

## CHAPTER 21

### LEAD

#### 2101. Applicability

a. The provisions of this chapter apply to industrial and construction work and supplement references 21-1 and 21-2.

(1) Construction work covered by reference 21-2, includes any repair or renovation or other activities that disturb in place lead-containing materials (LCM) (e.g., steel structure renovation and repair), but does not include routine cleaning and repainting (e.g., minor surface preparation and repainting of rental apartments between tenants or at scheduled intervals) where there is insignificant damage, wear, or corrosion of existing lead-containing paint, coatings, or substrates.

(2) Employees performing maintenance activities not associated with construction work are covered by the general industry standard for lead, reference 21-1. Maintenance activities covered by the general industry standard are those that involve making or keeping a structure, fixture, or foundation in proper condition in a routine, scheduled or anticipated fashion.

#### 2102. Discussion

a. The goal of this chapter is to prevent lead intoxication and related injuries during the use, handling, removal and melting of materials containing lead at Navy activities.

b. Lead, as used in this chapter, means metallic lead, all inorganic lead compounds and organic lead soaps. All other organic lead compounds are excluded. Lead's abundance, low melting point, high molecular weight, high density and malleability make it a useful structural material. When added to resins, grease, or rubber, lead compounds act as antioxidants. Common uses for lead and lead compounds include:

- (1) Ballast
- (2) Radiation shielding
- (3) Paint filler and hardener
- (4) Rubber antioxidant
- (5) An acoustical insulation component
- (6) Solder for electrical components and pipe joints
- (7) High voltage cable shielding
- (8) Small arms ammunition
- (9) Batteries

(10) Roof flashing

(11) Weights

While not an absolute indicator, red, forest green, chrome yellow, "school bus yellow", and "safety yellow" paints typically contain lead components, such as lead oxides and lead chromate. Lead is also found in polyurethane and water base paints.

c. Significant lead exposures can occur during:

(1) Lead and babbitt melting and casting.

(2) Ballast handling.

(3) Spraying, sanding, grinding, burning, welding and abrasive blasting of lead containing materials and paint.

(4) Soldering with torches.

(5) High voltage cable repair.

(6) Abrasive blasting with smelting slag.

(7) Lead-acid battery reclaiming.

(8) Machining lead.

(9) Improper handling of contaminated personnel clothing, etc.

(10) Bullet trap clean-out/general cleaning at firing ranges.

d. Lead has long been a recognized health hazard. Lead can damage the nervous system, kidneys and reproductive systems. Chronic lead exposure can initially damage the blood forming organs. Higher levels can result in reproductive dysfunction in both men and women, and it can cause peripheral nerve and central nervous system changes. Lead inhibits heme synthesis (red blood cell production) and at high levels leads to anemia. Overexposure to lead in men may result in decrease in sex drive, impotence and sterility. Lead can alter the structure of sperm cells raising the risk of birth defects. There is evidence of miscarriage and still birth in women whose husbands were exposed to lead or who were exposed to lead themselves. Lead can pass through the placenta and lead levels in the mother's blood are comparable to concentrations of lead in the umbilical cord at birth. The fetus and newborn may be at least as susceptible to neurological damage as young children.

e. In recognition of the serious health hazards associated with, and the numerous sources of, potential lead exposure, the Navy has established strict controls to limit both occupational and environmental exposures. Navy regions and activities shall apply standards and controls discussed in this chapter to all personnel ashore. Reference 21-3 discusses the lead control program for forces afloat. Work which falls under the OSHA construction standards, i.e., construction, demolition, renovation, or repair of structures, follow the requirements in reference 21-2.

### **2103. Permissible Exposure Limit (PEL) and Action Level Triggering Requirements**

a. PEL. The PEL for an 8-hour time-weighted average (TWA) exposure to airborne lead is 50 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air. For employee exposure of more than 8 hours in a workday, the PEL shall be determined by the following formula.

$$PEL\left(\frac{\mu\text{g}}{\text{m}^3}\right) = \frac{400}{\text{No. Hours Worked Per Day}}$$

Regions/activities shall implement engineering and administrative controls to the extent feasible to reduce the exposure to below the PEL when an employee's exposure exceeds the PEL for more than 30 days per year. Wherever the engineering and work practice controls that regions/activities institute are not sufficient to reduce employee exposure to or below the permissible exposure limit, the employer shall nonetheless use engineering controls to reduce exposure to the lowest feasible level and shall supplement them by use of respiratory protection. Where an employee is exposed to lead above the PEL for 30 days or less per year, regions/activities shall use engineering controls to reduce exposures to at least to 200  $\mu\text{g}/\text{m}^3$ . Thereafter, use any combination of engineering, work practice, and respiratory protection controls to reduce employee exposure to or below 50  $\mu\text{g}/\text{m}^3$ .

b. Action Level (AL). The AL for an 8-hour TWA exposure to airborne lead is 30  $\mu\text{g}/\text{m}^3$  (without regard to respirator use). Exposure to airborne lead at or above the AL, for more than 30 days per year, shall trigger biological monitoring and medical surveillance.

### **2104. Control of Lead in the Workplace Environment**

Chapter 5 discusses the basic principles for controlling hazards in the occupational environment including substitution with less hazardous materials, engineering controls (closed systems, thermostats), administrative controls (job rotation, work time limits), and use of personal protective equipment (PPE), in that order.

a. General Workplace Control Practices.

(1) The Navy shall not use paints containing more than 0.06 percent lead by dry weight unless the cognizant headquarters command specifically approves higher lead content paint.

(2) Before proceeding with work involving paint, the region/activity must determine if the paint contains sufficient lead to warrant applying lead controls for the work to be performed. This may be accomplished via testing of the paint using a valid laboratory method, or through established and accurate records which provide the needed information (e.g., paint application records coupled with lead content data from material safety data sheets, product labels, prior testing results, or other valid documentation). The cognizant safety professional or industrial hygienist (IH) shall determine the lead monitoring and controls required for the work. This determination shall be based on the lead content of the involved paints, the work methods to be employed, and observation, calculations, or previous measurements relevant to the employee exposure potential of the work in question.

(3) When feasible, regions/activities shall minimize the heating of lead and leaded materials through the use of thermostatically controlled heating or the removal of lead containing surface coatings or contaminants prior to heating.

(4) Regions/activities shall establish procedures to maintain work surfaces as free of lead dust as is practical and shall clean up lead dust with high efficiency particulate air (HEPA) filtered vacuum cleaners. They may only use wet sweeping and brushing when vacuuming or other equally effective methods have been tried and found to be ineffective or infeasible. Regions/activities shall not use compressed air to clean work surfaces or work floors.

(5) Regions/activities that have lead containing waste, scrap, debris, containers, equipment, and clothing consigned for disposal shall collect it, seal it in impermeable containers, and label waste per paragraph 2105.

(6) To minimize exposure potential, regions/activities shall isolate hot work on lead and abrasive lead removal operations to the extent feasible, from other operations.

b. Ventilation. Local exhaust ventilation is frequently required to ensure that atmospheric levels of lead particulate do not exceed the PEL. The list below contains general requirements for the design and use of ventilation to reduce exposures. The cognizant industrial hygienist shall provide specific guidance for each lead operation.

(1) The cognizant industrial hygienist shall provide recommendations regarding specific equipment design parameters and system servicing procedures for each operation.

(2) Regions/activities shall design, construct and maintain local exhaust ventilation and dust collection systems per references 21-4 through 21-7.

(3) Regions/activities shall test ventilation systems used to control lead exposures or emissions using qualified engineering or industrial hygiene personnel at least every 3 months and within 5 days of any production, process, or control change which may result in a change in employee exposure. Where devices such as manometers, pitot tubes, etc. are installed to continuously monitor the effectiveness of ventilation systems, regions/activities shall instruct employees who use the system on the meaning and importance of the measurements and to immediately contact their OSH office if the measuring devices indicate a malfunction. Where such devices are in place, industrial hygiene or engineering personnel only need to inspect the ventilation systems annually.

(4) Regions/activities using ventilation systems to control occupational exposures or emissions shall not directly exhaust into any workspace or to the atmosphere. They shall not recirculate air from operations generating lead. The region/activity environmental manager shall approve the air pollution control system after consulting with the cognizant air pollution regulatory agency.

(5) The industrial hygienist shall review the ventilation design for ease of maintenance and accessibility, as well as design errors, and shall pay special attention to hoods, duct work, clean out hatches, exhaust fans and air pollution control devices. Regions/activities shall install the exhaust fan, after the air pollution control system, in a protected and restricted room or shed. If a HEPA filter is required and the filter and pre-filter housing is located outdoors, they shall use a bag-in, bag-out style access housing.

**NOTE:**

Ventilation design review may not be required for indoor firing range repair or modification under the technical support of the Naval Facilities Engineering

Command's (NAVFAC) Technical Center of Expertise program if using a performance-based contracted approach and the design has been certified by NAVFAC's Technical Center of Expertise.

c. Personal Protective Clothing and Related Control Facilities

(1) Personnel engaged in operations where the concentration of airborne lead particulates is likely to exceed the PEL or where the possibility of skin or eye irritation exists, shall remove clothing worn to and from work and wear the protective clothing provided by the Navy. Employees shall use waterproof clothing when handling wet lead. Protective clothing includes:

(a) Full body, one-piece coveralls shall be used.

(b) Personnel shall use durable gloves and head covering. Hoods shall extend beyond the collar of the coverall, completely protecting the neck area.

(c) Regions/activities shall provide slip-resistant shoe covers or lightweight rubber boots and may also use disposable shoe covers.

(d) Regions/activities shall provide face shields, vented goggles, or other appropriate protective equipment for use whenever the possibility of eye hazard exists.

**NOTE:**

The proper use of protective clothing requires that employees close all openings and that garments fit snugly about the neck, wrists and ankles. Accordingly, employees shall tape the wrist and ankle junctions, as well as the collar opening on coveralls as necessary, to prevent contamination of skin and underclothing without restricting physical movement.

(2) Regions/activities shall provide clean protective clothing at least weekly. Clean protective clothing shall be provided daily when the 8-hour TWA airborne concentration exceeds  $200 \mu\text{g}/\text{m}^3$ .

(3) Regions/activities shall provide change rooms as close as practical to the lead work area(s) for employees who work where the airborne lead exposure is above the PEL (without regard to the use of respirators). They shall maintain change rooms under positive pressure with respect to adjacent lead work areas. They shall post protective clothing removal procedures in the change room and include vacuuming of clothing (before removal and while still wearing a respirator, if one was required for the task) using a HEPA filter vacuum. Removal of lead particles from clothing by blowing or shaking is prohibited.

(4) Employees exposed to airborne lead concentrations above the PEL (without regard to respirator use) shall shower at the end of the work shift prior to entering the clean change room. Regions/activities shall provide clean change rooms. Regions/activities shall provide clean change rooms incorporating showers within or adjacent to them for employees who work in areas where their airborne exposure to lead is above the PEL. Change rooms shall have two separate clothing lockers for each employee to prevent contamination of street clothes and to ensure that employees do not leave wearing any clothing or equipment worn during their work shift. Supervisors shall ensure that employees shower at the end of their work shift.

(5) Employees shall not take lead contaminated clothing home to be laundered. Regions/activities shall launder lead-contaminated clothing in a manner to prevent release of lead dust in excess of the AL. Contracts governing laundering of lead-contaminated clothing shall specifically require that contractors comply with the precautions specified in reference 21-1.

(6) Regions/activities shall transport lead-contaminated clothing in sealed containers to which are affixed the standard "caution label" (see paragraph 2104e). Regions/activities shall notify persons who clean or launder protective clothing or equipment in writing of the potentially harmful effects of exposure to lead.

d. Respiratory Protection

Limits of Respirator Usage

(a) Regions/activities shall use engineering control measures per paragraph 2104 and shall not achieve compliance with PELs solely by the use of respirators except under the following conditions:

1. During the time period necessary to implement engineering control measures.
2. In work situations in which the control methods prescribed are not technically feasible or are not sufficient to reduce the airborne concentration of lead particulates below the PEL.
3. During emergencies.

(b) Where respirators are required to control exposure to lead, regions/activities shall select respirators per appendix 21-A, and comply with the respirator program per chapter 15 of this manual and reference 21-8.

(c) Regions/activities shall supply a powered air purifying respirator with a HEPA filter in lieu of a half or full-face piece respirator, if the employee chooses to use this respirator and it provides adequate protection.

(d) Regions/Activities shall provide a respirator to employees who work with lead, upon request, and shall enter the employee into the respiratory protection program.

e. Warning Signs and Caution Labels

(1) Regions/Activities shall provide and display warning signs at each location where airborne lead concentrations may exceed the PEL. Regions/Activities shall conspicuously post signs so personnel may read them and take necessary precautions before entering the area. They shall clean and illuminate signs required by this paragraph as necessary so that the legend is readily visible. Signs, in compliance with reference 21-1, may contain a listing of required protective equipment and shall state, as a minimum, the following:

**WARNING**  
**LEAD WORK AREA**  
**POISON**  
**NO SMOKING, EATING OR DRINKING**

(2) Regions/Activities shall affix caution labels to containers of contaminated clothing, equipment, raw materials, waste, debris, or other products containing lead if, in any foreseeable way, these products could produce levels of airborne lead which might constitute a threat to health. These caution labels shall state:

**CAUTION**  
**CLOTHING CONTAMINATED WITH LEAD**  
**DO NOT REMOVE DUST BY BLOWING OR SHAKING**  
**DISPOSE OF LEAD CONTAMINATED**  
**WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL,**  
**STATE OR FEDERAL REGULATIONS**

f. Lunch Rooms and Personal Hygiene

(1) Regions/Activities shall provide lunchroom facilities for employees who work in areas where their airborne lead exposure is above the PEL (without regard to the use of respirators).

(2) When regions/activities locate lunch facilities adjacent to the lead work area, such facilities shall have a positive pressure, filtered air supply and be readily accessible to employees.

(3) Employees shall remove protective clothing and equipment before entering lunchroom facilities.

(4) Regions/Activities shall prohibit eating, drinking, chewing or the use of tobacco products, the application of makeup and storage of food and tobacco products in lead work areas.

(5) Lead workers shall wash their hands and face prior to eating, drinking, using tobacco products or applying cosmetics.

**2105. Environmental Protection Procedures**

a. Navy regions and activities must take care to ensure that measures taken to meet local and national environmental standards are compatible with the requirements of this chapter.

b. Regions/Activities shall require, prior to disposing of hazardous lead waste, bagging in heavy duty plastic bags or other impermeable containers and labeling with caution labels described in paragraph 2104e(2). Personnel shall label lead waste containers such as bags, trash cans, dumpsters, etc., "LEAD WASTE ONLY" and exercise care to prevent bags and other containers from rupturing when being moved to a dumpster or other suitable vehicle for transport to a hazardous waste disposal site.

c. Regions/Activities shall dispose of lead containing materials per applicable Federal, State and local environmental requirements. The cognizant environmental manager shall determine environmental requirements relating to lead emissions/disposal.

d. Technical assistance for air pollution control is available upon request from the Naval Facilities Engineering Command (COMNAVFACENGCOM) Engineering Field Divisions (EFDs).

#### **2106. Training**

All Navy personnel who work in areas where the potential exists for lead exposure at or above the action level, or for whom the possibility of skin or eye irritation exists shall receive initial training prior to or at time of assignment and at least annually thereafter. The training, per reference 21-1, shall include, as a minimum, the following:

- a. The specific nature of the operations during which exposure is possible.
- b. The purpose, proper selection, fit testing, use, and limitations of respirators.
- c. The adverse health effects of lead with particular attention to the reproductive effects upon both males and females.
- d. The purpose and description of the medical surveillance program, including the use of chelating agents and medical removal protection benefits.
- e. The engineering controls and work practices to be applied and used in the employee's job, including PPE and personal hygiene measures.
- f. The contents of the command's compliance plan.

#### **NOTE:**

All employees in a workplace in which there is a potential for exposure to airborne lead at any level shall be informed of the contents of appendices A and B of reference 21-1, and to any related documents, all of which are available at no charge from the Department of Labor (DOL). In addition, employees shall receive, upon request, any other handout type materials in use or related to the training program.

#### **2107. Industrial Hygiene Surveillance**

An exposure-monitoring plan shall be established for any lead operation with the potential to cause employee exposure at or above the action level. Qualified persons will conduct initial and periodic monitoring. Persons qualified to perform exposure monitoring are specified in chapter 8 of this manual. BUMED IHs will conduct exposure assessments as outlined in chapter 8 of this manual.

#### **2108. Employee Notification**

Within 5 working days after the receipt of monitoring results, the command shall notify each employee in writing of his/her exposure monitoring results. Whenever the results indicate that the employee was exposed above the PEL, without regard to respirator use, the written statement shall

include that fact and a description of the corrective action(s) taken to reduce the individual's exposure. See para 0803.a for requirements on documentation in each employee's medical record.

### **2109. Medical Surveillance**

- a. General. This program consists of three basic elements:
- (1) Pre-placement medical evaluation.
  - (2) Semi-annual blood lead monitoring.
  - (3) Follow-up medical evaluations based on the results of blood lead analysis and physician opinion.

Regions/Activities shall include personnel in this program when industrial hygiene surveillance indicates that they perform work or are likely to be in the vicinity of an operation which generates airborne lead concentrations at or above the AL for more than 30 days per year. Examinations may include special purpose histories and physical examinations, and laboratory tests designed to detect early signs of lead over-absorption. Refer also to reference 21-9 for medical protocols and guidance. Regions/Activities shall base inclusion into this program on airborne concentration measurements without regard to respirator use and, therefore, inclusion does not indicate that an individual is overexposed to lead.

b. Program Elements

(1) Pre-placement Evaluation. All Navy personnel shall receive a pre-placement evaluation as described in reference 21-9 prior to assignment to a position involving potential exposures to lead that equal or exceed the AL.

(2) Blood Lead Levels and Frequency of Monitoring. Navy regions and activities shall make blood lead analysis and zinc protoporphyrin (ZPP) available every 6 months for all personnel who are or may be exposed to lead above the AL for more than 30 days per year. Supporting medical facilities shall perform analysis every 2 months when the blood lead level exceeds 30  $\mu\text{g}/100\text{g}$  of whole blood.

(3) Follow-up Medical Surveillance

(a) Individual Reassignment/Medical Removal. An employee shall be reassigned to non-lead work:

1. If an employee's blood lead concentration equals or exceeds 60  $\mu\text{g}/100\text{g}$ .
2. If the average of his/her last three blood lead measurements equals or exceeds 50  $\mu\text{g}/100\text{g}$ ; however, Individuals need not be removed if their last blood test indicates a blood lead level at or below 40  $\mu\text{g}/100\text{g}$ .
3. Or, if the employee has signs or symptoms of lead toxicity.

For additional guidance concerning removal procedures, return to former job status, and removal protection requirements, refer to reference 21-1. Regions/Activities shall also reassign pregnant

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women exposed to lead at or above  $50 \mu\text{g}/\text{m}^3$  or with a blood lead level of  $30 \mu\text{g}/100\text{g}$  blood to a job without lead exposure, with medical removal benefits.

(b) Follow-up Blood Lead Monitoring. Regions/Activities shall perform follow-up lead monitoring within 2 weeks of the receipt of an initial or routine monitoring result with a blood lead concentration at or above  $30 \mu\text{g}/100\text{g}$  of whole blood, and periodically thereafter according to the following criteria.

1. During medical removal (to non-lead work activity), regions and activities shall monitor the employee's blood lead concentration monthly until the employee's last two consecutive test results are at or below  $40 \mu\text{g}/100\text{g}$ , at which time the employee may be returned to his/her regular work activity.

2. When an employee's blood lead concentration is between  $30$  and  $40 \mu\text{g}/100\text{g}$ , the region/activity shall monitor it every 2 months until the last two consecutive blood lead test results are less than  $30 \mu\text{g}/100\text{g}$ .

(c) Follow-up Evaluations

1. Medical Follow-up. Regions/Activities shall conduct a medical evaluation identical to the pre-placement evaluation, with the exception of chest x-rays, annually for each person found to have a blood lead concentration at or above  $30 \mu\text{g}/100\text{g}$  at any time during the prior year.

2. Reassignment Termination of Employment Follow-up. Regions/Activities shall conduct a medical evaluation identical to the pre-placement evaluation just prior to the reassignment or termination of an employee from a job requiring medical surveillance.

3. Physicians Written Opinion. Reference 21-1 requires a written opinion and reference 21-9 provides a sample written opinion.

4. Industrial Hygiene Follow-up Investigation. The cognizant industrial hygienist shall be notified of, and perform an investigation to determine the cause of, each blood lead concentration at or above  $30 \mu\text{g}/100\text{g}$  which has been verified by follow-up blood lead monitoring.

(d) Other Appropriate Medical Evaluations. The cognizant medical activity shall perform a medical examination, including those elements of the pre-placement examination, which the physician deems necessary:

1. As soon as possible after notification by an employee that he/she has developed signs or symptoms commonly associated with lead intoxication.

2. As soon as possible after notification that the employee desires medical advice concerning the effects of current or past lead exposure on the ability to procreate a healthy child.

3. As soon as possible after being informed that the employee demonstrates difficulty breathing during a respirator fit test or during respirator use.

4. As medically appropriate for personnel who have been removed from exposure to lead due to risk of sustaining material impairment to health, or otherwise limited pending a final medical evaluation.

c. Administrative Procedures

(1) Employee Notification. A region or activity shall notify the employee of the following, in writing, within 5 working days after receipt of results, when his/her blood lead level is at or above 30 µg/100g whole blood:

(a) His/her blood lead concentration level, as reported

(b) That the regulations require temporary medical removal with Medical Remove Protection benefits when, and if, the employee's blood lead level exceeds the current numerical criterion for medical removal under reference 21-1.

(2) Employee Counseling. The physician shall counsel personnel regarding any abnormalities detected during any screening test. The physician shall make an entry into the employee's medical record that describes the counseling given. The employee shall countersign this entry.

d. Medical Records

(1) Each employee record shall include the following identifying information:

(a) Name

(b) Social security number

(c) Date of birth

(d) Dates of examinations

(e) Job titles, job codes, and/ or primary and secondary Navy Enlisted Classification Code (NEC).

(2) All records of examinations, possible lead-related conditions, related laboratory results, and all forms and correspondence related to the employee's medical history shall become a permanent part of the health record. The cognizant activity shall retain such records for the period of employment plus 20 years, or 40 years, whichever is longer.

(3) Medical facilities shall enter the judgment of the occupational health physician concerning the adequacy of the diagnostic information to support the impression of lead-related disease in the medical record. Lacking definitive information, the evaluating physician must exercise his/her best medical judgment on each individual case.

(4) Regions/Activities shall make available copies of any examinations, laboratory results, or special studies in an employee's health record or compensation folder to a physician of the employee's choice after execution of a proper release of information form.

(5) Should the Navy select the initial physician, the employee may designate a second physician to review any findings and conduct independent examinations and tests as may be deemed necessary. The Navy shall provide to the initial and consulting (second) physician the following:

- (a) Copy of reference 21-1 and this chapter.
- (b) Description of employee's duties.
- (c) Employee's exposure level.
- (d) Description of PPE.
- (e) Blood lead determinations.
- (f) All prior written medical opinions.

(6) The cognizant medical activity shall maintain these medical records.

(7) Each individual currently or previously employed by Department of the Navy (DON) or any other person he/she may designate shall have access to the records, as paragraph 2109d(2) defines, within 15 days of the request.

#### **2110. Work Performed by Private Contractors**

a. Reference 21-10 should be used on construction projects impacting material containing lead and/or paint with lead. Reference 21-11 should be used where lead-based paint/paint with lead must be removed, controlled or lead-based paint hazards abated as defined by Public Law 102-550 Title X – Residential Lead-Based Paint Hazard Reduction Act of 1992.

b. Contract administrators shall insure that each contract, for work performed by an independent contractor in the United States or overseas which may involve the release of lead dust, shall incorporate the appropriate references and clauses to ensure that:

(1) The contractor is aware of the potential hazard to his/her employees and Navy personnel.

(2) The contractor complies with references 21-1, 21-2, 21-3, and 21-12 to protect his/her employees, as well as Navy personnel.

(3) The contractor shall control lead dust outside of the work boundary to less than  $30 \mu\text{g}/\text{m}^3$  at all times, and shall perform sufficient monitoring to confirm that this level of control is maintained. In addition, the controlled work area(s) shall meet these criteria prior to release for unrestricted access. Contractors shall provide copies of their monitoring results to the cognizant industrial hygienist.

#### **2111. Responsibilities**

a. The Chief, Bureau of Medicine and Surgery (BUMED) shall:

- (1) Centrally manage the lead medical surveillance program ashore and afloat.

(2) Provide professional industrial hygiene technical support and training assistance to commands for the purpose of evaluating the potential for lead exposure.

b. Commanders of Echelon 2 and other headquarters commands shall:

(1) Provide advice and technical assistance to define appropriate engineering and work practice controls, and to identify acceptable lead free substitute materials.

(2) Ensure program support by budgeting the resources required to meet the regulatory standards for the control of lead as prescribed by this chapter.

(3) Determine the applicability of reference 21-2 to any operations within their respective claimancies and provide policy and guidance to affected commands regions, and activities. This will require procedures to ensure pre-placement medical screening and training are provided to workers based on occupational "task based triggers" specified in reference 21-2.

c. COMNAVFACENGCOM shall:

(1) Provide advice and technical assistance concerning lead paint in Navy buildings, particularly housing, childcare facilities and hospitals.

(2) Ensure that contracting officers and representatives receive the appropriate level of training to adequately plan, design, oversee and review lead construction work.

d. Commanding Officers of shore activities shall:

(1) Apply control measures and monitoring procedures prescribed in this chapter to processes using lead or lead containing materials.

(2) Budget resources in order to meet these lead control requirements.

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Chapter 21

References

21-1. Title 29 Code of Federal Regulations (CFR) 1910.1025, Lead (as amended)  
[http://www.access.gpo.gov/nara/cfr/waisidx\\_01/29cfr1910\\_01.html](http://www.access.gpo.gov/nara/cfr/waisidx_01/29cfr1910_01.html).

21-2. Title 29 CFR 1926.62, Lead in Construction  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10641](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10641).

21-3. OPNAVINST 5100.19D CH-1 of 30 Aug 01, Navy Occupational Safety and Health Program Manual for Forces Afloat <http://www.safetycenter.navy.mil/instructions/afloat/510019D.htm>.

21-4. Title 29 CFR 1910.94, Ventilation  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9734](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9734).

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<http://www.acqih.org/store/ProductDetail.cfm?id=480>.

21-6. American National Standards Institute (ANSI) Z9.2-2001, American National Standard for Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems (NOTAL) <http://www.ansi.org/>.

21-7. UFC 3-410-04N of 25 Oct 04, Design: Industrial Ventilation  
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21-9. NEHC Technical Manual, NEHC-TM OM 6260 of Feb 01, Occupational Medical Surveillance Procedures Manual and Medical Matrix  
[http://www-nehc.med.navy.mil/downloads/Occmed/Medical\\_matrix\\_Feb\\_2001.pdf](http://www-nehc.med.navy.mil/downloads/Occmed/Medical_matrix_Feb_2001.pdf).

21.10. UFGS-13282N of Aug 03, Lead in Construction.

21-11. UFGS-13283N of Feb 02, Removal/Control and Disposal of Paint with Lead

21-12. Title 29 CFR 1910.134, Respiratory Protection  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=12716](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716).

## Appendix 21-A

### Required Respirator

Airborne Concentration of Lead or Condition of Use	Required Respirator <sup>1</sup>
Not in excess of 0.5 mg/m <sup>3</sup>	Half mask, air purifying respirator (10xPEL) equipped with high efficiency filters <sup>2,3</sup>
Not in excess of 2.5 mg/m <sup>3</sup> (50xPEL)	Full face piece, air purifying respirator with high efficiency filters <sup>3</sup>
Not in excess of 50 mg/m <sup>3</sup> (1000xPEL)	1. Any powered, air purifying respirator with high efficiency filters <sup>3</sup> or 2. Half mask, supplied air respirator operated in positive pressure mode
Not in excess of 100 mg/m <sup>3</sup> (2000xPEL)	Supplied-air respirators with full face piece, hood, helmet, or suit operated in positive pressure mode
Greater than 100 mg/m <sup>3</sup> , unknown concentration or fire fighting.	Full face piece, self-contained breathing apparatus operated in positive pressure mode

<sup>1</sup>Respirators specified for high concentrations can be used at lower concentrations of lead.

<sup>2</sup>Full facepiece is required if lead aerosols cause eye or skin irritation at the use concentrations.

<sup>3</sup>A high efficiency particulate air (HEPA) filter means 99.97 percent efficient against 0.3 micron size particles. Use 42 CFR 84 approved p100 filters to retain consistency with previous NIOSH HEPA filter color-coding.

## CHAPTER 22

### NON-IONIZING RADIATION

#### **2201. Discussion**

The term non-ionizing refers to forms of radiation, which do not have sufficient energy to cause ionization of atoms or molecules. Typically, examples include the electromagnetic emissions radiated by lasers, radiofrequency (RF), and microwave sources.

#### **2202. Policy**

The Department of the Navy (DON) policy is to preserve and maintain the health of its personnel by adopting practices that eliminate or control potentially hazardous radiation exposures. This policy encompasses:

- a. Limiting personnel exposures to levels that are within permissible exposure guidelines
- b. Identifying, attenuating or controlling through engineering design, administrative actions or protective equipment, hazardous exposure levels and other dangers associated with non-ionizing radiation sources
- c. Controlling areas in which harmful exposure to unprotected personnel could occur
- d. Ensuring personnel are aware of potential exposures in their work places and duty assignments and the control measures imposed to limit their exposures to levels that are within the permissible guidelines
- e. Investigating and documenting overexposure incidents.

#### **2203. Applicability**

All Navy activities employing sources of non-ionizing radiation which may affect the safety and health of personnel shall observe radiation protection requirements, exposure standards and safety guidelines. Provisions of this chapter do not apply to exposures administered to patients undergoing medical diagnostic or therapeutic procedures.

#### **2204. Laser Radiation**

Lasers are designed to operate at various wavelengths in the ultraviolet, visible and infrared portions of the electromagnetic spectrum, and are used in various military, industrial, medical and scientific applications. While mechanisms for biological damage from lasers are similar to effects produced from absorption of energy from conventional light sources, lasers are of special concern because of their potential to project hazardous levels of energy over great distances. Exposure to lasers can result in permanent and disabling eye injury.

## **2205. Laser Radiation Policy**

Chief, Bureau of Medicine and Surgery (BUMED) is the administrative lead agent for laser safety within the DON. Responsibilities for setting forth DON policy and guidance in the identification and control of laser radiation hazards are set forth in reference 22-1.

## **2206. Laser Permissible Exposure Limits (PELs)**

a. Laser PELs, also referred to as threshold limit values (TLVs) and maximum permissible exposure (MPE) limits, are published in references 22-2 and 22-3 respectively. For laser exposures that are within the PEL, no adverse biological effects are expected to occur even under repeated or long-term exposure conditions. Only trained and technically qualified personnel shall apply these exposure limits in determining laser safe viewing conditions, since an improperly conducted laser hazard evaluation may pose serious risks to a person's eyes.

b. Laser exposure limits are set to protect tissue from damage and are not the equivalent of comfortable viewing levels. Operators of lasers need to be aware of secondary laser safety concerns. For example, intrabeam viewing of visible wavelength lasers, even at or below the permitted safe level, will still be perceived as an intense light source capable of producing disabling glare or visual after-images. These temporary visual effects can interfere with performing critical tasks such as operating vehicles or aircraft. Similarly, intrabeam viewing of lasers at or below the permitted exposure limits can still damage or "saturate" night vision viewing devices because of the high amplification of incident light levels provided by the devices. Wearing of laser protective eyewear can also lead to other safety concerns, such as the potential for blocking or filtering out the color of some warning or alarm indicator lights.

## **2207. Laser Classification, Labeling, Technical Assistance and Exposure Incidents**

a. The Navy has adopted a system for categorizing the hazards of lasers, which provides a practical means for determining safety requirements appropriate for different types of lasers. These categories range from a Class I laser that is safe to view under all conditions, to the Class IV laser which can cause eye damage under most viewing conditions. Appendix 22-A provides information on laser classification, types of laser warning signs and labels, technical assistance and exposure incidents.

b. For most lasers used in medical, laboratory, research and industrial applications, use of the classification system precludes the necessity for performing any laser measurements or calculations. Reference 22-4 requires manufacturers to classify and label their laser systems. Laser measurements or laser safety calculations will usually be required only for lasers operating on outdoor ranges or in open areas when it is necessary to define a laser nominal hazard zone (NHZ).

## **2208. Military Exempt Lasers**

Lasers or laser systems designated for combat, combat training or classified in the interest of national security may be exempted from compliance with some or all of the provisions of reference 22-4. To obtain military exemption status, the contractor must have written authorization from the military contracting activity, and the laser product must be certified to conform with requirements in reference 22-5 and have been approved by the Navy Laser Safety

Review Board (LSRB). Commands shall maintain a current inventory of all military exempt lasers for submission to the administrative lead agent as requested. Commands wishing to dispose of lasers shall obtain approval from BUMED following guidance in references 22-1 and paragraph 2205.

**2209. Laser Safety Review Board (LSRB)**

Military laser systems are reviewed by the LSRB during their development to ensure that adequate safety criteria have been incorporated. LSRB review is required at appropriate stages of development and prior to introduction of prototype or production units into the fleet for testing or initial use. An important function of the Navy Laser Safety Program is a determination of the nominal ocular hazard distance (NOHD) or safe viewing range, for each operational laser system used in the Navy. LSRB review also applies to Class IIIb and Class IV commercial lasers and laser systems that are not intended solely for laboratory or medical use. Reference 22-6 contains general guidance for materials necessary and procedures followed by the LSRB review.

**2210. Laser Safety Hazard Control Program**

Commands operating Class III or IV commercial or military exempt lasers shall establish a laser safety program and designate a laser system safety officer (LSSO) per reference 22-6. The laser safety program shall include an inventory of all commercial Class IIIb, Class IV and all classes of military exempt lasers that are assigned to the command lasers for submission to the administrative lead agent as requested.

**NOTE:**

Some commercially available laser pointers are categorized as Class IIIa lasers with output levels that are not considered safe for all viewing conditions. A formal laser safety program is not required for Class IIIa laser pointers; however, the user needs to recognize that care must be exercised to control its accessibility (kept out of the hands of children or others who are unaware of the hazardous nature of lasers), and to avoid directing the pointer at those in the audience. Class II laser pointers do not pose a hazard during normal viewing, and their use is not restricted.

**2211. Medical Surveillance Procedures**

Enrollment in a laser radiation medical surveillance program is limited to those personnel who are clearly at risk from exposure to laser radiation. The nature of such risks is associated with accidental injuries resulting from excessive exposure to laser levels and not as a result of chronic exposures. The command LSSO determines which personnel should be enrolled in the surveillance program using the following guidance:

- a. Laser workers requiring medical surveillance are those individuals who routinely work with Class IIIb or Class IV lasers under conditions where there is a likely potential for accidental exposures to excessive levels. These workers require a pre-placement and termination laser eye examination per reference 22-7.

- b. The following personnel generally require medical surveillance:
- (1) Research and development (R&D) and laboratory personnel who routinely work with unenclosed Class III and Class IV laser beams
  - (2) Maintenance personnel who routinely repair or align Class III or Class IV laser systems
  - (3) Operators (personnel behind the laser) and down-range personnel who routinely work with Class III or Class IV engineering laser transits, geodimeters and alignment laser devices
  - (4) Operators who routinely work with Class IIIb and Class IV industrial lasers where access to an unenclosed beam path is possible.
- c. Other laser workers or personnel where the potential for accidental exposure is deemed very unlikely generally do not require medical surveillance. For example:
- (1) Personnel who work with Class I or Class II lasers, or with laser systems containing Class III or Class IV lasers when there is little or no potential for exposure to the open laser beam
  - (2) Visitors or other personnel involved infrequently in laser testing, demonstrations or training when the LSSO has ensured such personnel will be protected from exposure to levels of laser radiation greater than the PEL
  - (3) Supervisory, clerical and custodial personnel working in laser areas where laser safety procedures preclude their exposure to levels of laser radiation above the PEL
  - (4) Operators of fielded military laser systems when operations are conducted on established laser ranges, or as part of training operations where prescribed laser safety procedures are enforced
  - (5) Personnel involved in "force on force" laser training exercises where appropriate protection is established, either in the form of administrative controls or procedures, or where laser protective eyewear is provided.

## **2212. Laser Safety Training**

a. Commands shall provide LSSO laser safety training through the completion of a Laser System Safety Officer Course approved by BUMED and the Lead Navy Technical Laboratory at the Naval Surface Warfare Center, Dahlgren Division. There are four categories of LSSOs, administrative laser safety officer (ALSO), technical laser safety officer (TLSO), laser safety specialist (LSS), and range laser safety specialist (RLSS). Re-testing at the LSSO's highest certification level is required to maintain certification for all categories of LSSO every 4 years. If the LSSO fails the re-certification examination, the LSSO will have to be re-certified by attending the appropriate course. Commanding officers should determine which category of LSSO is appropriate for their command considering their mission, types of lasers being used,

and size of the laser safety program. Laser safety-training requirements at medical treatment facilities for the medical LSSO and designated medical personnel are contained in reference 22-8.

- (1) An ALSO is qualified to:
  - (a) Establish and manage a unit level laser safety program.
  - (b) Approve, disapprove, or submit for safety approval to higher authority all local laser uses, both portable and fixed.
  - (c) Instruct employees and supervisors on the safe use of lasers.
  - (d) Supervise laser operations and maintenance.
  - (e) Manage laser incident investigations as appropriate. Technical assistance of a LSS or a RLSS is required.
  - (f) Maintain a laser medical surveillance program.
  - (g) Maintain an inventory of military-exempt and class IIIb and class IV lasers.
  - (h) Post laser warning signs and devices.
  - (i) Ensure that laser operators have the appropriate knowledge to safely operate their specific lasers (supervisor safety briefs, factory training school, instructional materials, etc.)
  - (j) Provide safety briefs/pre-mission briefs to laser range users.
  - (k) Prior to use of a laser range, ensure/confirm that warning signs have been posted, the area is clear of specular reflectors, personnel have required LEP, and all other safety conditions for range laser use outlined in the range regulations or range standard operating procedures (SOPs) are met.
  - (l) Perform laser eye protection inspections.
- (2) A TLSO is qualified to:
  - (a) Understand the calculations and measurements of laser safety parameters such as nominal ocular hazard distances (NOHDs) and required optical densities for laser eyewear.
  - (b) Train ALSOs using the administrative lead agent (ALA) approved course curriculum (Qualifications of TLSOs as instructions requires ALA/lead Navy technical laboratory (LNTL) approval).
  - (c) Understand classification of lasers and laser systems.

(d) Perform the duties of a laboratory, installation, base, research facility, or RLSO that includes establishing and managing a base or installation laser range safety program; approving/disapproving the use of laser systems and laser operations on their range that fall within the guidelines of the range certification; and performing annual range safety compliance inspections; and ensuring laser ranges under their cognizance are certified/re-certified by RLSS at least every three years or when changes to the range fall outside the current certification.

(e) Ensure range regulations/SOPs are provided to commands requesting unsafe of the laser range.

(f) Review training plan (to include laser type(s) and proposed employment tactics) of each command requesting access to the laser range certification.

(g) Perform the same duties as an ALSO.

(3) A LSS is qualified to:

(a) Perform the calculations and measurements of laser safety parameters such as NOHDs and required optical densities for laser eyewear.

(b) Train ALSOs, TLSOs, RLSOs, and LSSs using the ALA-approved course curriculum. (Qualification of instructors requires ALA/LNTL approval).

