

## CHAPTER 22

## NON IONIZING RADIATION LASERS AND OPTICAL SOURCES

1. Discussion.

a. This section provides information for the protection of personnel from non ionizing radiation sources that encompass the visible, infrared, and electromagnetic spectrum and laser safety. Public Safety Department personnel, have been designated by the Commanding Officer to perform the duties of the Command Radiation Safety Officer (RSO) and Laser Safety Site Officer (LSSO).

2. Radio Frequency Radiation (RFR).

## a. RFR Biological Threshold and PEL

(1) Permissible exposure limits are expressed in terms of measurable field parameters to ensure that the equivalent whole body absorption electromagnetic field energy (EMF) will be less than 0.4 W/kg averaged over any 6 minute exposure period. The permissible exposure limits for shore and afloat establishments is outlined in OPNAVINST 5100.23 (series).

## b. Exclusions

(1) RFR permissible exposure limits may exceed under the following conditions.

(a) Personnel who are under medical care for diagnostic and or therapeutic purposes.

(b) Emergency mission requirements, with a written waiver from the RSO and Commanding Officer.

(c) Devices that are operating at or below 1 GHz with an out put power of 7w or less.

## c. Operating Procedures and Controls

(1) No person shall operate RFR emitting equipment that has the potential to exceed the PEL with out first obtaining a written authorization from the RSO.

(2) Personnel exposure measurements related to RFR shall comply with the exposure limits outlined in OPNAVINST 5100.23 (series).

(3) In the event that the PEL limits are expected to be exceeded the RSO shall take the following actions.

(a) Insure, that all measurements for exposures are performed by qualified safety personnel as out lined in OPNAVINST 5100.23 (series).

(b) Provide a briefing to management, employee representatives and exposed employees on measurements findings and reason for authorizing personnel exposures to exceed the PEL.

(c) Coordinate with management and exposed personnel to develop site specific exposure controls.

(d) Insure that site specific hazard controls and other related information is posted at the affected area, near the point of operations.

(e) Notify all exposed personnel and management in writing, of any operational exceptions and provide methodology and application procedures for hazard control countermeasures.

d. Medical Surveillance for RFR exposures

(1) Personnel that have been exposed to RFR levels that exceed five times the PEL, shall receive medical examinations as outlined in OPNAVINST 5100.23D (series).

e. Reporting accidental RFR exposures

(1) The RSO shall investigate all incidents related to actual or suspected RFR exposures, which are suspected to be at five times the PEL or greater. Investigations shall address, results of RFR measurements, medical examination results, detailed description of circumstances leading to the incident and recommendations to prevent future reoccurrence.

(2) For each incident that the exposure level exceeded five times the PEL, the RSO shall submit a message report, via the Commanding Officer to BUMED, Washington DC (MED 03) within 48 hours after the incident was discovered.

f. Warning Signs and Labels

(1) Management shall insure that RFR warning signs are posted at all access areas where the RFR levels have the potential to exceed the PEL.

(2) In areas where RFR levels have the potential to exceed ten times the PEL additional warning devices must be installed. Such devices are but not limited to warning lights, audible signals, equipment/facility interlocks.

(3) RFR warning signs design and label requirements are outlined in OPNAVINST 5100.23 (series).

g. Research and Development for RFR Sources

(1) Management in coordination with RSO, shall insure that potential RFR hazards are properly identified and that appropriate hazard controls are developed to meet and or exceed safety requirements, outlined in OPNAVINST 5100.23 (series).

(2) In the event that research is undertaken with an RFR source, which possesses characteristics not addressed in the existing Navy safety standards, the RSO shall notify BUMED so additional research and assistance can be initiated to determine personnel safe exposure to such conditions.

#### h. Protective Clothing

(1) RFR shielded protective clothing is not authorized for the protection of personnel. Such clothing could be used as a last resort when the RSO has been unable to provide adequate personnel protection by any other means.

#### i. Technical Assistance

(1) COMNAVSEASYSYSCOM has responsibility for shipboard RFR systems.

