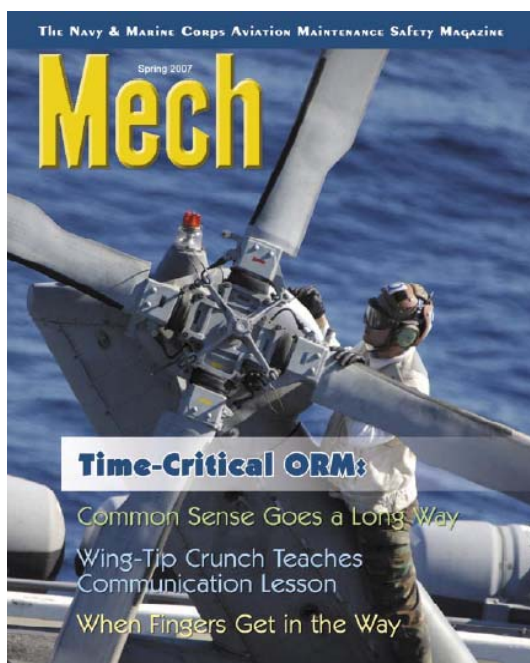
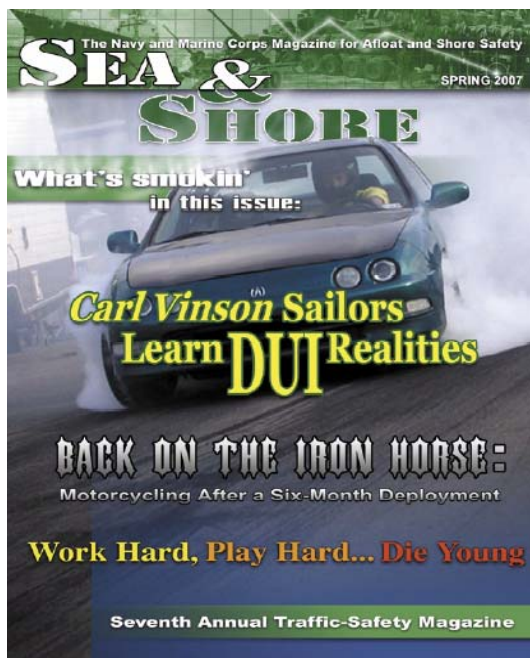


Fig 1-1. (Naval Safety Center publications)

SAFETY CHAIN OF COMMAND

The Chief of Naval Operations (Environmental Protection, Safety, and Occupational Health division), N09F, sets policy and establishes safety standards for the SOH Program. N09F carries out the policies of the *SOH Program Manual*, OPNAVINST 5100.23G, and *SOH Program Manual for Forces Afloat*, OPNAVINST 5100.19E. N09F maintains close liaison with other agencies within the Office of the Chief of Naval Operations (OPNAV) to provide safety and occupational health standards for surface ships, submarines, and aviation commands.

OPNAVINST 5100.23G specifies the proper chain of command and responsibilities for the SOH program. Ashore and afloat, all activities, commands, commanders, commanding officers, and officers incharge must carry out an effective safety and occupational health program. Administrative responsibility for safety extends from SECNAV to CNO to Commander in Chief, Atlantic Fleet (CINCLANTFLT) and Commander in Chief, Pacific Fleet (CINCPACFLT) for shore and afloat commands.

The CNO provides primary support for the SOH Program. The various systems commands, The Naval Safety Center, Chief of Naval Education and Training, and the Navy's Inspector General provide specified support.

Type commanders and afloat group and squadron commanders ensure their subordinate units carry out an effective safety and occupational health program.

RESPONSIBILITIES FOR THE LOCAL SAFETY PROGRAM

The chain of command manages the local safety program, since that is a command responsibility. each command level and supervisory level has responsibilities for supervising both routine and specialized tasks.

The commander, commanding officer, or officer in charge has ultimate responsibility for safety matters within his or her unit. He or she appoints a safety officer or safety manager to help carry out day-to-day safety-related activities. The duty of the safety officer or safety manager is to make sure all personnel understand and strictly enforce all prescribed safety precautions.

Afloat, the safety organization extends from the commanding officer down to the most junior sailor. Each department and division on board ship has safety program responsibilities. Ashore, although bases and tenant commands are staffed with military or civilian safety professionals, the safety organization includes every worker.



Fig. 1-2- Typical afloat safety organization

AFLOAT SAFETY ORGANIZATION

U.S. Navy Regulations charges commanding officers with absolute responsibility for the safety, well-being, and efficiency of their commands. The surface ship or submarine safety officer reports directly to the commanding officer on safety matters. The safety officer reports to the executive officer about administrative matters. The safety officer assignment may be a primary or collateral duty, depending on the type of ship and its size.

Primary duty safety officers shall be assigned to CV, CVN, LHA, LHD, AS, type ships. Ship and submarine squadrons and groups shall appoint a commissioned officer as the safety officer. On ships without a primary duty safety officer, the commanding officer shall appoint a commissioned officer of department head status and seniority as collateral duty safety officer (hereafter referred to as the safety officer). TYCOMs may grant waivers for small ships with limited officer manning to appoint a chief petty officer as the safety officer.

Whether a safety officer assignment is a primary or collateral duty, it should not be taken lightly. The assigned safety officer should be of department-head status and have the seniority to get the job done. Safety petty officers assigned to assist the safety officer must be E-5 or above. Figure 1-2 shows a typical afloat safety organization.

The safety officer, guided by the commanding officer, formulates and manages a safety program. The guidelines stated in OPNAVINST 5100.19E are the basis for the program. The safety officer checks the crew's activities and provides the coordination for keeping the program viable and visible to all hands.

The chain of command, which includes department and division safety officers, division safety petty officers, the master-at-arms (MAA) force, and the medical department, monitors the safety program. It informs the commanding officer of the command's progress in reaching mishap prevention goals and of the safety program's effectiveness. For example, under the guidance of the safety officer, safety organization personnel accomplish the following:

- Monitor mishap prevention standards by investigating all mishaps and near mishaps
- Evaluate the effectiveness of the safety program by analyzing internal and external reports including CASREPSs; binnacle lists; safety related messages; mishap and near mishap investigations; and various surveys, inspections, and zone inspections

- Coordinate distribution of safety information including lessons learned from official and nonofficial sources
- Coordinate shipboard training in general mishap prevention, especially for newly reported personnel
- Ensure commands prepare and submit occupational injury and illness reports to NAVSAFECEN based on OPNAVINST 5102.1D
- Perform trend analysis of injury and illness data
- Follow-up on reports of unsafe and unhealthful conditions as specified in OPNAVINST 5100.19E
- Track corrective action on safety and health items
- Maintain liaison with other commands and NAVSAFECEN in matters of mishap prevention
- Coordinate traffic and motor vehicle safety training
- Coordinate recreational and off-duty safety training

The commanding officer ensures personnel are instructed and drilled in applicable safety precautions and requires the posting of adequate warning signs in dangerous areas. He or she then establishes a force to see that the precautions are being observed.

The Safety Officer

The safety officer is responsible for managing the SOH program. The safety officer reports directly to the commanding officer on SOH matters and to the executive officer for the administration the SOH program. Normally, the safety officer has Department-head status and seniority and is responsible for carrying out a comprehensive safety program. Objectives established by the commanding officer serve as the basis for this program. OPNAVINST 5100.19E outline the duties and responsibilities of the safety officer. The safety officer's responsibilities include the following:

- (1) Act as the principal advisor to the commanding officer on shipboard SOH matters.
- (2) Oversee ship-wide planning to implement all elements of the SOH program.
- (3) Prepare and submit, through the chain of command, requests for external SOH support such as industrial hygiene surveys, safety surveys, safety assist visits or technical guidance.
- (4) Participate in mishap and safety investigation

- (5) Ensure timely and accurate recording and reporting of required mishap reports.
- (6) Maintain and analyze SOH records (inspection/assessment reports, injury reports, and mishap statistics) and determine trends.
- (7) Ensure that annual internal safety inspection is performed.
- (8) Ensure dissemination of SOH information.
- (9) Schedule/coordinate required SOH training with the training officer/planning board for training. Conduct training as appropriate and ensure records of that training are maintained.
- (10) Serve as advisor-recorder of the safety council. Prepare agenda for issuance by the chairperson.
- (11) Serve as chairperson of the enlisted safety committee.
- (12) Ensure, that SOH discrepancies beyond ship's force capability are properly identified, prioritized, and documented for corrective action.
- (13) Complete the Afloat Safety Officer course (A-4J-0020) or the Submarine Safety Officer course (F-4J-0020), as appropriate, prior to or within six months of assignment.
- (14) Ensure timely processing and follow-up on safety hazard reports submitted by crew members.
- (15) Coordinate with the command's traffic safety coordinator and recreation and off-duty safety (RODS) coordinator to include these programs in the overall SOH program.
- (16) On ships where the assigned safety officer or assistant safety officer is an industrial hygiene officer (IHO):
 - (a) Maintain and ensure calibration of all industrial hygiene equipment.
 - (b) Participate in and demonstrate proficiency in asbestos laboratory quality assurance programs as required by the TYCOM.
 - (c) Ensure that exposure monitoring for the command is performed, and provide technical assistance on request to tended units and other afloat units.

- (17) Establish web-enabled safety system (WESS) account on COMNAVSAFECEN website.

The safety officer works with all department heads and division safety officers and petty officers in carrying out the safety program in their areas.

Department Heads, Division Officers, and Work Center Supervisors shall:

- (1) Ensure that all assigned workspaces are inspected and maintained free of hazards and are in compliance with applicable SOH standards.
- (2) Ensure that all assigned personnel are properly trained, advised of any associated hazards, are equipped/provided with appropriate protective clothing/equipment, and complete any required medical surveillance screenings.
- (3) Take prompt action to abate/correct any identified deficiency under their control.
- (4) Integrate safety in all activities consistent with mission requirements.
- (5) Ensure that mishaps, hazards, and near-mishaps are reported to the safety officer.
- (6) Division officers shall appoint a senior petty officer (E-5 or above) as the division safety petty officer to assist in the responsibilities outlined above and provide appropriate on board indoctrination to ensure satisfactory performance in the safety field.

Division Safety Petty Officers/ Aviation Safety Petty Officers (not applicable to submarines)

The division safety petty officer or aviation safety petty officer (when embarked onboard ship) shall:

- (1) Inspect division spaces and submit hazard reports per OPNAV 3120/5.
- (2) Advise the division officer on the status of the SOH program within the division including any safety-related items revealed through maintenance, such as non-compliance with or deficiency in the planned maintenance system (PMS).
- (3) Keep the division officer informed of safety training needs within the division.

- (4) Conduct division SOH training and ensure documentation of that training is maintained.
- (5) Assist in mishap or hazard investigations and provide recommendations to division officers for correction.
- (6) Serve on the enlisted safety committee.
- (7) Perform or supervise the performance of required safety petty officer maintenance index page (MIP) planned maintenance.

Medical Department Representative

The medical department representative provides direct support to the ship's SOH Program. He or she provides or schedules medical surveillance services, such as hearing tests; arranges for outside industrial hygiene assistance; and maintains occupational health records. The medical department representative provides the safety officer with injury reports.

The Master-at-Arms/Safety Force

Master-at-arms (MAA) force personnel serve as the ship's safety force, assisting the safety officer in program enforcement and hazard identification. During their *routine* inspections, MAA personnel identify and report *routine* hazards and carry out a system of internal reporting to focus attention on the safety program.

Safety Council

The ship's Safety Council convenes quarterly to develop recommendations for policy in safety matters and to analyze progress of the overall safety program. The council consists of the commanding officer or executive officer (chairperson), the unit safety officer (recorder), and safety representatives from each department.

The safety officer may prepare an agenda for the chairperson's issuance before each meeting. This information should show the extent of any problems and suggested approaches to resolving the problems. The safety council also performs the following duties:

- (1) Reviews statistics compiled by the safety officer from mishap, hazard and inspection reports, safety or health related messages, and related reports from the medical representative.
- (2) Establishes mishap prevention goals and plans.

- (3) Establishes program improvement plans based on mishap experience, program deficiencies and other information.
- (4) Reviews issues and recommendations submitted by the enlisted safety committee.
- (5) Review compliance with operational risk management (ORM) implementation in all applicable operations and evolutions.

The safety officer keeps records of the Safety Council meetings and issues the minutes.

Enlisted Safety Committee

The Enlisted Safety Committee makes recommendations about the command's safety program to the Safety Council. The safety committee convenes to exchange information; improve communications; review conditions, mishaps, and injuries; and suggest improvements. It makes written safety recommendations to the Safety Council and the commanding officer. These meetings convene at least quarterly to enhance interdepartmental communication in mishap prevention at division and work center levels. Committee membership is as follows:

- Command safety officer (senior member)
- Division safety petty officers
- A safety representative from each embarked unit (e.g., aviation safety petty officer or Marine safety specialist)
- Chief master-at-arms

On small ships, with less than 300 crew members, ☐☐ the Enlisted Safety Committee may be incorporated into ☐☐ the Safety Council. Since submarines are not required to appoint safety petty officers, they are not required to have an Enlisted Safety Committee.

Individual Crewmembers

Safety program success depends on all-hands cooperation and support. The best safety program cannot prevent mishaps if the crew does not comply with safety precautions. All hands must follow posted safety precautions, comply with safety standards, and report unsafe or unhealthful conditions. They must report injuries and material damage immediately to their supervisor.

Safety Department Organization

Ships with a primary duty safety officer will have a safety department. This department, headed by the safety officer, may have an assistant safety officer and other safety assistants assigned. Aircraft carriers have an aviation safety officer, usually a Commander, assigned as department head and an industrial hygiene officer assigned as the assistant safety officer. A carrier

may have 5 to 10 additional safety assistants assigned, depending on its size and requirements. Large air-capable surface ships (LHDs, LHAs, and amphibious transport docks [LPDs]) normally have a lieutenant or lieutenant commander assigned as the aviation safety officer, with one to three assistants. Tenders have an industrial hygiene officer assigned as the safety officer, with one to five safety assistants. Safety department manning varies between ships.

During some special events, such as overhauls or deployment, the ship may assign additional personnel to the safety department.

SHORE ACTIVITY SAFETY ORGANIZATION

The goal of any safety program is to enhance operational readiness. We enhance this readiness by reducing the frequency and severity of on- and off-duty mishaps to personnel. In addition, we must reduce the cost of material and property damage attributed to mishap causes. How do we do that? We must instruct each person in the command on general safety precautions. These precautions include mishap prevention and instructions on special hazards found in the daily work environment. We must also ensure continuing action and command interest in mishap prevention. Finally, we must evaluate the effectiveness of the program.

Echelon-Two Commands

Within echelon-two commands, such as BUMED, Naval Sea Systems Command (NAVSEA), and Naval Air Systems Command (NAVAIR), authority and responsibility for performing the staff SOH functions are under a separate Occupational Safety and Health (SOH) office. A civilian safety professional heads the SOH office and reports directly to the commander of the systems command. The civilian safety professional's duties are similar to those of the afloat safety officer in providing safety information and evaluations for the staff. The SOH office may also serve as technical advisor to the CNO on SOH-related matters.

Shore Activity SOH Offices

Each shore activity must establish and staff an SOH office. The SOH manager is placed on the immediate staff of the commander, commanding officer, or director or officer in charge. The minimum requirements for all SOH offices include the following:

- SOH Program management
- SOH reviews and inspections
- Deficiency abatement
- Consultation
- Investigation and reporting of mishaps

- Employee hazard reports
- Analysis of SOH Program effectiveness
- Attendance and conduction of SOH council and committee meetings
- SOH training, promotion, and education
- Implementation of SOH Program requirements, depending on industrial activity at the shore command

Civilian staffing is based on the number of employees at the shore activity and tenant commands and on the extent of industrial activity. OPNAVINST 5100.23G discusses this staffing. This instruction also addresses occupational health medical staffing and industrial hygiene support. If a number of small bases are located in the same area, the SOH office may be consolidated and advise smaller commands through a services agreement.

Military commands at a shore activity may have a collateral duty safety officer assigned. This safety officer reports directly to the commander, commanding officer, or officer in charge for safety matters. Staffs, such as type commanders and support activities, may have both a military and civilian assigned as safety officer and SOH manager. If you are the collateral duty safety officer for your shore command, you may be dealing with the consolidated or base SOH office on a regular basis. You may consult the SOH manager or civilian staff of safety professionals concerning the program at your facility.

Aviation squadrons ashore have a military collateral or primary duty aviation safety officer assigned. That safety officer is assisted by aviation safety petty officers assigned to each division within the squadron. This safety organization remains in effect when the squadron deploys aboard ship or to remote shore stations. The base or naval air station SOH office maybe involved in the safety program as it pertains to the squadron's hangers and facilities.

Shore SOH Councils and Committees

SOH councils and committees serve as sounding boards for multiple viewpoints and interests of various groups and individuals on matters relating to the SOH Program. The SOH councils and committees have three basic functions:

- To create and maintain an active interest in occupational safety and health
- To serve as a means of communication regarding occupational safety and health
- To provide program assistance to commanding officers, including proposing policy and program objectives

The Federal Advisory Council on Occupational Safety and Health (FACSOH) acts in an advisory capacity to the Secretary of Labor. The council consists of 15 members appointed by the Secretary and includes representatives of federal agencies and of labor organizations representing employees. Field FACSOHs exist in many metropolitan areas; local Navy officials serve on this council. There is also a Department of Defense (DOD) Safety and Occupational Health Policy Council and a CNO Safety and Occupational Health Working Group (SOHWG). SOH councils, composed of both civilian and military members, may be established at major command headquarters.

At the activity level, Navy commands establish SOH councils, which meet at least quarterly. The commanding officer or executive officer chairs these councils. Members are appointed by local directive and include key safety professionals, military and civilian. SOH office representatives from each command, military collateral duty safety officers, aviation safety officers, and civilian employee representatives may be included in the membership.

Shore activities should also organize additional SOH committees at the supervisory or shop level. Provisions are made for their input to the SOH council. As a safety supervisor, you may be involved in the SOH committee or the SOH council, depending on the size and function of the shore activity sponsoring the SOH council.

AVIATION SAFETY PROGRAM ORGANIZATION

We will now discuss the various responsibilities for the command aviation safety program.

Commanding Officer

The commanding officer of an activity appoints an aviation safety officer as specified in the *Standard Organization and Regulations of the U.S. Navy*, OPNAVINST 3120.32C. This instruction lists the responsibilities of the command and dictates how the commanding officer should establish the program within the command.

Aviation Safety Officer

The aviation safety officer (ASO) acts as principal advisor to the commanding officer on all aviation safety matters. He or she advises and aids the commanding officer in setting up and managing a command aviation safety program. The ASO is responsible for providing safety education throughout the command. He or she also ensures the incorporation of safety standards and procedures into all activity functions. The ASO coordinates safety matters among the organization staff. He or she maintains appropriate

aviation safety records and mishap statistics. The ASO must be a primary billet assignment.

The aviation safety officer works with Quality Assurance/Analysis (QA/A) division personnel to develop a local maintenance instruction (MI) or command type of instruction. The ASO and QA/A division personnel investigate most mishaps/incidents and hazards in their activity. A description of the command safety organization and tasks or functions of each member of the command safety organization must be issued. The flight surgeon or wing flight surgeon serving the command is responsible for the aeromedical aspects of the command safety program.

Aviation Safety Council

If the command is a squadron, an air station, or larger, the command must form an aviation safety council. The council sets goals, manages assets, and reviews safety-related recommendations. The council keeps records of the meetings held. Members of the council review command plans, policies, procedures, conditions, and instructions to make sure they are current and correct. The council also responds to corrective recommendations. Standing members of the council include ground, aviation, and aeromedical (flight surgeon) safety officers.

Enlisted Aviation Safety Committee

Representatives from each work center and other designated activities, such as the Medical Department and Aircraft Intermediate Maintenance Department (AIMD), form the Enlisted Aviation Safety Committee. The committee meets once a month to discuss safety deficiencies and to provide recommendations for improved safety practices and promotion of safety awareness. The committee keeps a record of attendance and of subjects discussed at the meetings. The commanding officer makes a timely response in writing to all recommendations of the committee.

SAFETY TRAINING

Training is a vital part of every effective safety program. The goal is to promote hazard awareness and to integrate safety into all unit training. An important task supervisors have is educating personnel within a division. Proper safety training will help all hands become effective safety monitors. Remember, one person cannot ensure safe working habits and conditions. You need an all-hands effort to achieve mishap-free working conditions.

The command's training program, and each departmental training program, should include a systematic approach to promote mishap prevention, both in unit and off-duty activities. Make effective use

of educational materials from outside sources. These materials include Navy training films, safety notes, and various publications issued by the Naval Safety Center. Use these resources as aids in training. Display as many of these resources as applicable in division workspaces. That will increase personnel interest in safety.

Training in some SOH topics is mandatory, either as indoctrination or periodically. OPNAVINST 5100.23G outlines the SOH training requirements for shore activities. OPNAVINST 5100.19E defines indoctrination and annual SOH training requirements for a ship's force.

The safety officer or safety manager ensures safety training is conducted. Frequently, the safety supervisor, work center supervisor, or safety petty officer conducts on-the-job or general military training (GMT). If these safety professionals do not actually conduct the safety training, they should at least monitor it for effectiveness.

All military and civilian workers must be introduced to the SOH Program during indoctrination. Workers are made aware of the specific hazards in their work areas and general safety precautions. Additional training may be required for special evolutions such as the following:

1. Preparation for shipyard overhaul
2. Getting under way after a long in-port period
3. Seasonal weather changes or unusual weather
4. Unusual missions or operations
5. Increased industrial activity
6. After a serious mishap

TYPES OF SAFETY TRAINING

Safety training is accomplished through on-the-job training, general military training, indoctrination training, formal safety courses, safety standdowns, and safety surveys. The command training officer schedules required safety training, such as GMT and indoctrination. This training then becomes part of the command training plan. Safety professionals and safety supervisors must attend formal safety courses as part of their assignment. Safety standdowns consist of periods, usually of 1 or 2 days, of intensive safety training and awareness.

On-the-Job Training

Training, cross training, and qualifying for specific skills require the use of proper safety precautions. Safety precautions are a part of all standard operating procedures (SOP).

By monitoring safety precautions during routine work situations, you can detect unsafe practices. Once detected, you can take immediate action by providing training to correct those practices.

Monitoring of on-the-job safety practices serves as an evaluation of the training provided by supervisory personnel. It checks the effectiveness of training in all aspects of everyday life aboard your command. Those aspects include the planned maintenance system (PMS), weapons systems operations, damage control, fire fighting, and general housekeeping. Mishap trends also help target needed mishap prevention training.

General Military Training

Routine, shipboard general military training (GMT) must include safety topics. Aboard ship, the Planning Board for Training meets periodically to schedule training and ship's evolutions. The safety officer must ensure safety topics, especially the topic of required annual safety training, are included in the command training plan. General military training (GMT) can be accomplished through video tapes, stand-up lectures, drills, or a combination of methods. Training should be monitored and documented. Ashore, military personnel should also receive safety topic training as part of their regularly scheduled GMT.

Indoctrination Training

All new workers or sailors receive some type of indoctrination training to help them become familiar with their new job. Aboard ship, that is accomplished through Indoctrination Division, School-of-the-Ship, or submarine Phase I training. New worker indoctrination must include safety topics.

OPNAVINST 5100.23G & OPNAVINST 5100.19E require indoctrination training on the command's overall SOH Program. Federal Hazard Communication Standard training is required for all shore personnel who will be in contact with hazardous materials. Aboard surface ships, indoctrination training is required on back injury prevention, gas-free engineering, electrical safety, the tag-out program, and the radiation safety program.

Formal Safety Courses

A variety of formal safety courses are provided for Navy safety professionals. All safety officers and one-half the safety petty officers assigned aboard ship must take part in formal safety training. Civilian safety managers must attend formal courses and refresher training. OPNAVINST 5100.23G and OPNAVINST 5100.19E provide course requirements. The Naval Safety School in Norfolk, Virginia, provides numerous shore safety courses. Fleet Training Centers in Norfolk and San Diego conduct safety supervisor and

hazardous material training. The Surface Warfare Officer School in Newport, Rhode Island, presents the Afloat Safety Officer course. Submarine training facilities in Norfolk and Pearl Harbor conduct the Submarine Safety Officer course.

Safety Standdowns

In 1989, in response to a rash of Navy mishaps, the Chief of Naval Operations called for a Navy wide safety standdown. A safety standdown is a period, usually of 1 or 2 days, set aside for safety training, awareness, and drills. Type commander instructions require afloat units to conduct safety standdowns at least once a year, while yearly standdowns are recommended to other units. Shore commands may also take part in safety standdowns. A standdown may be called any time the command notes a particular safety problem or wants to reemphasize safety on a specific topic. For example, if a command has a serious mishap, it may have personnel take part in a safety standdown for a morning instead of working. Personnel may then review the events leading to the mishap and discuss the lessons learned.

Safety Surveys

Safety surveys are informal safety program evaluations conducted by the Naval Safety Center. These surveys are excellent training opportunities for safety supervisors. Checklists are used to determine safety requirements for each discrepancy. Shore, surface ship, submarine, and aviation safety surveys are available upon request from the Naval Safety Center. The results of safety surveys are provided directly to the commanding officer or commander, but to no one else in the chain of command.

Videotapes and Training Aids

Videotapes, films, and other visual training aids are good supplements to your safety training program. They should be used in conjunction with lectures or discussions. Since many young people are mediaoriented, videotapes and films capture their attention. However, videotapes and films should never be used as a substitute for a monitored presentation.

If you're looking for safety training videos, the place to visit is the web site for the Defense Automated Information System/Defense Instructional Technology Information System (DAVIS/DITIS). The Naval Safety Center does not issue safety videos or maintain a video library. The DAVIS/DITIS site contains the searchable listings and descriptions for thousands of audiovisual productions, videotapes and interactive multimedia instruction (IMI) products used by the Department of Defense.

BEING AN EFFECTIVE SAFETY TRAINER

The work center or area supervisor is an important link in the Navy's safety training program. These supervisors are responsible for specific training sessions, including monthly 5-minute stand-up training lectures. The success of training depends on the vigor and leadership demonstrated by the supervisor. The supervisor has the practical experience on the job to teach safety skills. But first, the supervisor must

- Understand the subject matter,
- Understand how to teach it, and
- Understand how to motivate people to learn.

Training conducted by supervisors has special challenges. You are a busy person and have many concerns—of which safety is only one. A training session should be brief, clear, and to the point to be well received and effective. Keep an open mind and a helpful attitude. Use your experience and knowledge to help trainees relate to safety situations within the Navy and in their job. Your goals are as follows:

- To arrange for conditions that allows effective learning. Good environmental conditions will not make your training effective, but poor conditions can prevent personnel from learning even during the best training session. Arranging for a good learning environment is more of a challenge aboard ship.
- To clearly emphasize the most important points as they relate to the Navy.
- To impress your students with good safety attitudes.

To attain these goals you should take the following steps:

- Preview the film or videotape before you conduct training. Before you begin training, you should first go through the entire program at least once to become familiar with the subject. Anticipate questions people may ask and be prepared to answer them.
- Study the current Navy safety policies and regulations that relate to the program. List the references for your topic in the lesson guide.
- Use handout materials if they can add to the training. Handouts work two ways—they give students something to take back with them to the work area, and they are a good source of information for later reference or summary. The lesson guide that supports a specific topic may provide suggested handout materials you can easily reproduce on a copier machine.
- Acquaint yourself with your lesson guide or outline. If you are lost or confused, you will

look unprepared. That can discredit you in the eyes of your students.

- Pay attention to class time. Keep the session moving and lively. Nothing is worse than a session that drags on aimlessly and painfully.

**KEEP TRAINING SHORT!
TRAIN EARLY IN THE DAY!**

At times, you may have problems creating a good climate for learning; you may have to search for a place to conduct training. Aboard ship, you may find yourself teaching in a crew's mess area or a workshop.

Ashore, you may have to teach in a lunchroom, conference room, or shop area. Students may have to stand. You may also have noise to contend with from ventilation or operating equipment. Understand that certain factors affect learning, including the "classroom" itself.

Simple human needs affect how well or how fast we learn. Physiological needs include being cold, hot, hungry, or tired. Having such needs will prevent personnel from learning because they will be concentrating on their body's needs first. Social needs have an impact on any group of people. All people want to have a feeling of belonging and to feel needed by others. Personnel develop a sense of belonging more easily within familiar surroundings. Adults also have an ego need; that is a need to feel useful and respected. Try not to talk down to your students or over their heads. Never assume they should know a safety precaution simply because it requires common sense, and never belittle them if they do not.

The safety instructor's style is also an important factor. In developing your own style, be sure you observe the following guidelines:

- Always accept a person's answer—do not embarrass a student who has given the wrong answer. Try to provide a positive statement. Say, "You're on the right track," rather than, "That's wrong."
- Talk to the entire group, not just to the front row. Move around. Speak loud enough that people sitting in the back of the room can hear you.
- Watch your mannerism. Relax. Take command of the group by your body language.

Safety training is often routine and repetitive. Impress upon your students the importance of safety training. Be prepared and present your training material in a professional and enthusiastic manner

SUMMARY

In this chapter, you have learned about the history of the SOH Program. We have introduced you to the current safety organization's program mission and objectives. We discussed the Naval Safety Center. We addressed safety and occupational health principles along with the elements of a local safety program. Remember, an effective safety program is everyone's responsibility. Safety is a six-letter word for a 7-day job!

CHAPTER 2

SAFETY PROGRAM PROMOTION AND ATTITUDES

This chapter deals with promoting your safety program and helping your workers develop a positive attitude toward safety. Sometimes people call this a "safety philosophy." It is an essential part of any successful safety program.

Some safety supervisors believe that by providing safety training, they are promoting safety. While safety training is a vital element, training alone cannot change unsafe attitudes or promote safe workmanship.

The advertising world calls promotional efforts "marketing." A command must "market" its safety program and sell safety to the worker.

SAFETY PHILOSOPHY

We often hear safety described as the use of "common sense." That is, safety should be obvious—anyone should be able to see a missing safety guard and realize it is a hazard. Unfortunately, that is not the case.

Safety is learned and experienced. From a young age, other people warn us about dangerous situations and how to identify potential hazards. Without that training, you might receive injury from such hazards. If not seriously injured, you surely will learn from the experience.

You can easily recognize some safety hazards. However, hazards involving toxic chemicals and exposures may not be obvious. Some occupational illnesses, such as asbestos exposure, do not show symptoms for 10 to 35 years. You need to be trained to recognize these hazards.

Just as we cannot rely on common sense to prevent mishaps, we cannot assume that everyone has a good attitude toward safety. The following are some attitudes that can contribute to mishaps:

- **The fatalist**—the people who have this attitude are sure that when "their time is up, nothing can be done about it."
- **The risk-taker**—People who have this attitude feel certain risks are just part of

the job and too often take unacceptable risks.

- **The immortal**—Young sailors and workers usually have this attitude. They feel immortal and cannot imagine that "it could happen to them."
- **The accident-prone**—People who have this attitude seem to have a greater number of mishaps than their coworkers or shipmates.

The attitude of the safety supervisor, safety manager, or safety petty officer can help mold the attitude of the workers. Supervisors must constantly seek to develop good attitudes in their people. Train your people in safe workmanship and try to convince them the command is sincerely interested in safety. Enforce all safety regulations to emphasize that the command "expects" safety to be a standard operating procedure.

RISKS

Risk taking is an inevitable part of our daily lives. Whether driving to work or getting under way, we face certain risks. However, we face different levels of risks. Some risks are considered acceptable or unavoidable. For example, we may have little choice but to drive to work, but we can reduce the hazard by using safety belts. An unacceptable risk would be to drive a motorcycle to work at a high speed without wearing a helmet.

Good risk taking can actually be considered a precaution against mishaps. In good risk taking, the person is trained to recognize the level of risk and choose whether the risk is worthwhile. A calculated risk based on the possible consequences of a hazard is safer than a haphazard risk based on poor judgment or ignorance. A lack of risk is not necessarily safer. A lack of risk sometimes means a person isn't "aware" of the risks.

Minimizing risks is a vital element of mishap prevention. You may be aware that a machine part is badly worn, so running that machine involves a risk. Mishap prevention occurs when you reduce that risk by taking interim or permanent corrective action.

We can assess the risk of any hazard. This assessment is based on the *severity* of that hazard should a mishap occur and on the *probability* that it will occur.

This risk assessment determines the level of risk involved. The level of risk is indicated by a risk assessment code (RAC). Chapter 3 discusses RACs.

A good safety attitude means the worker will perform work in a manner that will reduce risks. A worker with a poor safety attitude would merely accept the risks and put up with the results. A good safety attitude in workers depends on the safety supervisor. You can foster good safety attitudes through communication, motivation, and salesmanship.

COMMUNICATION

Good communication between workers and safety supervisors helps maintain interest in safety. Afloat and shore safety committees and safety councils, discussed in chapter 1, bring workers' safety concerns to supervisors. Through these committees and councils, the commanding officer becomes aware of unsafe conditions and hazards that require corrective action.

When workers see the command take action to correct a hazard, they understand that they play an important part in the safety program. They also see that the command cares enough about their safety to correct hazards.

We need hazard information so that we can correct hazards, not place blame or discipline a worker. We must never coerce or threaten crewmembers and workers to report hazards. They should feel comfortable in reporting a hazard to their supervisor or be able to report a hazard anonymously. Good communication between workers and their supervisors encourages safe attitudes and trust in their command. The sincerity of a safety supervisor is obvious in how he or she deals with safety problems and complaints.

MOTIVATION

To ensure total participation in the safety program, the command must motivate its people. It must motivate personnel to behave in a manner that will meet the various goals of the command. Program success consists of determining each person's needs. It also consists of selecting and

providing appropriate incentives (reinforcers) to meet those needs. It also should establish reasonable tolerance limits so that goals are achievable.

Some incentives that serve to motivate people include the following:

- Instinct for self-preservation
- Desire for material gain
- Desire for praise and acceptance
- Fear of ridicule or disapproval
- Sense of humanity
- Sense of responsibility
- Sense of loyalty
- Competitive instinct
- Desire for power or leadership
- Peer pressure and a desire to conform

We cannot overemphasize the importance of matching each person's needs to the proper incentives. A basic principle of behavior reveals that workers will repeat desirable behavior if the supervisor reinforces or rewards their actions. If the supervisor doesn't reinforce or reward a behavior, workers will stop the behavior.

Thus, a command must have an awards or incentives system. An incentives system not only determines how people will perform their various jobs, but how they think about them as well. An incentives system can reinforce mishap-free behavior and encourage safe performance. Similarly, it can discourage unsafe and reckless behavior through the withholding of reinforcement. For an awards system to be effective, however, we must provide timely reinforcement.

If a person is doing a good job, we should not wait until the end of the year to give that person a letter of appreciation or commendation. Immediately after the desired behavior occurs, we should provide positive reinforcement. That increases the chance of recurrence of good work. Too much time between behavior and reward may confuse the person. He or she may not know which behavior was noteworthy.

Reinforcement must also be sincere and relate to a person's needs. People will see an "attaboy" given for a job they know they did not do well for what it is: an insincere, meaningless pat on the back. A child may respond to such an act, but an adult will not. Similarly, people will view other incentives that fail to satisfy real needs as meaningless.

Providing feedback about job performance also motivates people to perform desired actions.

Motivation increases when reward is inherent in the task itself. An example is a technician who achieves a sense of satisfaction from a job well done. Motivation is highest when opportunities exist for achievement, recognition, increased responsibilities, and advancement. Such factors should be part of the job itself.

In a dull and repetitive job, management can increase motivation by rewarding safe work performance. Rewards should include both formal and informal incentives. Formal incentives include promotions, awards, formal commendations, special privileges, and work schedule selection. Informal incentives include praise, encouragement, acceptance by fellow workers, reduced supervision, and respect by others. Through careful use of such incentives, we can effectively influence the practices of our workers.

Motivation works best when the job itself provides opportunities to achieve satisfaction. Commands create such opportunities by providing workers with a feeling of acceptance, knowledge of where they stand, reasonable autonomy, and freedom to practice individual skills. We can reinforce that approach by using the following techniques:

- Communicating effectively
- Assigning jobs consistent with the abilities of the individuals
- Including all hands (when possible) in the decision-making process
- Highlighting program benefits (advantages versus disadvantages)
- Rewarding deserving personnel (official recognition, praise)

Occasionally people will be at odds with the goals of the safety program. Their behavior will conflict with the success of the program. Many managers assume that a lack of cooperation stems from a dislike of work. They also think that the main job of the supervisor is to find a way to coerce people to work. They try to control people through threats, reprimands, assignment of extra duty, and unusually close and strict supervision. Such external control approaches are only effective for short periods of time and do not encourage the self-motivation we desire in our workers.

Supervisors should know that external control is not the best way to ensure a good job. External control methods, if not appropriately applied, can breed dissatisfaction and frustration. Those

feelings can negatively affect both morale and skill. Use of the positive management techniques discussed earlier makes the management-worker relationship more harmonious. As a result, when you discipline a worker, it does not have the same negative qualities as the external methods. The corrected worker will understand the reason for the discipline, whether it is in the form of retraining, reminders, warnings, or penalties.

Providing meaningful mishap prevention orientations and adequate on-the-job training reduces the need for discipline. Setting the right example is also helpful. Emphasizing the risks of improper work practices may also be effective. Such actions help define good job performance, which, in turn, helps prevent workers from developing poor work procedures. That reduces the need for corrective disciplinary actions later.

Management within the Navy provides general guidance and a firm commitment to safety. Supervisors, as the key persons in mishap prevention, must make safety a prime and integral part of each job their workers perform. They must motivate and train people to develop and use safe work habits. They must build their workers' belief in mishap prevention. Finally, they must help all workers develop a strong personal commitment to mishap prevention. Once workers have made that commitment, they will consciously try to prevent mishaps. They will question unsafe acts, conditions, or instructions and follow established safety procedures and regulations.

SALESMANSHIP

Since the success of a safety program depends on worker cooperation, interest in the program must be "sold" to the worker. Good salesmanship involves three essential requirements:

- (1) a good product,
- (2) knowing your product, and
- (3) the ability to identify with the customer.

When you have a "product" to "market" or sell, the first requirement is to have a good product. Your product must provide something beneficial to the worker. Your product is freedom from loss of wages, from pain and injury, and from hardship for the worker's family.

Secondly, you must know your product. That takes study, attention to detail, and familiarity with safety standards. Your believability is a key to your ability to sell safety.

The third requirement is to put yourself in the place of your customer. Are the safety rules feasible? Can your workers comply with the safety standards and still get the job done? Do you require them to wear uncomfortable protective equipment for a long time in a hot environment? You should sell safety on an individual basis, attuned to what you know about your customer.

Every sale involves three steps: **preparation, presentation, and commitment.** **Preparation** is when you evaluate the hazards and risks of the job and the customer's ability to do the job. You research and observe the job or task determine the safety precautions that apply to the job, and target your safety efforts to address those precautions. **Presentation** is the use of your job knowledge to convince the worker of the need for safety. **Commitment** to a sale is when the customer agrees to "buy" the product. In other words, the worker decides to follow the safety precautions you have explained.

Safety must be sold to everyone in the chain of command, from the commanding officer down to the deck-plate workers. Command support is critical and may be your "hardest sell." All sales efforts start with the safety officer, manager, or supervisor.

SAFETY PROMOTION METHODS

Advertisers develop campaigns to promote products. Safety officers and supervisors can also develop an advertising campaign to promote their safety program. Safety promotion methods include the following:

- Safety posters and stickers
- Promotional stunts
- Safety contests
- Safety suggestions
- Recognition and rewards
- Recognition organizations

SAFETY POSTERS AND STICKERS

Colorful posters have been used to promote safety for over a century. Posters are a passive training method used to remind workers of a hazard, precaution, or idea. Posters must be current and have a message applicable to the audience. Change them frequently so they don't become part of the bulkhead.

Posters use both pictures and words to convey a safety message. For workers with poor reading skills, posters are more effective than lengthy written text. Eye-catching, colorful pictures are as important to the effectiveness of a poster as clever text.

Put posters in areas of high traffic, in places where workers linger or stand in line, or at entrances and exits. However, make sure you place them in appropriate areas. For example, you would place a poster about the use of safety belts near an exit to the parking lot rather than in the mess area. Put posters aboard ship near the mess line, in crew lounges, and near the quarterdeck. You can put large safety banners at the head of the pier or on the fence leading to the parking lot.

Posters are available, in limited quantities, from the Naval Safety Center and various commercial sources. The National Safety Council produces hundreds of posters, which you can procure through open purchase. Intermediate maintenance activities can make larger canvas banners upon request.

PROMOTIONAL STUNTS

Commands can use promotional stunts effectively to emphasize safety. Many naval bases, around holidays, display a wrecked vehicle near the gate. They post signs near the wreck reminding personnel to wear safety belts and not to drink and drive. Dressed up skeletons, dummies in precarious positions, and dramatic photographs can be used to emphasize safety. Promotional stunts should be safe but vivid and timely.

SAFETY CONTESTS

Most people are competitive and like contests, especially if they can win a prize. Competition can be between individuals, work centers, shops, divisions, or commands. Common safety contests involve mishap records, training accomplishments, or the reporting of hazards. Prizes can range from a safety "S" flag to a special liberty chit. You can stage a safety contest for the best command safety slogan, safety essay, or safety poster. You can track reported hazards and mishaps for a specific period so that you can recognize the division or shop with the fewest mishaps. You can create competition out of zone inspections and other safety inspections by recognizing those divisions or shops with the best record of safety compliance.

Each year, about 5 million American workers take part in safety contests sponsored by the National Safety Council. The Safety Council presents hundreds of awards in response to these contests. The success of the contests has proven they are good safety motivators.

SAFETY SUGGESTIONS

The Navy's Beneficial Suggestion Program applies to safety suggestions. Safety suggestions that could result in monetary rewards include those which accomplish the following:

- Decrease lost work time
- Eliminate a hazardous condition
- Recommend the use of a less hazardous material

Safety suggestions may be made internally (within the command) or externally (outside the command). External and internal safety suggestions should be considered for rewards. A properly designed safety suggestion program is an effective means of tapping into your workers' ingenuity. People who work with systems and equipment on a daily basis are in a better position to find a better, faster, easier, and safer way of working. A successful safety suggestion program must meet the following guidelines:

- The command must really want suggestions from its workers and sailors.
- Every suggestion must be taken seriously; if it is not usable, the person who made the suggestion must receive an explanation of why it can't be used.
- Action to incorporate the suggestion should be prompt or the reason for any necessary delay explained.
- Anonymity should be respected, if desired, by the person who makes the suggestion.
- Rewards should be reasonable in relation to the value of the suggestion.

Many safety suggestions have resulted in cash awards. For example, one suggested the use of biodegradable detergent in a solvent parts washer. Another suggested the inclusion of extra safety steps that eliminated frequent mishaps.

RECOGNITION AND REWARDS

Everyone appreciates a pat on the back and positive reinforcement. Too frequently in safety, supervisors tend to notice only the wrong and not the right. We will stop a worker who isn't wearing safety goggles, but walk right past a worker who is wearing the correct safety equipment. Recognition for correct behavior bolsters safety program compliance and safe attitudes.

Recognition can be as simple as mentioning the name of a worker or sailor in the Plan of the Day (POD) or Plan of the Week. Divisions or work centers with a superior mishap record can be recognized with a plaque or a notice on the safety bulletin board. Commands have used head-of-the-mess-line privileges, special liberty, and ship's store discounts as incentives and rewards for safe behavior. Recognition and rewards strengthen your safety program support, so make the extra effort to reward your people for safe practices.

Recognition also applies to your safety assistants. A special safety-green ball cap, lettered T-shirt, or safety petty officer name tag gives your safety team distinction. You can use the ball caps or name tags to motivate safety petty officers to complete their qualifications. All of these positive strokes make people feel good about their command's safety program.

RECOGNITION ORGANIZATIONS

Awards provide an excellent opportunity to promote safety programs. Many nonprofit organizations throughout the United States award people who use certain articles of protective equipment to eliminate or reduce the chances of serious injury. The following lists some of those organizations:

Wise Owl Club—founded in 1947, this is the oldest of all such "safety clubs." Membership is restricted to workers who have saved their eyesight by wearing eye protection. Address inquiries to Director of Industrial Service, National Society for the Prevention of Blindness, Inc., 79 Madison Avenue, New York, NY 10016.

The Golden Shoe Club—this club awards workers who have avoided serious injury by wearing safety shoes. The club's address is Golden Shoe Club, 1509 Washington Avenue, St. Louis, MO 63166.

Kangaroo Club— Members of this club have averted serious injury or death by wearing safety belts. The club's address is Kangaroo Club International, P.O. Box 950, Coatesville, PA 19320.

"I Survived" Club— the Naval Safety Center sponsors this club for naval personnel and members of their families whose lives have been saved by wearing safety belts or using child safety seats. The Naval Safety Center sends the survivor a certificate signed by the Commander of the Naval Safety Center. The story may appear in the *Safetyline* magazine. For more information contact the Naval Safety Center, Naval Air Station, Code 42, Norfolk VA 23511-5796.

SAFETY AND OCCUPATIONAL HEALTH MANAGEMENT PRINCIPLES

You should not question that safety and occupational health management go hand in hand. When you pursue one to the disadvantage of the other, the total outcome becomes less effective and less efficient. A common misconception is that safety is an isolated topic pursued by specialists and misunderstood by line management. That is true when managers have either ignored or been unaware of safety procedures. It is also true when managers have chosen to take risks without considering the impact on the total operation.

You must accurately assess the impact of your decisions on the organization and its goals. Then, if you must take risks, you will take them with full knowledge of the expected impact. You will achieve organizational goals by following prescribed safety precautions. You can enhance occupational safety and health (SOH) management by following safety management principles and establishing safety policies.

The following are some SOH principles you may find useful:

1. Good management fosters safety: Safety management is the part of the management process that identifies potential hazards and failures that could result in injury and property damage. Management is part of the decision-making process that considers the effects of a possible hazard on workers, material, and organizational relationships.

2. Safety is part of the professional job: You should integrate SOH concepts and procedures into your professional approach to every job. That is

something everyone, from top management through the first-line supervisor to the worker, should do. All training and apprentice programs should include SOH. Safety demands cooperation among all levels of management and workers.

3. Top management and command must be involved: Top management must take the lead in organizing SOH, setting SOH policy, and assigning SOH accountability. Management must hold Intermediate management levels accountable for all preventable mishaps. To be effective, a mishap investigation must not coerce, convict, or punish managers, supervisors, or workers. It should strive to be impartial when assessing the evidence and then develop recommendations to avoid future mishaps. The cause may not be one single event or design flaw. Management should work toward a safe and healthy operation or system through appropriate managerial methods.

4. Safety is economical: Mishaps cost money. Costs include those for damage repair, lost work time, worker replacement and training, and compensation claims. Safety specialists must advise management supervisors of how safety will reduce lost work time and enhance productivity, operational effectiveness, and morale. Money allotted to provide protective equipment and safe working conditions is a good investment.

5. First-line supervisors are essential to safety management: The first-line supervisor (shop foreman, work center supervisor, leading petty officer) needs time for stand-up briefings. He or she also needs the proper tools and personal protective equipment for safe operation. The first-line supervisor must have adequate resources and must be accountable for production and operation safety. Command support, including funding, is critical to safe operations.

6. Eliminate unsafe acts to reduce mishaps: Unsafe acts, unsafe conditions, and mishaps are symptoms of problems in the management system. You, as a manager or supervisor, must examine the symptoms to find and eliminate their causes. Lack of training, poor motivation, personality conflicts, drug or alcohol abuse, and bad attitudes are potential mishap causes. All of these problems are correctable through good management and supervision.

7. Severe mishaps should receive first priority: Certain circumstances and conditions carry a higher risk of producing severe injuries or costly damage. You can normally identify, anticipate, and control some of the following potentially hazardous conditions:

- Unusual, nonroutine activities, like weapons handling
- Nonproductive activities, during which boredom can lead to horseplay or unsafe acts
- Activities involving high-energy sources such as melting metals in a foundry
- Certain construction activities, such as demolition of a building
- Catastrophic conditions and recovery from such conditions
- Explosive operations Lack of proper on-site supervision Inadequate operator skills or untrained workers

8. Safety is an administrative role: The SOH manager, safety professional, or safety officer serves as an advisor. The manager is responsible for safety and safe decision making, including loss control and risk management. The safety advisor monitors and aids in the investigation of mishaps, collection of data, evaluation of trends, and development of analyses. He or she also promotes and educates workers in safety strategies, controls, and mishap prevention techniques. By definition, the safety officer, advisor, or manager is a spokesperson, cooperating with all levels of the organization. Each helps management and workers achieve a safe and healthy workplace.

9. Setting a safety example is contagious: If management ignores safety precautions or fails to wear protective equipment, workers receive the wrong message. Strict safety compliance by all levels of supervision sets the right example. When workers see others wearing proper protective equipment and following precautions, they are inclined to do the same. Management must never display the attitude that safety takes too much time or money.

10. Safety is a commitment: All levels of the organization must see management's motivation and commitment to safety. Therefore, management must issue safety policy and work closely with safety councils and committees. It must address hazard abatement, allocate resources for mishap prevention research, develop mishap prevention strategies and actions, endorse recordkeeping, and maintain accountability. Supervisors and middle management must follow safety precautions. They must convince workers that management is committed to safety. These efforts must be convincing to motivate workers to cooperate with safety policies. Real mishap rate reductions result in improved effectiveness and cost savings.

11. Safety must be marketed: Management must "sell safety" to the workers through a visible show of support. Promotions, contests, competitions, recognitions, and posters are ways of making your safety program visible to the workers. Positive program support solicits worker cooperation and a good feeling about safety. If you need to threaten and coerce workers into complying with safety precautions, then your sales efforts have failed.

Commands should manage SOH just as they should manage any other organizational function. Management should direct the safety effort by setting achievable goals and by planning, organizing, and controlling the methods used to achieve the goals. Workers must take part in goal setting and in developing mishap prevention strategies and actions to reduce injuries and material losses.

SUMMARY

In this chapter you learned about the philosophy of safety and what motivates safe behavior. You learned methods of selling, marketing, and promoting your safety program. Although safety seems to be a matter of common sense, you learned that safety must be taught and reinforced.

CHAPTER 3

MISHAP CAUSES, PREVENTION, AND HAZARD ABATEMENT

The Navy spends millions of dollars each year on damage, fatalities, injuries, and occupational illnesses. Mishaps seriously degrade operational readiness and waste tax dollars. Preventing mishaps depends on identifying, controlling, eliminating, and correcting hazards. When preventive efforts fail and mishaps do occur, investigating them thoroughly helps to determine the causes and prevent recurrences. The lessons learned from a mishap or near-mishap can yield valuable safety information.

What is a mishap? *Mishap Investigation and Reporting* (OPNAVINST 5102.1D) defines a **mishap** as any unplanned or unexpected event causing personnel injury, occupational illness, death, material loss or damage, or an explosion of any kind.

Mishaps are usually a painful experience. After being involved in a mishap, most people look back and say those immortal words, "If only I..." They then finish the statement with "had or had not. . ." With that information in mind, you should work toward making the words *If only I* obsolete. How do you do that? You can't be everywhere at the same time. To prevent mishaps, you have to get people to think about safety. You must promote enough interest to make people want to perform each task safely. We assume most people want to do their best; but remarkably, many people do not associate **best** with **safe**. All Navy personnel must commit themselves to "think smart, think safety."

In this chapter, we discuss various statistics on mishap causes, prevention methods, and hazard abatement.

MISHAP CAUSES

Seldom does a mishap have a simple cause. A combination of factors, coming together under just the right circumstances, usually cause the mishap. A specific chain of events often leads to a mishap. Breaking any link in that chain can usually prevent the mishap. To prevent their recurrence, we need to know what those events and the contributing causes were. Normally, we divide cause factors into the following broad classifications:

1. **Primary cause.** The primary cause, also called the immediate cause, is the actual, obvious cause of the mishap. For example, the cause of the sailor's death was a head injury from a fall down a ladder. The primary cause of death was the head injury.

2. **Contributing causes.** Contributing causes are all the factors that made up the chain of events leading to the primary cause. Only through investigation can we determine these contributing causes. For example, the primary cause of death was a head injury from a fall down a ladder. The contributing causes could have been worn ladder treads, a missing heel on the sailor's shoe, greasy hand rails, the sailor's rushing down the ladder, or many other causes. The primary cause alone does not give you enough information to prevent recurrence of the mishap.

Unsafe acts and conditions are known causes. Knowing how these unsafe acts and conditions develop will make your mishap prevention training more successful.

You can stop mishaps by preventing or eliminating the causes. That is why all hands, especially supervisors, need to understand why mishaps occur. The more you know about the causes of mishaps, the better equipped you will be to prevent them.

A practical definition of a **mishap cause** is anything and everything that has contributed to a mishap. That includes the **primary** and the **contributing causes**. The purpose of this broad interpretation of a mishap cause is to encourage you to adopt a broad and open approach when identifying the cause of a mishap. Thus, do not focus all your attention on the mishap alone. Investigate everything that leads to the mishap both directly and indirectly before determining the probable cause or causes. We categorize causes as follows:

- Human error
- Maintenance and support factors
- Administrative and supervisory factors
- Material failures or malfunctions
- Environmental factors

HUMAN ERROR

Human error causes an **alarmingly high number** of mishaps. Between 50 and 75 percent of mishap investigations conclude that the primary cause of the mishap was human error. Human error findings consider the human involvement before, during, and after the mishap.