(c) Classify lasers and laser systems.

(d) Conduct technical aspects of laser incident investigations.

(e) Perform the same tasks as a TLSO.

(4) A RLSS is qualified to:

(a) Conduct laser radiation hazard surveys and evaluations for commanding officer certification.

(b) Perform the calculations and measurements required to certify a laser range.

(c) Train ALSOs and RLSSs using the ALA-approved course curriculum. (Qualification of instructors requires ALA/LNTL approval.)

(d) Conduct technical aspects of laser range incident investigations.

(e) Perform the same tasks as a TLSO.

b. Laser range safety officers, laser maintenance personnel and industrial laser supervisors shall complete a formal command laser safety training course as outlined in reference 22-6.

c. Commands shall provide formal classroom training on the potential hazards associated with accidental exposure to laser radiation to all personnel in areas operating Class IIIb (and Class IIIa with danger logo) or Class IV lasers. In particular, the vulnerability of the eyes to being damaged by lasers shall be emphasized. Commands shall conduct annual refresher training per reference 22-6.

d. For employee training, the following laser safety training videotapes are available from the Norfolk Regional Electronic Media Center: *Laser Hazards and Control*, 804245DN, *Hazards and Control of Military Lasers*, 804246DN, and *Laser Safety in Medical Treatment Facilities*, 803198DN. (See section 0604b). Additional information is available in reference 22-9 on laser operations, hazard distances for Navy laser systems and use of laser protective eyewear.

### **2213. Other Optical Sources**

Broadband optical sources such as germicidal lamps, phototherapy, sun lamps, backlights, arc lights, projector lamps, high intensity discharge lamps and infrared arrays are also used in many medical and industrial applications. These types of light sources may require controls to prevent possible acute effects such as skin burns, photokeratitis, cataracts or retinal burns. Exposure guidance can be found in reference 22-2. Obtain assistance in the evaluation of broadband optical sources, where personnel are considered to be at ocular risk, from an industrial hygienist or radiation health officer.

### **2214. Radiofrequency (RF) Electromagnetic Fields (EMF)**

RF exposure is primarily associated with operation of various radars and communication systems at Navy shore facilities and aboard ships. In addition to personnel concerns, RF fields may generate induced currents or voltages that could cause premature activation of electro-explosive devices in ordnance, equipment interference or sparks and arcs that may ignite flammable materials and fuels.

### **2215. Radiofrequency Ashore and Afloat**

Naval Sea Systems Command (COMNAVSEASYSCOM) is the lead agency for coordinating electromagnetic safety programs for Naval ships. Space and Naval Warfare Systems Command (COMSPAWARSYSCOM) is the lead agency for coordinating electromagnetic safety programs for shore facilities. Reference 22-10 contains RF hazard (RADHAZ) guidance regarding hazards of RF exposure to personnel, fuels and ordnance.

### **2216. RF Permissible Exposure Limits (PELs) and Maximum Permissible Exposures (MPEs)**

a. Reference 22-10 will be amended to reflect the current RF PELs listed in reference 22-11 for the frequency range of 3 kilohertz to 300 Gigahertz and the current RF MPEs in reference 22-14 for the frequency range of 0 to 3 kilohertz. Those persons conducting RF hazard analysis and evaluations should consult the more extensive technical guidance contained in references 22-11, 22-12, 22-13, and 22-14.

b. Exposure limits are specified for locations that are defined as either controlled or uncontrolled environments. Controlled environments are areas where exposure may be incurred by personnel who are aware of the potential for RF exposure as a result of employment or duties, by individuals who knowingly enter areas where higher RF levels can reasonably be anticipated to exist and by exposure incidental to transient passage through such areas. Uncontrolled environments generally include public areas, living quarters and work places where there is no expectation that higher RF levels should be encountered.

c. The RF exposure limits for controlled environments represent scientifically derived values to limit absorption of RF energy in the body, and to restrict the magnitude of RF currents induced in the body. This means that the amount of energy absorbed is insufficient to produce or cause any adverse effects on health, even under repeated or long-term exposure conditions. The controlled environmental limits are the equivalent of personnel exposure standards for all individuals. In uncontrolled environments where access is not restricted or controlled, lower permissible exposure levels have been adopted as a consensus to maintain lower exposure levels outside of well-defined areas. The limits for uncontrolled environments should not be interpreted as being imposed to lessen any known adverse health effect, and should not be interpreted as being the limit on personnel exposure for non technical employees or for members of the public that enter a controlled environment.

d. For shipboard situations, consider the weather decks, enclosed and open masts and electronic work spaces as controlled environments. For shore stations, consider accessible areas beyond a station's perimeter fence line as uncontrolled environments. Within a station's boundaries, differentiation between controlled and uncontrolled environments will require individual determinations. For both ship and shore situations, incorporate existing physical structures or areas, such as decks, fences, rooftops, etc., in defining the location of boundaries for controlled environments.

e. No special RF exposure limits or additional exposure restrictions are imposed in the case of pregnancy.

#### **2217. RF Measurement and Evaluation**

a. Facilities shall determine RF levels for all areas in which personnel could receive exposures in excess of the exposure limits. In addition, shore facilities must determine RF field levels where locations of RF emitting antennas may be expected to raise concerns among personnel or generate public inquiries regarding levels of RF emissions beyond the base perimeter. Facilities must use proper RF measurement techniques and application of the RF exposure limits to avoid imposing unnecessary restrictions on operations or establishing overly restrictive protective boundaries. Facilities may obtain assistance in measuring RF emission levels from the activities listed in appendix 22-B.

b. A comprehensive RF hazard evaluation for major platforms, such as warships or communication stations, where multiple RF emitters exist in close proximity to each other, requires considerable technical familiarity with electromagnetic fields. Such surveys may involve determination of boundary locations for protective fences or enclosures, or specifying operational conditions or restrictions necessary for protection of personnel. The activities listed in appendix 22-C may perform these evaluations, which are primarily an engineering type survey.

c. In addition to appendix 22-B, safety or health professionals may make RF measurements or calculations for situations that primarily consist of determining RF exposure levels for a particular area occupied by personnel.

#### **2218. Safety Certification**

a. Activities identified in paragraph 2218(c) shall obtain a survey certification from the technical activities listed in appendix 22-B to ensure all RF sources have been evaluated, safe separation distances have been determined, warning signs posted and any other safety measures, such as protective fences, have been defined.

b. To maintain certification, the site shall forward information on new RF sources that are installed to the technical activity listed in appendix 22-B to obtain a theoretical or calculated safety evaluation. The activity with the original site certification shall maintain this provisional certification.

c. All shore facilities having RF emitters must obtain baseline certification. For most facilities, certifications/re-certifications will require an instrumented site survey or desktop analysis. Some activities with only a few low power RF systems may require neither. The certifying agency will determine certification survey/re-certification requirements of the facility. Re-certifications will be scheduled as follows:

(1) Three-Year Resurvey Re-certification. Major NAVNETSPAOPSCOM transmitter facilities are included within this group.

(2) Five-Year Resurvey Re-certification. Sites with large numbers or frequent additions/changes of RF emitters or a site located in populated areas where public exposure to RF emissions may be an environmental concern.

(3) Ten-Year Resurvey Re-certification. Sites having a moderate and stable number of RF microwave emitters.

#### **2219. Warning Signs, Labels and Devices**

a. The RF hazard warning signs, labels, devices, exposure incident procedures and technical assistance are shown in appendix 22-B. Appropriate warning statements are added in the lower triangular portion of the sign. Variations are authorized, such as subdued signs for camouflage or to improve visibility under certain lighting conditions, provided the general wording and layout of the sign remain the same.

b. Activities shall post RF hazard warning signs at all access points to areas in which levels exceed the exposure limits for controlled environments.

c. Activities should post RF hazard warning signs in appropriate areas in which the RF levels exceed the exposure limits for uncontrolled environments as determined by cognizant engineering or safety or health professionals.

d. In areas where access to levels greater than 10 times the exposure limits for controlled environments may exist, warning signs alone do not provide sufficient protection. Activities shall provide other warning devices and controls, such as flashing lights, audible signals, barriers or interlocks, as determined by the certification authority, depending upon the potential for exposure.

e. See appendix 22-B for reporting of RF incidents.

#### **2220. Research, Development and Acquisition**

a. Activities performing research, development, testing and evaluation (RDT&E) and acquisition of RF systems, including non-developmental items and commercial off-the-shelf items, shall identify RF control requirements by incorporating adequate protection measures or identifying appropriate operational restrictions to maintain personnel exposures within the exposure limit. System safety studies under reference 22-13 shall use the exposure limits given in reference 22-11 to define restrictions necessary to limit personnel exposures.

b. Activities shall include safety information, operational restrictions, and safe exposure distances for systems being fielded in appropriate fielding documents and technical manuals to limit RF exposure of personnel engaged in operation, maintenance and repair of the system.

#### **2221. RF Safety Training**

Activities shall provide RF safety training to personnel who routinely work directly with RF equipment or whose work environments contain RF equipment that routinely emits RF levels in excess of the exposure limits for controlled environments. Activities shall conduct training before assignment to such work areas, and shall focus on awareness of the potential hazards of RF fields, established procedures and restrictions to control RF exposures, and personnel responsibility to limit their own exposures. Activities may incorporate RF safety training in periodic safety training programs to satisfy command-training objectives.

#### **2222. Protective Clothing**

The Navy does not authorize RF-shielded protective clothing for routine use as a means of protecting personnel. This does not preclude use of other protective equipment, such as electrically insulated gloves and shoes for protection against electrical shock or RF burn, or for insulation from the ground plane.

#### **2223. Low Frequency and Static Electric and Magnetic Fields**

a. Electric and magnetic fields exist around power lines, electrical devices and appliances. The intensity of these fields decreases rapidly with distance. While questions have been raised about the possibility of health effects from exposure to electric and magnetic fields at levels that are commonly encountered in homes and most work places, findings issued by various scientific review panels have not confirmed that such fields pose any risk to health.

b. Since the body is a conductor, electric fields induce a charge on the surface of the body that results in current flow inside the body. Time varying magnetic fields, or body

movement in a static magnetic field, induce electric fields and current flow inside the body. For commonly encountered fields near high voltage transmission lines, power distribution systems, office equipment, and household appliances, the magnitude of these induced currents will typically be below levels which are perceptible. Existing guidelines given in reference 22-14 have been established to limit induced current densities in body tissues. This rationale has been used to set a biological endpoint since no other definable risk criterion has been identified for establishing a health standard for electric and magnetic fields.

#### **2224. Video Display Terminals**

a. Video display terminals (VDTs) are electronic devices that typically involve individuals remaining in close proximity to them for long periods of time. Various forms of electromagnetic energy are associated with VDTs, including static electric fields near the screen, 60 Hz electric and magnetic fields, higher frequency fields around 10 kHz from the beam sweep circuits and low intensity X-rays near some internal components.

b. Some computer manufacturers have chosen to advertise VDTs with low magnetic field emissions for marketing reasons. Other manufacturers have produced various products that are advertised as reducing electromagnetic emissions from VDTs. Extensive measurements have shown that the fields emitted from VDTs are already well below exposure guidelines. There is no requirement or need to periodically measure emissions from VDTs, or to procure add-on screens for shielding electromagnetic emissions from VDTs.

c. VDTs are sensitive to electrical interference, and the displays have been reported to be affected by 60 Hz magnetic fields as low as 10 to 15 milligauss. Such interference poses no health concerns other than annoyance. Correction usually involves relocation of the VDT away from the source of interference or in some cases, adding shielding to nearby power distribution components.

#### **2225. Responsibilities**

a. Commander, Naval Sea Systems Command (COMNAVSEASYS COM) shall:

(1) Serve as the lead agent for RF radiation safety and hazard analysis for the Navy's Electromagnetic Environmental Effects (E3) Program, and as the technical lead agency for laser safety and laser safety hazard analysis in the Navy.

(2) Ensure a capability exists to conduct laser hazard surveys of military laser systems, laser installations and firing ranges.

(3) Sponsor reference 22-10 in providing operating procedures and guidance for electromagnetic hazards to personnel, ordnance and fuel and for RF hazard certification for ships and craft.

b. Commander, Space and Naval Warfare Systems Command (COMSPAWARSYSCOM) shall:

(1) Serve as the technical lead agency for RF radiation safety and hazard analysis as a component of the Navy's Electromagnetic Environmental Effects (E3) Program for shore facilities.

(2) Provide information to COMNAVSEASCOM for updating information on the hazards of electromagnetic radiation to personnel and fuels in reference 22-10.

c. Chief, Bureau of Medicine and Surgery (BUMED) shall:

(1) Serve as administrative lead agency for laser safety and laser safety hazard analysis in the Navy.

(2) Will maintain a list of all DON laser systems that have been exempted from Title 21 Code of Federal Regulations and their status.

(3) Provide the secretariat to the LSRB and ensure laser safety design standards, safety documentation and training and laser protective devices are developed for military laser systems.

(4) Ensure laser safety design standards, safety documentation, training standards, and laser eye protection are developed for military laser systems.

(5) Serve as the lead agency for guidance on personnel exposure limits for lasers, RF and other electromagnetic sources.

(6) Provide technical assistance to Navy commands addressing electromagnetic exposures or human health effects issues with local governments or state agencies.

(7) Maintain the Navy repository of laser and RF investigative reports involving personnel injuries from lasers and RF overexposures.

(8) Provide assistance through the Navy Environmental Health Center for laser and RF hazard evaluations at industrial and medical activities.

(9) Sponsor appropriate biological research for addressing the effects of electromagnetic energy on humans.

d. Other Echelon 2 and headquarters commands shall ensure:

(1) Safety requirements are included in procurement activities for the design, operation, maintenance, repair, technical orders, handbooks, manuals and other publications related to lasers and RF systems per references 22-6 and 22-11.

(2) Laser and RF hazard surveys and certifications are obtained for new equipment, installations, laser training ranges or modifications of existing equipment, installations or ranges when required to define laser or RF exposure levels or determine personnel access restrictions.

- e. Commanders, commanding officers, and officers in charge shall:
- (1) Establish a laser safety program per reference 22-6 to protect personnel.
  - (2) Ensure personnel are trained to be familiar with potential laser or RF exposure hazards and appropriate protective measures.
  - (3) Allow laser operation only at installations and ranges that have been certified and approved by an appropriate LSSO as safe for each specific laser and tactic to be used.
  - (4) Obtain safety certification for non-ionizing radiation sources. Update these certifications when new items are added. Also obtain provisional certification whenever new lasers or RF systems are installed, existing RF radiating antennas are modified or relocated or new construction occurs in the vicinity of an RF radiating antenna, when such changes may affect restrictions or boundaries imposed for limiting personnel exposures to RF fields.
  - (5) Ensure laser or RF surveys are conducted by technically competent personnel. Technical activities are listed in appendix 22-A, for laser and 22-B for RF safety.
  - (6) Investigate, document and report results of laser or RF over-exposure incidents per chapter 14 of this document. Refer also to appendix 22-A for laser incidents, 22-B for RF incidents, and references 22-6 and 22-7.
  - (7) Ensure that the use and disposal of military exempt lasers are per reference 22-1.
  - (8) Prepare and retain on-site an annual inventory of all Class IIIb, Class IV, and all classes of military exempt lasers per references 22-1 and 22-6.

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## Chapter 22

### References

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- 22-3. American National Standards Institute (ANSI) Z136.1-2000, American National Standard for the Safe Use of Lasers, (NOTAL) [www.ansi.org/](http://www.ansi.org/).
- 22-4. 21 CFR 1040 of 1 Apr 2000 Performance Standards for Light-Emitting Products  
[http://www.access.gpo.gov/nara/cfr/waisidx\\_01/21cfr1040\\_01.html](http://www.access.gpo.gov/nara/cfr/waisidx_01/21cfr1040_01.html).
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- 22-8. BUMEDINST 6470.19, of 24 Aug 90, Laser Safety for Medical Facilities.
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- 22-12. Institute of Electrical and Electronics Engineers, IEEE Std.C95.1, 1999 Edition (Incorporating IEEE Std C95.1-1991 and IEEE Std C95.1a-1998, IEEE Standard for Safety Levels with Respect to Human Exposure to Radiofrequency Electromagnetic Fields 3kHz to 3GHz, (NOTAL) <http://www.ieee.org/portal/index.jsp>.
- 22-13. Institute of Electrical and Electronics Engineers, IEEE Standard Recommended Practice for Measurement of Potentially Hazardous Electromagnetic Fields, RF and Microwave, IEEE C95.3-1991 (NOTAL) <http://www.ieee.org/portal/index.jsp>.
- 22-14. Institute of Electrical and Electronics Engineers, IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz, IEEE C95.6-2000 (NOTAL) <http://www.ieee.org/portal/index.jsp>.

## Appendix 22-A

### **Laser Classification, Labeling, Warning Signs, Technical Assistance and Exposure Incidents**

#### **CLASS I LASERS**

Lasers which by inherent design normally cannot emit radiation levels in excess of the permissible exposure limits. Not hazardous under almost all operational or viewing condition. No controls required.

#### **CLASS II LASERS**

Low-powered lasers and laser systems that emit less than 1mW visible continuous wave (CW) radiation. Not considered hazardous for momentary exposure. These lasers carry a CAUTION label.

#### **CLASS III LASERS**

Lasers which do not present a diffuse reflection hazard.

##### **Class IIIa**

Low-powered laser systems that emit 1 to 5 mW visible CW radiation. Lasers or laser systems of less than 2.5 mW/cm<sup>2</sup> are not considered to be hazardous for momentary (0.25 seconds) unintentional exposures unless the beam is viewed with magnifying optics. These lasers carry a CAUTION label. Lasers that exceed 2.5 mW/cm<sup>2</sup> carry a DANGER label and should not be directly viewed even momentarily.

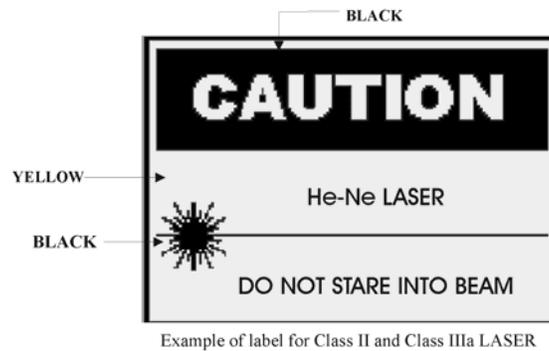
##### **Class IIIb**

Medium-powered lasers or laser systems considered to be hazardous when the direct or specularly reflected beam is viewed without protection. Special care is required to prevent intrabeam viewing and to control specular reflections from mirror-like surfaces. These lasers carry a DANGER label and require the use of protective eyewear.

#### **CLASS IV LASERS**

High-powered lasers or laser systems that can be hazardous to the eye from intrabeam viewing, specular reflections or diffuse reflections. They may also be hazardous to the skin or ignite flammable materials. These lasers carry a DANGER label. Strict controls are required, including use of protective eyewear and door interlocks.

### Example of a Class II Laser Warning Label



### Example of a Class IV Laser Warning Label



Laser safety-warning signs for posting at laser facilities and at laser ranges are stocked at the Naval Inventory Control Point, Naval Publication and Forms Branch, 700 Robbins Ave., Philadelphia, PA 19111-5098. For Information concerning these forms contact: commercial (215)(697-2626), or DSN (442-2626). Order on MILSTRIP via Defense Automated Addressing Systems. The following signs are available:

Sign Contents: "DANGER, LASER, KNOCK BEFORE ENTERING"  
Type: Laminated 10 inches high by 14 inches wide  
Form No.: 0118-LF-114-8900

Sign Contents: "DANGER, LASER RANGE IN USE, DO NOT ENTER"  
Type: Laminated 18 inches high by 24 inches wide  
Form No.: 0118-LF-020-1100

### **Laser Exposure Incidents**

a. If eye damage from laser exposure is suspected or observed, and in all cases of exposure to levels in excess of five times the laser exposure limits of this chapter, the cognizant activity shall ensure the individual receives a medical examination by an ophthalmologist or optometrist as soon as possible. While laser injuries associated with military operations have been rare, limited experience indicates that the extent of eye damage from an accidental laser

exposure may not be readily or initially apparent to either the individual or to local medical personnel. Since early medical intervention may lessen the severity of the damage or subsequent retinal scarring from the laser injury, efforts should be made to have the individual promptly seen by an ophthalmologist or at the ophthalmology department of a hospital **on a walk-in emergency basis**.

b. Commands shall investigate and document all suspected laser incidents or mishaps involving personnel exposure to excessive laser energy in accordance with chapter 14 of this manual. The command exercising operational control of the laser has the primary lead for conducting the laser exposure investigation and for ensuring the appropriate report is filed.

c. Commands are required to report exposure incidents (as outlined in subparagraph g) and investigate exposure levels for the following situations:

(1) Personnel injury has been sustained or physical symptoms are experienced by the individual(s), which are believed to be associated with laser exposure.

(2) Inadvertent exposure occurred to members of the general public or to other non-involved personnel as a result of naval operations, which have exceeded the PEL.

(3) Exposure circumstances or the severity of the incident or mishap are such that inquires from news media are anticipated, or are deemed to be of interest to the chain-of-command.

d. Commands shall refer personnel reporting physical symptoms or suspected of having been exposed to levels in excess of the PEL for a medical evaluation or follow-up.

e. Commands shall make initial notification for the occurrence of a laser incident by telephone, fax, message or e-mail to the appropriate technical assistance point listed in this appendix with copy to the Bureau of Medicine and Surgery (M3F7). Discussions following this initial notification can determine whether a more extensive investigation will be necessary and whether a site visit should be scheduled to assist in making laser measurements or an exposure evaluation. Central to the command's investigation will be a determination of the degree of laser exposure incurred since such incidents often involve emotional concerns or health worries, which cannot be easily addressed when measurement data is not available. Performing laser measurement assessments are often beyond the technical capabilities of the local command or the nearby medical facility.

f. In cases where it is necessary to reconstruct events or reestablish equipment configuration for conducting a laser exposure assessment, the accuracy of the recreation is crucial to the validity of the subsequent measurements. The command's investigating officer should apply particular attention to obtaining written statements from those involved giving detailed descriptions of the sequence of events, exposure times and equipment set-ups, as well as obtaining appropriate charts, diagrams or photographs indicating the locations of exposed personnel.

g. The command shall submit a final report on the laser incident to the Commander, Naval Safety Center, and to the Bureau of Medicine and Surgery (M3F7), with copies to appropriate headquarters and systems commands within 30 days of the incident. The

command shall also include in the report to BUMED pertinent medical records, retinal photographs and identification data for personnel who were exposed.

### **Laser Technical Assistance**

Interested parties may obtain technical assistance and advice regarding laser safety as follows:

a. For laser operations at medical activities, contact the Navy Environmental Health Center, (NEHC), 620 John Paul Jones Circle, Suite 1100, Portsmouth, VA 23708-2103, DSN 377-0700, commercial (757) 953-0700, fax (757) 953-0685.

b. For all laser operations, other than medical, military exemption of lasers, and certification surveys of laser firing ranges, contact the following activities: (Funding for services shall be provided by the requesting command).

Laser System Evaluation and Range Surveys:

Naval Surface Warfare Center Dahlgren Division, G-72, 17320 Dahlgren RD Dahlgren, VA 22448, DSN 249-1060/1149/2442, commercial (540) 653-1060/1149/2442, fax (540) 653-8453 <http://www.navylasersafety.com/>.

Laser Range Surveys:

Naval Surface Warfare Center Corona Division (Code SE-41), 2300 Fifth St, Norco, CA 92860 mailing address P.O. Box 5000 Corona, CA 92878-5000, DSN 933-4090, commercial (909) 273-4090 or fax (909) 273-5089.

c. For laser bio-effects and medical research issues, or assistance in evaluating laser-induced injuries, contact the Naval Health Research Center-Detachment Energy Bioeffects Laboratory, Brooks City Base 8315 Navy Road, Brooks AFB, TX 78235-5365, DSN 240-4699/6552, commercial (210) 536-4699/6552, fax (210) 536-6439.

d. For guidance on laser exposure limits and health issues, contact the Non-ionizing Radiation Health Branch, Bureau of Medicine and Surgery (M3F7), 2300 E Street NW, Washington DC 20372-5300, DSN 762-3448/3444, commercial (202) 762-3448/3444, fax (202) 762-0931.

## Appendix 22-B

### RFR Hazard Warning Sign, Labels, Exposure Incidents and Technical Assistance

Sign Title: Radiofrequency Hazard Warning - Keep Moving  
Form No.: 101/5  
Type: 5-inch Label  
NSN: 7690-01-377-5893  
Superseded NSN: 0967-LF-183-8010

Sign Title: Radiofrequency Hazard Warning - Keep Moving  
Form No.: 101/12  
Type: 12-inch Label  
NSN: 7690-01-377-5894  
Superseded NSN: 0967-LP-183-8010

Sign Title: Radiofrequency Hazard Warning - Beyond This Point  
Form No.: 102/5  
Type: 5-inch Label  
NSN: 7690-01-377-5895  
Superseded NSN: 0967-LP-153-8010

Sign Title: Radiofrequency Hazard Warning - Beyond This Point  
Form No.: 102/12  
Type: 12-inch Label  
NSN: 7690-01-377-5082  
Superseded NSN: 0967-LP-153-8010

Sign Title: Radiofrequency Hazard Warning - Burn Hazard  
Form No.: 103/5  
Type: 5-inch Label  
NSN: 7690-01-377-5896  
Superseded NSN: 0967-LP-315-2010

Sign Title: Radiofrequency Hazard Warning - Burn Hazard  
Form No.: 103/12  
Type: 12-inch Label  
NSN: 7690-01-377-5898  
Superseded NSN: 0967-LP-315-2010

Sign Title: Radiofrequency Hazard Warning - Fuel Operations  
Form No.: 104/5  
Type: 5-inch Label  
NSN: 7690-01-377-5899  
Superseded NSN: 0967-LP-315-1010

Sign Title: Radiofrequency Hazard Warning - Fuel Operations  
Form No. 104/12  
Type: 12-inch Label  
NSN: 7690-01-377-5900  
Superseded NSN: 0967-LP-315-1010

Sign Title: Radiofrequency Hazard Warning - Blank  
Form No.: 105/5  
Type: 5-inch Label  
NSN: 7690-01-377-5374  
Superseded NSN: 0967-LP-350-1010 and 0967-LP-096-3010

### **Reporting of RF Exposure Incidents**

a. Commands shall investigate and document all suspected RF incidents or mishaps involving personnel exposure to excessive RF levels, in accordance with reference 22-6 of this manual. The command exercising operational control of the RF source has the primary lead for conducting the RF exposure investigation and for ensuring the appropriate report is filed.

b. Commands are required to report exposure incidents and investigate exposure levels for the following situations:

(1) Personnel injury has been sustained or physical symptoms are experienced by the individual(s) that are believed to be associated with RF exposure.

(2) Personnel exposure has been determined to have exceeded the appropriate PEL in terms of power density by a factor of five or more. (For exposure determinations, provisions for time averaging and spatial averaging can be used in conjunction with transmitter duty factors and antenna rotation or scanning rates to establish maximum likely exposure levels.)

(3) Inadvertent exposure occurred to members of the general public or to other non-involved personnel as a result of naval operations that have exceeded the appropriate PEL.

(4) Exposure circumstances or the severity of the incident or mishap are such that inquiries from news media are anticipated, or are deemed to be of interest to the chain of command.

c. Commands shall refer personnel reporting physical symptoms, or suspected of having been exposed to levels in excess of five times the PEL, for a medical evaluation or follow-up. Since medical evaluations following RF exposure have been infrequently required and physical signs of injury are usually not manifested, medical personnel should be advised to refer to reference 22-7 for information on RF biological effects.

d. Commands shall make initial notification for the occurrence of an RF incident by telephone, fax, message or e-mail to the appropriate technical assistance point listed in this appendix with copy to the Bureau of Medicine and Surgery (M3F7). Discussions following this

initial notification can determine whether a more extensive investigation will be necessary and whether a site visit should be scheduled to assist in making RF measurements or an exposure evaluation. Central to the command's investigation will be a determination of the degree of RF exposure incurred since such incidents often involve emotional or health concerns which cannot be easily addressed when measurement data is not available. Performing RF measurement assessments are often beyond the technical capabilities of the local command or the nearby medical facility.

e. In cases where it is necessary to reconstruct events or reestablish equipment configuration for conducting an RF exposure assessment, the accuracy of the recreation is crucial to the validity of the subsequent RF measurements. The command's investigating officer should apply particular attention to obtaining written statements from those involved giving detailed descriptions of the sequence of events, exposure times and equipment set-ups, as well as obtaining appropriate charts, diagrams or photographs indicating the locations of exposed personnel.

f. The command shall submit a final report on the RF incident to the Commander, Naval Safety Center and to the Bureau of Medicine and Surgery (M3F7), with copies to appropriate headquarters and systems commands. The command will also include in the report to BUMED pertinent medical records and identification data for personnel who were exposed. BUMED is tasked with maintaining a permanent repository for RF exposure incidents.

### **Technical Assistance**

a. For RF health hazards, personnel exposures and exposure incidents from industrial and medical RF emitting sources, contact the Navy Environmental Health Center (NEHC), 620 John Paul Jones Circle, Suite 1100, Portsmouth, VA 23708-2103, DSN 377-0700, commercial (757) 953-0700, fax (757) 757-953-0685.

b. For measurement surveys for shipboard RF emitting systems, contact Systems Electromagnetic Effects Branch (Code J-52), Naval Surface Warfare Center Dahlgren Division, 17320 Dahlgren Road, Dahlgren, VA 22448-5100, DSN 249-8594, commercial (540) 653-3487, or (401)- 832-5552, fax (540) 653-7494.

c. For site certification and measurement surveys for shore-based RF emitting systems, contact Space and Naval Warfare Systems Center (SPAWARSYSCEN) Charleston (Attn: Code 323), P.O. Box 190022, North Charleston, SC 29419-9022, DSN 588-4228, or commercial (843) 218-4228. For shore facilities within PACNAVFACENGCOM geographical region, contact Space and Naval Warfare Systems Activity Pacific (SPAWARSYSACT PAC) (Attn: Code 2915), 675 Lehua Avenue, Pearl City, HI 96782-3356, DSN 315-474-7330, commercial (808) 474-7330, fax (808) 474-5511

d. For RF bio-effects and medical research issues, or assistance in evaluating personnel overexposure incidents, contact the Naval Health Research Center-Detachment Directed Energy Bioeffects Laboratory, Brooks City Base, 8315 Navy Road, Brooks City Base TX 78235-5365, DSN 240-4699/6532, commercial (210) 536-4699/6532, fax (210) 536-6439.

e. For guidance on RF exposure limits and health issues, contact the Non-Ionizing Radiation Health Branch, Bureau of Medicine and Surgery (M3F7), 2300 E Street NW, Washington DC 20372-5300, DSN 762-3448/3444, commercial (202) 762-3448/3444, fax (202) 762-0931.

## CHAPTER 23

### ERGONOMICS PROGRAM

#### **2301. Background and Discussion**

a. Ergonomics is the field of study that involves the application of knowledge about physiological, psychological and biomechanical capacities and limitations of the human body. This knowledge is applied in the planning, design, and evaluation of work environments, jobs, tools and equipment to enhance worker performance, safety, and health. Ergonomics is essentially fitting the workplace to the worker.

b. This program seeks to prevent injuries and illnesses by applying ergonomic principles to identify, evaluate, and control ergonomic risk factors for work-related musculoskeletal disorders (WMSDs). WMSDs are defined as a class of disorders involving damage to muscles, tendons, tendon sheaths, and related bones, and nerves. They may also be known more specifically as repetitive strain injuries (RSI); Cumulative Trauma Disorders (CTDs) and Overuse Syndrome. WMSDs result from the cumulative effect of repeated traumas associated with specific workplace risk factors. Risk factors include but are not limited to:

(1) Force - the amount of physical effort required to maintain control of equipment or tools or perform a task such as heavy lifting, pushing, pulling, grasping, or carrying.

(2) Repetition - performing the same motion or series of motions continually or frequently for an extended period of time with little variation. Examples include prolonged typing, assembling components and repetitive hand tool usage.

(3) Awkward or static postures - awkward posture refers to positions of the body (limbs, joints, back) that deviate significantly from the neutral position while performing job tasks. For example, overhead work, extended reaching, twisting, and squatting or kneeling. Static postures refer to holding a fixed position or posture. Examples include gripping tools that cannot be set down or standing in one place for prolonged periods.

(4) Vibration - Localized vibration, such as vibration of the hand and arm, occurs when a specific part of the body comes into contact with vibrating objects such as powered hand tools (e.g., chain saw, electric drill, chipping hammer) or equipment (e.g., wood planer, punch press, packaging machine). Whole-body vibration occurs when standing or sitting in vibrating environments (e.g., operating a pile driver or driving a truck over bumpy roads) or when using heavy vibrating equipment that requires whole-body involvement (e.g., jackhammers).

(5) Contact stress - results from occasional, repeated or continuous contact between sensitive body tissues and a hard or sharp object. Examples include resting the wrist on a hard desk edge, tool handles that press into the palms or using the hand as a hammer.

When present for sufficient duration, frequency, magnitude, or in combination, these risk factors may cause WMSDs. In addition, personal risk factors, such as, physical conditioning, existing

health problems, gender, age, work technique, hobbies and organizational factors (e.g. job autonomy, quotas, deadlines) may contribute to but do not cause the development of WMSDs. Additionally, environmental conditions such as working in temperature extremes may contribute to the development of WMSDs.

### **2302. Management Commitment**

A successful ergonomic program cannot be implemented without commitment by the commanding officer, or officer in charge, to resource and support worker and staff efforts to control ergonomic risk factors and reduce associated injury. Aggressive, visible, and coordinated management actions are necessary to prevent WMSDs, control costs related to these injuries, and improve mission readiness.

### **2303. Employee Involvement**

Employee involvement and feedback are essential to identify ergonomic hazards and develop an effective means for their abatement. A command ergonomic program shall include worker involvement to assist in ergonomic hazard identification.

a. If the command has a safety and health committee, the committee shall review and analyze ergonomic problem areas and recommend corrective actions.

b. The command may form worker-based teams to identify ergonomic problems, analyze risk factors, and develop solutions. Civilian best business practices reports and military studies have proven worker-based teams to be extremely effective in controlling ergonomic risk factors and reducing injury.

### **2304. Process Review and Measurement**

a. Each activity shall include a self-assessment of its ergonomic program as part of the Process Review and Measurement System (PR&MS), or equivalent management system, see para 0505.

b. Each activity shall conduct an analysis of WMSD reportable and recordable injury and illness data from reference 23-1, or an equivalent database, or log at least annually. Refer to paragraph 1410 of this instruction for guidance on completing this form.

c. WMSD analyses should include specific departments, codes, or operations experiencing WMSDs to determine where there is greater risk for injury. An accurate trend analysis for WMSDs should also include, but is not limited to, the following:

- (1) Body part involved.
- (2) Specific type of injury/illness.

(3) Number of known WMSD injuries and illnesses or determine rate of WMSD within a defined population.

(4) Number of lost workdays due to WMSD injury and illness or determine rate within a defined population.

(5) Description of job(s) to include ergonomic risk factors.

(6) Cost of treatment (if known).

d. An activity should consider observations made during safety inspections and other factors, such as absenteeism, high personnel turnovers, fitness and age of workers in the identification of ergonomic risk factors. The command may also elect to survey personnel in occupations known or suspected to have high risks to determine if they have experienced unreported warning signs or injuries.

e. Additional measures and metrics to assess and monitor the ergonomic program may be developed by each activity as necessary to adequately conduct more detailed analyses.

### **2305. Job Task Analysis**

a. Activities shall identify ergonomic risk factors as part of, or in conjunction with, workplace inspections required by chapter 9 and industrial hygiene surveys provided per paragraph 0803. Risk factors to consider include awkward and static posture, excessive force or repetition, contact stress, segmental or whole body vibration, and high hand forces.

b. The activity shall review the identified risk factors using appendix 23-A or 23-B to determine what action is required to eliminate or reduce the risk factor. There may be situations where action may not be deemed necessary after thorough analysis. If no action is taken, the risk factor analysis and decision rationale shall be documented in writing and kept on file for at least five years.

c. Activities shall use appendix 23-A or 23-B for the following situations where appropriate:

(1) Analysis of a task or operation attributable to a WMSD.

(2) Analysis of a task or operation identified as causing muscular pain or joint pain.

(3) Analysis of a task or operation identified as causing numbness or tingling of any body part.

(4) Analysis of a task or operation identified as causing extreme discomfort or muscular fatigue that is not relieved by rest.

(5) Analysis of repetitive motion tasks and operations considered significant by the activity.

(6) As the initial analysis conducted by a worker-based team.

(7) New analysis of jobs, tasks, operations, or workstations modified due to ergonomic concerns.

**NOTE:**

The Job Requirements and Physical Demands survey (JRPD) is an additional ergonomic tool that may be used by safety and occupational health personnel to identify jobs with ergonomic risk factors, employee discomfort, and assess ergonomic stressors. The JRPD may be used as a follow-up tool to appendix 23-A or independently to quantify ergonomic risks and prioritize projects. JRPD information may be provided through the resource list in appendix 23-C.

d. Ergonomic assessments shall be assigned Risk Assessment Codes (RAC) consistent with chapters 9 and 12.

**2306. Command Assistance**

The principles and application of ergonomics is a multidisciplinary applied science encompassing medical, engineering, industrial hygiene, and safety fields. It is recognized that activity personnel may not have the experience necessary to identify, analyze and resolve all ergonomic situations. When the safety manager or other internally available staff identifies ergonomic issues beyond the scope of their capabilities, commands should seek assistance from the resource list in appendix 23-C.

**2307. Hazard Prevention and Control**

a. The preferred priorities for corrective actions of ergonomic risk factors include: ergonomic risk elimination, engineering controls, substitution of materials/tools/equipment, improved work practices and administrative controls. Examples of administrative controls are: lifting restrictions, adjustment of work-rest cycles, slowing work pace, and job rotation.

b. Activities shall not use back support belts or wrist splints as safety protective equipment. These devices are considered medical appliances, and must be prescribed by a credentialed health care provider who shall assume responsibility for proper fit of the device, treatment, monitoring and supervision of the wearer.

c. Engineering Controls. Engineering controls are the preferred mechanism for controlling ergonomic risk factors. These controls may entail redesign of workstations, work methods, and tools to reduce or eliminate the risk factors. References 23-2 through 23-12 contain detailed guidance on principles and techniques for implementing engineering controls.

d. Workstation Design. Workstations should be adjustable to accommodate the person/persons performing a specific task or job, not just the average worker. Generally, design limits are based upon a range from the 5th percentile female to the 95th percentile male values for critical body dimensions. The workspace should be large enough to allow the full range of required movements. Anthropometrics data and design recommendations for military equipment and facilities can be found in reference 23-3.

e. Illumination. This reference also includes design criteria for task illumination, vibration levels, noise levels and ventilation. Adequate illumination for highly visual tasks may be one of the primary concerns for some workstations. Both the quantity and the quality of light are important. Glare, contrast, and shadows influence lighting quality and can seriously diminish performance. Illumination design guidance may be found in reference 23-4. Existing illumination problems should be corrected using guidance from references 23-4 and 23-5 or other professional references that meet or exceed the references of this chapter.

f. Design of Work Methods. Analyses of work processes, that require consideration of worker posture and repetition rate, should be supplemented by addressing the force or exertion required of workers. Redesign of work methods should also consider any changes in the time required to perform tasks. WMSD reduction benefits may not be realized if ergonomic related steps are added to the process, but sufficient time is not allowed to perform such tasks.

g. Tool Design and Handles. Properly designed tools and handles increase worker productivity by extending and amplifying manipulative abilities and protecting the workers against concentrated forces. Activities shall pay proper attention to the selection and design of tools and workstation layouts to minimize ergonomic stressors and back injuries. Activities and employees shall select or design tools and handles to minimize or eliminate the following risk factors for both male and female workers:

- (1) High contact forces and static loading.
- (2) Extreme or awkward joint positions.
- (3) Repetitive action of the fingers, wrist and arm.
- (4) Tool vibration (see references 23-9 and 23-10).
- (5) Excessive force or grip strength requirements.