(2) COMSPAWARSYSYSCOM has responsibility for defining shore RFR facilities/equipment.

### 3. Responsibilities.

#### a. Commanding Officer

(1) In accordance with the requirements outlined in OPNAVINST 5100.23 series, the Commanding Officer shall designate by letter a Radiation Safety Officer (RSO) and a Laser Safety officer.

(2) Submit an annual laser equipment inventory report to COMSPAWARSYSYSCOM (SPAWAR 223-2).

(3) Establish an inventory of all known major RF sources.

(4) Ensure that the appropriate RFR site surveys are accomplished as required by OPNAVINST 5100.23 (series).

#### b. Public Safety Department

(1) Is the designated command Non Ionizing radiation program manager and is responsible for developing command policies and operational procedures for the protection of personnel from all types of radio active sources.

(2) Maintain an accurate inventory of all radiological equipment located on board this station, as required by OPNAVINST 5100.23 (series).

c. Medical Officer

(1) Is responsible for develop a medical surveillance plan and shall provide the required medical examinations in accordance with OPNAVINST 5100.23 (series).

d. Management and employees are responsible to comply with site specific safety operating procedures and shall insure that no person is allowed to store or operate any type radio active emitting equipment, without first obtaining a written authorization from the department of Public Safety Radiation Officer.

4. Laser Classification and Labeling. All lasers which are not military exempt lasers must be classified and labeled by the manufacturer as required by reference (bb). Deficiencies in this area shall be referred to the Food and Drug Administration, Health and Human Services (HHS).

5. Military Exempt Lasers. Lasers or laser systems which meet the definition of "military exempt" as defined by reference (aa) are exempted from compliance with most of the reference (bb) requirements. Determination of Station lasers or laser systems which are "military exempt" must be made by the Station Laser System Safety Officer (LSSO). These lasers and systems must meet that requirements of references (ff) and (ii). Typically, lasers procured, designed, modified or tested for fleet use are exempt if such is a component of an Aircraft Platform Interface (API) system. Lasers procured "off-the-shelf" an utilized as such, are not necessarily exempt from reference (bb) requirements.

6. Medical Surveillance Program.

a. All users of class 3 or 4 lasers must provide the following data to the LSSO prior to assigning any employee to a laser operation:

(1) Employee's name and social security number.

(2) Employee exposure as defined by reference (z) as "laser personnel" or "incidental personnel."

(3) Resume of duties involving laser operations.

b. No employee will be assigned as a "laser personnel" until the above information is provided to the Station LSSO, the employee receives a replacement eye examination and the examination results are reviewed by the Station LSSO.

c. The above requirements apply to employees reassigned from "incidental personnel" status to "laser personnel" status as well as to all employees not exposed to laser radiation who are reassigned to either "incidental personnel" or "laser personnel" status.

d. The users of all Class 3 and 4 lasers shall provide an annual verification of the above data to the Station LSSO.

6. Laser Exposure Incidents. All laser mishaps and near-misses (suspected over-exposures) must be reported immediately to the Public Safety Department, extension 2525.

7. Laser Hazard Control Program.

a. The Station Category I LSSO is located within the Public Safety Department. The Station LSSO manages the Station Laser Hazard Control Program, is the chief advisor to the commanding Officer on all matters concerning laser safety and may empower directorate or department LSSOs to act on his/her behalf, provided they have received the requisite training as stipulated by reference (aa).

b. The Station LSSO will review and approve/disapprove all procurement of lasers and devices containing Class 3 and 4 lasers as a component. The Station LSSO will be notified at least 10 days prior to the shipment of any laser device or system to the Station from the Fleet, contractor or otherwise. Disposal of military exempt lasers shall be approved by the Station LSSO.

c. Laser device/system specific Standard Operating Procedures (SOP) shall be developed and approved by the department or Station LSSO prior to the operation of such systems. The approved SOP shall be posted at the laser site.

d. The existing OSH program shall be utilized to provide a periodic survey of all laser sites aboard the Station. Hazard classification shall be determined by the LSSO and provided to the Public Safety Department Safety and Health Inspection Program Manger.