We can reduce the number of mishaps by learning to identify and control the human factors that cause mishaps. Human error is part of nearly every mishap. Human error includes the actions of all personnel involved in the mishap. It includes those personnel who may have maintained or repaired equipment or even the worker at the factory where a part was manufactured. Human error involves both physical and mental factors, such as the following:

- Ergonomics (design of the workplace)
- Physical strength and condition of the individual
- Physical stresses and the body's subsequent responses
- Mental factors, including the person's attitude; behavioral factors; ability to retain and assimilate training; external mental stresses, such as interpersonal relationships; and mental illnesses

All of us mentally process information we receive. Factors such as personal experiences, emotions, knowledge, motivation, and attitudes influence how we interpret this information. They also cause us to respond in various ways to different situations. When a mishap occurs, we carefully examine each of these factors. Each one can cause the best trained and most skilled worker to make a wrong decision or response.

ERGONOMICS

Ergonomics refers to the technology involved in helping people physically adjust to their workplace. It is also called biomechanics or the man-machine interface. Basically, ergonomics concerns the design of a workplace, space, or process to minimize stresses on the body and to maximize production. Ergonomics became important with the development of production lines that required constant, repetitive motions.

A workbench that is too high or too low can cause fatigue. Poor lighting can cause confusion. Emergency switches that are out of reach can impair a person from controlling them. All of these work area designs place stress on the body that could contribute to human error.

Controls that an operator cannot reach quickly and easily are examples of poor design. Other examples are emergency controls protected by cumbersome interlocks and displays that are difficult to read and interpret.

Poor functional layout within a space causes inefficient operations and maintenance difficulties, which breed jury-rigged shortcuts. When investigating a mishap, we must look at the work area in which the mishap occurred.

TEMPORARY PHYSICAL ILLNESSES

Temporary physical illnesses, such as colds, flu, dizzy spells, heat stress, and nausea, affect our ability to work safely. These disorders can cause physical impairments that can contribute to mishaps. They can also disrupt concentration, mental alertness, memory, and reasoning ability.

PHYSICAL IMPAIRMENTS

Physical impairments, such as back injuries or hernias, can make people susceptible to mishaps. The weakened physical condition accompanying such defects can impair strength, stamina, and agility.

Mishaps also can stem from two other types of physical impairment—visual and hearing. Good vision is important to every job. A common visual impairment such as faulty depth perception can cause mishaps such as tripping or falling. Hearing impairments can cause mishaps when persons cannot understand audible communications and signals.

ALCOHOL

Alcohol is a chemical depressant. It acts as a general anesthetic for those parts of the brain which suppress, control, and inhibit thoughts, feelings, and actions. Typical effects of alcohol consumption include impaired judgment, unrealistic confidence, and slowed coordination and performance. Such effects bring about risk-taking behavior associated with unsafe acts and mishaps.

DRUG ABUSE

Drug abuse causes many mishaps. Some people die as a result of a drug overdose or respiratory depression caused by barbiturate intoxication. Sailors high on amphetamines and barbiturates sometimes fall

overboard and become lost at sea. Drug abuse or dependence is not only hazardous to the abuser, but also to other personnel, to equipment, and to the operational readiness of the command.

Polydrugs have created still another dimension of drug abuse. The term refers to the mixing of two or more drugs. Mixing alcohol with another drug is the most common form of polydrug abuse. This combination produces effects that can be fatal.

FATIGUE

Fatigue begins when a person starts a task; the fatigue increases as the task continues. It decreases awareness and reflex actions while increasing the chance of error. Symptoms include lower quality of performance, irritability, impatience, forgetfulness, confusion, and increased errors. Hard work long hours, and lack of sleep produce fatigue. In addition, such stresses as vibration, heat, high or constant noise, inadequate illumination, anxiety, boredom, monotony, and change in routine can produce fatigue.

MOTION SICKNESS

Since motion sickness produces severe nausea, it can weaken, distract, or disorient people. The most commonly experienced forms stem from the motions associated with aircraft, cars, trains, and ships. This illness is particularly dangerous because it causes a loss in normal alertness and decision-making abilities. Such a loss can cause a person to make serious mistakes. Once the body becomes adjusted to these movements, through training and adaptation, nausea disappears and normal functioning returns.

EXTREME TEMPERATURES

Extreme temperatures impair a person's overall performance, which increases the chances of inefficiency and mishaps. Heat stress and temperature extremes cause problems such as fatigue, increased reaction time, decreased mental awareness, and loss of dexterity and coordination.

NOISE

Unnecessary or unpleasant noise causes stress by overloading a person's nervous system. Stress can bring about emotional outbursts. Since emotional outbursts are impulsive and unrestrained, they can result in mishaps. Intense noise can cause hearing loss, both

permanent and temporary; headaches; fatigue; and nausea. Each of these effects can impair performance.

VIBRATION

We often overlook vibration as a potential source of decreased work performance, and yet it routinely accompanies many activities. Very low-frequency, high-amplitude vibrations can cause motion sickness. Prolonged exposure to vibration commonly produces annoyance and fatigue, which can reduce performance and effectiveness. Exposure to levels of vibration that produce discomfort can induce permanent physical damage to the internal organs.

VISUAL ACUITY

Mishap-free performance requires good visual acuity. Different problems can affect your vision during the day and at night. The most common problem during daylight is glare. Intense light reflected in random directions causes glare. Glare is hazardous because it can momentarily blind you. The blindness can continue for hours until your eyes have had time to adjust to low levels of light.

Even if your eyes adjust easily, your visual acuity at night is not as good as it is during the day. Night vision is extremely sensitive to stray light sources. When your eyes have adapted to darkness, a sudden flash of light can blind you, as glare does during the day. These conditions increase the chances of mishaps.

MENTAL FACTORS

Mental factors have been cited as causes involved in numerous mishaps. Mental factors range from just being in a bad mood to having a serious personality disorder. Although medical professionals usually investigate mental factors, all mishap investigators should look at these factors. In serious mishaps, a medical officer is assigned to determine physical and mental causes of human error. Medical records, prior injuries, responses to stress, and documented personality disorders are reviewed and investigated.

BEHAVIORAL FACTORS

Behavioral factors include actions such as skylarking, risk-taking, showing off, inattention, disregarding instructions or orders, and flaunting authority. Such behavior results when personnel ignore safe work procedures because of undesirable motives.

The following are examples of frequently seen displays of undesirable motives:

- Trying to save time and effort
- Trying to maintain personal comfort
- Trying to express resentment

An undesirable motive is clearly a complex problem. A person does not react simply to the basic needs of comfort, security, belonging, and self-fulfillment. Attitudes, feelings, and emotions stemming from a multitude of sources also affect a person's motives. Chapter 2 discussed attitudes and motivation.

LACK OF TRAINING AND EXPERIENCE

Mishaps caused by a lack of training and experience occur most often when people tackle a task with which they are neither familiar nor qualified. Experienced personnel can clearly recognize hazardous conditions that inexperienced persons may not notice. Since the inexperienced persons' limitations then exceed their capabilities, a mishap may occur.

The imbalance between a person's skills and required levels of training shows through improperly followed procedures, shortcuts, errors in judgment, and improper maintenance and operations. Supervisory personnel sometimes contribute to mishaps by making assignments without adequate knowledge of the capabilities and limitations of their people and equipment.

When you are training inexperienced people for new jobs, their training needs are obvious. They need your help to gain the knowledge and skills they must have to do a job.

Even when you provide people with the basic skills to do a job, they may not thoroughly understand it. They may be unable to retain what you taught them. You must counterbalance this lack of understanding with close supervision.

As people become more experienced and less closely supervised, training deficiencies become more apparent. Finding people placed in tasks beyond their current skill development is not uncommon. When asked if they can handle the assignment, many respond positively. They do not want to appear incompetent.

Knowledge alone is not always enough to prevent a mishap. Most tasks in the Navy require a certain skill level. These skills can vary from those required to paint

a bulkhead to those required to operate a nuclear reactor. To properly accomplish any job, people must safely develop skills through practice.

INTERPERSONAL RELATIONSHIPS

Since interpersonal relationships with our peers, supervisors, spouses, and parents can affect our mental attitudes and moods, they can contribute to mishaps. A worker's distraction because of worry about a pending divorce can lead to a mishap. A worker's disregard of an order because of a personality conflict with management or a supervisor can result in a mishap too. To avoid being labeled a "wimp," a person may give in to peer pressure and purposely take risks, such as working without eye protection. That can also result in a mishap.

When you investigate the causes of a mishap, carefully consider the personal lives of the people involved. Are they having problems at home? Are they under pressure because of financial troubles? Could peer interaction possibly have contributed to the cause of the mishap?

MAINTENANCE AND SUPPORT FACTORS

Maintenance and support factors include improper maintenance, improper priority assignments on work requests, or lack of proper quality assurance (QA). Shipyards, intermediate maintenance activities, contractors, or a ship's force may be involved with maintenance and support.

Mishaps can result from the way the manufacturer made, assembled, or installed the equipment. They can result from premature equipment failure caused by a manufacturer's improper processing and fabrication, improper assembly, or use of improper materials. Mishaps can also result from part failures caused by a manufacturer's deviation from design specifications, such as incorrect size, weight, strength, and similar engineering characteristics.

Material damage and personal injury mishaps can result from improperly maintained equipment. A motor incorrectly rewound at a shipyard could short out and cause a fire. Improper QA or the lack of approved QA procedures can result in a mishap. These types of mishaps overlap with human error causes.

ADMINISTRATIVE AND SUPERVISORY FACTORS

Reviewing whether regulations and their enforcement by all levels in the chain of command could have contributed to the mishap is essential during a mishap investigation. Standard operating procedures (SOPs) might be unsafe. Safety standards might be incomplete or missing from a technical manual. How the command views and enforces the use of SOPs and other procedures could contribute to the mishap.

Consider supervisory factors. Examine the proficiency and physical condition of the supervisor. Mishaps can result from an improper level of supervision or a failure to require personnel to meet personnel qualification standards (PQS). They can also result from a lack of formal and informal training of the supervisor and the crew.

Check the adequacy of the procedures and precautions of the task being performed when the mishap occurred. Examine these areas even when every action seems to have been appropriate and to have followed prescribed procedures. You may find procedures are incorrect or inadequate. For example, if you change, replace, or alter a piece of equipment, you must update the technical manual. If you do not, the operator or maintenance technician may accidentally use incorrect procedures for a particular task. Not posting the necessary instructions or removing them from the work area can lead to procedural problems. Instructions need to be available for reference in the work area.

Do not assume personnel already know the precautions to take when doing a job. Make sure they look them up in a procedural instruction or technical manual. Personnel must have these precautions available when needed. Make sure procedures contribute to mishap prevention by teaching personnel to follow the safety precautions for every procedure they perform.

MATERIAL FAILURES OR MALFUNCTIONS

Consider all material failures and malfunctions thoroughly, whether the failures or malfunctions occurred because of faulty design, defective manufacture, or repair. That does not include failures caused by normal wear and tear. Most mishaps blamed on material failure may really involve maintenance factors or human error.

When investigating material failures, especially metal fatigue failures, never try to force the pieces back together. That could alter or destroy the evidence needed for more detailed laboratory analysis.

ENVIRONMENTAL CONDITIONS

Environmental conditions are usually not cause factors. For example, a cause of a mishap might be excessive speed for existing sea conditions or failure to secure for sea; but the high sea state did not cause the mishap. We can attribute very few mishaps to "acts of God." Being struck by lightning maybe an act of God, but being outside during a thunderstorm was a contributing cause; therefore, the mishap was probably preventable.

Environmental factors can damage equipment and cause injury to workers. Environmental factors include extreme exposure to heat, cold, vibration, noise, illumination, radiation, or atmospheric contaminants. You may require electronic equipment to operate within a narrow temperature range, for instance. Deviation degrades performance and causes system failure. Humidity also takes its toll through corrosion and moisture accumulation. Entire systems are susceptible to damage by extreme weather conditions that produce abnormal winds, seas, and rain.

MISHAP PREVENTION

Although a mishap usually has only one primary cause, it may have more than one contributing cause. Alone, each contributing cause may not have caused the mishap. However, one contributing cause may have started a chain of events leading up to the mishap. Preventive efforts must be directed toward all the primary and contributing causes.

Mishap prevention is the process of eliminating mishap-producing causes before a mishap occurs. It is an **organized effort to eliminate unsafe acts** and unsafe mechanical, physical, or chemical conditions. The object of mishap prevention is to prevent mishaps from occurring. If they have already occurred, the object is to prevent them from recurring. Mishap prevention takes place through two means:

- The Navy Safety and Occupational Health Deficiency Abatement Program (SOH DAP), which identifies a hazard before a mishap occurs and takes action to prevent recurrence
- Mishap investigations, which reveal causes and identify action needed to prevent recurrence

HAZARD PREVENTION

Three methods are used to control the impact of hazards. The first, and preferred, is to prevent the hazard at the design stage. The second is to identify and eliminate existing hazards. The third is to reduce the likelihood and severity of mishaps from hazards that cannot be eliminated.

Hazards may be prevented through appropriate actions during the design process, when operating procedures are developed, and when equipment is purchased. The hazard would never exist if we anticipated problems and eliminated them before they reached the worker. Systems commands are responsible for preventive actions such as system safety reviews, design reviews, and the development of operating and purchasing procedures designed to eliminate hazards.

Usually, ships and shore commands have little control over the design process. If the design of equipment currently in use is hazardous, retrofitting or redesign may be required. If redesigning the equipment is beyond the scope of the activity, it may request help from the systems command or higher authority. The activity can then use that redesign information for future designs and purchases.

Hazards in the workplace may arise as the result of an inadequate preventive maintenance program. An effective preventive maintenance program can keep equipment and material from degrading to the point that they become an operational hazard.

Standard operating procedures (SOPs), instructions, or similar directives that tell how to perform work can prevent hazards from occurring. Obvious examples include SOPs for tank cleaning, foul weather operations, and asbestos removal. Personnel must be familiar with appropriate SOPs and current updates applicable to their duties.

Many hazards may be prevented by including appropriate specifications in purchase orders for equipment/material. Normally, buyers have little control over specifications for equipment/material purchased through the Navy supply system. However, since a considerable amount of material/equipment is locally purchased, you can prevent hazards by purchasing the proper types of material in the proper amounts.

Hazardous material is of special concern. We must minimize all local purchases of potentially hazardous material. Afloat commands should purchase only material listed on the Shipboard Hazardous Material

List (SHML). Shore commands should purchase only material listed on the Authorized Use List (AUL).

HAZARD CONTROL

When preventing hazards is impossible, we must control their effects by reducing the severity of the hazards. We use several methods to control hazard possibilities. The preferred order in which we use them is (1) substitution, (2) engineering controls, (3) administrative controls, and (4) use of personal protective equipment.

Substitution

Replacing an existing process, material, or equipment with a similar item having a lower hazard potential may reduce risks of injury or illness. Be careful in substituting materials by making sure they are made of technically acceptable materials that will not create a new hazard. Contact NAVSEA/NAVAIR for substitution approval. Naval Supply Systems Command (NAVSUP) must approve hazardous material substitutions.

Engineering Controls

Engineering controls used to control hazards include isolation and ventilation.

ISOLATION.— Isolation is the physical separation of people from contact with a hazard. This method involves the use of a barrier or limiter. It may be in the form of a physical barrier or involve separation by time or distance. Examples include machine guards, electrical insulation, sound barriers, and remote-controlled equipment.

VENTILATION.— Ventilation is the control of potentially hazardous airborne substances through the movement of air. Two methods are **general ventilation** (or dilution ventilation) and **local exhaust ventilation**. General ventilation is the dilution of an airborne substance by mixing it with the surrounding uncontaminated air. Local exhaust ventilation (fig. 3-1) is the removal of an airborne substance at its source or point of generation. This method of ventilation prevents the airborne contaminants from passing through the worker's breathing zone. Local exhaust ventilation is the preferred and more economical method. The use of general ventilation should be limited to the control of heat, humidity, or low toxicity solvent vapors when no other ventilation is possible.

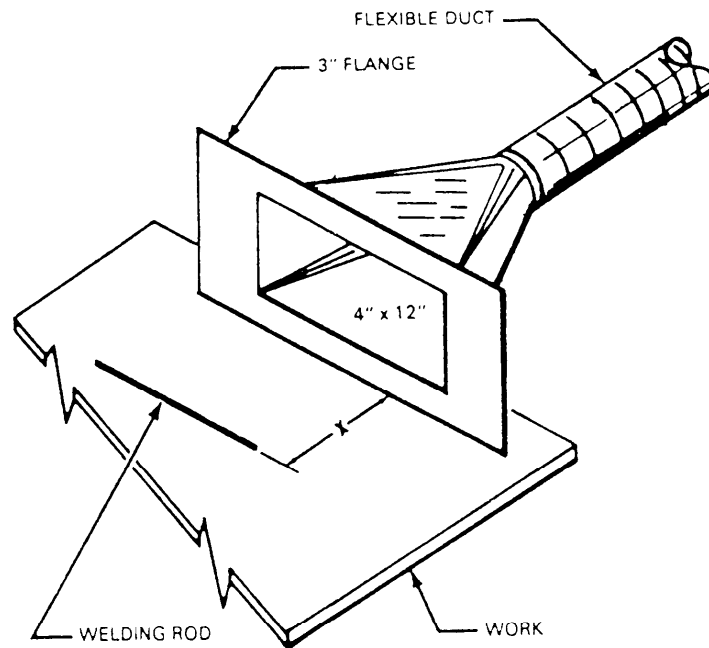


Figure 3-1.—Local exhaust ventilation.

Administrative Control

Administrative control employs special operating procedures to reduce the exposure of personnel to hazards. Examples include procedures that limit access to high hazard areas and that provide for adjusted work schedules such as heat stress safe stay times. Another example is an operating procedure requiring the use of semiautomatic equipment that does not require constant attendance (time separation). Adjusted work schedules should be used only when personnel may be repeatedly exposed to the hazard without adverse effect.

Personal Protective Equipment

The use of personal protective equipment (PPE) is the least preferred method of hazard control. With this method, any equipment breakdown, failure, or misuse immediately exposes the wearer to the hazard. The effectiveness of the PPE also depends on the conscious effort of the user to wear it properly. Nevertheless, when other methods cannot achieve adequate risk reduction, personal protective devices must be used, either alone or in conjunction with other protective measures.

HAZARD IDENTIFICATION

Hazard identification occurs through observation and routine safety program evaluations, surveys, and formal inspections. The safety officer, safety manager,

safety petty officer, or safety supervisor trains people to recognize hazards. In chapters 6, 7, and 8, we discuss the program evaluation and hazard identification process for shore, afloat, and aviation activities.

HAZARD REPORTING

The earliest possible detection of unsafe or unhealthful working conditions and the prompt control of hazards identified as a result of those conditions are essential. Encourage your subordinates to submit promptly a report of unsafe or unhealthful conditions.

All personnel should orally report unsafe or unhealthful working conditions to their immediate supervisor. That supervisor should promptly evaluate the situation and take appropriate corrective actions. Supervisors will contact the Safety and Occupational Health (SOH) office, safety manager, division safety petty officer, division officer, or safety officer for assistance, if needed. The person reporting the hazard must be kept informed of all actions taken.

After personnel orally report an unsafe or unhealthful condition, they may expect the supervisor to investigate the situation. If their supervisor takes no action to investigate the condition or they are unsatisfied with the result, personnel may submit a written report.

Ashore, the poster, DD Form 2272, DOD Occupational Safety and Health Protection Program, reminds employees that hazard reporting is their

NAVY EMPLOYEE REPORT OF UNSAFE OR UNHEALTHFUL WORKING CONDITION	
THIS FORM IS PROVIDED FOR THE ASSISTANCE OF AN EMPLOYEE AND IS NOT INTENDED TO CONSTITUTE THE ONLY METHOD BY WHICH A REPORT MAY BE SUBMITTED	
1 THE UNDERSIGNED (check one) <input type="checkbox"/> EMPLOYEE <input type="checkbox"/> REPRESENTATIVE OF EMPLOYEES BELIEVES THAT A VIOLATION OF AN OCCUPATIONAL SAFETY OR HEALTH STANDARD WHICH IS JOB SAFETY OR HEALTH HAZARD HAS OCCURRED AT:	
a. Navy installation/activity and mailing address	
b. Building or worksite where alleged violation is located, including address	
2 NAME AND PHONE NUMBER OF GOVERNMENT SUPERVISOR AT SITE OF VIOLATION	
3 DOES THIS HAZARD IMMEDIATELY THREATEN DEATH OR SERIOUS PHYSICAL HARM? <input type="checkbox"/> NO <input type="checkbox"/> YES	
4 BRIEFLY DESCRIBE THE HAZARD WHICH EXISTS INCLUDING THE APPROXIMATE NUMBER OF EMPLOYEES EXPOSED TO OR THREATENED BY SUCH HAZARD	
5 IF KNOWN, LIST BY NUMBER AND/OR NAME, THE PARTICULAR STANDARD (OR STANDARDS) ISSUED BY THE AGENCY WHICH YOU CLAIM HAS BEEN VIOLATED	
6 TO YOUR KNOWLEDGE, HAS THIS VIOLATION BEEN THE SUBJECT OF ANY UNION/MANAGEMENT GRIEVANCE OR HAVE YOU (OR ANYONE YOU KNOW) OTHERWISE CALLED IT TO THE ATTENTION OF, OR DISCUSSED IT WITH, THE GOVERNMENT SUPERVISOR? <input type="checkbox"/> NO <input type="checkbox"/> YES (List results, including any efforts by management to correct violation)	
7 EMPLOYEE TYPED OR PRINTED NAME	8 EMPLOYEE SIGNATURE
9 EMPLOYEE ADDRESS	10 EMPLOYEE PHONE NUMBER
11 MAY YOUR NAME BE REVEALED? <input type="checkbox"/> NO <input type="checkbox"/> YES	12 ARE YOU A REPRESENTATIVE OF EMPLOYEE <input type="checkbox"/> NO <input type="checkbox"/> YES (List organization name)

OPNAV 5100/11

Figure 3-2.—Navy Employee Report of Unsafe or Unhealthful Working Condition.

responsibility. They may use OPNAV 5100/11 (fig. 3-2) to report hazards. Employees should find blank copies of such forms and posted procedures for their use in areas convenient to all workplaces. Employees who wish to remain anonymous should say so on the form.

Upon receipt of a hazard report, the SOH office should contact the originator by telephone to acknowledge receipt of the form and discuss the seriousness of the reported hazard. The SOH office should investigate all reports brought to its attention. Investigations of alleged imminent danger situations are

made within 24 hours. Potentially serious situations are investigated within 3 days.

Forces afloat use the Safety Hazard Report (OPNAV Form 3120/5) (fig. 3-3). Personnel may submit a handwritten report that simply states the nature of the condition and its location. An originator who desires that his or her name not be revealed should state so in the report. All personnel should have access to these forms; make sure you educate your personnel in their use.

Upon receipt of a report, the safety officer contacts the originator to acknowledge receipt and discuss the

SAFETY HAZARD REPORT		1. ID NO												
A. SAFETY OFFICER SECTION														
2. ISSUED BY		3. ISSUED TO												
4. HAZZARD NOTED <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">a. DATE</div> <div style="width: 45%;">b. TIME</div> </div>		5. RISK ASSESSMENT CODE <i>(See explanation on back before completing)</i>												
6. LOCATION OF HAZARD		7. NATURE OF HAZARD												
B. DIVISION OFFICER SECTION														
1. CORRECTIVE ACTION TAKEN														
2. INTERIM CORRECTIVE MEASURES														
4. NAME, RANK AND TITLE	5. SIGNATURE	6. DATE FORWARDED												
C. DEPARTMENT HEAD SECTION														
1. ACTION TAKEN <input type="checkbox"/> CORRECTIVE ACTION TAKEN IN ITEM B1 ADEQUATE <input type="checkbox"/> ADDITIONAL ACTION TAKEN / REQUIRED (GIVE EXPLANATION IN C2)		2. EXPLANATION OF ADDITIONAL ACTION TAKEN / REQUIRED												
4. NAME, RANK AND TITLE	5. SIGNATURE	6. DATE FORWARDED												
D. RECORD SECTION														
1. INITIALS INDICATE ACTION TAKEN IN SECTIONS A, B AND C <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="padding: 5px;">TITLE</th> <th style="padding: 5px;">INITIALS</th> <th style="padding: 5px;">DATE</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">SAFETY OFFICER</td> <td style="width: 100px;"></td> <td style="width: 100px;"></td> </tr> <tr> <td style="padding: 5px;">EXECUTIVE OFFICER</td> <td></td> <td></td> </tr> <tr> <td style="padding: 5px;">COMMANDING OFFICER</td> <td></td> <td></td> </tr> </tbody> </table>		TITLE	INITIALS	DATE	SAFETY OFFICER			EXECUTIVE OFFICER			COMMANDING OFFICER			2. IS CSMP ENTRY REQUIRED? <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <input type="checkbox"/> YES <input type="checkbox"/> NO </div>
TITLE	INITIALS	DATE												
SAFETY OFFICER														
EXECUTIVE OFFICER														
COMMANDING OFFICER														
		3. IF YES, GIVE NAME OF SHIP BELOW: USN _____												

Figure 3-3.—Safety Hazard Report.

seriousness of the reported condition. The safety officer advises the cognizant division officer that an unsafe/unhealthful working condition has been reported.

Alleged critical danger situations will be evaluated immediately. If possible, potentially serious or moderate situations will be evaluated within 3 days.

The aviation community has its own hazard report (HR) system, covered in OPNAVINST 3750.6R. Aviation hazard reports (HRs) are used as follows:

- To report a hazard and the remedial action taken so that others can take similar action to eliminate the hazard
- To report a hazard and recommend that another organization take corrective action to eliminate the hazard
- To report a hazard so that some other organization may determine the proper corrective action to eliminate the hazard

Personnel in aviation squadrons and wings must submit an HR whenever they detect a hazard. Command aviation safety programs must encourage personnel to report hazards. Personnel send HRs by mail or message directly to the Naval Safety Center (NAVSAFECEN). The NAVSAFECEN will guard the report's confidentiality and distribute a sanitized report, as it believes necessary. Reports may include recommendations for corrective action within the command.

Four aviation hazards require special formats: bird (and bat) strikes; near mid-air collisions; physiological episodes; and embarked landing hazards. When these hazards occur, but they do not meet the criteria of a defined aircraft mishap, you must submit an HR using the proper, prescribed format.

Hazard Report Responses

The shore SOH office or afloat safety officer will provide an interim or final response in writing to the originator of the reported condition within 10 working days of receipt of the report. Interim responses will include the expected date for a final response. If the evaluation identifies a hazard and its cause, the final response will include a summary of the action taken for abatement of the deficiency. If no significant hazard is found to exist, the reply will include the basis for that determination.

The final response shall encourage the originator to contact the SOH office or afloat safety officer if he or she desires additional information or is dissatisfied with the response. If the originator remains dissatisfied after discussing the matter, the individual must be advised of the right to appeal to the commanding officer.

The commanding officer, or his/her representative, will respond to the originator of the appeal within 10 working days. An interim response will suffice if the evaluation is incomplete at that time. If still dissatisfied, the military or civilian employee has the right to further appeal. Personnel may appeal all the way through the chain of command to the Deputy Assistant Secretary of Defense (DASD) (Environment, Safety & Occupational Health [ES&OH]). Civilians may continue their appeal to the Department of Labor.

Encourage the reporting of hazards, but make sure employees and military members understand that you are taking corrective action. As a supervisor you must take all reports of hazards seriously, no matter how minor.

The Naval Safety Center tracks aviation hazard report corrective actions.

SAFETYGRAM Reports

Aboard ship, safety officers and personnel may submit a SAFETYGRAM, OPNAV 5102/4 (fig. 3-4), to report a hazard, voice a concern, or ask a safety question. They do not need to send the SAFETYGRAM through the chain of command, but can mail it directly to the Naval Safety Center. Usually, this type of hazard reporting is not used for hazards within a particular ship, but for those that may affect other similar units.

SAFETYGRAMs can be used to report near-mishaps. A near-mishap is an occurrence that, except for proximity or timely action, would have resulted in damage or injury to personnel. While the near-mishap does not cause personnel injury or damage to equipment or material, it does serve notice that a hazardous condition exists. This condition could result in a future mishap. The near-mishap is significant because it can serve as a warning to supervisors of an unsafe condition.

When a near-mishap occurs, personnel can submit a Safety Hazard Report to their supervisor or the command's safety officer. They can also send a SAFETYGRAM to the Naval Safety Center. The safety

SAFETYGRAM

(Mark X in appropriate box to indicate type of Command)

☐ Surface Ship

☐ Submarine

☐ Diving/Salvage

☐ Aviation

☐ Shore

Command, Ship, or Ship Class

References:

Plan No/Tech Manual/etc.

STATE: What, where, why, how it can be prevented or corrected.

SIGNATURE (NOT REQUIRED)

Instructions: (1) Send original to Commander NAVSAFCEN, and copies as appropriate. Retain file copy.

(2) May use pencil longhand, attach additional sheets as necessary. (3) If classified information included, follow appropriate marking and handling.

OPNAV 5102/4 (Rev. 8-78) S/N 0107-LF-061-0226 (Replaces NAVSAFCEN 5101-1, 5101/2 and 5101/3 which may be utilized to deplete existing stocks.)

Figure 3-4.—SAFETYGRAM.

INTERNAL MISHAP/NEAR MISHAP INVESTIGATION REPORT

From: _____ Division Officer

To: Commanding Officer

Via: (1) _____ Department Head
(2) Safety Officer
(3) Executive Officer

Date/Time of Mishap: _____ Mishap Category: _____

Location of Mishap: _____

Brief Description of Mishap (Including extent of injury and property damage):

Work/Task Supervisor (at time of mishap): _____

Witnesses: _____

Photos taken (circle one)? YES NO N/A

Cause of Mishap: _____

Corrective Action Taken or Recommended: _____

Signature/Date

2nd Endorsement

Does Mishap Meet External Reporting Requirements (circle one)? YES NO

If yes, indicate the DTG or letter serial number of report: _____
(Attach copy of report)

Safety Officer

RETURN COMPLETED INVESTIGATION REPORT TO SAFETY OFFICER

Figure 3-5.—Internal Mishap/Near Mishap Investigation Report.

officer reports the findings of the near-mishap investigation on an Internal Mishap/Near Mishap Investigation Report (fig. 3-5). If you ignore the conditions that cause near-mishaps, you are sure to invite a real mishap.

Injury Reports

Injury reports and trends in minor injuries can identify hazards and problem areas. Trends may reveal a lack of training, poor enforcement of PPE use, or an incorrect operating procedure.

Reports of injuries are treated as follows:

- Afloat, the medical department treating a crewmember completes an injury report and forwards it to the safety officer for investigation.
- Ashore, the SOH office or command keeps a log of Navy injuries and occupational illnesses (civilian and military ashore). It also submits a quarterly report of Navy and civilian occupational injuries and illnesses, as well as an annual report.

Shore activities also maintain records of all Federal Employees Compensation Act (FECA) claims. These claims can also alert a safety manager to local mishaps and hazard trends.

HAZARD ABATEMENT

Once we have identified and reported a hazard, the next step is corrective action. How do we get it fixed? Some remedies are simple. If someone is not wearing goggles, you provide a pair of goggles. Some corrective actions may be extensive and expensive. Renovation of a ventilation system to remove acid mist may take years. We can take temporary measures to protect workers, but we must take permanent measures to decrease the hazard.

One of the first steps in a hazard abatement program is to prioritize the hazards. That requires assessing the hazard and assigning some type of quantifier. Each identified hazard that cannot be corrected immediately is assigned a risk assessment code (RAC). The RAC represents the degree of risk associated with the deficiency based on the combined elements of **hazard**

severity and **mishap probability**. You derive the RAC as explained in the following paragraphs.

HAZARD SEVERITY

The hazard severity is an assessment of the worst potential consequence that is likely to occur as a result of a deficiency. The most unfavorable degree of injury, occupational illness, or property damage defines the "worst potential consequence." The SOH office or safety officer assigns roman numerals to hazard severity categories using the following criteria:

- Category I—Catastrophic: The hazard may cause death or loss of a facility.
- Category II—Critical: May cause severe injury, severe occupational illness, or minor property damage.
- Category III—Marginal: May cause minor injury, minor occupational illness, or minor property damage.
- Category IV—Negligible: Probably would not affect personnel safety or health, but is nevertheless in violation of a SOH standard.

MISHAP PROBABILITY

The mishap probability is the likelihood that a hazard will result in a mishap. The mishap probability is based on the assessment of such factors as location, cycles or hours of operation, and affected population. The SOH office or safety officer assigns an arabic letter to the mishap probabilities according to the following criteria:

- Subcategory A: Likely to occur immediately or within a short period of time.
- Subcategory B: Probably will occur in time.
- Subcategory C: May occur in time.
- Subcategory D: Unlikely to occur.

RISK ASSESSMENT CODE

The risk assessment code (RAC) is an expression of risk that combines the elements of hazard severity and

Table 3-1.—Risk Assessment Code (RAC)

A **Risk Assessment.** Each identified/validated hazard shall be assigned a Risk Assessment Code (RAC) by the activity safety office. The RAC represents the degree of risk associated with the deficiency and combines the elements of hazard severity and mishap probability. The RAC is derived as follows:

1. **Hazard Severity.** The hazard severity is an assessment of the worst potential consequence, defined by degree of injury, occupational illness or property damage which is likely to occur as a result of a deficiency. Hazard severity categories shall be assigned by Roman numeral according to the following criteria.

(a) Category I - **Catastrophic:** The hazard may cause death, or loss of a facility.

(b) Category II - **Critical:** May cause severe injury, severe occupational illness, or major property damage.

(c) Category III - **Marginal:** May cause minor injury, minor occupational illness, or minor property damage.

(d) Category IV - **Negligible:** Probably would not affect personnel safety or health, but is nevertheless in violation of a NAVOSH standard.

2. **Mishap Probability.** The mishap probability is the probability that a hazard will result in a mishap, based on an assessment of such factors as location, exposure in terms of cycles or hours of operation, and affected population. Mishap probability shall be assigned an Arabic letter according to the following criteria:

(a) Subcategory A - Likely to occur immediately or within a short period of time.

(b) Subcategory B - Probably will occur in time.

(c) Subcategory C - May occur in time.

(d) Subcategory D - Unlikely to occur.

3. **Risk Assessment Code (RAC).** The RAC is an expression of risk which combines the elements of hazard severity and mishap probability. Using the matrix shown below, the RAC is expressed as a single Arabic number that can be used to help determine hazard abatement priorities.

HAZARD SEVERITY	MISHAP PROBABILITY			
	A	B	C	D
Category I	1	1	2	3
Category II	1	2	3	4
Category III	2	3	4	5
Category IV	3	4	5	5

RAC	
1	- Critical
2	- Serious
3	- Moderate
4	- Minor
5	- Negligible

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mishap probability. Using the matrix in table 3-1, we express the RAC as a single arabic number that we use to help determine hazard abatement priorities. RACs are used on the various hazard reports, mishap reports, and mishap investigation reports.

SOH DEFICIENCY NOTICE

Ashore, civilian and military hazard correction is documented on a SOH Deficiency Notice, OPNAV 5100/12 (fig. 3-6). Section A describes the

NAVOSH DEFICIENCY NOTICE		
SECTION A - DEFICIENCY INFORMATION		I.D. NO.:
Organization:	Location:	
Description:		
Standard Violated:	RAC:	
OSH Official:	Date:	
SECTION B - ABATEMENT STATUS (COMPLETE ONE OF THE FOLLOWING)		
• DEFICIENCY CORRECTED		
Corrections Made:	Date:	
	Cost	
	Labor:	Material:
• ABATEMENT PROJECT INITIATED		
Project Description:	Action Taken (Included Work Orders/Purchase Request numbers and date as appropriate):	
	Cost Estimate:	Completion Date (Est):
• INTERIM CONTROLS		
SECTION C - COMMENTS		

OPNAV 5100.12

Figure 3-6.—NAVOSH Deficiency Notice.

hazard/deficiency. The activity safety office forwards a copy to the official in charge of the operation where the deficiency occurs. Copies of OPNAV5100/12 for RAC 1, 2, and 3 deficiencies must be posted in the area of the deficiency until the hazard has been abated.

The official in charge of the operation takes prompt action to correct the deficiency. Within 30 days of the date of the notice, he or she completes section B and returns a copy to the activity safety office. Work areas awaiting permanent abatement initiate interim

protective measures. The report should show the status of the deficiency in one of the following categories:

- The deficiency has been corrected.
- An abatement project has been initiated.

INSTALLATION HAZARD ABATEMENT PLAN

Ashore, a formal installation hazard abatement plan records deficiencies assigned RACs 1, 2, and 3 that

require more than 30 days for correction. This plan should include the following standard data for each deficiency (or logical grouping of similar deficiencies):

- Dates of hazard identification
- Location of the hazard(s)
- Description of the hazard(s), including reference to applicable standards
- Estimated RAC (with hazard severity, probability of single occurrence, and annual personnel exposure cited separately) or calculated RAC
- Interim control measures in effect
- Description of the abatement action, including estimated cost and completion date
- Closeout statement, showing: completed abatement action and actual cost, with date of completed action; or process discontinued or work site vacated

The installation abatement plan is available for review locally by recognized employee organizations, where applicable.

AFLOAT HAZARD ABATEMENT PLAN

The safety officer usually maintains a record or some type of log of safety hazard reports. This log is recommended but not required. This log can be used to track hazards that are corrected immediately or quickly. Hazards that require additional time to correct are entered into the 3-M Systems. Such hazards/deficiencies should be the subject of a 4790/2K and entered into the current ship's maintenance project (CSMP).

A safety hazard code, similar to an RAC, is placed in block 15 of the OPNAV 4790/2K; the safety hazard is explained in the Description/Remarks block. The CSMP is the Hazard Abatement Plan for forces afloat. Option "D" of the CSMP lists the OPNAV 4790/2Ks that were marked as safety hazards. The safety officer maintains the CSMP listing of NAVY SOH hazards/deficiencies that require authorization of funding by higher authority. A ship, shipyard, or intermediate maintenance activity that has SOH deficiencies it cannot correct should submit a request to the type commander for either an alteration equivalent to repair or a ship alteration.

INTERIM HAZARD CORRECTION

We recognize that immediate abatement of deficiencies in working conditions may not always be possible and that some temporary deviation from SOH standards may be required. Therefore, you must establish appropriate interim controls as soon as you note the deficiency. Ashore, you should document such controls on the SOH Deficiency Notice as prescribed in chapter 9 of OPNAVINST 5100.23G. The activity safety office approves interim protective measures in effect for more than 60 days. Afloat, the interim action should be documented on the Safety Hazard Report. For an RAC 1 (critical) or 2 (serious) hazard, the commanding officer must personally approve the interim control.

When you must delay correcting an unsafe condition for reasons such as a shortage of funds, personnel, or equipment, take appropriate temporary precautions to protect workers until the correction is made. Such precautions may include securing hazardous areas, disconnecting power sources, removing equipment from service, posting warning signs, or even verbally warning workers of the hazardous condition. Take temporary precautions promptly to reduce the hazard to personnel.

We need to address your authority to correct unsafe conditions at this point. Sometimes an unsafe condition may arise that requires immediate corrective action because it poses an immediate danger to life or limb. We call that an imminent danger situation. Act as your judgment tells you to act to meet the emergency. **Do not delay!** Do not worry about whether or not you have the authority. YOU HAVE IT!

HAZARD AWARENESS DEVELOPMENT

When we were young, adults tried to prepare us to live safely. They cautioned us over and over about the hazards we would encounter. "Look both ways before you cross the street." "Never swim alone." "Stay out of the medicine cabinet." These are some of the safety-related litanies adults repeated to us day in and day out. In school, our teachers also gave us safety instructions. Today, we are still learning about hazards.

As we grew, our own experiences made the warnings we received by word of mouth even more vivid. We slipped in the bathtub, broke our toys, cut ourselves with knives, damaged our bicycles, and soon. We not only encountered hazards, but experienced the results of failing to heed warnings about hazards.

Since we obviously cannot expect to experience everything in life ourselves, we must learn from the experiences of others. We need to heed the lessons learned by those who have gone before us.

Safety precautions and operating instructions provide documentation of experiences that teach us clear lessons. By heeding these precautions and instructions, we can prepare ourselves to live successfully and safely in our everyday environment.

We can learn about mishap prevention from actual mishaps. Experience shows what went wrong and how often. It also shows what has to be done to correct a potential mishap problem. Safety rules and operation and maintenance procedures and practices reflect lessons learned from past mishaps.

Environment, equipment design, or lack of finding or training increases the hazards of some conditions. For example, the best setting for a piece of equipment and its operator is a stable platform. However, the shipboard environment cannot always provide the ideal setting.

The environment of a naval ship is potentially dangerous. Fuel, ammunition, high temperatures, electrical circuits, steel decks, salt water, ladders, voids, and machinery create conditions that can catch the unwary. In the aviation community, high-performance aircraft make the hazards even greater. Everyone in the Navy must be aware of these hazards.

Make sure you provide hazard awareness training. The hidden hazards are the ones that often cause mishaps. Routine tasks may lull people into a false sense of security; they may then be tripped up by something that appeared irrelevant or that they did not notice. A detailed review of the conditions that existed at the time of a mishap might reveal hazards that would have been obvious to the trained observer.

Teach people that they should not take risks when they suspect something is wrong or take shortcuts to

avoid the inconvenience of safe practices. Make them realize that a disabling injury or lost or damaged equipment is much more inconvenient in the long run.

Use formal and on-the-job training to develop hazard awareness. Measure that awareness by the ability of your people to identify hazards. Although you can teach people to identify known hazards, you may have difficulty teaching them to recognize hidden hazards. Their skill level, experience, attitude, and sense of responsibility may affect their ability to identify hidden hazards. You must be able to recognize and evaluate those areas that affect your people's ability to learn. You must be able to teach others what you know and what you have learned through experience.

As a result of changing technology, the working environment constantly undergoes new developments and receives new equipment. Therefore, in spite of conscientious mishap prevention, you must always watch for hazards in the work environment. Hazards may exist because of mistakes made by others or because of your own behavior. Although hazard awareness training teaches people to be more observant of hazardous conditions, it requires a certain amount of self-awareness by the trainee. Education, training, and experience improve the trainee's awareness.

SUMMARY

In chapter 1 we reviewed safety training requirements. In chapter 2 we discussed safety attitudes and promoting a safety program. All of that information involves hazard awareness.

This chapter exposed you to some of the causes of mishaps and ways to prevent them. For further information and guidance, you may find the following references in Appendix I helpful. Remember, take steps to prevent mishaps BEFORE they happen.

CHAPTER 4

MISHAP INVESTIGATION FUNDAMENTALS

Mishaps seriously degrade operational readiness and waste tax dollars. Mishap prevention depends on hazard identification, elimination, control, and correction. We discussed these concepts in chapter 3. Despite all our best intentions to prevent mishaps, they still occur. When that happens, we must thoroughly investigate the mishap to prevent its recurrence. We must review every possible primary and contributing cause. From those causes we can learn and distribute lessons and plan corrective actions.

In this chapter, we will discuss the following information:

- Mishap investigation responsibilities
- Words and definitions investigations
- Privileged information
- Pre-mishap plans
- Investigator training
- Investigation kits associated with mishap
- Investigative procedures

MISHAP INVESTIGATIONS

The purpose of a mishap investigation is to determine the primary and contributing causes of the mishap. From those causes we can then plan corrective action to prevent a recurrence of the mishap. To limit mishap losses, we must analyze the frequency of potential mishaps and identify mishap causes.

Always investigate and report any mishap, near mishap, or situation that could result in a mishap; but conduct mishap investigations with care. You can use a number of investigative techniques to collect and examine evidence, take good witness statements, and determine the chain of events. Whether you are assisting a safety officer with a command or local investigation or serving as a member of a safety investigation board, the same techniques apply.

You may be required to help conduct a safety investigation of a mishap, personal injury, or fatality. OPNAVINST 5102.1D contain the requirements for safety investigations.

Certain mishaps are reportable to the Naval Safety Center. All mishaps require investigation, whether or not they are reported outside the command.

Investigation of mishaps is the responsibility of all levels of supervision, from the first-line supervisor to the commanding officer. Division officers, department heads, or representatives appointed by the commanding officer usually investigate serious injury or major property damage mishaps. First- and second-line supervisors investigate non disabling injury or minor property damage mishaps.

An investigation is best conducted by the lowest level of supervision involved in the job or event that resulted in the mishap. For instance, if improper maintenance or operation of a pump causes a mishap, the immediate supervisor of the maintenance person or operator often provides the best investigation.

You should investigate mishaps that occur under your supervision for several reasons. You are close to the jobs, working conditions, and your personnel. You know the details of jobs, procedures, hazards, environmental conditions, and any unusual circumstances that might arise. You also know the experience and personal characteristics of your personnel. This knowledge provides you with a good background for conducting a thorough investigation.

Conducting mishap investigations yourself strengthens your sense of responsibility for mishap prevention. While conducting mishap investigations, you will learn about the hazards, causes, and mishap conditions that are likely to recur. You must train new personnel, check for unsafe conditions and practices, and remind personnel about hazards.

Since a supervisor has the greatest influence on mishap reporting, you must take positive steps to ensure the prompt reporting of all mishaps. Teach subordinates, especially new arrivals, to report all mishaps, including the "near mishaps" when only chance prevented a mishap. Make sure personnel understand that hazardous conditions cannot be corrected unless they are reported to fully support these efforts, follow up on all reported mishaps with an investigation and corrective measures.

MISHAP INVESTIGATION RESPONSIBILITIES

The commanding officer ensures all mishaps are investigated, no matter how minor. Serious mishaps will be investigated by the cognizant Echelon 2 command. The safety officer or manager, as principal assistant to the commanding officer, will ensure a mishap investigation is conducted for less serious mishaps. The actual informal investigation may be conducted by a safety petty officer, safety supervisor, division officer, or safety manager.

The investigator's responsibilities include answering the following questions: What? Where? When? How? and Why? Notice that you are not trying to find **WHO** caused the mishap. Your job is to make an objective inquiry to learn the circumstances and causes, not to place the blame.

Each mishap shows a failure or defect in a person's actions, a piece of equipment, an environmental condition, a procedure, or a combination of these items. You should thoroughly examine each situation to determine all causes, both primary and contributory.

An important concept for you to understand is that mishaps and injuries are two separate occurrences. An injury is not the mishap; it is the result of the mishap, the investigation of an injury or damage uncovers the cause of a mishap.

WORDS AND DEFINITIONS ASSOCIATED WITH MISHAP INVESTIGATIONS

Before continuing, let's define some of the terms with which you as an investigator need to be familiar:

Evidence— Photographs, drawings, maps, charts, videos, etc., a safety investigator stages or annotates are privileged. Information directly calculated by a safety investigator, or developed at the specific request of the safety investigator, is privileged when that information would reveal the process leading to the development of conclusions, causes, and recommendations.

JAG Manual Investigation— an official legal search to uncover facts concerning a mishap. The JAG manual investigation is conducted separately from the safety investigation and can result in punitive or administrative action.

Mishap— Mishaps are unplanned events or a series of events, which interfere with or interrupt a process or procedure and may result in a fatality, injury, or occupational illness to personnel or damage to property.

Mishap investigation— a review of the events leading to, during, and following a mishap. The command involved conducts the investigation using the procedures outlined in OPNAVINST 5102.1D.

Safety Investigation Board (SIB) - a formal investigating body appointed to determine the primary cause(s) of mishaps. The board consists of a minimum of three members. The immediate controlling command of unit involved in the mishap normally appoints the senior member of the safety investigation board.

Witness Statements. Witness statements to an SIB shall not be provided to any activity, except as authorized in this Manual. Once the witness makes a statement to the SIB, the contents of the statement become part of the SIB's evidence.

Near Mishap— is an act or event which injury or damage was avoided merely by chance.

PRIVILEGED INFORMATION

Privileged information is that information voluntarily provided under a promise of confidentiality or information that would not have been discovered but for information voluntarily provided under a promise of confidentiality. The analyses of findings, conclusions, and recommendations of the safety investigation boards and any endorsements made by the board are privileged information. Also privileged are the calculations and deductions the board used in making those analyses.

A complete and comprehensive mishap investigation is an essential tool in identifying the cause of a mishap and thereby preventing recurrence.

Traditionally, the only source of mishap information is a Judge Advocate General (JAG) investigation. This investigation determines accountability and culpability.

The Manual of the Judge Advocate General, JAG Instruction 5800.7C governs the JAG Manual investigation. In a JAG Manual investigation, however, the reluctance of witnesses to divulge information for fear of being punished might lead to

the loss of valuable safety information. The sole purpose of the safety investigation is mishap prevention, not the determination of accountability. That is why we invoke the concept of privileged information for afloat and aviation investigations.

Individuals may be reluctant to reveal information pertinent to a mishap because they believe certain uses of the information could be embarrassing or detrimental to themselves, their fellow service members, their command, their employer, or others. They may also elect to withhold information by exercising their constitutional right to avoid self-incrimination.

Individual members of the armed forces **must be assured** that they may confide in others for the mutual benefit of fellow service members without incurring personal jeopardy in the process. Witnesses **do not** provide statements to safety investigation boards under oath, and requiring them to do so is prohibited. Mishap investigators must advise witnesses, in writing, of the purpose for which they are providing a statement and of the limited use to be made of the statement. The witnesses' statements are not limited to matters they could testify about in court. They may be invited to express opinions and speculate on possible causes of the mishap.

Safety investigation boards who believe their deliberations, opinions, and recommendations could be used for other than safety purposes might be reluctant to include vital safety information in their reports. Likewise, endorsers of SIREP may be reluctant to include vital safety information in their SIREP endorsements.

Should the Department of the Navy (DON) use privileged information for any purpose other than safety, it would lose the trust of its people in future assurances of privilege. To protect privileged information against unauthorized disclosure, the Navy must safeguard the entire reporting cycle. That cycle includes assurances of confidentiality given; privileged information obtained, developed, and reported; privileged information protected against misuse or public disclosure; and trust in assurances of privilege and confidentiality. If any segment of the cycle fails, we may lose vital safety information. Privileged information will not be used as follows:

- In making any determination affecting the interest of an individual involved in a mishap or making a statement under assurances of confidentiality or involved in a mishap.

- As evidence, or to obtain evidence, in determining misconduct or line-of-duty status
- As evidence to determine the responsibility of personnel for disciplinary or administrative action.
- As evidence to assert affirmative claims on behalf of the government.
- As evidence to determine the liability of the government for property damage caused by the mishap.
- As evidence before administrative bodies, such as officer or enlisted separation boards, judge advocate general manual investigations or inquiries, naval aviator or naval flight officer evaluation boards (USN) and field performance boards (USMC).
- In any other punitive or administrative action taken by the Department of Navy.
- In any other investigation or report of the mishap.

Not all evidence collected by a safety investigation board is privileged. Logs, most photographs, physical evidence, and copies of instructions are commonly available to anyone with no promises of restricted use. The source of physical evidence is privileged if divulged under the promise of confidentiality.

The concept of privilege has been successfully used by the Navy aviation community and U.S. Air Force to gather vital mishap information. Military and federal courts grant protection under executive privilege to the analysis, conclusions & recommendations of command safety investigators, members of Safety Investigation Boards (SIB), and Safety Investigation Report (SIREP) endorsers. Additionally, information given by witnesses under promise of confidentiality to safety investigation boards is privileged.

PRE-MISHAP PLANS

Do not wait for a mishap to happen. Be ready, physically and mentally. Pre-mishap plans vary widely, depending on the mission or task at hand, resources, environment, and personnel of each command. A mishap plan should be written so it remains valid during training exercises and deployments.

Develop a safety investigator's kit. This should be maintained and updated by the command or unit safety officer. The content of the kit depends on the

type of command or unit, mission, and equipment and weapons normally used in the performance of that mission.

A mishap plan should be written for normal operations and should be updated for training exercises and deployments.

INVESTIGATOR TRAINING

Whether a safety petty officer or an experienced safety manager, mishap investigators need some training to ensure they can conduct a useful investigation. Aviation safety officers receive extensive formal training in aircraft mishap investigation techniques. The Afloat Safety Officer Course currently devotes 3 days to mishap investigation and training. The Naval Safety School provides a mishap investigation course for shore activities.

Most investigator training is done in house or on board by a trained safety manager or safety officer. Good training is the key to a good investigation; a good investigation is the key to preventing mishaps. The following example demonstrates the importance of a good investigation:

A Seaman fell down a ladder and broke his ankle. He lost more than 5 work days, so his divisional safety petty officer (SPO) had to do an investigation and prepare a report. The SPO talked to one person who saw the SN fall. That person said the SN was hurrying to get to chow and slipped on the middle step. The SPO listed the cause of the mishap as inattention and rushing. The resulting mishap report was three sentences long. The next week another sailor fell down that same ladder and died.

What is wrong with this story? Perhaps the SPO was not trained in conducting a mishap investigation. Perhaps the SPO didn't realize the importance of the mishap investigator's job. When a formal safety investigation board investigated the second mishap, it found the following evidence:

- Worn ladder treads
- No nonskid at either end of the ladder
- Dirty ladder treads and greasy hand rails
- A burned out light at the top of the ladder
- Missing pins from the bottom handrail attachment
- The routine practice of requiring personnel who used that ladder to work until chow

was nearly over resulted in personnel hurrying to the mess decks

A thorough investigation of the first mishap may have prevented the fatality. The training of that investigator may have saved a life.