**NOTE:**

Activities can accomplish many workstation and job procedure designs using an approach to ergonomics based on an understanding of human anatomy and physiology without resorting to time-consuming and expensive measurements. For example, activities should select hand tools to distribute the applied forces over a wide area of the hand regardless of the job being performed. Sometimes it is possible, on a small scale, to obtain sample tools from manufacturers for trial periods to allow employees and management to decide which tool is the best based upon comfort, usability, utility, durability, price and productivity. This process will increase product acceptance and take advantage of worker experience and knowledge.

h. Administrative Controls. Administrative controls are procedures and practices that limit exposure by control or manipulation of work schedule or the manner in which work is performed. Administrative controls reduce the exposure to ergonomic stressors and thus reduce the cumulative dose to any one worker. If you are unable to alter the job or workplace to

reduce the physical stressors, administrative controls should be used to reduce the strain and stress on the work force. Administrative controls are most effective when used in combination with engineering controls. Examples of administrative controls include:

- (1) Rotating employees to jobs with dissimilar physical requirements.
- (2) Establishing adequate work/ rest schedules or stretch and flex programs.
- (3) Where heavy objects must be handled, activities may calculate a recommended weight limit using the methods contained in references 23-2, 23-8 or 23-12 to specify the maximum lift an unassisted individual should attempt for one or two handed lifts.
- (4) In situations where heavy lifts cannot be avoided, establish a policy to include the assistance of other personnel in the lift.
- (5) Label the actual weight of any object that a worker needs to lift or carry.
- (6) Ensure that material in storage is stacked off the floor and placed at no less than knuckle height.

i. Planned Facility Modifications and Equipment Purchases. When activities develop plans for new or modified facilities, processes, jobs, tasks, materials and equipment, they shall analyze such plans for opportunities to eliminate or reduce ergonomic hazards. For example, when purchasing office furniture to equip new facilities or replace existing equipment, activities should consider selecting equipment that allows easy adjustment of chair height, keyboard position and video display screen position. Reference 23-3 provides further information on physical body dimensions to assist with selecting the best tool or workstation layout to fit the worker.

j. Centrally-Managed Navy Safety and Occupational Health (SOH) Funds. Some projects developed to address ergonomic hazards that exceed the funding capability of local organizations may qualify for centrally-managed Navy Safety and Occupational Health (SOH) funds. Applications for these funds should be submitted per the procedures of chapter 12, section 1204, Hazard Abatement Program.

### **2308. Ergonomic Training**

a. A key to maintaining an effective ergonomics program is the proper training of managers, supervisors, professional staff, ergonomic teams and employees. General ergonomics training shall be provided to all employees as applicable to the employee's role in the workplace. Periodic refresher training should be provided at command discretion. Recommended training topics for various personnel are provided in appendix 23-D.

b. Safety and occupational health professional staff responsible for conducting the ergonomics program shall complete the Naval Occupational Safety and Health and Environmental Training Center (NAVOSHENVTRACEN) Ergonomics Program course (A-493-0085) or its equivalent. Appendix 23-D provides further information on equivalent training.

**2309. Medical Program**

a. Occupational Medicine Services. Cognizant medical commands shall support line activity initiatives to reduce WMSDs by providing occupational medicine services as described in section 0807. Occupational medicine professionals shall collaborate with commands, for the purpose of participating in command ergonomics teams, conducting work place visits to obtain knowledge of operations, work practices and transitional-duty jobs to provide ergonomics assessments, and facilitate recovery of individuals with WMSDs.

b. Physical Standards Pre-placement and Periodic Examinations. For positions that involve significant risk for WMSDs, the command, human relations office and cognizant medical command shall review the presence and adequacy of existing physical requirements of the job and make recommendations for improvement to the command.

**NOTE:**

As warranted, consistent with the provisions of 5CFR339.301 “an agency may require an individual who has applied for or occupies a position which has medical standards or physical requirements or which is part of an established medical evaluation program, to report for a medical examination:

(1) Prior to appointment or selection (including reemployment on the basis of full or partial recovery from a medical condition).

(2) On a regularly recurring, periodic basis after appointment; or

(3) Whenever there is a direct question about an employee's continued capacity to meet the physical or medical requirements of a position.

(4) In agency may require an employee who has applied for or is receiving continuation of pay or compensation as a result of an on-the-job injury or disease to report for an examination to determine medical limitations that may affect placement decisions.”

c. Health Education for Ergonomic Hazards. Each cognizant medical command shall collaborate with and assist the employing command in providing health education and lifestyle modification information to individuals with WMSD symptoms and for all identified workers at high risk for WMSDs.

d. Recovery of Injured Employees. The Navy encourages cognizant medical commands to offer medical care, advice, counseling and physical therapy services to rehabilitate employees with WMSDs. Where such services are not available from the cognizant medical command, activities may contract for physical therapy services, provided the cognizant medical command has an opportunity to review the procurement specification prior to solicitation and provide professional medical oversight of the contract.

e. Monitoring for Trends. Health care professionals shall periodically, e.g., monthly; review occupationally related acute care visits to monitor WMSD trends.

## **2310. Responsibilities**

a. Echelon 2 Commands shall:

(1) Provide guidance and assistance as necessary to subordinate commands on program development and implementation.

(2) Coordinate program implementation among similar activity types; disseminate information on process improvements to eliminate duplication of effort.

b. Commander, Naval Supply Systems Command (COMNAVSUPSYSCOM) shall take appropriate actions to increase the availability of ergonomically-designed furnishings, equipment and tools through the supply system. Conversely, commands shall take efforts to purge the supply system of ergonomically incorrect equipment such as back belts.

c. Commander, Naval Facilities Engineering Command (COMNAVFACENGCOM) shall:

(1) Perform comprehensive ergonomic risk analysis of WMSD factors as part of the facility design process.

(2) Review plans for new or modified facilities, processes, jobs, tasks, tools, materials and equipment to ensure that changes will reduce or eliminate ergonomic risk factors for WMSDs.

(3) Develop and implement a Navy-wide program to minimize ergonomic stress through facility design, equipment selection and maintenance of facilities, equipment and tools.

d. Naval Occupational Safety and Health, and Environmental Training Center (NAVOSHENTRACEN) realigned under the Navy Safety Center (NAVSAFECEN) shall insure appropriate training is provided consistent with this chapter.

e. Chief, Bureau of Medicine and Surgery (BUMED) shall:

(1) Develop technical and administrative guidance for the medical aspects of the ergonomics program.

(2) Provide medical support by developing therapy and treatment programs, including provision of physical therapists who perform in-house physical therapy to injured employees, serve as part of the education team providing training to prevent injuries and ergonomically evaluate return-to-work capabilities.

f. Commander, Naval Safety Center shall conduct a mishap analysis reviewing available data for a 5-year period, to identify WMSDs by activity and command, including number or rate of WMSD, injury/illness type, and body part.

g. Commanding Officers of Medical Commands, Activities, and Treatment Facilities  
shall:

- (1) Monitor WMSD trends using appropriate records.
- (2) Verify low risk of transitional duty assignments.
- (3) Provide health education for personnel with a past history or current symptoms of WMSD and education on preventive measures for high-risk individuals.
- (4) Assist line activities in the medical recovery of WMSD individuals and the implementation of transitional duty programs.
- (5) Assist commands in the development of physical requirements for positions.

h. Commanders, Commanding Officers and Officers in Charge shall:

- (1) Annually, analyze injury and illness records and other pertinent information to determine the need for ergonomic improvements and corrective actions within the activity.
- (2) Identify and budget resources to administer an effective ergonomics program consistent with the guidance in this chapter.
- (3) Consider shift-work related stressors when determining scheduling policies. Appendix 23-E provides guidance for shift work that does not involve military watch standing or military operational environments.
- (4) Where rehabilitative services are not available from the cognizant medical command, activities may contract for such services, provided the cognizant medical command has an opportunity to review the procurement specification prior to solicitation and provide professional medical oversight of the contract.

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Chapter 23

References

23-1. OPNAVINST 5102.1D/MCO P5102.1B, " of 25 May 05, "Navy and Marine Corps Mishaps and Safety Investigation, Reporting and Recordkeeping,  
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**Appendix 23-A**

**Physical Risk Factor Ergonomic Checklist**

The Physical Risk Factor Ergonomic Checklist can be used as a screening tool to identify ergonomic stressors in the workplace. For each category determine whether the physical risk factors rate as a “caution” or “hazard” by placing a check (✓) in the appropriate box. Risk of developing a Work-Related Musculoskeletal Disorder is increased when ergonomic risk factors occur in combination.

If a hazard exists, it must be reduced below the hazard level or to the degree technologically and economically feasible.

If the task rates a “caution”, then it should be periodically reevaluated since changes in the work environment may create new ergonomic stressors. Ensure significant contributing physical or personal risk factors are not present.

The checklist can be used for typical work activities which are a regular and foreseeable part of the job, occurring more than one day per week, and more frequently than one week per year.

OPNAV 5100/20(2-05)

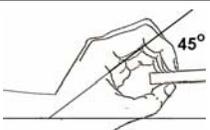
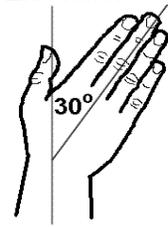
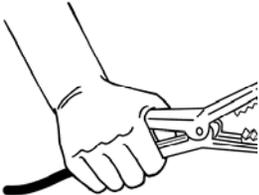
Evaluator:		Date:	
Department Name:	Location:	POC Name:	Phone Number:
Job Position Evaluated:		Number of employees performing job:	
Follow-up Date:		Email address:	

Recommendations / Follow-up / Job Description:
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**AWKWARD POSTURE**

	<b>Caution</b>	<b>Hazard</b>	<b>Comments</b>
 <p>1. Working with the hand(s) above the head, or the elbow(s) above the shoulders</p>	<input type="checkbox"/> more than 2 hours total per day	<input type="checkbox"/> more than 4 hours total per day	
 <p>2. Repeatedly raising the hand(s) above the head, or the elbow(s) above the shoulder(s) more than once per minute</p>	<input type="checkbox"/> n/a	<input type="checkbox"/> more than 4 hours total per day	
 <p>3. Working with the neck bent (without support and without the ability to vary posture)</p>	<input type="checkbox"/> more than 30 degrees for more than 2 hours total per day	<input type="checkbox"/> - more than 30 degrees for more than 4 hours total per day, or <input type="checkbox"/> - more than 45 degrees more than 2 hours total per day	

 <p>4. Working with the back bent forward (without support and without the ability to vary posture)</p>	<input type="checkbox"/> more than 30 degrees for more than 2 hours total per day	<input type="checkbox"/> - more than 30 degrees for more than 4 hours total per day, or <input type="checkbox"/> - more than 45 degrees more than 2 hours total per day	
 <p>5. Squatting</p>	<input type="checkbox"/> more than 2 hours total per day	<input type="checkbox"/> more than 4 hours total per day	
 <p>6. Kneeling</p>	<input type="checkbox"/> more than 2 hours total per day	<input type="checkbox"/> more than 4 hours total per day	

HIGH HAND FORCE			
	Caution	Hazard	Comments
 <p>7. Pinching an unsupported object(s) weighing 2 or more pounds per hand, or pinching with a force of 4 or more pounds per hand</p>	<input type="checkbox"/> more than 2 hours per day (comparable to pinching half a ream of paper or the force required to open two wooden clothespins)	<input type="checkbox"/> - more than 4 hours per day with no other risk factors, or - more than 3 hours day with highly repetitive motion, or - more than 3 hours per day with significant wrist deviation in flexion ( $> 30^\circ$ ), extension ( $> 45^\circ$ ), ulnar deviation ( $> 30^\circ$ )	 <p>45°</p> <p>Extension</p>  <p>30°</p> <p>Deviation</p>
 <p>8. Gripping an unsupported object(s) weighing 10 or more pounds per hand, or gripping with a force of 10 or more pounds per hand</p>	<input type="checkbox"/> more than 2 hours total per day (comparable to clamping light duty automotive jumper cables onto a battery)	<input type="checkbox"/> - more than 4 hours per day with no other risk factors, or - more than 3 hours day with highly repetitive motion, or - more than 3 hours per day with significant wrist deviation in flexion	 <p>30°</p> <p>Flexion</p>

		( $> 30^\circ$ ), extension ( $> 45^\circ$ ), flexion, or ulnar deviation ( $> 30^\circ$ )	
--	--	--	--

HIGHLY REPETITIVE MOTION			
	Caution	Hazard	Comments
 <p>9. Repeating the same motion with the neck, shoulders, elbows, wrists, or hands (excluding keying activities) with little or no variation every few seconds</p>	<input type="checkbox"/> more than 2 hours total per day	<input type="checkbox"/> - more than 6 hours per day with no other risk factors, or  <input type="checkbox"/> - more than 2 hours per day with wrists bent in flexion ( $> 30^\circ$ ), extension ( $> 45^\circ$ ), or ulnar deviation ( $> 30^\circ$ ) <b>AND</b> high, forceful exertions of the hand(s)	
 <p>10. Performing intensive keying</p> <p>Reference: Appendix 23-B Computer Workstation Checklist</p>	<input type="checkbox"/> more than 4 hours total per day	<input type="checkbox"/> Either:  <input type="checkbox"/> - more than 7 hours per day with no other risk factors, or  <input type="checkbox"/> - more than 4 hours per day with wrists bent in flexion ( $> 30^\circ$ ), extension ( $> 45^\circ$ ), or ulnar deviation ( $> 30^\circ$ )	

<b>REPEATED IMPACT</b>			
	<b>Caution</b>	<b>Hazard</b>	<b>Comments</b>
 <p>11. Using the hand (heel/base of palm) or knee as a hammer</p>	<input type="checkbox"/> more than 10 times per hour more than 2 hours total per day	<input type="checkbox"/> more than once per minute more than 2 hours total per day	
<b>HEAVY, FREQUENT OR AWKWARD LIFTING</b>			
	<b>Caution</b>	<b>Hazard</b>	<b>Comments</b>
 <p>12. Lifting object (Heavy)</p>	<input type="checkbox"/> Weighing more than 75 pounds once per day or more than 55 pounds or more than 10 times per day	<input type="checkbox"/> For exposures that exceed caution level perform lift analysis using the NIOSH Lifting Equation or the current Lifting Index in the ACGIH TLV guide	

	<p>13. Lifting objects (Frequent)</p>	<p><input type="checkbox"/> Weighing more than 10 pounds if done more than twice per minute</p> <p>Or</p> <p>more than 2 hours total per day</p>	<p><input type="checkbox"/> For exposures that exceed caution level perform lift analysis using the NIOSH Lifting Equation or the current Lifting Index in the ACGIH TLV guide</p>
	<p>14. Lifting (Awkward posture)</p>	<p><input type="checkbox"/> Objects weighing more than 25 pounds above the shoulders, below the knees or at arms length</p> <p>Or</p> <p>more than 25 times per day</p>	<p><input type="checkbox"/> For exposures that exceed caution level perform lift analysis using the NIOSH Lifting Equation or the current Lifting Index in the ACGIH TLV guide</p>
<b>MODERATE TO HIGH HAND- ARM VIBRATION</b>			
	<p>15. Using impact or percussive type tools such as impact wrenches, carpet strippers, chain saws, percussive tools (jack hammers, scalers, riveting or chipping hammers) or other tools that typically have high vibration levels</p>	<p><input type="checkbox"/> more than 30 minutes total per day</p>	<p><input type="checkbox"/> For exposures that exceed caution level more than 30 minutes total per day - perform analysis using the Hand - Arm Vibration Analysis Tool Guide in the ACGIH TLV guide</p> 

 <p>16. Using grinders, sanders, jigsaws or other hand tools that typically have moderate vibration levels</p>	<input type="checkbox"/> more than 2 hours total per day	<input type="checkbox"/> For exposures that exceed caution level more than 2 hours total per day - perform analysis using the Hand - Arm Vibration Analysis Guide in the ACGIH TLV guide	
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Drawings / Comments:

## **Appendix 23-B**

### **Computer Workstation Checklist**

The computer workstation checklist is one method available for performing computer workstation assessments. The checklist is designed to be printed as two double-sided pages (front and back). The first page sheet (page one and two) is an educational guide for the employee and is meant to be left at the workstation for the employee's reference. At the beginning of the assessment, the evaluator should define ergonomics and explain the proper-seated neutral position for a computer workstation. The second page sheet (page three and four) contains a checklist, which is intended to guide the evaluator and be kept for the evaluator's records. The checklist is designed to step the evaluator through the workstation evaluation. Answering an item on the checklist with "NO" indicates a potential ergonomics problem. Possible solutions to address the issue are indicated in the far right column.

Thank you for participating in an ergonomic computer workstation assessment.

Ergonomics is the science of fitting the workplace to the worker to reduce the risk of injury. In order to reduce your risk of developing Work-related Musculoskeletal Disorders (WMSDs), it is important to use your computer in a neutral posture. This will help prevent soft tissue WMSDs, such as Carpal Tunnel Syndrome and Tendonitis. The following illustration is a guide to setting up your computer workstation. The neutral posture is the optimal body position, which provides the greatest strength and control and minimizes stress. Even a neutral posture can be fatiguing if held all day, therefore micro-changes in posture and stretching are recommended (see page 2).

For more information or to report pain or discomfort you feel is associated with your job, please contact your Supervisor or Safety Officer who can refer you as needed to the Industrial Hygienist and/or Occupational Health Provider/Clinic.

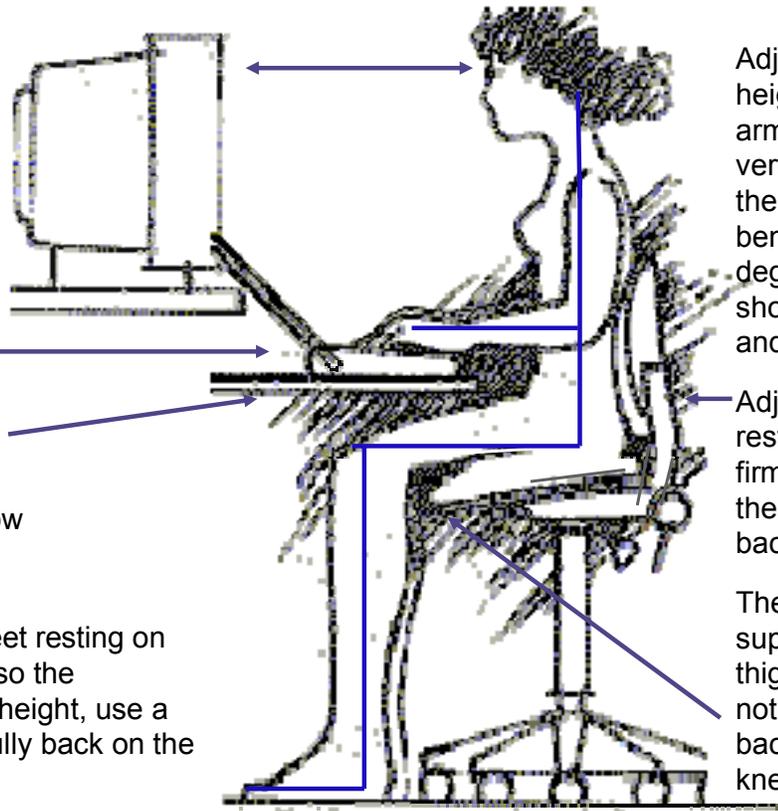
# Neutral Posture for Computer Use

Position the monitor directly in front of you and about an arm's length away. The top row of characters on the screen should be no higher than seated eye height

Use a document holder close to the monitor

Mouse should be next to the keyboard, both at a height equivalent to your seated elbow height

Knees comfortably bent with feet resting on the floor. If the chair is raised so the keyboard height equals elbow height, use a foot rest to encourage sitting fully back on the chair



Adjust the seat height so upper arms hang vertically, close to the body, elbows bent about 90 degrees, shoulders relaxed and wrists straight

Adjust the back rest to provide firm support to the small of the back

The seat pan supports the thighs but does not contact the back of the knees

The information in the figure accommodates 90% of the population. Special considerations may be necessary some workers. Additional guidance can be found on the Navy Ergonomics Program Web Page <http://www.navfac.navy.mil/safety/site/ergo/ergonom.htm>

**Tip:** 1) Taking 20 second micro-breaks throughout the day to refocus your eyes will reduce fatigue at the end of the day. 20/20 rule: for every 20 minutes of work, rest the eyes 20 seconds.

## TIME TO TAKE A COMPUTER BREAK

For every 20 minutes of computer use,  
look at an object 20 feet away for  
20 seconds. This reduces eyestrain.

Move your eyes side-to-side and top to bottom. This helps moisten your eyes and reduces eyestrain.

Close your eyes and gradually lower your head. This relaxes your eyes and neck.

Cup your eyes with your hands and close your eyes. Do not put any direct pressure on your eyes. This relaxes your face and moistens your eyes.

Extend your arms and fingers and rotate. This reduces stress on the upper extremities.

Rotate your ankle. This promotes blood circulation in your legs.

With your arms at your sides, shake your fingers. This relaxes your arms, hands and fingers.

While seated, elongate your back by pretending there is a cable attached to your head that is slowly pulling upwards. This will promote good posture and relieve some low back pain.

Shrug your shoulders. This eliminates stress from the shoulders and upper back.

Slowly pull your arms back as far as you can, trying to touch your shoulder blades together. This will reduce upper back stress.

**Computer Workstation Checklist**

**OPNAV 5100/21 (2-05)**

Evaluator:		Date:	
Employee Name:	Title:	Location:	Email:
Time in current position:		Phone Number:	
<b>Percent of day (or hours per day) spent performing the following tasks:</b>		Computer – Keying:	Mouse, Track ball:
Hours worked per week? workstation shared? Y / N	Is	Telephone:	Writing: Other tasks:
<b>Pain or discomfort, documented injuries, risk factors, etc:</b>			

If the answer is **NO** to any of the following questions, there is a potential problem.

Y	N	Minimum and maximum recommendations accommodate 90% of the population. Special considerations may be necessary for the extremes and users with special medical conditions. <b>Work Chair</b>	Possible Solutions Circle if recommended
		<b>Seat Height</b>	
		Do the user's feet rest comfortably on the floor or a footrest with thighs parallel to the floor and hips at a height equal to or slightly above knee height? <i>Action:</i> If the workstation height is adjustable - adjust the chair so the user's feet rest comfortably on the floor/footrest. If the workstation is not adjustable raise the user to the keyboard height (refer to keyboard section) and use a footrest to encourage sitting back in the chair.	Footrest
		<b>Seat Pan</b>	
		Does the seat pan support the thighs? The user should be able to fit two fingers between the backs of the knees and the edge of the seat. The seat pan should not be significantly shorter or longer than the length of the thighs. <i>Action:</i> Adjust seat pan and/or adjust backrest. (Fixed seat pan maximum length 16.9")	Foot rest Lumbar support Different chair
		Does the seat cushion have a rounded front edge?	Different chair
		Is the seat pan wider than the hip breadth of the user to allow space for movement and clothing? (Minimum 18")	Different chair
		<b>Backrest</b>	
		Does the backrest provide adequate lumbar support and buttocks clearance without interfering with the user's movement? The most pronounced part of the backrest should coincide with the middle of the user's lumbar area (small of the back) between 5.9" to 9.8" from the seat pan. <i>Action:</i> Adjust backrest.	Lumbar support
		Is backrest wide and high enough to support the torso? (Minimum 14.2"	Different chair

	W x 12.2" H)	
	<b>Armrests</b>	
	Do the armrests adjust to a height that is comfortable for the user and avoids hunched shoulders (armrests are too high) or slouching (armrests are too low) while allowing the user to get close enough to perform the task while sitting back in the chair? The user should not plant his/her elbows on the armrests while typing. Armrests should be soft and pliable. <i>Action:</i> Adjust armrests or remove armrests if they are not adjustable and interfere with the task.	
	Do the armrests adjust to a width that comfortably fits the user's hips and allow the user to easily exit/enter a chair and perform his/her task? (Minimum separation 18") <i>Action:</i> Adjust armrests or remove if necessary.	
	<b>Miscellaneous</b>	
	Does the chair have a stable base supported by five legs with casters and swivel 360 degrees?	Different chair
	Does the chair roll easily (casters appropriate for the floor surface)?	Chair mat Different casters

<b>Y N</b>	<b>Minimum and maximum recommendations accommodate 90% of the population. Special considerations may be necessary for the extremes and users with special medical conditions.</b>	<b>Possible Solutions</b> Circle if recommended
	<b>Work Surface</b>	
	Is there adequate clearance beneath the workstation for the user to get close enough to the task, maintain freedom of movement, and not come into contact with obstructions such as table legs, filing cabinets, etc? (Height clearance for legs minimum 25", depth clearance for knees minimum 17") <i>Action:</i> Rearrange workstation, remove clutter/obstructions.	Different work surface Raise or lower work surface
	Are the computer monitor and keyboard in alignment with (directly in front of) the user? <i>Action:</i> Rearrange workstation.	
	Is the work surface with the keyboard positioned at seated elbow height? Seated elbow height is measured with the feet resting comfortably on the floor (or a footrest) and the back positioned against the backrest. The upper arms are close to the sides with elbows at a 90° angle. The seated elbow height is the distance from the floor to the bony protrusion on the elbow. <i>Action:</i> Adjust work surface, keyboard tray, or chair. If feasible, reposition a portion of the work surface used exclusively for computer tasks.	Height adjustable keyboard tray Leg lifters for desk Different work surface
	Is the mouse or other input device located at the same height as the keyboard (at elbow height) within close reach? When keying or using the mouse, the upper arms should be close to the body, elbows approximately 90 degrees with forearms parallel to the floor and wrists straight.	Mouse bridge or platform Keyboard tray. Alternative or wireless pointing

		device
	Are frequently used support equipment / materials (telephone, documents, references) within 14" to 18" with occasionally used items within 22" to 26"? Two-handed reach distances are shorter than single-handed reaches and reaches for items over 10 lbs. should be performed standing. <i>Action:</i> rearrange workstation.	
	<b>Monitor</b>	
	Is the monitor located about arm's length away from the user (min. 15.7")? Monitor distance depends on the user's eyesight and possible corrective vision use, and monitor depth. <i>Action:</i> Rearrange workstation.	Suggest employee see personal eye care specialist  Larger work surface
	Is the monitor height (measured from the top row of characters on the screen) at a height equal to or 20° below the user's seated eye height (measured from the corner of the eye when a person is looking straight ahead)? The monitor should be located so the user does not have to bend the neck back or forward to see clearly. <i>Action:</i> Elevate or lower monitor. If necessary, elevate chair and provide footrest.	Monitor risers / arm
	Are the monitor images clear and stable, free of dust or glare (reflections)? <i>Action:</i> Turn off overhead lights, reposition blinds, or shield monitor to the side / top to assess glare. Rearrange workstation so that monitor is perpendicular to light source. Change lighting / blinds during the day to reduce glare.	Add task lighting, reduce overhead lighting (removing bulbs), glare screen
<b>Accessories</b>		
	Is the employee comfortable while receiving phone calls during the day, which require him/her to type or write while speaking?	Telephone headset
	Does the employee type in a neutral posture without using the wrist rest? A wrist rest should be used for resting; the arms should float above the keyboard in a neutral posture (straight wrists) when typing. The keyboard should be flattened or at a negative tilt as close to the user as possible.	
	If the worker references documents while typing, are they located in a holder next to, in front of, or at an equal distance to the monitor and not resting flat on the desk? Document position depends on eyesight, document and screen font, and task parameters.	Rearrange workstation Document holder
	Is the worker able to get up from the computer on a regular basis (typing for less than 6 hours a day)?	Sit/stand workstation
	Is the input device (mouse) appropriate for the task and is the user operating it with minimal force? Thumb operated trackballs are typically not recommended for extended daily use.	Alternative input device Input device sized to the user

*Workstation Sketch, Notes, Follow-up, Comments:*

## **Appendix 23-C Ergonomics Resources**

### **Naval Facilities Engineering Command ergonomic support**

Ergonomic Program Manager  
SOUTHWESTNAVFACENGCOM  
1220 Pacific Hwy  
San Diego, CA 92132-5190  
Ph: 619-532-2536, DSN: 522-2536

Web site: [www.navfac.navy.mil/safety](http://www.navfac.navy.mil/safety)

The ergonomic page of this website provides the assistance of certified ergonomists for situations that are beyond the professional capability of local resources.

### **Bureau of Medicine and Surgery (BUMED) ergonomic support**

Navy Environmental Health Center  
620 John Paul Jones Circle  
Suite 1100  
Portsmouth, VA 23708-2103  
Phone: (757) 953-0700  
After Hours: (757) 621-1967  
DSN: 377-0700

Contact: Industrial Hygiene or Occupational Medicine directorates

Web site: <http://www-nehc.med.navy.mil/occm/occlinks.htm> - ergonomic links

### **Commander Naval Safety Center (COMNAVSAFECEN) ergonomic resource**

<http://www.safetycenter.navy.mil/osh/ergonomics/default.htm>

This web site contains ergonomic best practice examples, public domain documents, government documents, technical information, and links to other ergonomic sites. This site will also have information for the Job Requirements and Physical Demands Survey (JRPD), which is an ergonomic tool to enable Safety and Occupational Health professionals to identify ergonomic risk factors and prioritize problem areas.

### **Naval Occupational Safety and Health, and Environmental Training Center**

0980 Breezy Point Crescent  
Norfolk VA 23511-3998  
Phone: 757 445- 8778  
Web site: <http://www.safetycenter..navy.mil/training/>

## Appendix 23-D

### Recommended Ergonomic Training

General awareness training for all employees - Activities shall provide general ergonomic awareness training to all employees, managers and supervisors. As a minimum this training shall include:

- (1) Definition of Ergonomics.
- (2) Why ergonomics is important.
- (3) Recognize workplace risk factors for musculoskeletal disorders and understand the general methods for controlling them.
- (4) Contributing factors to WMSDs.
- (5) The signs and symptoms of musculoskeletal disorders that may result for exposure to such risk factors and be familiar with the policy and procedures for early reporting.
- (6) Where to find more information and obtain assistance.
- (7) Periodic refresher training.

**Manager.** Managers should receive sufficient training on ergonomic issues to effectively carry out their responsibilities for the health and safety of their employees.

- (1) Proper maintenance of facilities, equipment and tools as a technique to minimize ergonomic stress.
- (2) The elements of an effective case management process.
- (3) Safe and unsafe ergonomic behaviors of employees.
- (4) Forming worker based teams and the benefits of a team approach to ergonomics.
- (5) Ergonomic policy of the Navy, Department of Defense, and the Occupational Safety and Health Administration (OSHA).

**Supervisors.** Supervisors with employees subject to identified ergonomic risk factors should receive the following training:

- (1) Recognition of WMSD signs and symptoms.
- (2) WMSD reporting.

- (3) Ergonomic risk factors, such as, awkward postures, static positions, external forces, repetitive motion and lifting hazards.
- (4) Methods to reduce or eliminate ergonomic risk factors.
- (5) How to select ergonomic equipment in the workplace.
- (6) How to obtain ergonomic assistance.

**Collateral duty personnel.** Activities without full time professional OSH managers may assign collateral duty personnel to administer an ergonomics program. At a minimum their training should include:

- (1) How to manage an ergonomics program.
- (2) How to identify ergonomic hazards.
- (3) Measures to reduce or eliminate ergonomic hazards.
- (4) How to evaluate the effectiveness of ergonomics programs and controls.

**Engineers, Equipment Specialists, Architects, and Designers.** Engineering staffs responsible for planning, designing, or writing specifications for equipment, tools, jobs, tasks and processes should receive formal training on methods of eliminating or reducing ergonomic risk factors.

- (1) Workstation and facilities design to reduce or eliminate ergonomic risk factors.
- (2) Tool and equipment selection.
- (3) How to evaluate designs to recognize potential ergonomic problem areas.

**Occupational Safety and Health.** OSH professional staff responsible for conducting the ergonomics program and other personnel involved in ergonomic assessments, control of ergonomic hazards and program management shall take the Navy Ergonomics Program (A-493-0085) course offered by NAVOSHENVTRACEN or equivalent. Equivalentents are:

- (1) Occupational Safety and Health Administration (OSHA) Course #2250 – Principles of Ergonomics Applied to Work-Related Musculoskeletal and Nerve Disorders.
- (2) Course from an accredited university with a minimum of 35 hours of classroom time and a passing grade.

**The training requirements will be waived for personnel holding current ergonomics certifications from:**

Oxford Research Institute ([www.oxfordresearch.org/](http://www.oxfordresearch.org/))

- (1) Certified Industrial Ergonomist (CIE).
- (2) Certified Associate Ergonomist (CAE).
- (3) Certified Human Factors Engineering Professional (CHFEP).

Board of Certification in Professional Ergonomics (<http://www.bcpe.org/>)

- (1) The Certified Professional Ergonomist (CPE).
- (2) Certified Human Factors Professional (CHFP).
- (3) Certified Ergonomics Associate (CEA).
- (4) Associate Ergonomics Professional (AEP).
- (5) Associate Human Factors Professional (AHFP).

**Health Care Providers.** Health Care Providers need to be able to recognize WMSDs, evaluate the work place for potential ergonomic risk factors, and develop return to work strategies.

## Appendix 23-E

### Ergonomic Considerations for Shift Workers

#### **A. Background**

Shift work is a risk factor for several medical disorders, poor performance, and decreased vigilance in the job. It presents these problems because of its conflict with normal human biological rhythms, particularly the sleep/wake rhythm and the temperature rhythm, which direct the body to sleep at night.

The problem with night work and transmeridian jet travel is that normal time cues are shifted faster than the human circadian rhythm can adjust. For example, it takes at least 2 days for the sleep/wake cycle to adjust to a 6-hour transmeridian flight. More time is required for body temperature and performance rhythms to adjust. Two to 3 weeks are required for complete adjustment of the temperature rhythm to a complete day-night reversal (a 12-hour time shift). Because different biological rhythms adjust at different rates, not only does the person become desynchronized with respect to external time cues, but individual rhythms no longer have a normal phase relationship.

The most frequent problem for night workers, experienced by at least 60 percent of these workers, is chronic sleep deprivation due to not only fewer total hours of sleep, but disrupted sleep as well. Such sleep deprivation in night workers can be severe. Night work has also been shown to be disruptive with respect to family and social interactions. Shift-workers are at higher risk for psychosocial problems as well as family problems, including divorce.

Personnel with a history of rigid sleep requirements, strong "morning types," and older workers (over 45) are more apt to have difficulty adjusting to night work. Five to 20 percent of night workers will suffer from shift maladaptation syndrome, which can only be treated by removal from the night shift.

This appendix contains minimal guidance on how to address shift work. For more assistance see appendix 23-C.

#### **B. Shift Workers Scheduling Guidelines**

Supervisors who prepare schedules for night shifts must consider the potential for scheduling practices to affect the ability of individuals to perform assigned tasks safely.

Unless prescribed by current labor contracts, schedules must be rotated in the forward (clockwise) direction. This direction is best because the human clock runs slow with respect to the 24-hour solar day and, therefore, adjusts faster to a phase delay than to a phase advance. The following additional guidelines regarding scheduling of night workers, including workers on rotating schedules that include night work, are recommended for consideration when preparing schedules.

- (1) At least 48 hours off should follow the night shift rotation.

- (2) Overtime should be avoided for personnel adjusting to time shifts.

**C. Medical Surveillance for Shift Workers**

Being assigned night shift work, by itself, does not obligate an employee to undergo a medical evaluation. Where medical evaluations are required, due to positions covered by medical standards, the requirement to work night shifts should be indicated by the appointing officer on the SF-78 by circling item B-28, "Protracted or irregular hours of work," to alert the examining physician to evaluate fitness to work night shifts or recommend appropriate restrictions.

Supervisors may request medical qualification information from workers who demonstrate persistent performance problems or increased absenteeism after beginning night work. Even workers who have been able to tolerate night work for years may begin to show signs and symptoms of shift work intolerance with increasing age.

Pre-employment evaluation of workers who will be involved in night work and surveillance of shift work employees require attention to the following medical conditions that may impair an individual's ability to perform assigned tasks safely or be aggravated by shift work schedules:

- (1) Diabetes mellitus, epilepsy, cardiovascular disease, asthma, peptic ulcer, irritable bowel syndrome, or use of medication with circadian variation in effectiveness. The examining physician must determine when such medical conditions are severe enough to warrant medical disqualification for night work.

- (2) Supervisors are cautioned to consult Federal Personnel Manual (FPM) chapter 339 governing medical qualification determinations.

**D. Additional References.**

- (1) LaDou J., Occupational and Environmental Medicine, 2<sup>nd</sup> ed., pp 592-3, Appleton and Lange, 1997.

- (2) Rom W.N., Environmental and Occupational Medicine, 3<sup>rd</sup> ed., pp 1173-7, Lippincott Williams and Wilkins, 1998.

- (3) Scott A.J., "Shift Work and Health", Primary Care, 1 Dec 2000, 1057-79.

## CHAPTER 24

### ENERGY CONTROL PROGRAM (LOCKOUT/TAGOUT)

#### 2401. Discussion

a. Purpose. This chapter establishes Navy policy and minimum procedures for locking out or tagging the sources of energy to equipment or systems under the requirements of reference 24-1 and the minimum performance standards of reference 24-2.

b. Scope and Application. The requirements of this chapter apply to the control of energy during servicing and maintenance of machinery and equipment ashore. These requirements apply only when the unexpected energizing or movement of machinery/equipment or the release of energy during the maintaining or servicing of such equipment/machinery could cause injury to personnel and/or property damage.

(1) This policy does not cover routine production operations unless:

(a) Operations require workers to remove or bypass a guard or other safety device.

(b) Operations require workers to place any part of their bodies into an area of the machine or equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during the machine operating cycle.

#### NOTE:

This chapter does not cover minor tool changes and adjustments and other minor servicing activities, which take place during normal production operations if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternate measures which provide effective protection.

(2) The requirements of this chapter do not apply to the following:

(a) Shipboard operations that are covered under references 24-3, 24-4, and 24-5.

(b) Equipment under the exclusive control of electrical utilization installations for the purpose of power generation, transmission and distribution, including related equipment for communication or metering, which are covered under references 24-6 and 24-7.

(c) Exposure to electrical hazards from work on, near or with conductors or equipment in electrical utilization installations, which are covered under references 24-6 and 24-7.

(d) Work on cord and plug-connected electrical equipment where exposure to the hazards of unexpected start-up of the equipment is controlled by unplugging the

equipment, and the plug is under the exclusive control of the worker performing the servicing or maintenance.

(e) Hot tap operations involving transmission and distribution systems for substances such as gas, steam, water or petroleum products performed on pressurized pipelines if:

1. Continuity of service is essential.
2. Shutdown of the system is impractical.
3. Documented procedures are followed and special equipment utilized to protect personnel.

(f) Training evolutions ashore on shipboard tagout per references 24-3, 24-4, and 24-5. However, the installation of equipment for such training is covered by this instruction.

