
CH2M HILL Hanford Group, Inc.	Manual	HNF-IP-0842
LASER SAFETY AND NONIONIZING RADIATION	Volume	IX, Safety
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	Page	1 of 5
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1.0 PURPOSE AND SCOPE

This procedure sets requirements and responsibilities for the purchase and use of industrial lasers, scientific lasers, laser systems, and devices that emit nonionizing radiation in all CH2M HILL Hanford Group Inc. (CHG) managed facilities and operations.

A laser safety officer, appointed by the manager of Safety and Health, has the authority and responsibility for establishing, monitoring, and enforcing all CHG laser safety rules. Industrial hygienists have the authority and responsibility for controlling safety and health hazards from devices that emit nonionizing radiation, such as microwave, radio frequency, ultraviolet, infrared, and intense visible light emitters.

This procedure does **not** apply to: 1) lasers in consumer products (such as laser printers and optical disk scanning devices) that are both completely enclosed and require no access by users at any time and 2) low power nonionizing sources such as consumer-type microwave ovens.

2.0 SOURCES

2.1 Requirements

1. 10 CFR 1910, Subpart G, "Occupational Health and Environmental Control."
2. 29 CFR 1910.97, "Nonionizing Radiation." (S/RID)
3. DOE 5480.4, Attachment 2, Section 2.d.(3)(c)." (S/RID)

2.2 References

ANSI Z136.1-1993, "Safe Use of Lasers."

3.0 IMPLEMENTATION

The provisions of this procedure are effective immediately. All affected personnel shall make themselves aware of the requirements of this procedure.

4.0 REQUIREMENTS

1. Control measures shall be used to reduce or eliminate the possibility of employee exposure to laser radiation and to other hazards associated with the operation of laser systems, both during normal usage and maintenance.
2. Periodic re-examinations of employees using lasers are not required.

3. Any nonionizing radiation source shall not be modified without approval from an industrial hygienist and the appropriate engineering organization.

NOTE: Modify means changes that could alter the operating characteristics of the device. Like-kind parts replacements are not considered modifications.

4. Many accidents involving lasers result from non-beam hazards. To ensure that these hazards are adequately identified and addressed, Safety personnel shall perform necessary hazard evaluations.
5. Lasers and laser systems may only be operated and maintained by authorized employees or vendors.
6. Employees involved with lasers must be trained, as required, by the laser safety officer.
7. Appropriate personal protective equipment, approved by the laser safety officer, is required to be worn whenever there is potential for exposure to the laser beam.
8. Spectators are not allowed into laser controlled areas without management approval.
9. Typical workplace nonionizing radiation sources are listed below.
- a. Microwave
 - Ovens
 - Diathermy
 - Communications
 - Radar.
 - b. Radio Frequency
 - Communications and broadcast
 - Dielectric heaters
 - Induction heaters
 - RF welding.
 - c. Ultraviolet
 - Welding, cutting
 - Product, process inspection
 - Sterilization
 - Medical diagnosis, treatment.
 - d. Infrared
 - Fluorescent, incandescent lamps
 - High-intensity discharge lamps
 - Heaters
 - Glass blowing, melting.

- e. Intense Visible
- High-intensity discharge lamps
 - Welding.

5.0 PROCEDURE (2.1.3)

5.1 Establishing Laser Installations

The line manager:

1. Appoints one person to act as the laser supervisor and be responsible for ensuring that each installation is operated safely according to this procedure and the guidance of the laser safety officer.
2. Ensures that all purchase requisitions for lasers and associated safety equipment are submitted to the laser safety officer for approval.
3. Before installing any laser equipment (other than sealed units in consumer products), contacts the laser safety officer and obtains approval.
4. **Never** allows any laser installation to be modified without approval from the laser safety officer and the appropriate engineering organization.
5. Ensures that any accident involving a laser is promptly reported to the laser safety officer (in addition to other notifications required by occurrence reporting procedures).

5.2 Classifying and Controlling Laser Installations

The laser safety officer:

1. Determines the classification level for each installation, according to the risk presented, from class 1 (no risk under normal operating conditions) through class 4 (hazard from direct and diffuse reflections) according to ANSI Z136.1, for each laser installation.
 - a. If necessary, delegates classification procedures to other persons trained in laser safety or optical engineering.
2. Specifies and implements the appropriate control measures from ANSI Z136.1 for each installation.
 - a. When appropriate, specifies alternate control measures that provide equivalent protection.

3. Ensures that, before working with a class 3b or 4 laser, and promptly after any suspected eye exposure, personnel who may be exposed to laser radiation complete a laser eye examination (provided by HEHF).
4. Specifies and implements controls for non-beam laser hazards, such as:
 - Fire and electrical hazards
 - Laser generated air contaminants
 - Collateral and plasma radiation
 - Explosion hazards (from high pressure arc lamps, filament lamps, and capacitor banks)
 - Compressed gases
 - Laser dyes (some dyes are carcinogenic)
 - Noise and other ergonomic problems
 - Ultraviolet and radio frequency radiation.

5.3 Supervising Laser Operations

Laser supervisor:

1. Prepares and uses written standard operating procedures, including laser-specific safety requirements. These standard operating procedures must be reviewed and approved by the laser safety officer.
2. Ensures that the following safety precautions are strictly observed.

5.4 Reporting Nonionizing Exposure (2.1.2)

Line Management

1. Notify an industrial hygienist if you or an employee has been exposed or may be exposed to nonionizing radiation sources.
2. Identify the source(s) and area(s) where employee exposure to nonionizing radiation may occur.

NOTE: In addition to the direct hazards from the nonionizing radiation, there may also be possible exposures to by-product emissions, such as X-rays. Also, high voltages used to generate nonionizing radiation are a shock hazard; ultraviolet light sources interacting with air pollutants may generate toxic gases.

3. Contact and get approval from your industrial hygienist before installing **any** nonionizing radiation source (other than low power sources such as consumer-type microwave ovens).
4. Keep exposure to nonionizing radiation as low as reasonably achievable (ALARA):
 - a. Implement the appropriate engineering and/or administrative controls.
 - b. Install the required warning signs and barriers as instructed by Industrial Hygiene.
 - c. If operating devices that emit hazardous levels of nonionizing radiation (as determined by Industrial Hygiene), ensure that:
 - 1) Approved procedures for their use and maintenance are prepared and followed
 - 2) All employees who work with or perform maintenance on the devices receive appropriate training and job specific hazard communication.
 - d. Ensure that all personnel in the area wear the personal protective equipment specified by Industrial Hygiene when the source is or may be in use.
5. Ensure that operations involving nonionizing radiation are evaluated and surveyed, as necessary, to ensure that personnel are not being overexposed.

NOTE: Industrial Hygiene is available to assist with such monitoring efforts.