INVESTIGATION KITS

In the movies we see civilian investigators with their cameras, fingerprint kits, and magnifying glasses. Although you may not investigate enough mishaps to justify having a professional kit, you may find the following equipment useful during evidence collection and mishap scene evaluation. Most of the equipment is common and will be available on board ship or at your activity.

- Yellow caution tape
- Measuring tape
- 35mm camera, digital, or video camera with extra film and batteries
- Blank paper for witness statements
- Advice to Witness forms
- Plastics bags for gathering debris
- Notebooks, pens and pencils
- Tape recorder with extra cassettes

INVESTIGATIVE PROCEDURES

A mishap has occurred! The worst that could happen has happened! What are your priorities? There is no question about the first priority at a mishap site save lives and prevent more injury and property loss. Aboard ship, damage control takes priority over preserving the scene of the mishap for investigators.

Begin your investigation as soon as possible after the mishap. The sooner you begin, the better your investigation will be. Witnesses will be present. You can gather more accurate facts because the damage and materials involved will be in the same relative position as when the mishap occurred.

The mishap investigator is seldom the first to arrive at the scene of a mishap. An activity with a pre-mishap plan will have a supervisor on the scene who knows how to protect the site, detain witnesses, and provide observations. Protecting and preserving the mishap site is important.

Your first overall observation and analysis on arrival at the scene is critical. Slow your approach to the scene so that you can observe the overall big picture.

Start your investigation the minute you arrive, but don't hinder damage control or first-aid efforts. Don't become part of the mishap! Once people have calmed down, victims have been removed, and the area is safe, your priorities are as follows:

- Preserve the evidence
- Protect the mishap site
- Secure the evidence

You will have little time to plan your investigation. Always be ready to begin collecting facts and evaluating the situation with little prior notification.

Preserving Evidence

Mishaps gather crowds! People forget their work and begin running in all directions as they rush in for a look. Too often, many more people arrive on the scene than need to be there. Preserving evidence and controlling activities under these conditions is almost hopeless. Evidence gets washed away, trampled on, thrown over the side, picked up as a souvenir, or scooped up in initial clean-up efforts.

When a mishap occurs, especially aboard ship, everyone's first thought is to get the site back to normal. That must be discouraged if it doesn't impact on operational readiness. Anything that can be left in place should not be touched.

As a safety supervisor, you may be a key player in preserving evidence until a safety investigation board arrives. Take the following steps (which should be included in your pre-mishap plan) to preserve evidence:

- Cord off or secure the mishap scene. Post a guard if you must!
- Get a photographer on the scene as soon as possible to take photographs—takes lots of photos of everything. Use a video camera, if available, as well.
- Cover the scene with a tarp if the scene is outdoors or if the scene may be disturbing to passersby.
- Prevent witnesses from leaving the area. Keep them from conversing with each other, if possible. Get their names and a phone number where you can reach them, if time allows, have them start writing down what they saw.
- Ensure the medical department representative or emergency medical technician preserves any transitory

evidence, such as blood samples, for drug and alcohol tests (if warranted and authorized).

- Minimize moving or disturbing any physical evidence. Other investigators may be using this same evidence, so protect it as a courtesy to all who may need that evidence.
- Before any evidence is moved, photograph it from several angles. If you don't have a camera, make a quick sketch or diagram.

Collecting Evidence

You may have seen investigators on television in surgical gloves placing little bits of debris in plastic bags. They handle such evidence gingerly to prevent damage to it.

You may want to collect parts, pieces, debris, and other items from the site to prevent their loss and to examine later. Carefully wrap them in protective material or place them in plastic bags, envelopes, or small glass or plastic containers. Accurately label each item with the following types of information:

- Who gathered the item (You may want to question the person later about the position or location in which it was found.)
- The identification of the item, if known
- The time and date it was gathered
- The location of the item when removed

When labeling evidence, make sure you do not put any information on the label that might be privileged. In other words, do not indicate the source leading to your finding the item or any deliberative comments. You must share physical evidence with other investigators, since it, in itself, is not privileged.

You may also collect records such as logs, operating procedures, or time cards as evidence. Even though you review the original record, make a copy of it to retain as evidence. Mark on the back who made the copy and when. A copy of a log made a week after the mishap may have given someone the chance to rewrite or "correct" it. Check for erasures and added lines.

PHOTOGRAPHING

Photographs are perhaps the most valuable piece of evidence you will have besides an eye witness. You can't just go in to a mishap scene and start

shooting photographs at random! You or your photographer needs to plan your shots to make the best use of limited time and still not miss critical information.

Take photographs of the wreckage, its distribution, and the surrounding area. Photographs are helpful in preserving items of evidence, which would be destroyed by time or elements. They eliminate lengthy narrative descriptions and provide reviewing officials and units with a clearer understanding of the mishap sequence and the environment. Photograph the mishap site surrounding the site and all items of evidence prior to removal, when possible.

Some safety officers and safety managers keep a disposable 35-mm camera or self-developing camera readily available. If they arrive early at the scene, having a camera on hand may be vital. If you intend to use the base or ship's photographer, arrange ahead of time for a review of investigation and photographic techniques with the photographer.

Photographs are physical evidence. They can be shared among investigators. The only exception is if the safety investigation board deliberately stages a photograph. Based on its deliberations, the board may want a photograph staged to prove or disprove a point. For example, the board may decide that a worker was electrocuted by touching a light switch over a metal sink. To prove that could have happened, the board may have a worker of the same height stand in the same spot to try to reenact touching the switch. Staging the photograph to show that the victim could reach the switch makes that photograph and its negative privileged information.

Also, if a Safety Investigation Board member writes or draws something on a photograph based on board deliberations, the photograph then becomes privileged. The negative to that photograph, without the writing, is not privileged.

Label each photo according to your log or record, telling when it was taken, who took it, under what conditions it was taken, where it was taken from, and what it shows. Otherwise, you may end up with a photo of a jumble of wires and twisted metal with no clue as to what the photo is of. It is embarrassing to leaf through a stack of photographs and not even know which angle is up!

VIDEOTAPING.

Videotaping is a valuable method of recording a mishap scene, but it is not a substitute for still photography. A video tape shows responders in action and shows movement and color; but it cannot be studied as well as a photo.

Recording a reenactment of the chain of events leading to a mishap can serve as a valuable supplement to still photography. A videotape made by an afloat or aviation safety investigation board to reenact a mishap is privileged, since the tape reflects the board's deliberations. Other video tapes made by reporters, a single investigator are not privileged since they are physical evidence.

SKETCHING, DIAGRAMING, AND CHARTING

A sketch is a drawing made at a mishap site. It is usually a rough, stylized drawing that can be smoothed up later into a more accurate diagram. Charts are usually tables of information, measurements, or statistics used to clarify certain points. You may also have charts of speeds, instrument readings, and temperatures.

The same rules that apply to the labeling of photographs apply to the labeling of sketches and diagram. Carefully label sketches and diagrams as you would a photograph. The advantage that a diagram has over a photograph is that it is less cluttered. A diagram can show movement with arrows, angles, positions of people and parts, and key distances.

Drawn closely to scale, it can emphasize certain aspects of a photograph to clarify a point. Sketches may be the only evidence you have from a mishap scene if photographs were not available before evidence was moved.

With a sketch or diagram, you can add information like temperatures, air flow, plots of noise, and lighting. Use grid or graph paper, if available, to help draw to scale. Mark sketches or diagrams aboard ships showing forward and aft, port and starboard, compartment number, or frame number. Ashore, mark magnetic north or place north in the upper left corner. Use key landmarks or features to orient your drawing. Mark key points, distances, and movement on a spare navigation chart or map. Remember to be as accurate as possible. Some items to record and measure include the following:

- Location of injured and dead personnel
- Machines and equipment affected by the mishap
- Parts broken off or detached from the equipment
- Objects damaged, marked, or struck against
- Gouges, scratches, dents, or paint smears
- Tracks or similar indications of movement
- Defects or irregularities
- Accumulations of stains or fluids
- Spilled or contaminated substances
- Areas of debris
- Sources of possible distractions or adverse environmental conditions
- Safety devices and equipment
- Positions of people and witnesses
- Possible movement of people, before, during, or after a mishap

Look for things that are obviously missing. A key part of a machine may not have been replaced during maintenance.

Using Various Types of Witnesses

We usually think of witnesses as being people who were at or near the mishap scene who can provide helpful information. But witnesses need not be human. A witness can be anything or anyone who provides insight into a mishap. A witness may not have even been near the mishap but can provide information about events leading up to the mishap. Some mishap investigation courses identify four types of witnesses, known as the four "P's": people, parts, position, and paper.

- **People.** People can include others besides eyewitnesses, participants, and victims. They can be your friends, supervisors, or anyone who can provide information about the mishap. They can also be technical representatives for equipment or aircraft involved in the mishap.
- **Parts.** Parts include debris, wreckage, charred wood, failed machinery, support equipment, or stressed metals found at the mishap site.
- **Position.** Position includes the mishap location, patterns of movement, where victims were found, and where the wreckage was found or was resting after the mishap.
- **Paper.** Paper, such as logs, records, reports, drawings, and recordings, provides witnessing information. Although we may not think of them as paper-type products, floppy disks also fall into this category.

All of these items "testify" about the mishap. But by far the most valuable information about "how" the mishap occurred comes from the human witness.

In a JAG Manual investigation or any other legal investigation, the investigator is interested in the truth. Witnesses must swear under oath that their testimony is true. The written testimony of witnesses, which can be used against them, must stand up in court.

Witnesses are sometimes reluctant to fully cooperate in legal investigations because they fear retribution. That inhibits investigators from getting all the pertinent information.

A safety investigation cannot risk the withholding of information! Therefore, witness testimony in a safety investigation is NEVER TAKEN UNDER OATH! The safety investigator and witness must share a free and open flow of truthful information. Witnesses must be confident that what they say will not be used against them in any disciplinary or administrative proceeding. Witnesses must feel free to share rumors; their opinions, thoughts, or recommendations; or any other information about the mishap. They must understand that the only purpose for the information is SAFETY and that investigators need to know everything about the mishap to prevent recurrence.

Safety officers, safety petty officers, or safety supervisors who conduct an informal investigation may take oral testimony. Although you may take notes, be careful to avoid documenting any information that may be used to harm witnesses or their command. For a command or local investigation, *assure* witnesses that you will not use the information against them, but let them know the report is releasable under the Freedom of Information Act (FOIA).

In a command or local investigation, information and evidence are not privileged. That is because junior supervisors may lack the ability to properly protect that information from release or misuse. Information becomes privileged only when gathered through an afloat or aviation safety investigation board. To avoid problems, avoid taking written statements for locally conducted investigations.

A safety investigation board that writes a limited-use mishap report can promise that the information witnesses provide will not be used against them. The board provides that promise in writing. An Advice to Witness form (fig. 4-1) is provided to all witnesses in an afloat mishap so that

they understand just how their testimony will be used by the board. Similar forms are used in both aviation and afloat mishap investigations. These witness statements are privileged. Shore safety investigation boards use a different form giving the witness testimonial immunity.

Remember, all testimony is VOLUNTARY in a safety investigation. Witnesses can refuse to cooperate. You must explain your purpose and request their assistance. You cannot force a person to provide information.

Interviewing Witnesses

Witnesses should be interviewed as soon as practical after the mishap to ensure the integrity of the information. Witnesses provide better information when the mishap is fresh in their minds. Waiting days, or even hours, to conduct an interview can be detrimental.

- Witnesses are strongly influenced by each other and the news media. Given time to talk among themselves and compare stories, witnesses may add to or change their story. Seeing the mishap on the news can influence their own account.
- Witnesses can forget. They forget minor details. If the witnesses didn't understand what they saw, they may use their imagination to fill in the blanks; therefore, their story may change.
- Some witnesses are hostile, and, given time, may develop a grudge. They may find out information that influences them to protect a friend or to try to hurt their supervisor.
- Witnesses may go out and tell all their friends about the exciting mishap. Each time they tell the story, it gets better. Without knowing it, the witnesses are embellishing the information.

Try to keep witnesses apart by giving them separate tasks at different locations. Put them to work drawing a sketch of the scene, listing participants, or writing down what they saw. Having a dozen sailors waiting together on the mess deck will ensure homogenized testimony. An investigator must also consider the personality of the witness:

- Extrovert or braggart
- Timid or self-conscious
- Suspicious
- Excitable
- Intentionally misleading
- Traumatized
- Untruthful

SIGNS OF UNTRUTHFULNESS

- Hang-dog appearance
- Repeats the questions asked
- Inaudible speech
- Defensive smile
- Nervous laugh
- Unnatural emphasis on details
- Excessive detail

The interviewer determines witness reliability. Witnesses may not be intentionally misleading, but you must compare their information to that of other witnesses. For example, six sailors responded to a fire aboard ship. Three said they heard the word passed and then heard the general quarters alarm. The fourth did not hear the word passed at all. The other two heard the word passed after the alarm. The interviewer must determine the credibility of each witness, compare testimony, and then decide which account was more accurate. The first three may have compared stories. The fourth may have been too far from a 1MC speaker.

ADVICE TO WITNESS

THIS IS PART OF A SAFETY INVESTIGATION
LIMITED DISTRIBUTION AND SPECIAL HANDLING REQUIRED BY OPNAVINST
5100.19D

THIS STATEMENT IS NOT PRIVILEGED AND MAY BE DISCLOSED

PLEASE READ THIS STATEMENT CAREFULLY
CERTIFY THAT YOU UNDERSTAND IT BY YOUR SIGNATURE AT THE
BOTTOM

I understand that:

- a. I have been requested to voluntarily provide information to a safety investigation board conducting an investigation of a Navy-Marine Corps mishaps.
- b. I AM NOT being requested to provide statement under oath or affirmation.
- c. Disclosure of personal information by me is voluntary, and that failure to provide such information will have no direct effect on me.
- d. The purpose of the information provided by me is to determine the cause of the mishap and/or the damage and/or injury occurring in connection with that mishap.
- e. All information provided by me to the SIR Board will be used ONLY for safety purposes. It is further understood, however, that the information provided by me or contained in this report may be released in response to a Freedom of Information Act (FOIA) request.
- f. Although releasable under FOIA, the information provided by me shall NOT be used by the Government:
 - (1) In any determination affecting my interests.
 - (2) As evidence to obtain evidence in determining misconduct or line of duty status of killed or injured personnel.
 - (3) As evidence to determine my responsibility or that of other personnel from the standpoint of discipline.
 - (4) As evidence to assert affirmative claims on behalf of the government.
 - (5) As evidence to determine the liability of the government for property damage caused by the mishap.
 - (6) As evidence before administrative bodies, such as Officer/Enlisted Separation Boards, Judge Advocate General Manual investigations/inquiries, Naval Aviator/Naval Flight Officer Evaluation Boards (FNAEB) or Marine Corps Field Flight Performance Boards (FFPB).
 - (7) In any other punitive or administrative action taken by the Department of the Navy.
 - (8) In any other investigation or report of the mishap about which I have been asked to provide information.
- g. My signature acknowledges that I do not need a full Promise of Confidentiality as a condition on my willingness to provide testimony to the Board and I understand that statements given without a Promise of Confidentiality may be released. (If the witness has any reservations about their statement being released to anyone outside the board itself, entitled persons in the safety endorsement process, or the public under FOIA, a Promise of Confidentiality should be offered to ensure forthright, candid testimony).

1. STATEMENT (Continue on reverse and/or attach separate sheet(s) as necessary)

2. PRINTED NAME (First, Middle, Last)			3. SIGNATURE
4. DATE	5. RANK/RATE	6. SERVICE	7. TELEPHONE NUMBER
8. ADDRESS WHERE YOU MAY BE LOCATED			

Fig 4-1

The interviewer's body language can intimidate witnesses or set them at ease. When interviewing, sit on the same level as the witness, not above. Offer the witness a soft drink or cup of coffee. Use a quiet place, such as an office or stateroom, to conduct the interview, not a crowded lunchroom. If a male is interviewing a female (or vice versa), the interviewer should ensure the door remains open and the place is not secluded. Make sure you are not interrupted during the interview. Interview one-on-one—avoid ganging up on a witness with two or three investigators.

INTERVIEW-DO NOT INTERROGATE!

Be sincere and friendly to your witnesses. Provide a phone number where you can be reached if they wish to add something they forgot to their testimony. Explain the purpose of your investigation. Do not argue with your witnesses.

Before your interviews, you should preplan a few common questions. Asking each witness a few similar questions can help determine if the witness's account is believable. Write down pertinent questions about which a particular witness may have information. Have a basic understanding of the equipment, material, and procedures surrounding the mishap. If you are not familiar with how a band saw works, you may not be able to ask pertinent questions about how the victim used the saw.

Ask neutral questions. Ask questions that require explanations, not just a yes or no answer. Listen, and permit silent periods. Do not rush your witness. Keep the interview on track. Solicit a witness's assistance and recommendations to prevent recurrence of the mishap. Always start with the same question: **WHAT FIRST ATTRACTED YOUR ATTENTION TO THE MISHAP?**

You may want to use a visual orientation to jog the witness's memory. If not too traumatic, take the witness to the mishap scene. Let the witness explain what happened, who was standing where, and what his or her actions were. First refresh the witness's memory at the scene; then conduct the interview. Be sensitive to your witness. A witness who saw a friend injured or killed may be too upset to provide much testimony.

If you want to interview a victim in the hospital, check with the physician first to see if an interview would harm the victim. Go to the hospital sometime other than regular visiting hours. Relatives of the victim may be hostile, press for information, or upset the victim. Relatives may try to blame you or your command for hurting their loved one.

In an informal interview you listen to the witness and take notes. Although a witness may draw a scene or write down a sequence of events, a local or command mishap investigation does not use Advice to Witnesses forms or take written statements.

A safety investigation board does use the Advice to Witnesses form and can ask for a written statement. A witness who is reluctant to write a statement may record or dictate the statement. Review dictated statements with the witness. Have a recorded statement transcribed; then review it with the witness.

Let witnesses know that you may call them in later to reinterview them or ask them more questions. Encourage witnesses to add to their testimony later, as well.

An interview has four phases:

- First phase—Free narrative
- Second phase—Repeat the story
- Third phase—Review the information
- Fourth phase—Clear up inconsistencies

Once you have interviewed and reinterviewed your witnesses, then you must analyze their information. Sometimes developing a chart of your witness information is helpful.

Determining the Sequence of Events

Now that you have your sketches, evidence, photographs, video tapes, and witness statements, you can determine your sequence of events. That is the most difficult part of investigating a mishap, especially a complex mishap. You must take all the events surrounding the mishap and put the jigsaw puzzle together.

In some mishaps you have logs and records that aid you in pinning down times and people. Start with the times you do have; then fill in the blanks with testimony and your "best guess." Some investigators write the sequence of events on small pieces of paper and arrange them into different sequences until a possible chain of events appears.

Your chain of events can start days or weeks before the mishap even occurred. Look as far back as needed to find a cause that could prevent recurrence. Maintenance done on an aircraft 6 weeks ago could be a contributing cause to an aircraft crash. Disconnecting a backup warning bell on a forklift last year may have contributed to a worker's being run over last week. All of these may be part of your sequence of events.

Your sequence of events may also be extremely short. A welding spark touching off a pyrotechnic device that detonates other ammunition that blows out the wall of a building may happen in a matter of seconds. The sequence of events is the investigator's best estimate of what could have happened.

Reconstructing the Mishap

Sometimes you will find that reconstructing the mishap will help you get a clear picture of how the mishap occurred. Using your best guess of the sequence of events, walk through the mishap.

Have those who take part in recreating the mishap proceed up to the point of the mishap. Use original players if they are not too upset to revisit the scene. Go through the events slowly; then stop and discuss the events.

Be careful not to repeat the unsafe act. You don't need to have another mishap on your hands! Beyond the point of the mishap, talk about the action taken and walk through it again. Try other possibilities to see if they could have been contributing causes. Videotape the reconstruction and view the tape. Many times you will discover the cause of the mishap through the reconstruction.

Checking Precedence

During your investigations you should also check to see if this same type of mishap has happened before. Based on the precept that there are "no new causes," a previous mishap could provide clues to this mishap. The Naval Safety Center, systems commands, and type commanders have information on previous mishaps, near-mishaps, and systems/equipment problems that may provide insight. Reviewing this type of information also aids in formulating corrective actions.

Determining Criminal Evidence

A mishap is an unplanned event. A criminal act is an intentional or planned event. A deliberate act is not a mishap. The criminal act may not be readily obvious until the mishap investigation is started. Arson, for example, may not be determined until most of the mishap investigation is completed.

When doing an investigation, if you find criminal evidence, stop the investigation and inform your chain of command. A safety investigation board that finds a possible criminal act will stop its investigation, and the senior member will inform the chain of command. Nonprivileged physical evidence can be turned over to criminal investigators. The sources of the evidence and privileged information are never revealed or turned over. If directed, a mishap investigation may continue, depending on the mishap. For example, if an arson fire occurred, but investigators found several hydrants out of commission and several hoses missing, a mishap investigation might look into those problems.

Analyzing Mishaps

A variety of analytical techniques are used in mishap investigations. Some are simple, while others derived from civilian investigators are quite sophisticated. In this section we will define and discuss a few of the more common analytical techniques used by DOD personnel.

An analysis of a mishap involves many methods and techniques of arranging facts. The facts can be used for the following purposes:

- To help determine what additional information is needed
- To establish consistency, validity, and logic
- To establish sufficient and necessary causes
- To help guide and support judgments and opinions

Some methods of analysis are used both to prevent mishaps and investigate them. Systems safety and failure mode analysis are detailed methods used when investigating systems involving complex, interrelated components. The Navy may use these methods for aircraft and weapons systems investigations. Some of the results of these analyses can also be used to predict mishaps or the possibilities that certain mishaps will occur.

The following techniques are used by some Navy mishap investigators, depending on their training and the extent of the investigation. Training is available in the techniques through the Naval Safety School and local colleges and universities.

FAULT TREE ANALYSIS.— The Navy uses fault tree analysis to determine if a particular system, component, or equipment requires planned maintenance. It asks questions such as, If maintenance is not done, will the system fail? If the system fails, what is the result? Will personnel get injured? Will operational readiness be damaged? The fault tree is a symbolic diagram on paper showing "what if " problems. It also branches off into other components affected by the failure. Analyzing mishap investigation information works backwards from the final failure to the original component. It shows the cause-and-effect relationship of systems.

CHANGE ANALYSIS.—Change signals trouble. A change in the steering of the ship or a change in the sound of an engine may signal trouble. Departures from the norm may be an element in the chain of events leading to a mishap. Changes interact with subsequent changes. A change in a Maintenance Requirement Card (MRC) could cause a change in frequency of the maintenance. The change in frequency could change the adequacy of the maintenance. The change in adequacy of maintenance could change the reliability of the equipment. The change in reliability could lead to a mishap. Analyzing the changes that affected a system or procedure may provide mishap causes. In a change analysis, we compare a mishap situation with a similar but mishap-free situation. We determine the differences and analyze them. These differences may be the cause factors.

MANAGEMENT OVERSIGHT AND RISK TREE.— The management oversight and risk tree (MORT) technique uses a logic tree format as a guide to seeking facts in mishap investigations.

It involves a long series of interrelated questions and the use of diagrams, symbols, and charts. It is similar to a fault tree but adds in more supervisory and human factors. Once completed, it provides a visible trail of facts and investigative steps. MORT is based on the concept that all accidental losses arise from two sources: (1) specific job oversights and omissions, and (2) the management system factors that control the job. Within the MORT system, a mishap means an unwanted transfer of energy that produces injury, damage, and loss. Mishaps are prevented by using energy barriers or controls. For example, the energy of a piece of broken grinding wheel causes the loss of an eye. The appropriate energy barrier would have been a guard on the grinder or eye protection on the worker.

TECHNIQUE OF OPERATIONS REVIEW.—

The technique of operations review (TOR) method is used in mishap prevention and as an investigative tool. It is directed more at management than at hardware. TOR is a step-by-step process whose goal is the efficient operation of a system. Analyzing the operation using TOR after a mishap defines weaknesses in the operation. TOR usually uses a group discussion method of defining all possible and probable causes and then tracing the events. As causes are accepted or rejected, the primary cause eventually becomes clear. TOR does not propose solutions but does expose problems.

SUMMARY

In this chapter you have been given some mishap investigation fundamentals concerning investigative techniques, collection of evidence, interviewing witnesses, and analyzing information. These procedures can be applied to any type of investigation, whether ashore, afloat, or involving aviation. The results of these investigations provide you with the information to complete mishap reports. Chapters 6, 7, and 8 deal with their respective areas of mishap reporting.

CHAPTER 5

NAVY OCCUPATIONAL SAFETY AND HEALTH PROGRAM FUNDAMENTALS

In chapter 1, we gave you background information on the Safety and Occupational Health (SOH) Program. In this chapter, we will discuss the following areas of the SOH Program:

- SOH Program background
- SOH Program elements
- Scope of SOH Program
- Industrial hygiene surveys
- Industrial hygiene terminology
- Heat Stress Control and Prevention Program
- Hearing Conservation Program
- Hazardous Material/Hazardous Waste Program
- Sight Conservation Program
- Asbestos Control Program
- Lead Control Program
- Radiation Protection Program
- Respiratory Protection Program
- Personal Protective Equipment (PPE) and Clothing Program
- Electrical Safety Program
- Tag-Out/Lock-Out Program
- Gas Free Engineering Program
- Medical Surveillance Program
- General safety precautions

The off-duty safety program elements, such as home, traffic, athletic, and recreation safety, are also part of the SOH Program. Chapters 10 and 11 discuss those elements.

SOH PROGRAM BACKGROUND

Federal law requires the Department of Defense (DOD) and Secretary of the Navy (SECNAV) (as discussed in chapter 1) to establish occupational safety and health programs. The Chief of Naval Operations (CNO) has established the SOH Program in response to this requirement.

In 1983, the first *SOH Program Manual*, OPNAVINST 5100.23C, was written, defining the Navy's occupational safety and health standards. Since program requirements differed significantly for military equipment, a separate SOH manual was drafted for forces afloat. OPNAVINST 5100.19B, a revision of the *Safety Precautions for Forces Afloat*, was issued in 1989. Numerous changes have been

made to these manuals to make them comply with revisions to OSHA standards.

SOH PROGRAM ELEMENTS

The SOH Program addresses the maintenance of safe and healthful conditions in the workplace or the occupational environment. It applies to all Navy civilian and military personnel and operations, ashore or afloat.

The principle elements of the SOH Program, in no particular order of importance, are as follows:

- Training
- Program evaluation
- Safety standards and regulations
- Mishap investigation and reporting
- Hazard control and deficiency abatement
- Inspections, surveys, and medical surveillance

A successful SOH Program is one that reduces work-related injuries and illnesses. That results when every level of the organization emphasizes the program. SECNAV has overall responsibility for the SOH Program. CNO administers the program through the chain of command.

These program elements are applied through two basic components of the SOH Program: the Occupational Health Program and the Occupational Safety Program.

OCCUPATIONAL HEALTH PROGRAMS

Occupational health deals with preserving the health of workers on the job. Unlike safety, in which the results of a mishap are quickly clear (such as a fall down a ladder), many occupational illnesses and diseases aren't instantly apparent. They may not show up until years after workers have been exposed to a hazard. Since the effects may be slow to appear, the hazards may not be readily obvious. One good example is hearing loss.

Hearing loss normally takes place gradually as a result of years of noise exposure. The Navy is concerned with occupational health issues as well as safety. They both can affect our sailors' quality of life. They can cause lost work time and cost millions of dollars in worker compensation.

Occupational health programs include the following:

- Heat stress control
- Lead safety
- Sight conservation
- Hearing conservation
- Respiratory protection
- Asbestos control
- Non-ionizing radiation and laser safety
- Personal protective equipment (PPE)
- Hazardous material control and management

We will provide in-depth coverage of the preceding programs in this and the following chapters. For additional information, consult the *Safety and Occupational Health (SOH) Program Manual*, OPNAVINST 5100.23G, or the *SOH Program Manual for Forces Afloat*, OPNAVINST 5100.19E.

OCCUPATIONAL SAFETY PROGRAMS

Occupational safety concerns the prevention of mishaps and injuries that may occur on the job. Most safety mishaps result in immediate injuries and material damage that affect mission readiness. Anytime a sailor loses a day of work because of a mishap, the command loses a valuable resource and part of the team. The occupational safety components of the SOH Program include the following:

- Deck safety
- Tag-out
- Electrical safety
- Gas free engineering
- Machinery and workshop safety
- Weapons safety (general safety precautions)
- Diving operations (general safety precautions)
- Shipboard aircraft safety (general safety precautions)
- Hazardous material handling, storage, and disposal
- Marine Sanitation Devices (MSD) safety
- Collection Holding, and Transfer (CHT) safety

Often, these occupational safety and occupational health programs overlap. Only by taking **all** SOH Program aspects, including on-duty and off-duty safety into account can we cover the entire spectrum of today's Navy.

SCOPE OF THE SOH PROGRAM

The SOH Program applies to both civilian and military workers. OPNAVINST 5100.23G, the *SOH Program Manual*, does not address all safety and health standards for civilian and military workers assigned ashore. In those cases, shore personnel must follow OSHA standards or other applicable criteria. For example, since the *SOH Program Manual* does not contain electrical safety standards, it refers readers to 29 CFR 1910, *General Industry Standards*.

OPNAVINST 5100.19E, *Safety and Occupational Health Program Manual for Forces Afloat*, applies to all DOD civilian and military personnel assigned to or embarked on naval vessels. This publication defines safety standards for ships, submarines, and small craft. Volumes II and III of OPNAVINST 5100.19E provide surface ship and submarine safety standards.

INDUSTRIAL HYGIENE

The shore and afloat SOH manuals refer personnel to industrial hygiene officers or industrial hygienists for assistance. Industrial hygiene is the science of protecting workers' health through the control of the work environment.

Historically, the health of workers was of little concern before 1900, even though diseases were attributed to certain occupations since the fourth century B.C. The occupational health effects of mining toxic metals, such as lead and mercury, were studied and well documented in 1473. Then in the early 20th century, the U.S. Public Health Service and U.S. Bureau of Mines conducted the first detailed federal studies on worker health. This concern for worker health and safety progressed slowly until 1970, when Congress passed the Occupational Safety and Health Act (OSHA). Industrial hygiene, as a profession, has been around for several hundred years, but didn't become a specialty within the Navy until the 1940s.

Industrial hygiene is both a science and an art; it concerns the total realm of control of the work environment. This realm of control includes recognition and detailed evaluation of workplace environmental factors that may cause illness, lack of well being, or discomfort among workers. Using this information, the industrial hygienist formulates recommendations to alleviate safety and health problems.

When speaking of the work environment, we include the following factors:

- Lighting
- Ventilation
- Air contaminants
- Facility design
- Physical stressors (heat, humidity, vibration, noise, radiation)
- Safety hazards (flying chips, turning shafts, saw blades)

INDUSTRIAL HYGIENE SURVEYS

An industrial hygiene survey involves inspecting every workplace at the facility or ship, from the overhead to the deck. Inspectors observe work processes and document all potential hazards. To quantify these hazards, inspectors take readings with meters and other types of equipment. They also collect air samples for laboratory analysis. They measure noise with a sound level meter. They use small air pumps to collect dust, vapors, or gases to determine exact exposure levels. These exposure levels help determine the hazard to workers and what controls are required. Controls are then tailored to the facility or workplace to eliminate or lessen the hazard. These controls generally fall into four categories:

- Engineering controls (design)
- Substitution
- Administrative controls (e.g., stay times)
- Use of personal protective equipment (PPE)

An industrial hygiene officer, civilian industrial hygienist, or industrial hygiene technician conducts the survey. Medical clinics, environmental and preventive medicine units, destroyer tenders, and submarine tenders provide industrial hygiene support.

INDUSTRIAL HYGIENE TERMINOLOGY

The following are some of the units and terms you will see on workplace monitoring and industrial hygiene survey reports:

Action level - Unless otherwise specified in a SOH standard, one-half the relevant permissible exposure level (PEL) or threshold limit value (TLV).

Ceiling limit (C) - The maximum hazard exposure concentration level, expressed as TLV(C), at which a person may work..

Concentration—the quantity of a substance per unit volume (in appropriate units).

The following are examples of concentration units:

mg/m - milligrams per cubic meter for vapors, gases, fumes, or dusts.

Ppm - parts per million for vapors or gases.

fibers/cc - fibers per cubic centimeter for asbestos.

Decibel (dB) - A unit used to express sound pressure levels; specifically, 20 times the logarithm of the ratio of the measured sound pressure to a reference quantity of 20 micropascals (0.0002 microbars).

In hearing testing the unit used to express hearing threshold levels as referred to audiometric zero.

Permissible exposure limit (PEL) – The legally established time-weighted average (TWA) concentration or ceiling concentration of a contaminant or the exposure level of a harmful physical agent that must not be exceeded.

Short-term exposure level (STEL) - The concentration to which workers can be exposed continuously for a short time without suffering from (1) irritation, (2) chronic or irreversible tissue damage, or (3) narcosis.

Time-weighted average (TWA) - The average concentration of a contaminant in air during a specific period, usually an 8-hour workday or a 40-hour workweek.

Threshold limit value (TLV) - An atmospheric exposure level under which nearly all workers can work without harmful effects. TLVs are established by the American Conference of Governmental Industrial Hygienists (ACGIH).

SPECIFIC HAZARDS

We will now discuss the administration of various SOH programs that address specific hazards. These hazards include hearing conservation, sight conservation, respiratory protection, heat stress, electrical safety (tag-out program), and personal protective equipment. In addition, we will cover hazardous material control and management, asbestos control, gas free engineering, and lead

control. OPNAVINST 5100.23G, chapters 7 through 31, and OPNAVINST 5100.19E, volume I, part B, chapters B1 through B12, discuss these subjects in detail. The basic criteria are similar, whether applied ashore or afloat. Refer to the appropriate SOH manual for program details.

HEAT STRESS PROGRAM

We define heat stress as any combination of work, air flow, humidity, air temperature, thermal radiation, or internal body condition that strains the body. Heat stress becomes excessive when the strain to regulate its temperature exceeds the body's capability to adjust.

Personnel affected by heat stress can suffer fatigue, nausea, severe headache, and poor physical and mental performance. As body temperature continues to rise (because of prolonged exposure), heat rash and heat injuries (such as heat cramps, heat exhaustion, and heat stroke) occur.

Heat stroke severely impairs the body's temperature-regulating ability and can be fatal. Recognizing heat stress symptoms and getting prompt medical attention for affected persons are all-hands responsibilities. From 1989 to 1992, 68 people received injuries from heat exhaustion or heat stress at shore activities.

All of these injuries involved lost time away from work thirteen people lost 5 or more workdays. Of the 41 incidents involving military people, 29 (71 percent) people were drilling, playing, or taking part in physical fitness training. The rest were working.

Aboard ship, nearly 50 heat stress reports were filed in 1991, most involving personnel wearing the fire-fighting ensemble (FFE).

During Operation Desert Storm, the control of heat stress among engineering plant watch standers was critical. In the hot climate around Saudi Arabia, ships were unable to maintain air conditioning and ice machines that broke down from overuse. Heat stress caused by air and water temperatures above 90°F threatened operational readiness.

Symptoms of Heat Stress

The following are the symptoms of heat stress and the steps you should take to help the victim:

Heat Exhaustion: Victims have pale and clammy skin and experience profuse sweating. Their pulse is fast but weak, and their breathing is fast and shallow. They may experience weakness, nausea,

dizziness, and mild cramps. Move victims to a cool location and seek medical attention for them as soon as possible.

Heat Stroke: Victims have hot, flushed, dry skin. Their pulse is fast and strong, and their breathing is fast and deep. They may twitch or vomit. Shock will follow. Heat stroke is a life-threatening medical emergency. Call a medical emergency immediately.

Controlling Heat Stress

You can encounter heat stress aboard U.S. Navy ships in workshops, laundries, sculleries, engineering spaces, food preparation spaces, and steam catapult spaces. Detailed surveys of ship spaces have confirmed that these heat stress conditions often have been so severe that a limit was placed on personnel exposures to avoid serious harm.

The primary correctable causes of heat stress in these spaces were as follows:

- Excessive steam and water leaks
- Boiler air casing leaks
- Missing, damaged, improperly installed or deteriorated thermal insulation on steam piping,
- valves, and machinery
- Ventilation system deficiencies, including design deficiencies, missing or damaged duct work, misdirected terminals, improper or clogged screens, closed or partially closed CIRCLE WILLIAM dampers, dirty ventilation ducting, and inoperative fan motors and controllers

Heat stress can occur when personnel are wearing layered, impermeable, or impervious clothing such as fire-fighting; chemical, biological, and radiological (CBR); or hazardous material protective clothing.

The presence of atmospheric contaminants such as combustion gases or fuel vapors may also contribute to heat stress. Heavy exertion, such as that involved in athletics, in hot, humid weather also leads to heat stress. Other conditions that lead to heat stress include reduced physical stamina because of illness; lack of sleep; or the use of medication, drugs, or alcohol.

Heat stress ashore is of concern when personnel are required to work or drill in hot weather. Many bases raise colored flags to indicate the level of caution required because of the heat.

Preventing Heat Stress

You can prevent heat stress injury as follows:

- By detecting, correcting, and controlling the conditions that cause heat stress
- By using dry bulb thermometers to monitor locations in which heat stress conditions may be present
- By restricting personnel exposure to heat stress conditions as the result of heat stress surveys conducted to determine safe stay times
- By recognizing heat stress symptoms in yourself or in shipmates and acting to prevent or minimize the effects of heat injury

Since dry bulb temperature, humidity, and radiant heat all affect the body and may cause heat stress, you must take all three into account. Conducting a heat stress survey with a wet bulb globe temperature (WBGT) meter provides a calculated WBGT index.

You can use this index with a graph of physiological heat exposure limits (PHEL) curves to determine stay times in that environment. Since we cannot reduce the heat, we must reduce the exposure time of the personnel working in that heat. Stay times also take into account the work load of the individual.

You can find further information and guidance on the Navy Heat Stress Control and Prevention Program in OPNAVINST 5100.19E, *Safety and Occupational Health Program Manual for Forces Afloat*; and NAVMED P-5010-3, *Manual of Naval Preventive Medicine*, chapter 3, "Ventilation and Thermal Stress Ashore and Afloat."

HEARING CONSERVATION PROGRAM

The Navy recognizes hearing loss as an occupational hazard related to certain trades. For example, gunfire and rocket fire produce high-intensity impulse or blast noises that can cause hearing loss.

Hearing loss can result from the continuous or intermittent noises of aircraft and marine engines, as well as industrial activities. The noise of saws, lathes, grinders, forging hammers, or internal combustion engines also creates a hazard to your hearing.

Hearing loss is a serious concern within the Navy. Action must be taken to reduce hearing loss attributed to occupational exposure. Work-related hearing losses result in costly compensation claims. Hearing loss may also cause lower productivity and efficiency and may contribute to mishaps.

To prevent occupational noise-related hearing loss, the Navy has developed the Hearing Conservation Program.

Goals of the Hearing Conservation Program

One goal of the Hearing Conservation Program is to prevent occupational hearing loss among military and civilian workers.

Another is to ensure personnel can hear well enough to perform their duties.

The program elements used to achieve these goals are as follows:

- Surveying all work environments to identify potentially hazardous noise levels and personnel at risk
- Using engineering controls (design methods) to limit noise exposure
- Requiring periodic hearing tests
- Training personnel to protect their hearing when working in hazardous noise environments
- Ensuring personnel use personal protective equipment

Education is vital to the overall success of a hearing conservation program.

Make sure your personnel receive instruction and understand the rationale for the following elements of the Hearing Conservation Program:

- Proper wearing and maintenance of hearing protective devices and conditions requiring their use
- Command program and personnel responsibilities for off-duty practices to help protect hearing
- Encourage your personnel to use hearing-protective devices during off-duty activities that expose them to hazardous noise sources, such as lawn mowers, chain saws, and firearms.
- All personnel exposed to gunfire during training or to artillery or missile firing under any circumstances must wear hearing-protective devices.

Noise Measurements

To control hazardous noise exposure, we must accurately determine the actual noise level using standard procedures and compare these levels with accepted criteria.

Noise measurements are taken as part of the industrial hygiene survey or the workplace monitoring program for the commands with periodic sampling requirements.

How do you know if you need hearing protection?

- Use the base-line thumb rule. Hearing protection is person who is one arm length away.

Taking noise measurements is part of the base-line or 18-month Industrial Hygiene Survey aboard ship. You need not take actual measurements during the follow-up survey unless you suspect changes in noise levels in the work environment. Keep records of noise measurements until superseded by a later survey.

Larger afloat commands may establish a workplace monitoring plan to conduct periodic sampling throughout the 18-month cycle.

Ashore, noise measurements are taken according to the workplace monitoring plan, and records are maintained for 40 years.

Resurveys are conducted within 30 days of any significant modifications or changes in work routine.

Analyzing Noise Measurements

Analyzing noise measurements to assess the hazard potential is a complex task. An industrial hygienist or some other qualified person under the industrial hygienist's direction performs the analysis.

The analysis determines hazardous noise areas, equipment, and processes.

The person qualified to take the noise measurements uses a sound level meter to identify all potentially hazardous noise areas.

The work areas where the sound level, continuous or intermittent, is routinely greater than 84 dB(A) or where the peak sound pressure level, caused by impulse or impact noise, routinely exceeds 140 dB are considered hazardous noise areas. These areas and equipment are then labeled to warn of the noise hazard.

Hearing Tests/Audiograms

Hearing tests, or audiograms, are required monitor the hearing of workers routinely exposed hazardous noise.

Periodic monitoring will allow us to catch a hearing loss before it becomes severe or to correct potential problems with hearing-protective devices.

Audiograms test a person's hearing at a variety of frequencies in the human speech range. Audiograms can be conducted at most Navy clinics, aboard tenders, and aboard air capable surface ships.

Personnel working in hazardous noise areas must be entered in the Hearing Conservation Program. Military personnel should have received a reference hearing test upon entry into naval service.

Civilian personnel being considered for employment in an occupational specialty or area that involves routine exposure to hazardous noise should receive a reference audiogram.

Navy employees presently in service who do not have a reference audiogram filed in their health record will not be assigned to duty in designated hazardous noise areas until they receive a reference hearing test.

All personnel should receive a hearing test periodically and before ending their naval service or civilian service.

Labeling of Hazardous Noise Areas and Equipment

Make sure you label designated noise-hazardous areas with the approved 8-inch by 10.5-inch decal. Normally, you should apply the proper decals to the outside of all doors or hatches leading into the noise-hazardous area. That ensures personnel know what protection they must wear in that area.

Label equipment, such as hand tools, with the approved 2- by 2-inch hazardous noise sticker, NAVMED 6260/2A . This sticker ensures personnel know whether to wear single or double protection when using that equipment.

Personal Hearing-Protective Devices

When a hazardous noise area or operation is identified, we try to control or eliminate that noise hazard using engineering controls.

These controls include the use of acoustic material, the isolation of noisy equipment, or the substitution of a less noisy process.

If we cannot reduce the noise to a safe level, then our only choice is the use of personal protective equipment, such as earplugs or earmuffs. The equipment is also used as an interim measure until the noise hazard is under control or eliminated.

Personnel working in designated hazardous noise areas or operating noise-hazardous equipment must wear hearing protection devices. They must wear single-type hearing-protective devices when noise levels are greater than 84 dB(A). They must wear a combination of both the insert type and circumaural muff type of hearing-protective devices in all areas where noise levels exceed 104 dB(A).

Each hearing-protective device is tested and assigned a noise reduction rating (NRR). This NRR tells how many decibels the earplug or muff will reduce the external noise.

For example, suppose the noise hazard area is measured at 90 dB(A). If you wear an earplug with an NRR of 20 dB, you will only be exposed to 70 dB. That is well below the hazard level of greater than 84 dB(A). These NRRs are listed on earplug and earmuff packaging.

Medical personnel dispense all earplugs requiring fitting. The medical representative measures the examinee's ear canals and instructs him or her on the proper type, size, and use of earplugs. In addition, the examinee learns how to clean and maintain the earplugs.

Foam earplugs, earcaps, and earmuffs require no fitting; but personnel must be trained to use them properly.

HAZARDOUS MATERIAL/HAZARDOUS WASTE PROGRAM

We use hazardous materials daily, afloat and ashore, in maintenance, repair, and cleaning. We could not maintain our operational effectiveness without using hazardous materials.

In using hazardous materials, 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 that, OSHA passed a regulation called the *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 it.

The hazardous materials you must use to do your job can be hazardous to your health and the environment if handled improperly. Therefore, you have the right to be trained in the use of hazardous materials 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. *Hazardous Material Control and Management (HMC&M)*, OPNAVINST 4110.2, provides the details of this program. OPNAVINST 5100.23G, chapter 7, and OPNAVINST 5100.19E, chapter B3, also discuss hazardous material control and management.

The Naval Supply Systems Command manages the overall program for hazardous material control and management for the Navy.

The program objectives are as follows:

1. Minimize the amount of hazardous materials in use
2. Use hazardous materials safely
3. Decrease the amount of hazardous waste we produce

Definition of Hazardous Material

What is hazardous material? We define hazardous material 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:

- Aerosols
- Compressed gases
- Oxidizing materials
- Toxic or poisonous materials
- Flammable and combustible materials
- Corrosive materials, such as strong acids and alkalies

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

Definition of Hazardous Waste

We define hazardous waste as any discarded material (liquid, solid, or gas) that meets the definition of hazardous material. Only the Environmental Protection Agency or a state authority may designate material as hazardous waste.

Categories of Used or Excess Hazardous Material

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

Material Safety Data Sheets

Material Safety Data Sheets (MSDSs) are technical bulletins containing information about hazardous material.

Manufacturers produce MSDSs based on their testing and research of their products. By law, they must provide the data to hazardous materials users.

They tell users how to use, store, and dispose of hazardous material. OPNAVINST 5100.19E requires all hands to follow these guidelines. MSDSs must be in English and contain at least the following information about the material:

- Identity
- Hazardous ingredients
- Physical and chemical characteristics
- Physical hazards
- Reactivity
- Health hazards
- Precautions for safe handling and use
- Control measures
- Routes of entry into the body
- Emergency and first-aid procedures for exposure
- Date of preparation of the MSDS or last change
- Name, address, and phone number of a responsible party who can provide additional information on the hazardous material and appropriate emergency procedures

Manufacturers may use any format or arrangement of this information, but every MSDS must include all the items.

Some MSDSs contain ingredient information that the manufacturer considers proprietary (a trade secret). Proprietary information is provided on the compact disk-read only memory (CD-ROM) labeled "LR" version. The "L" version does not contain proprietary information. Only safety and health professionals should have access to the "LR" version of the CD-ROM.

Every hazardous material user must be trained on the precautions associated with that material. MSDSs must be available upon request to any user. If you have a question, check with your command's hazardous material/hazardous waste coordinator.

Labeling of Hazardous Materials

Labeling provides the handler, shipper, and user of a hazardous material with critical information. You must ensure every container of hazardous material has a label.

Tank trucks and railroad tank cards must be placarded with Department of Transportation (DOT) symbols. Although the format of the label may differ from company to company, the OSHA Hazard Communication Standard mandates that certain information appear on the label.

That information includes the following:

- Identity of the material or chemical
- Name and address of the manufacturer or responsible party
- The appropriate hazard warning

DOD has a hazardous Chemical Warning Label (fig. 5-1). DOD personnel must use this label on DOD manufactured hazardous materials, repackaged containers tanks of hazardous chemicals, and unlabeled materials already in the DOD system.

Several types of multicolored signs, placards, and decals are used to provide visual hazard warnings. They may contain words, shapes, symbols, pictures, or any combination of these.

Sometimes they picture the international symbols for gloves, aprons, goggles, and respirators. These international symbols appear as small pictures

(called *icons*) on the label showing the required protective equipment.

Manufacturers use various symbols and DOT shipping labels with the required OSHA labeling. Used alone, these DOT symbols or labels **do not** meet the OSHA labeling requirements.

Navy personnel should not place any labels on containers that already have proper labels. If you buy or receive a hazardous material with the minimum required labeling, do not add any additional labeling. If you have an unlabeled container **or** one with a damaged label, you can print a label from HAZMINCEN onto plain paper or the DD Form 2522.

SIGHT CONSERVATION PROGRAM

The Navy must provide eye protection, at government expense, for personnel working in eye-hazardous areas. Workers must wear appropriate eye protection when performing eye-hazardous operations such as pouring or handling molten metals or corrosive liquids and solids.

Personnel must also wear eye protection when cutting and welding, drilling, grinding, milling, chipping, sand blasting, or performing other dust- and particle-producing operations.

Anyone near such operations, including visitors, also must wear eye-protective equipment. OPNAVINST 5100.23G, chapter 19, and OPNAVINST 5100.19E, chapter B5, provide more information on the Navy's Sight Conservation Program regarding:

- Operation of effective equipment maintenance program
- Compliance with procedures for the use of temporary eye wear
- Operation of a comprehensive training/education program
- Operation of an effective enforcement program

The Navy considers any person found to have vision in one eye of 20/200 or worse to be visually impaired. You cannot assign people who have a visual impairment to duties that present a hazard to their remaining eye. Make certain these personnel always wear protective eye wear, regardless of their occupation or work station.

To setup an effective sight conservation program, activity safety officers must identify eye-hazardous areas and ensure they are posted with warning signs. Commands must equip these areas with emergency eyewash facilities. Safety officers must also identify eye-hazardous occupations and processes that require personal protective equipment and determine the safeguards needed.

Safety officers maintain a listing of areas, processes, and operations that require eye protection. In addition, they keep a listing of areas requiring eyewash or deluge shower facilities.

Safety officers maintain eye injury records and ensure the program is evaluated for compliance and effectiveness.

Labeling of Sight Hazard Areas

A warning sign and 3-inch yellow and black striping or checkerboard markings on the deck identify eye-hazardous areas. The black and yellow striping or checkerboard pattern outlines the eye hazardous area. The sign warning of an eye hazard area is mounted directly on the hazard, part, machinery, boundary bulkhead or door in a conspicuous location.

Basic Sight Program Requirements

All Navy activities that perform eye-hazardous operations must have a sight conservation program. The program should include, but is not restricted to, the following:

- Determination and evaluation of eye-hazardous areas, processes, and occupations
- Operation of a vision and medical screening program
- The words should be in black letters on a yellow background. The signs and tape are available in the supply system.

PROTECTION REQUIRED IN THIS AREA

Emergency Eyewash Stations

Emergency eyewash facilities are designed to provide first aid to personnel who splash corrosive materials into their eyes. Corrosive materials are especially hazardous to the eyes because the longer the materials contact the eyes, the more damage they cause.

If you get a chip of metal in your eye, as long as you don't rub your eye, the metal doesn't cause further damage. You have time to get to sick bay to have the eye treated.

Chemicals continue to cause damage as long as they remain in the eyes. Taking the time to go to sick bay for treatment could result in serious damage to the eyes. For that reason we need on the spot first aid to wash the eye to dilute the chemical. Areas in which corrosive materials are used must have emergency eyewash facilities. Make sure all such emergency facilities are easily accessible to personnel in need of them. Make sure the locations of all units are unobstructed and are located as close to the hazard as possible. In no instance should a person have to travel more than 100 feet or take more than 10 seconds to get to the eyewash unit.

People who work in areas that use great quantities of corrosives face the risk of splashing the materials on their body. Those areas must be equipped with a combination deluge shower and eyewash station.

Plumbed and self-contained emergency eyewash equipment (fig. 5-3) flush the eyes using potable water. The minimum flow rate must be 0.4 gallons per minute for 15 continuous minutes. Ensure the velocity of the water will not hurt the user's eyes. You must clearly mark each eyewash station with a safety instruction sign. Post signs in a visible location close to the eyewash unit. The sign must identify the unit as an emergency eyewash station.

ASBESTOS CONTROL PROGRAM

For many years, the Navy used asbestos as the Primary insulation (lagging) material in high temperature machinery, shipboard boilers, and the piping of boiler plants at shore facilities. The material was used as floor tile, as gasket materials, and for other uses that required fire resistance.

We now recognize airborne asbestos fibers as a major health hazard. The Navy developed an asbestos exposure control program to protect and monitor personnel who have been exposed to asbestos. Aboard ship, many pipes and boilers still have asbestos insulation. However, the Navy started a program in the mid- 1970s to use less harmful materials, such as fibrous glass, for pipe and boiler insulation.

Asbestos removals are limited to shipyards, or contractors. Aboard ship you cannot remove asbestos insulation except in an operational emergency approved by the commanding officer.

The Navy Asbestos Control Program which is part of the SOH program, ensures compliance with OSHA regulations. It also prevents the exposure of any Navy personnel to asbestos. The program covers the following areas:

- Identifying asbestos hazards
- Controlling asbestos in the work environment
- Following strict work practices
- Properly disposing of asbestos waste
- Establishing an asbestos medical surveillance program
- Protecting the environment
- Training people to recognize asbestos hazards and observe necessary precautions

The program's purpose is to protect personnel who, through their job or in emergency situations, come into contact with asbestos. If personnel must handle asbestos, we must ensure they have the proper protection and training.

The Navy follows upon the health of personnel who may have been exposed to asbestos in their current work or in the past through the Asbestos Medical Surveillance Program.

This program monitors the health of personnel exposed to asbestos before regulations were set. It also screens personnel currently assigned to emergency asbestos removal teams.