#### **2402. General Policy**

All regions and shore activities shall comply with the lockout/tagout requirements of reference 24-1, except as noted in paragraph 2401.

a. Commands shall discipline any person(s), other than the original person(s) who installed the lockout/tagout device(s) or that person's supervisor, who removes a lockout/tagout device.

b. When similar machines and/or equipment are covered with a single generic written procedure, the procedure shall list the types of equipment to which the operating procedure applies.

c. Lockout/tagout is the preferred method of energy control and commands shall use it ashore where feasible. Regions/Activities shall not use combination locks for lockout. No two-lockout devices (locks) shall have the same key. No more than two keys shall exist for any lock. The worker shall maintain one key and the supervisor shall maintain the other in a location readily accessible to that supervisor in the event of an emergency.

d. Both lockout and tagout devices shall indicate the identity of the employee applying the device(s). Lockout/tagout devices shall be standardized throughout a region or within each shore activity.

e. Commands shall ensure that all training complies with reference 24-1, is specific to the region or activity, but need not include instruction on energy sources or means of isolation that are not applicable to the region or activity.

#### **2403. Requirements for Contractors or Other Outside Agencies**

Regions/Activities shall ensure contracts require the contractor or agency to:

a. Submit a copy of instructions explaining the contractor's or agency's lockout/tagout program. In addition, the region or activity shall provide the contractor or agency with a copy of the lockout/tagout program instruction of the region or activity where the work is to be performed.

b. Contractors must comply with the requirements of reference 24-8.

#### **2404. Responsibilities**

a. Commanders of Echelon 2 and Other Headquarters Commands shall:

(1) Ensure development and implementation of lockout/tagout programs are per the guidance in this chapter for all systems and operations under their cognizance.

(2) As necessary, provide amplifying guidance to subordinate activities on command implementation of the lockout/ tagout program to ensure program consistency and effectiveness.

b. Naval Education and Training Command (NETC) and/or Naval Personnel Development Command (NPDC) shall:

(1) Incorporate lockout/tagout requirements into appropriate Navy Training Systems Plan.

(2) Develop a lockout/tagout training syllabus and related performance qualification standards to include the provisions of lockout/tagout.

(3) Provide specialized lockout/ tagout training where necessary.

(4) Integrate lockout/tagout principles and procedures into the curriculum of the Navy Supply Corps School (Athens, GA) and the Naval School Civil Engineer Corps Officers (Port Hueneme, CA).

(5) Serve as the central source for delivery and dissemination of information on Navy lockout/tagout training.

(6) Incorporate lockout/tagout information into the curriculum of all appropriate training courses.

c. Commander, Naval Supply Systems Command (COMNAVSUPSYSCOM) shall provide standard stock OSHA-compliant tags and locks for use within the region or activity per the requirements of this chapter.

d. Commanders, Commanding Officers, and Officers in Charge shall:

(1) Develop and implement written plans and procedures for a lockout/tagout program that meet the policy of this chapter and the direction of reference 24-1.

(2) Initiate actions to identify and resolve deficiencies in the lockout/tagout budget and allocation of resources to bring about effective local program implementation.

(3) Ensure a current roster of trained and qualified employees who are authorized to work on hazardous energy systems and equipment is maintained.

(4) Ensure affected employees receive training about the energy control program, i.e., lockout/tagout identification, notification requirements and general energy control program requirements.

e. Region or Activity Safety Offices shall:

(1) Approve the equipment or applications where tagout may be used in place of lockout (and maintain a list of approvals) unless this responsibility is delegated to someone else by the commanding officer. Each request of equipment or application variance allowing only tagout shall be submitted to the safety office with sufficient documentation demonstrating that an equivalent means of lockout protection will be achieved allowing full employee protection as required by reference 24-1.

(2) Annually review compliance with the provisions of this chapter and any specific procedures developed as a result.

(3) Where lockout is not feasible, tagout may be used. Regions/Activities shall maintain a list of the type of equipment and applications. The official authorizing tagout will ensure compliance with the requirements of this chapter for use of tagouts to achieve equivalent protection to lockout systems.

(4) Ensure periodic inspections are performed by an authorized employee other than the one utilizing the procedures. Further, periodic inspection shall be documented and certified as being performed in accordance with reference 24-1.

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### References

24-1. Title 29 Code of Federal Regulations (CFR) 1910.147 of 13 Feb 96, The Control of Hazardous Energy (lockout/tagout), latest revision, and Title 29 CFR 1910.332 of 6 Aug 90, Electrical-Safety-Related Work Practices [http://www.access.gpo.gov/nara/cfr/waisidx\\_04/29cfr1910\\_04.html](http://www.access.gpo.gov/nara/cfr/waisidx_04/29cfr1910_04.html).

24-2. American National Standards Institute (ANSI) Standard Z244.1-2003, American National Standard for Personal Protection Lockout/Tagout of Energy Sources-Minimum Safety Requirements (NOTAL), <http://www.ansi.org>.

24-3. OPNAVINST 5100.19D CH-1 of 30 Aug 01, Navy Occupational Safety and Health Program Manual for Forces Afloat, [http://neds.daps.dla.mil/Directives/5100.19d\\_CH-1.pdf](http://neds.daps.dla.mil/Directives/5100.19d_CH-1.pdf).

24-4. OPNAVINST 3120.32C of 11 Apr 94, Standard Organization and Regulations of the U.S. Navy. <http://neds.daps.dla.mil/312032.htm>.

24-5. NAVSEA Technical Manual SO400-AD-URM-010/TUM, of 1 Sept 2000, "Tag-out Users Manual".

24-6. OPNAV P-45-117-6-98 of Jun 98, Electrical Safety Field Guide  
<http://www.safetycenter.navy.mil/instructions/osh/OPNAV-45-117-6-98.pdf>.

24-7. UFC 3-560-02 of 16 Jan 04, Safety of Electrical Transmission and Distribution Systems.

24-8. EM385-1-1 of 3 Nov 03, U.S. Army Corps of Engineers Safety and Health Requirements Manual. <http://www.usace.army.mil/inet/usace-docs/eng-manuals/em385-1-1/toc.htm>.

## CHAPTER 25

### POLYCHLORINATED BIPHENYLS (PCBs)

#### **2501. Policy**

a. Navy policy is to minimize the potential for polychlorinated biphenyl (PCB) exposure by substitution with non-PCB containing materials, using engineering and administrative controls and using appropriate personal protective equipment (PPE).

b. Occupational exposures to PCBs may arise from processes such as retrofilling PCB-containing electrical transformers, removing PCB-impregnated felts or gaskets or working with synthetic rubber, plasticizers or other materials that contain PCBs.

#### **2502. Discussion**

a. The Occupational Safety and Health Administration (OSHA) regulates workplace PCBs as air contaminants per reference 25-1. The Environmental Protection Agency (EPA) regulates environmental contamination involving PCBs under reference 25-2. The only human health hazard that has been definitively associated with prolonged exposure to liquid PCBs is a type of skin lesion characterized as chloracne. Eye irritation, chloracne and subclinical liver enzyme abnormalities have been recorded with high inhalation exposures. Note that no adverse human effects have ever been described for exposures to PCB surface contamination alone (references 25-3 and 25-4). For additional information regarding toxicological evaluation, guidance on occupational and environmental issues and other technical information, refer to reference 25-5.

b. The low vapor pressure associated with PCBs suggests that air concentrations on the order of 0.5 milligram per cubic meter ( $\text{mg}/\text{m}^3$ ) of air are difficult to achieve under normal workplace conditions. High concentrations of liquid PCBs, optimal temperature and pressure conditions and/or subjection to mechanical dispersion processes would be required to achieve such airborne levels. Air sampling, which has been conducted at a variety of occupational worksites for industrial processes involving PCBs, confirms that airborne concentrations of PCBs are rarely detectable.

c. Under certain conditions such as industrial transformer fires, polychlorinated dibenzo-dioxins (PCDDs) and polychlorinated dibenzo-furans (PCDFs) can be generated from PCBs or PCB solvents (chlorophenols). It must be noted that the health effects of these toxic by-products do not apply to unpyrolyzed PCB compounds, as is sometimes falsely assumed.

d. The National Institute for Occupational Safety and Health (NIOSH) and the International Agency for Research on Cancer have concluded that there is sufficient toxicological evidence to characterize PCBs as "suspected carcinogens." Neither OSHA nor the American Conference of Governmental Industrial Hygienists (ACGIH) characterize PCBs as suspected human carcinogens.

### **2503. Permissible Exposure Limits, Skin Designation**

a. Permissible Exposure Limits (PELs). PCB PELs relate to allowable airborne exposure concentrations for an 8-hour day in a 40-hour workweek. There are two PELs for PCBs depending on the approximate percentage by weight of chlorine in the compound:

- (1) Chlorodiphenyl (42 percent chlorine) - 1.0 mg/m<sup>3</sup>
- (2) Chlorodiphenyl (54 percent chlorine) - 0.5 mg/m<sup>3</sup>

b. Skin Designation. Skin designation denotes that PCBs can be absorbed through the skin. Activities shall prevent or reduce skin exposure to PCBs to the extent necessary through the use of substitution, engineering controls, work practices or PPE, such as gloves, coveralls, goggles or other appropriate PPE.

### **2504. Control of PCB Exposure in the Workplace Environment**

a. General Workplace Control Practices. For situations not exceeding the PELs and not involving unprotected PCB skin contact, activities shall employ routine work and personal hygiene measures appropriate for any occupational setting.

(1) When working with PCB-impregnated materials, such as insulating felts, or with articles that contain liquid PCB solutions, personnel shall strictly observe good housekeeping procedures to avoid the possibility of secondary surface contamination.

(2) Employees involved in PCB- related work activities shall not eat, drink, smoke, chew tobacco or gum or apply cosmetics in the work area.

(3) Activities shall collect and dispose of PCB-containing waste, scrap and debris, and PCB-contaminated clothing (consigned for disposal) in sealed impermeable bags or other impermeable containers labeled per applicable Federal, State or local environmental regulations. For guidance consult reference 25-2.

(4) Personnel shall not perform hot work in the immediate area when work is performed with PCB material.

#### **b. Personal Protective Equipment**

(1) Personnel engaged in handling PCB-contaminated or PCB-impregnated material (such as "rip out" or "stripping" operations), during which skin contact with PCBs is considered probable, shall wear the following PPE:

(a) Full-body, one-piece disposable coveralls constructed of Tyvek<sup>®</sup> material or comparable substitute material.

(b) Nitrile or Viton<sup>®</sup> gloves.

(c) Nitrile or neoprene foot coverings if the work involves the probability of foot contamination by any means.

(d) Face shields and vented goggles or other appropriate eye protective equipment wherever the possibility of eye contact exists.

(2) If work situations exist where it is likely that workers' clothing will become saturated with PCB-containing liquids, personnel shall use protective clothing materials having "greater than 24 hours" breakthrough times against PCBs, as listed in reference 25-6. The following PPE is recommended if saturation is anticipated:

- (a) Saranex<sup>®</sup>-coated Tyvek<sup>®</sup> coveralls for whole body protection.
- (b) Viton<sup>®</sup> rubber for gloves and foot coverings.
- (c) Face shields and chemical goggles for eye protection.

c. Respiratory Protection

(1) Under most conditions, activity safety offices shall use air-sampling data to determine the necessity for wearing respiratory protection. The cognizant industrial hygienist shall determine the need to perform air sampling for PCBs.

(2) If air sampling results indicate that the PELs for PCBs have been exceeded, personnel shall use a supplied air respirator that has a full face piece and is operated in the pressure-demand or other positive-pressure mode.

(3) Use of respirators shall comply with the requirements of chapter 15.

(4) When selecting respiratory protection for PCB decontamination, the cognizant industrial hygienist should give consideration to the solvent being used, the potential airborne concentration of the solvent and the possible presence of chlorinated dioxins and furans.

**2505. Medical Surveillance Program**

Activities shall include personnel who meet the exposure criteria outlined in reference 25-7, and as determined by an industrial hygienist, in the appropriate medical surveillance program.

**2506. Environmental Contamination**

PCBs are recognized environmental contaminants. The threat they pose to the environment is largely due to their chemical stability, lipid solubility and resistance to biodegradation.

Reference 25-8 provides Navy requirements that address Federal environmental regulations. Refer to reference 25-2 for spill cleanup requirements.

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### References

- 25-1. Title 29 Code of Federal Regulations (CFR) 1910.1000 Subpart Z, Table Z-1-A, of 1 Jul 96, Limits for Air Contaminants  
[www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9992](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992).
- 25-2. Title 40 CFR 761 of 1 Jul 96, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions,  
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=6ef43a59d61828d3ff2c7b39ca02a54a&rgn=div5&view=text&node=40:30.0.1.1.17&idno=40/>.
- 25-3. DHHS, National Institute for Occupational Safety and Health (NIOSH) Publication No. 77-225 of Sep 77, "Criteria for a recommended standard, Occupational Exposure to Polychlorinated Biphenyls". <http://www.cdc.gov/niosh/77-225.html>.
- 25-4. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR) Publication No. TP-92/16 of 1993, Toxicological Profile for Selected PCBs (Arochlor-1260, 1254, 1248, 1242, 1232, 1221, and 1016)  
[www.hhs.gov/hhsmanuals/safety.pdf](http://www.hhs.gov/hhsmanuals/safety.pdf).
- 25-5. NEHC Technical Manual, Industrial Hygiene Field Operations Manual, of August 2004, "Poly-chlorinated Biphenyls (PCBs), Polychlorinated Dibenzofurans (PCDFs), and Polychlorinated Dioxins (PCDDs), latest edition, <http://www-nehc.med.navy.mil/ih/ihfom.htm>.
- 25-6. ACGIH (American Conference of Governmental Industrial Hygienists) 3<sup>rd</sup> Edition, Guidelines for Selection of Chemical Protective Clothing (NOTAL),  
<http://www.acgih.org/store/ProductDetail.cfm?id=256>.
- 25-7. NEHC Technical Manual, Industrial Hygiene Field Operations Manual, of March 2004, "Medical Surveillance Procedures Manual and Medical Matrix," latest edition,  
<http://www-nehc.med.navy.mil/occmcd/Matrix.htm>.
- 25-8. OPNAVINST 5090.1B of 1 Nov 94, Environmental and Natural Resources Program Manual, Chapter 11, "PCB Management Ashore", <http://neds.daps.dla.mil/5090.htm>.

## CHAPTER 26

### CHEMICAL-BIOLOGICAL-RADIOLOGICAL-NUCLEAR-EXPLOSIVE (CBRNE) (Formerly Man-Made Vitreous Fibers)

#### **2601. Discussion**

Secretary of the Navy (SECNAV) issued DON "Installation Chemical, Biological, Radiological, Nuclear and High-Yield Explosive (CBRNE) Emergency Response Guidelines" in June 2004 (see reference 26-1). Occupational Safety and Health Administration (OSHA) "Guidelines for Emergency Preparedness and Response" are available at <http://www.osha-slc.gov/SLTC/emergencypreparedness/index.html>. OPNAV Instruction 3440.17, reference 26-2 establishes the overall policy, guidance, operational structure, and assignment of responsibilities for developing, implementing, and sustaining a comprehensive all-hazards Emergency Management Program at Navy Shore installations and regions.

This chapter provides occupational safety and health guidance and direction on responsibilities for protective equipment, heat stress, mishap investigation, and the CBRN Respiratory Protection Program as they relate to CBRNE incidents. CBRNE incidents like industrial explosions, fires or release of chemicals require plans and policies to mitigate loss of life and property. A list of military chemical agents that could be involved is available in appendix 26-A.

#### **2602. Roles and Responsibilities**

a. Safety Support. Working as part of an emergency management team in accordance with this instruction, Navy Shore Installation Commanders shall provide the following support capability:

- (1) Participation in Emergency Planning, whereby the designated safety representative:
  - (a) Participates in planning for selection of personal protection equipment.
  - (b) Participates in planning for emergency equipment acquisition and review.
  - (c) Assists in integrating safety into training plans (formal and exercise).
  - (d) Participates in preparing hazard and risk communication plans.
  - (e) Participates in vulnerability assessments.
  - (f) Participates in preparing plans for notification/recall of essential personnel.
  - (g) Participates in communication of emergency plans.

(h) Participates in development of Navy policy and doctrine, for Tactics, Techniques, and Procedures (TTP).

(i) Participates in risk analysis and threat assessments.

(j) Ensures employees who respond to CBRNE incidents are appropriately enrolled in medical surveillance and respiratory protection programs.

(2) Participation in Emergency Response, whereby the designated safety representative:

(a) Participates in development of site-specific Health and Safety Plans (HASP).

(b) Serves as Incident Command System, Regional Operations Center (ROC) representative and Emergency Operating Center (EOC) safety representative.

b. Industrial Hygiene and Occupational Medicine Support. Chief, Bureau of Medicine and Surgery (BUMED) shall provide all Navy shore activities with technical industrial hygiene and occupational medicine response capability to support installation emergency responders.

(1) Industrial hygiene technical representatives shall provide the following capabilities

(a) Participation in Emergency Planning, whereby the industrial hygiene representative:

1. Participates in preparation of the installation Chemical, Biological, Radiological Defense (CBRD) including preparation, endurance, and recovery from a natural or man-made disaster.

2. Provides industrial hygiene support including consultation on such issues as hazardous materials, chemical detection and identification, and personal protective equipment.

3. Participates in primary and secondary decontamination planning.

4. Assists in the development of health risk communication plans for shore installations including Medical Treatment Facilities (MTF).

5. Participates in medical surveillance planning.

6. Participates in collective protective shelter system planning.

7. Provides risk assessment interpretation and maintenance of record of exposure documentation.

8. Conducts review and implementation of exposure monitoring plans.

9. Provides PPE evaluation in relation to incident.

(b) Participation in Emergency Response. Regional response capabilities shall be implemented to provide a high level of analytical and risk assessment capabilities that will focus on hazard recognition exposure level determination and risk assessment guidance. Where technical industrial hygiene support exists on the installation, the existing industrial hygiene support shall include the following capabilities:

1. Provides consultation before and during an incident on the capabilities and limitations of chemical and biological detection methods and the interpretation of monitoring data.

2. Participates in the interpretation and communication of sampling and monitoring information provided by detection equipment.

3. Provides technical expertise in the emergency operations center where coordination with the Incident Command Safety Officer will help to ensure a comprehensive health and safety plan is developed and that health risk is well communicated to the Incident Commander (IC).

4. Participates in monitoring collective protective shelter systems.

(2) Occupational Medicine Support. (See paragraph 0805 for further detail)

(a) Serves as installation Medical Treatment Facility (MTF) Emergency Operating Center (EOC) representative equivalent.

(b) Conducts medical surveillance in accordance with the NEHC Technical Manual, reference 26-3.

**NOTE:**

Military personnel, who have been confirmed by their region or activity as having no deployment limiting medical conditions, and with a current annual Preventive Health Assessment per OPNAVINST 6120.3 are considered qualified to wear any type of respiratory protection. Shipboard personnel undergoing shore firefighting training are not required to obtain medical qualification or respirator fit testing for self-contained breathing apparatuses (SCBA), including the oxygen breathing apparatus (OBA), prior to reporting for training.

### **2603. Personal Protective Equipment**

a. Navy policy is that activities provide, use and maintain personal or individual protective equipment (PPE) when competent authority determines that its use is necessary and that such use will lessen the likelihood of injuries and/or illnesses. PPE procurement and enforcement of proper use and maintenance is the responsibility of the activity. Equipment breakdown, failure or misuse immediately exposes the worker to the hazard. Many protective devices, through misapplication or improper maintenance, can become ineffective without the knowledge of the wearer and can have potentially serious consequences. For this reason, proper equipment selection, maintenance, employee training (including equipment limitations) and mandatory enforcement of equipment use are key elements of an effective PPE program.

b. The level of respiratory and personal protection that a specific responder will require is primarily dependent on the nature of the task that the responder is assigned to complete during the incident.

(1) Per reference 26-4, the use of Mission Oriented Protective Posture (MOPP) gear as directed by the Combatant Commander is specified for all military operations during wartime operations by active duty and reserve military personnel. MOPP gear is graded into seven levels of protection. Each higher level of protection is associated with wearing more components of the protective ensemble. The MCU-2A/P military respirator is worn during the highest level of MOPP protection (MOPP IV).

#### **NOTE:**

MOPP IV is not equivalent to Level C because the Joint Service Light-Weight Integrated Suit Technology (JSLIST) will not pass penetration testing of National Fire Protection Association (NFPA) 1992. Military personnel stationed overseas are permitted to wear MOPP gear, including military gas masks (e.g., M40A1 or MCU-A/P) in lieu of level C protection during first response operations only if and when directed by the Theater Combatant Commander.

#### **Warning:**

C2A1 canisters do not provide protection against several toxic industrial chemicals (TICs), such as ammonia, carbon monoxide, carbon dioxide, nitric oxide, nitrogen dioxide and metal carbonyls. See Table (1), which lists the filtration performance of C2A1 canisters against TICs.

Table 1 - Level of Protection Afforded by Nuclear, Biological & Chemical (NBC) Filters for Selected Toxic Industrial Chemicals\*

High Hazard	Medium Hazard	Low Hazard
Ammonia – P	Acetone cyanohydrin – M	Allyl isothiocyanate – E
Arsine – E	Acrolein – P	Arsenic trichloride – M
Boron trichloride – E	Acrylonitrile – P	Bromine – P
Boron trifluoride – E	Allyl alcohol – M	Bromine chloride – M
Carbon disulfide – P	Allyl amine – P	Bromine pentafluoride – M
Chlorine – E	Allyl chlorocarbonate – M	Bromine trifluoride – M
Diborane – E	Boron tribromide – M	Carbonyl fluoride – P
Ethylene oxide – P	Carbon monoxide – P	Chlorine pentafluoride – M
Fluorine – E	Carbonyl sulfide – P	Chlorine trifluoride – M
Formaldehyde – P	Chloroacetone – M	Chloroacetaldehyde – M
Hydrogen bromide – E	Chloroacetonitrile – M	Chloroacetyl chloride – M
Hydrogen chloride – E	Chlorosulfonic acid – E	Cyanogen – E
Hydrogen cyanide – E	Crotonaldehyde – M	Diphenylmethane-4 diisocyanate – E
Hydrogen fluoride – E	Diketene – M	Ethyl chloroformate – M
Hydrogen sulfide – E	1,2-dimethyl hydrazine – P	Ethyl chlorothioformate – E
Nitric acid, fuming – E	Dimethyl sulfate – E	Ethylene imine – P
Phosgene – E	Ethylene dibromide – M	Ethylphosphonothioicdichloride – E
Phosphorus trichloride – E	Hydrogen selenide – P	Ethyl phosphonous dichloride – M
Sulfur dioxide – E	Iron pentacarbonyl – M	Hexachlorocyclopentadiene – E
Sulfuric acid – E	Methanesulfonyl chloride – E	Hydrogen iodide – P
Tungsten hexafluoride – E	Methyl bromide – P	Isobutyl chloroformate – M
	Methyl chloroformate – P	Isopropyl chloroformite – M
	Methyl chlorosilane – P	N-butyl chloroformate – M
	Methyl hydrazine – M	Nitric oxide – P
	Methyl isocyanate – P	N-propyl chloroformate – M
	Methyl mercaptan – p	Isopropyl isocyanate – P
	N-butyl isocyanate – M	Parathion – E
	Nitrogen dioxide – P	Perchloromethyl mercaptan – E
	Phosphine – M	Sec-butyl chloroformate – M
	Trichloroacetyl chloride – M	Sulfuryl fluoride – P
	Phosphorus oxychloride – M	Tert-butyl isocyanate – M
	Phosphorus pentafluoride – P	Tetraethyl lead – E
	Selenium hexafluoride – E	Tetraethyl pyrophosphate – E
	Silicon tetrafluoride – P	Tetramethyl lead – M

High Hazard	Medium Hazard	Low Hazard
	Stibine – P	Toluene 2,4-diisocyanate – E
	Sulfur trioxide – M	Toluene 2,6-diisocyanate – E
	Sulfuryl chloride – P	
	Tellurium hexafluoride – P	
	Tert-octyl mercaptan – E	
	Titanium tetrachloride – E	
	Trifluoroacetyl chloride – P	
Legend: Filter Effective (E); Marginally (M); Poor (P).		

\***Source:** NTTP 3-11.27 (FM 3.11.4), Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection.

(2) Navy military and civilian personnel shall use protective ensembles that are compliant with this manual, 29 CFR 1910.120, and reference 26-5 (NFPA 1994, *Protective Ensembles for Chemical/Biological Terrorism Incidents*). NFPA 1994 establishes specifications “for minimum levels of protection for fire and emergency services personnel assigned to chemical/biological terrorism agents including dual-use industrial chemicals, chemical terrorism agents, or biological terrorism agents.” Only NIOSH approved respirators may be used (see Section 2606 and Chapter 15 of this manual).

c. Selection of PPE. Selection of the appropriate PPE is a complex process. Key factors involved in this selection process are identification of the hazards, or suspected hazards; their potential routes of exposure to employees (inhalation, skin absorption, ingestion, and eye or skin contact); and the performance of the materials (and seams) in providing a barrier to these hazards. The amount of protection provided is material-hazard specific. Protective equipment materials will protect well against some hazardous substances and poorly, or not at all, against others. In many instances, protective equipment materials cannot be found which will provide continuous protection from the particular hazardous substance. In these cases, the breakthrough time of the protective material should exceed the work durations.

(1) Per Appendix B of reference 26-6, PPE is divided into four levels described in Tables 2, 3, 4 and 5 based on the degree of protection afforded. See Section 2606 and Chapter 15 of this manual for specific details on respirator selection. All SCBA purchased for first responders must be NIOSH CBRN approved. Once activities are fully equipped with NIOSH CBRN approved SCBA, then these respirators will be the only respirators allowed for use with Level A and Level B protective ensembles. During the interim period, NIOSH approved SCBA meeting NFPA 1981 requirements may be worn with Level A and B protective ensembles under the circumstances described in Tables 2 and 3:

Table 2 – Level A Protection

Level A protection is selected when the greatest level of skin, respiratory, and eye protection is required. The following constitute Level A equipment; it may be used as appropriate;

1. NIOSH CBRN agent approved SCBAs are the first choice of respiratory protection. Since SCBAs will be worn under Level A encapsulating suits, a NIOSH approved SCBA meeting NFPA 1981 requirements (see glossary) may also be worn. SCBA air cylinder service life must be rated for 60 minutes.
2. Totally encapsulating chemical-protective suit.
3. Coveralls.<sup>1</sup>
4. Long underwear.<sup>1</sup>
5. Gloves, outer, chemical-resistant.
6. Gloves, inner, chemical-resistant.
7. Boots, chemical-resistant, steel toe and shank.
8. Hardhat (under suit).<sup>1</sup>
9. Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally encapsulating suit).<sup>1</sup>

<sup>1</sup>Optional, as applicable.

Table 3 – Level B Protection

Level B protection is selected when the highest level of respiratory protection is necessary but a lesser level of skin protection is needed. The following constitutes Level B equipment (to be used as appropriate).

1. SCBA will be selected on a case-by-case basis depending on the presence of chemical warfare agent(s)(CWA). When CWA agent is present, then only a NIOSH CBRN agent approved SCBA may be worn. If CWA is not present, then a NIOSH CBRN agent approved SCBA is the first choice of SCBA, however, use of a NIOSH approved SCBA meeting NFPA 1981 requirements (see glossary) is permissible.
2. Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).
3. Coveralls.<sup>1</sup>
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots, outer, chemical-resistant steel toe and shank.
7. Boot-covers, outer, chemical-resistant (disposable).<sup>1</sup>
8. Hardhat.<sup>1</sup>
9. Face shield<sup>1</sup>

<sup>1</sup>Optional, as applicable.

Table 4 – Level C Protection

Level C protection is selected when the concentration(s) and type(s) of airborne substance(s) are known and the criteria for using air-purifying respirators are met. The following constitute Level C equipment (to be used as appropriate).

1. NIOSH CBRN agent approved air-purifying respirators.
2. Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical resistant overalls).
3. Coveralls.<sup>1</sup>
4. **Gloves, outer, chemical-resistant.**
5. Gloves, inner, chemical-resistant.
6. Boots (outer), chemical-resistant steel toe and shank.<sup>1</sup>
7. Boot-covers, outer, chemical-resistant (disposable).<sup>1</sup>
8. Hardhat.<sup>1</sup>
9. Escape mask.<sup>1,2</sup>
10. Face shield.<sup>1</sup>

<sup>1</sup>Optional, as applicable.

<sup>2</sup>Currently, there is an interim period between promulgation of the NIOSH CBRN agent escape only respirator approval schedule and the time that escape only respirators have completed certification testing and have been granted NIOSH approval. During the interim period, NIOSH CBRN agent approved air-purifying respirators may be worn where escape only respirators have been determined to be required. They are to be worn only for escape when used in this capacity.

Table 5 – Level D Protection

Level D - A work uniform affording minimal protection: used for nuisance contamination only. The following constitute Level D equipment (to be used as appropriate):

1. Coveralls.
2. Gloves.<sup>1</sup>
3. Boots/shoes, chemical-resistant steel toe and shank.
4. Boots, outer, chemical-resistant (disposable).<sup>1</sup>
5. Safety glasses or chemical splash goggles.<sup>1</sup>
6. Hardhat.<sup>1</sup>
7. Escape mask.<sup>1,2</sup>
8. Face shield.<sup>1</sup>

<sup>1</sup>Optional, as applicable.

<sup>2</sup>Currently, there is an interim period between promulgation of the NIOSH CBRN agent escape only respirator approval schedule and the time that escape only respirators have completed certification testing and have been granted NIOSH approval. During the interim period, NIOSH CBRN agent approved air-purifying respirators may be worn where escape only respirators have been determined to be required. They are to be worn only for escape when used in this capacity.

(2) Table 6 provides an overview of the National Fire Protection Association (NFPA) responder levels associated with the appropriate respiratory and personal protective levels (per reference 26-6 and NFPA 472, Standards for Professional Competence of Responders to HAZMAT Incidents).

Table 6 – NFPA Responder Levels & Required Equipment/Training Standards

Emergency Response Organization Levels (Parallel to OSHA Training Standards)		Minimum Equipment and Training Requirements
Level 1	First Responder Awareness Level: Witnesses and/or discovers a HAZMAT release.	Equip and train to operate in an environment requiring Level D protection (as defined in OSHA Standards, Title 29).
Level 2	First Responder Operations Level: Responds to HAZMAT release in defensive manner without trying to stop release.	Equip and train to operate in an environment requiring Level C protection, with full-face respirator.
Level 3	HAZMAT Technician: Responds aggressively to stop HAZMAT release.	Equip and train to operate in an environment requiring Level A protection.
Level 4	HAZMAT Specialist: Responds with and in support of HAZMAT technician but has specific knowledge of HAZMAT substances.	Equip and train to operate in an environment requiring Level A protection.
Level 5	Incident Commander: Assumes control of the incident scene beyond the first responder awareness level.	Equip and train to operate in an environment requiring Level A protection.

**Note:** OSHA training requirements for emergency responders covered in 1910.120 (q); and, NFPA 472, *Professional Competence of Responders to Hazardous Material Incidents* gives a comprehensive set of training knowledge necessary for the various levels of responders (awareness through incident command).

(3) Specific training standards for protective equipment are discussed in reference 26-7. Respiratory protection program requirements are addressed in Chapter 15 of this manual.

d. All personal protective clothing and equipment as well as respiratory protective equipment shall be sized to fit the individual and be of safe design and construction for the work to be performed. Federal agencies and standards organizations have developed standards and specifications for the design and use of PPE and devices. Activities shall only use those items that have been recognized and approved. Upon approval by NIOSH, CBRN-approved respirators are listed on the NIOSH National Personal Protective Technology Laboratory (NPPTL) website, and then included in the NIOSH Certified Equipment List (CEL) when it is periodically updated. Additional equipment may be approved in the future through the use of Federal specifications, American National Standards Institute (ANSI) specifications and recognized approval authority, such as Underwriter's Laboratories (UL), Factory Mutual (FM), or

American Society of Testing and Materials (ASTM). Website addresses for NIOSH NPPTL and NIOSH CEL are located at the following website addresses:

- <http://www.cdc.gov/niosh/npptl/default.html>
- <http://www.cdc.gov/niosh/celintro.html>

e. Notable Exemptions.

(1) Where the safety and health of the contractor's employees are affected, references 26-7 and 26-8 specify that the contractor is responsible directly to OSHA or appropriate state office where OSHA has approved a state plan. Per paragraph 1502.b.1 contractors are responsible for providing their own respiratory protection programs and respiratory protective equipment.

(2) Further guidance on safety and occupational health policies and procedures may be found in references 26-9 and 26-10.

**2604. Heat Stress**

Mandatory levels of protection for first responders require full or partially encapsulating ensembles of PPE. These protective ensembles serve to prevent bodily absorption of harmful CBRN agents via skin, eye and respiratory contact. Protective ensembles can rapidly become hot, heavy, and restrictive even under mild to moderate activity. While guarding against exposure to harmful CBRN agents, the protective ensemble also prevents dissipation of normal body heat. As a consequence, heat and sweat accumulate inside the PPE ensemble becoming, first, a source of discomfort, then a distraction that could impair job performance, and finally result in a serious and possibly life-threatening heat-related injury or illness.

a. Per reference 26-11, the IC should consider the circumstances of each incident and make suitable provisions for rehydration, rest and rehabilitation for members operating at the scene. These considerations should include medical evaluation and treatment, food and fluid replenishment, and relief from extreme climatic conditions, according to the circumstances of the incident. The IC should maintain an awareness of the condition of members operating within their span of control and ensure that steps are taken to provide for their safety and health. The command structure should be utilized to request relief and reassignment of fatigued members.

(1) Medical monitoring. Changes in gait, speech, or behavior that require entry personnel to undergo immediate decontamination, doffing of protective clothing, and assessment should be monitored. If entry personnel complain of chest pain, dizziness, shortness of breath, weakness, nausea, or headache, they should undergo immediate decontamination, doffing of protective clothing, and assessment.

(2) The IC should also be aware that post-entry medical monitoring procedures specified by reference 26-11 are also recommended for any first responder requiring medical treatment.

b. There are only two effective methods of preventing heat stress related illness - limited stay times and cooling equipment.

(1) The preferred method is limited stay times with rehabilitation periods built into the crew rotations. The maximum recommended length of an excursion into a "hot zone" while wearing Level A or B PPE may be significantly less than rated SCBA bottle life depending on equipment limitations and depth of exclusion zone. This limited time takes into account the time to enter and begin work mitigating the incident, travel back to the decontamination line and time to process through decontamination. The main reason for the limited time is the finite time of the supplied air in the SCBA and assumes an SCBA bottle rated for 60 minutes.

(2) The second method, cooling equipment, is also effective, but there are several drawbacks. First the equipment itself adds weight and limits movement. Next, unless the equipment comes with a power source, the cooling medium will warm to the skin temperature over time and thus not cool at all but become extra weight/insulation to the wearer. Finally, cooling equipment may give a false "sense of security" because the equipment cools the skin surface but does not prevent a gradual increase in the core body temperature of the wearer. Core body temperature, not skin surface temperature, is the primary factor in heat stress. The best method of combating these drawbacks is to maintain the limited entry time standard for the entry crew. Heat stress exposure guidelines are found in reference 26-12.

c. Per U.S. Fire Administration, (Federal Emergency Management Agency, FEMA, U.S. Fire Administration, Emergency Incident Rehabilitation, FA-114/July1992 <http://www.usfa.fema.gov/downloads/pdf/publications/fa-114.pdf>), the following summary guidelines are recommended to prevent heat stress among first responders:

(1) Rehabilitation. Incident command staff officers should consider the establishment of rehabilitation areas during the initial planning stages of an emergency response. It should be stressed that the climatic or environmental conditions of the emergency scene should not be the sole justification for establishing a rehabilitation area. Any activity/incident that is large in size, long in duration, and/or labor intensive will rapidly deplete the energy and strength of personnel and therefore merits consideration for rehabilitation. Climatic or environmental conditions with a heat stress index above 90 degrees or a wind chill index below 10 degrees Fahrenheit warrant establishing a rehabilitation area.

(2) Hydration. A critical factor in the prevention of heat injury is the maintenance of water and electrolytes. Water and electrolytes must be replaced during work periods and at emergency incidents. Rehydration is important even during cold weather operations where, despite the outside temperature, heat stress may occur during firefighting or other strenuous activity when protective equipment is worn.

(3) Nourishment. The IC shall provide food at the scene of an extended incident when units are engaged for three or more hours.

(4) Rest. Members should rehydrate (at least eight ounces) while SCBA cylinders are being changed. In all cases, the objective evaluation of a member's fatigue level shall be the criteria for rehabilitation time. The Rehabilitation Officer shall determine duration of rest intervals. Fresh crews, or crews released from the Rehabilitation Sector/Group, shall be

available in the staging area to ensure that fatigued members are not required to return to duty before they are rested, evaluated, and released by the Rehabilitation Officer.

(5) Recovery. Members in the Rehabilitation Area should maintain a high level of hydration. Members should not be moved from a hot environment directly into an air conditioned area because the body's cooling system can shut down in response to the external cooling. An air-conditioned environment is acceptable after a cool-down period at ambient temperature with sufficient air movement. Certain drugs impair the body's ability to sweat and extreme caution must be exercised if the member has taken antihistamines, diuretics or stimulants.

d. Medical Evaluation.

(1) Medical Response Group. The Medical Response Group will provide qualified personnel that shall evaluate vital signs, examine members, and make proper disposition (return to duty, continued reconstitution, or medical treatment and transport to medical facility). Continued reconstitution should consist of additional monitoring of vital signs, providing rest, and providing fluids for re-hydration. Medical treatment should be provided for members whose signs and/or symptoms indicate potential problems, in accordance with local medical control procedures. Emergency Management Specialists (EMS) shall be assertive in an effort to find potential medical problems early.

(2) Documentation. All medical evaluations should be recorded on standard forms.

**2605. Confined Space Entry**

Entry into a confined space shall not be performed during a CBRNE incident without the order of the IC. All confined space entries will be conducted in accordance with Chapter 27 of this manual.

**2606. CBRN Respiratory Protection Program**

a. Scope. Reference 26-13 requires that a respiratory protection program be established where respiratory protection is necessary to protect employees against inhalation hazards. The CBRNE Respiratory Protection Program includes all elements of the respirator program described in reference 26-13 and Chapter 15 of this instruction. This chapter contains additional requirements for respirator selection; respirator use and limitations; respirator inspection, cleaning, and decontamination; respirator training; fit testing; program evaluation; and respirator cartridge change out schedules.

b. Roles and Responsibilities. The Respiratory Protection Program Manager (RPPM) having cognizance over the first responders will be assigned as the CBRN RPPM. At facilities where there is no RPPM, the Commanding Officer will assign, in writing, an RPPM to manage the CBRN Respirator Protection Program. Alternatively, these facilities may obtain RPPM services from another command via an interservice support agreement. RPPMs may have as many assistants as necessary to implement the respirator program. All of the prerequisite

requirements for wearing respiratory protection, including medical evaluation, respirator selection, fit testing, and training, must be completed prior to responding to a CBNRE incident.

c. CBRN-Specific Respiratory Protection Program Elements

(1) Respirator Selection. Respirator selection for first responders is based on the same principles discussed in Section 1507.c. of this instruction and directed by the IC. Should it become necessary to respond to incidents involving CBRNE agents, the following respiratory protection will be worn. (See Section 2603 for descriptions of Levels A, B, and C protection).

**NOTE:**

SCBA operated in the “demand mode” and respirators receiving only NIOSH approval as pressure demand respirators shall not be worn for Level A or B protection. Also, there are currently no NIOSH CBRN agent approved combination airline/SCBA. All of these types of respirators do not provide adequate airflow for entering CBRNE immediately dangerous to life or health (IDLH) atmospheres and have not undergone permeation testing against vapor and liquid chemical agents. All SCBA purchased for first responders must be NIOSH CBRN approved. Once activities are fully equipped with NIOSH CBRN approved SCBA, then these respirators will be the only respirators allowed for use with Level A and Level B protective ensembles. During the interim period, NIOSH approved SCBA meeting the NFPA-1981 requirements may be worn with Level A and B protective ensembles under the circumstances described in the following two paragraphs.