e. All users, laser devices, or systems shall utilize the existing Public Safety Department Sight Conservation Program to obtain and record the requirement for, and issuance of, protective eyewear.

f. Visitor control and protection procedures shall be provided by the user of each laser device and system.

g. Users are required to provide Laser Safety Review Board (LSRB) technical data packages and support the LSRB review when required to go to the Station LSSO.

h. Users are required to submit laser data sheets for each Class 3, Class 4, and all military exempt laser annually. Data sheet format is provided in Exhibit 22A.

i. Laser safety committee requirements shall be incorporated into existing safety and health committees.

j. Personnel performing maintenance on laser devices or systems shall strictly adhere to established lock-out/tag-out procedures.

k. Personnel working in areas where Class 3, Class 4 or equivalent military exempt lasers are used shall have formal classroom training including:

- (1) Laser fundamentals.
- (2) Biological effects.
- (3) Specular and diffuse reflections.
- (4) Ancillary hazards (e.g., electrical, chemical, etc.)
- (5) Laser system classification.
- (6) Control measures.
- (7) Responsibilities.
- (8) Medical surveillance requirements.

8. Responsibilities.

a. Station LSSO shall:

(1) Receive laser safety training by successfully completing the Navy LSSO course "SET 460." Refresher training shall be obtained periodically if technical training is not used within one year of training.

(2) Ensure each laser is classified and labeled prior to use according to enclosure (10) of reference (aa). Class 3 and Class 4 lasers include those which, although classified otherwise for operational purposes, have been broken down for maintenance in such a manner that Class 3 or Class 4 radiation levels are accessible. For example, if radiation at the level of Class 3 or Class 4 is accessible when a class 1 laser housing is removed, then procedures and labeling of the laser and in maintenance manuals must warn of this condition.

(3) Determine radiation wave lengths, energy and power levels and optical densities of eyewear needed to provide protection under both unaided and optically aided viewing.

(4) Maintain and submit to Commander, Space and Naval Warfare Systems Command (SPAWARSYSCOM) (SPAWAR OOF) all necessary records required by reference (aa) and other Government regulations. Maintain a list of all lasers and their locations at the activity. Submit annually by 31 August a list of all local military exempt lasers and Class 3 and Class 4 non-exempt lasers to SPAWARSYSCOM (SPAWAR OOF), or to the logistics manager of military exempt lasers, if such a manager has been appointed, for forwarding to SPAWARSYSCOM (SPAWAR OOF).

(5) Provide personnel information on all employees exposed to lasers to the activity medical surveillance in accordance with reference (aa).

(6) Investigate local laser radiation incidents, take corrective action and report such incidents as directed in this instruction.

(7) Survey, at least annually, all local laser installations for safety and conduct hazard evaluations whenever needed to ensure hazard control. Take measurements when necessary to determine Nominal Ocular Hazard Distances (NOHD) in the manner described in reference (aa).

(8) Establish buffer zones on ranges. Ensure use of beam stops whenever feasible to limit beam travel. Obtain eyewear with sufficient optical density protection at the operating wave lengths and other personal protective equipment required for hazard control.

(9) Approve, disapprove or submit for safety approval to higher authority all local laser uses, both portable and fixed.

(10) Establish and promulgate local laser safety regulation for indoor and outdoor operations and maintenance.

b. Supervisors shall:

(1) Comply with the medical surveillance requirements of paragraph 5.

(2) Comply with the mishap/incident reporting procedures of paragraph 6.

(3) Ensure all lasers areas are properly labeled.

(4) Ensure SOPs are posted for each laser operation. A sample SOP is provided as Exhibit 22B.

(5) Provide annual inventory information to the Station LSSO.

(6) Ensure employees receive required training prior to assignment as a "laser" or "incidental" employee.

(7) Notify the Station LSSO of all procurement or receipt of government furnished equipment containing Class 3 and Class 4 lasers.

9. Certification. Employees shall not be allowed to operate or maintain laser equipment unless they have received the required medical examinations and training as described in this instruction.

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