Asbestos Health Hazards

The danger of asbestos results from the asbestos fibers that break off into small particles. These fibers are small enough that, when airborne, you can inhale them. Once deep in the lungs, the fibers cause scar tissue or tumors.

We now link asbestos fiber exposure with diseases such as asbestosis, lung cancer, and mesothelioma. These asbestos diseases may not show up for 15 or more years after exposure. Most cases of lung cancer in workers exposed to asbestos occur among workers who smoke. Workers who smoke and are exposed to asbestos have chances 90 times greater of developing cancer.

Identifying Asbestos

Can you identify asbestos? Can you tell by looking at lagging whether or not it is asbestos? The only way to determine if material contains asbestos is to analyze the materials under a microscope. Every tender and repair ship and most shore medical facilities have the microscopes needed to test materials for asbestos and to analyze suspected material. If in doubt about insulation, consider it to be dangerous.

Aboard ship, anyone seeing a potential asbestos hazard (open or torn lagging) should report the hazard to the chief engineer or safety officer immediately.

Controlling Exposure to Asbestos

You should never try to handle, remove, or repair suspected asbestos material without proper authorization and special protective equipment.

Each ship having asbestos on board must have a trained, asbestos rip-out team for emergencies. This team receives training, is medically monitored, and has special protective clothing and equipment available for use when needed.

For detailed information on asbestos protective measures, refer to *Naval Ships' Technical Manual (NSTM)*, chapter 635; *Thermal, Fire, and Acoustic Installation*, OPNAVINST 5100.19E, chapter B1; and OPNAVINST 5100.23G, chapter 17.

LEAD CONTROL PROGRAM

We also recognize lead as a serious health hazard. If you ingest lead, it can damage your nervous system, blood-forming organs, kidneys, and reproductive system.

Although we normally associate lead in the Navy with lead-based paints, we also come into contact with other sources of lead.

To prevent lead poisoning and related injuries during the use, handling, removal, and melting of materials containing lead, the Navy developed the Lead Control Program. OPNAVINST 5100.23G, chapter 21, and OPNAVINST 5100.19E, chapter B10, explain the Lead Control Program.

The following items aboard ship contain lead:

- Batteries
- Pipe joints

- Lead-based paint
- Small arms ammunition
- Weights and cable sockets
- High-voltage cable shielding
- Ballast and radiation shielding

Lead exposure occurs during:

- grinding
- sanding
- spraying
- burning
- melting
- soldering

Lead exposure can also occur during machining, disassembling engines with leaded gasoline, and handling contaminated protective clothing.

The greatest hazard comes from lead dust, since we can easily inhale or ingest the fine particles. Most ingestion exposures occur when personnel eat or smoke without washing the lead dust off their hands.

Elements of the Lead Control Program

The Navy's Lead Control Program includes the following elements:

- Medical surveillance
- Worker and supervisor training
- Control of lead in the workplace
- Environmental protection and waste disposal procedures
- Periodic industrial hygiene surveys to identify potential hazards from lead sources

Whenever possible, the Navy substitutes lower lead content or lead-free paints and coating for paints containing lead. However, many lead-based paints are still in use in the Navy today. Existing coatings of paint may contain lead, especially if they are 5 years old or older.

Medical Surveillance for Lead Workers

Medical surveillance for lead workers consists of a pre placement medical evaluation, blood-lead level monitoring, and follow-up evaluations.

In addition, medical surveillance includes removing personnel from exposure to lead, when necessary, based on blood-lead levels.

Personnel must take part in the program under the following conditions:

- When a work site is found to have an airborne level of 30 micrograms of lead per cubic meter of air for over 8 hours
- When the workers handle lead at least 30 days per year

We must teach and warn occasional lead workers and handlers (those who handle lead less than 30 days per year) about the hazards of lead.

RADIATION PROTECTION PROGRAM

Radiation is energy transmitted through space in the form of electromagnetic waves (rays) or nuclear particles. Radiofrequency radiation, including microwaves; x-rays; and gamma, infrared, visible light, and ultraviolet rays are electromagnetic waves. Alpha particles, beta particles, and neutrons are nuclear particles.

CATEGORIES OF RADIATION

Radiation is commonly divided into two categories, which are indicative of the energy of the wave or particle: ionizing and non-ionizing radiation. Radiation with enough energy to strip electrons from atoms in the media through which it passes is known as ionizing radiation.

Examples include alpha particles, beta particles, x-rays, and gamma rays. Less energetic radiation that is not capable of such electron stripping is known as non-ionizing radiation. Radio waves, microwaves, visible light, and ultraviolet radiation belong to this category.

Potentially hazardous sources of ionizing and non-ionizing radiation exist aboard Navy ships. Ionizing radiation sources include radioactive material and equipment that generate x-rays. Lasers, radar, and communications equipment emit non-ionizing radiation.

RADIATION PROTECTION PROGRAM ELEMENTS

The Radiation Protection Program consists of the following elements:

- Training
- Medical surveillance
- Identification and evaluation of radiation sources
- Investigation and reporting of radiation incidents
- Use of dosimeter to monitor exposure to ionizing radiation

OPNAVINST 5100.23G, chapter 22, and OPNAVINST 5100.19E, chapter B9, outline the Radiation Protection Program. This program is designed to minimize personnel exposure to radiation from sources other than nuclear weapons and nuclear power systems.

Nuclear weapons and nuclear power systems have their own radiation protection and control programs. The program excludes those individuals, who as patients, are exposed to radiation while undergoing diagnostic or therapeutic procedures.

RESPIRATORY PROTECTION PROGRAM

Many repair and maintenance operations generate air contaminants that are dangerous if inhaled.

Engineering controls, such as local exhaust ventilation, are the most effective methods of protecting personnel against such contaminants. When engineering controls are not possible, personnel must wear respiratory protection. OPNAVINST 5100.23G, chapter 15, and OPNAVINST 5100.19E, chapter B6, cover the Respiratory Protection Program.

The Respiratory Protection Program requires training, fit-testing, record keeping, medical screening, and procurement and tracking of equipment. It also requires the purchase of respirators, spare parts, and cartridges.

Respirators have been used by workers for centuries. Discomfort from dust and smells drove some workers to invent their own respirators using cloth and animal bladders.

The coal mining industry took the lead in developing and certifying respirators for miners suffering from black lung disease.

In the late 1960s and early 1970s, the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA) were designated as the certifying agencies for respirators.

Respirators and respirator parts are designed and manufactured according to strict NIOSH and MSHA guidelines. Respirators that NIOSH and MSHA have tested and certified are labeled with a NIOSH/MSHA certification number. Parts are not interchangeable between manufacturers.

Elements of the Respiratory Protection Program

Respiratory Protection Program must include the following elements:

- Written standard operating procedures
- Proper, hazard-specific selection of respirators
- User training in the proper operation and limitations of respirators
- Regular cleaning and disinfection of respirators
- Convenient, clean, and sanitary storage of respirators
- Inspection, repair, and maintenance of respirators
- Industrial hygiene surveys to identify operations requiring respirators and to recommend specific types of respirators
- Periodic monitoring and evaluation of program effectiveness
- Medical qualification
- Use of only NIOSH and MSHA approved respirators
- Fit-testing

Ashore, the commanding officer or officer in charge starts the program by appointing, in writing, a certified respiratory protection program manager (RPPM).

Afloat, the commanding officer appoints, in writing, a trained respiratory protection officer (RPO). Although the duties of the RPPM and the RPO are similar, the duties of each depend on the size of the command and the extent to which command personnel use respirators.

Selecting the Proper Respirators

You must wear the correct respirator for the right job! A respirator is not going to do you any good if it is the wrong type. Some people believe they can wear the surgical masks worn by medical personnel during various evolutions, such as deck grinding and small welding jobs.

Those blue surgical masks serve only one purpose - to keep the doctor from passing saliva to the patient. Surgical masks will not protect personnel from any type of air contaminant. Selecting and wearing the correct, properly fitted respirator is the only way workers can ensure they are protected.

Identifying Various Types of Air Contaminants

When selecting a respirator, we must first understand the six types of air contamination we may be exposed to:

- Dust - Small solid particles created by the breaking up of larger particles by processes such as crushing, grinding, sanding, or chipping. Some dusts are very toxic, such as the sanding dust from lead-based paints.
- Fumes—Very small particles (1 micrometer or less) formed by the condensation of volatilized solids, usually metals. Fumes are produced from the welding, brazing, and cutting of metals.
- Gas—a material that under normal conditions of temperature and pressure tends to occupy the entire space uniformly. Such material includes hydrogen sulfide gas from the collection, holding, and transfer system; acid gas from battery charging; and ammonia gas from deck stripping. Gases are usually invisible and sometimes odorless.
- Mist and Fog—finely divided liquid droplets suspended in air and generated by condensation or atomization. A fog is a mist of enough concentration to obscure vision. Mists are produced when you spray solutions such as paint and spray cleaners.
- Smoke—Carbon or soot particles less than 0.1 micrometer in size resulting from the incomplete combustion of carbonaceous materials such as coal or oil.
- Vapor (inorganic or organic)—The gaseous state of a substance that is normally a liquid or solid at room temperature. Vapors are produced by fuels, paints and thinners, solvent degreasers, hydraulic fluids, and dry-cleaning fluids.

Knowing what types of air contaminants these terms refer to is critical to the proper selection of respirators. For example, many people believe that paint gives off fumes. *Fumes* is a common term used to describe any smells in the air. However, fumes are actually a condensed particle of vaporized metal given off during welding or cutting.

If you select a respirator labeled **Dust, Mist and Fumes** to protect you from paint vapors, you will not be protected. Respirator cartridges are labeled as to the type of protection they provide.

The workplace monitoring plan or the industrial hygiene survey will pinpoint those areas and processes that require respirators. Since most ships carry few exotic chemicals and have limited heavy industrial work, they don't need a great variety of respirators or cartridges. Ashore, extensive industrial work may require an activity to have a greater selection and variety of respirators.

Identify Various Types of Respirators

You should be familiar with the three basic types of respirators: air-purifying, supplied-air, and self-contained.

An **air-purifying** respirator removes air contaminants by filtering, absorbing, adsorbing, or chemical reaction. This respirator may be disposable or have a disposable prefilter on a cartridge (fig. 5-7). You can only use the air-purifying respirator when the adequate oxygen (19.5 to 23.5 percent by volume) is available and the contaminant level is not immediately dangerous to life or health (IDLH).

We classify air-purifying respirators as follows:

- Particulate-removing—these respirators have filters that remove dusts, mists, fumes, and smokes by physically trapping the material on the filter surface.
- Gas- and vapor-removing—these respirators have cartridges that absorb or chemically bind vapor or gas within the cartridge.
- Combination particulate and gas- and vapor removing - These respirators are a combination of the preceding two types of respirators. They are required when you have a combination of materials such as a particle (mist) and a vapor.

Since these air-purifying respirators are negative pressure respirators, they can only be used with air contaminants that have good warning properties, such as odor or taste. Warning properties indicate when the mask is leaking or the cartridge is used up.

The **supplied-air** respirator provides breathing air independent of the environment. You must wear this type of respirator when the following conditions exist:

1. Contaminant does not have enough odor, taste, or irritating warning properties.
2. The contaminant is of such high concentration or toxicity that an air-purifying respirator is inadequate.

We classify supplied-air respirators, also called airline respirators, as demand, pressure-demand, and continuous-flow respirators. This respirator can be used in IDLH situation areas if operated in the pressure demand mode. It must also be equipped with an auxiliary, self-contained air supply of at least 15 minutes.

The breathing air source for air-line respirators must meet at least the minimum requirements for grade D breathing air. A ship's LP air is NOT suitable for use as breathing air unless it is specifically tested and certified to meet purity standards.

A self-contained breathing apparatus (SCBA) allows you complete independence from a fixed source of air. It allows the greatest degree of protection but is also the most complex. The SCBA provides protection in oxygen-deficient environments or other environments dangerous to life or health. The SCBA is equipped with a bottle of compressed air and is used in hazardous material spill kits.

Fit-Testing Procedures Required Before Using

Before personnel can use a respirator, they must be fit-tested. The screening also reviews the user's health record and potential for ill effects from working in a health-hazardous atmosphere.

A respirator mask must properly seal around the user's face to keep contaminated air from leaking into the mask. There are different brands, models, and sizes of respirators, all of which fit differently.

Trained personnel from shore medical commands, environmental and preventive medicine units, or occupational safety and health offices fit-test respirator masks on potential users. First they have potential respirator users don a mask; then they test for leakage around the facepiece to ensure it seals properly.

Afloat, larger ships and tenders, with primary duty safety officers, have trained fit-test personnel. Shore support is provided to smaller ships. OPNAVINST 5100.23G, chapter 15, and OPNAVINST 5100.19E, chapter B6, give fit-testing procedures.

PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

Personal protective equipment (PPE) protects the user in a hazardous environment. Any PPE

breakdown, failure, or misuse immediately exposes the wearer to the hazard.

Many protective devices, through misuse or improper maintenance, can become ineffective without the wearer knowing it. OPNAVINST 5100.23G, chapter 20, and OPNAVINST 5100.19E, chapter B12, provide information on PPE and PPE issue.

Personal protective devices do not reduce or eliminate the hazard itself. They merely set up a "last line of defense." Any equipment breakdown, failure, or misuse immediately exposes the worker to the hazard. PPE is used as an interim measure or when engineering controls cannot be applied.

Design and Construction of Personal Protective Clothing and Equipment

All personal protective clothing and equipment should be designed and constructed to allow work to be performed safely.

Therefore, extensive research and testing have been conducted to develop standards and specifications for the design and construction of personal protective clothing and equipment.

The federal government requires that personal protective clothing and equipment meet these standards and specifications. Therefore, the government only recognizes the certification and approval of certain agencies.

Those agencies include the following:

- National Fire Protection Association (NFPA)
- American National Standards Institute (ANSI)
- Mine Safety and Health Administration (MSHA)
- Occupational Safety and Health Administration (OSHA)
- National Institute for Occupational Safety and Health (NIOSH)

All crew members must wear the required personal protective clothing and equipment. Workers should notify their supervisor immediately if the required clothing or equipment is not available to do the assigned work. Workers should also notify their supervisor if they need instruction on how to wear or use the clothing or equipment.

All personnel required to wear personal protective clothing or equipment must receive training before first using it and annually thereafter.

Types of Personal Protective Clothing and Equipment

We will now discuss the various types of personal protective clothing and equipment designed to cover you from head to toe.

HEAD PROTECTION - Helmets or hard hats protect crewmembers from the impact of falling and flying debris and from impact with low overheads. On a limited basis, they protect personnel from shock and burn. Metal hard hats are not acceptable for shipboard use. Head protection is available in the supply system.

FOOT PROTECTION - Navy life exposes personnel to a variety of foot hazards, from flight decks to machine shops to heavy supply parts stowage areas. For normal daily wear, personnel wear leather shoes. For protection against falling objects, personnel should wear safety shoes with built-in toe protection and non-slip soles. Other types of shoes available for specialty work are molder's boots and semi-conductive shoes. Aboard ship, personnel cannot wear Corfam, plastic, or synthetic shoes in firerooms, main machinery spaces, or hot work areas. Safety shoes are provided to military personnel. Civilian employees are either provided safety shoes from the supply system or a local purchasing agent or are reimbursed for their own purchase.

HAND PROTECTION - Personnel should not wear gloves when operating rotating or moving machinery. However, they should wear gloves for protection against other types of hazards. Handling sharp materials requires the use of leather gloves. Performing hot work or handling hot items requires the use of heat-insulated, non asbestos gloves. The use of portable electric tools in damp locations or during work on live electrical circuits or equipment requires the use of electrical-grade, insulating rubber gloves. Handling caustic or toxic chemicals requires specific gloves, depending on the type of substance being used. Thin rubber gloves or food handler-type gloves tear and leak easily and are not resistant to chemical absorption. Therefore, personnel must not use these gloves for any activity involving the use of a chemical substance. All types of gloves are available in the supply system.

SAFETY CLOTHING - Safety clothing consists of flameproof coveralls, disposable coveralls, impervious chemical spill coveralls, welding leathers, and chemical aprons. When standing watch or working in a ship's fireroom, or in main machinery spaces, or in hot work areas, personnel must wear fire-retardant coveralls. They should not wear synthetic clothing, such as certified Navy twill (CNT), in those areas. Aboard ship, fire retardant coveralls are provided as organizational clothing. Ashore, special protective clothing is provided at government expense.

FALL PROTECTION EQUIPMENT - Personnel must wear parachute-type safety harnesses with Dyna-brake safety lanyards when climbing, working aloft, or working over the side. They should substitute wire rope for nylon working lanyards when performing hot work.

FLOTATION DEVICES - Whenever personnel other than aircrew members and flight deck personnel are required to wear life jackets in open sea operations, the life jackets must be inherently buoyant. In exposed battle stations and when working over the side, personnel must wear jacket-type life preservers. They must also wear them topside in heavy weather, during replenishment at sea, and in small boats.

ELECTRICAL SAFETY PROGRAM

Electrical shock is a serious hazard. If you combine high humidity, metal structures, high-voltage electricity, and perspiration, you have an electrical hazard. You must always observe safety precautions when working around electric circuits and equipment to avoid injury from electric shock and short circuits.

Records show most fatalities caused by electric shock result from people working on energized circuits and equipment. Post-mishap investigations show that they could have prevented these mishaps by following established safety precautions and procedures.

A technician must view safety with a full appreciation of the various hazards involved in maintaining complex and sophisticated Navy equipment.

Elements of the Electrical Safety Program

The Electrical Safety Program consists of the following elements:

- Following electrical safety standards
- Properly using equipment tag-out procedures
- Performing routine and periodic testing to detect and correct unsafe equipment
- Properly installing, maintaining & repairing electrical and electronic equipment
- Performing control and safety testing of personal electrical and electronic equipment

Portable Electrical Tool Issue

Ships must have a centralized portable electrical tool issue room for the daily issue of portable electrical tools. The electrical safety officer supervises operation of the portable electrical tool issue room. Personnel assigned to the portable electrical tool issue room perform daily inspections and safety testing of equipment before issuing it and upon its return.

Before issuing portable electrical tools, personnel assigned to the tool issue room brief tool users on routine tool safety precautions. In addition, they issue any required personal protective clothing and equipment. The tool custodian documents this briefing on the issue record. The custodian can issue tools only to personnel who have received ship's electrical safety training within the year.

Certain divisions or work centers maybe authorized permanent custody of selected electrical tools or equipment. These divisions perform required safety checks on their equipment. Personnel performing these checks must be members of an electrical or electronic rating. They must not issue these tools to other divisions.

Ashore, tools must meet Underwriters Laboratories (UL) approval or have a grounded metal case. Tools are usually held by the user's shop or division and do not require electrical safety check for use ashore. *General Industry Standards*, 29 CFR 1910, and *Safety and Health Standards for Shipyard Employment*, 29 CFR 1915.132, address the shore Electrical Safety Program.

Basic Electrical Safety Training

All personnel, when reporting aboard and annually thereafter, receive indoctrination on basic electrical safety. This indoctrination covers the requirements of using personal protective equipment, cardiopulmonary resuscitation (CPR), and first aid for electrical shock. Training for all personnel is documented and kept on file.

TAG-OUT/LOCK-OUT PROGRAM

The Tag-Out/Lock-Out Program is a two-fold program. It ensures that personnel correctly tag out equipment before conducting maintenance and that personnel are notified when systems are not in a normal configuration. A Tag-Out/Lock-Out Program is necessary to prevent injury to personnel and damage to equipment.

Ships have a tag-out program, which requires the use of paper tags or labels to indicate systems are deenergized or under special configuration. Personnel must follow this program in the maintenance of all shipboard equipment, components, and systems. OPNAVINST 5100.19E, chapter B11, and OPNAVINST 3120.32C, section 630.17, cover this program.

Shore activities pattern their Tag-Out/Lock-Out Program after OSHA regulations. OPNAVINST 5100.23G, chapter 24, covers this program. The tags used ashore are very different from those used aboard ship, and in some instances locks are used to lock out a system.

Tag-out/lock-out procedures consist of a series of tags, adhesive labels, or locks. Personnel apply them to instruments, gauges, or meters to show that they are inoperative, restricted in use, or out of calibration.

Each tag contains information personnel must know to avoid a mishap. All corrective maintenance should include standard tag-out/lock-out procedures, including work done by an intermediate maintenance or depot level activity. Coordination is required between shipyard and contract workers and afloat units when tagging-out shipboard systems.

Training ashore and afloat is needed to ensure personnel understand the Tag-Out/Lock-Out Program. Detailed training is required for personnel authorized to administer the program.

GAS FREE ENGINEERING PROGRAM

Why do we have gas free engineering? Entry into, work in, or work on confined or enclosed spaces may cause injury, illness, fires, or death.

Hazards may result from flammable or explosive materials or atmospheres, toxic materials, or an oxygen-depleted atmosphere. Personnel normally do not inhabit confined or enclosed spaces. We consider them unsafe for entry or work until an authorized person, usually the gas free engineer,

tests the air. Then that person issues a gas free certificate stating the hazard or special precautions to follow. Only by carefully retesting the air in confined and enclosed spaces can we ensure the safety and health of personnel working in these areas.

Health and Fire Hazards

A lack of oxygen in a confined space will not support life and may asphyxiate workers. The presence of toxic gases or vapors from paint or tank contamination may cause asphyxiation or intoxication. Flammable vapor or gas build-up could lead to a serious explosion or fire.

Any combination of the above could lead to fatalities or serious injury or material damage if workers try to enter or work in the unknown atmosphere.

Gas Free Certificates

The ship's gas free engineer (GFE) or the shore marine chemist is assigned to test the applicable space. Each person must obey the requirements and limitations outlined on a gas free certificate. The certificate is posted at the entrance to the space. It shows the conditions that existed at the time the tests were conducted.

The following are examples of conditions documented on gas free certificates:

SAFE FOR PERSONNEL - SAFE FOR HOT WORK

SAFE FOR PERSONNEL - NOT SAFE FOR HOT WORK

NOT SAFE FOR PERSONNEL - NOT SAFE FOR HOT WORK

NOT SAFE FOR PERSONNEL WITHOUT PROTECTION -NOT SAFE FOR HOT WORK

NOT SAFE FOR PERSONNEL INSIDE - SAFE FOR HOT WORK OUTSIDE

Aboard ship, a gas free certificate is good for a maximum of 8 hours. After 8 hours, the testing must be repeated. While testing, the GFE or the marine chemist must wear the protective equipment required by the certificate and his or her supervisor.

Ashore, the gas free certificate issued by the marine chemist will indicate retest periodicity.

Requesting Gas Free Services

Now that we know why we have gas free testing, we need to know who performs the service. Anytime you have a need to enter a confined or enclosed space aboard ship, you must make a request to have the space tested to ensure it is gas free. Contact the damage control assistant (DCA) or fire marshal to arrange for these services.

For more information on the Gas Free Engineering Program afloat, consult OPNAVINST 5100.19E, chapter B8, and *Naval Ships' Technical Manual (NSTM)*, chapter 074, volume 3.

Ashore, the marine chemist performs gas free services as outlined in OPNAVINST 5100.23G, chapter 27.

MEDICAL SURVEILLANCE PROGRAM

The Medical Surveillance Program monitors the continuing health of certain personnel. The results of the industrial hygiene surveys, as interpreted by qualified occupational health professionals, determine the selection of personnel for medical surveillance examinations.

The medical department representative (MDR) and the division officer identify personnel who require medical surveillance. The MDR follows the guidance of the *Medical Surveillance Procedures Manual*; *Navy Occupational Health Information Management System (NOHIMS) Medical Matrix*; and *Navy Environmental Health Center (NAVENVHLHCEN) Technical Manual*, NEHC-TM91.5.

Navy facilities ashore and afloat establish military and civilian employee medical treatment and surveillance programs.

Medical facilities ashore provide direct support to ships that are not equipped or staffed to provide appropriate medical surveillance and documentation.

In general, these programs monitor the following areas:

- Job certification or recertification to determine a person's fitness to begin or continue to perform a job safely and effectively
- The effectiveness of major hazard-specific programs based on a continuing check on the health status of exposed personnel

- As a secondary prevention, the detection of early indicators of excessive exposure caused by the work environment before actual illness, disease, or injury occurs and to allow for the timely start of corrective actions to prevent any long-term adverse effects
- Compliance with the requirements of certain SOH standards

Medical Examinations

The types of examinations scheduled are preplacement or base-line, special-purpose or periodic, and termination.

Medical examinations assess the health status of people as it relates to their work. These examinations produce specific information that determines the adequacy of protection for personnel from potential workplace hazards.

The medical examination may include a physical examination, clinical laboratory tests, radiologic exams and physiologic testing, or an inquiry about the person's occupational history. OPNAV Form 5100/15, Medical Surveillance Questionnaire shows an individual's previous and current employment. This information helps identify work or other activities that may pose a potential health hazard for the person.

Occupational medical examinations are scheduled based on a person's birth month or as operational requirements permit. For hazard-specific medical surveillance, a medical examination will be provided when the action level of the contaminant is exceeded. An examination is also provided when the exposure exceeds 30 days per year.

Medical Records

Existing directives dictate procedures on the maintenance, retention, and disposal of medical records. The cognizant medical command, branch clinic, or Military Sealift Command medical offices maintain records consisting of forms, correspondence, and other files that relate to an employee's medical and occupational history.

Other information includes occupational injuries or illnesses, physical examinations, and all other treatment received in a health unit. Included, too, are audiograms; pulmonary function tests; industrial hygiene computations; laboratory and x-ray findings; and records of personal exposure to physical, biological, and chemical hazards. A

problem summary list and copies of pre-employment, disability retirement, replenishment, cargo handling, and small boat and fitness for duty examinations are also included.

GENERAL SAFETY PRECAUTIONS

Volume II (surface ship) and volume III (submarine) of OPNAVINST 5100.19E provide general safety precautions for forces afloat. OPNAVINST 5100.23G and *General Industry Standards*, 29 CFR 1910, provide shore safety precautions.

The afloat safety precautions specifically cover shipboard operations, such as heavy weather, underway operations. Consult these precautions to plan for training before specific evolutions. Afloat safety precautions only cover general precautions. Naval warfare publications (NWP) and technical manuals provide more detailed precautions.

In general, safety precautions ashore do not apply aboard ship. In other words, a civilian contractor bringing electrical equipment on board is not required to comply with the ship's electrical safety check program. The civilian employee follows OSHA safety precautions. OSHA is not authorized to inspect military workers or ships for safety, but it is authorized to inspect civilian work sites aboard ship. OPNAVINST 5100.23G, chapter 11, and OPNAVINST 5100.19E, chapter A3, discuss these authorized OSHA inspections aboard ship.

SUMMARY

As a responsible employer, the Navy is obligated to provide you with the safest and healthiest work environment possible. On older ships and shore facilities, especially, that can be a challenge. Every command must fully support the SOH Program.

We discussed the various SOH Program elements such as hearing conservation, sight conservation, respiratory protection, heat stress, electrical safety, and personal protective clothing. In addition, we discussed hazardous material/hazardous waste, asbestos control, gas free engineering, lead control, and medical surveillance.

You have a duty to yourself and the people you work with to know and enforce all safety regulations. Before assigning personnel to a task that can harm them in any way, ensure they are familiar with and know the correct safety procedures. Make sure they are wearing the proper protective clothing and using the correct respirator. Provide them with adequate eye and hearing protection.

Take no short cuts and do all jobs safely. Get copies of OPNAVINST 5100.23G, *Naval Occupational Safety and Health (SOH) Program Manual*, and OPNAVINST 5100.19E, *Navy Occupational Health and Safety Program Manual for Forces Afloat*. Become familiar with them. Remember the adage, "The life you save may be your own." Complacency, haste to complete a job, and the "it can't happen to me" attitude can hinder an effective self-policing safety program.

CHAPTER 6

SHORE SAFETY

In this chapter, we will discuss general safety programs and the Navy Safety and Occupational Health (SOH) Program as they apply to shore activities. Shore activities, with both Department of Defense (DOD) civilian and military workers, have a greater diversity of industrial operations than ships. Like their non-DOD civilian counterparts, shore activities derive safety standards almost exclusively from Safety and Occupational Health Administration (OSHA) regulations.

OPNAVINST 5100.23G, the *Navy Safety and Occupational Health (SOH) Program Manual*, provides the administrative requirements for shore SOH programs. OPNAVINST 5100.23G applies to all shore Navy civilian and military personnel worldwide, except those under the SOH Program responsibility of the Commandant of the Marine Corps (CMC). Since afloat units have many unique requirements, the standards for afloat units found in OPNAVINST 5100.23G have been included in OPNAVINST 5100.19E, *Navy Safety and Occupational Health (SOH) Program Manual for Forces Afloat*.

In this chapter, we will address the following topics:

- Shore activity organization and staffing
- Shore safety training
- Occupational health standards
- SOH Inspection Program
- Inspections and investigations by OSHA officials
- Mishap reporting for shore activities

SHORE SAFETY ELEMENTS

In chapter 1 we discussed the shore safety organization with regard to echelon 2 commands and the local Safety and Occupational Health (SOH) office. At shore activities and commands, commanders, commanding officers, and officers in charge must conduct an aggressive, continuing SOH program and issue an SOH policy statement. This SOH policy statement adopts and enhances or expands on the SOH policy in OPNAVINST 5100.23G. Chapter 2 of OPNAVINST 5100.23G lists the SOH responsibilities.

Individual civilian and military personnel must comply with SOH standards and regulations. Violators of SOH regulations or instructions are subject to disciplinary action prescribed in *Civilian*

Personnel Instruction (CPI) 752 or the *Uniform Code of Military Justice*. Individuals must also report observed workplace hazards and mishaps.

Everyone must be familiar with the SOH program. Based on chapter 10 of OPNAVINST 5100.23G, commands must post the procedures personnel must follow to report unsafe or unhealthful working conditions. Personnel must know where they can review command SOH Program documentation, such as SOH standards, SOH committee records, and the activity hazard communication plan.

Shore commands must also post 1146-DOL-XX (5102)-the annual summary report of occupational injuries and illnesses for the preceding year. They also must place the Department of Defense Safety and Occupational Health Program poster in a prominent location. This poster provides personnel with their SOH points of contact within the activity.

SHORE SAFETY ORGANIZATION AND STAFFING

Major naval shore activities have an SOH office. Organizationally, the SOH office reports directly to the commander, commanding officer, or officer in charge. As was discussed in chapter 1, the SOH office plans, directs, and administers the activity SOH program. SOH offices have many specific as well as administrative functions, depending on individual activity operations. Chapter 3 of OPNAVINST 5100.23G lists all of these functions.

Staffing of the SOH office depends on its workload and location, the population it serves, and the tenant commands it supports. Activities with 400 or more personnel shall assign a full safety manager and adequate clerical staff. Both the managers and the clerical staff are trained, fully qualified SOH professionals. They may be safety engineers, Safety and Occupational Health specialists, industrial hygienists, or industrial hygiene technicians. In areas where it is more effective, a consolidated SOH office may serve several activities. Written agreements define the services of consolidated SOH offices.

Medical and Industrial Hygiene Support

Hospitals and clinics provide occupational health support. Depending on the area they serve, most hospitals and clinics have industrial hygiene and preventive medicine divisions or departments. The hospitals and clinics usually provide occupational medicine services with full-time occupational health nurses and physicians. The size, type, and location of activities supported determine the assignment of nurses and physicians. Chapter 3 of OPNAVINST 5100.23G provides the equations used to calculate staffing requirements.

Industrial Hygiene Laboratories

Industrial hygiene laboratories provide analytical services in support of workplace monitoring and occupational medicine examinations. The Navy has two consolidated industrial hygiene laboratories (CIHLs). They are located at the Environmental and Preventive Medicine Units in Norfolk, Virginia (NAVENPVNTMEDU 2); San Diego, California (NAVENPVNMEDU 5). Each CIHL is accredited by the American Industrial Hygiene Association (AIHA). Additionally, most industrial hygiene offices can perform limited industrial hygiene analyses, such as asbestos identification and airborne fiber concentration determination.

SHORE SAFETY TRAINING PROGRAMS

A well-developed and coordinated training effort, keyed to all levels and types of personnel, is required to maximize safe operating practices and procedures. SOH training can change behavior and lead to mishap prevention and improved performance.

The SOH Training Group oversees the Navy-wide management of SOH training. This training group consists of a steering committee and four working groups. The working groups represent the surface ship, submarine, aviation, and shore communities and their special training needs. The steering committee consists of a SYSCOM member and representatives from OPNAV, CINCPACFLT, COMNAVSAFECEN, CHBUMED, NAVINSGEN, NETC and PRESINSURV. Working together, this steering committee reviews, updates, and revises the SOH/Hazardous Material Control and Management (HMC&M) Navy Training Plan (NTP). This NTP provides for the manning, funding, and planning of SOH training to support all communities and echelons.

Activity SOH Training

Activity SOH training programs are designed to instruct individual employees to work in a safe and healthful manner. The training is tailored to each person's level of responsibility.

OSHA regulations require employers to conduct hazard communication (HAZCOM) training. This training covers the specific hazards and safe work practices involved in the handling of hazardous materials/chemicals.

All top management personnel, employee representatives, supervisory and nonsupervisory personnel, and collateral duty SOH personnel are required to have initial SOH orientation training. Initial and annual training is required, when applicable, for workers exposed to specific hazards, such as asbestos and lead. Professional development courses are required for full-time SOH personnel. Appendix 6-A of OPNAVINST 5100.23G provides a complete listing of shore SOH training requirements.

Formal safety courses are available through the Naval Safety School located at the Naval Air Station, Norfolk, Virginia. The school currently provides shore-oriented safety courses available to military and civilian personnel. For a list of courses, quotas, and convening dates, search the Navy Safety Center Website or logon the eNTRS website. All quotas are assigned through the eNTRS website.

Shore safety supervisors receive specific training as well as orientation, monthly, and annual refresher training on the activity's SOH Program. Supervisory personnel also receive training on how to manage the activity's SOH Program at the work unit level. In this training, they learn how to train and motivate subordinates to develop safe and healthful work practices. They also learn how to integrate occupational safety with job training. Other SOH training for supervisory personnel involves the following areas:

- SOH performance measurement
- Job hazard analysis
- Enforcement of SOH standards
- Mishap investigation
- The use and maintenance of personal protective equipment
- Hazardous material control and management (HMC&M)

Safety and Health Reference Library

The safety supervisor uses educational and promotional materials such as posters, films, technical publications, pamphlets, and related materials. These materials help promote the reduction and prevention of workplace-related accidents and injuries.

Although the local office normally supplies the activity with educational and promotional materials, it can simply provide the activity with information on how to procure the materials. Some materials are purchased through the National Safety Council or similar organizations. Films and video tapes are available through the Naval Education and Training Support Centers on a temporary or permanent custody basis. These centers are located on each coast. They may be contacted at the following addresses or phone numbers:

Naval Education and Training Support Center,
Atlantic
Code N5, Bldg. W313
Naval Station, Norfolk, VA 23511-6197
Phone (804) 444-4011/1468, DSN 564-4011/1468

Naval Education and Training Support Center,
Pacific
921 West Broadway
San Diego, CA 92132-1360
Phone (619) 532-1360, DSN 522-1360

Various periodicals also provide valuable SOH information. They include applicable portions of the *Federal Register*, Defense Logistics Agency hazardous material newsletters, and the following magazines:

- *Safetyline*— this magazine is published six times per year by the Naval Safety Center (NAVSAFECEN). Included in this magazine are articles on occupational health, weapons safety, off-duty safety, occupational safety, high-risk training, fire prevention, motor vehicles, and hazardous materials.
- *Occupational Hazards*— you can receive this magazine at no cost by writing to Occupational Hazards Magazine, 111 Chester Avenue, Cleveland, OH 44114.
- *Occupational Health and Safety*— this magazine is available from Medical Publications, Inc., 225 New Road, Waco, TX 76810.

Safety and Health Training Records

The SOH office is responsible for maintaining SOH training records. These records must be maintained for 5 years. As required by the *Federal Personnel Manual*, civilian employee training must be documented in personnel records. Military personnel training is documented in the General Military Training Record.

SOH offices also maintain copies of lesson plans used for local training classes. SOH training records are reviewed during inspections.

OCCUPATIONAL HEALTH STANDARDS

The primary objective of the SOH Program is to provide a safe and healthy work environment. Shore activity occupational safety standards are derived from OSHA regulations such as 29 CFR 1910—*General Industry Standards*. Occupational health standards are also derived from these regulations.

Most safety deficiencies are recognized during workplace evaluations and inspections. Deficiencies such as a broken guard on a grinder or paints stored near a heat source are obvious hazards. Occupational exposures to gases, dusts, radiation, and vapors are less obvious. Identifying and monitoring these health hazards require a more elaborate program. Most hospitals and clinics have occupational health programs to support the activity SOH office in recognizing and controlling these hazards.

Occupational health programs are divided into the following two major specialties:

- Industrial hygiene—Involves surveillance of the workplace and evaluation of identified health hazards
- Occupational medicine—Focuses on job qualification examinations and the medical surveillance of employees potentially exposed to workplace hazards

Together, these specialties try to identify, treat, and prevent acute and chronic occupational illnesses.

Industrial Hygiene Survey

OPNAVINST 5100.23G and DODINST 6055.5, *Industrial Hygiene and Occupational Health*, require the thorough evaluation of each Navy workplace to accurately identify and quantify all potential health hazards. An initial, or base line, industrial hygiene survey is required for this evaluation. However,

potential hazards that need to be monitored must be identified before the industrial hygiene survey can begin.

The base-line survey is followed by periodic surveys at intervals dependent upon the presence and degree of hazards found. Periodic surveys must be conducted at least annually when hazards are found. Surveys may be scheduled at longer intervals if no hazards are present.

Changes in the workplace require a new base-line industrial hygiene survey, either for the entire workplace or just for those hazards specifically altered by the change. Limited or special-purpose evaluations can also be conducted when problems arise or when new information is available about the hazards of an operation.

The first step in the industrial hygiene survey is a workplace assessment (walk-through survey). The responsible industrial hygienist or a qualified technician conducts this walk-through survey to obtain the following information:

- A description of each work site
- A description of operations and work practices
- A list of hazardous materials or biological agents used and their rate of use
- A list of physical hazards and their sources
- A description of existing controls (ventilation, personal protective devices, etc.) with an evaluation of their use and effectiveness
- Following the walk-through survey, the industrial hygienist prepares a written assessment of each workplace.

Workplace Monitoring Plan

Next, a workplace monitoring plan is developed for areas in which an employee might be exposed to toxic chemicals or harmful physical agents. The industrial hygienist, assisted by the SOH office, develops this plan based on a sampling strategy designed to obtain samples representative of actual exposures. SOH standards or the professional judgment of the industrial hygienist determines the sampling parameters needed to quantify employee exposures.

In quantifying an exposure, the industrial hygienist determines the measured exposure level as compared to safe levels. That allows the

hygienist to assess the effectiveness of, or the need for, control measures directed at reducing or eliminating health hazards. The hygienist makes this assessment based on the results of the sampling programs carried out within the work environment.

If the exposure assessment shows that an employee might be exposed to toxic chemicals or harmful physical agents, a workplace monitoring plan is prepared and carried out. Activity SOH personnel and the responsible medical command or clinic industrial hygienists jointly develop the Workplace Monitoring Plan, OPNAV 5100/14. They base the plan on a sampling of actual exposures. Specific SOH standards or, when such standards do not exist, the professional judgment of the industrial hygienist prescribes the frequency of monitoring.

The results of the analysis and interpretation of the data gained through this sampling strategy serve several purposes. They provide a timely assessment of hazards and provide recommendations for required changes to existing conditions. They also determine requirements for medical surveillance of exposed personnel. These results also help the SOH office and the command prioritize and fund corrective actions and determine manning and support services.

Data pertinent to personnel exposures are incorporated into each person's medical record. Survey, evaluation, and monitoring records are retained for a minimum of 40 years (except asbestos monitoring records, which are retained indefinitely). Employees have access to records that pertain to their individual exposures as provided and defined in 29 CFR 1910.20, *Access to Employee Exposure and Medical Records*.

In chapter 5, we discussed industrial hygiene and medical surveillance. Additional information is available in chapter 8 of OPNAVINST 5100.23G.

SOH INSPECTION PROGRAM

Once the SOH Program is in place, we need a way of evaluating program compliance and effectiveness. The SOH Inspection Program has three levels of inspection:

- Local SOH office
- Echelon 2 or 3 commanders
- Naval Inspector General

The Inspection Program is designed to identify deficiencies that must be corrected to protect personnel and to meet the requirements established by federal agencies. All SOH inspections must be

conducted by inspectors trained and qualified in the subject they inspect.

Workplace Safety Inspections

At the activity level, workplace inspections are targeted at identifying hazardous conditions, unsafe work practices, and violations of standards. These inspections are also used to follow up on accident reports and abatement programs. Workplace monitoring programs and medical surveillance requirements are also determined at the local level.

All Navy workplaces with recognized potential health hazards must be evaluated at least annually. Frequent inspections are required for areas with a high potential for hazards. Deficiencies identified during local inspections are documented on an OPNAV 5100/12, SOH Deficiency Notice, as the written report of that workplace inspection. This report must be forwarded to the official in charge of the area inspected within 15 working days of the inspection. We reviewed this process and hazard abatement in chapter 3.

SOH Management Evaluations

Echelon 2 and 3 commanders conduct evaluations of subordinate commands and field activities. They ensure that their activities have an effective SOH Program and that the program is properly carried out. Written reports of these management evaluations are forwarded for action to the activity commander, commanding officer, or officer in charge.

SOH Oversight Inspections

SOH oversight inspections are conducted by the Naval Inspector General (NAVINSGEN) for shore activities and by the President, Board of Inspection and Survey (PRESINSURV), for afloat units. Both of these extensive inspections evaluate compliance with all aspects of the SOH Program.

At shore activities, the SOH Oversight Inspection Unit (NOIU), located in Norfolk, Virginia, conducts oversight inspections. This is an extensive inspection involving the use of a point system to quantify compliance. The Inspection Unit inspects those sites with the most severe safety and health problems. It usually conducts the inspections on short notice.

NAVINSGEN provides Chief of Naval Operations (CNO) with a semiannual summary of

inspection results, including a summary evaluation of program effectiveness.

You can get help in preparing for a management evaluation or NAVINSGEN inspection from the following sources:

- *SOH Program Evaluation Guide for Shore Activities*, NAVSAFECEN PUB 5100/1
- NAVSAFECEN, Code 41, commercial phone number (804) 444-6043 or DSN 564-6043

INSPECTIONS AND INVESTIGATIONS BY OSHA OFFICIALS

Certain ships, Navy Facilities, and private sector contractor sites at Navy facilities are subject to Department of Labor (DOL) inspections. The DOL carries out the Safety and Occupational Health Act (OSHACT). The OSHACT provides for the development, issuance, and enforcement of standards. Civilian employees, Navy or contractor, are protected by OSHA.

Contractor Inspections

The OSHACT defines DOD contractors, operating from DOD or privately owned facilities located on or off Navy shore installations, as employers. They are subject to enforcement authority by federal and certain state OSHA officials.

Normally, federal and state OSHA officials are authorized to enter contractor workspaces without delay and at reasonable times to conduct inspections. However, officials must arrange to provide the proper credentials authorizing the inspection before their visit. They will be accompanied by representatives of the shore activity.

A state may exercise jurisdiction over SOH matters involving a contractor workplace at a Navy shore installation provided the state has an SOH plan approved by the Secretary of Labor.

Only federal OSHA officials may perform inspections in DOD contractor workplaces situated in areas where the United States holds exclusive federal jurisdiction, such as aboard naval vessels. Chapter 11 of OPNAVINST 5100.23G covers various federal jurisdiction exceptions and exemptions.

Navy Civilian Inspections

Federal OSHA officials, acting as representatives of the Secretary of Labor, are authorized to conduct

amounted or unannounced inspections of all Navy civilian workplaces. Exclusions are workplaces in foreign countries and military workplaces staffed exclusively with military personnel. Workplaces excluded from these inspections may be scheduled as part of DOL's targeted inspection program. This scheduling may occur as a result of an annual evaluation of the DOD SOH Program or in response to a complaint from a Navy civilian employee or employee representative. OSHA may also conduct an inspection solely at the discretion of the Secretary of Labor.

Navy activities employing civilians will have a designated coordinator with whom federal OSHA officials interface for inspection purposes. Before an inspection, OSHA officials must present their credentials and inform the chain of command of their visit. During the inspection, they must abide by certain restrictions in taking photographs and accessing records.

Federal OSHA officials are authorized to interview civilian employees or to be accompanied by employee representatives during the inspection. Reports and deficiency notices generated by federal OSHA officials are sent up the chain of command to the CNO. Special requirements exist concerning access to areas requiring security clearances. As a safety supervisor, you should know that OSHA may inspect the work site of Navy civilians or contractors. Federal OSHA officials may inspect Navy civilian work sites. Federal and state OSHA officials may inspect contractor work sites. Aboard ship, only federal OSHA officials may inspect Navy civilian or contractor work sites. If your work center or area is staffed exclusively with military personnel, OSHA officials have no jurisdiction and are not authorized to conduct work-site inspections. SOH regulations cover inspections of work centers or areas staffed strictly with military personnel. Chapter 11 of OPNAVINST 5100.23G provides details on these inspections.

MISHAP REPORTING FOR SHORE ACTIVITIES

In chapter 4, we discussed mishap investigation techniques and procedures. OPNAVINST 5102.1D, *Mishap Investigation and Reporting*, govern mishap reporting for all Navy and Marines. To track shore activity occupational injuries and illnesses, the SOH office uses the following logs and reports:

- Log of Navy Injuries and Occupational Illnesses (civilian and military), Local Form 5102/7
- OPNAV Safety Report (SR), OPNAV 5102/9 (used for personnel injury and material property damage)
- Annual Report of Navy Civilian Occupational
- Injuries and Illnesses, 1146-DOL-XX(5102)
- Annual Summary of Navy Civilian Occupational
- Injuries and Occupational Illnesses

These reports may bring certain mishaps to the attention of the SOH office. The SOH office then conducts an investigation of that mishap. If the mishap meets the criteria of a reportable mishap, the SOH office ensures a mishap report is prepared. Mishap reports are sent to the Naval Safety Center, which maintains mishap statistics for military and civilian mishaps.

Reportable Shore Mishaps

Any injury, fatality, or occupational illness occurring ashore that results in one or more of the following events will be investigated and reported:

- A fatality or hospitalization of three or more people for inpatient care beyond observation as a result of a single mishap.
- A lost workday case that prevents a military person from performing regularly established duty or work for a period of 1 day or more; or a lost workday case that causes a civilian employee to miss work for a full shift on any day before the day of injury or onset of illness.
- Electric shock resulting from an equipment design deficiency.
- Chemical or toxic exposure or an oxygen deficiency requiring medical examination or attention. A student mishap at a training command that results in any interruption or cessation of formal training in which at least 1 day of instruction is lost or the student is rolled back or disenrolled from the course.

- A contractor mishap caused by contractor operations that result in reportable injury or occupational illness to military or on-duty civilian personnel.
- Fires, injuries, and fatalities associated with fires.
- Material (property) damage occurring ashore involving a repair or replacement cost of \$10,000 or more as a result of a mishap. Cost of repair or replacement includes cost of labor; all DOD man-hours will be computed at \$16 per hour for that purpose. Examples of reportable mishaps are those involving the improper operation or maintenance of equipment, improper ashore cargo handling, and equipment casualties caused by electrical faults. Damage to small craft and service craft assigned to a shore activity is also reportable
- Explosive and conventional ordnance mishaps.
- DOD motor vehicle mishaps involving collisions with other vehicles; pedestrians or bicyclists struck by a motor vehicle or other objects; personal injury or property damage caused by cargo shifting in a moving vehicle; personal injury in moving vehicles or from falls from moving vehicles; towing or pushing mishaps; and other injury or property damage when on or more of the following conditions result:
 1. At least \$5,000 property damage
 2. A fatality or lost-time injury
 3. A fatality or injury requiring treatment greater than first aid to non-DOD personnel
- A traffic mishap that does not involve a government motor vehicle but results in a fatality or lost-time injury to military personnel or to on-duty DOD civilian personnel or results in \$5,000 damage to DOD property. Collisions involving pedestrians or bicyclists struck by a motor vehicle and other objects are to be included if reporting requirements are met.
- Off-duty, recreation, athletic, and home mishaps. (Chapter 11 of this manual

covers the Recreation, Athletics, and Home Safety Program.)

- Diving mishaps if they result in a fatality—regardless of the time between the diving incident and death or whether hyperbaric treatment-recompression therapy was conducted as a result of aviation bends or a diving mishap—or any diving injury that result in a lost workday.

An exception to these shore mishap reporting requirements is made for aircraft and aviation accidents. Chapter 8 of this training manual covers naval aviation safety.

Special Investigations for Shore Mishaps

If an occupational on-duty shore mishap results in a fatality or hospitalization of five or more persons, the responsible echelon 2 command initiates an investigation within 48 hours of notification of the mishap. The echelon 2 command establishes an investigative team to examine the cause of the mishap and recommend corrective action. The leader of this team may be either from headquarters or from a subordinate command other than the mishap activity, this team leader must be a senior line officer (O-5 or above) or an SOH professional. The Naval Safety Center may also provide a team member. An investigation is not required for motor vehicle mishaps or for mishaps exclusively involving contractor personnel.

The mishap investigation team reports its findings to the Naval Safety Center, Chief of Naval Operations (N09F), and the chain of command in a detailed For Official Use Only mishap report.

SUMMARY

In this chapter, you learned the SOH Program requirements specific to shore activities. You learned about organization and staffing, SOH training programs, and occupational health program fundamentals. You reviewed workplace monitoring and SOH inspections as well as inspections by OSHA officials.

You learned the different mishap reporting requirements for Navy civilian, military, and contractor personnel at shore activities. You also learned the importance of carefully coordinating SOH and OSHA regulations to ensure worker protection.

CHAPTER 7

AFLOAT SAFETY

Ships and submarines present unique hazards not found at shore industrial activities. As discussed in chapter 1, Department of Defense (DOD) safety directives allow for the adjustment of Occupational Safety and Health Administration (OSHA) safety standards for military systems and equipment. We must attain the highest possible safety standards within these limitations. As we have a separate safety program for shore activities and aviation, we address afloat safety standard in its own directive, OPNAVINST 5100.19E, *Safety and Occupational Health (SOH) Program Manual for Forces Afloat*

The Afloat Safety Program applies to all DOD military and on-duty civilian personnel assigned to or embarked in a U.S. Navy vessel. The program also covers U.S. Naval Reserve and Military Sealift Command (MSC) vessels manned by military personnel and civil service employees. Because of the manning complexities of MSC ships, a command may tailor some administrative procedures for MSC ship application. However, the procedures must provide protection equal to, or better than, those contained in OPNAVINST 5100.19E.

In this chapter, we will address the following topics:

- Afloat Safety Program background and goals
- Afloat Safety Program elements
- Afloat Safety Program organization
- Shipboard safety organization
- Afloat safety training
- Afloat Safety Program evaluation
- Surface ship safety standards
- Afloat mishap reporting

AFLOAT SAFETY PROGRAM GOALS

Attaining the highest degree of operational readiness and mission accomplishment is the primary goal of the Afloat Safety Program. We achieve this goal by eliminating or controlling hazards. By achieving this goal, we reduce injuries, deaths, and material damage.

Another goal of the program is to setup and maintain a fleetwide atmosphere of safety consciousness. This awareness must be foremost in every evolution of the program. To achieve the

Afloat Safety Program goals, we must strive for constant improvement through positive leadership. We need personnel at all levels to take part in the Afloat Safety Program. We also need the support of those who oversee the program in helping to ensure compliance. You can easily see how your role as a supervisor fits into this program. The critical, first step in achieving the Afloat Safety Program goals is hazard identification. Hazard identification requires all levels of the chain of command to practice safety awareness by continuously watching for hazards. Preventing mishaps depends on the elimination, control, and correction of hazards. We discussed hazard abatement in chapter 3.

Remember, you cannot eliminate some hazards. In such cases, you can reduce the risk through engineering controls, administrative controls, and personal protective devices. OPNAVINST 5100.19E, *Safety and Occupational Health (SOH) Program Manual for Forces Afloat*, introduces specific requirements on hazard awareness, identification, reporting, and correction.

All commands should take the following actions:

- Report unsafe or unhealthful conditions, without fear of reprisal
- Take positive action on all reports of unsafe conditions
- Correct unsafe conditions based on the severity of the hazard
- Investigate and report mishaps and near mishaps and rapidly issue lessons learned to prevent recurrence

AFLOAT SAFETY PROGRAM ELEMENTS

The Afloat Safety Program encompasses a variety of operational safety, general safety, and health program elements. Various directives contain safety guidance and standards. Commanding officers will use them to set up their shipboard safety program.

You can find most of the shipboard safety standards in the *SOH Program Manual for Forces Afloat*, OPNAVINST 5100.19E. Volume I contains detailed program administration requirements. Volume II provides safety standards for surface ships, and volume III provides submarine safety

standards. The following publications also contain safety precautions:

- *Naval Ships' Technical Manuals (NSTMs)*
- *General Specifications for Ships of the United States Navy (GENSPECS)*
- *General Specifications for Overhaul of Surface Ships (GSO)*
- Naval Sea Systems Command instructions
- Bureau of Medicine and Surgery instructions
- Ordnance publications (OPs)
- Fleet and type commander directives

AFLOAT SAFETY PROGRAM ORGANIZATION

Primary responsibility for directing the Afloat Safety Program rests with the chain of command. The chain of command includes commanding officers, executive officers, department heads, division officers, division leading petty officers, and work center supervisors. It also includes the individual sailor or MSC civilian worker. Chapter 1 discussed a typical ship safety organization. The safety organization provides a means to introduce the program and set it in motion.