(a) Level A - NIOSH CBRN agent approved SCBA are the first choice of respiratory protection. Since SCBA will be worn under Level A encapsulating suits, NIOSH approved SCBA meeting the NFPA 1981 requirements (see glossary) may also be worn. SCBA air cylinder service life must be rated for 60 minutes. NIOSH CBRN-agent approved SCBA are listed on the following website:

- <http://www.cdc.gov/niosh/npptl/cbrncheck.html>

(b) Level B - SCBAs will be selected on a case-by-case basis depending on the presence of liquid chemical warfare agent(s) (CWA). When CWA is present then only NIOSH CBRN agent approved SCBA are permitted to be worn. If CWA agent is not present, then NIOSH CBRN agent approved SCBA are the first choice of SCBA, however, use of NIOSH approved SCBA meeting NFPA 1981 requirements is permissible.

(c) Level C - NIOSH CBRN agent approved air-purifying respirators will be selected for Level C protection. The MSA CBRN agent approved Millennium® respirator (TC-14G-0270) is the first choice of Level C respiratory protection. The MSA Millennium® and the Navy’s military gas masks (MCU-2A/P) are almost identical respirators. The MSA Millennium® is made from the same mold as the MCU-2A/P. Besides using different canisters, the main difference between these two masks is that the Millennium® is made of Hycar rubber, whereas the MCU-2A/P is made of silicone and therefore requires a rubber second skin because silicone is much more permeable to chemical agents. Also, the MCU-2A/P exhalation valve pressure is greater than the Millennium®. Although the Millennium® is the first choice,

equivalent masks are also authorized for purchase. NIOSH CBRN agent approved air-purifying respirators can be accessed at the following website:

- <http://www.cdc.gov/niosh/npptl/cbrnaprcheck.html>

(d) Medical Treatment Facility (MTF) Secondary Decontamination Stations and Decontamination Corridor Security Until NIOSH CBRN approved powered air purifying respirators (PAPRs) are available, personnel assigned to secondary decontamination stations at MTFs and military security personnel stationed at the decontamination corridor will wear full-face rubber PAPRs equipped with combination organic vapor, acid gas, and HEPA filters. Once NIOSH CBRN agent approved PAPRs are available, they will be the only air-purifying respirators permitted for use during these operations.

(2) Use and Limitations.

(a) NIOSH CBRN agent approved SCBAs shall not be used beyond six hours after initial exposure to chemical warfare agents to avoid possibility of agent permeation.

(b) NIOSH CBRN agent approved air-purifying respirators shall not be worn into IDLH atmospheres or atmospheres containing less than 19.5% oxygen. They must not be used beyond eight hours after initial exposure to chemical warfare agents to avoid possibility of agent permeation. If liquid exposure is encountered, the respirator shall not be used for more than two hours.

(c) Additional limitations of NIOSH CBRN approved respirators are addressed further on the NIOSH approval labels and in respirator manufacturers' instruction manuals. Ensure all of these limitations are understood by all personnel in the CBRN respirator program and by personnel implementing this program.

(3) Inspection, Cleaning, and Decontamination.

(a) Inspection. Manufacturer's instructions will be used for inspecting full-facepiece air purifying respirators, powered air purifying respirators (PAPRs) and SCBAs. Per paragraph (h) of reference 26-13, since these respirators will be used for emergency use, they must be inspected monthly and a written inspection record will be maintained for the life of the respirator. Employees shall inspect their respirators for serviceability prior to donning them. They are also responsible for ensuring that cartridges are inserted correctly into the respirator (e.g., not cross threaded). Defective or dirty respirators shall not be used.

(b) Cleaning and Decontamination. Respirators exposed to contaminants must be properly decontaminated. Decontamination procedures are in reference 26-15 (see section 2608). Respirator cleaning procedures are covered in Chapter 15.

(4) Training. Respirator training requirements for first responders, supervisors, and respirator issuers are specified in Section 1511 of Chapter 15. Additional training requirements are provided in reference 26-6.

(5) Fit Testing. Personnel wearing tight-fitting respirators shall be quantitatively fit tested by activities initially and annually thereafter according to the OSHA accepted quantitative fit testing methods and procedures set forth in Appendix A of reference 26-13. Positive pressure respirators will be fit tested in the negative pressure mode by either converting the facepiece into a negative pressure air-purifying respirator or using a surrogate negative-pressure air-purifying respirator made by the same manufacturer and having identical sealing surfaces and facepiece materials. Employees shall not be fit tested unless they have been medically evaluated.

(6) Program Evaluation.

(a) On-Scene Inspections. The Incident Safety Officer will conduct frequent inspections of the incident site to ensure that the correct respirators are being used, are being worn properly, and are in good working condition. The Incident Safety Officer will convey this information to the CBRN RPPM, who will maintain a record of inspection dates and findings.

(b) Periodic program audits are performed according to Section 1513.

(7) Respirator Cartridge Change-Out Schedules.

(a) In recovery situations only, where exposure levels are known, chemical cartridge air-purifying respirators may be used (up to their maximum use concentration) for protection against gases and vapors including substances without good warning properties, as long as a cartridge change-out schedule is developed and implemented.

(b) In the absence of industrial hygiene air sampling data, respirator cartridges used by security guards must be changed after every eight-hour shift; and cartridges used by personnel assigned to secondary decontamination stations at medical treatment facilities and by security guards stationed at the decontamination corridor must be changed every two and a half hours; C2A1 cartridges, when military gas masks are allowed to be worn by the Theatre Combatant Commander, must be changed according to reference 26-4. More detailed information on respirator cartridge change out schedules, including a method for validating estimated change out schedules, is provided in articles addressing this issue on the Navy Environmental Health Center (NEHC) respirator homepage located at the following website addresses:

- <http://www-nehc.med.navy.mil/ih/Respirator/ChangeSchedule.htm>
- <http://www-nehc.med.navy.mil/ih/launches/CalChemCart.doc>

**2607. Training**

Training requirements are specified in Navy Shore Installation Emergency Management Program, reference 26-2.

## **2608. Decontamination**

Decontamination requirements are specified in Navy Shore Installation Emergency Management Program, reference 26-2. Guidelines for the decontamination of emergency response personnel and their equipment after exposure to hazardous materials, and for planning for decontamination before an incident occurs is in references 26-14.

## **2609. Risk Communication**

Risk Communication requirements are specified in Navy Shore Installation Emergency Management Program, reference 26-2. In addition, the Navy Environmental Health Center "Risk Communication Primer: A Guide for Conveying Controversial or Sensitive Environmental, Health and Safety Information to a Concerned Audiend," reference 26-15 is a useful tool for use by commanding officers, public health officials, emergency response personnel, medical personnel and safety , and health and environmental personnel.

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### Chapter 26

### References

- 26-1. SECNAV Instruction 3400.4 of 8 June 04, DON "Installation Chemical, Biological, Radiological, Nuclear and High-Yield Explosive (CBRNE) Emergency Response Guidelines." [http://neds.daps.dla.mil/Directives/3400\\_4.pdf](http://neds.daps.dla.mil/Directives/3400_4.pdf).
- 26-2. OPNAVINST 3440.17, Navy Shore Installation Emergency Management Program
- 26-3. NEHC Technical Manual OM 6260 of 1 Feb 01, Occupational Medical Surveillance Procedure Manual and Medical Matrix  
<http://www-nehc.med.navy.mil/occmcd/Matrix.htm>
- 26-4. NTTP 3-11.27, Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection, of 02 Jun 2003  
<http://globalsecurity.org/wmd/library/policy/army/fm/3-11-4/index.html>.
- 26-5. NFPA 1994, Standard on Protective Ensembles for Chemical/Biological Terrorism Incidents, 2001 Edition  
<http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1994&cookie%5Ftest=1>.
- 26-6. Title 29, Code of Federal Regulations, Part 1910, Subpart 120 (29 CFR 1910.120)  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9765](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9765)
- 26-7. Title 29, Code of Federal Regulations, Part 1910, Occupational Safety and Health Standards for General Industry  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9696](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9696).
- 26-8. Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction

[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10593](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10593).

26-9. DODINST 6055.1, of 13 Aug 98, DOD Safety & Occupational Health (SOH) Program  
<http://www.dtic.mil/whs/directives/corres/html/60551.htm>.

26-10. DODINST 6055.5, of 10 Jan 89, Industrial Hygiene and Occupational Health  
<http://www.dtic.mil/whs/directives/corres/html/60555.htm>.

26-11NFPA 471 2002, Recommended Practice for Responding to Hazardous Materials Incidents  
[www.nfpa.org/Codes/NFPA\\_Codes\\_and\\_Standards/List\\_of\\_NFPA\\_documents/NFPA\\_471.asp](http://www.nfpa.org/Codes/NFPA_Codes_and_Standards/List_of_NFPA_documents/NFPA_471.asp).

26-12. OSHA Technical Manual, Section III, Chapter 4, Heat Stress.  
[http://www.osha.gov/dts/osta/otm/otm\\_iii/otm\\_iii\\_4.html](http://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_4.html).

26-13. Title 29, Code of Federal Regulations, Part 1910.134, Respiratory Protection  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=12716](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716).

26-14. NFPA Hazardous Material Response Handbook, Supplement 10, Guidelines for the Decontamination of Firefighters and Their Equipment following Hazardous Material Incidents, 1997  
<http://www.nfpa.org/PDF/Sup10.pdf?src=nfpa>.

26-15. Risk Communication Primer: A Guide for Conveying Controversial or Sensitive Environmental, Health, and Safety Information to a Concerned Audience, NEHC.  
<http://www-nehc.med.navy.mil/HERC/Products/primer.pdf>.

## Appendix 26-A

### MILITARY AGENTS

#### Nerve Agents

- Tabun (NATO military designation, GA)
- Sarin (NATO military designation, GB)
- Soman (NATO military designation, GD)
- GF (Cyclohexyl methylphosphonofluoridate)
- VX (Methylphosphonothioic acid S-(2-(bis(1-methylethyl)amino)ethyl) O-ethyl ester)
- GE (Phosphonofluoridic acid, ethyl-, isopropyl ester)
- VE (Phosphonothioic acid, ethyl-, S-(2-(diethylamino)ethyl) O-ethyl ester)
- VG (Amiton)
- VM (Phosphonothioic acid, methyl-, S-(2-(diethylamino)ethyl) O-ethyl ester)

#### Health Effects

- Cholinesterase inhibitors
- Disable enzymes responsible for transmitting nerve impulses.
- Initial effects of organophosphorus agents occur within 1-10 minutes of exposure
- Death
  - Within 15 minutes for Tabun, Sarin, and Soman
  - From 4-42 hours for VX.

#### Blister/Vesicant Agents

- Lewisite (L)
- Mustard-Lewisite (HL)
- Nitrogen mustards (HN-1, HN-2, HN-3)
- Phosgene oxime (CX)
- Sulfur mustards (H, HD, HT)

#### Health Effects

- Vesicants
- Skin blisters
- Damage eyes, mucous membranes, respiratory tract, and internal organs
- Initial effects rapid
- Mustard agents
- Destroy different substances within cells of living tissue
- Initial effects occur 12 to 24 hours after exposure.
- Symptoms variable
- Acute mortality low
- Death can occur from complications after lung injury.

### **Blood Agents**

- Cyanogen chloride (CK)
- Hydrogen cyanide (AC)

#### Health Effects

- Highly volatile
- Rapidly acting
- Seizures
- Respiratory failure
- Cardiac arrest

### **Pulmonary Agents**

- Chlorine
- Chloropicrin (PS)
- Diphosgene (DP)
- Phosgene (CG)

#### Health Effects

- Liquids dispersed in gas form
- Damage the respiratory tract and cause severe pulmonary edema in about four hours, leading to eventual death. Effects are variable
- Rapid or delayed depending on the specific agent.

### **WEB LINKS FOR MORE INFORMATION**

#### **National Institute of Health (NIH)**

<http://www.nlm.nih.gov/medlineplus/chemicalweapons.html>

#### **Center for Disease Control and Prevention (CDC)**

<http://www.cdc.gov/search.do?action=search&queryText=chemical+warfare+agents>

#### **CDC Morbidity and Mortality Weekly Report**

- Recommendations for Protecting Human Health Against Potential Adverse Effects of Long-Term Exposure to Low Doses of Chemical Warfare Agents. MMWR Morb Mortal Wkly Rep. 1988 Feb 12;37(5):72-4, 79  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/00001041.htm>
- Biological and Chemical Terrorism: Strategic Plan for Preparedness and Response: Recommendations of the CDC Strategic Planning Workgroup MMWR Recomm Rep. 2000 Apr 21;49(RR-4):1-14.  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4904a1.htm>

#### **National Center for Environmental Health**

<http://www.cdc.gov/search.do?action=search&queryText=chemical+weapons>

#### **NFPA**

Supplement 14, Emergency Response to Incidents Involving Chemical and Biological Warfare Agents <http://www.nfpa.org/index.asp>

**Chemical and Biological Defense Information Analysis Center (CBIAC). The CBIAC is a DoD Information Analysis Center**

<http://www.cbiac.apgea.army.mil/index.html>

**Department of Homeland Security**

- Chemical Threat  
<http://www.ready.gov/chemical.html>

**U.S. Army**

- Chemical Materials Agency <http://www.cma.army.mil/>
- U.S. Army Center for Health Promotion & Preventive Medicine, Chemical Exposure Guidelines <http://www.hard-target.net/htsb81.pdf>
- U.S. Army Medical Research Institute of Chemical Defense  
<http://chemdef.apgea.army.mil/>
- Health Service Support in a Nuclear, Biological and Chemical Environment  
<http://www.nbc-med.org/SiteContent/MedRef/OnlineRef/FieldManuals/fm4-02.7.pdf>
- Chemical Stockpile Emergency Preparedness Program <http://www.csepp.army.mil/>

**U. S. Environmental Protection Agency**

- Chemical Emergency Preparedness and Prevention Office  
<http://www.epa.gov/swercepp/>

**Federal Emergency Management Administration (FEMA)**

- Hazardous Materials Guide for First Responders  
<http://usfa.fema.gov/fire-service/hazmat/hazmatguide/hmgfr2e.shtm>
- Terrorism  
<http://www.fema.gov/hazards/terrorism/>

**Occupational Safety and Health Administration**

- OSHA's Emergency Preparedness and Response Page  
<http://www.osha.gov/SLTC/emergencypreparedness/index.html>

**Textbook**

Yin Sun and Kwok Y. Ong, Detection Technologies for Chemical Warfare Agents and Toxic Vapors, CRC press, New York, 2005.

## CHAPTER 27

### CONFINED SPACE ENTRY (CSE) PROGRAM (NON-MARITIME)

#### **2701. Discussion**

Confined spaces are enclosures that have limited means of entry and exit, and although they are large enough to get into, they are not designed for continuous employee occupancy. Examples include storage tanks, pits, vaults, vats, water towers, chemical reactors, process vessels, and manholes. Each year, over a million and a half workers enter confined spaces. Many are seriously injured or killed as a result of asphyxiation, electric shock, heat stress or engulfment by liquids or finely divided solids such as wood dust. Many incidents are exacerbated by ill-fated rescue attempts made by well meaning, but untrained, rescuers.

The Occupational Safety and Health Administration (OSHA) estimates that 85 percent of confined space-related incidents could have been prevented if proper precautions had been followed. Moreover, the overwhelming majority of all confined space fatalities could have been prevented if spaces had simply been tested for atmospheric hazards or ventilated prior to entry. For this reason, Navy policy is to consider all confined spaces to contain the most unfavorable and unsafe conditions. Entry into, or work in or on, such spaces is prohibited until qualified personnel have performed the tests, evaluations and prescribed procedures of this chapter to ensure that safe conditions exist and are maintained. Each installation shall develop a written program that explains the processes, means and methods used for recognizing, evaluating and controlling potential confined space hazards, and for communicating information concerning those hazards to employees.

This instruction explains the minimum requirements for an acceptable written, site-specific confined space program. It incorporates the requirements of those standards, codes, rules and regulations outlined in appendix A. In situations where a conflict exists, the most restrictive requirement prevails.

#### **2702. Applicability**

- a. The provisions of this chapter apply to all Navy shore non-maritime commands.
- b. Naval maritime facilities such as naval shipyards, Ship Repair Facilities (SRFs), Intermediate Maintenance Facilities (IMFs), Shore Intermediate Maintenance Activities (SIMAs), Trident Refit Facilities (TRFs), and other Navy commands whose primary mission is shipbuilding, ship repair, or ship breaking are governed by reference 27-1.
- c. Navy shore non-maritime commands (e.g. FISC) performing facilities-related confined space work ashore within a facility identified in subparagraph 2702.b shall comply with this chapter, except that a certified NFPA Marine Chemist or Board certified Navy GFE shall be used as required by reference 27-1. For those situations where non-maritime commands perform confined space work at naval maritime facilities and occupy the same confined space with naval maritime facility employees, entry procedures shall be developed and managed by the cognizant Navy GFE.
- d. Navy shore non-maritime commands performing ship repair operations shall comply with reference 27-1, except that the Confined Space Program Manager (CSPM) may

provide management of the applicable reference 27-1 requirements, and perform or designate other personnel to perform duties limited to those of a Navy Competent Person (formerly known as Gas Free Technician). Personnel performing Navy Competent Person duties must have completed the training and OJT specified in reference 27-1, except that the amount of experience in a maritime facility and the amount of OJT may be limited to the appropriate types of confined space operations performed by the activity as determined by the CSPM. A certified NFPA Marine Chemist or Board Certified Navy GFE shall still be used as required by reference 27-1.

e. Shipboard confined space and gas free requirements are found in references 27-2 and 27-3.

### **2703. Program Management**

a. Regional commanders, commanding officers, or officers in charge are ultimately responsible for all safety and health issues at their installations. In cooperation with other members of their management team, they shall provide continuing support, both motivational and financial; to ensure that an installation's confined space entry program remains effective. They shall appoint, in writing, a qualified CSPM.

b. The CSPM, in cooperation with line managers, supervisors, and employees, shall manage all facets of the installations confined space entry program, and has full authority to make necessary decisions to ensure the program's continued success. The CSPM is the only person authorized to amend an installation's confined space program

c. The CSPM shall successfully complete course number A-493-0030, Confined Space Safety, (formally OSH 245E Gas Free Engineering for Non-Maritime Operations) conducted by the Naval Occupational Safety and Health and Environmental Training Center (NAVOSHENVTRACEN), or equivalent. The cognizant headquarters command OSH manager must approve equivalent training. The command OSH office shall keep verification of such training on file along with the written appointment to the position. In addition to formal classroom training, the command shall establish a proficiency program to ensure that CSPMs possess the understanding, knowledge, and skill necessary for the safe performance of their duties. This can be accomplished by having the program audited by a CSPM from another activity.

d. The CSPM shall use additional personnel to perform duties in support of the confined space program. The CSPM has the authority to designate other qualified persons to assist in the day-to-day management and implementation of the confined space program as follows:

(1) Assistant Confined Space Manager (ACSPM). The ACSPM may be authorized to perform duties equivalent to those of the CSPM and shall meet the same qualifying criteria. The CSPM must designate the ACSPM in writing.

(2) Qualified Person (QP). QP duties are limited to performing atmospheric testing in confined spaces and inspecting for physical hazards. If the space does not contain, or have the potential to contain, any atmospheric or serious physical hazard, the QP may reclassify the space as "non-permit required". If the space contains hazards that cannot be eliminated, its classification will remain "permit required" and the QP shall contact the CSPM or

ACSPM to inspect and provide an entry permit. If authorized, the QP may also conduct follow-up inspections and atmospheric testing on permit required spaces after initial permits were issued by the CSPM/ACSPM. CSPM or ACSPM shall conduct/coordinate the formal classroom/proficiency training for personnel assigned duties as a QP and appoint the QP in writing. Training shall include the proper use, maintenance, calibration, and operational check of equipment being used. In addition, training shall include requirements and provision of this chapter as it relates to the QP responsibilities, procedures for testing atmospheric hazards, recognition and control of hazards related to confined spaces, responsibilities of personnel entering and working in confined spaces and emergency procedures.

e. Tenant commands and/or shore installations participating in a regional OSH program may have the regional CSPM manage and administer the program through a written agreement signed by both parties.

f. Individual employees are responsible for fully understanding the installation's confined space program and for complying with its procedures and policies.

#### **2704. Duties and Responsibilities**

a. CSPM's duties and responsibilities include, but are not limited to:

(1) Ensuring, to the extent feasible, that surveys of the installation are conducted to identify existing and potential confined spaces

(2) Ensuring, to the extent feasible, that the hazards associated with each identified confined space are characterized to the extent necessary to minimize losses

(3) Reviewing and approving the purchase of equipment required for confined space entry

(4) Auditing the training of those employees involved in confined space entry to assure that they are able to demonstrate proficiency in the requirements of the installation's confined space program

(5) Auditing line managers, supervisors and designated QPs to verify that they continue to demonstrate proficiency in the discharge of their duties and responsibilities related to confined space entry

(6) Ensuring, to the extent feasible, that effective procedures for managing confined space entry work performed by independent contractors are in place

(7) Ensuring, to the extent feasible, that entry permits/entry certificates are reviewed on a periodic basis sufficient to allow identification of problems that could compromise the confined space entry program, and to assure that identified deficiencies are investigated and corrected prior to subsequent entry into the installation's confined spaces

(8) Determining when it is necessary to obtain the assistance of outside professional resources.

b. Supervisor's duties and responsibilities include, but are not limited to:

(1) Ensuring that workers under their control who enter confined spaces are informed of the hazards to which they may be exposed and have demonstrated proficiency in the skills necessary to protect themselves from those hazards.

(2) Ensuring that all special equipment required for entry is available and in proper working order

(3) Determining that training in both confined space procedures and the use of any specialized equipment has been provided, and that employees under their control who enter confined spaces, have demonstrated proficiency in the application of those procedures specialized equipment

(4) Auditing the work performed by employees under their control who enter confined spaces to assure that it conforms to this program as well as those programs integrated into it, such as lock-out/tag-out, respiratory protection, bloodborne pathogens, etc.

(5) Informing the CSPM of any unauthorized digressions from the installation's confined space program or any problems that arise during confined space entry

c. Individual employees' duties and responsibilities include, but are not limited to:

(1) Participating in the development of the installation's site specific confined space program

(2) Minimizing their exposure to potentially hazardous conditions

(3) Notifying their supervisors of any recognized uncontrolled hazards

(4) Interceding with coworkers to stop inappropriate or hazardous behaviors that may result in injury or property damage

(5) Not using defective equipment, and reporting defects to their supervisors

(6) Inquiring about the potential hazards to which they may be exposed to ensure that they know and understand the precautions they must take to protect themselves from those hazards

(7) Using equipment and conducting themselves in a manner consistent with the training they have received.

**2705. Entry Options**

Three options are available with respect to entry into permit-required confined spaces:

a. Reclassifying a permit-space as a non-permit space by eliminating all entry-related hazards as explained in section 2723.

b. Implementing alternative entry procedures that require continuous forced mechanical ventilation and continuous air monitoring in situations where the only hazard posed is an atmospheric hazard which can be controlled by ventilation, as explained in section 2724.

c. Establishing a permit-entry procedure, as explained in section 2725, that includes provisions for:

(1) Designating authorized entrants, authorized attendants, and authorized entry supervisors as described in section 2726.

(2) Implementing a process for issuing, canceling, reviewing and archiving written entry permits as described in section 2726.

(3) Providing for emergency rescue services as described in section 2728.

(4) Implementing, if necessary, procedures for entry into atmospheres that are immediately dangerous to life or health (IDLH), as described in section 2729.

#### **2706. Administrative Policy**

a. As a matter of administrative policy, all shore-side confined spaces, other than those associated with new construction activities, tunneling operations, trenching and excavating, telecommunications, and electrical generation, distribution, and transmission shall be permit-required confined spaces.

b. Personnel may enter permit-spaces only per the provisions of a written confined space program that explains the processes, means, and methods used to achieve compliance with this instruction. However, the ACSPM or QP may declassify a permit-space per the provisions of section 2723 or allow entry into a permit-space under the alternative entry procedures described in section 2724.

#### **NOTE:**

Locally generated confined space entry permits shall contain, at minimum, the required items found in 29 CFR 1910.146 (f).

c. Every entry into a permit-required confined space must be documented on a confined space permit/entry certificate like that in appendix B, or on an equivalent permit/certificate that is designed and formatted to addresses site-specific issues, conditions or concerns.

#### **2707. Program Content**

The CSPM, or other designated qualified person responsible for confined space program management, shall consult with affected employees and their authorized representatives on the development of a written confined space program. The program shall describe with reasonable specificity the processes, means and methods by which the installation manages its entries into confined spaces.

**2708. Identification of Confined Spaces**

The written program shall describe the process the installation employs to identify on-site confined spaces and poorly ventilated enclosed spaces. The process must ensure that both permit and non-permit spaces are identified. This includes mobile, portable and transient confined spaces such as those imparted by aircraft, pollution control equipment, rail tank cars, highway tank trucks, and similar shipping containers.

**2709. Hazard Analysis and Risk Communication**

The written program must describe the process, means, and methods the installation uses to inform affected employees of the:

- a. Existence and location of confined spaces and poorly ventilated enclosed spaces.
- b. Nature of the potential hazards posed by confined spaces and poorly ventilated enclosed spaces.
- c. Prohibition against entering confined spaces and poorly ventilated enclosed spaces unless special precautions are taken and an entry permit is completed.

**2710. Preventing Unauthorized Entry**

The written program shall describe the site-specific processes, means and methods that are used to prohibit unauthorized entrants from entering confined spaces. These methods may include any combination of the following:

- a. Verbal notification,
- b. Posting warning signs,
- c. Stickers or labels,
- d. Limiting access through the use of key cards, cipher locks, cylinder locks; tack welding the edges of the cover to the body of the enclosure, the need for a special tool, or any other equally effective means used in lieu of signs, stickers and/or labels.

**2711. Pre-Entry Precautions**

a. The written program shall explain the site-specific process used to identify any precautions, work practices, or controls that need to be implemented before entry. At a minimum, the program shall address the following, if applicable to the installation's operations:

- (1) Conducting a job-specific hazard analysis
- (2) Limiting access to the work area
- (3) Controlling hazardous energy

- (4) Providing effective isolation
- (5) Draining, flushing and cleaning
- (6) Testing and monitoring
- (7) Controlling atmospheric hazards
- (8) Controlling physical hazards
- (9) Assessing protective equipment needs
- (10) Emergency response planning
- (11) Determining if entry conditions are acceptable.

b. The written program shall identify any specialized equipment necessary to accomplish the tasks specified above. It shall also include provisions that the region or activity shall provide this equipment to employees at no cost and shall maintain the equipment to ensure its continued effectiveness.

#### **2712. Job-Specific Hazard Analysis**

All hazards associated with entry must be identified and noted on the permit before a space is entered. The written program shall describe the process for conducting a job specific hazard analysis used to achieve this objective, and a requirement that any hazards, including those that have been controlled or eliminated, be identified on the permit so that the hazard information may be communicated to affected employees.

#### **2713. Limiting Unauthorized Access**

Access to a confined space work zone must be limited to authorized employees. The written program shall describe the means and methods used to achieve this objective.

#### **2714. Controlling of Hazardous Energy**

Energy that poses a hazard to authorized entrants must be controlled to the extent feasible through disconnecting, blocking or otherwise disabling equipment whose unexpected start up could cause injury, or alternatively, by implementing a lock-out/tag-out program, that at a minimum meets the requirements of 29 CFR 1910.147. If reference is made to the facilities lock-out/tag-out program, the CSPM shall ensure that the lockout/tagout procedures are incorporated in the procedures used for confined space entry.

#### **2715. Providing Effective Isolation**

a. Isolation is the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; providing a double block and bleed system; locking- or tagging-out of all sources of energy; or blocking or disconnecting all mechanical linkages.

b. The written program shall either describe the process used to achieve isolation, or refer to the facilities general isolation program. If reference is made to the installation's program, the CSPM must evaluate that program to determine if it meets the requirements necessary to allow it to be used for confined space entry.

#### **2716. Draining, Flushing and Cleaning**

a. Spaces may contain residue that is flammable, corrosive, toxic or otherwise hazardous to entrants. The written program shall describe the process used to identify these hazards and explain how they may be eliminated or controlled prior to entry.

b. The written program shall incorporate a provision that the installation's cognizant environmental representative shall be notified to evaluate any space that is to be drained, flushed, or rinsed. This evaluation must identify any **specific** Federal, State, and/or local environmental codes, standards, rules, regulations, or statutes that apply to the draining, flushing rinsing, and waste disposal processes.

#### **2717. Testing and Monitoring**

a. This section shall explain the installation's process for identifying hazards that may require testing and monitoring, and describe the means and methods by which this testing and monitoring is to be conducted. At a minimum, the written program shall address:

- (1) Testing and monitoring of non-atmospheric hazards
- (2) Testing and monitoring of atmospheric hazards
- (3) Identifying factors affecting instrument selection
- (4) Sampling strategies, methods and techniques
- (5) Establishing instrument alarm set points
- (6) Interpreting testing and monitoring results
- (7) Establishing acceptable entry conditions
- (8) Establishing maintenance and calibration protocols
- (9) Requiring continuous monitoring when feasible
- (10) Appropriate selection and proper calibration of instruments.

b. The written program, shall also describe the process by which authorized entrants or their authorized representatives are provided with the opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces.

### **2718. Control Of Atmospheric Hazards**

a. Written confined space programs shall stipulate that atmospheric hazards be controlled to the extent feasible through forced, mechanical ventilation. If the CSPM or other designated qualified person determines that ventilation is not effective for controlling atmosphere hazards, he/she shall require respiratory protection. Personnel entering the space shall use air-supplied respirators unless the CSPM or other designated qualified person determines that air-purifying devices are acceptable.

b. The following is the minimum standard when evaluating for atmospheric hazards:

(1) A flammable gas, vapor, or mist shall be lower than 10 percent of its lower explosive limit (LEL). Hot work may only be performed if the source of the gas, vapor, or mist has been determined and adequately controlled below 10% of the LEL.

Note: Even though the atmosphere is controlled to concentrations lower than 10% LEL, the CSPM or designated qualified person must ensure the measured LEL of a particular gas, vapor, or mist does not also exceed the PEL.

(2) The atmospheric oxygen concentration shall not be below 19.5 percent or above 22 percent;

(3) The Permissible Exposure Limit of any substance is not exceeded.

### **2719. Control of Physical Hazards**

Physical hazards associated with confined space entry include: environmental hazards such as heat and cold stress, ionizing and non-ionizing radiation and noise; equipment-related hazards such as unguarded machinery and exposed energized conductors; and task-related hazards such splash with corrosive materials, contusions from impacts, and lacerations from sharp edges. The written program shall describe the process used to manage entrants' exposure to physical hazards.

### **2720. Assessing Protective Equipment**

The CSPM/ACSPM, in coordination with a safety specialist and/or industrial hygienist, shall determine the requirements for appropriate personal protective clothing and equipment. See chapters 15 and 20 of this manual for specific requirements. The CSPM/ACSPM shall list required clothing and equipment on the entry certificate. The written program shall either describe the process used to assess the need for personal protective equipment, or refer to the installation's personal protective equipment program. If reference is made to the installation's program, the CSPM or other designated qualified person shall evaluate that program to determine if it meets the requirements necessary to allow it to be used for confined space entry.

### **2721. Emergency Response Planning**

An emergency is any occurrence, including any failure of hazard control or monitoring equipment, or event internal or external, to a permit space that could endanger entrants. The written program shall explain the process for developing an emergency response plan that addresses the unique nature of each entry.

## **2722. Determining If Entry Conditions Are Acceptable**

While precautions such as barricading, ventilating, controlling hazardous energy, and conducting atmospheric testing may be taken for entry into many confined spaces, each entry is unique. Consequently, a variety of variable parameters shall be used to establish whether or not conditions are suitable for entry. The written program shall describe the process for identifying what conditions are deemed to be acceptable for entry.

## **2723. Reclassification Procedures**

If a permit space poses no actual or potential atmospheric hazards, and if all the other hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated. If it is necessary to enter the permit space to eliminate hazards, that entry shall be performed per section 2724.

The written program for any installation that decides to reclassify a permit space shall describe the process used for reclassification. At a minimum this process shall include provisions for:

- a. Explaining the basis for determining that the permit space poses no actual or potential atmospheric hazards and that all other hazards can be eliminated without the need to enter.
- b. Issuing an "entry certificate" that contains the date, the location of the space, atmospheric test results, and the signature of the person making the determinations described above.
- c. Making sure an "entry certificate" is made available and posting it at the site so that each employee entering the space or the employee's authorized representative can be informed of the hazards and conditions of the space.
- d. Evacuating the space if hazards arise, and reevaluating the space to determine if it must be reclassified as a permit space.
- e. The entry certificate is only valid for a period of time as determined by the CSPM.
- f. Canceled entry certificates shall be retained for at least 1 year to facilitate the review of the permit-required confined space program required by section 2735.

## **2724. Alternative Entry Procedures**

Less stringent entry procedures that do not require a permit, an attendant, an entry supervisor, or rescue provisions, may be used in situations where the only hazard posed is an atmospheric hazard that can be controlled through continuous, forced, mechanical ventilation.

The written program for any installation that decides to enter permit spaces under the alternate entry procedure shall describe the process for implementing that procedure. At a minimum, this process shall include provisions for ensuring that:

- a. An explanation of the basis for determining that the permit space poses only an atmospheric hazard is provided.
- b. An explanation of the basis for determining that the hazard can be controlled though continuous forced ventilation is provided.
- c. Any conditions that make it hazardous to remove an entrance cover are eliminated before the cover is removed.
- d. When entrance covers are removed, a railing, temporary cover, or other temporary barrier that prevents an accidental fall through the opening and protects employees from foreign objects entering the space promptly guards openings.
- e. Before employees enter the space, the internal atmosphere is to be tested, with a calibrated, direct-reading instrument, for oxygen content, flammable gases and vapors, and potential air contaminants.
- f. Any employee who enters the space, or that employee's authorized representative, is provided an opportunity to observe the pre-entry testing.
- g. A hazardous atmosphere does not exist in the space whenever it is occupied.
- h. Continuous forced ventilation is provided and used.
- i. Employees do not enter the space until the ventilation has eliminated any hazardous atmosphere.
- j. The ventilation air is provided by a clean source and does not increase the hazards in the space.
- k. The air is delivered in a manner that ventilates the immediate areas where employees are present within the space.
- l. The ventilation is continued until all employees have left the space.
- m. The atmosphere within the space shall be monitored continuously with a direct reading instrument to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere, unless the CSPM or other designated qualified person determines that such monitoring is unnecessary. Atmospheric testing results shall be documented with the date and time of test. Test results shall be kept with the entry certificate.
- n. A written entry certificate is issued that contains the date, the location of the space, and the signature of the person providing the certification. The certification shall be made before entry and shall be made available to each employee entering the space, or to that employee's authorized representative.
- o. When there are changes in the use or configuration of a non-permit space that might increase the hazards to entrants, the space is reevaluated and if necessary, reclassified as a permit-space.

p. If a hazardous atmosphere is detected during entry, employees shall immediately evacuate, and the space shall be evaluated to determine how the hazardous atmosphere developed, and procedures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

q. Canceled entry certificates shall be retained for at least 1 year to facilitate the review of the permit-required confined space program required by section 2735.

#### **2725. Permit-Required Program Elements**

If a permit-space cannot be reclassified as explained in section 2723, or cannot be entered under the alternate entry procedures described in 2724, it shall be entered under the auspices of a written, site-specific, entry permit procedure, which at a minimum, describes the process for:

- a. Issuing, canceling, reviewing and archiving entry permits.
- b. Designating employees authorized to participate in the entry, including entrants, attendants, and entry supervisors.
- c. Rescue response planning, including the process used to identify, evaluate, and select a rescue service provider.
- d. Establishing procedures for entry into atmospheres that are immediately dangerous to life or health.

#### **2726. Permit System**

The written program shall include an explanation of the process used for issuing, canceling, reviewing and archiving entry permits. The process shall include provisions that require that:

- a. The supervisor sign the permit indicating that all specified precautions have been taken, that conditions are acceptable for entry as explained in section 2722 and that authorized entrants may proceed into the space.
- b. The duration of the permit does not exceed one shift or the time required to complete the assigned task or job identified on the permit, whichever is less.
- c. Completed permits be made available at the time of entry to all authorized entrants or their authorized representatives, by posting at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry hazards have been controlled. Any problems encountered during an entry must be noted on the permit so that appropriate revisions to the confined space program can be made.
- d. Canceled permits be retained for at least 1 year to facilitate the review of the permit-required confined space program required by section 2735. Permits that contain atmospheric testing information that constitutes an employee exposure record shall be maintained for the employee's duration of employment plus 30 years as stipulated by 29 CFR 1910.1020.

**2727. Designation of Employees**

The written program shall describe the process used to designate confined space entrants, attendants, supervisors, and entry. Duties and responsibilities for these individuals are described in appendix B.

**2728. Rescue Procedures**

The written, site-specific plan shall describe the process used to:

- a. Identify credible scenarios that may require rescue.
- b. Identify potential providers of rescue services.
- c. Evaluate the capabilities of potential rescue service providers to assure that they are capable of providing timely rescue services consistent with the nature of the anticipated emergencies, and are in fact able to rescue incapacitated entrants from the space.
- d. Develop procedures for summoning rescue services.
- e. Provide necessary aid to rescued employees.

**2729. Procedures For Entry Into IDLH Atmospheres**

Entry into, work in, or on a confined space that is immediately dangerous to life and health (IDLH) shall not be permitted under normal operations and is only authorized in cases of rescue efforts and extreme emergencies. The written program shall describe the site-specific procedures that are followed when entry must be made into spaces that are immediately dangerous to life and health (IDLH). These procedures shall include provisions for ensuring that:

- a. Installation commanders or their designees are notified, specifically to authorize the entry into the IDLH atmosphere and provide necessary assistance appropriate to the situation.
- b. One employee or, when needed, more than one employee, is located outside the IDLH atmosphere during entry.
- c. Visual, voice, or signal line communication is maintained between the employees in the IDLH atmosphere and those located outside the IDLH atmosphere.
- d. The employees located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue.
- e. Employees located outside the IDLH atmospheres are equipped with:
  - (1) Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA

(2) Appropriate retrieval equipment for removing the employees who enter these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employees and would not increase the overall risk resulting from entry; or provide equivalent means for rescue where retrieval equipment is not feasible.

f. In the case of a potentially flammable atmosphere, all ignition sources are prohibited.

### **2730. Hot Work**

Hot work includes all flame heating, welding, torch cutting, brazing, carbon arc gouging or any work which produces heat, by any means, of 400 degrees F (204 degrees C) or more, and, in the presence of flammables or flammable atmospheres, other ignition sources such as spark or arc producing tools or equipment, static discharges, friction, impact, open flames or embers, and non explosion proof lights, fixtures, motors or equipment. The written program shall either describe the process used to control hazards associated with hot work, or refer to the installation's hot work program. If reference is made to the installation's hot work program, the CSPM shall evaluate that program to determine if it meets the requirements necessary to allow it to be used for confined space entry. Minimum work practices that the hot work program shall address are described in chapter 5 of reference 27-1.

### **2731. Special Processes**

Processes such as, but not limited to, spray application of flammable or combustible materials, abrasive blasting, and pressure-washing pose special hazards. An installation that performs these tasks shall develop a job-specific hazard analysis that addresses the unique hazards posed by each of these processes.

### **2732. Employee Training**

Employees who enter confined spaces shall possess the understanding, knowledge, and skill necessary for the performance of their duties. The written program shall explain the process the installation uses to ensure that employees are trained and have demonstrated proficiency in confined space entry.

