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| CH2M HILL Hanford Group, Inc. | Manual | ESHQ |
| LASER SAFETY AND NONIONIZING RADIATION | Document | TFC-ESHQ-IH-STD-02, REV A-2 |
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[Ownership matrix](#)

1.0 PURPOSE AND SCOPE

(5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.5)

This standard 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. (CH2M HILL) 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 CH2M HILL 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 standard 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 IMPLEMENTATION

This standard is effective on the date shown in the header. ~~CH2M HILL must comply with DOE O 440.1A until the approval and issue of TFC PLN 43, Revision B. Upon issue of TFC PLN 43, Revision B, reference to DOE O 440.1A is to be treated as obsolete.~~

3.0 STANDARD

1. The purchase and use of industrial lasers, scientific lasers, laser systems, and devices that emit nonionizing radiation shall be based upon the following minimum standards:
 - 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.
 - Periodic re-examinations of employees using lasers are not required.
 - 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.

- 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.
- Lasers and laser systems may only be operated and maintained by authorized employees or vendors.

**LASER SAFETY AND NONIONIZING
RADIATION**

- Employees involved with lasers must be trained, as required, by the laser safety officer.
- 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.
- Spectators are not allowed into laser controlled areas without management approval.
- For the purpose of this standard typical workplace nonionizing radiation sources include the following.
 - Microwave
 - Ovens
 - Diathermy
 - Communications
 - Radar.
 - Radio Frequency
 - Communications and broadcast
 - Dielectric heaters
 - Induction heaters
 - RF welding.
 - Ultraviolet
 - Welding, cutting
 - Product, process inspection
 - Sterilization
 - Medical diagnosis, treatment.
 - Infrared
 - Fluorescent, incandescent lamps
 - High-intensity discharge lamps
 - Heaters
 - Glass blowing, melting.
 - Intense Visible
 - High-intensity discharge lamps
 - Welding.

3.1 Establishing Laser Installations

The line managers shall assure that the installation of laser equipment meets the following standard criteria:

- One person shall act as the laser supervisor and ensure that each installation is operated safely according to this standard and the guidance of the laser safety officer.

- That all purchase requisitions for lasers and associated safety equipment are submitted to the laser safety officer for approval.
 - That before installation any laser equipment (other than sealed units in consumer products), the laser safety officer is contacted and that their approval for installation is obtained.
 - Any laser installation modifications are approved by the laser safety officer and the appropriate engineering organization prior to such changes being initiated.
 - That any accident involving a laser is promptly reported to the laser safety officer (in addition to other notifications required by occurrence reporting procedures).

3.2 Classifying and Controlling Laser Installations

(5.1.2)

NOTE: The requirements and specifications of ANSI Z 136.1 (2007) may apply to lasers/laser systems purchased after March 16, 2007.

The laser safety officer shall ensure that the installation and use of laser equipment meets the following standard criteria:

- The classification level is established for each laser 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. If necessary, delegates the responsibility for implementing and following appropriate classification procedures to other persons specifically trained in laser safety or optical engineering.
- That appropriate control measures from ANSI Z136.1 for each laser installation are specified and implemented. When appropriate, alternate control measures that provide equivalent protection may be specified and implemented with the approval of the laser safety officer.
- That before working with class 3b or 4 lasers, and promptly after any suspected eye exposure, ensure personnel who may be exposed to laser radiation complete a laser eye examination.
- That controls for non-beam laser hazards are specified and implemented, such as:
 - Fire and electrical hazards
 - Laser generated air contaminants
 - Collateral and plasma radiation
 - Explosion hazards (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.

3.3 Supervising Laser Operations

Those supervising laser operations shall assure that the use of laser equipment meets the following standard criteria:

- That written standard operating procedures, including laser-specific safety requirements are prepared and applied.
- That operating procedures are reviewed and approved by the laser safety officer.

3.4 Reporting Nonionizing Exposure

Line Management is responsible for:

- Notifying an industrial hygienist when an employee has been exposed or may be exposed to nonionizing radiation sources.
- Identifying 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.

- Obtaining approval from an industrial hygienist before installing any nonionizing radiation source (other than low power sources such as consumer-type microwave ovens).
- Keeping exposure to nonionizing radiation as low as reasonably achievable (ALARA) by:
 - Implementing the appropriate engineering and/or administrative controls
 - Installing the required warning signs and barriers as instructed by Industrial Hygiene
 - If operating devices that emit hazardous levels of nonionizing radiation (as determined by Industrial Hygiene), ensure that:
 - Approved procedures for their use and maintenance are prepared and followed
 - All employees who work with or perform maintenance on the devices receive appropriate training and job specific hazard communication.
 - 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.

- 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.

4.0 DEFINITIONS

No terms or phrases unique to this standard are used.

5.0 SOURCES

5.1 Requirements

1. American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices (2005).
2. ANSI Z136.1-~~1993~~, "Safe Use of Lasers." (2000)
3. 29 CFR 1910, Subpart G, Section 97, "Nonionizing Radiation." (S/RID)
4. 29 CFR 1926, Subpart D, Section 54, "Nonionizing Radiation."
5. TFC-PLN-47, "Worker Safety and Health Program."
- ~~5.DOE-O 440.1A, Attachment 2.-(S/RID)~~