All levels in the chain of command have some specific safety duties and responsibilities. You should consult the following instructions for further information on specific duties and responsibilities:

- *Safety and Occupational Health (SOH) Program Manual for Forces Afloat*, OPNAVINST 5100.19E
- *Standard Organization and Regulations of the U.S. Navy*, OPNAVINST 3120.32C
- *Mishap Investigation and Reporting*, OPNAVINST 5102.1D

CHIEF OF NAVAL OPERATIONS

The Chief of Naval Operations (CNO) is responsible for executing and managing the Afloat Safety Program. The CNO ensures safety training is provided to all U. S. Navy afloat commanding officers, executive officers, department heads, and primary and collateral duty ship's safety officers. In addition, the primary duty safety officers assigned to readiness group and squadron staffs also receive safety training.

SYSTEMS COMMANDERS

Systems commanders (COMNAVSEASYSKOM, COMNAVAIRSYSKOM, COMSPAARSYSKOM and COMNAVSUPSYSKOM) provide technical focus for comprehensive development, assessment, and administration of surface ship, air, and submarine safety programs. When requested, they help mishap investigation boards in the investigative process. Systems commanders respond to the recommendations and corrective actions developed by the type commanders. They also issue proper documentation to correct hazardous conditions. Finally, COMNAVSEASYSKOM maintains membership in the Safe Engineering and Operations Program (SEAOPS) for the landing craft, air cushion (LCAC) review committee.

NAVAL EDUCATION AND TRAINING CENTER (NETC)

Naval Education and Training Center (NETC) is responsible for ensuring that subordinate commands provide effective safety training at all levels in the chain of command. NETC also ensures that safety awareness is an extensive and integral part of every U.S. Navy training course.

COMMANDER, NAVAL SAFETY CENTER

Commander, Naval Safety Center, supports the Assistant/Deputy Chief of Naval Operations and the systems commanders in effecting, maintaining, and improving the Afloat Safety Program. COMNAVSAFECEN recommends revisions to OPNAVINST 5100.19E about safety standards for forces afloat. Naval Safety Center personnel, also act as technical consultants for all afloat safety training. At least annually, COMNAVSAFECEN reports on the Afloat Safety Program compliance to the assistant Chiefs of Naval Operations. These reports are based on the analysis of data collected during safety surveys.

COMNAVSAFECEN provides an advisor to safety investigation boards for Class A mishaps. The commander coordinates, with the type commander (TYCOM), recommendations for investigation of other than Class A mishaps that may warrant a mishap investigation board. When agreed upon with the type commander, COMNAVSAFECEN also provides an advisor for mishap investigation boards for other than Class A mishaps.

COMNAVSAFECEN determines, when appropriate and if requested, the privileged or non-privileged status of all mishap investigation board evidence. COMNAVSAFECEN conducts the final review and analysis of safety investigation reports (SIRs). He or she endorses SIRs and provides a copy to all endorsers. Naval Safety Center retains as the custodian, SIRs and the endorsements for at least 5 years. COMNAVSAFECEN checks the completion of corrective action resulting from a SIR.

Sanitizing SIRs and endorsements for use in safety training upon request is another COMNAVSAFECEN responsibility. Sanitizing includes removing all identifiable data that could connect the report to an individual, organization, or particular mishap. COMNAVSAFECEN promptly distributes essential information, such as lessons learned, to cognizant commands. The Naval Safety Center also maintains a centralized historical safety data repository.

TYPE COMMANDERS

Submarine, surface, air, Naval Reserve, and MSC TYCOMs ensure subordinate afloat commands set in motion and maintain the Afloat Safety Program. Through group and squadron commanders, TYCOMs foster a positive atmosphere that encourages and demands continuous attention to hazard identification, mishap prevention, and proper reporting. TYCOMs ensure the correction of documented hazards receives priority during availability planning.

Additionally, they make sure subordinate units conduct timely and complete shipboard safety mishap investigations. A TYCOM directs a safety investigation board in the investigation of other mishaps if the investigation may reveal vital safety information.

TYCOMs will provide and maintain the overall Quality Assurance (QA) Program as an integral part of mishap prevention. In maintaining the QA Program, they must strive to eliminate the hazards in dangerous shipboard systems. TYCOMs coordinate with the Commander Navy Safety Center, and other technical agencies in providing aid to the mishap board, when requested.

GROUP AND SQUADRON COMMANDERS

Group and squadron commanders ensure subordinate commands execute and maintain the Afloat Safety Program according to the policy and philosophy of OPNAVINST 5100.19E. They must

include elements of this program in command inspections, including evaluation of the QA process in maintaining shipboard systems. They also help units identify hazards beyond their capability to correct in the availability work package. The units should then schedule the correction of these hazards.

Additionally, group and squadron commanders ensure subordinate commands include mishap prevention, investigation, and reporting in their group and squadron training requirements. The TYCOM directs this training. Finally, group and squadron commanders make sure commanding officers are informed of hazardous conditions and of specific hazards identified by a safety investigation.

GROUP OR SQUADRON SAFETY OFFICER

The group or squadron safety officer acts as the principal advisor to the commander for the Afloat Safety Program. Group and squadron safety officers were first assigned as a primary duty in 1991. These full-time safety officers provide continuity in the chain of command for safety matters from the ships to the TYCOM.

The group or squadron safety officer maintains appropriate safety records and mishap statistics. He or she then makes this information available to a mishap board upon request. The group or squadron safety officer aids subordinate commands in conducting safety mishap investigations for all other reportable mishaps. Assuring distribution of safety information and lessons learned resulting from mishap investigations is an additional responsibility of the group or squadron safety officer.

The group or squadron safety officer schedules and coordinates mishap prevention and hazard awareness training with the group or squadron training officer. The safety officer helps subordinate commands in rating their compliance with suitable instructions and in rating the effectiveness of their safety and QA programs. The group or squadron safety officer also coordinates with the staff material officer to ensure that the Current Ship's Maintenance Projects (CSMPs) identify hazards beyond ships' force capability to correct.

SHIPBOARD SAFETY ORGANIZATION

Chapter 1 discusses the shipboard safety organization in detail. OPNAVINST 5102.1D outlines some of the specific duties of the safety

organization dealing primarily with mishap investigation and reporting.

COMMANDING OFFICERS, MASTERS, AND CRAFTMASTERS

Commanding officers, masters, and craft masters must conduct an aggressive, positive Afloat Safety Program based on OPNAVINST 5100.19E. They ensure all mishaps are investigated and assist mishap investigation boards in their investigations. The safety officer acts as the principal advisor to the commanding officer for the Afloat Safety Program.

AFLOAT SAFETY OFFICERS

The afloat safety officer reports directly to the commanding officer in matters about hazardous or unsafe conditions or operations. The safety officer reports through the executive officer for matters on program administration, program deficiencies, and corrective action status. The safety officer helps the commanding officer conduct mishap investigations for all reportable mishaps not investigated by mishap investigation boards.

In case of a mishap, the safety officer aids the CO in the following responsibilities:

- Making an accurate plot of the scene
- Taking photographs or making videotapes of the wreckage, its distribution, and the surrounding area
- Diagramming any underwater damage
- Submitting the appropriate report

DEPARTMENT HEADS, DIVISION OFFICERS AND WORK CENTER SUPERVISORS

Department heads, division officers, and work center supervisors include information on mishap prevention and investigations in general military training (GMT). They must emphasize the positive, all-hands approach to safety awareness and hazard identification. They must report hazards as outlined by OPNAVINST 5100.19E. They also must inspect all work and make sure all repair actions under their responsibility conform with QA procedures.

ALL HANDS

All hands must know and obey all safety precautions and standards. They must report suspected unsafe or unhealthful work procedures or conditions to their immediate supervisor. In

addition, personnel must report any injuries, occupational illnesses, or property damage resulting from a mishap to their supervisors. Finally, they should help all safety investigators by voluntarily providing mishap information.

AFLOAT SAFETY TRAINING

The key to a successful safety program is quality training. NETC provides safety training at all levels in the chain of command. The *Safety and Occupational Health (SOH) / Hazardous Material Control and Management (HMC&M) Navy Training Plan*, NTP S-40-8603, requires that all U.S. Navy courses, from recruit through commanding officer training, include safety topics. The plan also requires the periodic review and revision of safety courses to ensure they reflect current safety standards.

SHIPBOARD SAFETY TRAINING

Building and expanding upon SOH formal training requires an effective, onboard training effort. The safety officer and the organization of division safety petty officers provide a cadre to execute onboard training. All shipboard personnel will receive Afloat Safety Program indoctrination and annual refresher training that includes the following topics:

- An introduction to the Afloat Safety program, the identity of key safety personnel, and the identity of safety chain of command personnel
- Detailed information on mishap prevention, investigation, and reporting with emphasis on privileged information
- Safety precautions and safety standards
- Hazard identification and reporting procedures

FORMAL TRAINING FOR SHIPBOARD SAFETY AND HEALTH PROGRAMS

In addition to shipboard training, several shore courses are offered for shipboard personnel. Fleet training centers, the Naval Safety Center, the Naval Safety School, and Navy Environmental and Preventive Medicine Units (NEPMUs) conduct the training. The SOH training incorporated into these courses reinforces basic and specialty training. This training provides direct support toward the management of hazard-specific programs associated with the SOH Program. Formal SOH training provides personnel with information on how to

detect hazards, perform surveillance, report deficiencies, report mishaps, conduct training, and achieve program elements.

Formal safety training was upgraded in 1991 in response to a tasking from the Chief of Naval Operations for an improved Afloat Safety Program. The Naval Safety Center developed two new safety officer courses and helped to revise the safety supervisor course. The following formal training is provided for the surface ship and submarine safety organization:

AFLOAT SAFETY OFFICER COURSE (A-4J-0020)

This 10-day course trains commissioned officers, warrant officers, and Military Sealift Command first officers who have been or will be assigned as a command's safety officer. The course concentrates on preparing primary and collateral duty safety officers to manage the program aboard their commands. The Surface Warfare Officer School staff in Newport, Rhode Island, presents the course, which they export to major fleet home ports.

The course uses OPNAVINST 5100.19E to provide instruction on hazard identification (inspections and industrial hygiene surveys), medical surveillance, and hazard abatement. It also covers program evaluation, training, safety standards and regulations, and the Safety Council and Enlisted Safety Committee. It also addresses the major hazard-specific and support programs and the detailed instruction on mishap investigation and reporting. This course is required for staff and shipboard primary and collateral duty safety officers.

SUBMARINE SAFETY OFFICER COURSE (F-4J-0020)

This 3-day course is a condensed version of the 10-day Afloat Safety Officer course. It is tailored exclusively for submarine, collateral-duty safety officers. The submarine training facilities at Norfolk, Virginia, and Pearl Harbor, Hawaii, presents the course. This course provides the same topics as the afloat course but drops the surface-ship-unique topics. All collateral duty submarine safety officers should complete either this course or the Afloat Safety Officer course.

SAFETY PROGRAMS AFLOAT COURSE (J-493-2099)

This 5-day course, presented at fleet training centers, provides specialized SOH training to senior enlisted personnel. Anyone who takes the course

must be an E-5 or above who has been, or will be, assigned to duty as a division safety petty officer or safety supervisor. One-half of the division safety petty officers from each ship will attend this course before, or within 6 months of, their assignment. Training covers information on workplace monitoring, hazard identification, hazard abatement, and deficiency correction. In addition, personnel receive training on rating the division safety program, safety standards and regulations, mishap or near-mishap investigations, and division safety training. The training guide combines occupational health and safety subject matter into 20 generic lesson guides, complete with quizzes and handouts. It also provides lists of available training aids, video tapes, and formal course information. It supplies a sample long-range training plan, references, and a technical assistance guide.

Division safety petty officers also receive training on the enlisted safety committee, using and caring for personal protective equipment, and advising the division officer on safety matters. This course helps the student develop and maintain an effective division safety program.

AFLOAT SAFETY PROGRAM EVALUATION

The principle way commands discover hazards is through workplace inspections. The command's supervisors direct the workplace inspections. They arrange for appropriate safety and health personnel to evaluate ship's spaces and equipment. They also routinely observe operations at the jobsite. Onsite observations enable supervisors to detect and correct hazards resulting from noncompliance with the safety standards contained in OPNAVINST 5100.19E, volumes II and III.

Commands use industrial hygiene surveys as another method of identifying and evaluating workplace hazards. Professional industrial hygienists conduct these surveys to evaluate each workplace for occupational hazards and physical stressors. This survey identifies medical surveillance requirements. The examinations detect adverse health effects resulting from health hazardous exposure associated with duties.

ANNUAL WORKPLACE SAFETY INSPECTIONS

Every workspace on board ship should be inspected for safety hazards at least once a year. The safety officer will ensure this inspection is

conducted. An experienced officer, accompanied by a division safety petty officer (or aboard submarines, a submarine-qualified senior petty officer from the division), is assigned to accomplish the safety inspection of a workplace.

Safety inspections of all workspaces/equipment need not be conducted at one time. During regularly scheduled zone inspections, you can designate certain spaces to receive "safety" zone inspections. These zone inspections will make up the safety inspection. The completed Workplace Inspection Form with an accompanying deficiency list, such as a Zone Inspection Deficiency List (ZIDL), is returned to the safety officer upon completion of the inspection. That allows the hazards to be documented and followed for corrective action.

INDUSTRIAL HYGIENE SURVEYS

This survey quantifies hazardous exposures associated with health-hazardous operations based on actual measurements. We discussed industrial hygiene services in chapter 5. The industrial hygiene survey provides the following information:

- Summary of SOH Program compliance
- List of asbestos hazards
- List of eye hazardous areas
- Respiratory protection requirements
- Lead hazard areas or processes
- Medical surveillance requirements
- Other data from measurements and air sampling

An update of the baseline industrial hygiene survey is necessary as system, equipment, or loadout changes significantly affect the onboard hazard and/or risk. Deterioration of existing controls, modifications and additions to shipboard processes and equipment will occur over time. An update of the industrial hygiene survey is required at least every 2 years to address all changes that may have occurred. These surveys will normally be accomplished by a Navy Environmental and Preventive Medicine Unit (NEPMU) or a tender or aircraft carrier industrial hygiene officer. The safety officer should keep a copy of the survey report and follow up on corrective actions.

JOBSITE OBSERVATION

It is amazing how many people can walk right by hazard and not notice it! Every supervisor, of every rank, has an obligation to be on the lookout for

hazards. Most hazards are identified through jobsite observation. The commanding officer, executive officer, safety officer, department heads, division officers, and work center supervisors should routinely walk through workspaces during the workday or during evolutions to observe jobsite performance. They should make these observations to detect and correct hazards resulting from worker noncompliance with safety standards. Supervisors should correct those hazards that can be corrected on the spot and document all others. They may need to take temporary measures to prevent a mishap until a permanent correction is made.

MASTER-AT-ARMS FORCE INSPECTIONS

Members of the master-at-arms (MAA) force act as roving safety inspectors during their normal tours of the command. They must be alert to any deficiencies or hazards that could result in injury to personnel or damage to equipment. They assist the safety officer in keeping the SOH Program visible to all hands. They attempt to have any observed deficiency or hazard corrected "on the spot." If that is not possible, they will report the deficiency to the safety officer or their supervisor. Although submarines do not have an MAA force, roving watch standers can still be on the lookout for hazards.

NAVSAFECEN SAFETY SURVEYS

Naval Safety Center conducts the shipboard safety survey of one or two day's duration. The interval between surveys, surface ships and submarines, shall not exceed 36 months. The safety survey normally will be conducted during the Fleet Readiness Training Program (FRTTP). The ship's immediate superior in command (ISIC) will allocate time early in the ship's FRTTP so the commanding officer can use the safety survey results in deployment preparations. For two-crew submarines (e.g., SSBNs), the survey should be conducted during a refit/major maintenance period when both crews are onboard.

The shipboard safety survey includes training and a survey of a representative sample of the entire ship, identifying safety hazards, training safety officers and safety petty officers, and providing the commanding officer with an evaluation of the safety status of the command. The survey is intended to promote operational risk management as the primary tool in preventing mishaps and reducing the risks inherent to the operational Navy. The survey report shall be provided to the ship, including a relative standing for safety performance among the ship

class. Within 30 days of the completion of the survey, commanding officers shall provide their ISIC, in writing, the status of the significant discrepancies identified during the survey and indicate those that have been corrected, those on the CSMP (including job sequence number (JSN)), and those beyond capability of the command to correct without outside assistance. To arrange a survey, contact the Naval Safety Center, Afloat Directorate, at SAFE-AFLOAT@navy.mil, or by naval message.

FORMAL SAFETY INSPECTIONS

Many formal inspections conducted afloat and ashore review safety procedures and conditions. SOH and environmental protection (EP) inspections are conducted by the Board of Inspection and Survey (INSURV) during final contract trials (FCTs) and regularly scheduled (4-5 years) material inspections (MIs). One area the Board inspects is SOH. This area of the inspection includes a thorough examination of the ship's programs, training, administration, and material condition.

The following are examples of other formal inspections conducted aboard ships, which cover elements of the SOH Program:

- Operational propulsion plant examination (OPPE)
- Light-off examination (LOE)
- Logistics management assessment (LMA)
- Medical readiness inspection (MRI)
- Command inspection by the immediate superior in command (ISIC) or type commander (TYCOM)
- Various weapons and radiological controls inspections
- Intermediate maintenance activity (IMA) audit/maintenance material inspection (MMI) (tenders only)

Preparation for any of these formal inspections is extensive and time consuming, especially if you don't keep the programs up to date. A routine self-inspection and survey program can help you stay ahead of hazard correction and keep your command ready for inspection. Volume I of OPNAVINST 5100.19E provides checklists at the end of every chapter. These checklists help you evaluate your program and determine your course of action for inspection preparations.

SURFACE SHIP SAFETY STANDARDS

As stated earlier, shipboard life is one of the most hazardous working and living environments in existence. The existence of hazardous materials and equipment contributes to the creation of a mishap-prone environment. A ship is a constantly moving platform subject to conditions such as weather, collision, and grounding. These conditions help to create a mishap-prone environment. Therefore, you can see how dangerous a ship's environment can be. Any chain of events could lead to a major catastrophe. Because of that, personnel must follow both **PRACTICAL SAFETY** and prescribed **SAFETY REGULATIONS** to prevent personal injury and illness.

Every time a mishap occurs involving a violation of an afloat safety standard, you should once again bring the standard to the attention of all personnel. You can do that by using Plan of the Day (POD) notes or division training at quarters. Most sailors receive instruction on safety standards at recruit training and at advanced training schools. However, don't forget the new crewmember reporting on board! Give him or her copy of the afloat safety standards found in chapter C1 (for surface ships) and chapter D1 (for submarines) of OPNAVINST 5100.19E. Briefing the new crewmember on the intent and importance of the standards is important.

We will now examine general safety standards that apply to all shipboard operations and spaces.

The following standards may save your life!

- Locate and remember all exits from working and living spaces that you frequent.
- Know the storage location of life jackets in or near working and living spaces.
- Make sure you secure or lash down all movable objects in your spaces.
- Always wear clothing that snugly fits your body.
- Carry a load in a reamer that allows one hand to be free when practical.
- Always move up or down a ladder with one hand on the railing.
- Know the emergency shutdown procedures for all equipment you use.

- Make sure you do not block exits with equipment or boxes.
- Ensure ventilation ducts are free of blockage.
- Prohibit horseplay aboard ship.
- Prevent personnel from wearing rings, watches, key rings, and other items that might become entangled or caught on projections.
- Always wear approved safety shoes when the job requires it.
- Carry as little in your pockets as possible.
- Walk, don't run in passageways.
- Be cautious when nearing a "blind" corner.
- Know the location of all lifeboat and life raft stations. Know how to proceed to them from your living and working spaces.
- Identify the location of all fire stations and other fire-fighting equipment in or near your living or workspaces.
- Keep constantly familiar with the whereabouts of crewmembers in the space where you are working. That is especially important if the work is in tanks, voids, or other restricted movement areas.
- Smoke only in designated areas.
- Use equipment in an authorized manner, and make sure it is used only by authorized personnel.
- Wear sunglasses topside only.
- Close and dog watertight doors if so designated during normal operations.
- Know the location of life rings, water markers, and flares.
- Know the areas where you should wear personnel protective equipment.
- Inform senior personnel responsible for a given space or equipment if you discover unsafe conditions.
- Do not lean against lifelines.
- Keep decks free of obstacles and materials causing slippery conditions. Post slippery areas with a warning sign. Make sure you install nonskid around machinery work areas.
- Provide temporary protection by guardrails or chains, suitably supported by stanchions or pads, when opening accesses in bulkheads or decks normally closed.
- Never straddle or step over lines, wire, and chains under tension.
- Wear a life jacket topside where the potential exists of falling, slipping, or being thrown or carried into the water.
- Never lock escape scuttles so personnel cannot open them from the inside.
- Never dismantle or remove any lifeline or hang or secure any weight or line to any lifeline except as authorized by the commanding officer.
- Never dismantle or remove any inclined or vertical ladder without permission from the commanding officer. Secure such areas with temporary lifelines and post with a warning sign.
- Never operate machinery or equipment with defective safety devices without permission of the commanding officer.
- Never tamper with or render ineffective any safety device, interlock, ground strap, or similar device intended to protect operators or equipment without the approval of the CO.
- Never open or close electrical switches and pipe valves unless authorized.
- Make sure you pad low overheads above inclined ladders (72 inches) and passageways (75 inches).
- Color-code hazardous areas around machinery and elevators to warn people of danger areas.
- Rig heavy weather lifelines before expected inclement weather.
- Attach a safety line to workers when working in a tank or void.

AFLOAT MISHAP REPORTING

In late 1989, in response to a rash of shipboard mishaps, the Chief of Naval Operations (CNO) called a Navywide safety standdown. After the standdown, CNO tasked Commander, Naval Safety Center (COMNAVSAFECEN) with providing recommendations to improve our safety programs among ships and submarines.

These recommendations were as follows:

1. Establish better afloat mishap investigation and reporting procedures.
2. Add primary duty safety officers to group and squadron staffs and large ships (crew greater than 500).
3. Upgrade safety training.

Safety officials found that although the aviation community was thorough in its investigation of serious mishaps, ships were ineffective in reporting mishaps. Without detailed investigations, we were unable to provide lessons learned in a timely manner. CNO directed COMNAVSAFECEN to create an afloat safety program patterned after the Aviation Safety Program in OPNAVINST 3750.6R. OPNAVINST 5102.1D provides detailed procedures and report formats for mishap investigation and reporting.

Although safety professionals were assigned to type commander staffs, no primary duty safety officers served within the chain of command between the safety professionals and the ships. Beginning in 1991, primary duty safety officers were assigned to readiness squadrons and group staffs. Primary duty safety officer billets were also added to fast combat support ships (AOEs). Other large ships already had primary duty safety officers. Ships with a crew of less than 500 personnel were to assign a collateral duty safety officer. All of these assignments provided continuity and assistance throughout the chain of command for safety issues.

During the period following 1991, safety training needed to be upgraded. New directives and emphasis on safety required a safety officer to have more in-depth knowledge and capabilities. Therefore, the CNO tasked NAVSAFECEN to develop a 10-day afloat safety officer course, now presented by Surface Warfare Officer School in Newport, Rhode Island.

In 1992, NAVSAFECEN developed a submarine safety officer course, now presented by the Naval Safety and Environmental Training Center. The course for safety petty officers offered at Naval Safety and Environmental Training Center was revised to 2 days. When mishaps occur, accurate safety investigation and reporting serves to prevent mishap recurrence. We derive our general safety mishap investigation and reporting procedures from OPNAVINST 5102.1D, *Mishap Investigation, Reporting, and Recordkeeping*. We discussed mishap investigation procedures in chapter 4. Investigative procedures are similar no matter where the mishap occurs.

REPORTABLE MISHAPS

The following mishaps must be investigated, recorded, or reported.

1. Class A, B and C government property damage mishaps. This includes property damage caused by a government evolution, operation or vehicle to other government or non-government property.

2. Class A, B, and C on-duty DoD civilian mishaps and military on/off-duty mishaps.

3. Any other work-related illness or injury that involves medical treatment beyond first aid, loss of consciousness, and/or days away from work, as well as light duty or limited duty for on/off-duty military personnel, or days of job transfer or restricted work for on-duty civilians.

4. Other incidents of interest to the Navy and Marine Corps for mishap prevention purposes are reportable mishaps.

a. All on-duty military fatalities or permanent total disabilities that are the result of a medical event that commenced within one hour of a command-sponsored Physical Training (PT), Physical Readiness Test (PRT), Physical Fitness Test (PFT), or Physical Fitness Assessment (PFA) (e.g., chest pains, heart attack, coma, etc.)

b. Mishaps occurring as the result of a DoD activity, operation, or evolution that results in the injury or death of a guest or military dependent.

c. All on-duty military training-related fatalities, and any high or moderate risk training mishaps that result in the loss of one training day, rolling back or disenrollment of the student from a course.

d. All explosive mishaps, including all ordnance impacting off range and all live fire mishaps.

e. All on-duty diving cases involving the Central Nervous System (CNS), oxygen toxicity, Pulmonary Over Inflation Syndrome (POIS), or hyperbaric treatment.

f. All afloat cases of grounding, collision, and flooding. In the case of collisions involving only U.S. Navy or Military Sealift Command ships or craft, the senior command will submit a consolidated report of the event. In all other collisions (including a vessel running into a stationary object), the report will include an estimate of the damage to the other ship, craft, or object.

g. All fires occurring afloat (all cases except small trash fires in which no personnel were injured and the material property damage was limited to trash.)

h. All Government Motor Vehicle (GMV) or Government Vehicle Other (GVO) mishaps resulting in \$5000 or more government vehicle or government property damage, and/or injury/fatality of DoD-personnel; or a mishap caused by a GMV/GVO resulting in \$5000 or more total damage including any private vehicle or private property damage, and/or injuries/fatalities to non-DoD personnel.

i. Any mishap involving Helicopter Rope Suspension Technique (HRST), air cargo drop, and/or parachuting, regardless of damage costs or extent of injuries.

j. All reportable work-related injury and illness mishaps involving a contractor, where DoN provided direct supervision of the contractor, the mishap was caused wholly or in part by DoD operations, and DON has the means to affect change to prevent reoccurrence of the mishap.

k. Any medically diagnosed work-related illness and injury, such as cumulative trauma disorder or musculoskeletal disease, whether or not involving further medical treatment or any time away from work.

l. Work-related Significant Threshold Shift (STS) in hearing averaging 10 dB or more at 2000, 3000, and 4000 Hz in one or both ears, and the person's total hearing level is 25 decibels or more above audiometric zero in the same ears (averaged at 2000, 3000, 4000 Hz) when an audiologist, otologist, or occupational medicine physician confirms the shift is toward deteriorated hearing, is permanent, and is considered to be of occupational origin.

m. Any work-related needle stick injury or cut from a sharp object that is contaminated with another person's blood or other potentially infectious material.

n. Work-related tuberculosis infection, as evidenced by a positive skin test or diagnosis by a physician or other licensed health care professional, after exposure to a known case of active tuberculosis.

o. Any case requiring a military member or civilian employee to be medically removed under the requirements of an OSH health standard

PRIVILEGED INFORMATION

Since a thorough safety mishap investigation cannot be conducted if the witnesses are afraid or reluctant to provide information, they are assured that the board will keep their testimony in confidence. Since the SIR is a limited-use report that

is not releasable under the Freedom of Information Act (FOIA), we can protect witness testimony and other mishap board deliberations from being used for other than safety purposes. We call this protected information "privileged" information. We discussed privileged information in more detail in chapter 4.

SAFETY INVESTIGATION BOARDS

Superiors in the chain of command appoint a formal safety investigation board to investigate all afloat Class A mishaps. The board consists of at least three members. The immediate superior in command (ISIC) of the ship or craft involved in the mishap appoints the senior member of the board. This board is appointed in writing and will include a medical member if the mishap involved a fatality or injury. COMNAVSAFECEN sends an advisor to help each board. This advisor is not a member of the board, but assists the board in conducting the investigation. The board may also request technical assistance, such as technical representatives and forensic experts. Technical assistants are not members of the board.

The mishap investigation boards submit findings and recommendations in an MIR. An MIR is a **limited**-use report written by a mishap investigation board as a result of a Class A mishap. SIRs contain privileged information. The chain of command receives and endorses the MIR. All MIR endorsements are also privileged. The NAVSAFECEN endorses all SIRs. The chain of command then takes corrective action to prevent recurrence of the mishap. These actions may include sending out a message with lessons learned, changing procedures or designs, or alerting all units with similar systems to review their equipment. Lessons learned can be generated by the TYCOM or the NAVSAFECEN.

SUMMARY

In this chapter, we introduced you to the Afloat Safety Program. We discussed its goals and its scope, as well as the responsibilities of the personnel involved in the program. We examined the program's organization. We reviewed the training, both ashore and afloat, available to shipboard personnel. We briefly discussed shipboard mishap reporting procedures. Finally, we examined basic submarine and surface-ship safety precautions.

For detailed information on the Afloat Safety Program, you should consult the references listed at the end of this training manual.

CHAPTER 8

Naval Aviation Safety

Aircraft mishaps are unforgiving. The loss of one aircraft can cost millions of dollars. Therefore, aviation safety has been of concern since man began to fly. As a result, both civilian aerospace industries and the military have developed aircraft mishap prevention programs.

Aviation personnel are exposed to many dangerous situations. In fact, many insurance companies rate flight line operations, and in particular the flight deck environment, among the most dangerous jobs in the world. Naval aviation safety programs have existed since before World War II to reduce the danger of those jobs. These programs are incorporated into the training of all Navy pilots and aviation support personnel.

In this chapter, we discuss the following elements of the Naval Aviation Safety Program:

- Purpose of the program
- Objective of the program
- Scope of the program
- Hazard reports
- Aircraft mishaps
- Pre-mishap plans
- Mishap reports
- Mishap investigations
- Mishap investigation reports
- Mishap investigation report endorsements
- Mishap and Hazard Recommendation tracking Program

We also discuss the command aviation safety program and shipboard aircraft safety.

Purpose of the Naval Aviation Safety Program

The Naval Aviation Safety Program enhances operational readiness when it preserves the lives and enhances the well-being of its members by protecting the equipment and material they need to accomplish their mission. The Naval Aviation Safety Program supports every aspect of naval aviation. Knowledge gained here may assist other safety efforts. The program may, therefore, yield benefits and preserve resources far beyond its intended scope.

Objective of the Naval Aviation Safety Program

The Naval Aviation Safety Program succeeds by preventing damage and injury. Potential causes of damage and injury under human control are termed hazards. The goal of the Naval Aviation Safety Program is to eliminate or control hazards.

Scope of the Naval Aviation Safety Program

The Naval Aviation Safety Program encompasses all activities which detect, contain, or eliminate hazards in naval aviation. These activities include:

- Aircraft and Unmanned Aerial Vehicle (UAV) design, research, development, test, evaluation, procurement, modification, maintenance, servicing, and operations.
- Aircraft and UAV support equipment, facilities, supplies, and weapons.
- Personnel selection, training, education, clothing, and equipment.
- Policies, procedures, instructions, directives, and publications.

However, to be truly effective, this program must transcend these boundaries and become part of the culture that is Naval Aviation. An effective safety program requires everyone associated with naval aviation to shun the minimum requirements and adopt an active safety culture; one that is constantly renewed by fresh ideas.

Assistant Chief of Naval Operations (Air Warfare)

The Director, Air Warfare (N88), directs and supervises the Naval Aviation Safety Program. He or she conducts the program within the office of the Chief of Naval Operations (CNO).

Commander, Naval Safety Center

The Commander, Naval Safety Center advises and aids the CNO in formulating, administering, and monitoring the Naval Aviation Safety Program. In addition, COMNAVSAFECEN has the following responsibilities:

- Advise and assist CNO/CMC in the formulation, administration, and monitoring of the Naval Aviation Safety Program.
- Under exceptional circumstances, waive or change the investigation and reporting requirements of the OPNAVINST 3750.6R.
- Conduct final review, evaluation, and classification of all naval aviation SIRs.
- Analyze and distribute safety information received in reports required by the OPNAVINST 3750.6R.
- Maintain a repository for all reports and related data submitted per the OPNAVINST 3750.6R.
- Administer a system for accountability of naval aviation mishaps and mishap exposure data.
- Release mishap data as directed.
- Develop standards and publish procedures for aviation mishap investigation.
- In special cases, initiate and conduct naval aviation mishap investigations under the authority of CNO.
- Administer the Mishap and Hazard Tracking (MISTRAC) Program per Chapter 9 of the OPNAVINST 3750.6R.
- Liaise with safety organizations in the other armed services, the Department of Defense (DoD), Director, Aviation Safety Programs Naval Postgraduate School
- NAVPGSCOL), naval aviation commands at all levels, and offices and bureaus within the DON.
- Advise and assist CNO and CMC in the administration of the naval aviation safety awards program.
- Research, study, compile and analyze naval aviation safety statistics.
- Sponsor and attend conferences, symposia, seminars, and ad hoc groups in the furtherance of safety.
- When invited, conduct aviation safety surveys.
- Publish naval aviation safety magazines, and explore and exploit any other media which will strengthen and support the Naval Aviation Safety Program.
- Help review and evaluate aviation system safety engineering efforts, acquisitions, and modifications to current equipment.
- Participate selectively on boards, at conferences, in studies, and design reviews.
- Selectively participate in engineering proposal evaluations and maintenance feasibility inspections of new aviation

production systems and equipment, and in production improvement conferences.

- Assist appropriate offices, commands, and agencies prepare operating instructions.
- Maintain membership on NATOPS boards and councils.
- Act as technical advisor on aviation safety for all naval education and training courses, films, training aids, and devices.
- As necessary, request support from the Armed Forces Institute of Pathology.

Commander of Organizations Requiring an Aviation Safety Officer

Activities requiring an aviation safety officer (ASO) include functional wings, marine aircraft wings, marine air groups, and training wings. Also included are all activities that are reporting custodians. Commanders of organizations with ASO billets must take the following actions:

- Assign only graduates of the Aviation Safety School who are naval aviators or naval flight officers to the primary duty of Aviation Safety Officer. Make every effort to assign an officer who has been to the school in the past 4 years or provide that officer with ASO training.
- Structure the command in a way that assures the ASO has either direct access to the Commander or the Commanding Officer or access via the Safety Department Head or the Section Head.
- Assign an Enlisted Aviation Safety Specialist as an assistant to the ASO. This person must be a graduate of the Aviation Safety Specialist Course (A-493-0065), taught by the Naval Occupational Safety and Health Training Center (NAVOSHENVTRACEN), or attend within 6 months of the assignment.
- Establish and maintain a Command Aviation Safety Program per OPNAVINST 3750.6R.
- Refrain from assigning the ASO to punitive or disciplinary duties such as Administrative Discharge Boards or JAG Manual Investigations.

Commanders of Naval and Marine Corps Air Stations

Commanders of naval and Marine Corps Air Stations, air facilities, and expeditionary airfields will perform the functions:

- Establish and maintain a Command Aviation Safety Program.
- Maintain a pre-mishap plan coordinated with those of near by commands.
- Report aviation mishaps occurring within their area of responsibility.
- Secure aircraft or UAV wreckage within their area of responsibility.
- Support AMBs and mishap investigations of other services, including wreckage recovery, transportation and salvage.
- Manage relations with local authorities, the public, and the press.
- Investigate and process claims originating from aviation mishaps.
- Provide access to, or a list of, environmental experts capable of coordinating the removal of environmental wastes and contaminants from a crash site and determining the extent of environmental damage.
- Stock tools and equipment not normally carried in squadron investigation kits, such as: Tyvex suits, positive breathing apparatuses, picks, shovels, gas-driven circular saws, tri-walls, pallets, camping gear for site security, foul-weather gear, water buffalo, sanitation equipment, food, communication equipment, floor wax (to dampen composite materials), and flood lights.

All Naval Aviation Personnel

All naval aviation personnel must acquaint themselves with safety regulations and directives applicable to them and to their assigned duties. They must follow established safety standards. In addition, they must report hazards and mishaps in accordance with their Command Aviation Safety program and OPNAVINST 3750.6R. Also they must submit to physical examination and biological testing as deemed necessary by Commanding Officer, Reporting Custodian, Senior Member of AMB or Naval Safety Center Mishap Investigation Representative, following any mishap or incident with potential to meet defined naval mishap limits as outlined in OPNAVINST 3750.6R.

Purpose of Hazard Reports

The four purposes for Hazard Reports (HRs) are as follows:

1. To report a hazard and the remedial action taken, so others may take similar action.

2. To report a hazard and recommend corrective action to others.

3. To report a hazard another organization may determine appropriate corrective action.

4. To document a continuing hazard in order to establish risk severity and exposure.

Submission of Hazard Reports

General submission criteria. A hazard is a potential cause of damage or injury under human control. Submit Hazard Reports whenever less than mishap reportable loss occurred or a hazard is detected or observed or whenever an event occurs that should have been a mishap but for luck, quick reaction or procedure. Keep in mind that the reports submitted under this instruction are the only consistent source of data for the aviation portion of the Navy's Safety Information Management System (SIMS). Unreported hazards do not get into the safety database. The same thing is true of reports submitted under other directives, such as the Naval Aviation Maintenance Program, OPNAVINST 4790.2H. Sending a Hazardous Material Report (HMR) instead of an aviation Hazard Report deprives the safety community of long-term trend information, data, and documentation useful in mishap prevention. HMRs are a maintenance report, do not require chain of command endorsement and lack the visibility of a Hazard Report. It is never inappropriate to issue both a Hazard Report and an HMR concerning the same event. Additionally, submit a Hazard Report for specific occurrences of Electromagnetic Interference, unintentional Out of Control Flight, a Bird-Animal Strike, a Near-Midair Collision, a Physiological Episode, an Embarked Landing hazard, Air Traffic Control hazards, and other circumstances as outlined in OPNAVINST 3750.6R.

Originators of Hazard Reports shall assign a Risk Assessment Code (RAC) which best describes the risk associated with the report hazard, e.g., RAC 1, RAC 3, etc. appendix B of OPNAVINST 3750.6R. No formal deadlines are required with the exception of ATC Hazard Reports. However, try to forward reports of hazards with a severe RAC within 24 hours of detecting the hazard. All other Hazard Reports should be submitted within 30 days following hazard detection. Severe ATC Hazard Reports shall be submitted within three working days and Routine ATC Hazard Reports shall be reported within 30 days. Complete reports that require information from tape recordings of air

traffic control (ATC) communications or radar video in a timely manner. ATC records over these tapes after 15 days unless investigators request a copy.

NONPRIVILEGED STATUS

Hazard Reports are not privileged. Do not give promises of confidentiality. Although the Navy and Marine Corps may only use Hazard Reports for safety purposes, the contents may be divulged to outside agencies in response to FOIA requests. Avoid the identification of specific individuals.

SECURITY CLASSIFICATION

Normally, Hazard Reports are unclassified. Omit any portion of the report that warrants classification and substitute the word "classified" in its place. In the unlikely event that a meaningful report cannot be produced in this fashion, submit a classified report. Refer to OPNAVINST 3750.6R for further information.

Naval Aviation Mishap Categories

The three naval aircraft mishap categories are defined as follows:

1. **Flight Mishaps (FM).** This category encompass those mishaps which result in \$20,000 or more damage to a DOD aircraft or UAV or, the loss of a DOD aircraft or UAV - when intent for flight for DOD aircraft or UAV existed at the time of the mishap. Other property damage, injury or death is irrelevant to this classification.
2. **Flight-Related Mishaps (FRM).** Those mishaps which result in less than \$20,000 damage to a DOD aircraft or UAV - when intent for flight existed at the time of the mishap and, additionally, \$20,000 or more total DOD and non-DOD damage or a reportable injury or death occurred.
3. **Aviation Ground Mishap (AGM).** Those mishaps in which the intent for flight did not exist but a DOD aircraft or UAV was lost, or more than \$20,000 damage was sustained by a DOD aircraft or UAV, or DOD or non-DOD property was damaged in the amount of \$20,000 or more, or a reportable injury occurred.

Naval Aircraft Mishap Severity Classes

The following mishap severity classes, based on personnel injury and property damage, apply to all

three categories of mishaps listed above. To determine mishap costs see paragraph 314 of OPNAVINST 3750.6R.

CLASS A SEVERITY - A Class A mishap is one in which the total cost of damage to property or aircraft or UAVs exceeds \$1,000,000, or a naval aircraft is destroyed or missing, or any fatality or permanent total disability results from the direct involvement of naval aircraft or UAV. Loss of a UAV is not a Class A unless the cost is \$1,000,000 or greater.

CLASS B SEVERITY - A Class B mishap is one in which the total cost of damage to property or aircraft or UAVs is more than \$200,000 but less than \$1,000,000, or a permanent partial disability or the hospitalization of three or more personnel results.

CLASS C SEVERITY. A Class C mishap is one in which the total cost of damage to property or aircraft or UAVs is \$20,000 or more, but less than \$200,000, or an injury requiring five or more lost workdays results.

An occurrence resulting in a total property damage cost (including all aircraft damage) of less than \$20,000 and no defined injuries is not reportable as a naval aircraft mishap. However, it may be reported as an aviation hazard.

Injury Classification

There are eight injury classifications:

1. **Fatal Injury.** An injury which results in death from a mishap or the complications arising there from, regardless of the time between the mishap and the death.
2. **Permanent Total Disability.** is any injury which, in the opinion of competent medical authority, permanently incapacitates someone to the extent they cannot pursue gainful employment. In addition, the amputation of, or the loss of use, of both hands, or both feet; or loss of, or blindness in, both eyes, or a combination of any of these injuries as a result of a single mishap constitutes a permanent total disability.
3. **Permanent Partial Disability.** An injury which does not result in death or permanent total disability, but, in the opinion of competent medical authority, results in permanent impairment or loss of any part of the body, the loss of the great toe, the thumb, or an unrepairable inguinal hernia, with the following exceptions:

- a. Teeth
- b. The four smaller toes
- c. Distal phalanx of any finger
- d. Distal two phalanges of the little finger
- e. Repairable hernia
- f. Hair, skin, nails, or any subcutaneous tissue

4. Lost Workday Injury. The total number of full calendar days, weekends included, that a person was unable to work as a result of an injury or occupational illness, excluding the day of the mishap and the day returned to duty or work.

5. First Aid Injury. An injury with no lost workdays. Used when individuals are treated and released.

6. No injury.

7. Lost at sea.

8. Missing or unknown.

NOTE: Lost at sea and missing or unknown injuries equate to a fatality for mishap severity-level classification. Refer to OPNAVINST 3750.6R

PRE-MISHAP PLANS

A pre-mishap plan describes - in advance - the steps that must be taken when a mishap occurs. Anticipate all reasonable eventualities and devise measures to cope with them. Deficiencies may be identified through periodic drills designed to ensure the plan's smooth execution when a mishap occurs. Pre-mishap plans are simply descriptions of who is responsible for doing what, both before and after an aircraft mishap. Pre-mishap plans will vary widely, depending on the mission, resources, environment and personnel of the publishing command. Try to write pre-mishap plans so that they will remain valid during deployments. Incorporate an abbreviated pre-mishap plan into a Letter of Instruction (LOI) or implementing instructions for detachments. Other changes may be required when the command moves on or off a ship. For more information on both pre-mishap plans and post-mishap plans, consult OPNAVINST 3750.6R.

RECORD KEEPING AND REPORTS

Record keeping and reporting is vital to provide safety information to Department of the Navy (DON) and Department of Defense (DOD). These records and reports are required by federal law and provide information to identify unsafe acts and conditions, and apply corrective measures. With the

inception of electronic reporting, mishaps or incidents that previously were only locally recordable, and not reportable outside the command, are all now in the reportable category, since all electronic entries are transmitted to the Commander, Naval Safety Center (COMNAVSAFECEN) mishap database. Besides material damage, fatalities and disability mishaps, data must also be collected on time away from work, light, limited, and restricted duty injuries and occupational illnesses for preventive efforts. Therefore all recordable mishaps are to be reported electronically (via WESS) to COMNAVSAFECEN.

Notify your chain of command and COMNAVSAFECEN, of all on-duty DoD civilian and all on and off-duty military Class A mishaps, and any mishaps that result in the hospitalization of three or more personnel, within eight hours of the mishap by telephone or electronic means. Notify COMNAVSAFECEN, and the chain of command, of all other on-duty DoD civilian and all on and off-duty military fatalities regardless of cause (suicide, homicide, medical, etc.) within eight hours by electronic means. Additionally, inform Commandant of the Marine Corps, Safety Division (CMC (SD)) on Marine Corps military or civilian fatalities. Include COMNAVSAFECEN NORFOLK VA//00/30/40/60// and CMC (SD), when Marines are involved, as information addressees on Operational Reports (OPREP-3). Refer to OPNAVINST 5102.1D for more information on Mishap reporting.

AIRCRAFT MISHAP INVESTIGATIONS

A naval aviation mishap signals a failure in the Naval Aviation Safety Program. It is evidence we failed to detect and eradicate the hazards which caused this mishap before it was too late. It is not too late, however, to keep it from happening again – which is why we investigate aviation mishaps with such vigor.

PURPOSE OF AVIATION MISHAP INVESTIGATIONS

Naval Aviation mishap safety investigations have but one purpose and that is to answer the question, "Why?" The mishap investigation is a search for causes; it looks for undetected hazards and tries to identify those factors that caused the mishap as well as those that caused any additional damage or injury during the course of the mishap. Mishap investigations also demonstrate an

organization's commitment to their safety program. All naval aviation mishap safety investigations are conducted solely for safety purposes.

Aircraft Mishap Safety Investigations

Naval aviation mishap safety investigations encompass those investigations of naval aviation Flight Mishaps, Flight-Related Mishaps, and Aviation Ground Mishaps conducted under the auspices of OPNAVINST 3750.6R. No other investigation relieves a command from the responsibility to conduct a mishap safety investigation. AMBs, appointed and maintained by aircraft and UAV reporting custodians, conduct naval aviation mishap investigations. Squadron officers, trained at the Aviation Safety Officer's Course and flight surgeons, trained at the Naval Aerospace and Operational Medical Institute are members of the board. This system of squadron-level AMBs is consistent with one of the basic tenants of the Naval Aviation Safety Program that an individual or command detecting a hazard is obliged to others in this profession to report that hazard as soon as it is detected.

The system supports and encourages mutual trust and confidence common among naval aviators and avoids both the specter of adversarial investigations of one command by another and the implication that safety is the business only of higher authority.

For detailed information on the types of investigations conducted, consult chapter 6 of OPNAVINST 3750.6R

MISHAP INVESTIGATION RESPONSIBILITIES

The senior reporting custodian of a naval aircraft involved in a naval aviation mishap is responsible for investigating and reporting the mishap. An Aviation Mishap Board must investigate every naval FM, FRM, and AGM, then report on them according to OPNAVINST 3750.6R

AVIATION MISHAP BOARDS

Each aircraft reporting custodian shall maintain at least one standing Aviation Mishap Board (AMB).

a. Appointment of AMBs. The aircraft controlling custodian or the designated appointing authority shall appoint AMB members by name and in writing. On all Class A Mishap Investigations, appoint the senior member from commands not

involved in the mishap - preferably from outside the expected endorsing chain. The senior member will be a Naval Aviator or Naval Flight Officer (A commander or lieutenant colonel or above), a graduate of the ASO or Aviation Command Course, or have other suitable training or qualifications acceptable to the aircraft controlling custodian. On other mishaps the senior member may be from the reporting custodian and of any rank senior to the Pilot in Command and Mission Commander. Refer to OPNAVINST 3750.6R for details.

SAFETY INVESTIGATION REPORTS

After a mishap, use the SIR to report the hazards uncovered by the investigation. SIRs are vital to the success of the Naval Aviation Safety Program. Their succinct, open and forthright information, opinions, and recommendations help prevent the recurrence of aviation mishaps. Any attempt at command influence, any effort to edit, change, or in any way censor the content of SIRs, contradicts the spirit of the program and OPNAVINST 3750.6R.

PURPOSE OF SAFETY INVESTIGATION REPORTS

SIRs report the hazards which cause mishaps and the damage or the injuries that occur during a mishap. Equally important is the opportunity they offer to submit recommendations to prevent the mishap and the damage or injury from happening again in the future.

Safety Investigation Report Contents.

An SIR has two parts. Part A contains all MDR messages and enclosures specified in subparagraph 716c of OPNAVINST 3750.6R. Part B is privileged. It consists of the complete SIR message and all enclosures required by subparagraph 716d of OPNAVINST 3750.6R. COMNAVSAFECEN will place the endorsements in Part B.

Requirements for an Endorsement

Endorsing Hazard Reports and SIRs is an important step in hazard elimination. Endorsers have the opportunity to lend their broader perspective and authority to the process of completing recommended corrective actions. Prompt, comprehensive endorsements are the hallmark of a strong Command Aviation Safety Program.

PURPOSE OF ENDORSEMENTS

Hazard Report and SIR endorsements help eliminate the hazards those reports describe. They convey the endorser's position relative to matters contained in the reports.

MISHAP AND HAZARD RECOMMENDATION TRACKING

Aggressively tracking corrective actions ensures their timely resolution before the associated hazard can cause additional damage or injury. The numbers of hazards identified in naval aviation each year that require this monitoring is enormous.

Some means of prioritizing them is necessary so those with the greatest potential for harm can be addressed first. To facilitate this we use the Risk Assessment Code (RAC). The RAC weighs hazards and assigns priorities for corrective action based on their severity and their expected frequency of occurrence. The more severe the hazard, the lower the RAC, and the more urgent the action required. Hazards with the most urgent Risk Assessment Codes receive first priority for action and resources. Anyone, without regard to seniority, can identify and assign corrective action. Responsibility for making the required corrections lies with the action command assigned through the Hazard Mishap Report process. The endorsing process ratifies the assigned action through the chain of command and, until every one has had their say and the action is complete, COMNAVSAFECEN and its MISTRAC system is the link that keeps all parties informed.

COMMAND AVIATION SAFETY PROGRAM

A Command Aviation Safety Program consists of written policies, procedures, and plans, coupled with the attitudes and practices which promote aviation safety. Its only purpose is to preserve human lives and material resources and, thereby, to enhance readiness. An effective Command Aviation Safety Program supports the objectives of the Naval Aviation Safety Program. Their goals are parallel: to eliminate hazards and enhance the safety awareness of all hands. To accomplish this we must detect and eliminate hazards, concentrate on safety awareness training, and enforce the highest possible standards of conduct and performance.

Command Aviation Safety Responsibilities

Although all aviation personnel are responsible for carrying out the command aviation safety

program, certain command personnel have the primary responsibility for the program.

Commanding Officer

The commanding officer of an activity appoints an aviation safety officer (ASO) as specified in the *Standard Organization and Regulations of the U.S. Navy*, OPNAVINST 3120.32C. This instruction lists the command ASO's responsibilities and how the ASO should establish the program within the command.

Aviation Safety Officer

The aviation safety officer (ASO) acts as principal adviser to the commanding officer on all aviation safety matters. He or she advises and aids the commanding officer in setting up and managing a command aviation safety program. Providing safety education throughout the command is a responsibility of the ASO. He or she also ensures the incorporation of safety standards and procedures into all activity functions.

The ASO coordinates safety matters among the organization staff. He or she maintains appropriate aviation safety records and mishap statistics. The ASO must be a primary billet assignment.

The aviation safety officer and Quality Assurance/ Analysis (QA/A) Division personnel, working together, develop a local maintenance instruction (MI) or command type of instruction. This instruction identifies the command policies and responsibilities of all concerned. You should consult the following publications during the instruction development process:

- *The Naval Aviation Safety Program*, OPNAVINST 3750.6R
- *Navy's Safety and Occupational Health (SOH) Program Manual for Forces Afloat*, OPNAVINST 5100.19E
- *Navy's Safety and Occupational Health (SOH) Program Manual*, OPNAVINST 5100.23G
- *NAVAIROSH Requirements for the Shore Establishment*, NAVAIR A1-NAOSH-SAF-000/P-5100-1

The ASO and QA/A Division personnel investigate most mishaps/incidents and hazards in their activity. OPNAVINST 3750.6R identifies report requirements and specifies the conditions under which you report mishaps and injuries to the Commander, Naval Safety Center. To prevent

mishaps and their causes, local activities should check the effectiveness of their safety program and mishap investigation and reporting procedures.

The key to having an effective safety program is effective communication at all levels of command. A variety of publications are available to the safety officer and key members in the safety program to help in the communication process. The Naval Safety Center helps to promote safety in aviation through various safety-oriented publications. They are described in chapter 1. Some of the publications available that contain current, accurate information you can use to help prevent aviation mishaps include:

- *Approach* magazine
- *Aviation Safety Bi-weekly Summary*
- *MECH* magazine

FUNCTIONS OF THE COMMAND AVIATION SAFETY PROGRAM

Sound, positive leadership combined with able and proper management of the command aviation safety program ensures the reinforcement of the following three program functions:

1. Hazard detection
2. Hazard elimination
3. Safety education and awareness

Hazard Detection

We accomplish hazard detection most often at the squadron level. However, the Aviation Safety Program requires that command aviation safety programs at all levels include methods for hazard detection.