### **2733. Contractor Management Provisions**

a. Whenever contractors perform work in an installation's confined spaces, the job shall be coordinated so that neither the contractor nor the installation's employees jeopardize each other's safety. The written program shall describe the process for managing work contractors perform in the installation's confined spaces. At no time shall contractor personnel enter a confined space under the installation's permit or certification. If contractor personnel and Navy personnel occupy the same space certification shall be for Navy personnel only and stated so on the permit or certificate.

b. At a minimum the written program shall include provisions that stipulate that the party responsible for requesting that the contract work be performed is personally responsible for ensuring that the work is carried out per the contract provisions. The written program shall also describe the installation's process for:

- (1) Informing the contractor that the installation contains permit spaces
- (2) Explaining to the contractor why a space is considered to be a permit-space
- (3) Sharing knowledge of the hazards that have been identified through experience with the space
- (4) Informing the contractor that their personnel may only enter permit-spaces under the provisions of the installations written program
- (5) Apprising the contractor of any precautions or procedures that the installation has implemented for the protection of employees in or near permit spaces where contractor personnel will be working (for example draining, flushing, isolating, etc.)
- (6) Coordinating entry operations with the contractor, so that contractor and installation employees do not compromise each other's safety
- (7) Debriefing the contractor at the conclusion of the entry relative to any hazards confronted or created during entry operations.

c. The written program shall include a provision that describes the installation's process for determining if the contractor's written program addresses at least the following elements as applicable to the specific job to be performed:

- (1) Conducting a job-specific hazard analysis
- (2) Limiting access to the work area
- (3) Controlling hazardous energy
- (4) Providing effective isolation
- (5) Draining, flushing and cleaning
- (6) Testing and monitoring
- (7) Controlling atmospheric hazards
- (8) Controlling physical hazards
- (9) Assessing protective equipment needs
- (10) Determining if entry conditions are acceptable
- (11) Issuing, canceling, reviewing and archiving entry permits
- (12) Designating of employees authorized to participate in the entry including entrants, attendants and entry supervisors

(13) Emergency planning, including identifying, evaluating and selecting rescue services

(14) Establishing procedures for entry into atmospheres that are immediately dangerous to life or health.

d. The written program shall also describe the process that will be followed in the event that the CSPM or other designated qualified person determines that the contractor's program does not address one of the elements listed above. The contractor shall correct this deficiency before the installation allows work to proceed.

#### **2734. Precautions for Specific Operations**

a. Specific regulatory provisions govern construction activities including underground construction and trenching; telecommunications work; and work involving the generation, distribution and transmission of electricity.

##### **b. Construction Operations**

(1) Even though the OSHA permit-required confined space standard does not apply to construction work, construction contractors shall comply with generally accepted industry procedures, practices and standards covering entry into confined spaces. To that end, construction contractors who enter confined spaces at naval facilities shall have a written confined space program that meets the minimum requirements prescribed by this instruction.

(2) A construction contractor may use its existing generalized confined space entry program, provided that it is supplemented by other documentation that describes how it intends to manage the job-specific hazards. In addition, as stipulated by OSHA standard 29 CFR 1926.21(b)(2) each construction contractor shall have a designated competent person as defined by 29 CFR 1926.32(f) who is responsible for making regular and frequent inspections of the job sites. For all ROICC contracts, military construction contracts, contractors must follow guidelines provided in EM-385-1 U.S. Army Corps Of Engineers Safety And Health Requirements Manual for working in confined spaces as well as 29 CFR 1926 Construction Standards.

c. Trenches and Excavations. Although trenches and excavation appear to meet the definition of a permit-space, specific trenching and excavation regulations more appropriately address the hazards they pose. However, since hazards posed are similar to those associated with confined space entry, procedures must exist that address such things as atmospheric testing, ventilation, and emergency response planning. A separate site-specific trenching and excavation policy rather than the installation's confined space program should address entry into trenches and excavations.

##### **d. Underground Construction**

(1) This section applies to the construction of underground tunnels, shafts, chambers, and passageways. It also applies to cut-and-cover excavations, which are both physically connected to ongoing underground construction operations within the scope of this section, and covered in such a manner as to create conditions characteristic of underground construction.

(2) A separate site-specific tunneling and excavation policy rather than the installation's confined space program should address working involving tunneling and other underground construction activities excavations.

e. Aircraft (ACFT) Fuel Cells

(1) ACFT fuel cell entry often presents unique entry requirements. Installations shall acquaint personnel with the fuel cell associated with each type, model, and series. ACFT or fuel cell configuration on which they will be providing confined space services. All elements of this instruction apply to ACFT confined space entry.

(2) A previously certified rubber fuel cell, which has been removed from the aircraft, may be reclassified as requiring no certificate if testing and inspection demonstrate that the hazards within the fuel cell have been eliminated. This applies only to rubber fuel cells that have been removed from the ACFT. It does not apply to installed rubber fuel cells or drop tanks.

(3) Only the Naval Air Systems Command (NAVAIRSYSCOM) (PMA 260) approved gas detectors shall be used to obtain required test readings of the atmosphere in a fuel cell.

f. Telecommunication, and Electrical generation, distribution and transmission

This section applies to operation conducted in manholes, un-vented vaults or any other confined space covered under 29 CFR 1910.268 and 269.

g. Confined space operations conducted on a Naval Maritime Facility or ship repair operations at any location

(1) The requirements of subparagraphs 2702.c and 2702.d shall be followed, except that if a space contains or has contained liquids, gases, or solids that are toxic, corrosive, or irritant and cannot be ventilated to within the PELs or is IDLH, a certified NFPA Marine Chemist, a Board-Certified Navy GFE, or Certified Industrial Hygienist must re-test the space until the space can be certified SAFE FOR ENTRY or SAFE FOR ENTRY WITH PPE. In such case, the Certified Industrial Hygienist also may provide the certification.

(2) In situations that apply to paragraph 2702.c, the CSPM or designated representative shall be trained and knowledgeable of reference 27-1 procedures that are applicable to the operations being performed.

**2735. Program Evaluation**

The CSPM or other designated qualified person shall evaluate the effectiveness of the installation's confined space program at least annually and whenever there is reason to believe that the program may not providing adequate protection to employees. The purpose of this evaluation is to identify program deficiencies and correct them before authorizing subsequent entries. The site-specific written program shall describe the process used for conducting and reviewing the installation's confined space program.

## Chapter 27

### References

- 27-1. Gas Free Engineering Manual, of 1 Sept 99, NAVSEA S6470-AA-SAF-010 REV 01.
- 27-2. OPNAVINST 5100.19D CH-1 of 30 Aug 01, Navy Occupational Safety and Health Program Manual for Forces Afloat, chapter BB, Gas Free Engineering  
[http://neds.daps.dla.mil/Directives/5100.19d\\_CH-1.pdf](http://neds.daps.dla.mil/Directives/5100.19d_CH-1.pdf).
- 27-3. Naval Ships Technical Manual, NAVSEA S9086-CH-STM-030/CH-074, Gas Free Engineering.

## Appendix 27-A

### Standards Incorporated by Reference

Occupational Safety and Health Administration

Government Printing Office <http://www.gpo.gov>

General Industry Standard 29 CFR 1910

Shipyards Industry Standard 29 CFR 1915

Construction Industry Standards 29 CFR 1926

National Fire Protection Association  
Battery March Park  
Quincy, MA  
<http://www.nfpa.org>

American National Standards Institute

Instrument Society of America

American Petroleum Institute  
Washington, DC  
<http://www.api.org>

EM-385-1 U.S. Army Corps of Engineers Safety and Health Requirements Manual

## Appendix 27-B

### Entry Permit/Certificate Minimum Requirements

Confined space entry permit/certificate must minimally contain the following information per 29 CFR 1910.146:

- (1) The permit/confined space entered.
- (2) The purpose of the entry.
- (3) The date and the authorized duration of the entry permit/certificate.
- (4) The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space.

**NOTE:**

This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.

- (5) The personnel, by name, currently serving as attendants.
- (6) The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry.
- (7) The hazards of the permit space to be entered.
- (8) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;

**NOTE:**

Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

- (9) The acceptable entry conditions.
- (10) The results of initial and periodic tests performed, accompanied by the names or initials of the testers and by an indication of when the tests were performed.
- (11) The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services.
- (12) The communication procedures used by authorized entrants and attendants to maintain contact during the entry.

(13) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section.

(14) Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety.

(15) Any additional permits, such as for hot work that have been issued to authorize work in the permit space.

(16) Include section for reclassification/or alternative entry procedure to allow for explanation for basis of downgrading the permit for personnel entry.

## Appendix 27-C

### Designation of Employees

**1. Supervisors.** Supervisors shall cancel permits if a condition not allowed under the permit arises in or near the permit space and remove unauthorized individuals who enter or who attempt to enter the permit space during entry operations. Consequently, they shall either remain at the space for the duration of entry, or they must transfer that authority to a new attendant. The latter is possible only if the new attendant possesses the requisite knowledge and skill to act as the supervisor under conditions present at the time of the entry. The supervisors' duties and responsibilities shall include:

a. Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposures

b. Verifying, by checking the permit, that all tests the permit specifies have been conducted and that all procedures and equipment the permit specifies are in place before endorsing the permit and allowing entry to begin

c. Terminating the entry and canceling the permit when the entry operations covered by the permit have been completed, or when a condition that is not allowed under the entry permit arises in or near the permit space

d. Verifying that rescue services are available, and that the means for summoning them are operable

e. Removing unauthorized individuals who enter or who attempt to enter the permit space during entry operations.

f. Determining, whenever responsibility for a permit space entry operation is transferred, and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

**2. Authorized Attendants.** Authorized confined space attendants shall:

a. Know the hazards that entrants may face during entry, including information on the mode, signs or symptoms, and consequences of exposure.

b. Be aware of possible behavioral effects in authorized entrants.

c. Keep an accurate count of authorized entrants in the permit space and ensure that any means used to identify authorized entrants such as a badge-in/ badge-out board is accurately maintained.

d. Remain outside the permit space during entry operations until relieved by another attendant.

e. Communicate with authorized entrants as necessary to monitor their status and to alert entrants of the need to evacuate the space

f. Monitor activities inside and outside the space to determine if it is acceptable for entrants to remain in the space.

g. Order entrants to immediately evacuate the space under any of the following conditions:

- (1) A prohibited condition is detected.
- (2) Behavioral effects associated with potential hazards to which entrants may be exposed are observed.
- (3) A situation develops outside the space that could endanger the entrants.
- (4) The attendant cannot effectively and safely perform all the required duties.

h. Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.

i. Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:

- (1) Warn the unauthorized persons that they must stay away from the permit space.
- (2) Advise the unauthorized persons that they must exit immediately if they have entered the permit space.
- (3) Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.

j. Perform non-entry rescues as specified by the rescue procedure.

k. Perform no duties that might interfere with their primary duty to monitor and protect the authorized entrants.

**3. Authorized Entrants.** Authorized confined space entrants shall:

a. Know the hazards they may face during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

b. Be able to demonstrate proficiency with any equipment they are expected to use, including under emergency conditions such as equipment failure.

c. Communicate with the attendant as necessary to enable the attendant to monitor their status, and to enable the attendant to alert them of the need to evacuate the space if necessary.

- d. Alert the attendant whenever:
  - (1) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
  - (2) The entrant detects a prohibited condition.
- e. Exit the space as quickly as possible whenever:
  - (1) An order to evacuate is given by the attendant or the entry supervisor.
  - (2) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
  - (3) The entrant detects a prohibited condition.
  - (4) An evacuation alarm is activated.

## CHAPTER 28

### BLOODBORNE PATHOGENS

#### **2801. Discussion**

The principal bloodborne pathogens of concern in this chapter are human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV). Many others exist, but generally are not occupationally transmitted in significant numbers. Due to the rapid spread of Acquired Immune Deficiency Syndrome (AIDS), and its precursor HIV, and to counter HBV, the Occupational Safety and Health Administration (OSHA) generated the bloodborne pathogens standard to protect people from occupational exposures to all bloodborne pathogens. The diseases associated with these pathogens are preventable when the appropriate precautions are taken. The objective of this chapter is to protect Navy personnel by providing the guidance necessary to understand and implement the requirements of the bloodborne pathogens standard.

#### **2802. Applicability**

This chapter applies to all facilities in which workers have occupational exposure to potential bloodborne pathogens. Hospitals, medical treatment facilities, emergency rescue personnel, enforcement personnel, laboratories working with potential bloodborne pathogens, and all other personnel who can reasonably anticipate to have occupational exposure to bloodborne pathogens shall meet the requirements of reference 28-1.

#### **2803. Exposure Determination**

The requirement for first aid and cardio pulmonary resuscitation (CPR) training alone does not dictate the need to include individuals into programs designed to meet the bloodborne pathogens standard's requirements. Personnel who perform "Good Samaritan" acts that result in potential exposure shall receive the same prompt medical evaluations and follow-up that covered employees receive. Facilities shall follow reference 28-1 for exposure determination procedures.

#### **2804. Hazard Prevention and Control**

Facilities shall conduct hazard prevention and control procedures per references 28-1 and 28-2.

#### **2805. Responsibilities**

a. Echelon 2 and other Headquarters Commanders shall provide guidance and assistance to subordinate commands to ensure the effectiveness of this program, including assistance in determining the job classifications of covered employees.

b. Naval Education and Training Command (NETC) shall provide bloodborne pathogen training, and training materials meeting the requirements of reference 28-1 through the Naval Occupational Safety and Health and Environmental Training Center (NAVOSHENVTRACEN). Development of training and training material shall be coordinated with the Chief, Bureau of Medicine and Surgery (BUMED).

c. BUMED shall:

(1) Review and provide technical and administrative guidance on the medical aspects of the bloodborne pathogens program.

(2) Provide guidance for the review of medical records for bloodborne pathogen information and trends.

(3) Review NETC training material, (e.g., videos, interactive computer software, courses), for consistency with requirements of this chapter.

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Chapter 28

References

28-1. Title 29 Code of Federal Regulations (CFR) 1910.1030 of 6 December 1991, Bloodborne Pathogens  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10051](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051).

28-2. BUMEDINST 6230.15, of 1 November 1995, Immunization and Chemoprophylaxis,  
<http://navymedicine.med.navy.mil/Files/Media/directives/6230-15.pdf>.

## CHAPTER 29

### OCCUPATIONAL REPRODUCTIVE HAZARDS

#### **2901. Discussion**

a. A reproductive hazard is any biological, chemical, or physical stressor that has the potential to adversely affect the human reproductive process. These effects may occur through either parent's reproductive cells, prior to conception or during the development of the fetus. A reproductive hazard that has its effect during fetal development is a developmental hazard.

b. Many potential stressors, which are considered reproductive hazards, also cause injury to other human organ systems. The government already regulates many of them based on these other effects. Therefore, if the worksite is following regulations and exposures are below established permissible levels for these regulated hazards, the reproductive system is also protected. However, in some cases reproductive effects occur at lower exposure levels than these other effects. In these cases, the current exposure standards do not protect the reproductive system. These hazards are the primary concern of this chapter.

c. Much is not known about reproductive hazards. A hazardous workplace exposure may, in some cases, occur far removed from its ultimate reproductive effect. Flexibility in handling these issues is, therefore, a necessity to allow changes to procedures and processes as knowledge is gained.

#### **2902. Policy**

a. Navy policy is to provide safe and healthful working conditions for all military and civilian employees. This includes protection of employees' reproductive capacity and their future or developing offspring from untoward effects of employee exposures.

b. The number of occupational exposure criteria (permissible exposure limits (PELs,) etc.) that were developed to protect the reproductive system is limited. The goal is to keep the utilization of known reproductive stressors as low as reasonably achievable. Regions/Activities shall document efforts to achieve this goal per paragraph 2903. The primary methods of achieving this goal shall be through use of engineering controls, and the judicious use of personal protective equipment.

c. In most cases, the potential for exposure to reproductive hazards should not automatically force the removal of an individual from a position, billet or job. However, removal from a particular task within a position or job modification may be necessary. In no case shall regions or activities use the potential for exposure to reproductive hazards to deny employment or promotion. If, as a last resort, job removal is necessary based upon operational requirements coupled with an inability to control workplace reproductive hazards, regions or activities shall not deny any individual pay or promotion because of regions or activities enacting measures to protect their reproductive health and/or that of their developing fetus.

d. Reference 29-1 provides policy and procedures regarding the management of pregnant service women. References 29-2 through 29-6 contain guidance on civilian personnel issues related to pregnant workers. The safety office shall refer all employee questions regarding pregnancy employment issues to the human resources office. Appendix 29-A reprints specific information from references 29-5 and 29-6 on work-related issues during pregnancy.

### **2903. Control of Reproductive Hazards in the Workplace**

#### **a. Identification and Evaluation of Reproductive Stressors**

(1) For simplicity, reference 29-7 provides a list of common chemicals that may be present in general Navy workplaces. Safety personnel shall routinely look for these hazards during inspections or visits.

(2) Industrial hygiene personnel shall identify reproductive stressors that are listed in reference 29-7 during surveys of all Navy workplaces, as section 0802 of this instruction requires.

(3) Industrial hygienists (IH) shall clearly annotate (highlight, asterisk, etc.) reproductive stressors on the list of materials and harmful physical agents found in each workplace.

(4) Where stressor-specific exposure standards developed with the intent to protect the reproductive system exist, regions or activities shall quantify the degree of exposure using conventional means, and then compare the results to those exposure standards (i.e., PELs, Threshold Limit Values (TLVs<sup>®</sup>), etc.). Where stressor specific standards either do not exist, or were developed without consideration of reproductive health risk, regions and activities shall still determine the quantitative evaluation of the exposure if possible. An IH and an occupational physician shall review the results of sampling. They shall determine the significance of any potential reproductive risk to male and female employees or developing fetuses at this time and incorporate the findings into the report along with recommended mitigation procedures, if necessary.

(5) The IH shall specifically address a reproductive hazard assessment (including negative determinations) as part of the routine evaluation in industrial hygiene survey reports they submit to the cognizant line activity per paragraph 0803 of this instruction. If the exposure assessment is unacceptable, recommendations to reduce exposures per paragraph 2902b should be made.

(6) Regions/Activities should contact the Navy Environmental Health Center (NEHC) if they need additional assistance, (757) 953-0700-5500 (DSN: 377-0700).

#### **b. Hazard Abatement**

(1) Chapter 5 discusses basic principles for controlling all hazards in the occupational environment. These include substitution with less hazardous materials; engineering controls (local exhaust ventilation systems, etc.); administrative controls (job rotation, work time limits, etc.); and the use of personal protective equipment (PPE).

Regions/Activities shall not consider the routine prolonged removal of an individual (or subpopulation) from a particular worksite an appropriate administrative control.

(a) For chemicals that are known reproductive hazards, substitution with a less hazardous substance is the abatement method of choice.

(b) Regions/Activities shall consider all products that they currently use containing more than trace amounts of any of the chemicals. Reference 29-7 lists stressors for possible elimination by substitution with a less hazardous material. While it is not possible to establish a strict definition of the term "trace", the presence of a confirmed reproductive toxicant in a product, at a concentration of 0.1 percent or greater by weight, should serve as a general guideline with regard to consideration of hazardous materials control/ substitution initiatives.

(c) Regions/Activities shall consider products containing chemicals in reference 29-7 for elimination/reduction via the Environmental and Natural Resources Program Manual in reference 29-8.

(d) Regions/Activities shall also consider these chemicals (reference 29-7) for substitution issues in the development of hazardous material inventories and authorized use lists that chapter 7 of this instruction prescribes.

(2) The use of PPE, including respirators, is the last resort method for hazard abatement. If activities use PPE, they shall exercise caution to ensure that the PPE does not pose a heat stress, heavy lifting, or other hazard in itself.

c. Training

(1) All safety and occupational health professionals should receive training concerning reproductive hazards. The training should address Navy policy, legal considerations, risk communication, and technical issues (hazard identification, evaluation, and control). The Navy considers training provided in Navy-sponsored workshops as well as NETC-approved courses sufficient to satisfy this requirement.

(2) Regions/Activities shall also specifically address reproductive hazards in safety training programs for personnel responsible for or working with reproductive stressors (e.g., management personnel, civilian personnel officers, supervisors, employee representatives, and non-supervisory personnel) per chapter 6 of this instruction.

d. Counseling Section

(1) General. Regions/Activities shall afford all employees who have potential exposure to occupational reproductive hazards counseling by a credentialed occupational medicine provider, if requested.

(2) Medical activities including contract facilities, shall question pregnant women, seen at the facility regarding their, and their spouses', potential exposure to developmental hazards. The Navy recommends referral to occupational medicine for evaluation if regions or activities determine there is a possibility of exposure.

(3) Developmental Hazards. Reference 29-1 requires servicewomen who become pregnant to notify their commands. Civilian employees are strongly encouraged to notify their commands as soon as possible after becoming pregnant. Upon notification, the command shall perform the following evaluation:

(a) The woman shall be given the Developmental Hazard Questionnaire from reference 29-7. A command supervisor, knowledgeable about the woman's workplace shall fill out the Supervisor's Statement found in 29-7. If the potential for exposure to a developmental hazard is present in the workplace, or if activities have not determined the possibility of such potential, regions/activities shall arrange for an occupational health physician to evaluate the woman as soon as possible.

(b) If the most recent industrial hygiene survey documents that no potential for exposure to a developmental hazard exists in the woman's workplace, then an occupational medicine evaluation should occur if either the pregnant woman or her commanding officer requests it.

(c) Place a copy of the appropriate sections of the completed evaluation in the employee's medical record and in the employee's command safety office.

(4) Regions/Activities shall encourage all male employees anticipating conceiving children within 120 days, or whose partner is currently pregnant, to notify their commanding officer so that regions/activities can conduct a reproductive/developmental hazard evaluation.

(5) Male and female infertility evaluations should include consultation with occupational medicine to determine if occupational or environmental exposures may be related to the disorder.

#### **2904. Responsibilities**

a. Commanding Officers shall:

(1) Ensure that all safety supervisors are cognizant of all items in reference 29-7 utilized at the command. Medical commands and commands with hospital units shall utilize the list in reference 29-7, paying particular attention to medications and anti-neoplastic drugs that are listed.

(2) Train all employees concerning the importance of occupational reproductive hazards, and specifically concerning the hazards present at the command, and the importance of command notification of pregnancy as part of routine hazard awareness. Upon notification of pregnancy, ensure that female military and civilian employees are provided the questionnaire in reference 29-7 and are made aware of the availability of evaluation by an occupational health physician per 2903.d)(3)(a).

(3) Maintain exposures of all personnel to reproductive hazards below applicable standards where available or below limits that occupational health professionals recommend where no standards are yet established.

b. The Chief, Bureau of Medicine and Surgery (BUMED) shall:

(1) Provide for professional and technical assistance relative to reproductive hazards to all commands.

(2) Publish guidance for occupation health professionals on industrial hygiene and medical issues concerning occupational reproductive hazards. Such guidance shall include:

(a) Workplace surveillance for the presence of reproductive hazards, and their exposure levels

(b) A current list of known reproductive stressors that may be present in general Navy workplaces. Reference 29-7 contains the 2001 edition of this list.

(c) Information on reproductive stressors considered, but not selected, for the list along with the rationale for non-selection

(d) Appropriate training for all safety and occupational health professionals

(e) Appropriate counseling to personnel potentially exposed to reproductive hazards.

(3) Review references 29-1 and 29-9 and this chapter to ensure that Navy policy is consistent with the Supreme Court ruling and other related legislation.

(4) Review of possible candidate-substitute materials identified by Commander, Naval Supply Systems Command (COMNAVSUPSYSCOM) to identify potential reproductive toxicants, upon request.

(5) Assist NETC in developing training programs for safety and occupational health professionals and workers. Provide for individual occupational medicine counseling of pregnant employees exposed to developmental hazards per section 2903d and of other employees upon request.

c. Naval Education and Training Center (NETC) shall develop training programs for safety and occupational health professionals and workers to address reproductive stressors of Navy concern. BUMED shall provide technical guidance for this training.

d. COMNAVSUPSYSCOM shall identify products currently in Navy use that contain reproductive stressors listed in reference 29-7 for substitution, elimination, and annotation in HMIS.

- 29-1. OPNAVINST 6000.1B of March 03, Guidelines Concerning Pregnant Servicewomen. [http://neds.daps.dla.mil/Directives/6000\\_1b.pdf](http://neds.daps.dla.mil/Directives/6000_1b.pdf).
- 29-2. Title 5 Code of Federal Regulations (CFR), Part 630, Subpart L, of 1993, Family and Medical Leave Act (FMLA) <http://www.opm.gov/cfr/>.
- 29-3. Public Law 95-555 (92STAT 2076) of 1978, Prohibition of Sex Discrimination on the Basis of Pregnancy.
- 29-4. Title 5 CFR part 335 of 1 Jan 04, Promotion and Internal Placement <http://www.opm.gov/cfr/>.
- 29-5. 29 CFR 1604.10, Employment Policies Relating to Pregnancy and Childbirth [http://www.access.gpo.gov/nara/cfr/waisidx\\_00/29cfr1604\\_00.html](http://www.access.gpo.gov/nara/cfr/waisidx_00/29cfr1604_00.html).
- 29-6. Title 5 CFR, part 339, Medical Qualification Determinations <http://www.opm.gov/cfr/>.
- 29-7. Navy Environmental Health Center Technical Manual NEHC-TM-6260-01, of 13 June 01, Reproductive and Developmental Hazards: A Guide for Occupational Health Professionals <http://www-nehc.med.navy.mil/downloads/occmcd/Reprodev2001.pdf>.
- 29-8. OPNAVINST 5090.1B of 1 Nov 94, Environmental and Natural Resources Program Manual <http://neds.daps.dla.mil/5090.htm>.
- 29-9. Supreme Court Ruling, 89-1215 of 20 Mar 91, International Union, United Automobile, Aerospace and Agricultural Implement Worker's of America, UAW, et al., Petitioners v. Johnson Controls, Inc.

## Appendix 29-A

### **Pertinent Reference Information On Pregnancy Employment Policies For Civilian Personnel**

1. **Office of Personnel Management** <http://www.opm.gov/oca/leave/html/factindx.asp>

Agencies should always be aware of working conditions or strenuous requirements in the workplace that could have an adverse effect on an expectant mother. If, after consulting her doctor, an employee asks for a change in duties or assignment, every reasonable effort should be made to accommodate her. Agencies may request medical certification of the nature of the limitations recommended by the employee's doctor. Sick leave may also be used for physical examinations.

2. **29 CFR 1604 Appendix - Questions and Answers on the Pregnancy Discrimination Act**

a. **Question:** If, for pregnancy-related reasons, an employee is unable to perform the functions of her job, does the employer have to provide her an alternative job?

**Answer:** An employer is required to treat an employee temporarily unable to perform the functions of her job because of her pregnancy-related condition in the same manner as it treats other temporarily disabled employees, whether by providing modified tasks, alternative assignments, disability leaves, leave without pay, etc. For example, a woman's primary job function may be the operation of a machine, and, incidental to that function, she may carry materials to and from the machine. If other employees temporarily unable to lift are relieved of these functions, pregnant employees also unable to lift must be temporarily relieved of the function.

b. **Question:** What procedures may an employer use to determine whether to place on leave a pregnant employee who claims she is able to work or deny leave to a pregnant employee who claims that she is disabled from work?

**Answer:** An employer may not single out pregnancy-related conditions for special procedures for determining an employee's ability to work. For example, if an employer requires its employees to submit a doctor's statement concerning their inability to work before granting leave or paying sick benefits, the employer may require employees affected by pregnancy-related conditions to submit such statement. Similarly, if an employer allows its employees to obtain doctor's statements from the personal physicians for absences due to other disabilities or return dates from other disabilities, it must accept doctor's statements from personal physicians for absences and return dates connected with pregnancy-related disabilities.

c. **Question:** Can an employer have a rule that prohibits an employee from returning to work for a predetermined length of time after childbirth?

**Answer:** No.

d. **Question:** If an employee has been absent from work as a result of a pregnancy-

related condition and recovers, may her employer require her to be on leave until after her baby is born?

Answer: No. An employee must be permitted to work at all times during pregnancy when she is able to perform her job.

e. Question: Must an employer hold open the job of an employee who is absent on leave because she is temporarily disabled by pregnancy-related conditions?

Answer: Unless the employee on leave has informed the employer that she does not intend to return to work, her job must be held open for her return on the same basis as jobs are held open for employees on sick or disability leave for other reasons.

f. Question: Must an employer hire a woman who is medically unable, because of pregnancy-related conditions, to perform a necessary function of a job?

Answer: An employer cannot refuse to hire a woman because of her pregnancy-related condition so long as she is able to perform the major functions necessary to the job. Nor can an employer refuse to hire her because of its preferences against pregnant workers or the preferences of co-workers, clients, or customer.

## CHAPTER 30

### INDOOR AIR QUALITY MANAGEMENT

#### 3001. Discussion

a. Poor indoor air quality (IAQ) detracts from the quality of the work environment. Problems such as uncomfortable air temperature and humidity can decrease productivity. To increase the level of comfort and productivity in the work environment, make an effort to evaluate, maintain and improve IAQ.

b. Multiple causes of poor IAQ exist, any one of which could decrease the quality of the work environment. Some examples are:

(1) Unacceptable Humidity Ranges (Below 30% and Above 60%). Low humidity may lead to dryness and irritation of the nose, throat, skin, and eyes. High humidity aids in the growth of certain molds. Susceptible individuals can experience allergic reactions to mold spores and particulate matter from the breakdown of mold protein.

(2) Insufficient Ventilation. Lack of sufficient fresh air leads to high carbon dioxide concentrations in workspaces. Lack of fresh air may cause fatigue, drowsiness, poor concentration, and the sensation of temperature extremes without actual temperature changes. Increased CO<sub>2</sub> levels are an indicator of poor ventilation. Carbon dioxide levels are not correlated with other contaminant levels, but with the ability of the ventilation system to provide and circulate fresh air, dilute, remove and recirculate "stale" air. Reference 30-1 states that between 15 and 33 percent of the population will have symptoms when the level of CO<sub>2</sub> is between 600 and 800 parts per million (ppm). Between 33 and 50 percent of the population become symptomatic when the level of CO<sub>2</sub> is between 800 and 1000 ppm, and virtually everyone will have some or all symptoms when the level is above 1500 ppm.

(3) Off-gas Chemicals. Many modern office furnishings and equipment off-gas chemicals. Adhesives, carpeting, upholstery, manufactured wood products, copy machines, pesticides, and cleaning agents are examples of items that off-gas.

(4) Tobacco Smoke. Smoking and second hand smoke, otherwise known as environmental tobacco smoke (ETS), contribute to poor IAQ. According to the American Cancer Society, tobacco smoke contains more than 4,000 different chemical compounds, including about 43 carcinogens. ETS causes eye, nose, and throat irritation; headaches; and bronchitis. In 1986, approximately 23,000 U.S. nonsmokers died from lung cancer. The U.S. Surgeon General attributed a substantial number of those deaths to ETS. In addition, ETS contributes to heart disease.

(5) Biological Contamination. Biological contaminants such as bacteria, molds, pollen, and viruses may be present in stagnant water, air ducts, humidifiers, and drain pans. Water-damaged material and insect and bird droppings contribute to biological contamination. Biological contaminants can trigger allergic reactions and some types of asthma and can cause some common infectious diseases.

(6) Combustion Products. Combustion products, such as carbon monoxide and nitrogen oxides, can be released by vehicle exhaust, improperly burning furnaces, appliances, and ETS.

(7) Building Modifications. Physical modifications within buildings usually generate dust. Improper isolation techniques can release asbestos, lead, and other contaminants into the renovated building's ventilation systems.

(8) Poor Air Distribution. Poorly distributed air in a building creating a wide range of temperature within a work environment is a common cause of poor air quality in the work environment.

c. Proper designs for new and renovated buildings preclude many IAQ problems. However, modified structures may experience heating, ventilating, and air conditioning (HVAC) problems (e.g., HVAC not capable of providing adequate fresh air for new uses of the space).

### **3002. IAQ Investigation Approach**

a. Individuals working in buildings with indications of poor IAQ shall report the problem(s) to their immediate supervisors. If the Navy maintains the building, the appropriate supervisor shall coordinate all contact with the designated facilities maintenance activity and the region or activity safety manager. If the region or activity is unable to determine the cause of the problem, the safety manager shall request the cognizant industrial hygiene service to initiate an IAQ investigation. Reference 30-2 provides guidance on indoor air quality evaluations and includes the mold assessment tool, "Mold Remediation Wheel."

b. The Chief, Bureau of Medicine and Surgery (BUMED) Consultative Assistance Team (CAT) shall assist in IAQ investigations beyond the scope of the cognizant industrial hygiene service. BUMED will determine whether the problem is primarily health-related or engineering-related, or both and will request assistance from appropriate sources as needed (e.g., NAVFACENGCOM). Paragraph 0806 discusses CAT capabilities and functions.

c. If the IAQ investigation or CAT reveals mold contamination, follow the procedures in reference 30-2, chapter 13 and 30-9 for assessment and remediation.

d. If the building contains Navy personnel, but is maintained by a private enterprise, report the problem(s) to the appropriate facilities maintenance organization. If there is no solution, contact the safety manager and follow the process described in paragraphs 3002a and 3002b.

### **3003. Environmental Tobacco Smoke**

a. A prime source of poor IAQ is environmental tobacco smoke. Many non-smokers find ETS offensive. The National Institute for Occupational Safety and Health (NIOSH), in reference 30-3, states that the preferable method to protect nonsmokers is the elimination of smoking indoors.

b. The Department of Defense (DOD) mandates smoke-free workplaces in reference 30-4. U.S. Navy policy on ETS is to protect all personnel in working and public living environments from involuntary exposure to ETS. Navy regions and activities shall:

(1) Prohibit smoking in all Department of the Navy (DON) vehicles, aircraft, and work buildings. This applies to all Navy and Marine Corps (USMC) active duty, civilian personnel, their dependents, and visitors in DON-controlled locations.

(2) Permit smoking only in individually assigned family and bachelor living quarters and in Navy lodge and USMC hostess houserooms designated for smoking except when a common HVAC system serves individual housing units. In such circumstances, commanding officers (COs) should make reasonable efforts to designate sufficient smoking quarters for smoking members. Do not recirculate air from smoking quarters with air entering nonsmoking quarters.

(3) Prohibit smoking in common spaces of multiple housing units (e.g., family housing apartment complexes, bachelor quarters, Navy lodges, USMC hostess houses, etc.). Any space within a building common to all occupants and visitors such as corridors, elevators, lobbies, lounges, stairways, rest rooms, cafeterias, snack bars, barber shops, laundry rooms, etc. is defined as common space.

(4) Not locate outdoor areas designated for smoking in areas commonly used by nonsmokers. Locate the smoking area away from supply air intakes and building entryways/egresses to prevent ETS entering the building.

c. The Federal Labor Relations Authority for Washington, D.C., in reference 30-5, has determined that unions could negotiate "hazardous duty" pay for those employees exposed to ETS.

#### **3004. Building Design and Maintenance**

a. Regions/activities can preclude many potential IAQ problems through proper planning in the design of new and renovated buildings. Single copies of reference 30-6 are available from NIOSH as publication 91-114. In addition, the EPA has established an IAQ Information Clearinghouse (1-800-438-4318).

b. Regions/activities shall design and construct new and renovated buildings to meet the latest American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) standards, references 30-7 and 30-8. Reference 30-7 specifies the conditions in which at least 80 percent of the occupants will find the environment thermally acceptable. Reference 30-8 specifies the minimum ventilation rates and recommends indicator levels for IAQ that should provide occupants with an acceptable level of comfort and minimize the potential for adverse health effects. Reference 30-10 or similar documentation should be used during ventilation system design development, construction, and acceptance testing and should be used in conjunction with NAVFACINST 1227.1, "NAVFAC Total Building Commissioning Policy" of 23 October 2003, reference 30-11. Reference 30-12 should be used to provide the CO's staff with sufficient information to maintain the system throughout the system life cycle.

c. Regions/activities shall ensure that building designs properly locate air intakes and exhaust vents or stacks during new and renovated building construction.

(1) Do not place fresh air intakes above loading docks. This avoids pulling truck exhaust and odor from dumpsters directly into the building. Place fresh air intakes on the prevailing wind side of the building.

(2) Place exhaust vents on the opposite side of the building from fresh air intakes. Do not locate intakes and exhaust vents in close proximity to each other.

(3) Extend all exhaust stacks or chimneys beyond the roofline of the building. Exhaust stacks should have sufficient height and discharge velocity to ensure that exhaust gases release into the true airflow over the building. If located lower than the true airflow, exhaust gases could swirl at the edges of the building and be pulled back inside through a fresh air intake.

(4) Do not place caps over exhaust stacks or chimneys. Use bird and debris screens over all HVAC in-take and exhaust openings.

d. Building designers frequently use modular office systems to conserve space. These systems often block airflow to parts of the office. During the design and purchasing process, confirm that the modular office systems are compatible with the airflow patterns proposed by the HVAC engineers. The ASHRAE standard (see reference 30-8) for offices of 20 cfm of fresh air/occupant is based on a maximum occupancy of seven people/1,000 square feet. The designer shall not reduce airflow where there are fewer than seven people. Increase airflow per the ASHRAE standard if the occupancy is greater than seven people/1,000 square feet.

e. Design new and renovated buildings to ensure HVAC systems are accessible for maintenance actions, especially preventive maintenance.

f. Personnel shall not make unauthorized modifications to the HVAC systems (e.g., by blocking off vents, cutting into duct work to create new vents, removing inspection panels and ceiling tiles, etc.). Personnel shall report ventilation problems according to the guidance given in Paragraph 3002.

g. Do not modify HVAC systems for energy conservation in such a way as to affect adequate air quality (e.g., sealing outdoor air intakes).

h. To help maintain good IAQ, commanding officers shall develop and implement effective programs of routine inspection and preventive maintenance of all HVAC systems and spaces.

### **3005. Responsibilities**

a. Echelon 2 and other headquarters commanders shall provide guidance and assistance to subordinate commands to ensure the effectiveness of this program.

b. BUMED shall:

(1) When appropriate, request that BUMED CAT be augmented by the Naval Facilities Engineering Service Center (NFESC) ventilation engineering personnel.

(2) Budget adequate resources for medical facilities to support this policy.

- c. Commander, Naval Facilities Engineering Command (COMNAVFACENGCOM)  
shall:
- (1) Augment BUMED CAT with NFESC ventilation engineers when requested.
  - (2) Ensure that building construction and modification plans reflect consideration of IAQ issues and comply with requirements described in paragraph 3004.
  - (3) Ensure that HVAC systems in new buildings meet the specifications in the ASHRAE standards contained in references 30-7 and 30-8.
- d. Commanders, Commanding Officers, and Officers in Charge shall:
- (1) Establish smoke-free buildings and zones.
  - (2) Ensure that IAQ issues are considered in the design of new buildings.
  - (3) Coordinate with COMNAVFACENGCOM to ensure that new building design adheres to the ASHRAE standards contained in references 30-7 and 30-8.
  - (4) Develop and implement an effective program of routine inspections and preventive maintenance of all HVAC systems and spaces, including HVAC accessibility per paragraph 3004e.
  - (5) Ensure that employee concerns or complaints of IAQ problems are investigated and resolved in a timely manner using the procedures in paragraph 3002.
  - (6) Ensure HVAC systems meet paragraph 3004 requirements.

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## Chapter 30

### References

- 30-1. Air Force Occupational & Environmental Health Laboratory (AFOEHL) Report 90-169CA00111KGA, 1 Oct 90, Brooks, AFB  
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- 30-2. Industrial Hygiene Field Operations Manual, NEHC Technical Manual, NEHC-TM IH 6260.91-2 of Oct 03, Chapter 13 <http://www-nehc.med.navy.mil/ih/ihfom.htm>.
- 30-3. U.S. Department of Health and Human Services (DHHS), National Institute for Occupational Safety and Health (NIOSH) Publication No. 91-108 of June 1991, Current Intelligence Bulletin 54: Environmental Tobacco Smoke in the Workplace - Lung Cancer and Other Health Effects.  
[http://www.cdc.gov/niosh/91108\\_54.html](http://www.cdc.gov/niosh/91108_54.html).
- 30-4. DODI 1010.15 of 1 Feb 01, Smoke-Free DOD Facilities  
<http://www.dtic.mil/whs/directives/corres/html/101015.htm>.
- 30-5. SECNAVINST 5100.13C of 2 Aug 02, Navy and Marine Corps Tobacco Policy  
[http://neds.daps.dla.mil/Directives/5100\\_13c.pdf](http://neds.daps.dla.mil/Directives/5100_13c.pdf).

30-6. Federal Labor Relations Authority, Case No. 0-NG-1947-1949 of 13 December 1991. Vol. 42 <http://www.fra.gov/decisions/v43/43-084-4.html>.

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30-8. American Society of Heating, Refrigerating, and Air-Conditioning Engineers Standard ANSI/ASHRAE 62-2001, Ventilation for Acceptable Indoor Air Quality (NOTAL) <http://membership.ashrae.org/template/EnewsletterLanding>.

30-9. Interim Technical Guidance (ITG) FY03-4, NAVFAC Mold Response Manual.

30-10. American Society of Heating, Refrigerating, and Air-Conditioning Engineers Guideline 1-1996, The HVAC Commissioning Process (NOTAL) <http://ashrae.org>

30-11. NAVFACINST 12271.1, of 23 October 03 "NAVFAC Total Building Commissioning Policy."

30-12. NAVFACINST 11013.39B, of 14 September 00, "Operation and Maintenance Support Information (OMSI) for Facility Projects."

## CHAPTER 31

### WEIGHT HANDLING SAFETY

#### **3101. Discussion**

Safe and reliable weight handling is critical to the operation of the Navy. The minimum requirements and applicable standards for the safe use of all types of weight handling (WH) and rigging equipment at Navy shore activities, and shore based commands, are summarized below.

#### **3102. Program Requirements**

a. Reference 31-1 provides weight handling policy and directs compliance with reference 31-2 for Navy shore activities and shore-based commands. Shore-based commands include the Naval Construction Force (NCF) and other operating forces that own or operate WH equipment ashore.

b. Reference 31-2 is a single source document and complies with references 31-3 through 8, which are the Occupational Safety and Health Administration (OSHA) standards applicable to WH and rigging equipment, and references 31-9 through 31-23, which are national consensus standards.

c. The commanding officer or officer in charge is responsible for ensuring safety of the activity's weight handling program which includes certification of equipment, training and qualification of personnel.

d. OSHA requires activities using cranes and derricks in longshoring operations, and floating cranes and floating derricks in shipbuilding, ship repair and shipbreaking to be certified by an OSHA accredited certification agency. References 31-3, 31-4, 31-5 and 31-6 address OSHA certification requirements. Activities shall use reference 31-2 as an alternate standard to the certification requirements for Navy-owned equipment, and the Navy Crane Center, Naval Facilities Engineering Command shall perform the certification. Non-floating cranes and derricks that activities use in shipbuilding, ship repair and shipbreaking do not require third party certification.

(1) Longshoring Definition. Reference 31-5 defines the term "longshoring operations" as "the loading, unloading, moving, or handling of cargo, ship's stores, gear, or any other materials, into, in, on, or out of any vessel." The certification program includes mobile cranes, placed aboard barges or other vessels, and used to transfer materials into, on, in, or out of a vessel.

(2) Certification Requirement. The Navy Crane Center shall certify all Navy-owned equipment requiring third party certification, unless CNO (N09F) approves an alternative certification source. For contractor-owned equipment operated on Navy installations, a private OSHA-accredited certification agency shall provide the third party certification.

(3) Procedures. Reference 31-2 addresses specific procedures for third party certification.

e. Investigation and Reporting of WH Accidents. Reference 31-2 contains special reporting requirements concerning WH accidents.

### **3103. Responsibilities**

a. Commander, Naval Facilities Engineering Command (COMNAVFACENGCOM) shall manage the Navy's WH programs ashore through its Navy Crane Center of Expertise, ensuring compliance with OSHA standards. Specific mission responsibilities include providing and maintaining policy to establish design standards and manage weight handling equipment and operations, auditing shore and shore-based command weight handling programs to ensure compliance, reviewing and approving crane alterations, issuing crane safety advisories, equipment deficiency notices and establishing training programs.

b. Reimbursable functions include:

- (1) Performing third party certifications.
- (2) Providing technical assistance to solve unique weight handling problems.
- (3) Acquiring new cranes or refurbishing existing cranes by contract.

These responsibilities are specifically addressed in reference 31-1.

c. Naval Education and Training Command (NETC) shall assist COMNAVFACENGCOM in establishing and maintaining weight handling training programs.

d. Commanders, Commanding Officers and Officers In Charge shall develop and implement WH and rigging programs per references 31-1 and 31-2 and adequately budget to ensure compliance.

e. Cognizant Safety Offices shall provide oversight of the safety program, including safety inspection, evaluations, assessments and audits, risk assessments and mishap investigation.

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## Chapter 31

### References

31-1. SECNAVINST 11260.2 of 10 Sept 97, Navy Weight Handling Program for Shore Activities, [http://neds.daps.dla.mil/Directives/11260\\_2.pdf](http://neds.daps.dla.mil/Directives/11260_2.pdf).

31-2. NAVFAC P-307, Management of Weight Handling Equipment, <http://ncc.navfac.navy.mil/crane/rcdr/rcdr.htm>.

31-3. Title 29 Code of Federal Regulations (CFR) 1915, Occupational Safety and Health (OSH) Standards for Shipyard Employment,

[http://www.osha.gov/pls/oshaweb/owastand.display\\_standard\\_group?p\\_toc\\_level=1&p\\_part\\_number=1915](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1915).

31-4. Title 29 CFR 1917, Safety and Health Regulations for Marine Terminals, [http://www.osha.gov/pls/oshaweb/owastand.display\\_standard\\_group?p\\_toc\\_level=1&p\\_part\\_number=1917](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1917).

31-5. Title 29 CFR 1918, Safety and Health Regulations for Longshoring, [http://www.osha.gov/pls/oshaweb/owastand.display\\_standard\\_group?p\\_toc\\_level=1&p\\_part\\_number=1918](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1918).

31-6. Title 29 CFR 1919, Safety and Health Regulations for Gear Certification, [http://www.osha.gov/pls/oshaweb/owastand.display\\_standard\\_group?p\\_toc\\_level=1&p\\_part\\_number=1919](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1919).

31-7. Title 29 CFR 1910, OSH General Industry Standards, [http://www.osha.gov/pls/oshaweb/owastand.display\\_standard\\_group?p\\_toc\\_level=1&p\\_part\\_number=1910](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910).

31-8. Title 29 CFR 1926, Safety and Health Regulations for Construction, [http://www.osha.gov/pls/oshaweb/owastand.display\\_standard\\_group?p\\_toc\\_level=1&p\\_part\\_number=1926](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1926).

31-9. American Society of Mechanical Engineers (ASME) B30.2-2002, An American National Standard for Overhead and Gantry Cranes (To Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist) (NOTAL), <http://www.asme.org>.

31-10. American Society of Mechanical Engineers (ASME) B30.4-2003, An American National Standard for Portal, Tower and Pillar Cranes (NOTAL), <http://www.asme.org/>.

31-11. American Society of Mechanical Engineers (ASME) B30.5-2002, An American National Standard for Mobile and Locomotive Cranes (NOTAL), <http://www.asme.org/>.

31-12. American Society of Mechanical Engineers (ASME) B30.6-2003, An American National Standard for Derricks (NOTAL), <http://www.asme.org/>.

31-13. American Society of Mechanical Engineers (ASME) B30.7-2002, An American National Standard for Base Mounted Drum Hoists (NOTAL), <http://www.asme.org/>.

31-14. American Society of Mechanical Engineers (ASME) B30.8-2004, An American National Standard for Floating Cranes and Floating Derricks, (NOTAL), <http://www.asme.org/>.

31-15. American Society of Mechanical Engineers (ASME) B30.9-2003, An American National Standard for Slings, (NOTAL), <http://www.asme.org/>.

31-16. American Society of Mechanical Engineers (ASME) B30.10-2000, An American National Standard for Hooks, (NOTAL), <http://www.asme.org/>.

31-17. American Society of Mechanical Engineers (ASME) B30.11-1998 An American National Standard for Monorail and Underhung Cranes, (NOTAL), <http://www.asme.org/>.

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31-20. American Society of Mechanical Engineers (ASME) B30.20-2003, An American National Standard for Below-the-Hook Lifting Devices, (NOTAL), <http://www.asme.org/>.

31-21. American Society of Mechanical Engineers (ASME) B30.21-1999, An American National Standard for Manually Lever Operated Hoists, (NOTAL), <http://www.asme.org/>.

31-22. American Society of Mechanical Engineers (ASME) B30.22-2000, An American National Standard for Articulating Boom Cranes, (NOTAL), <http://www.asme.org/>.

31-23. Wire Rope Sling Users Manual published by the Wire Rope Technical Board, <http://www.domesticwirerope.org/wrtb/>.

## CHAPTER 32

### SAFETY AWARDS PROGRAM ASHORE

#### **3201. Purpose**

To issue the policy and procedures for selecting the winners of the Chief of Naval Operations (CNO) Shore Safety Awards.

#### **3202. Applicability**

This chapter applies to all U. S. Navy shore establishments and activities.

#### **3203. Policy**

CNO policy requires military and civilian personnel to apply safe and healthful practices in all their daily activities. To recognize outstanding efforts in risk management and mishap prevention, the CNO Safety Shore Activity Awards Program provides recognition to a command with the best overall command safety program record; and to individuals who have made significant contributions to a command/ activity or overall safety program. The awards recognize outstanding contributions to operational readiness and conservation of resources through effective risk management. In addition to outstanding safety records, activities selected must have aggressive, innovative mishap prevention programs. These awards recognize excellence and are not to be confused with recognition for safety improvements (e.g., suggestion, invention, special achievement) under the provisions of the incentive awards program.

#### **3204. Types of Awards**

Appendix 32-A provides an explanation and selection criteria for CNO Shore Safety Awards Ashore, based on the requirements of reference 32-1. Appendix 32-B provides applicable formulas for the calculation of ashore mishap statistics. Awards are presented for excellence at the region/activity and individual levels.

#### **3205. Action**

Region/Activity commanders, commanding officers, or officers in charge shall develop and implement a region/activity safety awards program applicable to the mission and operations of the individual activity.

Echelon 2 and 3 headquarters commands are also encouraged to establish "in-house" safety awards of their own in line with the CNO award criteria to recognize respective activities and individuals within each claimancy.

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References

32-1. SECNAVINST 5100.15B of 25 May 05, Secretary of the Navy Awards for Achievements in Safety Ashore [http://neds.daps.dla.mil/Directives/5100\\_15b.pdf](http://neds.daps.dla.mil/Directives/5100_15b.pdf).

## Appendix 32-A

### Awards Selection Criteria

#### Description

Chief of Naval Operations (CNO) Shore Safety Awards will be presented annually on a fiscal year basis to shore activities (including Fleet operational/support units located ashore) based on the overall quality of their safety programs, mishap prevention records, and contributions to the Navy's safety program. In addition, individuals will be recognized for their contributions to their command/region/activity and/or the Navy's safety program through CNO Individual Awards for Safety.

#### Award Categories

a. Region or Activity. Regions or activities in the following categories will compete for one award each per category.

(1) Industrial – Those activities in the 50 United States whose primary mission is the production, maintenance, or rehabilitation of Navy equipment, material, or facilities. These include aviation depots, public works centers, shipyards, and ship repair facilities. Test centers and research and development (R&D) facilities will compete in the non-industrial category.

1,000 (a) Small - activities with military and civilian working population of 1 -

1,001 - 3,000 (b) Medium - activities with military and civilian working population of

3,001 and greater (c) Large - activities with military and civilian working population of

(2) Non-Industrial – Activities such as naval stations, air stations, supply depots, training centers, and medical centers in the 50 United States will compete in this category.

800 (a) Small - activities with military and civilian working population of 1 -

801 - 2,000 (b) Medium - activities with military and civilian working population of

2,001 and above (c) Large - activities with military and civilian working population of

(3) Industrial - Outside of the 50 United States.

(4) Non-industrial - Outside of the 50 United States.

(5) Fleet Operational/Support Unit Ashore - one award - for those commands located ashore with sea or shore duty unit identification codes that are designated as fleet operating or fleet support units and are not eligible for the surface ship award. The safety program must be based on the shore safety requirements of OPNAVINST 5100.23G.

b. Individual. The CNO Individual Award for safety will be presented to one military officer, one military enlisted, and one Navy civilian for a total of three (3) awards. All civilian nominees must be performing safety duties either in a full-time or collateral status, or have made a significant contribution to their command's, or the Navy's safety program in some other capacity related to safety.

### **Eligibility**

a. Region/activity Awards. Regions and activities are eligible to compete for the award if:

(1) All industrial and non-industrial shore activities and fleet operational/support units ashore are eligible if they have received a rating of satisfactory or better as a result of the most recent inspection(s) by the Naval Inspector General (IG), or the major command Safety Office. The inspection must have occurred within the past three fiscal years. Documentation (copy of the inspection cover letter, with score or results) of this inspection must be included in the nomination package or the activity will not be considered.

b. Individual Awards.

(1) CNO Safety Award – Nominees must have made significant contributions to either the individual command program or to the overall Navy safety program. The award will be based on contributions made during the previous three years, including the past fiscal year.

(2) Activities and units that have experienced a military off-duty or PMV fatality or permanent total disability, or on-duty Class A mishap, are not eligible to compete for the award.

### **Nomination and Evaluation Criteria**

a. Activities meeting the eligibility criteria may submit a nomination package through their chain of command with sufficient supporting documentation to allow evaluation by the higher command. Echelon 3 commands, as applicable, will evaluate documentation and nominate one activity for each category, as applicable, and submit the nomination to their Echelon 2 command not later than 30 November of the year following the fiscal year under award consideration.

b. Echelon 2 commands shall evaluate documentation and nominate one activity for each category, as applicable, for the annual awards and submit their nominations to the Commander, Naval Safety Center (COMNAVSAFECEN), 375 A Street, Norfolk, VA 23511-4399

with a letter of recommendation stating the award category for consideration. COMNAVSAFECEN will accept nominations only from Echelon 2 commands.

c. As the CNO shore safety program encompasses all safety disciplines, nominations will be evaluated for program elements in the following: occupational safety and health; motor vehicle; fire safety; and off-duty safety program.

d. Additionally, the following loss data shall be included to determine the degree of program effectiveness:

- (1) Three year trend in civilian mishap compensation costs
- (2) Three year trend in civilian mishap rates
- (3) Three year trend in military on-duty mishap rates
- (4) Three year trend in the number and cost of reportable government motor vehicle mishaps
- (5) Three year trend in the number and cost of reportable fire mishaps

e. Echelon 2 nominations shall be submitted in writing to be received at COMNAVSAFECEN not later than 31 December of the year following the fiscal year under award consideration. Nominations received after 31 December will not be considered. The nominations must be supported with sufficient documentation to substantiate program implementation. All programs applicable to the activity shall be addressed. The nomination package shall be limited to 20 pages (11" X 11 1/2" maximum size).

f. A preliminary evaluation will be conducted by COMNAVSAFECEN to ensure eligibility. The programs determined to be best qualified will be evaluated by a selection committee of at least four subject matter experts and chaired by an O-6 from COMNAVSAFECEN/CNO N09F

g. Winners of the CNO Shore Safety Award shall be forwarded as the Navy's nominees to compete with the Marine Corps nominees for the SECNAV Shore Safety Award of reference (a).

h. Activity Award. The nomination package shall be completed using guidance provided below. Include in the package:

- (1) Copy of higher command or Navy IG inspection letter to verify eligibility requirement with score or ratings of that inspection
- (2) Copy of higher command or Navy IG inspection results
- (3) Documentation of workplace population to support the award category for consideration

- (4) List of activity safety instructions
- (5) Brief synopsis of each program applicable to the activity:
  - (a) Organization, Staffing and Management Support (include host/tenant support and number of people supported)
  - (b) Inspection and Abatement Program
  - (c) Mishap Reporting and Record keeping
  - (d) Mishap Reduction
  - (e) Industrial Hygiene - workplace monitoring, annual evaluations and medical surveillance
  - (f) Safety Councils and Committees
  - (g) Safety Training
  - (h) Safety Program Cost Data
  - (j) Safety Promotion/Awards
  - (j) Motor Vehicle Safety
  - (k) Successes/initiatives in various other safety elements, such as Confined Space Entry, Hearing Conservation, Respiratory Protection Program, Electrical (Lockout-Tagout), Asbestos, etc. and other programs applicable to the individual activity
  - (l) Review of project plans, specifications
  - (m) Fiscal year 3-year on-duty Mishap Trends – Civilians
  - (n) Fiscal year 3-year on-duty Mishap Trends – Military
  - (o) Fiscal year 3-year Government Motor Vehicle (GMV) Mishap Trends - number and cost
  - (p) Fiscal year 3-year Fire Trends - number and cost
  - (q) Fiscal year 3-year Compensation Costs Trends – Civilian
  - (r) Unique/special initiatives

Explain each program sufficiently to address key elements of each and to support implementation of the total program. Statements that the program is established in accordance with required instructions are not sufficient.

i. CNO Individual Award for SOH - Nominations for the CNO Individual Award for safety may be by individual nomination, either by the individual themselves, by others, or from the activity. Submittals must be from the activity to which the individual is assigned and be routed via the appropriate chain of command for endorsement. No more than a three-page nomination letter stating the contributions the individual has made to the command/activity program or the overall Navy program shall be submitted directly to COMNAVSAFECEN by 31 December annually. Only those written nominations received by 31 December will be considered. A COMNAVSAFECEN/CNO (N09F) selection committee will evaluate all nominations. The selection committee will be composed of an O-6 chair from COMNAVSAFECEN and at least four other representatives from the Navy safety community. None of the committee members may be under consideration for the award. The selection committee shall meet no later than 15 January annually to evaluate and select the winners.

### **Presentation of Awards and Recognition of Nominees**

a. COMNAVSAFECEN may present the CNO Award for Safety Ashore and CNO Individual Award for Safety to winners at a special ceremony during the annual Safety Professional Development Conference (Safety PDC). All winners will be announced by CNO via Naval message and recognized in other Navy publications, as appropriate. Winners in the activity category will be forwarded to Secretary of the Navy for consideration for the Secretary of the Navy Award for Achievement in Safety Ashore.

b. Winners will be awarded with an engraved plaque. COMNAVSAFECEN will maintain awards records and post award information on their web site.

### **SECNAV Awards**

The Secretary of the Navy (SECNAV) Activity Award is governed by SECNAVINST 5100.15B. Nominating packages for the winners in each category of the CNO Award for Safety Ashore will be forwarded to compete in their respective category for the SECNAV award.

## Appendix 32-B

### Formulas for Calculation of Mishap Trends

1. TOTAL CASE RATES:

a. Military and Civilian On-Duty Total Case Rate:

$$\frac{\text{*Total Number of Injuries X 200,000}}{\text{End Strength X 2000HRS}}$$

b. Military Off-Duty Total Case Rate:

$$\frac{\text{*Number of recorded off-duty injuries X 200,000}}{\text{End Strength X 3760 HRS}}$$

2. LOST TIME CASE RATES

a. Military and Civilian On-Duty Lost Time Case Rate:

$$\frac{\text{**Number of all On-duty lost time/deaths X 200,000}}{\text{End strength X 2000 HRS}}$$

b. Military Off-duty Lost Time Case Rate:

$$\frac{\text{**Number of off-duty lost time/deaths X 200,000}}{\text{End strength X 3760 HRS}}$$

\*Number of injuries/death (deaths, lost time, no lost time, first aid) recorded on the Log of Navy Injuries and Illnesses.

\*\*Number of lost time/death mishaps recorded on the Log of Navy Injuries and Illnesses.

## GLOSSARY

**Abate** - To eliminate or reduce permanently an unsafe or unhealthful working condition by coming into compliance with the applicable OSH standard.

**Accident** - Any unplanned or unexpected event causing material loss or damage or causing personnel injury or death.

**Accident Investigation** - The investigation of the facts surrounding the causes of an accident.

**Accident Report** — See Mishap.

**ACGIH**<sup>®</sup> – The American Conference of Governmental Industrial Hygienists, (ACGIH<sup>®</sup>) is a member-based organization and community of professionals that advances worker health and safety through education and the development and dissemination of scientific and technical knowledge. Examples of this include annual editions of the **TLVs<sup>®</sup> and BEIs<sup>®</sup>** and work practice guides.

**Acquisition** - The acquiring by contract with Navy funds of supplies or services (including construction) by and for the use of the Federal government through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated, and evaluated. Acquisition begins at the point when agency needs are established and includes the description of requirements to satisfy agency needs, solicitation and selection of sources, award of contracts, contract financing, contract performance, contract administration, and those technical and management functions directly related to the process of fulfilling agency needs by contract.

**Action Level** - Unless otherwise specified in a OSH standard, one-half the relevant PEL, TLV<sup>®</sup>, etc.

**Activity** - A physical location ashore, under a single higher authority command, where business is conducted or where services or operations are performed.

**Acute** –Momentary, usually severe or crucial, often dangerous in which rapid changes are occurring. An acute exposure runs a comparatively short course (24 hours or less).

**Administrative Contracting Office (ACO)** - A designated contracting officer performing administrative functions under ASPR 1-406 (NOTAL).

**Administrative Control** - Procedures and practices that limit exposure to harmful physical or chemical agents by control or manipulation of work schedule or the manner in which work is performed. Administrative controls reduce the exposure to stressors and thus reduce the cumulative dose to any one worker. If unable to alter the job or workplace to reduce the stressors, administrative controls should be used. Administrative controls are most effective when used in combination with engineering controls. For example, limiting work in heat stress to 1 hour daily.

**Agency** - An Executive Department, as defined in 5 U.S.C. 101, or any employing unit or authority of the government of the United States not within an Executive Department to which the provisions of Executive Order 12196 are applicable.

**Ambient** - Of the surrounding or encircling area. Normal ambient pressure or atmosphere refers to the normal conditions for a particular location outside a confined or enclosed space.

**ANSI** - American National Standards Institute, a national consensus standard-developing organization.

**Anchorage (fall arrest tie-off point)** – A secured structure that can safely withstand forces exerted by fall arrest and rescue equipment. The structure can be in the form of a beam, girder, column, or floor. Anchorage is either engineered or improvised.

**Anthropometrics** - The ergonomic term anthropometry comes from the Greek anthropos (man) and metrein (to measure). Anthropometry deals with the measurement of the dimensions and certain other physical characteristics of the body such as volumes, centers of gravity, inertial properties, and masses of body

**Asbestos-Containing Material (ACM)** - Any material containing more than one percent asbestos as defined in 29 CFR parts 1910.1001, 1926.1101, and 1915.1001. ACM can be divided into three major categories:

a. Thermal System Insulation (TSI) - ACM applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat energy transfers or water condensation.

b. Surfacing - ACM that is sprayed on, troweled on or otherwise applied to surfaces such as acoustical plaster on ceilings and fireproofing materials on structural members or other materials on surfaces for fireproofing, acoustical, or other purposes.

c. Miscellaneous - ACM not included in the definition for TSI or surfacing.

**Asbestosis** - A chronic, usually progressive lung disease associated with exposure to asbestos fibers. It is generally characterized by long latency (years or decades), and characteristic changes in chest x-ray, pulmonary function, and lung parenchyma (tissue).

**Atmosphere Immediately Dangerous to Life or Health (IDLH)** - Any atmosphere (generally due to a concentration of any toxic, corrosive or asphyxiate substance) that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

**Attendant** - An individual stationed on the outside of a confined space for the purpose of monitoring the activities of those inside and requesting assistance in the event of an emergency.

**Audiogram** - A graph or table showing hearing threshold levels as a function of frequency.

**Audiometer** - Instrument used to measure hearing sensitivity using pure tones.

**A-Weighted Sound Level** - The sound pressure level that has been filtered or weighted to quantitatively reduce the effect of low frequency noise. A-weighted sound pressure is designed to approximate the response of the human ear to sound.

**Biological Agent (CBRNE Term)** - Any micro-organism, virus, or infectious substance, capable of causing death, disease, or other biological malfunction in a human, an animal, a plant, or another living organism; deterioration of food, water, equipment, supplies, or material or any kind; or deleterious alteration of the environment.

**Blanking or Blinding** - The absolute closure of a pipe, line, or duct by fastening across its bore a solid plate or cap which completely covers the bore; which extends at least to the outer edge of the flange at which it is attached; and which is capable of withstanding the maximum upstream pressure.

**Bloodborne Pathogens** - Pathogenic microorganisms transmissible by exposure to blood, including Hepatitis B Virus (HBV) and Human Immune Deficiency Virus (HIV), as well as syphilis, malaria, and others.

**Body Harness** – (See Harness)

**Capture Velocity** - That velocity at a distance from a hood, necessary to overcome dispersive forces and capture the contaminant.

**Ceiling Value** - The concentration that should not be exceeded during any part of the working exposure.

**Chemical Agent (CBRNE Term)** - In CBRNE context, a chemical agent is a substance intended to kill, seriously injure or incapacitate through its toxicological effects. There are two main CBRNE classes of chemical agents. Military agents consist of nerve agents, blister/vesicant agents, lung-damaging, and blood agents. Another class of possible substances that could be used in a terrorist event is toxic industrial materials (TIMs).

**Chronic** - Persistent, prolonged, repeated.

**Class I Asbestos Work** - Activities involving the removal of thermal system insulation or surfacing ACM/PACM.

**Class II Asbestos Work** - Activities involving the removal of ACM, which is neither TSI, or surfacing ACM. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

**Class III Asbestos Work** - Repair and maintenance operations, where ACM, including TSI and surfacing ACM and PACM, is likely to be disturbed (see definition of disturbance).

**Class IV Asbestos Work** - Maintenance and custodial activities during which employees contact but do not disturb ACM and PACM and activities to clean up dust, waste and debris from Class I, II, and III activities.

**Claustrophobia** - An abnormal fear of being in a confined or enclosed space.

**Cognizant Security Office** - The Defense Contract Administrative Services Regional Office of Defense Logistics Agency having contract administrative service authority over the geographical area in which the contractor workplace is located.

**Cold Work** - Work that does not involve potential ignition sources. See Hot Work.

**Combatant Commander (CBRNE Term)** – A commander of one of the unified or specified combatant commands established by the President. (DoD Dictionary of Defense and Associated Terms- Joint Publication JP 1-02).

**Command** - The headquarters and all subordinate commands, activities/installations, units, forces and employees.

**Commander** - The Navy official in charge of a naval shore command, activity or installation, office or unit. Unless specified to the contrary, the term is synonymous with commander, commanding officer (CO), officer in charge (OIC), director, or other title for the head of the organization.

**Concentration** - The quantity of a substance per unit volume (in appropriate units).

The following are examples of concentration units:

mg/m<sup>3</sup> 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

**Confined Spaces** (See Permit Required Confined Space)

**Confined Space Entry Permit** - A special written permit/form issued by the CSPM, or a qualified person under the direction of the CSPM, which authorizes entry into certain confined spaces under a given set of conditions and safety precautions.

**Confined Space Program Manager (CSPM)** - An individual who has successfully completed course number A-493-0030, Confined Space Safety, conducted by the Naval Occupational Safety and Health and Environmental Training Center (NAVOSHENVTRACEN) or equivalent training approved by the Echelon Two occupational safety and health manager, and has been appointed, in writing, by the commanding officer to implement a comprehensive confined space entry program (Non-Maritime).

**Contaminant** - A material or agent not normally present in the atmosphere, e.g., dust, fume, gas, mist or vapor, which can be harmful, irritating, or a nuisance.

**Contamination (CBRNE Term)** – (1) The deposit and/or absorption of radioactive material or biological or chemical agents on and by structures, areas, personnel, or objects. (2) Food and/or water made unfit for consumption by humans or animals because of the presence of environmental chemicals, radioactive elements, bacteria, or organisms. (3) The by-product of the growth of bacteria or organisms in decomposing material (including food substances) or

waste in food or water. (DoD Dictionary of Defense and Associated Terms- Joint Publication JP 1-02).

**Contractor Employee** - An employee of a contractor performing work at a contractor workplace under a Navy contract.

**Contractor Workplace** - Any place on a Navy installation, located within the United States, its territories, or possessions, where work currently is being, recently has been, or is scheduled to be performed by contractor employees under a Navy contract, including a reasonable access route to and from the workplace. The term contractor workplace does not include any area structure, machine, apparatus, device, equipment, or material therein, with which a contractor employee is not required or reasonably expected to have contact nor does it include any working condition for which OSHA jurisdiction has been preempted under section 4(b)(1) of the OSH Act.

**Cumulative Trauma Disorders (CTDs)** - Health disorders arising from repeated biomechanical stress. Other terms that have been used for such disorders include "work-related musculoskeletal disorders", "repetitive motion injury," "occupational overuse syndrome," and "repetitive strain injury." spine (neck and back), and lower extremities. Examples of disorders in this class include carpal tunnel syndrome, tennis elbow, tendinitis, tenosynovitis, DeQuervain's Disease, and low back strain.

**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, 20 micro-pascals (0.0002 microbars)

**Decibels, A-Weighted (dBA)** – A sound level reading in decibels as measured on the A-weighted network of a sound level meter. On this scale, the sound pressure level has been filtered or weighted to reduce the effect of low frequency noise. A –weighted sound pressure is designated to approximate the response of the human ear to sound

**Decontamination (CBRNE Term)** – The process of making any person, object, or area safe by absorbing, destroying, neutralizing, making harmless, or removing chemical or biological agents, or by removing radioactive material clinging to or around it.

**Designated Agency Occupational Safety and Health Official (DASHO)** - The individual at each Federal Agency who is responsible for the administration of the occupational safety and health program. According to 29 CFR 1960.6, this individual should be of the rank of Assistant Secretary or equivalent and shall have sufficient headquarters staff with the necessary training and experience. In addition, the headquarters staff should report directly to, or have access to the DASHO.

**Detector Tube** - A glass tube that utilizes a sensitive chemical (in a suspension of silica gel) which produces color change whenever contaminated air is pulled through the tube.

**Disability** - The incapacity, because of injury or illness in employment, to meet his or her obligations or needs or to pursue an occupation, or to earn the wage which the employee was receiving at the time of the injury or illness."

**Disabling Work/Duty Injury** - Any impairment resulting from an occupational injury which prevents a military person from performing his/her regularly established duty or work for a period of 24 hours or more, subsequent to 2400 on the day of injury or onset of illness; or restricts the ability of a civilian employee of the Navy to function at normal or expected levels of mental or physical activity.

**Disturbance (Asbestos)** - means activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM and PACM, no greater than the amount, which can be contained in one standard sized glove bag or waste bag, in order to access a building or vessel component. In no event shall the amount of which can be contained in one glove bag or waste bag, which shall not exceed 60 inches in length and width.

**Dosimeter** - A device for measuring cumulatively the exposure of an individual over a period of time.

**Dust** - Small solid particles created by the breaking up of larger particles by processes such as crushing, grinding, or explosion. Examples of processes that generate dust: Use of machine shop tools, paint chipping, sanding, woodworking, and abrasive blasting.

**Effectiveness of Corrective Action** - The degree to which the proposed hazard abatement system can be expected to reduce the cited hazard. For health hazards, this would typically be expressed as the intensity of the hazardous chemical or physical agent remaining, in appropriate units, after the proposed abatement measure is operational. For safety hazards, effectiveness is expressed as "in full compliance" or "not in full compliance" with the applicable standard, if any.

**Electric Field** - A fundamental component of electromagnetic waves, which exists when a voltage potential difference exists between two points in space. (See Field Strength.)

**Emergency Operations Center (EOC) (CBRNE Term)** – The physical location at which the coordination of information and resources to support domestic incident management activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps a higher level of organization within a jurisdiction. EOCs may be organized by major functional discipline (e.g., fire, law enforcement, and medical services), by jurisdiction (e.g., Federal, State, regional, county, city, tribal), or some combination thereof.

**Emergency Responder (CBRNE Term)** – Military, Federal, State, Local, and Private emergency management and operations personnel, disaster preparedness officers, medical treatment providers at medical treatment facilities and clinics, preventive medicine, public health, industrial hygiene, safety, environmental, legal, public works, public affairs/information, mortuary affairs, and/or other designated personnel that actively support emergency operations either at or off the actual incident site.

**Emergency Response Management (CBRNE Term)** - The process of preparing for mitigating, responding and recovering from an unplanned event that can cause death or significant injuries or that could disrupt operations, or cause physical or environmental damage. Components are planning, training, testing equipment and coordinating activities.

**Employee** - Any person employed or otherwise offered, permitted, or required to work by a Navy command including both civilian and military personnel.

**Employee/Personnel (Asbestos) Exposure** - An exposure (to asbestos) that would occur if respiratory protective equipment were not used.

**Employment Accident** - An accident occurring as a result of work performance or exposure to the work environment.

**Engulf** - To surround and capture an individual by a liquid or finely divided solid substance.

**Engineering Control** - Engineering controls are physical changes to work stations, equipment, materials, processes, production facilities or any other relevant aspect of the work environment that reduces or prevents exposure to work place risk factors. The use of PPE is not considered an engineering control.

**Entry** - The act by which a person intentionally passes through an opening into a permit-required confined space and includes ensuing activities. The entrant is considered to have entered if any part of the entrant's face breaks the plane of an opening into the space.

**Entry Supervisor** - The supervisor of the employees authorized entry into a confined space.

**Ergonomics** - Ergonomics is the field of study that involves the application of knowledge about physiological, psychological and biomechanical capacities and limitations of the human body. This knowledge is applied in the planning, design, and evaluation of work environments, jobs, tools and equipment to enhance worker performance, safety and health and reducing the potential for fatigue, error, or unsafe acts. Ergonomics is essentially fitting the workplace to the worker. The application of knowledge about physiological, psychological and biomechanical capacities and limitations of the human body to work environments, jobs, tools and equipment to enhance worker performance, safety and health and to reduce the potential for fatigue, error, or unsafe acts.

**Ergonomic Risk Factors** - Workplace conditions that pose a biomechanical, physiological or physiological stress to a worker. Examples of work place risk factors include force, repetition, awkward or static posture, vibration, and compression. When present for sufficient duration, frequency, magnitude, or in combination, these risk factors may cause Work-related Musculoskeletal Disorders. Additionally, environmental conditions such as working in temperature extremes may contribute to the development of WMSDs.

**Ergonomist** - An expert or specialist in the field of ergonomics. A "certified" ergonomist is a Certified Professional Ergonomist as determined by the Board of Certification in Professional Ergonomics.

**Excess Hazardous Material (EHM)** - Ready-for-issue hazardous material classified as excess and no longer needed by the generating activity.

**Excursion Limit** - A limitation on short-term exposures that are called for by industrial hygiene considerations, generally 3 times the TLV-TWA for no more than a total of 30 minutes during a workday, and never exceeding 5 times the TLV-TWA.

**Explosion Proof** - An apparatus, device, or piece of equipment that is tested and approved for use in flammable or explosive atmospheres as defined in the National Electrical Code (NEC).

**Explosive or Flammable Limits** - The range of concentration of a material, expressed in percent in air, that will burn or explode if ignited. The lower explosive limit is the minimum percent by volume of a gas or vapor that, when mixed with air at normal temperature and pressure, will form a flammable mixture.

**Exposure Incident (Bloodborne Pathogens)** - means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties.

**Facility** - A separate, individual building, structure, or other form of real property, including land, which is subject to separate reporting under the Department of Defense real property inventory. (NOTE: This definition differs from that used elsewhere because it includes "land.")

**Facility Requirements** - The facilities required by an activity to perform its mission, tasks, and functions and to support assigned forces. Facility requirements are expressed normally as quantities of land, waterfront space, easements, types of buildings and structures, capacity of utilities, etc., in terms of units of measure. A facility requirement is an abstract specification and is not identifiable with a particular building or structure.

**Falls from heights (or elevations)** – Falls of 4 feet or more to a lower level from a surface.

**Falls on same level (slips, trips & falls)** – A sudden, unplanned change in position in which a person comes to rest unintentionally on the floor, ground, or on an object under or next to them.

**Fall Prevention** – The elimination and minimization of potential fall hazards, lessening the chance of Navy civilians or military personnel exposure to falls from any height (e.g. sand and salt on icy same level surfaces, tape or protective flat molding over cords crossing pathways, guard rails or walls on walkways or platforms at heights, floors covering openings, area isolation).

**Fall Protection** – Action and procedures to effectively protect Navy civilians and military personnel from falling from any elevated surface; or from falling from any height onto dangerous equipment, into a hazardous environment, or onto an impalement hazard.

**Fall Restraint System** – A system consisting of equipment and components connected together designed to restrain a person from reaching an exposed fall hazard.

**Fall Suspension Rescue Plan** - A written plan to ensure prompt rescue of an employee in the event of a fall from a height where the employee is left suspended in a body harness.

**Far Field (Fraunhofer region, plane wave region)** - The region far from an antenna, compared to the size of the antenna and the wavelength of the radiation, where the power decreases with the square of the distance from the source. In this region the radiation has the properties of a plane wave. (See Plane Wave.)

**Federal OSHA Official** - Investigator or compliance officer employed by, assigned to, or under contract to OSHA.

**Field Strength** - The magnitude of the electronic field (in volts/meter) of magnetic field (in amps/meter).

**First Aid Case** – A first aid case is a specific type of no lost time case, applicable to civilian employees only. It is a non-fatal traumatic injury or occupational illness or disease, and is not recordable if it involves only:

- (1) Using non-prescription medications at non-prescription strength;
- (2) Administering tetanus immunizations;
- (3) Cleaning, flushing, or soaking wounds on the skin surface;
- (4) Using wound coverings, such as bandages, BandAids™, gauze pads, etc., or using SteriStrips™ or butterfly bandages.
- (5) Using hot or cold therapy;
- (6) Using any totally non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc.;
- (7) Using temporary immobilization devices while transporting an accident victim (splints, slings, neck collars, or back boards).
- (8) Drilling a fingernail or toenail to relieve pressure, or draining fluids from blisters;
- (9) Using eye patches;
- (10) Using simple irrigation or a cotton swab to remove foreign bodies not embedded in or adhered to the eye;
- (11) Using irrigation, tweezers, cotton swab or other simple means to remove splinters or foreign material from areas other than the eye;
- (12) Using finger guards;
- (13) Using massages;
- (14) Drinking fluids to relieve heat stress.

**First Responder (CBRNE Term)** – Military, Federal, State, Local, or Private law enforcement, fire, rescue, emergency medical, EOD, public works, or Hazardous Materials (HAZMAT) response personnel who arrive on the scene of an incident and take action to save lives, protect property, and meet basic human needs.

**Forces Afloat** - U.S. Navy surface ships and submarines including embarked troops, staffs, detachments, and aircraft squadrons.

**Frequency** - The rate at which a sound source vibrates or makes the air vibrate. The unit of time is usually 1 second and the term Hertz (Hz) is used to designate the number of cycles per second. Frequency is related to the subjective sensation of pitch. High frequency sounds (2000, 3000 and 4000 Hz) are high pitched.

**Fumes** - Material from a volatilized solid that has condensed in cool air. The solid particles thus formed are usually less than 1.0 micrometer in diameter.