Hazards exist as a result of poor design, improper or unprofessional work or operational practices, and inadequate training or preparation for a task or mission. Other causes of hazards include inadequate instructions or publications or a demanding and unforgiving environment. Each member of the command must support a program of reduced risks by reporting hazards.

Hazard Elimination

The keys to effective hazard elimination are knowledge, required procedures and reporting instructions, proper use of materials and equipment, and safety awareness. As hazard detection is an all-

hands effort, so too is hazard elimination. You can readily identify some hazards and correct them on the spot. Others, however, are more difficult to identify. We accomplish hazard elimination through remedial action to correct hazards. This action is divided into the following three parts:

1. Reporting of hazards
2. Remedial action to correct hazards
3. Monitoring of corrective actions

Safety Education and Awareness.

Every command's Aviation Safety Program must contain a safety education and awareness element designed not only to educate its members on the proper management of safety information, but also teach them how to identify, report, and correct hazards. This educational effort includes the requirement for certain, designated personnel to attend formal U.S. Navy aviation and other safety related courses of instruction. Unit safety training shall encompass, routinely, all safety subjects, including aeromedical safety, and the principles and practical applications of risk management.

Elements of the Command Aviation Program

Prerequisites for a successful Command Aviation Safety Program include:

- **Command Climate-** What concerns leaders absolutely fascinates their subordinates. Knowing this, wise commanders will champion the idea that eliminating hazards through aggressive risk management is a worthy effort. They will establish clear, achievable goals and they will monitor and reward their command's progress toward those goals. The wise commander intuitively understands the imperative to protect the free flow of safety information at all levels of their command. Successful leaders know that a deep-seated safety awareness, and uncluttered communications channels running up and down the chain of command will foster a genuine sense of ownership of the safety process by all hands and produce, thereby, an effective command safety culture.
- **Command Safety Goals-** Commanders should establish a clear set of aviation safety goals and set forth an aviation safety policy which defines how their personnel may attain these goals.

- **Command Safety Organization-** Commanders shall describe their command's safety organization, define its requirements, and delineate the functions of each member of their safety organization. They shall assign their flight surgeon or the wing flight surgeon who serves their command with the responsibility for the aeromedical aspects of the Command Safety Program.
- **Aviation Safety Council-** Squadrons, air stations, and other large commands shall form an Aviation Safety Council which will set goals, manage assets, review safety-related recommendations, and keep records of their meetings. The council, with the aviation and ground safety officers and the flight surgeon as permanent members, should review command plans, policies, procedures, conditions and instructions to ensure their currency, correctness and responsiveness to safety recommendations.
- **Enlisted Aviation Safety Committee-** Enlisted representatives from every work center in the command (including the Medical Department and Aircraft Intermediate Maintenance Department (AIMD)) shall form an Enlisted Aviation Safety Committee. In monthly meetings they shall discuss safety deficiencies and provide recommendations for improving safety practices and awareness. Members shall keep a record of attendance and discussion topics. The commanding officer will respond to their recommendations in a timely manner.

Each activity safety petty officer/noncommissioned officer should complete the personnel qualification standards (PQS) for *Aviation Safety PO/NCO*, NAVEDTRA 43218.

Safety Standdown.

Commands shall conduct periodic safety standdowns devoted to providing dedicated time for safety training, awareness, and enhancement of the command safety climate.

Safety Surveys.

Safety surveys should be conducted periodically to assess the command's safety program. These may be accomplished internally by squadron personnel, or externally through the services of a sister aviation

command, by a NAVPGSCOL Aviation Safety Officer's class, or through a formal survey by a COMNAVSAFECEN survey team. Request formal surveys from COMNAVSAFECEN biannually, regardless of any other surveys conducted in the interim.

Safety Training. Commanders shall ensure safety training is conducted and properly documented. Lacking a waiver from higher authority, every effort shall be made to properly train those individuals who occupy a position for which formal safety instruction is mandatory.

Investigation of Suspected Hazards and Reporting Requirements

The command must investigate and determine recommended corrective action on all hazards discovered or reported. The command must report hazards as required by OPNAVINST 3750.6R, OPNAVINST 4790.2J, and other applicable directives.

Reporting of hazards contributes to safety and hazard awareness. Reporting of hazards also helps in obtaining corrective action and improves procedures, processes, and materials.

General Safety

The command shall establish the SOH and general safety programs required by OPNAVINSTs 5100.19E, 5100.23G and 5102.1D. These include: Hearing and Sight Conservation, Traffic Safety, Flight Deck and Flight Line Safety, Respiratory Protection, Home Safety, and Hazardous Materials.

SHIPBOARD AIRCRAFT SAFETY

Flight decks are hazardous, and their danger to personnel goes beyond the chance of crashes. Exhausts on jet engines can propel personnel into other objects or over the side of the ship. Propellers and rotor blades can maim or kill. Aircraft carry ordnance and fuel that can cause fires and explosions. Moving aircraft can hit personnel. The ship pitches and rolls. For those reasons, all personnel whose job requires them to work on the flight deck must be constantly alert and aware of all dangers to avoid injury or death.

Flight line safety precautions, discussed later, apply to flight deck operations. The primary difference is the limited space and tempo of operations experienced on the flight deck. The flight deck is increasingly more dangerous.

All personnel assigned flight quarters on or above the hangar deck must wear appropriate jerseys and helmets. Personnel on the flight deck during flight quarters must wear the following equipment:

- A cranial impact helmet or its equivalent
- Goggles
- Sound attenuators
- Flight deck shoes
- Flotation gear
- An adequately secured whistle
- A survival light

FOREIGN OBJECT DAMAGE

Engines can suck up loose objects from the deck or area around the intake. That can cause costly foreign object damage (FOD) or complete loss of the engine. Personnel must inspect the deck and other areas for FOD by conducting FOD walkdowns before beginning air operations or when starting engines for maintenance.

Flight deck personnel must not put loose objects in shirt pockets and must keep their shirt pockets buttoned while they are in a flight operations area. FOD prevention is one of the reasons we prohibit the dumping of trash and garbage during launch and recovery operations.

You must observe several miscellaneous safety precautions when working on the aircraft flight line and the carrier flight deck. The following precautions are of special importance to ensure your safety as well as the safety of your coworkers.

Propellers and Rotors

The first general precaution you must observe when working on the line around propeller-driven aircraft or helicopter rotors is to **BEWARE OF PROPELLERS**. When you see a propeller, let it be a constant reminder to **STAY CLEAR!** In general, do not cross in front of moving propellers, as whirling propellers are not easily seen. A good habit is to always walk around propellers. Keep the area around the aircraft clear of loose gear and debris.

Intake Ducts

Maintenance of jet engines presents several major hazards. The air intake duct of operating jet engines represents an ever-present hazard. It is a hazard both to personnel working near the inlet duct of the aircraft and to the engine itself if the turn-up area around the front of the aircraft is not kept clear of

debris. Jet engines will "eat" anything, and they have no respect for life or limb. This hazard is, of course, greatest during maximum power settings (high-power turn-up).

The air inlet duct may develop enough suction to pull hats, eyeglasses, loose clothing, and rags from pockets. Personnel should properly secure or remove all loose articles before working around operating jet engines. In some engines, the suction is strong enough to pull a person up to or, in some cases, into the inlet and pull the person's eyeballs out. Needless to say, personnel must take every precaution to keep clear of the intakes.

Protective screens are supplied as part of the ground-handling equipment for most jet aircraft. These screens should be installed before maintenance turn-ups. The use of turn-up screens protects both personnel and engines. It does NOT eliminate the need for caution; a person can receive serious injury as a result of being pulled against the screen. Small items can be pulled through the screen, resulting in thousands of dollars of damage to the engine.

Exhaust Area Hazards

Jet engine exhaust creates several hazards. Tests show that while the carbon monoxide content of jet exhaust is low, other gases are present that are irritating to the eyes. Less noticeable, but as important, is the respiratory irritation exhaust fumes may cause.

The two most important hazards of jet engine exhaust are the high temperature and high velocity of the exhaust gases from the tail pipe. You can find high temperatures up to several hundred feet from the tail pipe, depending on wind conditions. Closer to the aircraft, temperatures are high enough to damage asphalt pavement.

When a jet engine is started, excess fuel accumulates in the tail pipe. When the fuel ignites, long flames can be blown out the tail pipe. Flight line personnel should know the possibility of this hazard. They should keep all flammable materials clear of the danger area.

During maximum power settings, the high velocity of the exhaust gases may pick up and blow loose dirt, sizable rocks, sand, and debris several hundred feet that creates an eye and FOD hazard. Therefore, you should use caution when parking an aircraft for run-up. The general information section of the applicable maintenance instruction manual

(MIM) contains information about exhaust area hazards. These instructions should be strictly adhered to. **NO ONE SHOULD FOOLISHLY EXPERIMENT WITH THE SPECIFIED SAFETY MARGINS.**

After engine operation, no work should be done to the exhaust section for at LEAST ONE-HALF HOUR (preferably longer). If work is required immediately, personnel must wear heat-resistant gloves.

Engine Noise

Jet engines produce noise capable of causing temporary as well as permanent loss of high-frequency hearing. On the flight line, noise levels can exceed 150 decibels (dB). When working around jet engines, you should take the following precautions to protect your hearing:

- Report on time for your annual or periodic audiograms.
- Do not exceed the directed time limits on exposure to the various sound intensities. Wear the proper ear protection, such as earplugs or sound attenuators. If double hearing protection is specified, wear earplugs under your cranial earmuffs.

Damage to hearing occurs when you expose your ears to high sound intensities for excessive periods. The higher the sound intensity, the shorter the period of exposure that will produce damage. As stated in an earlier chapter, exposures above an 84-dB(A) sound intensity, without hearing protection, can cause hearing damage.

The wearing of approved earplugs or sound attenuators will protect you from hearing loss. In extremely high noise level areas, such as the flight

line, even double protection may not be enough protection. In such cases, time limits are set for allowable exposures to noise. Wearing hearing protection can raise the limits of time exposure. All personnel working within danger areas should be familiar with calculated decibel levels (as specified in the applicable maintenance instruction manual) and should wear the required protective equipment.

Movable Surface Hazards

Movable surfaces such as flight control surfaces, speed brakes, power-operated canopies, and landing gear doors are a major hazard to flight line personnel. These units are normally operated during ground operations and maintenance. Therefore, you should ensure that all personnel and equipment are clear of the area before operating any movable surface.

SUMMARY

In this chapter, we addressed the scope and goal of the Naval Aviation Safety Program. We covered the concepts and individual responsibilities associated with the safety program. We discussed the command aviation safety program functions and its elements. We examined hazard reports, naval aircraft mishap reports, and mishap investigation reports. We considered the endorsements required on both hazard reports and mishap investigation reports. We examined general shipboard aircraft safety. Finally, we discussed the importance of monitoring mishap corrective actions.

We did not intend for this chapter to make you an expert in naval aviation safety. The chapter was developed to provide you with a basic introduction to aviation safety as well as the references you should consult for additional information.

CHAPTER 9

EXPLOSIVES SAFETY

This chapter will acquaint you with basic explosives safety precautions. All activities involved with ordnance have experts trained in the areas of ordnance usage, stowage, handling, disposal, and transportation. As a safety supervisor, you must know about ordnance safety.

It will be up to you to reduce hazards and to help prevent mishaps. In this chapter we briefly discuss the following topics:

- Purpose and elements of the Naval Explosives Safety Program
- Organization and general responsibilities of the Naval Explosives Safety Program
- The safety supervisor's ordnance safety requirements and responsibilities
- General safety precautions for weapons elevators and ammunition hoists
- Personal protective equipment
- Protective clothing worn during ordnance handling
- Prohibited articles in hazardous areas
- Ordnance hazards associated with fire and heat
- Qualification/certification criteria and procedures
- Definitions and terms associated with explosives mishap reports
- Reportable mishaps or deficiencies
- Investigation and reporting responsibilities

THE NAVAL EXPLOSIVES SAFETY PROGRAM

Preventing the premature, unintentional, or unauthorized discharge of explosives and devices containing explosives is what explosives safety is all about. It involves a decrease in the effects of explosions, combustion, and toxicity. It includes all mechanical, chemical, biological, and electrical hazards associated with explosives and hazards of electromagnetic radiation to explosive ordnance. In addition, explosives safety includes equipment or systems in which malfunction would hazard the safe handling, maintenance, storage, transfer, release, delivery, or firing of explosives.

The Weapons Systems Explosives Safety Review Board (WSESRB) reviews the explosives safety of weapons or explosives systems. It makes safety recommendations to the proper naval systems commander or project manager responsible for the system or material under review. This board, headed by a representative of the Commander, Naval Sea Systems Command (COMNAVSEASYS COM), consists of representatives from appropriate systems commands and other commands as necessary.

The Department of Defense Explosives Safety Board (DDESB) sets up explosives safety standards for Department of Defense (DOD) personnel. It advises the Secretary of Defense and each DOD component on hazardous conditions associated with the handling, transportation, and storage of explosives and ammunition. This board consists of one colonel or captain (O-6, or senior) from each military department.

An officer or a person of equivalent seniority chairs the board. That position rotates among the departments. Liaison officers and a permanent secretariat of senior civilian explosives safety engineers from each of the military departments provide technical support to the board.

PURPOSE AND ELEMENTS OF THE NAVAL EXPLOSIVES SAFETY PROGRAM

The purpose of the Naval Explosives Safety Program is to ensure safety and enhance operational readiness. The program uses several elements to reduce, to a minimum, the chance of injury, loss of life, and property damage.

Explosives Safety Standards

Explosives safety standards are an essential element of the Naval Explosives Safety Program. The DDESB sets explosives safety standards and periodically coordinates their revision. These standards guide DOD components in avoiding the hazardous conditions connected with explosives. Appropriate Naval Sea Systems Command (NAVSEASYS COM) publications publish the standards for naval use and observance.

Explosives Safety Studies

Explosives safety studies, surveys, and reviews are conducted as part of the Naval Explosives Safety Improvement Program (NESIP). The Chief of Naval Operations (CNO) established this element of the safety program. The WSESRB conducts some of the reviews, while the Navy Ammunition and Hazardous (AMHAZ) Materials-Handling Review Boards conduct others. The Naval Sea Support Center detachments conduct detailed inspections.

Explosives Safety Training

Training is another key element of the Naval Explosives Safety Program. You must make sure your personnel follow safe operating practices and procedures. To do that, they must maintain a clear and practical understanding of mishap prevention. Make sure the personnel involved in handling or transporting explosives know how to perform their work safely and quickly. Experienced commissioned officers or petty officers train shipboard personnel until they are competent to perform their work under less direct supervision. We address training in more depth later in this chapter.

Explosives Safety Inspections

One element required of all levels of command is the establishment and continuation of a positive explosives safety inspection program. This program, too, must be present at all levels of command.

Explosives Mishap Investigations and Reporting Procedures

The final element of the Naval Explosives Safety program is the use of explosives mishap investigation and reporting procedures. The gathering of information concerning mishaps, incidents, and material safety is basic to any safety program. Such information helps you to develop organized steps needed to prevent further mishaps. We discuss investigation and reporting procedures later in this chapter.

ORGANIZATION AND GENERAL RESPONSIBILITIES OF THE NAVAL EXPLOSIVES SAFETY PROGRAM

The Naval Explosives Safety Program is an important part of the primary program areas (shore, surface, aviation, and submarine and

diving). It extends into several support areas of the Naval Safety and Occupational Health (SOH) Program. It applies to all personnel, civilian and military, in any Department of the Navy duty assignment in which explosives are, or may be, present.

The CNO exercises general supervision and command authority for the application of technical guidance. Within the Office of the CNO, the Deputy Chief of Naval Operations (DCNO) supervises U.S. Navy explosives safety matters. The DCNO exercises the authority of the Secretary of the Navy for waiver of explosives safety requirements. The DCNO coordinates with the Commandant of the Marine Corps the explosives safety policies, programs, and guidance that mutually affect Navy and Marine forces.

NAVSEASYS COM sets up and issues technical standards and criteria and provides technical help to the Department of the Navy. NAVSEASYS COM also furnishes technical advice and evaluations to the CNO when operational requirements conflict with technical requirements. NAVSEASYS COM directs and coordinates all technical offices concerning explosives safety and prepares data as needed to analyze program effectiveness. This command also provides the necessary technical advice and guidance for development of training programs. These programs set up a level of competence within the Department of the Navy that ensures the success of the Naval Explosives Safety Program.

The following is a list of commanders who have assigned responsibilities under the supervision of the CNO (N09F):

- Commander, Naval Air Systems Command
- Commander, Naval Electronic Systems Command
- Commander, Naval Supply Systems Command
- Commander, Naval Facilities Engineering Command

The Commander, Naval Safety Center (COMNAVSAFECEN), provides support to the CNO (N09F) in the supervision and management of the Naval Explosives Safety Program.

All commands having custody of explosive materials must make sure only qualified personnel handle those materials. Commands must submit reports of explosives mishaps. We discuss both the

certification program and explosives mishap reporting later in the chapter.

ORDNANCE MISHAP PREVENTION

Improper processing, handling, loading, and testing of explosive devices have, in the past, caused mishaps. These mishaps resulted in injury, loss of life, or damage to property. They also reduced the working effectiveness of both fleet and shore activities.

Personnel error is the major cause of mishaps with explosive devices. Analysis of mishaps caused by personnel error shows that the most common reasons for their occurrence are as follows:

- Lack of training
- Improper procedures
- Improper handling
- Lack of proper supervision
- Inattention
- Complacency

THE SAFETY SUPERVISOR'S ORDNANCE SAFETY REQUIREMENTS AND RESPONSIBILITIES

As an ordnance safety supervisor, you must be familiar with current directives in ordnance safety, such as *Ammunition and Explosives Ashore*, NAVSEA OP 5, and *Ammunition Afloat*, NAVSEA OP 4. You also should know the type and classification of ordnance within your command or activity. In addition, you should know the specific hazards the various types of ordnance pose. Personnel supervising the use, care, inspection, handling, preparation, or routine disposal (excluding explosive ordnance disposal operations) of ammunition and explosives must adhere to the following guidelines:

- Be qualified and certified as required by OPNAVINST 8020.14 and supplemental regulations.
- Make sure personnel obey all regulations and instructions; remain vigilant throughout the operation; and strictly prohibit horseplay
- Carefully instruct and frequently warn personnel under them of the need for care and constant vigilance.
- Brief working parties on related safety instructions before they begin an operation.
- Know the hazards of fire, explosion, and other catastrophes that the safety regulations should prevent.
- Be alert to detect any hazardous procedures or practices.
- Know the symptoms of a deteriorating mental attitude of certified personnel, and take immediate corrective action upon detecting such symptoms.
- Make sure subordinates are qualified and certified to perform the job assigned to them.
- Make sure their certification is current.
- Report those personnel who are not qualified for their assigned work to their immediate superior.
- Enforce orders about the maximum number of personnel permitted in the hazard area.
- Permit the use of only authorized tools and handling equipment for the operations.
- Make sure personnel use them in the manner specified by standard operating procedures.
- Keep the area clean; prevent the blocking of safety exits, aisles, and accesses to fire-fighting equipment.
- Enforce compliance with safety regulations that concern protective clothing and equipment.
- That includes inspecting; maintaining; or replacing, if necessary, goggles, gloves, respirators, aprons, and other personal protective equipment.
- Instruct personnel on the purpose and use of protective equipment before they engage in an operation requiring its use.
- Before leaving at the end of a work day, make sure all conditions in the work area are safe.
- Inform the immediate supervisor of any area needing lights, guards, safety appliances, or repairs.
- Report in writing to the commanding officer any requests, suggestions, or comments about safety standards.
- Assign personnel to guide ordnance through scuttles or hatches. Install 1-inch pads on edges of openings.
- Refrain from competing with other ordnance handling parties.
- Prohibit any other cargo handling operations during ordnance-handling operations.
- Post warning signs during ordnance-handling operations, and hoist the "BRAVO" flag.
- Keep ordnance-handling parties small.
- Alert your immediate supervisor of the need for explosive ordnance disposal (EOD)

personnel to remove defective or suspected ammunition from the work area.

As a supervisor, you have no authority to waive or alter NAVSEASYS COM and other commands' safety regulations. You cannot permit anyone to deviate from or violate these regulations.

Ordnance Handling Training of Subordinates

You now know what your duties as a supervisor are. What are the duties of those personnel you train and supervise? Operating personnel must read, understand, and strictly follow all safety standards, requirements, and precautions that apply to their work or duty.

Personnel working with hazardous munitions must know that such substances are designed to explode and are **always** dangerous. Make sure they are trained to instantly respond to, or initiate, any warning signal. The signal can be oral, visual, audible, or any combination of these. Conduct training on a regular basis to ensure all personnel are aware of the meaning and intent of all warning signs, safety precautions, and instructions.

In addition, train your subordinates to take the following actions:

- Immediately report to their supervisor any condition, actions, or equipment or material they consider unsafe
- Immediately **warn** other **personnel** when they are in **danger** because of known hazards or by their failure to obey safety precautions
- Wear or use approved protective clothing or equipment, as required
- Immediately report to their supervisor any injury or evidence of impaired health to themselves or others occurring during work or duty
- Warn others if an unforeseen hazard occurs by giving an audible warning; exercise reasonable caution in such appropriate situations
- Immediately report to their supervisor the presence of unauthorized personnel in the area
- Thoroughly wash hands after handling ordnance

- Refrain from moving cracked, dented, deformed, corroded, or otherwise damaged ordnance
- Avoid handling ordnance that is "armed" or on which the safety device is off, unless directed otherwise

General Ordnance Precautions

The greatest danger from ordnance is explosion. Because of built-in safety devices, ordnance requires outside intervention to set it off unintentionally. Fire, excessive heat, improper handling, or simple misjudgment or mistakes can cause a weapon to detonate.

The major safety factor in preventing an ordnance catastrophe is having a well-experienced and knowledgeable person in charge. He or she must identify and correct potential safety hazards. A crew who knows and understands the basics of ordnance safety and has a real respect for ordnance hazards helps its supervisor. The following is a list of general ordnance precautions that you and your subordinates must follow:

- Do not smoke or allow open flames near ordnance.
- Stop operations immediately if ordnance leaks any material. Notify supervisors who will take corrective action.
- Use ordnance only for its designed purpose.
- Make sure fire-fighting equipment is available near ordnance operations.
- Do not eat or drink near ordnance.
- Know and understand decontamination methods if handling chemical ordnance.
- Get immediate first aid if fuels or oxidizers splash on you.
- Never enter a space where you suspect liquid fuel leaks without having a gas free survey conducted.
- Report all mishaps immediately.
- Do not try to alter or change ordnance in any way.
- Use only authorized equipment to perform any operation on ordnance.
- Electrically ground weapons during assembly, disassembly, and check-out.
- Use approved standard operating procedures (SOPs) for all hazardous operations.
- Suspend operations involving ordnance during thunderstorms or high winds as directed by local regulations.

GENERAL SAFETY PRECAUTIONS FOR FREIGHT/WEAPONS ELEVATORS AND AMMUNITION HOISTS

When working around freight/weapons elevators and ammunition hoists, observe the following safety precautions:

- Always emphasize safety as well as following safety procedures when using freight/weapons elevators and ammunition hoists. Allow only trained personnel to operate this equipment. Ensure they know how to operate emergency devices.
- Inspect the elevators and hoists at least once each week or after use. Look for loosened or damaged parts. Tag the equipment OUT OF SERVICE before beginning repairs, adjustments, or inspections. Until repairs are complete, make sure elevator doors remain locked or barricades remain erected if they must remain open.
- Place a placard or card in each elevator showing its safe working load. You must never exceed the safe working load.
- Authorize personnel to use only those elevators specified for passenger use. Elevators not authorized for passenger use must carry a KEEP OFF THIS ELEVATOR WHEN NOT IN OPERATION sign.
- Close and secure all elevator doors or gates before starting the elevator and when in use.
- Keep hands away from motor-operated doors if you are the operator. When you can manually operate doors or gates, grasp only the handles provided. Operators must never leave the elevator-operating mechanism unprotected.
- Remove the load from an elevator or hoist that does not start. If the elevator or hoist still fails to work, call maintenance personnel for help. Do not jump off the elevator if it refuses to stop. Safety devices and automatic terminal stops should take care of an emergency.
- Perform maintenance and testing of elevators according to *Naval Ships' Technical Manual (NSTM)*, chapter 700.
- Use more than one person to move the elevator when performing maintenance.
- Use only elevators and hoists designated for ammunition.

- Secure covers on ammunition hoists when not in use.
- Make sure personnel do not ride in or on top of ammunition hoists to perform maintenance of any type.
- Load heavy loads in the center of the platform. Make sure the operator exercises extreme care in handling such loads. While unloading or offloading heavy loads, make sure the operator checks to see that locking devices and safe hoisting attachments are in place.

PERSONAL PROTECTIVE EQUIPMENT

Personnel who handle ordnance must wear proper personal protective equipment (PPE). This equipment consists of garments and devices needed to protect people from hazards inherent to the performance of specific jobs. Do not mistake PPE with safe work attire, such as short sleeves, cuffless trousers, or safety shoes. PPE does nothing to reduce or eliminate a hazard, and its failure means immediate exposure to the hazard. PPE may become ineffective or misused without the wearer knowing so, which is particularly serious.

You must provide personal protective clothing and equipment and make sure personnel use them in the following situations:

- When enclosing or isolating a process, or when equipment is impractical
- When making process-material substitutions
- When providing ventilation
- When using other control measures
- When short exposures to hazardous airborne concentrations may occur
- When certain or accidental spills may occur

Always make sure personnel observe the following safety precautions:

- Wear ear protection when handling ordnance during firing exercises
- Wear nonskid, steel-toed safety shoes when working with ordnance
- Clean their protective clothing after each use to remove all traces of contamination before stowing it
- Inspect clothing for damage, deterioration, or other defects before using it
- Reject any items that are not completely satisfactory

When working with ordnance containing white phosphorus, make sure enough emergency equipment is available for personnel to use.

PROHIBITED ARTICLES IN HAZARDOUS AREAS

Personnel working with explosives or in areas where explosives are present must not wear certain clothing articles. They also must not wear or carry certain prohibited articles. Some of the prohibited articles are listed in the following paragraphs.

Articles of Adornment

Personnel may not wear articles of adornment, such as watches, rings, necklaces, chains, bracelets, earrings, neckties, and scarves, in the following situations:

- When working with exposed explosives or in areas where exposed explosives are present
- When operating moving or rotating equipment
- When physically handling material, such as that involved in lifting or moving
- When working with equipment that could cause electric shock
- When handling weapons with electric leads

There are several exceptions to the above list. Personnel may wear articles of religious adornment if the local safety office approves. Operators of materials-handling equipment engaged in receipt, storage, and issue of material may be exempted at the discretion of the local safety office. Another exemption, if approved by the local safety office, concerns personnel operating or testing electrical equipment that is properly grounded.

Tools

Personnel must use authorized tools when working on explosives or in an explosives area. You, as supervisor, should make periodic inspections to ensure compliance.

Firearms

Do not permit anyone carrying a firearm to enter any explosives area or building. The exceptions are couriers, assigned security

personnel, or personnel responding to an emergency.

Matches and Lighters

Unless the commanding officer gives written authorization, do not permit matches, cigarette lighters, and other spark-producing devices in explosives areas.

Food

Personnel must not bring food to any area or eat, drink, or store food in any area in which the handling or storing of explosives or chemical agents occurs.

ORDNANCE HAZARDS ASSOCIATED WITH FIRE AND HEAT

Fire is a hazard to life and property, especially when ammunition and explosives are involved. Many of these materials are extremely sensitive to heat. They react at temperatures much lower than those required to ignite ordinary wood, paper, or fabrics. Even indirect heat generated by a fire could start a reaction that could result in an explosion. The **first and most important rule** in operations involving ammunition and explosives is to **keep them away from excessive heat!**

All personnel concerned with ammunition and explosives must investigate the cause of fires. They must also recognize and follow good practices to prevent fires. Personnel concerned with ammunition must thoroughly understand procedures for fighting and controlling fires involving explosive materials. Having a well-trained and efficient organization responsible for fire safety is especially important. Personnel concerned with ammunition must have a full awareness of their responsibility.

Immediately report all fires starting near ammunition or explosives. Begin fighting the fire with all available means and without awaiting specific instructions. If the fire involves explosive material or if it is supplying heat to explosives, evacuate personnel in the area and seek safety. Also evacuate personnel if a fire is so large that you cannot extinguish it with the equipment available.

Personnel engaged in fighting fires involving explosives and ammunition should seek available cover. Do not expose yourself unnecessarily to intense heat, flying fragments, or possible explosions.

Fire Hazard and Fire-Fighting Indoctrination

Make sure all personnel, supervisory or otherwise, receive indoctrination about, and become thoroughly familiar with, fire hazards and fire-fighting equipment. They must be familiar with the safety practices of the operations for which they are responsible. They must be familiar with the fire bill provisions, both general and local, that apply to their operation. They must know the actions to take if a fire emergency develops.

Fire Watch Responsibilities

You must make sure that a qualified fire watch, adequately prepared and equipped, is standing by during the following evolutions:

- Maintenance and repair work involving open flames or heat-producing devices near or within an area where personnel store, process, or handle explosives
- Disposal operations

Fire Hazard Inspections

Fire hazard inspections conducted periodically are an important part of fire prevention. You should regularly inspect, preferably monthly, all areas and buildings of an ammunition activity. Common causes of fire and fire violations include, but are not limited to the following:

- Excessive amounts of combustible, explosive, or otherwise dangerous materials
- Hazardous conditions arising from defective or improperly installed equipment and machinery used for processing or handling ammunition or explosives
- Dangerous accumulations of rubbish, waste paper, boxes, and shavings
- Improper storage of materials
- Obstructions interfering with the use of fire exits, fire doors, or fire-fighting equipment
- Insufficient, inoperative, or poorly maintained fire-fighting equipment
- Uncontrolled vegetation growing around buildings and magazines
- Evidence of violations of smoking regulations or the use or possession of matches, cigarette lighters, or other prohibited articles
- Missing or improperly posted fire bills

- Unauthorized use of heat- or flame-producing devices or equipment in restricted areas

Smoking Regulations

Personnel must not smoke in areas containing ammunition, explosives, or any other hazardous materials. You should conspicuously display NO SMOKING signs where smoking is prohibited. The commanding officer may appoint certain smoking areas within restricted areas.

Housekeeping

An essential element of any fire prevention effort is good housekeeping. Accumulations of explosive dust, combustible scrap, and flammable residue are primary sources of destructive fires. Keep areas clean and orderly to reduce fire hazards. Do not allow rubbish and trash to gather. Stack combustible material in an orderly manner to prevent toppling or collapsing of stacks.

EXPLOSIVES HANDLING PERSONNEL QUALIFICATION AND CERTIFICATION PROGRAM

The intent of the Explosives Handling Personnel Qualification and Certification Program is to make sure you qualify and certify personnel before they perform any task involving explosive devices. This program concerns everyone involved in the handling, preparation, inspection, or adjustment of live ammunition.

You should permit only reliable, mentally sound, and physically fit persons to work with or use explosives and ammunition. Make sure their qualification and certification are current.

QUALIFICATION PROCEDURES

Personnel qualify at various levels, such as team member, quality assurance, and safety observer. We discuss the different qualification levels in later paragraphs.

Explosive devices are segregated into representative "family types." That prevents the need for personnel to qualify on every type of ordnance or ammunition. Personnel qualify by demonstrating their skills before a certified member of the certification board. They show each evolution they will perform (for example, assembly and testing) on the specific explosive device, represented by a family type of device, if appropriate. The person qualifying must know the documentation,

such as a technical manual, that applies to each device and how to use it.

QUALIFICATION LEVELS

As with any qualification process in the Navy, there are different levels and minimum standards for certification. The qualification levels and corresponding basic qualification standards are as follows:

1. **Team Member (TM):** Members must have an awareness of basic safety precautions about the work task and explosive devices concerned. They must have received formal or on-the-job training and must have been recommended by their immediate supervisor.

NOTE: TM qualified personnel will perform in team concept only under supervision of a Team Leader.

2. **Individual/Team Leader (I/TL):** Team Leaders must have the same basic qualifications as a TM. They must have sufficient knowledge and must have demonstrated the skill required to be entrusted with performing the work task alone or to direct the performance of others in safe and reliable operations. They must be capable of interpreting the requirements of applicable checklists and assembly/operating manuals.

3. **Quality Assurance (QA):** QA personnel must have the same basic qualifications as an I/TL. They must have a detailed knowledge of applicable inspection criteria for the explosive/device system. They must be able to determine whether an explosive device/system is functioning properly while in use. They must be able to determine whether the individual followed necessary assembly or installation procedures according to applicable directives.

4. **Instructor (IN):** Instructors must have the same basic qualification as an I/TE. They must have the required skills to instruct others and provide formal training using an approved course of instruction.

5. **Safety Observer (SO):** Safety observers must know enough about safety procedures and the functioning of safety devices to decide on actions needed to counter improperly used procedures or safety devices. **NOTE:** This level of qualification does not build on any other level of qualification.

CERTIFICATION PROCEDURE

The commanding officer or officer in charge (OIC) of each unit or naval activity involved with explosives appoints a certification board. This board includes, as a minimum, the responsible department head (or comparable supervisory representative if not a department). The board also includes at least one person, E-6 or above, certified to perform the task, function, or evolution. In large units, such as aircraft carriers or weapons stations/ammunition depots, the department head may delegate the responsibility for certification. Additional personnel from within or outside the command may increase the board as appointed by the commanding officer or OIC.

Once qualified and recommended, personnel receive their final certification. The commanding officer, OIC, or the appointed head of the certification board issues the final certification. You must make sure this information gets entered into your people's training or personnel record. In addition, you must keep a certification sheet in the operating area for each person performing operations covered by an operating procedure. Activities may vary the certification sheet formats to satisfy specific requirements.

Duration of Certification

Certification, unless revoked, is valid for a maximum of 12 months. The certification board confirms a renewal of the certification, whether issued at the time of expiration or later. The certification covers an individual or a team qualification. If possible, you should completely requalify personnel before renewing their certification.

Revoking Certification

Commanding officers and officers in charge are responsible for revoking individual or team certification whenever they believe it is in the interest of safety. Relocating certification for individuals and teams, including the team leader, is mandatory if an explosives mishap occurs because they fail to follow authorized procedures. Relocating certification is also mandatory when personnel behave as follow:

- Flagrantly disregard safety precautions
- Recklessly operate explosive devices equipment used to handle
- Show incompetence or unreliability by any other behavior

You should recognize that ordnance incidents and mishaps can and do happen through accidental acts, carelessness, and minor rule infractions. They also happen through deliberate acts, negligence, and major rule infractions. With the commanding officer's approval, personnel with a revoked certification must be retrained until you consider them requalified and recertified. However, their behavior may show that retraining may not be effective. You should then assign them to other tasks not involving explosive devices. Revoking the certification of military personnel requires an entry in the proper portion of their individual service record. The entry must state the specific reason for the revocation.

For information on qualification and certification procedures, you should consult OPNAVINST 8020.14, and NAVSEAINST 8020.9A for naval shore activities.

EXPLOSIVES MISHAP OR CONVENTIONAL ORDNANCE DEFICIENCY REPORTING PROCEDURES

A significant potential for damage or injury exists in mishaps involving explosives. Therefore, the requirements for reporting explosives mishaps are more extensive than those for reporting other types of mishaps. To report those mishaps properly, you first need to understand the meaning of the following terms:

Explosives Mishap. An incident or accident involving conventional ordnance, ammunition, explosives, or explosive systems and devices resulting in an unintentional detonation, firing, deflagration, burning, launching of ordnance material (including all ordnance impacting off range), leaking or spilling of propellant fuels and oxidizers, or release of a chemical agent. Even if an ordnance system works as designed, if human error contributed to an incident or accident resulting in damage, death, or injury, the event is an explosives mishap.

Explosive Material. A chemical or a mixture of chemicals that undergoes a rapid chemical change (with or without an outside supply of oxygen) freeing large quantities of energy in the form of blast, light, and hot gases. Incendiary materials and certain fuels and oxidizers that can be made to undergo a similar chemical change are also considered explosive materials.

Conventional Ordnance Deficiency. A malfunction, observed defect, or induced defect involving conventional ordnance, explosives, ammunition, explosive systems, devices, or support and handling equipment used to handle, load, store, or transport ordnance.

Chemical Agent. A chemical compound intended for use in military operations to kill, seriously injure, or incapacitate people through its chemical properties. Excluded are riot control agents, chemical herbicides, smoke and flames, pesticides, and industrial chemicals unrelated to chemical warfare.

REPORTABLE MISHAPS AND DEFICIENCIES

Report explosives mishaps and conventional ordnance deficiencies in accordance with OPNAVINST 5102.1D, *Mishap Investigation and Reporting* and chapter 10 of OPNAVINST 8600.2A, *Naval Airborne Weapons Maintenance Program (NAWMP)*.

Reportable mishaps and deficiencies include incidents and malfunctions involving non-nuclear explosives, explosive ordnance, chemical agents, and explosive systems.

Explosives Mishaps

The following describes events you should report as explosives mishaps. When reporting these events, use the format described in the applicable instruction listed in the preceding paragraph:

Detonation, Deflagration, Burning, or Firing. An unintentional initiation, or explosion, or reaction of an explosive material, component, or system. Accidental discharge of all guns, including small arms.

Inadvertent Launch. An unintentional launching of a weapon.

Chemical Agent Release. Any intentional launching of a weapon resulting in the following:

- Damage to property from contamination, or costs incurred for decontamination
- Physiological symptoms of agent exposure exhibited by individuals
- A serious potential for exposure created by the quantity of the agent released into the atmosphere

Propellant Fuels and Oxidizers. Leaking or spilled propellant fuels and oxidizers.

All ordnance impacting off range.

Conventional Ordnance Deficiencies

The following describes events you should report as conventional ordnance deficiencies. When preparing a report of these events, follow guidelines of OPNAVINST 5102.1D, use the words *Conventional Ordnance Deficiency Report* for the subject line. If the report will include a request for an engineering investigation, use the words *Conventional Ordnance Deficiency Report/Engineering Investigation Request* for the subject line.

Malfunctions. The failure of an explosive component, weapon, or weapons system to function as designed; for example, failure to launch and dud weapons.

Improper Handling. Ordnance handling incidents attributed to human error. Examples include misuse of equipment, failure to follow established procedures, and violation of safety precautions, resulting in dropped or damaged ordnance. Other examples include human errors during processing, assembling, testing, loading, storing and transporting ordnance.

Inadvertent Arming. The unintentional arming of an explosive component or weapon. Defective Weapons Support Equipment. Deficiencies involving any equipment or device used in the manufacture, test, assembly, handling, and transportation (skids, trailers or similar equipment) of any explosive system.

Observed Defect. A discovered defective weapon or weapons system. Examples include protruding primers, damaged components, cracked grains, and advanced corrosion.

Other

- An event that, except for chance, would have been an explosives mishap.
- Any failure or malfunction of, or damage to, a launch device or associated hardware and software resulting in a hazardous condition when handling or otherwise manipulating dummy, exercise, or explosive material.
- Unusual or unexpected occurrences, unnatural phenomena, unfavorable environments, or instances of equipment

failure that may damage or affect the safety of an explosive material or system. That includes hazards of electromagnetic radiation to ordnance (HERO) sensitive explosive systems exposed to radiation hazard (RADHAZ) environments.

- The failure of a missile or explosive system to test, calibrate, or otherwise meet preloading or prelaunch requirements.
- Use of explosive ordnance disposal (EOD) services involving military explosives for other than routine disposal of explosives.

EXCEPTIONS

Report the following events as explosives mishaps or conventional ordnance deficiencies; use the guidelines of the publication listed for each event:

- Explosives mishaps or conventional ordnance deficiencies occurring aboard a U.S. Navy, U.S. Naval Reserve, or Military Sealift Command vessel
- Mishaps or deficiencies occurring during airborne weapons systems and equipment operations, including armament supporting equipment (any equipment used in the loading or unloading of an explosive system or launch device on an aircraft); follow OPNAVINST 8600.2A, *Naval Airborne Weapons Maintenance Program (NOTAL)*.
- Nuclear weapons mishaps and incidents; follow OPNAVINST 3100.6E, *Special Incident Reporting (OPREP-3, Navy Blue and SITREP) Procedures (NOTAL)* and JCS Publication 1-03.7 (NOTAL).
- Explosives mishaps and conventional ordnance deficiencies that occur off station while an explosive material or system is in the custody of a common (commercial) carrier; follow NAVSEA OP 8020.13B and volume I of NAVSEA OP 2165.
- Explosives mishaps and conventional ordnance deficiencies involving transportation by commercial carriers (including railroads) that occur on board a naval installation; follow OPNAVINST 5102.1D and volume 1 of NAVSEA OP 2165.

POST-MISHAP AND DEFICIENCY ACTION

The activity experiencing the mishap or deficiency will take the following action:

- Stop using the item, lot, or batch involved pending guidance from higher authority.

- Start the reporting procedures.
- Accurately and quickly respond to requests for additional information.

Depending on the severity of the explosives mishap or deficiency, other U.S. Navy commands and activities may help in identifying the actual cause. They would then take steps to ensure that similar mishaps or deficiencies do not occur; the following is an example of how those steps may be taken:

1. NAVSAFECEN together with other activities may conduct a mishap investigation.
2. Commander, Naval Sea Systems Command (NAVSEASYS COM); Commander, Naval Air Systems Command (NAVAIRSYS COM); or Commandant, U.S. Marine Corps, may designate all related explosive systems unserviceable, direct follow-up tests and evaluation of various lots to identify defective hardware, or initiate procedural changes in the use of the weapons system.
3. Commander, Ships Parts Control Center (SPCC), Mechanicsburg, Pennsylvania, may support the above command decisions regarding disposition and use of defective or questionable parts by issuing a Notice of Ammunition Reclassification (NAR).

4. NAVSAFECEN would then enter all relevant information into a data repository.

INVESTIGATION AND REPORTING RESPONSIBILITIES

The commanding officer, officer in charge (OIC), or ship's master requires the investigation and reporting of all reportable explosives mishaps occurring within the command. Included are those mishaps involving personnel attached to their command.

SUMMARY

We discussed the Naval Explosives Safety Program and the Explosives-Handling Personnel Qualification and Certification Program in this chapter. We also discussed the duties of a safety supervisor in ordnance safety. We covered the precautions you should take when handling ordnance. We listed the safety precautions you should follow during maneuvers involving freight/weapons elevators and ammunition hoists. We examined the personal protective equipment you must use when handling ordnance. We listed the articles prohibited in hazardous areas as well as the fire prevention, protection, and control techniques each supervisor should know. Finally, we discussed the procedures you should use to report an explosives mishap.

CHAPTER 10

TRAFFIC SAFETY

For many years, motor vehicle mishaps have accounted for a majority of the accidental deaths of Navy personnel. From 1999 through 2004, 1,155 Navy and Marines died in motor vehicle mishaps. Many others suffered injuries that prevented them from returning to the work force.

The Navy's operational readiness depends upon its people. Motor vehicle mishaps are degrading this readiness through needless deaths and injuries. To combat this problem, the Navy established the Navy Traffic Safety Program. This program defines the safety precautions, regulations, and laws governing the use of all vehicles by Navy people, both on and off duty.

In this chapter, we address the following areas of the Navy Traffic Safety Program:

- Program applicability
- Program enforcement
- Safety belts
- Child safety seats
- Driver education
- Alcohol
- Pedestrians
- Portable headphones
- Cell phone policy
- Motorcycles

NAVY TRAFFIC SAFETY PROGRAM

The Navy Traffic Safety Program defines motor vehicles as wheeled vehicles designed for travel on public roads under motor power or assisted by motor power. Vehicles include automobiles, trucks, motorcycles, mopeds, and all-terrain vehicles. Navy personnel may operate motor vehicles that they or the government own, lease, rent, or control. The Navy Traffic Safety Program applies to all naval bases, stations, facilities, installations, detachments, and all other property under the jurisdiction of the U.S. Navy.

Every command, including forces afloat, must designate, in writing, a traffic safety program manager. Department of Defense (DOD) and Navy motor vehicles must conform to Federal Motor Vehicle Safety Standards. Tactical and combat

vehicles must closely conform to federal motor carrier safety regulations.

Each naval installation must strive to meet the highway safety program standards (HSPS) outlined in *Issuance of Navy Traffic Safety Program*, OPNAVINST 5100.12G. These standards include marking hazards, setting safe speed limits, adopting laws, and ensuring that drivers are licensed.

PROGRAM APPLICABILITY

The Navy Traffic Safety Program applies to the following motor vehicle operators, passengers, and pedestrians:

- All Navy military personnel (on or off base and on or off duty)
- All Navy civilian personnel in a duty status, on or off base
- All people in, or on any Navy motor vehicle, on or off base
- All people on a naval base, anytime
- Even when driving an off-road motorcycle while off duty, personnel must obey applicable requirements of the Navy Traffic Safety Program.

PROGRAM ENFORCEMENT

Noncompliance with certain parts of the Navy Traffic Safety Program can result in a court martial under the *Uniform Code of Military Justice (UCMJ)*. It can also result in nonjudicial punishment (NJP) for military people involved in minor violations. Noncompliance by civilian employees may result in disciplinary action. If you receive an injury because you violate a Navy Traffic Safety Program regulation, the violation may be considered in determining the compensation to which you may be entitled. For example, if you have an accident while driving a friend's motorcycle without wearing the required protective equipment (an approved helmet, proper shoes, etc.) or before attending the motorcycle safety course, the Navy may not pay your medical bills. If you die, your family may not receive all of your death benefits.

Issuance of Navy Traffic Safety Program, OPNAVINST 5100.12G authorizes disciplinary action for certain violations. For example, you may receive disciplinary action for failing to follow safety belt rules or for riding in the cargo areas of vehicles (in the back of a pickup truck).

SAFETY BELTS

Safety belts have been provided in most vehicles for the past 20 years. The original lap seat belt provided a measure of safety, but injuries still occurred when people snapped forward into the dashboard or steering wheel. Therefore, manufacturers began equipping vehicles with safety belts by adding shoulder harnesses to prevent the upper body from moving forward. In some cars, the safety belt moves into place automatically when the car is started.

Since 1990, some manufacturers have begun to equip vehicles with air bags as well as safety belts. Air bags have grown in popularity as survivors have testified to their effectiveness.

National statistics have shown that using safety belts saves lives. Many states now have laws requiring the use of safety belts. The Navy requires personnel to use safety belts at all times.

All Navy motor vehicles must be equipped with safety belts for the driver and passengers. Each person riding in, or operating, a Navy motor vehicle must wear a safety belt. If the vehicle does not have a safety belt at a seating position, no one is permitted to ride in that seat. The only exception is buses not equipped with safety belts in passenger seating positions. If the cargo area of a vehicle does not have safety belts installed, no one is permitted to ride there. That means you may not catch a ride to the ship in the back of a Navy pickup or stake truck.

The rules are similar for private motor vehicles. **All** Navy personnel, on and off base, are required to wear a safety belt when riding in or operating a motor vehicle. If a vehicle does not have safety belts installed or if the safety belts are damaged, military personnel are not permitted to ride in that vehicle. Public transportation, buses, and taxis are exceptions. You are not permitted to ride in the cargo area of motor vehicles without using safety belts.

CHILD SAFETY SEATS

All children under the age of 4 or weighing less than 40 pounds must be restrained in a child safety seat while riding in a Navy motor vehicle or while riding in a private motor vehicle on any naval base. This restriction applies even when a state has child safety seat laws that differ from the Navy's requirements.

WARNING

The operator of the vehicle is responsible for informing all passengers of the safety belt, child safety seat, and protective equipment requirements of the Navy Traffic Safety Program. That means, as an operator of a motor vehicle, you must make sure your passengers **BUCKLE UP!**

DRIVER EDUCATION

The Chief of Naval Education and Training (CNET) is required to provide all military personnel under the age of 26 who have a driver's license or who are required to operate a government motor vehicle with a minimum of 8 hours of classroom instruction in traffic safety. This training may be provided during recruit training or at their first duty station.

You may be required to attend such a course if you are found at fault in a traffic mishap while operating a government motor vehicle. You may also be required to attend such a course if you have been convicted of serious moving traffic violations in a government or private vehicle on base.

The Commander, Naval Safety Center (COMNAVSAFECEN) certifies instructors who conduct the American Automobile Association's Driver Improvement Program at commands throughout the Navy.

Individuals **must not be assigned** as drivers of Navy police vehicles, ambulances, fire trucks, and crash and rescue vehicles until they have successfully completed the National Highway Traffic Safety Administration's Emergency Vehicle Operator Course (EVOC). This course is conducted by a COMNAVSAFECEN approved instructor. This training is to be repeated every 3 years thereafter to ensure competency in the safe operation of such vehicles.

ALCOHOL

Alcohol seriously affects a person's ability to operate a motor vehicle. Alcohol is the leading contributing factor in motor-vehicle-related deaths and injuries. Small amounts of alcohol (one beer or a mixed drink) can affect a person's judgment and motor skills. The best defense is **don't drive after drinking**. Make arrangements for alternate forms of transportation (for example, call a taxi or a friend, or designate someone to drive who is not going to drink).

You are not permitted to have open containers of alcohol in your possession while operating or as a passenger in a motor vehicle on any naval installation.

PEDESTRIANS

The Navy Traffic Safety Program also pertains to pedestrians. Personnel **are not authorized** to jog on main roads and streets on naval installations with high traffic density and during peak traffic periods. Local commanders are required to define and publish the peak traffic periods of the locale and the roads and streets with high-density traffic.

If possible, avoid jogging on roads and streets on naval installations; use defined jogging facilities or routes when available. When jogging on roads and streets, jog in patrolled areas and wear light-colored clothing. During periods of reduced visibility (for example, at night or during fog or rain), wear reflective clothing. Jog facing traffic and obey traffic rules and regulations. Appropriate fluorescent or reflective personal protective equipment **must be provided to and used by all personnel** who are exposed to traffic hazards in their assigned duties. This requirement involves traffic control personnel, roadway maintenance and construction crews, and electricians and telephone repair personnel working on overhead lines.

PORTABLE HEADPHONES

Portable entertainment devices, such as miniature headset radios, cassette players, or other devices with headphones, can be dangerous. Not only do they produce hazardous noise if turned up to full volume, but they can cause mishaps. People have been killed while walking on train tracks or along roadways because they could not hear horns or warnings.

The use of portable headphones, earphones, or other listening devices is prohibited on roadways, sidewalks, and shoulders along roadways on all naval facilities while operating a motor vehicle, jogging, walking, bicycling, or skating. That does not include the use of hearing aids or hearing-protective equipment, nor does it negate the requirement for wearing hearing-protective equipment where conditions dictate. Also exempted is communication equipment being used for official business.

CELL PHONE POLICY

According to the Cellular Telecommunications Industry Association, there are 100 million wireless subscribers today, which is more than 36 percent of the U.S. population. Of those subscribers driving passenger cars on America's roadways at any given time, three percent are talking on hand-held cell phones. That's the results of a survey conducted by the National Highway Traffic Safety Administration.

DoD policy states that hand-held cell phones are prohibited from use while driving on base. Motorists either must have a hands-free device or park off the roadway to use their hand-held devices. Violations draw different penalties, depending on where they occur.

MOTORCYCLES

The Navy uses the term *motorcycle* to refer to motorcycles, motor scooters, motorized bicycles, mopeds, and all-terrain vehicles (ATVs). If you are in the Navy and operate a motorcycle, on or off base, **you are required** to successfully complete a motorcycle safety program approved by NAVSAFECEN. You must be licensed by a state to operate a motorcycle before you can enroll in the course. You must also complete this course before you can obtain a base sticker that allows you to operate a motorcycle on base. Although you cannot license an ATV for operation on public roadways, all ATV operators must successfully complete the All Terrain Vehicle Safety Institute (ASI) ATV Rider Course.

Motorcycle safety courses are available throughout the Navy. You are not required to pay for those courses. Once you have successfully completed an approved course, it is important you continue to practice your riding skills. The skills you learn in the course are only effective if they are used. **About half of all motorcycle accidents involve personnel with less than 5 months' riding experience on the motorcycle involved.**

Navy motorcycle operators must wear the following protective equipment when operating/riding a motorcycle:

- A properly fastened helmet that meets U.S. Department of Transportation standards.
- Properly worn eye-protective devices, which are defined as impact- or shatter-resistant eyeglasses, goggles, or a face shield attached to a helmet. Motorcycle-mounted windshield is not considered to be proper eye protection.
- A long-sleeved shirt or jacket, long-legged trousers, and full-finger leather or equivalent gloves.
- Properly worn hard-soled shoes with heels. Riders are encouraged to wear over-the-ankle shoes or boots.
- A commercially available, brightly colored, mesh or fabric safety vest with reflective vertical, horizontal, or diagonal stripes front and back with a minimum of 130 square inches of reflective area; 65 square inches on the front and 65 square inches on the back.

The proper personal protective equipment (PPE) for motorcycle riders does much more than protect them during a mishap. It also protects them from exposure to the environment. A helmet and eye/face protection protect from wind blast, sand, gravel, bugs, and so forth. Clothing protects the riders from weather, flying objects, and hot parts of the motorcycle. Since motorcyclists are exposed to these conditions each time they ride, they should protect themselves as much as possible by wearing PPE.

SUMMARY

We discussed the most important parts of the traffic safety program covered in OPNAVINST 5100.12G, *Issuance of Navy Traffic Safety Program*. We discussed to whom the program applies; possible penalties for failure to comply; safety belt regulations; driver education; pedestrians; and the use of alcohol, portable headphones, and motorcycles. Read this chapter carefully and follow its directions. We want you to live and enjoy operating your motor vehicles for a long time.