**Gas** - Diffuse, formless fluid normally in a gaseous state.

**Harness (Full Body)** - Means of configuration of connected straps secured about the employee in a manner that will distribute the fall arresting forces over at least the upper thighs, waist, shoulders, chest and pelvis, with means for attaching a lanyard to other components of the personnel fall arrest system. Full-body harness is the only body support device allowed by OSHA when a free fall distance exceeds two feet.

**Hazard** - A workplace condition that might result in injury, health impairment, illness, disease, or death to any worker who is exposed to the condition, or damage or loss to property/equipment.

**Hazard Category** - A workplace condition as defined below:

- (1) Category I - Catastrophic: The hazard may cause death or loss of a facility.
- (2) Category II - Critical: May cause severe injury, severe occupational illness, or major property damage.
- (3) Category III - Marginal: May cause minor injury, minor occupational illness, or minor property damage.
- (4) Category IV - Negligible: Probably would not affect personnel safety or health, but is nevertheless in violation of specific criteria.

**Hazard Control Assessment** - An objective overall assessment for measuring the relative priority of hazard abatement projects in terms of a 3-digit dimensionless number. This assessment will be used to prioritize centrally funded projects.

**Hazard Control Hierarchy** - Effective design or redesign of a task or workstation is the preferred method of preventing and controlling harmful stresses. The methods of intervention (in order of priority) to be used are: process elimination, engineering controls, substitution, work practices and administrative controls; e.g. adjust work-rest cycles, slowing work pace, task rotation.

**Hazardous Chemical** - Any chemical that is a physical hazard or a health hazard per 29 CFR Section 1910.1200 (c), and with some exceptions as specified in the Community Right to Know Law of 1986 (Superfund Amendments and Reauthorization Act (SARA), Title III). See "Hazardous Material."

**Hazardous Material (HM)** - For the purpose of preparing the Material Safety Data Sheet, a hazardous material is defined as a material having one or more of the following characteristics: (a) has a flashpoint below 200°F (93.3°C) closed cup, or is subject to spontaneous heating or is subject to polymerization with release of large amounts of energy when handled, stored, and shipped without adequate control; (b) has a threshold limit value below 1000 ppm for gases and vapors, below 500 mg/m<sup>3</sup> for fumes, and below 30 mppcf for dusts; (c) a single oral dose which will cause 50 percent fatalities to test animals when administered in doses of less than 500 mg

per kilogram of test animal weight; (d) is a strong oxidizing or reducing agent; (e) causes first degree burns to skin in short time exposure or is systematically toxic by skin contact; (f) in the course of normal operations, may produce dusts, gases, fumes, vapors, mists, or smokes with one or more of the above characteristics; (g) produces sensitizing or irritating effects; (h) is radioactive; or (i) the item has special characteristics which in the opinion of the manufacturer could cause harm to personnel if used or stored improperly.

**Hazardous Material Information System (HMIS)** - A computer-based information system developed to accumulate, maintain, and disseminate important characteristics of hazardous materials, which exist throughout DoD.

**Hazardous Substance (HS)** - Any substance that, because of its quantity, concentration, or hazardous properties, may pose a substantial hazard to human health or the environment when purposely released or accidentally spilled.

**Hazardous Waste (HW)** - any material that is subject to the Hazardous Waste Manifest Requirements of the U.S. Environmental Protection Agency specified in 40 CFR part 262.

**Hazardous Waste Minimization (HAZMIN)** - Consists of three parts:

- a. Avoiding HW generation by minimizing and controlling HM acquisition and use, and by applying best management, engineering, and equipment to Navy processes and procedures.
- b. Recycling HW to reduce it to a ready-for-use state.
- c. Treating HW to reduce the volume or to reduce it to a non-hazardous state.

**Headquarters Command** - An Echelon 2 organization assigned primary support responsibility for subordinate activities or commands. Primary support responsibility is the provision of resources (funds, manpower, facilities, and material) for shore activities to enable them to carry out their mission. Primary support includes administrative, personnel, and material support and guidance in such matters as internal organization, process, procedures, budgeting, staffing, and facilities. Support includes the responsibility to assist in evaluating the operational effectiveness of shore activities and responding to other requests for technical assistance. Examples of headquarters commands are the systems commands headquarters, Fleet Commanders, and the Field Support Activity for CNO-assigned activities.

**Hearing Level** - Amounts in decibels by which the threshold of audition for an ear differs from zero decibels (dB) for each frequency -- a standard audiometric threshold derived from normal-hearing young adults.

**Hertz (HZ)** - Unit of frequency (of change in state or cycle in a sound wave, alternating current, or other cyclical waveform) of one cycle per second.

**High-Efficiency Particulate Air (HEPA) Filter** - Filter capable of retaining particles of 0.03 to 0.5 micron size with an efficiency of 99.996 percent, used to extract hazardous particles and droplets from ventilation airflow

**Hot Work** - Hot work includes all flame heating, welding, torch cutting, brazing, carbon arc gouging or any work which produces heat, by any means, of 400°F or more; or, in the presence of flammables or flammable atmospheres, use of ignition sources such as spark or arc producing tools or equipment; static discharges, friction, impact, open flames or embers; and non-explosion-proof lights, fixtures, motors, or equipment. See Cold Work.

**Human Factors** - The application of behavioral principles to the development of technological systems to make such systems work more efficiently and productively and to make it easier for people to operate and maintain these systems.

**Humanitarian Respirator Use** - Provision of a respirator in the absence of any regulatory requirement. (See Voluntary Respirator Use)

**IDLH** – Immediately Dangerous to Life or Health . An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

**Illness (Occupational)** - Any abnormal condition or disorder, other than an injury, caused by exposure to conditions associated with the occupational environment.

**Imminent Danger** - A condition that immediately threatens to cause the loss of life or serious injury or illness of an employee.

**Impulse or Impact Noise** - Sound of short duration, usually less than 1 second, with an abrupt onset and rapid decay. Also, those variations in noise levels that involve maxima at intervals greater than 500 milliseconds. Where the intervals are less than 500 milliseconds, the noise is considered continuous.

**Incident (Confined Space)** - A mishap resulting in death, injury, property damage and/or situations involving unauthorized (inadvertent or willful) entry into a PRCS, disregard of permit requirements, improper testing, or issuance of a permit without evaluation of space conditions.

**Inerting** - A process in which an inert or nonflammable gas is introduced into an atmosphere to such a degree that the oxygen/flammable vapor content of the atmosphere will not burn or explode.

**Injury** - Traumatic bodily harm, such as a cut, fracture, burn, or poisoning, caused by a single or 1-day exposure to an external force, toxic substance, or physical agent.

**Inspection** - A comprehensive survey of all or part of a workplace in order to detect safety and health hazards as distinguished from routine, day-to-day evaluation and monitoring by local OSH personnel.

**Installation** - A facility or group of facilities located in the same vicinity, which support particular Navy functions. Installations may include locations such as stations, air stations, shipyards, etc., or may be vessels.

**Intrinsically Safe Equipment** - Equipment, which, by design, does not have or is not capable of producing sufficient levels of energy to cause ignition.

**Joint Service Lightweight Integrated Suit Technology (JLIST) (CBRNE Term)** – A chemical protective ensemble of over-pants and bib-type pants that are designed to provide skin protection for military personnel against chemical warfare gases and vapors.

**Joint Service Mask Leakage Tester (JSMLT) (CBRNE Term)** – The JSMLT, also known as the TDA-99M, is a respirator leakage testing apparatus used to test military mask serviceability and to perform quantitative fit testing.

**Laboratory** - A term referring to research laboratories and chemical analytical laboratories that are managed and staffed by academically trained and -qualified professionals and chemists. This term, as used in this instruction, does not include entire installations having "laboratory" in their organization name, or material laboratories that mainly characterize the physical properties of materials. The term is intended to describe functional room(s) or area(s) where specific analytical and research tasks are performed by highly trained professionals under the supervision of highly trained and qualified, professional chemists.

**Lanyard (for fall arrest/restraint)** – A flexible line of rope, wire rope, or strap that generally has a connector at each end for connecting the body harness to a deceleration device, lifeline or anchorage. Sometimes has a separately attached deceleration device (shock absorber) or a built-in deceleration method.

**Lost Time Case** - A nonfatal traumatic injury that causes any loss of time from work beyond the day or shift it occurred; or a nonfatal illness/disease that causes disability at any time.

**Lost Workday Case** – Any impairment resulting from an accident or occupational disease which prevents a military person from performing his/her regularly established duty or work for a period of 24 hours or more, subsequent to 2400 on the day of injury or onset of illness; or prevents a civilian employee of the Navy from performing work for a full shift on any day subsequent to the day of injury or onset of illness.

**Magnetic Field** - A fundamental component of electromagnetic waves produced by a moving electrical charge. (See Field Strength.)

**Maritime Operations** - Operations on ships at sea or the following shore activities.

- a. Construction of ships, including the installation of machinery and equipment
- b. Repair of ships, including alterations, conversions, installations, cleaning, painting, and other maintenance
- c. Breaking down of a ship's structure for the purpose of scrapping
- d. Loading, unloading, moving, or handling cargo into, in, on, or out of ships.

**Material (Property) Damage** - Mishap-related damage of facilities, equipment, or material (property) that a dollar expenditure would accrue to repair or replace.

**Material Safety Data Sheet (MSDS)** - OSHA Form 174 or an equivalent form containing the identical data elements, must be used by manufacturers of chemical products to communicate to users the chemical, physical, and hazardous properties of their product to comply with the OSHA Hazard Communication Standard, 29 CFR 1910.1200. The completed form identifies key information on the product: name, address, and emergency contact for the manufacturer; the identity of hazardous ingredients; physical/chemical characteristics; fire and explosion hazard data; reactivity data; health hazard data; precautions for safe handling and use; and control measures. It should be emphasized that OSHA Form 20 or DD-1813 forms are considered obsolete and should not be used for supplying MSDS information. All data submitted must comply with provisions of FED-STD 313C (NOTAL). See chapter 7.

**Medical Documentation** - A written statement from a licensed physician or other appropriate credentialed practitioner.

**Medical Treatment** - Treatment administered by a physician or health care provider under the standing orders of a physician. Medical treatment does not include first aid treatment even though provided by a physician or health care provider.

**Mesothelioma** - A rare neoplasm arising from the cells that line the pleura (chest cavity and lungs) and peritoneum. It is usually associated with asbestos exposure, and may have a latent period as long as 30 to 40 years.

**Military Personnel** - All Navy military personnel on active duty (USN/USNR); Naval Reserve personnel (USNR-R) on active duty or in a drill status; Naval Academy midshipmen; Reserve Officer Training Corps (ROTC) midshipmen when engaged in directed training activities; and other DoD and Foreign National military personnel assigned to the Navy or embarked in Navy or Military Sealift Command vessels.

**Military-Unique Equipment, Systems, Operations, or Workplaces**

a. Equipment and systems that are unique to the national defense mission, including the operation, testing, and maintenance procedures dictated by the design and configuration. Examples are: military weapons, aircraft, ships, submarines, missiles and missile sites, early warning systems and sites, military space systems, ordnance, tanks, and tactical vehicles.

b. Operations or workplaces that are uniquely military, such as field maneuvers; combat training; naval operations; military flight and missile operations; associated research, test, and development activities; and actions required under emergency conditions.

**Mishap** - Any unplanned or unexpected event or series of events that result in damage to DoD property; occupational illness or injury to on-duty DoD military or civilian personnel; or damage to public and private property or injury and illness to non-DoD personnel caused by DoD operations.

**Mishap Severity Classification** - DoD mishaps are classified according to the severity of resulting injury, occupational illness or property damage. Property damage severity is generally given in terms of cost and is calculated as the sum of the costs associated with DoD property and non-DoD property that is damaged in a DoD mishap. Additionally, if a reportable

occupational injury or occupational illness results, the event is reportable even if the associated costs are less than the minimum dollar criteria. The following classifies DoD mishaps:

(1) Class A Mishap. The resulting total cost of reportable material property damage is \$1,000,000 or more; or an injury or occupational illness results in a fatality or permanent total disability.

(2) Class B Mishap. The resulting total cost of reportable material (property) damage is \$200,000 or more, but less than \$1,000,000; or an injury or occupational illness results in permanent partial disability; or three or more personnel are inpatient hospitalized.

(3) Class C Mishap. The resulting total cost of reportable material (property) damage is \$20,000 or more, but less than \$200,000; a non-fatal injury that causes any loss of time from work beyond the day or shift on which it occurred; or a non-fatal illness or disease that causes loss of time from work or disability at any time (lost time case). For reporting purposes, refer to paragraph 1408a.

**Mission-Oriented Protective Posture (MOPP) (CBRNE Term)** – A flexible system for establishing readiness levels through the use of various elements of collective and individual protection consistent with the threat, work rates imposed by the mission, and environmental conditions. This posture permits maximum protection from exposure without unacceptable reduction in efficiency. (FM 101-5-1/MCRP 5-2A) (FM 3-3/FMFM 11-17)

**Mist** – Finely divided liquid droplets suspended in air and generated by condensation or by atomization.

**Monitoring Industrial Hygiene** - Measurement of the amount of contaminant or physical stress reaching the worker in the environment.

**Monitoring (Medical Surveillance)** - The pre-placement and periodic evaluation of the health status of workers exposed to toxic substances or physical agents in the workplace - measures the effects of contaminant on a worker's body functions and tissues, e.g., decreased lung function, dermatitis, abnormal blood count.

**Monitoring Hearing Tests** - Periodic hearing tests, obtained subsequent to the reference hearing test, which are used to detect shifts in the individual's threshold of hearing.

**MSHA** - Mine Safety and Health Administration

**NAVOSH** - Navy Occupational Safety and Health

**Navy Civilian Personnel**

(a) Navy Federal Civilian Personnel. All career, career-conditional and temporary (whether full-time or part-time or intermittent) Department of the Navy (DON) civilian employees who are subject to Civil Service regulations who are paid from appropriated

Federal funds and are covered by the Federal Employees' Compensation Act. The Navy excludes civilians paid by appropriated funds on a contract or fee basis.

(b) Navy Non-Appropriated Fund (NAF) Civilian Personnel. All civilian personnel the Navy employs to serve Navy activities that are paid from non-appropriated funds and are covered by the Longshoreman and Harbor Workers' Compensation Act. These employees typically work in special services, recreation and athletic programs, hobby shops, open messes, and Navy Exchanges. The Navy excludes civilians paid by non-appropriated funds on a contract or fee basis.

(c) Navy Foreign National Civilian Personnel. Foreign nationals the Navy employs in direct (appropriated or non-appropriated funds) or indirect-hire (contract or fee basis) status when the Navy has supervisory control. The Navy excludes those paid on a contract or fee basis when the host government has supervisory control. Activities shall review and determine if the host nation injury and illness reporting and compensation systems supersede DoD requirements per the status of forces agreements.

**Navy Contractor** - A non-Federal employer engaged in performance of a Navy contract, whether as prime contractor or subcontractor.

**Navy Employees** - For purpose of this instruction, Navy employees include all military and civilian personnel (except contractors) paid from Navy appropriated and non-appropriated funds.

**Navy Non-Operational Mishap** - Mishaps that are not Navy operational mishaps. These consist of cases in which Navy military personnel or any military personnel assigned to the Navy are injured while using facilities the Navy owns and maintains that are service-related facilities, such as pools, athletic fields, retail stores, clubs, child care centers, and housing. This category also includes cases in which any person (military, Federal civilian, non-DoD) is injured due to negligence in the maintenance of service-related facilities the Navy owns and maintains and also includes cases in which off-duty Navy military personnel or military personnel assigned to the Navy are injured in any other capacity not previously mentioned and not considered as operational.

**Navy Operational Mishap** - Any mishap involving DoD or non-DoD property damage or personal injury as a direct result of the execution of specific Navy operations.

**Navy Operations** - Official, authorized activities or facilities that the Navy conducts, provides, owns and maintains. Facilities include aircraft, surface ships, submarines, government motor vehicles, and shore establishments, including service-related facilities.

**Navy Safety and Occupational Health (SOH) Standards** - Occupational safety and health standards published by the Navy which include, are in addition to, or are alternatives for the OSHA standards which prescribe conditions and methods necessary to provide a safe and healthful working environment.

**Navy Personnel** - For purposes of this instruction include the following categories.

a. **Civilian** - General Schedule and Wage Grade employees; Youth/Student Assistance Program employees; Foreign Nationals directly employed by Navy commands; and non-appropriated fund employees.

b. **Military** - All U.S. Navy personnel on active duty; U.S. Military Reserve or National Guard personnel on active duty or in drill status; Service Academy midshipmen/cadets; Reserve Officer Training Corps cadets when engaged in directed training activities; Foreign National military personnel assigned to Navy commands; and personnel of other branches of the Armed Forces serving with the Navy.

**NBC (CBRNE Term)** – an acronym for nuclear, chemical and biological. Term is used in reference to military respirator cartridges.

**Near Field** - The electromagnetic field, which exists relatively near the radiation source. In this area, the electric and magnetic fields do not exhibit a plane wave relationship, and power does not decrease with the square of the distance from the source. The near field region is further subdivided into the reactive near field region, which is closest to the antenna and contains most or nearly all of the stored energy associated with the field of the antenna, and the radiating near field region, where the radiation field predominates over the reactive field but lacks substantial plane wave character and is complicated in structure.

**Needleless Systems** - means a device that does not use needles for:(1) The collection of bodily fluids or withdrawal of body fluids after initial venous or arterial access is established; (2) The administration of medication or fluids; or (3) Any other procedure involving the potential for occupational exposure to bloodborne pathogens due to percutaneous injuries from contaminated sharps.

**Negative Exposure Assessment (Asbestos)** - For any one specific asbestos job performed by employees who have been trained in compliance with 29 CFR 1910.1001, 1915.1001 and 1926.1101, the employer may demonstrate that employee exposures will be below the PELs.

**NFPA 1981 Requirements** – “Meeting NFPA 1981 requirements calls for SCBA to be approved by NIOSH under Subparts H through L of 42 CFR 84 and meet all firefighter testing requirements of NFPA 1981. NFPA 1981 requires testing SCBA at 100 lpm, in contrast to the 40 lpm NIOSH testing required under Subpart H of 42 CFR 84. Under higher exertion levels, SCBA meeting the higher airflow requirements will provide a higher level of protection than SCBA approved only under Subpart H of 42 CFR 84.”

**NIOSH** - National Institute for Occupational Safety and Health.

**NIOSH Approved Respirators** - Respirators that have been certified by NIOSH or NIOSH/MSHA.

**No Lost Time Case** - A non-fatal traumatic injury or occupational illness or disease that does not meet the definition of a Lost Time Case. This definition includes, but is not limited to, each case where medical expense is incurred but no lost time from work is incurred as represented by a charge to leave or COP.

**Noise Exposure** - Personal interaction to a combination of sound level and its duration.

**Non-DoD Personnel** - Off-duty DoD civilian personnel, persons other Federal Agencies employ and other civilians and foreign nationals that DoD does not employ.

**Normal Working Population Exposed to Hazard** - The number of people whose authorized activities on Navy property cause them to be exposed to the specified hazardous condition on a significant number of occasions during a work year; no one should be included in this estimate who is exposed to the cited hazard so infrequently or at such low exposure concentrations that it can be considered insignificant. For example, do not count as exposed those persons who only occasionally pass by the door of a room where a hazard is present.

For specific chemical or physical agents, the population exposed is dependent on the numbers of personnel involved in the specific activity, the effectiveness of confinement or containment systems, and the process steps involved. For agents requiring extensive processing, potential exposure may be plant-wide, but will vary in intensity. If isolation is practiced, the exposed population may be only one worker per shift. If collection systems are not used to confine potential emissions, personnel not actively engaged in the operation may also be exposed to hazardous substances.

Populations exposed to a specific safety hazard will vary with the type of hazard and its locations. If the safety hazard is associated with a specific piece of equipment, only the operator may be exposed. For a grinder, the population exposed could differ according to the safety features of the equipment. If the grinder has a guard, only the operator might be injured through contact with the grinding wheel; on the other hand, if a grinder is without an adequate guard, shattering of the grinding wheel could injure other personnel in the immediate vicinity.

***Nuclear Agent (CBRNE Term)*** - *A material related to the nuclear cycle of mining and processing uranium or plutonium used at nuclear power plants associated with nuclear energy and materials that emit particle and electromagnetic radiological processes.*

**Occupation Exposure Limit (OEL)** – The exposure limit used by a health professional to help determine a workers' or populations' health risk from exposure to a hazard. "OEL" is a generic term used to apply to all exposure limits, to include: DoD standards from DoDI 6055.1, Occupational Safety and Health Administration (OSHA), Permissible Exposure Limits (PELs), DoD Component standards, military deployment environmental health limits, American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLVs), National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (RELs), and other exposure limits reviewed for potential use.

**Occupational Health** - That multidisciplinary field of preventive medicine that is concerned with the promotion and maintenance of the highest degree of physical, mental and social well being of workers in all occupations, and the prevention and/or treatment of illness or injury induced by factors in the workplace. The major disciplines involved are: occupational medicine, occupational health nursing, epidemiology, toxicology, audiology, industrial hygiene, ergonomics, and health physics. Activities include the design, implementation and evaluation of

comprehensive health and safety programs that promote employee health and safety in the workplace.

**Occupational Health Care Provider** - Occupational medicine physicians, occupational health physician assistants, occupational health nurses, occupational health nurse practitioners, occupational audiologists, and independent duty corpsmen trained to provide occupational health services.

**Occupational Illness** - A physiological harm or loss of capacity caused by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness or disease is any condition not meeting the definition of occupational injury.

**Occupational Injury** Any injury, such as a cut, fracture, sprain, amputation, that results from a work accident or from an exposure involving a single incident in the work environment. - All injuries occurring aboard Navy service craft and small boats are occupational injuries.

**Occupational Medicine Services** - Medical examinations and tests related to medical surveillance, pre-employment, pre-placement, periodic, and pre-termination; tests required for protecting the health and safety of naval personnel; job-related immunizations and chemoprophylaxis; education and training related to occupational health; diagnosis and treatment (including referral to other medical and surgical specialties) of injuries and illnesses resulting from employment, and other medical services provided to avoid lost time or to improve employee effectiveness.

**Occupational Safety and Health Professional** - Persons who meet the Office of Personnel Management standards for Safety and Occupational Health Specialist/Manager GS-018, Safety Engineer GS-803, Ergonomist (Medical Officer GS-602, Health Physicist GS-1306, Industrial Hygienist GS-690, Occupational Health Nurse GS-610, , Industrial Hygiene Officer, Audiologists, Radiation Health Officers, or comparably qualified personnel as determined by appropriate Navy authority. A Certified Safety Professional (CSP) is a safety professional that has obtained and maintains national certification from the Board of Certified Safety Professional (BCSP). A Certified Industrial Hygienist (CIH) is an industrial hygiene professional that has obtained and maintains national certification from the American Board of Industrial Hygiene (ABIH)

**Off-Duty Personnel** -(See OPNAVINST 5102.1D)

**On-Duty Personnel** -(See OPNAVINST 5102.1D)

**OSHA** - Occupational Safety and Health Administration, Department of Labor (DOL).

**OSHAct** - The Williams-Steiger Occupational Safety and Health Act of 1970 (Stat. 1590 et seq., 29 U.S.C. 651 et seq).

**OSHA Standards** - OSHA standards are those standards issued by the DOL's Occupational Safety and Health Administration under Section 6 of the OSHAct.

**Oxygen-Deficient Atmosphere** - An atmosphere that contains an oxygen partial pressure of less than 148 millimeters of mercury (19.5 percent by volume at sea level).

**Oxygen-Enriched Atmosphere** - An atmosphere containing more than 22 percent oxygen by volume.

**Particulate Matter** - A suspension of fine solid or liquid particles in air, such as: dust, fog, fume, mist, smoke, or spray. Particulate matter suspended in air is commonly known as an aerosol.

**PEL** - Permissible Exposure Limit. The maximum permissible concentration of a toxic chemical or exposure level of a harmful physical agent (normally averaged over an 8-hour period) that an employee may be exposed.

**Permit Required Confined Space (PRCS)** - A confined space that, has any one or more of the following characteristics: 1) Contains or has the potential to contain a hazardous atmosphere; 2) Contains a material that has the potential for engulfing the entrant; 3) Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section; and/or, 4) Contains any other recognized serious safety or health hazards.

**Plane Wave** - An electromagnetic wave characterized by mutually orthogonal electric and magnetic fields, which are related by the impedance of free space (377 ohms).

**Potentially Hazardous Noise** - Exposure to greater than 84 dB(A) sound level or 140 dB peak sound pressure level for impact or impulse noise. The safe exposure time (T) for periods of less than 16 hours in any 24-hour period may be determined using the equation:

$$T = 16/2^{[(L-80)/4]}$$

where T = Time in hours and L = Effective sound level in dB.

**Potentially Hazardous Noise Area** -

a. Any work area where the A-weighted sound level (continuous or intermittent) is greater than 84 dB.

b. Any work area where the peak sound pressure level (impulse or impact noise) exceeds 140 dB.

**Power Density** - The amount of power per unit area in an electromagnetic field, usually expressed in milliwatts per square centimeter or watts per square meter.

**Pre-incident Plan** - A written plan prepared by a public, or Government emergency response agency, containing general and detailed information for determining their response to anticipated emergency incidents at a specific facility.

**Pressing Up** - The process of filling a space with a liquid to exclude flammable vapor/air mixtures from the space.

**Presumed Asbestos Containing Material** -(PACM) - Thermal system insulation and surfacing material found in buildings constructed no later than 1980.

**Procurement** - The process of obtaining material via the supply system directly from the private sector in such a manner that the local activity is actually involved in the "purchasing" via contract, blanket purchase agreement, petty cash, or other means. See "Acquisition."

**Protective Clothing** - An article of clothing furnished to an employee at government expense and worn for personal safety and protection in the performance of work assignments in potentially hazardous areas or hazardous conditions.

**Protective Equipment** - A device or item to be worn, used, or put in place for the safety or protection of an individual or the public at large, when performing work assignments in or entering hazardous areas or under hazardous conditions. Equipment includes hearing protection, respirators, electrical matting, barricades, traffic cones, lights, safety lines, life jackets, etc.

**Pure-Tone Audiogram** - A set of measures that compares the hearing sensitivity of an individual in detecting faint pure tones in a quiet test room, to the corresponding ability in a normal-hearing young adult population. Usually shown as a graph or table depicting hearing thresholds in decibels at the frequencies of 500, 1,000, 2,000, 3,000, 4,000 and 6,000 Hz.

**Radio frequency Radiation (RFR)** - Electromagnetic radiation at frequencies between 10 kHz and 300 GHz.

**Radiological Agent (CBRNE Term)** - Elements that have an unstable number of neutrons in the nucleus, and that emit ionizing radiation called alpha or beta particles that may be accompanied with gamma or x-rays.

**Rate of Exposure** - The number of hours per year it is estimated that an average member of the exposed population is exposed to the cited hazardous condition. This figure should be an estimate by someone familiar with the work situation, based on the best available existing information (such as time cards). Special studies to obtain these data are not required.

The estimate should be based on net working days per year (i.e., total working days per year minus vacations and holidays, but not sick leave). Usually, net working days is 40 hours per week and 50 weeks per year, i.e., 2,000 hours per year.

For an exposure to a health hazard, the rate of exposure may be easily calculated if the individual works only at the operation in question. However, an employee will generally work in an area of potential exposure for a period of time and move to another location. If the transiency follows a predictable routine, the rate of exposure can be assessed by determining the degree of hazard at all work locations and eliminating those where the potential hazard is minimal.

The rate of exposure to safety risks may also vary. As an example, in general traffic areas, the lack of a guard rail on platforms or hand rails on stair steps may create brief repetitive exposures to several people, including operators, inspectors, and occasional casual personnel.

In such cases, calculate average use of the steps or the platforms to determine the rate of exposure.

**Recognized Potential Hazard** - A health hazard with an employee exposure (without regard to personal protective equipment) greater than the action level (as an 8-hour time-weighted average), short-term exposure limit, ceiling limit, or peak limit.

**Recordable Mishap** - (From 29CFR1904.7(a)):

An injury or illness that results in any of the following: death, days away from work, restricted work or transfer to another job, medical treatment (beyond first aid of civilians), or loss of consciousness, or that involves a significant injury or illness diagnosed by a physician or other licensed health care professional, even if it does not result in death, days away from work, restricted work or job transfer, medical treatment (beyond first aid of civilians), or loss of consciousness. The Navy requires activities to enter these cases on the appropriate occupational injury and illness log. (The "first aid" designation only applies to civilian personnel.)

**Recordable Occupational Injuries or Illnesses** – (See "Recordable Mishap".)

**Recovery** - The principle by which removal from noise allows the inner ear hair cells to regain their pre-noise exposed condition.

**Recurrence** - A situation in which an injured employee, after returning to work, is again disabled and stops work as a result of the original injury. (Recurrent injuries or illnesses do not require new entries on the Log of Occupational Injuries or Illnesses; however, adjustments may be required to reflect changes in the extent or outcome of the case).

**Recycled Material** - Recycled material is material that can be utilized in place of a raw or virgin material in manufacturing a product. See 40 CFR 261.

**Reference Hearing Test** - A hearing test performed when an individual is not experiencing a temporary threshold shift in hearing or other transient otologic pathology. The resulting audiogram will be used as a reference in computing any possible future threshold shift. Normally, this reference audiogram will be first performed for hearing conversation purposes.

**Regulated Area (Asbestos)** - An area established by the employer to demarcate areas where Class I, II, and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate; and a work area within which airborne concentrations of asbestos, exceed or there is a reasonable possibility they may exceed the permissible exposure limit.

**Reportable Mishap** - Any mishap as defined in Section 1408. Activities should not consider the criteria all-inclusive; if there is a "lesson to be learned," whether or not it meets the criteria, then activities should submit a report.

**Reportable Occupational Injuries and Illnesses**

a. All fatalities resulting from occupational injuries or illnesses, regardless of the time between the injury and death, or the length of the illness

- b. All lost workday cases involving the loss of 120 hours or more for military and 5 days or more for civilians
- c. Electric shock - Any case ashore resulting from equipment design deficiency
- d. Chemical or toxic exposure or oxygen deficiency - All cases requiring medical examination or attention. (Excluded are cases in which medical attention was solely due to medical surveillance requirements.)
- e. Any student mishap at a training command that results in termination of training.

**Reproductive Hazard** - Any occupational stressor (biohazard, chemical, or physical) that has the potential to adversely affect the human reproductive and/or developmental process.

**Respiratory Protection Program Manager RPPM** - An individual who meets the requirements of the Office of Personnel Management for safety and health personnel as defined under "Safety and Health Professional", has successfully completed the training requirements of chapter 15, and is designated as the RPPM in writing by the commanding officer.

**Restricted Area** - Any area where access is controlled for the purpose of excluding entry of persons of less than 140 centimeters (55 inches) in stature.

**RFR Permissible Exposure Limit (PEL)** - The maximum level expressed in specific absorption rate (SAR) or derived equivalent power density, electric field strength, or magnetic field strength to which an individual may be exposed which, under the conditions of exposure, will not cause detectable bodily injury according to present medical knowledge.

**Risk Assessment Code (RAC)** - A simple expression of risk that combines the elements of hazard severity and mishap probability. This assessment will be used to help prioritize abatement projects.

**Safety Data File** - The computer file, developed as part of the HMIS, used to store the hazardous material characteristics relevant to their safe handling, use, and disposal.

**Safety or Health Professional** – (see Occupational Safety and Health Professional)

**Serious Physical Harm** - Impairment of the body in which part of the body is made functionally useless or is substantially reduced in efficiency on or off the job. Such impairment may be permanent or temporary, chronic or acute. Injuries involving such impairment would usually require treatment by a medical doctor. Illnesses involving such impairment could shorten life or significantly reduce physical or mental efficiency by inhibiting the normal function of a part of the body.

**Service Craft** - Self-propelled and non-self-propelled small vessels and craft designed to operate in coastal and protected waters and provide general support to combatant forces and shore establishments (examples are tugs, barges, floating cranes, yardcraft).

**Sharps With Engineered Sharps Injury Protections-** Means a nonneedle sharp or a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident.

**Significant Threshold Shift** - A change in hearing threshold of an average of 10 dB or more at 2,000, 3,000, and 4,000 Hz in either ear shall be considered a significant threshold shift. A change of hearing threshold level of 15 dB or greater, in either ear, at any frequency (1,000 to 4,000 Hz) between the reference audiogram will be considered an Early Warning shift, requiring counseling and refitting or hearing protection, but no additional hearing tests.

**Small Boat** - Self-propelled, water-borne small craft capable of limited independent operation in protected waters (examples are launches, Boston whalers).

**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.

**Solvent** - A substance, most commonly water, but often an organic compound that is used to dissolve another substance.

**Specific Absorption Rate (SAR)** - The time rate at which RFR energy is imparted to an element of biological body mass. It is usually measured in W/kg or normalized to incident power density in W/kg/mW/cm<sup>2</sup>.

**Specific Hazard (Safety or Health)** - A word or words constituting the distinctive designation of the cited hazard; for example, the name of the safety hazard might be "unguarded flywheel" or "lack of fire exit"; the name of the health hazard might be "asbestos fibers in the air," "mercury," or "noise." General terms are not acceptable health hazards.

For chemical hazards, the specific name of the dangerous chemical is required. As an example, if a solvent is being used, its chemical name, e.g., "trichloroethylene," must be given; the word "solvent" is not adequate. If more than one chemical is involved in the work operation, or a chemical mixture is being used, give the chemical name of the single most hazardous chemical involved. If the specific hazard is a chemical by-product or by-product mixture resulting from the work operation, give the chemical name of the single most hazardous by-product.

For noise hazards, specify whether they are steady-state or impulse. When the cited health standard is one that details ventilation requirements for a particular type of operation, such as spray painting or arc-welding, the specific hazard name should be "insufficient ventilation to control \_\_\_\_\_." Terms such as spray paint, welding fumes, etc., are adequate only in cases relating to ventilation standards.

**Standard** - A rule, established by competent authority, which designates safe and healthful conditions or practices under which work must be performed to prevent injury, occupational illness, or property damage.

a. **Criteria** - Those parts of a standard that establish a measurable quality, e.g., specifications, inspection intervals, etc.

b. **Equivalent Criteria** - The measurement of equivalency shall be a judgment based on the preponderance of information available. Generally they must provide protection at least as effective as the criteria they replace.

**State OSHA Official** - Investigator or compliance officer employed by a state that has an OSHA-approved occupational safety and health plan.

**Supervisor** - (Military or civilian), one who immediately directs the job efforts of a working group.

**Systems Acquisition** - The process by which weapon systems, weapons platforms, and related equipments are conceived, designed, obtained, and introduced into operational use.

**TDA-99M (CBRNE Term)** - A portable instrument used to test for respirator serviceability by determining microphone assembly, lens, facepiece, drinking tube, exhalation and inhalation valve leakage. This device, also known as the Joint Service Mask Leakage Tester (JSMLT) is used to perform quantitative fit testing.

**Transportation Data File** - The computer file, developed as part of the HMIS, used to store the hazardous material characteristics relevant to their safe transportation and handling.

**Threat Assessment (CBRNE Term)** - A formal description and evaluation of risks to an information system.

**TLV®** - Threshold Limit Value. Threshold limit values are established by the American Conference of Governmental Industrial Hygienists® (ACGIH). TLVs refer to airborne concentrations of a substance and represent conditions under which it is believed that nearly all workers may be exposed day after day without adverse effect.

**Toxic Industrial Chemical (TIC) (CBRNE Term)** - A chemical produced in quantities of greater than 30 tons in a single facility and has a median lethal concentration toxicity (LC50 inhalation) of less than 100,000 mg per min/m<sup>3</sup> and an appreciable (undefined) vapor pressure at 20C. Primarily an inhalation hazard but troops can receive a dosage through ingestion or absorption of the skin.

**Toxic Industrial Material (TIM) (CBRNE Term)** - Chemical substances other than chemical warfare agents used in general industry in such quantities that a release or unplanned event of these materials could cause significant human injury, illness or death. These materials are used in a variety of settings including manufacturing facilities, maintenance areas and general storage areas.

**Toxic Substance or Harmful Physical Agent** - any chemical substance, biological agent (bacteria, virus, fungus, etc.), or physical stress, noise, heat, cold, vibration, repetitive motion, ionizing and non-ionizing radiation, hypo-hyperbaric pressure, etc., which:

a. Is regulated by any NAVOSH standard or Federal law or rule due to a hazard to health.

b. Is listed in the latest printed edition of the National Institute for Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemicals.

**Transportation Data File** – The computer file, developed as part of the HMIS, used to store the hazardous material characteristics relevant to their safe transportation and handling.

**Threat Assessment (CBRNE Term)** – A continual process of compiling and examining all available information concerning potential terrorist activities by terrorist groups that could target a facility.

**TWA** - Time-Weighted Average. An average value weighted in terms of the actual time that it exists during a given time interval.

**Vapor** - Gaseous form of substances that are normally in the solid or liquid state.

**Voluntary Respirator Use** – is when an employee chooses to wear a respirator, even though the use of a respirator is not required by the activity or by any OSHA standard. (This glossary term was modeled from language in the OSHA small Entity Compliance Guide). When there is no risk of personal overexposure and only filtering facepiece respirators are issued for voluntary use, activities are not required to have a complete program. However, they must ensure that the facepieces are not dirty or contaminated, that their use does not interfere with the employee's ability to work safely, and that the information in appendix D and the respirator approval label are provided to employees.

If respirators are required to be worn in the workplace to protect the health of the employee, or where an activity requires an employee to wear a respirator, i.e., in a situation where reference 15-3 does not otherwise require such use, or when respirators other than filtering facepieces are worn by voluntary users, then a complete written respiratory protection program must be established and implemented.

**Vulnerability (CBRNE Term)** - (1) The susceptibility of a nation or military force to any action by any means through which its war potential or combat effectiveness may be reduced or its will to fight diminished; (2) The characteristics of a system that cause it to suffer a definite degradation (incapability to perform the designated mission) as a result of having been subjected to a certain level of effects in an unnatural (manmade) hostile environment.

**Vulnerability Assessment (CBRNE Term)** - The systematic examination of a system to identify those critical infrastructures or related components that may be at risk from an attack and the determination of appropriate procedures that can be implemented to reduce that risk. The systematic examination of security measures to identify security deficiencies, provide data from which to predict the effectiveness of proposed security measures, and confirm the adequacy of such measures after implementation.

**WESS (Web Enabled Safety System)**- the reporting system for all civilian and military occupational illnesses and injuries.

**Working Days** - Monday through Friday (excluding Federal holidays), or other appropriate authorized days of agency operation.

**Workplaces** -

a. Applicable Workplaces and Operations - Navy workplaces and operations generally comparable to those of business and industry in the private sector. Examples include facilities involved and work performed in: the repair and overhaul of vessels, aircraft, or vehicles, except for equipment trials; construction; supply services; civil engineer or public works; medical services; and office work. Accordingly, Navy workplaces and operations such as those involved with shipyards, air rework facilities, public work centers, and like operations are included in this definition.

b. Uniquely Military Equipment, Systems and Operations - Navy equipment and systems that are unique to the national defense mission. Examples include: military aircraft, ships, submarines, missiles and missile sites, early warning sites, military space systems, artillery, tanks, and tactical maneuvers, naval operations, military flight operations, associated research test and development activities, and actions required under emergency conditions.

**WMSD** – Musculoskeletal Disorders (MSDs) are injuries and illnesses that affect muscles, nerves, tendons, ligaments, joints, spinal discs, skin, subcutaneous tissues, blood vessels, and bones. Work-related Musculoskeletal Disorders (WMSDs) are: Musculoskeletal disorders to which the work environment and the performance of work contribute significantly, or Musculoskeletal disorders that are aggravated or prolonged by work conditions