RECREATION, ATHLETICS, AND HOME SAFETY

Off-duty mishaps outnumber shipboard and industrial mishaps. The Navy is concerned with personnel both on and off duty. In addition to traffic safety, discussed in chapter 10, the Navy has developed the Navy Recreation, Athletics, and Home Safety Program.

Sports and recreation are in the Navy to stay. In addition to raising morale, these activities contribute to the development of leadership. The service member meets many conditions in sports activities that are similar to conditions in combat. In athletic competition, an individual can develop various qualities to levels unattainable by other means. These qualities include personal courage, confidence, aggressiveness, and determination. These same qualities, which are essential in combat, can lead to mishaps and injuries in sports competition. Somehow we must find the "fine line" between courage and recklessness, between confidence and unrealistic appraisal of a situation, and between determination and inappropriate stubbornness. Finding the "fine line" reduces mishaps and injuries. We can achieve that fine line through proper supervision, effective instruction, and proper training of participants.

It is Navy policy to provide Navy personnel, and their families, programs that will effectively contribute to their morale and well being. All personnel should include some form of exercise in their daily routine to attain and maintain an acceptable state of physical fitness. The Navy recommends that personnel take part in vigorous sports activities to maintain desired levels of physical fitness.

An old adage says, "A man's home is his castle." Unfortunately, that very same castle can lead to a variety of mishaps. You can prevent many home mishaps, such as children's poisoning, lawn mower mishaps, and fires. Whether a mishap affects the sailor or the sailor's family, it still affects the Navy. A safe attitude on the job needs to extend to the home and off-duty hours.

In this chapter, we discuss the following areas of the Navy Recreation, Athletics, and Home Safety Program:

- Recreation, athletics, and home safety training
- Facilities evaluation and inspections
- Personal protective equipment

- Recreational safety controls
- Safety for recreational activities
- Safety for athletic activities
- Safety in the home
- Off-duty mishap investigation and reporting

NAVY RECREATION, ATHLETICS, AND HOME SAFETY PROGRAM

The Navy issued a directive dealing with recreation, athletics, and home safety in 1987 and updated it in 1990. *Navy Recreation, Athletics, and Home Safety Program*, OPNAVINST 5100.25A, sets up policy and procedures for executing this program ashore and afloat. This program applies to the following personnel:

- All military personnel on or off base
- Military dependents while on government property and while taking part in command-sponsored events off base

That means you are covered during an off-base softball game as part of the command's team or as a spectator. It applies to you while you swim in the base pool and to the members of your family as they watch you at the base bowling alley. It also covers you if you get hurt while repairing your car in your garage at home.

NAVY RECREATION, ATHLETICS, AND HOME SAFETY TRAINING

The Recreation, Athletics, and Home Safety (RAHS) Program manager must make sure military personnel receive training on recreation, athletics, and home safety at least quarterly. The program recommends that civilian personnel also receive this training.

Work center supervisors and department/division safety petty officers should conduct this training. When you are responsible for this training, make sure it is seasonal and geographically appropriate. Conduct the training before or during those times of the year when personnel are at risk.

You can use Plan of the Day (POD) notes, posters, stand-up lectures, and video tapes to help you with this training. You can also use athletic team training as another way to train personnel in athletic safety.

The following are some of the recreation, athletics, and home safety topics that should be covered during training each year:

- Basketball (responsible for the most lost time of any sport)
- Physical fitness
- Water sports
- Racquetball
- Football
- Softball
- Hobby safety

Qualification Training

Patrons using recreational watercraft and Navy automotive and woodworking hobby-shop equipment expose themselves to high-hazard activities. Morale, welfare, and recreation (MWR) staff members make sure only qualified patrons safely operate watercraft, power tools, hydraulic lifts, and spray paint booths. Staff members should keep a record of those who qualify.

Competent MWR staff members should conduct training in the use of this equipment. They should emphasize the use of safety precautions, safety equipment guards, and personal protective equipment (PPE).

The health hazards associated with spray painting require additional precautions. MWR employees must advise patrons in writing of the hazards spray painting poses. An MWR employee must observe patrons throughout the spray painting evolution.

Qualification training for watercraft includes basic rules of the road, knowledge of personal flotation devices (PFDs), applicable safety requirements, and emergency procedures. Successfully completing a small boat safety course, such as that offered by the U.S. Coast Guard Auxiliary, is evidence of qualification.

Record keeping of Training

Commands must maintain all training records for 2 years. Documentation should include a log of scheduled training, dates of training, and names of personnel attending. Each department should maintain its own

training records. These records will be available for annual inspections.

FACILITIES EVALUATION AND INSPECTIONS

Recreational and hobby facilities and equipment used by military patrons and dependents will be of safe design. The facility must provide a safe and healthful setting for patrons as well as workers.

Each command must inspect and evaluate its recreational facilities and equipment annually. These facilities and equipment include game rooms, hobby shops, shipboard gyms, and workout and weight-lifting areas. Ashore, they include all the facilities run by fleet recreation and special services. Ships with enough athletic equipment to checkout, such as volleyballs and basketballs, must also have written recreational safety measures. Naval Safety Center (NAVSAFECEN) policies require these measures to reduce the possibility of injury to participants and spectators.

The safety and health personnel and the designated RAHS Program manager should jointly conduct the inspection. The inspection identifies hazards and ensures the execution of abatement plans. NMPCINST 1710.6A, *Aquatic Programs and Facilities*, governs the inspection of swimming pools and waterfront areas. Applicable Navy standards govern the inspection of other recreational facilities. A summary of these standards and other requirements for program administration is available from the NAVSAFECEN.

Personnel checking out athletic equipment must ensure it is in good condition. Staff personnel should check gym equipment for sharp edges, loose or worn parts, and obstruction hazards. Poorly made athletic equipment, which may not stand up to heavy use, should not be used.

PERSONAL PROTECTIVE EQUIPMENT

You have no choice about wearing several types of personal protective equipment (PPE). BUPERSINST 1710.11C states that personnel must wear approved eye protection when playing squash, handball, and racquetball. Eye protection is not the only PPE required during an athletic event. Certain athletic events and work at the hobby shop require the use of mouthpieces, hand protection, and other types of protective equipment. Did you know that mouthpieces are credited with preventing about 200,000 injuries in high school and college football alone?

Navy RAHS Program managers are responsible for educating people about off-duty hazards and stressing the importance of using PPE for sports. The game players are responsible for wearing the required eye-protective equipment while playing games. The facility manager has the responsibility and authority for ensuring all players wear the proper safety equipment. All commands are required to provide PPE for recreational and athletic activities. For example, if you check out a racquetball racket, the command should provide safety glasses.

The use of PPE should also be emphasized for hobby shop patrons or personnel working at home. For example, training should cover the wearing of safety glasses or goggles and hard-soled shoes while mowing the lawn.

RECREATIONAL SAFETY CONTROLS

Most sports have inherent hazards we cannot eliminate without compromising the game. However, many preventable mishaps occur during recreational activities. We can prevent athletic injuries by providing better training and the proper PPE. Most athletic injuries result from people being out of condition or not warming up before an event. Practically all sports involve some type of hazard since they center around the principles of attack and retreat. But, if you take the proper safety control measures, you can reduce most of the injury-causing hazards.

Administrative Controls

To ensure safe recreational activities for personnel, commands should provide protective control in the form of rules and procedures. They should also provide qualified physical training instructors, special services officers, and recreational leaders. Commands should select recreational personnel based on their experience. However, they should also consider their familiarity with, interest in, and ability to instruct or supervise activities.

Installations should set up effective programs to make certain the proper PPE is on hand when needed. In addition, commands must make sure that facilities are available and that leaders are present to supervise the events.

Leadership and Supervision

When supervising or coaching an athletic event, you must be aware of several factors. One factor is

leadership. Good leadership promotes safety at recreational activities. You must consider the physical differences of the participants. As a leader, you also must understand the goal of the sport involved and demand complete observance of the rules.

If you are a recreational leader, give preliminary instructions to all players and thoroughly indoctrinate beginners in the basics of the sport. You can do that through a progressive training program. To avoid mishaps caused by confusion, make sure all players clearly understand your instructions.

As a recreational supervisor or coach, make sure all injured persons receive immediate medical attention. Make sure participants do not drink alcoholic beverages before or during play.

Before allowing players to engage in any vigorous sport, put them through a warm-up period. Without preliminary warm-ups, your players are more likely to be injured.

Qualified officials must manage all sports contests, whether intramural or extramural. They must make sure the participants carefully follow the standard rules of the game.

Personal Responsibility

As a participant in an athletic event, you have several responsibilities. One is to protect yourself from injury. You should not continue to participate, practice, or play in events when you are excessively tired. Before play starts, warm up. Do not try a new game or practice a new athletic skill without direct supervision of a qualified monitor. Make sure your equipment fits properly and you know how to use it. Wear only clean clothing and equipment next to your skin. Do not take unnecessary chances. Pay strict attention to how to play the game.

SAFETY FOR RECREATIONAL ACTIVITIES

Recreational safety includes many outdoor activities, such as water sports, hunting, bicycling, and ice and snow sports.

The most deadly recreational activities, by far, are conducted on or near the water. Watersports can be fun. The thrill of boating, waterskiing, scuba diving, or even just fishing have long been a part of our leisure time. However, we must respect water. Water can be deadly to both children and adults alike. Drowning is the leading killer of Navy people in recreational mishaps

and the third leading cause of accidental deaths in the United States. From 1987 to 1992, 42 percent of all Navy people killed in recreational mishaps died from drowning. You can prevent drowning by knowing some common water-safety tips.

Swimming

About 45 percent of all drownings involve people falling in the water while walking on piers and bridges or fishing from boats. Many victims were poor swimmers who lacked basic water skills.

If you are going to spend time near the water, you should know how to swim. Swimming is your best defense against drowning. You should know how to swim even if you never expect to go in the water. You may someday have the opportunity to save a drowning person's life.

Always swim with a friend. The buddy system saves lives. Swim only in designated areas. Undesignated swimming areas may have hidden hazards that can kill you.

Teach your children how to swim. Drowning is the second leading cause of accidental deaths in children. NEVER leave a child alone near a swimming pool or swimming area. Many parents think they can hear their child fall into a pool. They are wrong. Drowning is a silent killer. There is usually no loud splash or cry for help because the first gasp for air fills a child's lungs with water, blocking all sound. Child-proof your pool. Install a double layer of protection around your pool. Build a fence at least five feet high around the pool with a self-closing, self-latching gate. Make sure the latch is out of children's reach. You also can buy an electronic sensor that floats in the pool and sounds an alarm if something disturbs the water.

Beware of cold water. Chances of survival in 50-degree water are only 50-50 if you are exposed for 50 minutes. If you are alone, use the heat escape lessening position (HELP). To do that, huddle to conserve heat by crossing your arms and feet and pulling your knees up (fig. 11-1). You can die from hypothermia, even if you fall into water as warm as 70 degrees, if you stay immersed long enough. If you have several people in the water, huddle together in a circle (fig. 11-2). For either of these techniques to be effective, you must be wearing an approved personal flotation device.

Do not jump or dive into water that may be so cold it will numb your body. Instead, ease into the water

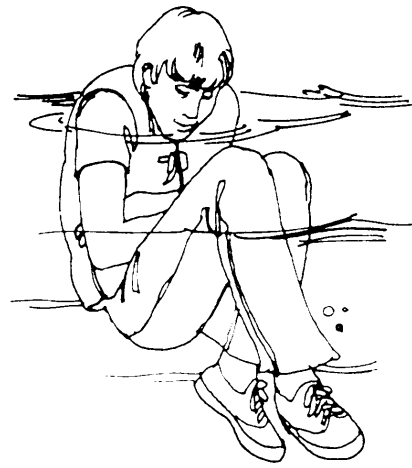


Figure 11-1.—Heat escape lessening position (HELP).

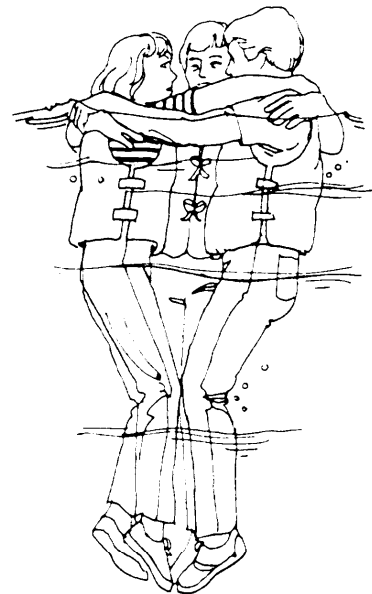


Figure 11-2.—Huddle position

gradually. Cold water exhausts a swimmer faster than warm water. Do not swim long distances in cold water. Cold or tired muscles are susceptible to cramps. To overcome a cramp, draw your knees toward your chest and massage your cramped foot or leg while moving it. You should be in a "face forward" float position while doing that.

Know and consider your swimming limitations. Do not swim when you are tired, overheated, or chilled. If you find yourself fatigued, you can find temporary relief by floating, treading water on your back, or varying the style of swimming. If you find yourself in trouble,

conserve strength as much as possible. You can do that by resting on your back in a floating position with a minimum amount of motion.

We have said this before, but we will say it again: NEVER drink and swim. Alcohol and water are a deadly combination. Alcohol dilates the blood vessels and your body loses heat faster. It also impairs your judgment and increases risk-taking.

Look before you dive! Shallow water dives could leave you paralyzed for life. It did for two Navy people in 1992. Know the depth of the water before your dive. Never dive in unknown waters.

If you have a history of ear trouble, check with your doctor before swimming. Try to avoid swimming underwater. You may use commercial plugs to keep water out of the ear canal. If you fear eye infections or irritations, wear a face mask or goggles.

Except in an emergency, avoid swimming in the dark. Finally, never jokingly call for help.

Scuba, Skin, and Cave Diving

Skin diving, scuba diving, and cave diving are demanding swimming sports that require a person to be in good physical condition. These activities also require good swimming ability and a thorough knowledge of the sport. Two Navy service members drown almost every year during recreational diving. The main reason is lack of training and certification. Proper certification is essential to diving safely. Open water scuba diving certification does not qualify a person for cave or cavern diving.

All divers should get a physical examination by a doctor who is aware of the special hazards and demands of underwater diving. Heart problems, sinus or ear problems, lung trouble, and related health difficulties could make it risky for an affected individual to dive.

All divers should observe the following basic safety rules for diving:

- NEVER drink alcohol before diving.
- NEVER dive until you are a good swimmer.
- Stay in top physical condition.
- NEVER dive alone-use the buddy system.
- Use safe, reliable, time-proven equipment. Make sure your equipment is properly adjusted and maintained. Be familiar with your equipment.

- Be familiar with your diving area before diving, and plan each dive. If you are unfamiliar with the area, get instruction from a knowledgeable source.
- Always use a float with surface identification (diver's flag). This identification helps during rescue or for self-rescue.
- Heed all pains and strains as warning symptoms.
- Know basic first aid.
- Know and obey all local diving laws and regulations.
- Join a reputable diving club.
- Know the basic laws of diving physics and physiology.
- Practice skin diving frequently before scuba diving.
- NEVER wear goggles or earplugs when skin or scuba diving. They are **swimming** aids, not diving aids.
- Engage only in diving exercises that are consistent with your training and experience.

You should observe the following basic safety precautions for scuba diving:

- NEVER use pure oxygen in your tank; it is poison to a diver. Instead, use clean, filtered, certified, compressed air.
- Know your decompression rules and avoid planned decompression dives.
- Set up a system of communication with other divers; develop emergency procedures and procedures for reuniting in case of separation.
- NEVER hold your breath while scuba diving.
- NEVER dive when suffering from a cold, sore throat, or when feeling ill.
- NEVER ascend faster than 60 feet per minute. A usually safe rule of thumb is "NEVER ascend faster than the slowest bubbles."
- Wear a buoyancy compensation device and submersible pressure gauge.
- Adjust buoyancy to be slightly positive on full inhalation.

- Surface carefully to avoid coming up under a boat or some other object. If visibility is poor, extend one or both hands above your head to ward off any object.
- If you lose visual contact with your buddy, listen for the sound of escaping bubbles from the other scuba equipment. If unable to locate your buddy, pound on your cylinder to attract attention. If this fails, surface, locate your buddy, and then descend together.
- Check your cylinder pressure and equipment before a second dive.
- Know how to use an alternate air source and a low-pressure buoyancy compensation inflation system.

Boating

The purchase of a nautical-type or sailor's hat does not suddenly cloak a person in boating experience. The overwhelming majority of boat operators involved in fatal accidents have never taken a safe boating course. Before you go boating, take a safe boating course. For more information on the boat course, call the Coast Guard Boating Course hot line at 1-800-336-BOAT.

About 50 percent of all boating mishaps resulting in serious injuries involve alcohol. Operating a boat while intoxicated, with a blood alcohol content (BAC) of 0.10 percent or more, carries a \$1,000 civil penalty. It carries a criminal penalty of up to \$5,000, 1 year in jail, or both.

Collisions or people falling overboard causes most boating injuries. If you fall or are accidentally thrown into the water, a personal flotation device (PFD) can save your life. U.S. Coast Guard studies show that up to 85 percent of all boating deaths could have been prevented if the victims had been wearing a PFD. Always wear a PFD when boating. Even though it isn't a Navy regulation, we strongly urge you to wear a PFD when you are in your own boat. However, in a watercraft owned by the Morale, Welfare, and Recreation (MWR) Department, the operator and any passengers must wear a PFD approved by the U.S. Coast Guard.

Match your motor to your boat. If you use a motor, have someone check it before your first boat trip of the season. Make sure you have a fire extinguisher aboard, along with tools and equipment to make minor motor adjustments or repairs. Make sure you have enough fuel before starting out. NEVER refuel with the motor running.

Do not go out in a small boat unless you are thoroughly familiar with the craft. Learn to handle your boat by practicing near shore in shallow, smooth water. Become familiar with the basic rules about right-of-ways, channel markings, anchorages, and use of lights.

Leave a float plan with a friend before you set out. Your plan should include the identification number of your boat, who is with you, where you are going, when you expect to return, and when to contact the Coast Guard. Inspect your boat each time before you use it, checking for leaks and other defects. Remove any water that may be present on the deck to reduce the possibility of slip hazards. Check weather conditions before you leave home and while on the water. Storms come up in a hurry. Learn to read cloud formations and other weather signs. Never leave the dock without all required safety equipment.

Make sure you do not overload or improperly load your boat. Counting the number of seats does not indicate capacity. Overloading is dangerous and reduces freeboard (the distance from the waterline to the edge of the boat). Improper loading makes a boat unstable or less maneuverable. Know the safe load capacity and recommended horsepower for your boat. The best place for the load is on the bottom and in the middle. Do not allow passengers to sit or stand on the bow, stern, or gunwales. In rough water, place the load, including passengers, low to keep the boat stable sideways; place the load away from the ends to give the bow and stern buoyancy.

Keep a small boat away from big boats, especially at night. Speedboats and paddle-wheelers are especially dangerous. Before large swells from a large boat reach your small boat, head into them. Slow down so they will slide under your boat from end to end.

TIPS IN CASE OF BOAT OR WEATHER TROUBLE.—What do you do in case of trouble? First of all, don't panic. The following are a few boating tips you should keep in mind:

- If you get trapped on the water by a sudden squall, point the bow into (toward) the wind. Reduce speed or shorten the sail at once.
- If you get caught in rough water, head the boat so that it receives the waves at a 45-degree angle either to the left or to right side of the bow. Do not get crosswise.
- Go slowly against a strong sea because speed can bury the bow, allowing more water to come aboard. Arrange your load to keep the bow up.

- Keep the boat well bailed; if necessary, throw out heavy items (not people) to lighten the craft.
- In swift current, do not grab for trees or bushes along the bank to slow up.
- If your boat capsizes or swamps, try to keep calm. Most small boats support several people even though filled with water. A swamped boat, right side up, will support about as many persons as it is designed to carry when afloat.
- If you can manage it, sit in the swamped boat. Do not try to swim for shore even if you think you can do it easily. Instead, paddle or row for shore or wait for help.
- In rough or cold water, maintain a firm hold on the boat with a belt or rope.

TIPS IN CASE SOMEONE FALLS OVERBOARD.— If someone falls overboard, grab the person quickly and hang on if possible. Get the person back into the boat as fast as you can. If the person tries to climb over the side in a panic, balance the boat until he or she gets in or quiets down. Throw a life preserver, cushion, or rope to a person who is some distance from the boat instead of going into the water after him or her.

Bring the person aboard over the stern if it is square; bring the person aboard near either the bow or stern if the stern is not square. Rescuers should keep low in the boat; that allows them to have one hand free, most of the time, to hang onto the boat.

Water Skiing

Water skiing is one of the most thrilling of water sports. Spectacular as it appears, it is among the easiest to learn. Many people, particularly children, master the basics within an hour. Even though it seems easy, you still must take precautions and know various factors before you ski.

To water-ski safely requires three people: the skier, the boat operator, and an observer who knows all the proper hand signals. It is not surprising that showing off is the chief cause of water-skiing mishaps.

Before you even think about strapping on a pair of water skis, learn correct and safe water-skiing techniques from a qualified instructor. The instructor will teach you how to hold the towline, how to "get up" on skis while keeping your balance, and how to control your skis.

<u>SIGNAL</u>	<u>MEANING</u>
A thumbs-up gesture	Boat faster
A thumbs-down gesture	Boat slower
Thumb and forefinger in shape of an <i>O</i>	Speed OK
Circle finger overhead and point in direction of turn desired	Turns
Raise hand with fingers spread	Stop
Slap thigh with hand	Return to dock or shore
Draw hand or finger across throat	Cut motor
Point in direction you wish to go, then point to yourself	Go that way
Clasp hands overhead while treading water (after fall)	I'm OK

Figure 11-3.—Water-skiing signals.

Before you water-ski, check your equipment, making sure the personal flotation device (PFD) you wear fits properly and is secure. Some states require a rearview mirror for the boat driver. Pay close attention to the tightness of the ski binders or runners.

Know the different water-skiing signals you must use to communicate with the boat operator and the observer (fig. 11-3). You only need to know two audible signals. When you are in the starting position and want the boat operator to take up the slack in your towline, shout "In gear." When the line becomes taut, your ski tips are up, and you are ready to begin skiing, shout "Hit it" for your boat operator to open the throttle.

Relax when you ski. Holding the towline too tight and becoming tense are bad habits. A relaxed skier learns fast and takes few spills while learning. Don't try stunts beyond your ability. Learn each stunt progressively. Leave the fancy skiing to the professionals.

NEVER wrap the towrope around any portion of your body or place your arms or legs through the bridle. Always ski in water that is deep enough. How do you know if the water is deep enough? Your skis should not touch bottom. Make sure the water is free of floating objects and other obstructions.

When you fall, and you *will fall*, fall backward and not forward whenever possible. At speeds above 25 mph, you should somersault or roll with the fall. Tuck your head beneath your arms and roll into a ball. Rolling not only controls the fall but blunts the impact. Don't tense up and stiffen. At lower speeds, lean to the side or back before you release the towline. When you release the towline, you will fall in the direction of the lean. You will hit with a thud, rather than a splash. Forget about your skis. You can retrieve them easily—they float, remember?

Hunting

The misuse of small arms has resulted in many accidents causing serious and fatal injuries to Navy personnel. Between 1987 and 1992, eight Navy men and women died in hunting and fishing mishaps. Ninety-one were injured in small arms accidents alone, most with guns they thought were unloaded. Firearms accidents kill as many females as males. The highest rate is in the 15- to 24-year age group.

Between one-fourth and one-third of all fatal, accidental shootings occur in connection with hunting trips. Annual studies of hunting accidents, both fatal and nonfatal, made by the National Rifle Association have shown firearm hunting accidents both by "intentional discharge" and "accidental discharge." The principal causes of accidents by intentional discharge have been as follows:

- Victim moved into line of fire without warning.
- Victim shot by excited hunter firing quickly at game.
- Victim unseen by shooter.
- Victim mistaken for game.

The principal causes of casualties occurring through the accidental discharge of the gun have included the following:

- Stumbling or falling while carrying gun
- Catching trigger of gun in brush
- Clubbing game or cover with gun
- Bumping or jolting the gun while removing it from vehicle or boat
- Unwittingly letting gun fall from an insecure rest
- Crossing a fence
- Horseplaying with a gun thought to be unloaded

- Loading and unloading gun

Before you go hunting, you should learn the safe use of firearms from a competent instructor. The instruction should take place on a well-protected range. Experienced adults should accompany young people learning to shoot and coach them in firearm safety. You should never try backyard target shooting. Practice basement or other indoor shooting only if you have constructed a satisfactory backstop. Avoid shooting at hard, horizontal surfaces because of the danger of a ricochet. If you find yourself shooting over water, exercise extreme caution to avoid ricochets.

As a hunter, you must concern yourself more about safety than about the possibility of your missing a chance at your game. Your attitude in these matters is the real difference between being a safe or unsafe hunter. Regardless of how much hunters know or how great their skill and experience, if they do not practice safety, they are unsafe hunters.

BICYCLING

Millions of people have found that biking is economical, healthy, and a great way for the entire family to take part in wholesome recreation. However, most of the time you will be sharing the road with vehicles of all shapes and sizes. Since a bicyclist is the most vulnerable participant in the highway system, observing safety rules is in your own best interest. That enables you to protect yourself against the carelessness of others.

The impact of a rider's head against a sidewalk from a 10-speed bike going 25 mph is as great as that of a rider thrown from a motorcycle at the same speed. From 1989 to 1992, more than 500 sailors were seriously injured or killed in bicycle accidents. More than 150 of those sailors suffered head injuries, 10 while wearing helmets. Helmets won't prevent head injuries in every bike accident, but they do make a difference in the severity of those injuries. You can protect yourself from serious injury by wearing an American National Standards Institute (ANSI) or a Snell Memorial Foundation approved bicycle safety helmet. In addition, you can protect yourself by complying with OPNAVINST 5100.25A, which covers the Navy Recreation, Athletics, and Home Safety Program. This instruction requires all recreational bicyclists operating on government property to wear light-colored clothing and to wear reflective clothing during reduced visibility conditions.

ICE AND SNOW SPORTS

Ice and snow sports can be fun but deadly. In addition to the stresses placed on the body, there is the added hazard of extreme cold. Winter sports include the following activities:

- Ice skating
- Sledding, tobogganing, and snow disk riding
- Snowmobiling
- Skiing

Of these winter sports, Navy personnel experience the most mishaps from snow skiing. Each year thousands of people suffer injuries in skiing accidents. From 1984 to 1992, more than 150 Navy people have been hurt in mishaps on ski slopes and trails. One of these mishaps resulted in a fatality when a skier lost control in icy conditions and crashed into a tree. Another person suffered a permanent disability when he fractured a vertebrae in his lower back. Fortunately, most injuries are less severe, with broken legs and knee injuries commonly reported. You can still get hurt while cross-country skiing even though it is slower than downhill skiing.

The most common cause of skiing accidents is inexperience. Beginners hurt themselves when they try to move from a beginner's slope to advanced or expert slopes too soon. Trying slopes that are too steep or icy can result in injuries to even the more experienced skiers. The buildup of too much speed can cause you to lose control.

SAFETY FOR ATHLETIC ACTIVITIES

People take part in many sports and other athletic activities both as members of on- and off-base teams. Intramural sports are part of the total recreation program. Athletics provide a basic physical conditioning process through which the Navy can help build and maintain an effective fighting force.

Some athletic events have inherent risks for participants. Padding and protective equipment can help reduce injuries and are mandatory for some sponsored team events. A good athlete is familiar with the injury potential of the sport being played and knows how to avoid injuries. When you are injured, you are of little use to a team. Part of the skill of any sport is the ability of an athlete to avoid injury.

One factor repeatedly cited as a major contributor to a mishap involving physical fitness is overexertion.

Once people realize they are out of shape, they want to do something about it. Unfortunately, they usually try to get back into shape too fast. Age has nothing to do with deaths relating to overexertion while exercising. Anyone is subject to overexertion, regardless of age or physical conditioning. With today's emphasis on health and wellness, many people take up strenuous fitness activities before they condition their bodies.

Good physical fitness can pay off, if you do it carefully and consistently. However, strenuous exercise once a week can do more damage than good. Before you start any physical fitness program, check with your doctor. The doctor will determine what precautions you should take and if you need a complete physical exam. Checking with your doctor is especially important if you are more than 35 years old.

Baseball and Softball

Since baseball and softball present similar hazards, you should take similar precautions to avoid injury. The most serious mishaps associated with baseball and softball are those resulting from sliding and collisions. Breakaway bases are much safer than stationary bases. Softball fields operated by MWR departments are being converted from stationary to breakaway bases. Until the MWR installs breakaway bases, your command should conduct a sliding clinic. Establish a no-sliding rule for command-sponsored picnic and pickup games to prevent personnel from breaking their ankles and legs.



Establish a no-sliding rule.

Teammates need to communicate with each other to avoid collisions. Before the game, appoint the center fielder to call off teammates for outfield fly balls. Appoint the shortstop to do the same thing for infield fly balls. Make sure they make calls in a clear, loud voice. These precautions will keep players from running into each other and possibly resulting in a tragedy such as the one involving a highly skilled Navy technician. While going for a fly ball, this technician collided with another player; he never recovered from the impact and eventually died.

Basketball

Many basketball injuries result from people warming up improperly, wearing the wrong type of shoes, and playing too aggressively. Taping your ankles or using ankle supports with high-top shoes reduces the severity of ankle injuries. Don't wear running shoes for playing basketball. Your high top shoes should have 1/2 inch at the toe for clearance on the sudden stops and pivots common to basketball. They should have nonslip soles and provide adequate ventilation. In early season workouts, paint the soles of your feet with benzoin to lessen your chances of getting blisters. Wear an inner sock of light cotton underneath a wool or heavier-weight athletic sock.

Wear pads to protect your knees and elbows from bruises and floor burns. Wear a knee brace if you need knee support.

Setting up basketball courts on flight and hanger decks provides recreation at sea, but these courts can cause serious injuries. Twisting and pivoting on a nonskid deck, as well as Falling, can result in a variety of injuries. Be careful when playing on this type of surface.

Boxing

All participants, including boxers, coaches, referees, and physicians in a Navy boxing competition must attend at least one precompetition meeting or clinic. The purpose is to review concepts contained in the *Safety Awareness Manual* and explain procedures for training and competition. Other required publications include: *Official Boxing Rules*, *Physician's Ringside Manual*, and the *Introduction to Olympic Boxing* pamphlet. You can order copies of these publications (at a nominal charge) from the following address:

USA Boxing, Inc.
1750 East Bolder Street
Colorado Springs, CO 80909-5776

Boxers must wear a mouthpiece, U.S.A. Amateur Boxing Federation approved protective headgear, gloves, and a groin protector during sparring and competition. All weight classes must wear 16-ounce gloves. The gloves will be either the thumbless type or thumb-attached type. Boxing gloves must be checked before use. They should be clean, be free of lumps, and have smooth surfaces. A boxer should be able to fasten them securely.

Mouthpieces must be custom-made and individually fitted. When sparring and during actual matches, boxers should wear protective headgear. Boxers should wrap their hands to protect them while sparring, while working out on the heavy bags, and for all matches.

Medical officers providing support must be familiar with and must meet the requirements of the *Physician's Ringside Manual*. The professional qualifications of these medical officers should include current competency in the emergency treatment of head trauma, management of traumatic injury, certification in basic and advanced cardiopulmonary resuscitation (CPR), and experience in transporting unstable patients.

For additional information on Navy boxing competition, refer to enclosure (7) of BUPERSINST 1710.11C.

Football

Football is one of the most hazardous of all team sports because of the continuous heavy body contact. Only trained, well-conditioned players should take part in competitive football games. Players need not get hurt if they apply various safeguards.

All players must wear full-weight football shoulder, hip, thigh, and knee pads as well as headgear when they expect body contact both in practice and in the actual game. This gear must be properly fitted.

We recommend that anyone engaging in active sports wear a mouthpiece. The mouthpiece is a relatively inexpensive piece of equipment that reduces oral damage considerably. It also provides the cushion necessary to help prevent concussion from the shock of blows sustained by the head and chin.

Helmets provide a method of holding the skull away from the shell on impact. A helmet should have at least a 1-inch clearance between the outer shell and the nylon or canvas webbing into which the head fits. The helmet should be lined with vinyl plastic, which is 15 times more shock absorbent than foam rubber. The player must be able to hear in a helmet. Discard old helmets.

Flag/Touch Football

Some people think touch and flag football are safe sports because pads and helmets are not normally required. However, what usually starts as a friendly game often turns into a rough game of tackle. The shoulder block is the only block permitted in touch and flag football. It is done between the waist and shoulder with both feet contacting the ground at the moment of contact.

To prevent collisions, teams should leave a fumbled football lying on the ground. Neither team should be allowed to advance the football; it should belong to the team that last had possession.

When playing football, wear a mouthpiece to protect your teeth and your tongue. Don't wear chains, rings, and metal wrist bands. If you wear glasses, secure them and make sure the lenses are shatter-proof.

Golf

When playing golf, you should wear socks and well-fitted shoes to prevent blisters caused by long periods of walking and turning. When other players are hitting, watch their shots to avoid being hit by a ball or club. You should not hit your ball until the players ahead of you are well out of range. To keep from damaging your skin from the sun's rays, you may want to wear a protective cap and sun screen.

Avoid the golf course during electrical storms and severe weather. Golf clubs make excellent electricity conductors. If you get caught on the course, keep away from isolated trees, wire fences, hilltops, small sheds, and shelters in exposed areas. Try to reach thick timber or a depression in the ground or get near a steep cliff.



If caught in an electrical storm, do not delay; seek shelter.

Squash/Handball/Racquetball

Most injuries from racquet sports occur when players do not use the proper eye protection. These injuries include hemorrhaging of the eye area, cuts, and corneal abrasions. A racquetball travels about 80 miles per hour when hit. Goggles without lenses offer little protection. A small ball, like the one you use in racquetball or squash, compresses when you hit it and can penetrate open frames. How can you protect your eyes? Learning how to duck faster isn't the answer. Wearing the proper eye protection while playing racquetball is not only safe, it is mandatory. Wear impact-resistant eyewear with either molded polycarbonate wraparound protectors or lenses mounted in sturdy frames. This requirement applies to all participants (military, family members, civilians, and guests) at all times. The people that issue Navy recreational equipment should provide eye protection with racquetball rackets. In addition, wear a mouthpiece to protect your teeth and tongue.

Skateboarding

Skateboarding is a sport rapidly growing in popularity. Unfortunately, as its popularity increases, so do mishaps and injuries. Mishaps frequently occur when skateboarders lack balance and body control or haven't had enough practice. Several conditions contribute to skateboard mishaps and injuries: lack of protective equipment, poor board maintenance, and uneven riding surfaces. Fractures are the most common type of injuries for skateboarders. Some deaths have been reported, mostly from people falling off boards or colliding with cars.

When skateboarding, wear protective equipment, such as slip-resistant shoes, helmets, and specially designed padding. This equipment may not fully protect skateboarders from fractures, but it can reduce the number and severity of cuts and scrapes. Wrist braces and special skateboarding gloves also help absorb the impact of a Fall. With protective equipment, you must look for comfort, design, and function. The equipment should not interfere with your movement, vision, or hearing.

Roller Skating and In-Line Skating

Roller skating is an old sport in which a renewed interest has developed. In-line skating is a relatively new and exciting sport. The same injuries and mishaps we talked about earlier on skateboarding apply here. The

same types of PPE that apply to skateboarding also apply to these two sports.

Soccer

Americans have discovered what Europeans have enjoyed for a long time—the fast-paced game they call soccer. However, as the popularity of soccer grows, so do the mishaps and injuries associated with it. Soccer is a rough-and-tumble game. In addition to scrapes, bruises, and cuts, soccer players suffer sprains, muscle cramps, and broken bones.

When playing soccer, wear a knee brace if you need knee support. Wear a mouthpiece to protect your teeth and your tongue. Don't wear chains, rings, and metal wrist bands. If you wear glasses, secure them and make sure the lenses are shatter-proof.

Tennis

Tennis is a comparatively safe sport, except for the possibility of sprains and overexertion. If you are a tennis player, avoid overexertion in the hot sun and drink plenty of fluids. Wear socks and well-fitted shoes to prevent blisters.

Track and Field

Track and field events are relatively safe athletic activities. Being in good physical condition is extremely important if you are a runner because of the sustained physical exertion on your body. The memory of a well-trained Olympic marathoner barely making it across the finish line is a grim reminder of the rigors of track. Track officials must give immediate help to a runner in danger of collapsing at the end of a race. That prevents the runner from falling and getting injured.

Walking

Walking is an increasingly popular way to exercise. As the core of an effective fitness program, walking may be just what the doctor ordered. Regular walking will normally help in lowering your blood pressure and cholesterol levels. Both may reduce the risk of heart attack. Walking may also reduce depression and anxiety.

Wrestling

The very nature of wrestling—constant body contact, sudden falls and movements, and the injury potential of the various wrestling holds—makes it a

hazardous sport. Qualified leaders must supervise all wrestling activities to prevent injury to participants.

SAFETY IN THE HOME

In 1992, home fatalities and serious injuries were significantly lower than in 1991. This improvement is partially because of increased command emphasis on preventing off-duty mishaps, greater safety awareness, and training.

You can prevent mishaps, such as children's poisoning, lawn mower mishaps, and home fires. Most of these mishaps occur because of human error, such as lack of knowledge, inattention or distraction, or intentional violation of safety practices. You and your family can prevent nearly ALL injuries and deaths that occur in the home. It is up to you to take home the safety measures you learn on the job and teach them to the rest of your family.

Slips and Falls

Most home mishaps involve falls. Falls are the third leading cause of death for off-duty Navy personnel. Most people fall on level surfaces, not from higher places. The following are the most common causes of slips and falls:

- Slipping on small scatter rugs
- Walking on highly polished or wet floors
- Tripping on upturned or torn carpets
- Walking on dark stairways
- Standing on chairs to extend one's reach

Falls may happen because of spilled water or grease on kitchen floors. Slippery conditions can exist because of water on bathroom floors. Toys left on the floor of the living room and other parts of the house are also trip hazards.

The bathroom is the most common area in the average home where falling mishaps take place. However, bathtub and shower falls have decreased over the last 25 years because of anti-slip bath mats, stick-on applique slip-proofing, and manufacturer-applied slip-proofing.

Ladders

Every home should have a ladder. If you don't have one, you should get one and learn to use it properly. Whether you use a ladder to paint a ceiling, to clean out

the gutters, or for any other purpose, take some extra precautions. Most ladders sold for household use are type III light-duty ladders, rated for a maximum load of 200 pounds (user plus materials). If the ladder must carry more weight than that, select a type II medium-duty ladder (up to 225 pounds) or a type I heavy-duty ladder (up to 250 pounds). Most manufacturers label ladders with their duty rating or type number. Remember, don't overload your ladder.

Hobby Shop Equipment

If you have or use a hobby or craft shop, you should not allow bench, table, or work areas to become cluttered. Periodically remove excess trim and scrap to proper containers to prevent excessive accumulation. Return tools to their proper place when you no longer need them. Clean machines and floor areas after use. You must always wear the correct PPE.

Wear snug clothing when operating machinery and equipment. Do not operate equipment while wearing a necktie or scarf or anything that could become entangled in the revolving machinery. Do NOT wear gloves when working with drills, rip saws, table saws, and so on. Make sure you know the location of the power switch. Remove all jewelry. Use a brush, not your hands, to remove chips or cuttings.

Check drill bits to make sure they are straight and sharp. Make sure you tighten all chucks and clamps securely. Stop all equipment when making adjustments. NEVER reach around revolving equipment. You must be careful of kickback or violent throwback of the material you are feeding. Inspect saw blades to make sure they are in good condition and are free of gum or adhered resins. Check all machine safety guards. They should be substantial, in place, and properly aligned. Never operate the equipment without the safety guards, spreader, and anti-kickback fingers in place and properly adjusted. Set a saw blade to the proper cutting height. Adjust the fence or gauge, and secure it firmly.

When using equipment having blades, shut off the power and let the blade stop rotating before cleaning away debris. Never reach over or under the blade while operating the saw. Hold the stock firmly against the table and fence, and feed with even pressure within the capacity of the saw to take the load. Do not stand directly in line with stock you are putting through.

Note any clicking sound of a band saw, which indicates a cracked blade. Do NOT operate the saw if you hear that sound. Inspect the saw for excessive "burning" and buildup of gum or resins on the blade of

wheel surfaces. Use the proper size blade for the work. Do not cut small radius work on a wide band. Conversely, be sure the blade is as wide as the work will permit.

Do not stop or slow a saw by braking with a piece of wood. Permit natural rundown of the saw. Inspect the condition of the material. Test for safe depth of cut on a piece of soft, straight stock before proceeding.

Electricity

Electricity has made life in the home much more comfortable and housework much easier. However, electricity is not a blessing without blemishes. Electricity at home can be either a servant or a killer. It all depends on how you handle it. To keep electricity in your home your servant, NOT your killer, obey the safety rules for each part of your home.

Install ground fault circuit interrupters (GFCIs) near bathroom and kitchen sinks as well as outdoors. GFCIs are shock-protection devices that detect electrical faults to prevent people from being seriously injured or killed. They detect electrical faults by monitoring circuit leakage to ground. When leakage exceeds 5 milliamps, the GFCI breaks the circuit, thereby preventing an electric shock. You can easily install them in the place of existing outlets, and they are relatively inexpensive.

Electrical appliances or other electrical items do not normally present a shock hazard to you unless they are defective. How do you reduce shock hazard? You should inspect the item before and after use, follow all safety standards, and use only materials approved by testing laboratories. Even when an electrical item in your home becomes defective, you can reduce the chance of its becoming a shock hazard to you. You do that by keeping your body from becoming part of the electrical circuit. A 110-volt house current kills more people annually than any other voltage. It takes less electricity to kill a person than it does to light a 10-watt light bulb. If you do not maintain the electrical equipment and systems in your home, they can be a threat to you and your family's safety.

Fires

In 1991, 3,500 Americans died and 21,275 were injured in home fires. That's roughly about 15 people a day. Most home fires result from unattended cooking, careless smoking habits, overloaded electrical circuits, and children playing with matches. You and your family should know in advance what to do in case of fire. Obviously, you should do everything possible to

prevent a fire in the first place. The three main precautions you should take to help prevent fires are as follows:

1. Install fire or smoke detectors.
2. Plan fire escapes.
3. Reduce fire hazards.

Most fatal home fires occur at night while people sleep. Smoke usually precedes measurable amounts of heat in most cases of fire. Fire produces toxic gases and smoke that actually numbs the senses. If you are asleep or become disoriented by toxic gases, you may not even realize there is a fire. You cannot rely on your own senses to detect a fire. So, it is extremely important for you to install fire or smoke-detectors to sound an alarm. In addition, you and your family should practice escape drills. Make sure everyone in the family knows the phone number of the fire department.

There are two types of detectors—smoke detectors and fire detectors. Smoke detectors sound an alarm at the first trace of smoke. Heat or fire detectors sound an alarm to warn of an abnormally high temperature in the immediate area of the detector. Detectors can either be battery operated or part of a home's central wiring system. Be sure to install a detector on a circuit that you cannot turn off at a wall switch.

The National Fire Prevention Association's (NFPA) Standard 74 for household fire-warning equipment recommends you install one smoke detector outside each sleeping area of your house. You should install additional detectors on each story of your house. Don't forget the basement and attic, too. Supplement these detectors with additional detectors around the home, such as in hallways, utility rooms, the dining room, and furnace room.

Smoke rises, filling the highest points in a house, before moving down to the floor. To detect the first traces of smoke, mount the detector high on a wall or on the ceiling. Mount ceiling-mounted fire or smoke detectors at least 4 inches away from any wall. If you mount a detector on a wall, allow 4 to 12 inches from the ceiling. In a room with a high-pitched ceiling, mount the detector on or near the highest point of the ceiling. DO NOT install fire or smoke detectors near windows, doors, or air registers where drafts could affect their sensitivity.

Children

More children die each year from preventable injuries than from childhood diseases. Accidents are

killing our children at an alarming rate. Mishaps are the leading cause of death for children aged 1 to 14 years.

The Department of Defense (DOD) takes part in a national campaign to safeguard our children. The National Safe Kids Campaign began in 1988 to eliminate mishaps to children through parental education and improvement of national safety codes and standards. To provide a balanced program covering all facets of children's safety, the campaign focuses each year on a different high-risk area.

BURNS AND SCALDS.— The number of children burned and scalded is alarmingly high. Many children under age 14 are treated in emergency rooms after being scalded by food; tap water; and hot liquids, such as grease. Most of these scalds occur in the kitchen. Keep all pots and pans out of children's reach. Keep hot substances away from the edges of tables and counters.

Hot tap water can easily scald children, especially in the bathtub. Always supervise your children in and around water. To prevent tap water scalds, stay with your children while they are taking a bath. You should check the temperature of bath water before bathing your child. (Hot water heaters should not be set higher than 120 degrees.)

Keep dangling enticements, such as a coffee pot cord or the drape of a table cloth, away from children.

POISONING AND CHOKING.— Every 30 seconds a child is poisoned in this country. A bottle of kitchen cleanser is harmless when adults use it to clean areas of the house. However, put that same bottle of kitchen cleanser into the hands of a curious child and you have a deadly situation. Children cannot protect themselves from accidental poisoning. You can, however, prevent accidental poisonings in your home. Some causes of children's accidental poisonings are medicines, household chemicals, cleaning products, make up, and plants; medicines cause most of the poisonings. Keep such common household items out of sight and reach of children.

OFF-DUTY MISHAP INVESTIGATION AND REPORTING

The commanding officer is responsible for seeking ways and means of controlling and preventing injuries. That includes both on- and off-duty activities. Whether personnel are injured on the job or at home, their injuries can have an impact on mission readiness. Mishap prevention also extends to off-duty activities.

Mishaps in the category of "home, sports, and recreation" rank second only to privately owned motor vehicle accidents as a major cause of accidental injury. Sports and recreational injuries cost the Navy millions of dollars each year and result in a loss of countless man-years of work. In addition, these injuries result in impaired combat effectiveness because of the loss of skilled personnel—some temporarily disabled and others permanently handicapped.

In sports mishaps involving the category of "supervisory deficiencies," the major factor is inadequate instruction. That shows the need for sound coaching and officiating of athletic contests. Is the intent of athletic contests to develop the body and a competitive spirit or just to win? You can effectively reduce injuries in sports and recreation by following these principles:

- Use proven administrative controls
- Effectively lead and supervise
- Provide and maintain adequate equipment and facilities
- Properly condition participants

You can prevent mishaps at home and in sports and recreation by identifying, isolating, eliminating, or controlling hazards. You should guard against those hazards you cannot eliminate. Finally, avoid creating new hazards.

Refer to OPNAVINST 5102.1D, *Mishap Investigation and Reporting*, for a list of the requirements for investigation and reporting of mishaps ashore. You must report any fatality or injury that occurs on government property, whether it involves civilian personnel, military personnel, or military dependents. Additionally, report fatalities or injuries that occur in conjunction with command-sponsored events off government property. In general, an injury is reportable if the injured person loses at least 1 working day because of that injury. All fatalities are reportable. These reports are sent to the Naval Safety Center within 30 days of the mishap.

SUMMARY

In this chapter, we addressed the Navy Recreation, Athletics, and Home Safety Program. We examined the various types of personal protective equipment (PPE) individuals must wear when taking part in various sporting, athletic, and home activities. We discussed the various training Navy personnel must receive. We addressed various recreational safety controls commands and supervisors must follow. We discussed safety precautions for various recreation and athletic activities, including water sports. We covered various home hazards and safety precautions. Finally, we examined the reporting and investigating requirements for recreation and sports mishaps.

APPENDIX I

REFERENCES USED TO DEVELOP THIS NONRESIDENT TRAINING COURSE

NOTE: Although the following references were current when this NRTC was published, their continued currency cannot be assured. When consulting these references, keep in mind that they may have been revised to reflect new technology or revised methods, practices, or procedures; therefore, you need to ensure that you are studying the latest references.

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ASSIGNMENT 1

Textbook Assignment: "Development of the Navy Safety Program," chapter 1, pages 1-1 through 1-14, and "Safety Program Promotion and Attitudes." chapter 2, pages 2-1 through 2-7.

- | | |
|--|---|
| <p>1-1. The Navy is obligated to provide you with a safe and healthy work environment according to which of the following regulatory measures?</p> <ol style="list-style-type: none"> 1. Occupational standards 2. Naval standards 3. Tradition 4. Law | <p>1-5. The guidance needed to carry out the basic safety and health program elements specified in 29 CFR is provided in which of the following instructions?</p> <ol style="list-style-type: none"> 1. DODINST 6055.1 2. OPNAVINST 5100.19E 3. OPNAVINST 5100.23G 4. SECNAVINST 5100.10H |
| <p>1-2. The occupational health element of the Navy Safety Program is conducted by which of the following individuals or activities?</p> <ol style="list-style-type: none"> 1. CNO 2. CNET 3. BUMED 4. COMNAVSAFECEN | <p>1-6. What person is designated as the safety and occupational health official for the Department of the Navy?</p> <ol style="list-style-type: none"> 1. Chief of Naval Education and Training 2. Chief of Naval Operations 3. Assistant Secretary of the Navy 4. Secretary of the Navy |
| <p>1-3. Enlisted personnel on shore duty were included in safety programs beginning in what year?</p> <ol style="list-style-type: none"> 1. 1929 2. 1939 3. 1949 4. 1959 | <p>1-7. SECNAVINST 5100.10H delegates the authority for the operational aspects of the SOH Program to which of the following individuals or activities?</p> <ol style="list-style-type: none"> 1. CNO 2. CNET 3. BUMED 4. COMNAVSAFECEN |
| <p>1-4. The Occupational Safety and Health Act (OSHA) became law in what year?</p> <ol style="list-style-type: none"> 1. 1940 2. 1950 3. 1960 4. 1970 | <p>1-8. What document serves as the basis for the SOH Program?</p> <ol style="list-style-type: none"> 1. OPNAVINST 3120.32C 2. OPNAVINST 5100.19E 3. OPNAVINST 5100.23G 4. SECNAVINST 5100.10H |

- 1-9. Which of the following OPNAV instruction is the Program Manual for Forces Afloat?
 1. 3750.6R
 2. 5100.19E
 3. 5100.23G
 4. 5102.1D
- 1-10. Freedom from danger, risk, or injury defines which of the following words?
 1. Peril
 2. Hazard
 3. Safety
 4. Severity
- 1-11. We measure a hazard according to which of the following elements involved in the occurrence of a mishap?
 1. Risk
 2. Peril
 3. Lost days
 4. Severity and probability
- 1-12. Most mishaps are preventable.
 1. True
 2. False
- 1-13. What is the most frequent cause of Navy mishaps?
 1. Equipment malfunction
 2. Human error
 3. Weather
 4. Fate
- 1-14. Where is the NAVSAFECEN located?
 1. Pensacola, Florida
 2. Pittsburgh, Pennsylvania
 3. Columbus, Ohio
 4. Norfolk, Virginia
- 1-15. The NAVSAFECEN conducts safety surveys of the naval operating forces and shore establishments upon the request of which of the following individuals?
 1. Type commander
 2. Unit safety officer
 3. Unit medical officer
 4. Chief of Naval Operations
- 1-16. The NAVSAFECEN performs which of the following functions?
 1. Promotes interest in mishap prevention through hazard awareness
 2. Conducts safety surveys
 3. Provides safety recommendation and database reports
 4. All of the above
- 1-17. Unless otherwise directed, NAVSAFECEN is NOT responsible for safety in which of the following areas?
 1. Afloat operations
 2. Ashore operations
 3. Nuclear propulsion
 4. Ordnance handling
- 1-18. The NAVSAFECEN receives and analyzes all mishap and injury reports submitted by which of the following commands?
 1. Aviation and ship commands only
 2. Submarine and shore commands only
 3. Aviation and shore commands only
 4. Aviation, ship, submarine, and shore commands
- 1-19. In addition to being entered into NAVSAFECEN's data bank, the results of a NAVSAFECEN safety survey are given to what person?
 1. Type commander of the unit involved
 2. Chief of Naval Education and Training
 3. Commanding officer of the unit involved
 4. Chief of Naval Operations

1-20. Approach, the Naval Aviation Safety Review, is published at least how often?

1. Daily
2. Weekly
3. Bi-Monthly
4. Quarterly

1-21. Articles, commentaries, and short features about mishap prevention, as well as articles about flight operations, are found in which of the following publications?

1. Flash
2. Sea/shore
3. Approach
4. Combat Systems and Weapons Department Management

1-22. What safety periodical contains articles on shipboard safety problems, trends, mishaps briefs, and statistics?

1. Ship Safety Bulletin
2. Sea/Shore
3. Approach
4. Safetyline

1-23. Safety line is published a maximum of how many times each year?

1. One
2. Two
3. Six
4. Eight

1-24. You can find a summary of research from selected reports of submarine hazards in which of the following publications?

1. Flash
2. Sea/shore
3. Approach
4. Safetyline

1-25. The proper chain of command and responsibilities for the SOH program are contained in which of the following instructions?

1. OPNAVINST 5354.1C
2. OPNAVINST 5100.8G
3. OPNAVINST 5100.23G
4. OPNAVINST 5430.1A

1-26. Safety matters within a unit are the ultimate responsibility of which of the following individuals?

1. Work center supervisor
2. Commanding officer
3. Executive officer
4. Safety officer

1-27. The commanding officer appoints which of the following individuals to help carry out day-to-day safety-related matters?

1. Safety officer
2. Medical officer
3. Engineer officer
4. Executive officer

1-28. Afloat, the safety organization extends from the commanding officer down to which of the following levels?

1. Top management only
2. The most junior sailor
3. Middle management only
4. First-line supervisors only

1-29. Safety petty officers assigned to assist the safety officer must be in which of the following paygrades?

1. E-5 and above
2. E-4 and below
3. E-3 only
4. E-7, E-8, and E-9 only

1-30. Who normally serves as the recorder for the Safety Council?

1. Commanding officer
2. Executive officer
3. Engineer officer
4. Safety officer

1-31. The division safety petty officer is appointed by what person?

1. Commanding officer
2. Executive officer
3. Department head
4. Division officer

1-32. To develop recommendations for policy in safety matters and to analyze the progress of the overall safety program, the ship's Safety Council convenes how often?

1. Quarterly
2. Monthly
3. Weekly
4. Daily

1-33. Ships with less than 300 crew members may incorporate the Enlisted Safety Committee into the Safety Council.

1. True
2. False

1-34. What is the primary goal of any safety program?

1. To place safety violators on report
2. To enhance operational readiness
3. To eliminate all accidents
4. To predict all accidents

1-35. Which of the following personnel would normally be assigned as the aeromedical safety officer?

1. Flight surgeon
2. Aviation officer
3. Air operations officer
4. Physical fitness coordinator

1-36. The Enlisted Aviation Safety Committee meets at least how often?

1. Once a month
2. Twice a month
3. Three times a year
4. Monthly

1-37. Safety training is accomplished by which of the following means?

1. On-the-job training and general military training
2. Indoctrination training and formal safety courses
3. Safety standdowns and safety surveys
4. All of the above

1-38. Indoctrination training on the command's overall SOH Program is required by which of the following instructions?

1. OPNAVINST 5100.23G
2. OPNAVINST 5100.19E
3. Both 1 and 2 above
4. OPNAVINST 1500.71

1-39. What is the best time of the day to conduct training?

1. Early in the day
2. After sundown
3. Just before liberty call
4. After lunch

1-40. A person who is cold, hot, hungry, or tired has what type of need?

1. Psychological
2. Physiological
3. Social
4. Ego

1-41. All people want to have a feeling of belonging. This is an example of what type of need?

1. Psychological
2. Physiological
3. Social
4. Ego

1-42. Which of the following needs is associated with a person's need to feel useful and respected?

1. Social
2. Ego
3. Physiological
4. Psychological

1-43. An effective instructor will observe which of the following guidelines?

1. Always accept a person's answer
2. Talk to the entire group, not just to the front row
3. Watch your mannerisms
4. All of the above

1-44. A command uses which of the following approaches to "market" its safety program?

1. Safety legislation
2. Mandatory training
3. Promotional efforts
4. Behavior modification

1-45. We can always rely on common sense to prevent mishaps.

1. True
2. False

1-46. You can develop a safety attitude in your workers through which of the following practices?

1. Enforcing all safety regulations
2. Training your people in safe workmanship
3. Convincing them of the command's sincere interest in safety
4. All of the above

1-47. Good risk taking can be considered a precaution against mishaps. A good risk taker exhibits the ability to make which of the following responses to a risk?

1. Overcome it
2. Totally avoid it
3. Explain it to a superior and help decide what action to take
4. Recognize the levels involved and decide whether taking it is worthwhile

1-48. To encourage workers to report hazards, you should take which of the following steps?

1. Make workers feel comfortable and assure them of their anonymity in reporting hazards
2. Discipline workers for failing to report hazards
3. Award workers for reporting hazards
4. Coerce or threaten workers

1-49. Some people have a desire for recognition and status. Which of the following incentives serve as an appropriate motivator for such people?

1. Material gain
2. Self-preservation
3. Personal comfort
4. Praise and acceptance

1-50. After a worker safely completes a job that is hazardous, which, if any, of the following awards would be appropriate?

1. A sincere "attaboy"
2. A letter of appreciation at the next award ceremony
3. A week's leave
4. None of the above

1-51. Job motivation is achieved by which of the following means?

1. Recognition
2. Increased responsibility
3. Opportunity for achievement
4. All of the above

1-52. Which of the following methods will reduce the need for disciplinary corrective actions?

1. Threats and reprimands
2. Close supervision
3. Meaningful mishap prevention orientation
4. Assignment of extra duty

1-53. To be a good salesman, you must have the ability to

1. sell
2. manage
3. advertise
4. identify with the customers

1-54. What are the three steps involved in selling your safety program?

1. Preparation, presentation, and commitment
2. Preparation, advertising, and selling
3. Preparation, presentation, and selling
4. Advertising, presentation, and commitment

- A. Safety posters and stickers
- B. Promotional stunts
- C. Safety suggestions
- D. Safety contests

Figure 1-A.-Safety Promotion Methods.

COMMANDS DEVELOP ADVERTISING CAMPAIGNS TO PROMOTE SAFETY. SELECT THE PROMOTION METHOD IN FIGURE 1-A DESCRIBED BY THE STATEMENTS GIVEN FOR QUESTIONS 1-60 THROUGH 1-64. RESPONSES MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL.

1-55. A passive training method used to remind workers of hazards.

1. A
2. B
3. C
4. D

1-56. Prizes awarded for the best command safety slogan, safety essay, or safety posters.

1. A
2. B
3. C
4. D

1-57. Display of a wrecked vehicle near a naval base gate during the holiday season.

1. A
2. B
3. C
4. D

1-58. A safety recommendation that could result in monetary rewards.

1. A
2. B
3. C
4. D

1-59. Use of both pictures and words to convey a safety message.

1. A
2. B
3. C
4. D

1-60. Who should take the lead in organizing SOH setting SOH policy, and assigning SOH accountability?

1. All hands
2. Top management
3. Middle management
4. First-line supervisors

ASSIGNMENT 2

Textbook Assignment: "Mishap Causes, Prevention, and Hazard Abatement, "chapter 3, pages 3-1 through 3-17, and "Mishap Investigation Fundamentals, "chapter 4, pages 4-1 through 4-10.

- | | |
|--|--|
| <p>2-1. What is the primary purpose of a mishap investigation?</p> <ol style="list-style-type: none"> 1. To determine culpability 2. To determine replacement cost 3. To determine the effects on operational readiness 4. To determine the causes and prevent recurrences | <p>2-5. According to studies, what minimum percentage of mishaps are caused by the person involved in the mishap?</p> <ol style="list-style-type: none"> 1. 80% 2. 20% 3. 50% 4. 40% |
| <p>2-2. An unplanned event that interrupts work and causes damage or injury describes which of the following terms?</p> <ol style="list-style-type: none"> 1. Mishap 2. Mistake 3. Misconduct 4. Mismanagement | <p>2-6. What technology deals with workplace designs that minimize body stress and maximize production?</p> <ol style="list-style-type: none"> 1. Economics 2. Ergonomics 3. Aerodynamics 4. Biosystematics |
| <p>2-3. As a supervisor, you need to understand why mishaps occur for which of the following reasons?</p> <ol style="list-style-type: none"> 1. To conduct financial planning 2. To anticipate a mishap occurrence 3. To understand your job description 4. To better equip you to prevent mishap occurrence | <p>2-7. If a mishap occurs because of a person's faulty depth perception, you should report which of the following cause factors for the incident?</p> <ol style="list-style-type: none"> 1. Alcohol 2. Environment 3. Physical impairment 4. Temporary physical illness |
| <p>2-4. Anything contributing to a mishap can be referred to as a/an</p> <ol style="list-style-type: none"> 1. safety program deficiency 2. operating error 3. mishap cause 4. mishap | <p>2-8. The most common form of polydrug abuse is a mixture of which of the following drugs?</p> <ol style="list-style-type: none"> 1. Amphetamines and barbiturates 2. Amphetamines and aspirin 3. Cocaine and marijuana 4. Alcohol and any drug |
| | <p>2-9. Experience has shown that when people tackle new tasks, mishaps occur for which of the reasons?</p> <ol style="list-style-type: none"> 1. Lack of patience 2. Lack of initiative 3. Lack of training 4. following Lack of self-confidence |

2-10. Supervisors sometimes contribute to mishaps because they have a lack in which of the following areas?

1. Knowledge of the capabilities of their personnel
2. Materials
3. Funds
4. Time

2-11. To counterbalance the lack of understanding on a new job, an inexperienced person should be provided with

1. training
2. close supervision
3. knowledge
4. basic skills

- A. Administrative and supervisory factors
B. Environmental factors
C. Maintenance and support factors
D. Material failure factors

Figure 2-A.-Mishap Cause Factors.

TO ANSWER QUESTIONS 2-12 THROUGH 2-16, SELECT THE CAUSE FACTOR IN FIGURE 2-A RESPONSIBLE FOR THE MISHAP DESCRIBED AS THE QUESTION. RESPONSES MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL.

2-12. A mishap caused by premature equipment failure resulting from improper installation.

1. A
2. B
3. C
4. D

2-13. A mishap resulting from failure to require personnel to meet personnel qualification standards.

1. A
2. B
3. C
4. D

2-14. A mishap caused by metal fatigue failure.

1. A
2. B
3. C
4. D

2-15. Mishap resulting from lack of quality assurance (QA).

1. A
2. B
3. C
4. D

2-16. A mishap resulting from the accidental use of incorrect procedures.

1. A
2. B
3. C
4. D

2-17. The process used to eliminate mishap-producing causes before a mishap occurs is called mishap

1. determination
2. correction
3. prevention
4. detection

2-18. Which of the following methods is preferred for controlling the impact of hazards?

1. Identifying existing hazards
2. Eliminating existing hazards
3. Preventing the hazard at the design stage
4. Reducing the impact of hazards that cannot be eliminated

2-19. What program is used to maintain equipment and material and prevent them from becoming operational hazards?

1. QA
2. PMS
3. MDS
4. PARs

- A. Substitution
- B. Engineering controls
- C. Administrative controls
- D. Use of personal protective equipment

Figure 2-B.—Hazard Control Methods.

WHEN PREVENTING HAZARDS IS IMPOSSIBLE, HAZARD CONTROL METHODS ARE USED TO CONTROL HAZARD POSSIBILITIES. TO ANSWER QUESTIONS 2-20 TO 2-24, SELECT THE METHOD IN FIGURE 2-B THAT MATCHES THE DESCRIPTION USED AS THE QUESTION. RESPONSES MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL.

- 2-20. A barrier used to physically separate people from contact with hazards.
- 1. A
 - 2. B
 - 3. C
 - 4. D
- 2-21. Replacing an existing piece of equipment with a similar item having a lower hazard potential.
- 1. A
 - 2. B
 - 3. C
 - 4. D
- 2-22. Using special operating procedures to reduce exposure of personnel to hazards.
- 1. A
 - 2. B
 - 3. C
 - 4. D
- 2-23. Using chemical gloves, safety goggles, and so forth, when working with acids.
- 1. A
 - 2. B
 - 3. C
 - 4. D
- 2-24. Using local exhaust ventilation to prevent airborne contaminants from passing through the worker's breathing zone.
- 1. A
 - 2. B
 - 3. C
 - 4. D
- 2-25. An alleged imminent danger situation hazard report is received. An investigation should be conducted within what minimum amount of time?
- 1. 24 hours
 - 2. 36 hours
 - 3. 48 hours
 - 4. 72 hours
- 2-26. When not satisfied with the response to a hazard report, military personnel can appeal through the chain of command to which of the following persons?
- 1. Chief of Naval Operations
 - 2. Secretary of Labor
 - 3. Deputy Assistant Secretary of Defense
 - 4. Secretary of Health
- 2-27. A safetygram is used to report a hazard within a particular ship.
- 1. True
 - 2. False
- 2-28. What code expresses the risk that combines the elements of hazard severity and mishap probability?
- 1. Risk category code
 - 2. Risk assessment code
 - 3. Mishap category code
 - 4. Mishap classification

2-29. A hazard that could cause death is assigned what hazard severity category?

1. I
2. II
3. III
4. IV

2-30. What RAC is assigned to a hazard that is immediately likely to cause a mishap and could result in death?

1. 1
2. 2
3. 3
4. 4

2-31. Which of the following documents contains the Hazard Abatement Plan for forces afloat?

1. PMS
2. PQS
3. SORM
4. CSMP

2-32. Afloat, the interim control for a RAC 1 or 2 hazard must be approved by what person?

1. Commanding officer
2. Executive officer
3. Safety officer
4. Supply officer

2-33. Which of the following elements improve(s) hazard awareness in personnel?

1. Experience
2. Education
3. Training
4. All of the above

2-34. Which of the following persons is/are responsible for mishap investigation?

1. Commanding officer only
2. Division officer only
3. Leading petty officer only
4. All levels of supervision

2-35. A mishap occurred in your shop. As the supervisor, you should be the person who conducts the mishap investigation for which of the following reasons?

1. Seniority
2. Prior experience
3. Investigative technique
4. Knowledge of the experience and characteristics of your personnel

2-36. When conducting a mishap investigation, you should NOT ask the witnesses what type of questions?

1. Who
2. How
3. What
4. Where

2-37. Mishaps and injuries are two separate occurrences.

1. True
2. False

2-38. Privileged information is usually gathered by using which of the following methods?

1. Interrogation
2. Forced confession
3. Promise of confidentiality
4. Promise of reward

2-39. Witnesses will provide statements to mishap investigation boards under oath.

1. True
2. False

2-40. Which of the following items is considered privileged information?

1. Copies of instructions
2. Witness statements
3. Physical evidence
4. Logs and records

2-41. Which of the following factors is the key to a good investigation?

1. Witnesses' attitude
2. Witnesses' enthusiasm
3. Investigator's instinct
4. Investigator's training

2-42. What is the first priority when mishaps occur?

1. Save lives
2. Control damage
3. Preserve the evidence
4. Protect the mishap site

2-43. A diagram of a mishap scene has what primary advantage over a photograph?

1. Shows less clutter
2. Shows no action
3. Shows no direction of movement
4. Shows less lighting information

2-44. A witness is defined as an insight provider to a mishap. Which of the following elements can be classified as a witness?

1. Parts
2. People
3. Position
4. Each of the above

2-45. When it comes to "how" the mishap occurred, which of the following witnesses or situations provide the most valuable information?

1. Parts
2. Paper
3. People
4. Position

2-46. During a safety investigation afloat, how can you minimize the withholding of information?

1. Witness should testify under oath
2. Witnesses should be rewarded
3. Promise of confidentiality
4. Promise of testimonial immunity

2-47. To assure witnesses that the information they provide will not be used against them, a formal mishap investigation board uses what form?

1. Advice to Witnesses form
2. Special Request form
3. DD-1149 form
4. DD-1348 form

2-48. When in the process of interviewing several witnesses, you should take which of the following steps to prevent them from forming a homogenized testimony?

1. Assign witnesses separate tasks at different locations
2. Meet witnesses individually
3. Meet with witnesses as a group
4. Have witnesses wait in the mess deck for the interview

2-49. To effectively interview witnesses, you should apply which of the following techniques?

1. Ask questions that can only be answered by a yes or no
2. Ask questions that will require explanations
3. Always start your interview with a different question
4. Use two or more investigators to interview a witness

2-50. You do NOT use Advice to Witness forms when performing which, if any, of the following types of investigations?

1. Local mishap investigations
2. Formal mishap investigations
3. Static mishap investigations
4. None of the above

2-51. What is considered the most difficult part of a mishap investigation?

1. Taking pictures
2. Interviewing witnesses
3. Determining the sequence of events
4. Determining who caused the mishap

2-52. You may obtain information on previous mishaps that may provide clues to the mishap you are currently investigating from which of the following commands?

1. Naval Safety Center
2. Systems commands
3. Type commanders
4. All of the above

2-53. YOU found criminal evidence during an informal investigation. Which of the following actions should you take?

1. Call NIS
2. Consult with legal services
3. Stop your investigation and inform your chain of command
4. All of the above

- A. Fault Tree Analysis
- B. Change Analysis
- C. Management Oversight and Risk Tree
- D. Technique of Operations Review

Figure 2-C.—Analytical Techniques.

SELECT THE ANALYTICAL TECHNIQUE IN FIGURE 2-C THAT MATCHES THE DESCRIPTION USED IN QUESTIONS 2-61 THROUGH 2-65. RESPONSES MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL.

2-54. A departure from the norm. which could become an element in the chain of events leading to a mishap.

1. A
2. B
3. C
4. D

2-55. A method of determining if a particular system, component, or equipment requires planned maintenance.

1. A
2. B
3. C
4. D

2-56. An analysis directed more at management than at hardware.

1. A
2. B
3. C
4. D

2-57. An analysis that takes into account more supervisory and human factors.

1. A
2. B
3. C
4. D

2-58. A method of working backward from the final failure to the original component to show the cause-and effect relationship of the system.

1. A
2. B
3. C
4. D

ASSIGNMENT 3

Textbook Assignment: "Navy's Safety and Occupational Health Program Fundamentals," chapter 5, "pages 5-1 through 5-27, and "Shore Safety," chapter 6, pages 6-1 through 6-11.

- 3-1. A separate SOH manual for forces afloat was issued for what reason?
1. Because of their high tempo of operations
 2. Because of unique military equipment
 3. To comply with OSHA standards
 4. To comply with CNO'S directive
- 3-2. The Safety and Occupational Health (SOH) Program applies to which of the following groups of people?
1. Military personnel
 2. Civilian personnel
 3. Nonappropriated fund personnel
 4. All of the above
- 3-3. Which of the following is a measure of a successful SOH Program?
1. All surveys being conducted
 2. SOH training being conducted
 3. All mishaps being reported
 4. Work related injuries and illnesses being reduced
- 3-4. The SOH Program Manual does NOT address some of the safety and health standards for personnel assigned ashore. In those cases, what safety standards should shore personnel adhere to?
1. NAVELEX
 2. NSTM
 3. OSHA
 4. CNO
- 3-5. Able B. Seaman is assigned to ground electronics at a naval air station. He will find the electrical safety standards that apply to his job in which of the following publications?
1. SOH Program Manual
 2. General Industry Standards
 3. SOH Program Manual for Forces Afloat
 4. Standard Organization and Regulations of the U.S. Navy
- 3-6. Industrial hygiene deals with controlling the work environment to protect the workers'
1. wages
 2. health
 3. benefits
 4. working hours
- 3-7. The legally established exposure level of a harmful physical agent is identified by which of the following terms?
1. Ceiling limit
 2. Threshold limit value
 3. Short-term exposure level
 4. Permissible exposure limit
- 3-8. During an industrial hygiene survey, which of the following areas should be investigated?
1. Decks only
 2. Galleys only
 3. Engineering spaces only
 4. Every workplace at the facility

3-9. Heat stress becomes excessive when the body

1. is unable to adjust to changes in temperature
2. starts sweating
3. temperature reaches 99 degrees Fahrenheit
4. is exposed to rising temperature

3-10. Aboard ship, what was the leading cause of heat stress injuries reported in 1991?

1. Participating in physical fitness training
2. Working in engineering spaces
3. Wearing the fire-fighting ensemble
4. Working in food preparation areas

3-11. A victim having hot, flushed, dry skin and a fast, strong pulse is suffering from what type of heat stress?

1. Heat cramps
2. Heat stroke
3. Heat fatigue
4. Heat exhaustion

3-12. A victim who has pale and clammy skin; has a fast, weak pulse; and is experiencing profuse sweating is suffering from what type of heat stress?

1. Heat exhaustion
2. Heat fatigue
3. Heat stroke
4. Heat cramps

3-13. What type of heat stress is a life threatening medical emergency?

1. Heat exhaustion
2. Heat fatigue
3. Heat stroke
4. Heat cramps

3-14. When heat cannot be reduced in the work area, which of the following precautions could prevent a heat stress injury?

1. Control the conditions that cause heat stress
2. Detect the conditions that cause heat stress
3. Restrict personnel exposure to the heat
4. Use dry bulb thermometers

3-15. When the noise level cannot be maintained below 84 dB by using engineering controls, which of the following types of protection is necessary?

1. Isolate the noisiest equipment
2. Use earplugs or earmuffs
3. Reduce the number of operating personnel
4. Secure the area to personnel

3-16. What regulation ensures the safe and effective use of hazardous materials?

1. Material Safety Data Sheet instructions
2. Hazard Communication Standard
3. Hazardous Materials User's Guide
4. DOD Hazardous Materials Information System

3-17. The Navy's hazardous material control and management program is managed by which of the following commands?

1. Occupational Safety and Health Agency
2. Environmental Protection Agency
3. Naval Supply Systems Command
4. Naval Safety Center

3-18. Material can be designated as hazardous waste by which of the following commands?

1. EPA or State Agency
2. NSC
3. OSHA
4. NSSC

- 3-19. The Material Safety Data Sheet (MSDS) provides which of the following hazardous material information?
1. Price
 2. Manufacture date
 3. Transportation date
 4. Health Hazards
- 3-20. What data base provides useful information on more than 70,000 hazardous materials used by the defense department?
1. Material Safety Data Sheets
 2. Hazardous Materials Information System
 3. Ship Hazardous Materials List & Authorized Use List
 4. Hazardous Material User's Guide
- 3-21. Which of the following information appears on hazardous material labels as mandated by OSHA?
1. Name and address of the manufacturer
 2. Emergency and first-aid procedures
 3. Transportation data
 4. Disposal data
- 3-22. A hazardous material that you ordered arrived with only the minimum required OSHA label. What additional label, if any, should you attach to the material?
1. Hazardous chemical warning label
 2. Visual hazard warning label
 3. MSDS label
 4. None
- 3-23. Who is responsible for determining an eye-hazard area?
1. Division officer
 2. Industrial hygienist
 3. Activity safety officer
 4. Activity commanding officer
- 3-24. Aboard ship, who should have a complete list of all eye-hazard areas?
1. Safety officer
 2. Medical officer
 3. Safety petty officer
 4. Chief master-at-arms
- 3-25. Which of the following processes is used to identify asbestos products?
1. An oil laboratory test
 2. Microscopic analysis
 3. An acidity test
 4. Casual observance
- 3-26. If you ingest lead, what part of your body can be damaged?
1. Lungs
 2. Kidneys
 3. Stomach
 4. Esophagus
- 3-27. Which of the following shipboard materials contain(s) lead?
1. Batteries
 2. Pipe joints
 3. Weights and cable sockets
 4. All of the above
- 3-28. What type of radiation strips atoms of its electrons?
1. Laser radiation
 2. Radar radiation
 3. Ionizing radiation
 4. Nonionizing radiation

3-29. As outlined in OPNAVINST 5100.19E and 5100.23G, which of the following personnel are excluded from the Radiation Protection Program?

1. Nuclear weapons technicians
2. Medical x-ray technicians
3. Dental x-ray technicians
4. Radar technicians

3-30. Afloat, the commanding officer starts a respiratory protection program by appointing, in writing, which of the following personnel?

1. Certified respiratory protection program manager
2. Respiratory protection officer
3. Medical officer
4. Safety officer

3-31. When, if ever, would a surgical mask be considered as adequate respiratory protection?

1. During chipping
2. During painting
3. During grinding
4. Never

3-32. A respirator cartridge used while painting is identified by which of the following labels?

1. Dust
2. Mist
3. Fumes
4. Vapor

3-33. What type of respirator do you use in an environment that is deficient in oxygen and is laden with mercury?

1. Self-contained breathing apparatus
2. Emergency escape breathing device
3. Air-purifying respirator

4. Cartridge respirator

- A. Dust
- B. Fumes
- C. Gas
- D. Mist and fog

Figure 3-A.-Types of Air Contaminants.

IDENTIFYING THE TYPES OF AIR CONTAMINANTS IS CRITICAL IN SELECTING THE PROPER RESPIRATOR. TO ANSWER QUESTIONS 3-41 THROUGH 3-45, SELECT THE TYPE OF AIR CONTAMINANT IN FIGURE 3-A THAT MATCHES THE DESCRIPTION USED AS THE QUESTION. RESPONSES MAY BE USED ONCE. MORE THAN ONCE, OR NOT AT ALL.

3-34. Particles formed by the condensation of volatile solids that are produced by the welding, brazing, or cutting of metals.

1. A
2. B
3. C
4. D

3-35. A material that under normal temperature and pressure tends to occupy an entire space.

1. A
2. B
3. C
4. D

3-36. Particles created by breaking up larger particles during the crushing, grinding, sanding, or chipping of materials.

1. A
2. B
3. C
4. D

3-37. Finely divided liquid droplets suspended in air that are produced during spray painting.

1. A
2. B
3. C
4. D

3-38. A material that is usually invisible and odorless.

1. A
2. B
3. C
4. D

3-39. Personal protective clothing and equipment (PPE) can reduce or eliminate the hazard itself.

1. True
2. False

3-40. You are assigned to do hot work over the side. Which of the following PPE are you required to wear?

1. Safety shoes, heat-insulated gloves, safety harness, and approved hard hat
2. Safety shoes, leather gloves, and safety harness
3. Safety shoes, heat-insulated gloves, and a safety harness with wire rope
4. Safety shoes, heat-insulated gloves, and a safety harness with nylon lanyards

3-41. Afloat, in which of the following spaces can you obtain an extension cord?

1. Electronics Technician's shop
2. Electrical tool issue room
3. Boatswain's locker
4. Supply

3-42. The electrical tools custodian can only issue tools to which of the following personnel?

1. Members of electrical and electronics ratings
2. Engineering personnel
3. Personnel who have received electrical safety training within the year
4. All of the above

3-43. When, if ever, should personnel receive indoctrination and training on basic electrical safety?

1. Upon reporting aboard
2. Annually
3. Both 1 and 2 above
4. Never

3-44. During all corrective maintenance, you are required to abide by which of the following safety procedures?

1. Planned Maintenance System (PMS) procedures
2. Maintenance Data System (MDS) procedures
3. Standard operating procedures
4. Tag-out/Lock-out procedures

3-45. Which of the following precautions should you observe when working in a confined space?

1. Always report to the gas free engineer before working in a confined space
2. When aboard ship, use gas free certificates for only 8 hours
3. Wear a hard hat aboard ship during a confined space test
4. Test a confined space for the presence of toxic gases only

3-46. As a supervisor, you should ensure your workers follow which of the following safety precautions?

1. Comply with safety procedures
2. Wear appropriate PPE
3. Take no short cuts and safely perform all jobs
4. All of the above

3-47. What instruction provides the administrative requirements for shore SOH programs?

1. OPNAVINST 5100.19E
2. OPNAVINST 5100.21B
3. OPNAVINST 5100.23G
4. OPNAVINST 5102.1D

3-48. Both military and civilian personnel are subject to disciplinary action when they violate SOH regulations.

1. True
2. False

3-49. Ashore, who plans, directs, and administers the SOH programs?

1. Commanding officer
2. Safety officer
3. Naval safety center
4. SOH office

3-50. For an activity to have a full-time SOH manager, it should have at least a total of how many personnel?

1. 100
2. 200
3. 300
4. 400

3-51. Which of the following activities provides analytical services and occupational medicine examinations?

1. Industrial hygiene laboratories
2. Medical training centers
3. Naval hospitals
4. SOH offices

3-52. Which of the following approaches is likely to change behavior and lead to mishap prevention?

1. Legislated safety
2. Safety endorsement
3. SOH training
4. Peer pressure

3-53. How much total HAZCOM training is required by collateral duty SOH personnel?

1. 30-minute initial training only
2. 3-hour initial training and OJT
3. Initial training and refresher training as required
4. 24-hour initial training and 3-hour annual training

3-54. At which of the following naval air stations can you obtain quotas for shore-oriented safety courses?

1. Norfolk, Va.
2. Meridian, Miss.
3. Pensacola, Fla.
4. North Island, Calif.

3-55. Which of the following statements describes the objective of the SOH program?

1. To establish mishap prevention standards
2. To provide a safe and healthy work environment
3. To evaluate the effectiveness of the safety program
4. To provide supervision in matters pertaining to safety

3-56. What type of survey is required if hazards are found in a work place?

1. Base-line
2. Walk-through
3. Periodic
4. Initial

3-57. When the industrial hygiene survey shows potential exposure of personnel to toxic chemicals, what plan is prepared?

1. Workplace monitoring plan
2. Industrial hygiene plan
3. Exposure sampling plan
4. Pre-mishap plan

3-58. Data pertinent to personnel exposures (except asbestos) are retained for a minimum of how many years?

1. 10 years
2. 20 years
3. 30 years
4. 40 years

3-59. Navy workplaces with recognized potential health hazards should be evaluated at what minimum frequency?

1. Weekly
2. Annually
3. Bimonthly
4. Semiannually

3-60. Ashore, SOH oversight inspections are conducted by which of the following commands?

1. OSHA
2. NAVINSGEN
3. PREINSURV
4. NAVSAFECEN

3-61. You have civilian employees working in your facility. Which of the following personnel may conduct SOH inspections of your work site?

1. Federal OSHA officials only
2. State OSHA officials only
3. Both 1 and 2 above
4. Safety Center officials only

3-62. OSHA officials can conduct worksite inspections on work centers staffed with military personnel only,

1. True
2. False

3-63. To report property damage, the SOH office uses which of the following logs/reports?

1. Annual Summary of Navy Civilian Occupational Injuries
2. Log of Navy Injuries and Occupational Illnesses
3. Explosive Mishap Report
4. OPNAV Safety Report

3-64. Before a mishap is reported to the Naval Safety Center, any injury involved must result in how many lost workdays?

1. 5
2. 2
3. 3
4. 4

3-65. Which of the following mishaps is reportable?

1. A mishap resulting in \$5000 property damage
2. Electric shock because of a personnel error
3. Traffic mishap not involving a government vehicle, but resulting in \$1000 DOD property damage
4. Damage to small craft assigned

3-66. An investigation of a shore mishap that resulted in a fatality is initiated by which of the following persons?

1. Local SOH officer
2. Echelon 2 commander
3. Echelon 3 commander
4. Naval Inspector General

ASSIGNMENT 4

Textbook Assignment: "Afloat Safety," chapter 7, pages 7-1 through 7-10; "Naval Aviation Safety," chapter 8, pages 8-1 through 8-11; and "Explosives Safety," chapter 9, pages 9-1 through 9-5.

- 4-1. The primary goal of the afloat safety program is to
1. instruct personnel in hazard prevention
 2. evaluate effectiveness of the safety program
 3. maintain safety records and mishaps statistics
 4. attain the highest degree of operational readiness
- 4-2. What is the first critical step in achieving the goals of the afloat safety program?
1. Hazard identification
 2. Hazard elimination
 3. Hazard prevention
 4. Hazard correction
- 4-3. Shipboard safety standards can be found in what volume of the SOH Program Manual for Forces Afloat?
1. I
 2. II
 3. III
 4. IV
- 4-4. Directing the afloat safety program is the responsibility of which of the following personnel?
1. Executive officer
 2. Safety officer
 3. Commanding officer
 4. Members of the chain of command
- 4-5. Who executes and manages the afloat safety programs?
1. Chief of Naval Operations
 2. Commanding officer
 3. Executive officer
 4. Safety officer
- A. Chief of Naval Education and Training
B. Commander, Naval Safety Center
C. Systems commanders
D. Type commanders
- Figure 4-A.-Afloat safety program personnel.
- IN ANSWERING QUESTIONS 4-6 THROUGH 4-10, SELECT FROM FIGURE 4-A THE PERSON WHO PERFORMS THE FUNCTION LISTED AS THE QUESTION. RESPONSES MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL.
- 4-6. Conducts the final review and analysis of safety investigation reports (SIRs).
1. A
 2. B
 3. C
 4. D
- 4-7. Responsible for ensuring that subordinate commands provide effective safety training.
1. A
 2. B
 3. C
 4. D

4-8. Provides technical focus for comprehensive development and administration of the afloat safety program.

1. A
2. B
3. C
4. D

4-9. Sanitizes SIREPs and endorsements for use in safety training.

1. A
2. B
3. C
4. D

4-10. The safety officer directly reports hazardous conditions or operations to which of the following personnel?

1. Commanding officer
2. Executive officer
3. Engineer officer
4. Division officer

4-11. All hands have which of the following safety responsibilities?

1. Know and obey all safety precautions
2. Report unsafe procedures
3. Provide mishap information to safety investigators
4. Each of the above

4-12. What is the key to a successful safety program?

1. An experienced safety officer
2. Hazard identification
3. Quality training
4. Mishap reporting

4-13. Safety courses are offered to shipboard personnel by which of the following activities?

1. Mobile training units
2. Fleet training centers
3. Naval training centers
4. Recruit training centers

4-14. What is the principal way commands discover hazards?

1. By chance
2. By the occurrence of mishaps
3. Through workplace inspections
4. Through individual personnel reports

4-15. At least how often should shipboard work spaces be inspected for safety hazards?

1. Weekly
2. Monthly
3. Annually
4. Semiannually

4-16. Results of surveys conducted by the Safety Center are sent to which of the following personnel?

1. Unit commanding officer
2. Chief of Naval Operations
3. Type commander
4. Unit safety officer

4-17. In 1989, the CNO called for a Navywide safety standdown for which of the following reasons?

1. Aviation mishaps
2. Off-duty mishaps
3. An annual requirement
4. A rash of shipboard mishaps

4-18. Detailed procedures and report formats for afloat mishap investigation and reporting is contained in what instruction?

1. OPNAVINST 5100.19E
2. OPNAVINST 5100.10H
3. OPNAVINST 5102.1D
4. OPNAVINST 5100.23G

4-19. A mishap that results in property damage of \$500,000 is assigned what mishap classification?

1. Class A
2. Class B
3. Class C
4. Special case

4-20. Shipboard mishaps involving civilians or foreigners are reportable under OPNAVINST 5102.1D.

1. True
2. False

4-21. What term is used to identify the potential cause of damage and injury?

1. Lack of training
2. Human error
3. Hazard
4. Stress

4-22. Who directs and supervises the Naval Aviation Safety Program?

1. Commander, Naval Safety Center
2. Commander, Naval Air
3. Aviation safety officer
4. Director, Air Warfare

4-23. Who advises and aids the CNO in the administration and monitoring of the Naval Aviation Safety Program?

1. Commander, Naval Safety Center
2. Commander, Naval Air
3. Aviation safety officer
4. Director, Air Warfare

4-24. Which of the following officers can be assigned as the aviation safety officer (ASO)?

1. A designated naval flight officer
2. A flight surgeon
3. An air department officer
4. An AIMD officer

4-25. The ASO billet is only a collateral duty.

1. True
2. False

4-26. When do you submit a Hazard Report (HR)?

1. When directed by higher authority
2. When directed by the ASO
3. Whenever a hazard is detected
4. Whenever a mishap has occurred

4-27. A special HR format is required to report which of the following hazards?

1. Bird strike
2. Mid-air collision
3. Aircraft fire
4. Aircraft mishap resulting in fatal injury

4-28. In the interest of safety, all HRs with a severe risk assessment code should be submitted within how many hours after the hazard is detected?

1. 60
2. 24
3. 36
4. 48

4-29. The only restriction on the use of HRs is that they are used For Official Use Only (FOUO).

1. True
2. False

- A. Fatal injury
- B. Permanent total disability
- C Permanent partial disability
- D. Lost workday

Figure 4-B.-Injury classifications.

IN ANSWERING QUESTIONS 4-39 THROUGH 4-43, SELECT THE INJURY CLASSIFICATION IN FIGURE 4-B THAT MATCHES THE DESCRIPTION USED. THE QUESTION. RESPONSES MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL.

4-30. An injury that results in the loss of both arms.

1. A
2. B
3. C
4. D

4-31. An injury that results in death due to a complication arising from the mishap.

1. A
2. B
3. C
4. D

4-32. An injury that results in second degree burns over 5 percent of the body.

1. A
2. B
3. C
4. D

4-33. An injury that results in an unrepairable inguinal hernia.

1. A
2. B
3. C
4. D

4-34. An injury that results in the loss of the great toe.

1. A
2. B
3. C
4. D

4-35. Mishap reports provide which of the following information concerning aircraft mishaps?

1. Hazard elimination information
2. Mishap prevention information
3. Information about the person causing the mishap
4. Information about the progress of investigation

4-36. NAVSAFECEN requires that a Class A aviation mishap be reported initially by which of the following means?

1. Message
2. Telephone or Message
3. Mail
4. Courier

4-37. Aircraft mishap investigations are conducted for which of the following reasons?

1. To determine culpability
2. To determine total damage
3. For safety purposes only
4. For accounting purposes only

4-38. On what form do you report the hazards responsible for a mishap?

1. Special HR
2. SIREP
3. MR
4. HR

4-39. What is the purpose of the Mishap and Hazard Recommendation Tracking (MISTRAC) Program?

1. To monitor corrective actions
2. To ensure all hazards are reported
3. To eliminate hazards
4. To identify corrective actions

4-40. Under the MISTRAC program, who monitors corrective action recommendations?

1. ASO
2. CNO
3. COMNAVAIR
4. COMNAVSAFECEN

4-41. Who is responsible for providing safety education in a command?

1. CO
2. XO
3. EMO
4. ASO

4-42. What are the three functions of a command aviation safety program?

1. Hazard reporting, hazard detection, and hazard elimination
2. Hazard detection, hazard elimination, and safety training
3. Hazard reporting, hazard elimination, and safety training
4. Hazard monitoring, hazard reporting, and hazard detection

4-43. What publication identifies the requirements and conditions in reporting aviation mishaps?

1. OPNAVINST 3750.6R
2. OPNAVINST 5100.19E
3. OPNAVINST 5100.23G
4. NAVAIR A1-NAVOSH-SAF-000/P5100-1

4-44. Which of the following elements of an aviation safety program is/are vital to a successful safety effort?

1. Command climate
2. Command safety goals
3. Command safety organization
4. All of the above

4-45. Flight deck operations are more dangerous than ground aircraft operations for which of the following reasons?

1. Hazards posed by propellers and rotors
2. Exhaust area hazards
3. Limited space
4. Engine noises

4-46. What are the two most serious hazards of jet engine exhaust?

1. High temperature and noise
2. High temperature and high velocity
3. Noise and high velocity
4. Noise and exhaust gasses

4-47. Preventing the premature, unintentional, or unauthorized discharge of explosives is the main reason for having an explosives safety program.

1. True
2. False

4-48. Who reviews the explosive safety of weapons or explosives systems?

1. DDESB
2. WSESRB
3. DCNO
4. COMNAVSAFECEN

4-49. DOD explosives safety standards are established by which of the following organizations?

1. DDESB
2. WSESRB
3. NAVSAFECEN
4. NAVSEASYS COM

4-50. The explosives safety standards provide which of the following types of guidance to DOD components?

1. Disposal of explosives
2. Storage of explosives
3. Transportation of explosives
4. Avoidance of hazardous conditions connected with explosives

4-51. A waiver for an explosive safety requirement can be obtained from which of the following personnel?

1. Commanding officer
2. Secretary of Defense
3. Deputy Chief of Naval Operations
4. Commander, Naval Supply Systems Command

4-52. What is the most common cause of mishaps involving explosive devices?

1. Weather conditions
2. Manufacturing defects
3. Faulty design
4. Personnel error

4-53. Any requests, suggestions, or comments about explosives safety standards should be forwarded in writing to which of the following personnel?

1. Commander, Naval Supply Systems Command
2. Deputy Chief of Naval Operations
3. Secretary of Defense
4. Commanding officer

4-54. What flag is hoisted during ordnance handling operations?

1. ALPHA
2. BRAVO
3. KILO
4. PAPA

4-55. Who is authorized to safely remove and dispose of defective or suspected ammunitions from a work area?

1. CO
2. DCA
3. EOD
4. DCNO

4-56. As an explosive safety supervisor, you are authorized to alter some safety regulations to complete tasking on time.

1. True
2. False

4-57. What is the major safety factor in preventing an ordnance catastrophe?

1. Explosive safety instructions
2. An experienced fire-fighting team
3. A well-experienced and knowledgeable person in charge
4. The availability of more personnel than what is required for any ordnance operation

4-58. At a minimum, when should you inspect ordnance elevators and hoists?

1. Monthly and after use
2. Meekly and before use
3. Weekly and after use
4. Semiannually

4-59. What publication should you use as a reference when performing maintenance and testing of elevators?

1. OPNAVINST 5100.21B
2. OPNAVINST 8600.2A
3. NSTM, chapter 400
4. NSTM, chapter 700

ASSIGNMENT 5

Textbook Assignment: "Explosives Safety," chapter 9, pages 9-6 through 9-12; "Traffic Safety," chapter 10, pages 10-1 through 10-7; and "Recreation, Athletics, and Home safety," chapter 11, pages 11-1 through 11-15.

- 5-1. The wearing of certain articles of adornment are prohibited during ordnance operations. Exemptions to that regulation may be made by which of the following offices or centers?

1. Local safety office
2. Naval Safety Center
3. Naval supply center
4. Chaplain's office

- 5-2. Who can give written authorization allowing spark-producing devices in explosives areas?

1. Supply officer
2. Safety officer
3. Commanding officer
4. Aviation ordnance officer

- 5-3. When a fire threatens a warehouse full of explosives, which of the following precautions should you take?

1. Evacuate personnel in the area
2. Call for additional fire fighters
3. Remove the explosives from the warehouse
4. Call an explosive ordnance disposal team

- 5-4. Which of the following ordnance evolutions requires a fire watch?

1. Inspection
2. Disposal
3. Transfer
4. Load up

- 5-5. Which of the following precautions is essential to any fire prevention effort?

1. Good housekeeping
2. A no smoking ordinance
3. A properly posted fire bill
4. Well-trained fire-fighting team

- A. Team member (TM)
- B. Individual/Team leader (I/TL)
- C. Quality assurance (QA)
- D Instructor (IN)
- E. Safety observer

Figure 5-A.-Qualification Levels.

TO ANSWER QUESTIONS 5-6 THROUGH 5-9, SELECT THE QUALIFICATION LEVEL IN FIGURE 5-A THAT MATCHES THE DESCRIPTION USED AS THE QUESTION. RESPONSES MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL.

- 5-6. Requires sufficient knowledge to direct the performance of others in safe and reliable operations.

1. A
2. B
3. C
4. E

- 5-7. Requires a detailed knowledge of applicable inspection criteria for the explosive/device system.

1. A
2. C
3. D
4. E

5-8. This level of qualification does not build on any other level of qualification.

1. B
2. C
3. D
4. E

5-9. Possesses the required skills to instruct others and provide formal training using an approved course.

1. A
2. C
3. D
4. E

5-10. Certification, unless revoked, is valid for a maximum of how many months?

1. 6 months
2. 12 months
3. 24 months
4. 36 months

5-11. The revocation of individual or team certification is mandatory when which of the following actions results in a mishap?

1. Flagrant disregard of safety precautions
2. Shows incompetence and/or unreliability
3. Operating explosive handling equipment recklessly
4. Each of the above

5-12. The procedures required for reporting explosives mishaps are more extensive than those required for other types of mishaps because of

1. the existence of a significant potential for damage or injury
2. the complications caused by an explosives mishap
3. the submission requirements of various agencies
4. the great difficulty in investigating an explosives mishap

5-13. Which of the following incidents is a reportable explosives mishap?

1. Misuse of equipment resulting in damaged ordnance
2. A chemical release of an agent into the atmosphere that creates a serious potential for exposure
3. A failure to launch weapons
4. The unintentional arming of an explosive component

5-14. Which of the following incidents is a reportable conventional ordnance deficiency?

1. Accidental discharge of small arms
2. The unintentional launching of a weapon
3. The unintentional arming of a weapon
4. Leaking or spilled propellant fuels and oxidizers

5-15. A common carrier transporting explosive materials has a mishap outside the naval base. Your report of this mishap should be based on which of the following instructions?

1. OPNAVINST 5100.12G
2. OPNAVINST 5100.19E
3. OPNAVINST 5102.1D
4. NAVSEA OP 2165

5-16. What type of mishap accounts for the majority of accidental deaths of Navy personnel?

1. Diving
2. Afloat
3. Aviation
4. Motor vehicle

- 5-17. The highway safety program standards are contained in what instruction?
1. OPNAVINST 5100.12H
 2. OPNAVINST 5100.19E
 3. OPNAVINST 5100.21B
 4. OPNAVINST 5100.23G
- 5-18. The Navy Traffic Safety Program is not applicable to a person who drives an off-road motorcycle while off-duty.
1. True
 2. False
- 5-19. Non-compliance with the Navy Traffic Safety Program can result in which of the following immediate actions by the Navy?
1. Revocation of driving license
 2. Discharge from military service
 3. Reduced wages and compensation
 4. Nonpayment of medical bills for sustained injuries
- 5-20. You should wear a safety belt when riding in a motor vehicle in which of the following locations?
1. Off military bases only
 2. On military bases only
 3. Off military bases within the United States only
 4. Off base, whether in the United States or overseas, and on all military bases
- 5-21. To qualify to drive Navy police vehicles, ambulances, and crash and rescue vehicles, you must take what safety course?
1. ATV Safety Institute Rider Course
 2. AAA Driver Improvement Course
 3. National Highway Traffic Safety
 4. Administration's EVOC Motor Vehicle Emergency Safety Course
- 5-22. What is the leading cause of motor vehicle-related deaths and injuries?
1. Fatigue
 2. Alcohol
 3. Inexperience
 4. Faulty equipment
- 5-23. Which of the following precautions should you take when jogging on roads and streets?
1. Jog facing traffic
 2. Jog with the traffic
 3. Wear dark-colored clothing
 4. Always use portable headphones
- 5-24. All naval personnel operating mopeds, on or off base, are required to complete which of the following safety programs?
1. A motor vehicle safety course
 2. AAA driver improvement course
 3. National highway traffic safety course
 4. A motorcycle safety program course
- 5-25. What instruction deals with recreation, athletics, and home safety?
1. OPNAVINST 5100.19E
 2. OPNAVINST 5100.23G
 3. OPNAVINST 5100.25A
 4. NAVSAFECEN 5102/30
- 5-26. The Navy Recreation, Athletics, and Home Safety Program applies to which of the following groups of people?
1. Military dependents on base only
 2. Military personnel off duty only
 3. Military personnel on duty only
 4. All of the above

5-27. At least how often should military personnel receive training on recreation, athletics, and home safety?

1. Annually
2. Semiannually
3. Daily
4. Quarterly

5-28. Whether a customer is qualified to operate hobby shop tools and equipment is determined by which of the following persons?

1. The public relations officer
2. The MWR staff member
3. The medical officer
4. The safety officer

5-29. You want to paint your truck in the auto hobby shop. The MWR employee should provide you with a written advisory about which of the following information?

1. The hazards associated with spray painting
2. The chemical composition of the paint
3. Medical emergency procedures
4. The area clean-up procedure

5-30. Which of the following documents proves you are qualified to operate a watercraft?

1. A basic boat operation card
2. U.S. Coast Guard small boat safety course completion certificate
3. A boat license
4. A valid driver's license

5-31. Command training records should be maintained for a minimum of how many years?

1. Five
2. Two
3. Three
4. Four

5-32. What instruction governs the inspection of base swimming pools?

1. NMPCINST 1710.6A
2. OPNAVINST 5100.19E
3. OPNAVINST 5100.23G
4. SECNAVINST 5100.10H

5-33. Who is responsible for educating personnel on off-duty hazards and the importance of PPE in sports?

1. Division officer
2. Safety officer
3. RAHS Program manager
4. MWR officer

5-34. Many athletic injuries can be prevented by which of the following protective measures?

1. Conditioning and training
2. Choosing the best athletes only
3. Controlling the amount of alcohol use
4. Limiting the number of participants

5-35. In competitive team play. Who should be aware of the physical differences of the players?

1. The medical representative
2. The coach
3. The players
4. The recreation officer

5-36. Which of the following responsibilities do you have as a participant in an athletic event?

1. To win at all costs
2. To exceed your capabilities
3. To protect yourself from injury
4. To push yourself to the limit

5-37. Which of the following recreational activities is considered the most deadly?

1. Racquet sports
2. Ice sports
3. Water sports
4. Football

5-38. Which of the following recreational mishaps is the leading killer of Navy people?

1. Drowning
2. Accidental discharge of a firearm during hunting
3. Head injuries from boxing
4. Head injuries from bicycling

5-39. What is your best defense against drowning?

1. Learn how to swim
2. Beware of cold water
3. Use the buddy system
4. Avoid swimming in lakes or rivers

5-40. YOU develop a cramp in your leg while swimming. Which of the following actions should you take?

1. Tread water and yell for help
2. Take a deep breath and float face up
3. Keep affected leg straight and swim to safety
4. Draw your knees toward your chest and massage your cramped leg while moving it

5-41. Unlike drinking and driving, drinking and swimming is safe.

1. True
2. False

5-42. What percentage of all boating mishaps with serious injury involves alcohol?

1. 10 percent
2. 20 percent
3. 50 percent
4. 75 percent

5-43. You rented a boat from MWR. Who, if anyone, on board the boat should wear a U.S. Coast Guard approved PFD?

1. The operator
2. All passengers
3. Both 1 and 2 above
4. No one

5-44. Improper loading makes a boat unstable. The best place to distribute the load is in which of the following sections of the boat?

1. Aft
2. Middle
3. Forward
4. Half way between middle and aft.

5-45. Should your boat capsize, what would be the safest action for you to take?

1. Cling to the boat until help arrives
2. Swim to shore
3. Swim away from the boat and float until help arrives
4. Find the anchor and hold on to it

5-46. If someone falls overboard and drifts some distance from the boat, which of the following safety steps should you take?

1. Go into the water after the person
2. Throw a life preserver or rope toward the person
3. Call for help while circling the boat around the person
4. Maneuver the boat toward the person and let him or her hang onto the boat

5-47. Safe water skiing requires a minimum of how many people?

1. Five
2. Two
3. Three
4. Four

5-48. When water skiing, you should know what number of audible signals?

1. One
2. Two
3. Three
4. Four

5-49. Hand signals are used in water skiing as a means of communication between the skier and driver. What is the meaning of a “hand raised with fingers spread”?

1. “Stop”
2. “I am OK”
3. “Cut the motor”
4. “Slow the boat”

5-50. You are skiing at more than 25 mph when you realize that you are going to fall. What should you do after releasing the towline?

1. Stiffen your body before impact
2. Extend your legs and arms forward and fall backward
3. Grab your skis and hold until impact
4. Tuck your head beneath your arms and roll into a ball

5-51. Which of the following places is a safe location for firearms shooting practice?

1. In your back yard
2. In your basement
3. Over water
4. At the target range

5-52. To protect yourself from severe head injuries while bicycling, you should wear which of the following accessories?

1. A heavy head sweatband
2. An ANSI approved helmet
3. A plastic hard hat
4. A metal hard hat

5-53. Navy personnel experience the most mishaps from which of the following winter sports?

1. Snow skiing
2. Sledding
3. Snowmobiling
4. Ice skating

5-54. What factor is repeatedly cited as a major contributor to mishaps involving physical fitness?

1. Age
2. Sex
3. Overexertion
4. Physical conditioning

5-55. During softball or baseball games, which, if any, of the following precautions will keep team members from colliding with each other?

1. Use of approved PPE
2. Use of breakaway bases
3. Use of designated players to call off teammates for fly balls
4. None of the above

5-56. All participants of a boxing competition must attend a pre-competition meeting or clinic for which of the following purposes?

1. To size up the competition
2. To weigh all participants
3. To obtain a physical examination
4. To review concepts presented in the Safety Awareness Manual

5-57. While playing golf, you are caught in a thunderstorm. Which of the following precautions should you take?

1. Go to the top of a hill
2. Keep close to wire fences
3. Try to reach thick timber
4. Seek shelter under an isolated tree

5-58. The requirement to wear proper eye protection during a racquetball game applies only to military personnel.

1. True
2. False

5-59. Home fatalities and serious injuries were lower in 1992 than 1991. To which of the following factors can you attribute this significant reduction?

1. Training
2. Greater safety awareness
3. Command emphasis on preventing off-duty mishaps
4. All of the above

5-60. What type of mishap causes most injuries in the home?

1. Falls
2. Burns
3. Shock
4. Poisoning

5-61. In the average home, most falling mishaps occur in what area?

1. Garage
2. Bedroom
3. Kitchen
4. Bathroom

5-62. The majority of ladders for household use have which of the following ratings?

1. Type I, heavy duty
2. Type II, light duty
3. Type III, light duty
4. Type IV, medium duty

5-63. What measurement of voltage kills more people annually than any other voltage?

1. 6
2. 110
3. 220
4. 440

5-64. Which of the following factors cause most home fires?

1. Defective house wiring
2. Defective electrical equipment
3. Home cooking
4. Children playing with matches

5-65. Your most reliable source of fire detection is your senses.

1. True
2. False

5-66. National Fire-Prevention Association Standard 74 recommends the installation of one smoke detector in which of the following areas of a home?

1. Above the door of each room
2. Outside each sleeping area
3. Above the entry to the basement
4. Outside the kitchen area

5-67. When a smoke detector is installed near windows and doors, its sensitivity could be affected by which of the following elements of the environment?

1. Draft
2. Light
3. Moisture
4. Humidity

5-68. To prevent hot tap water from scalding children, you should set the hot water heater at what maximum temperature setting?

1. 120 degrees
2. 130 degrees
3. 140 degrees
4. 150 degrees

5-69. What is the most common cause of accidental poisoning of children in the home?

1. Paint
2. Alcohol
3. Medicines
4. Kitchen Cleaner

5-70. In general, an injury is reportable if the injured person loses a maximum of how many working days?

1. One
2. Five
3. Three
4. Four