



Loss Control TIPS

Technical Information Paper Series

Innovative Safety and Health SolutionsSM

An Overview of OSHA's Laboratory Standard: 29 CFR 1910.1450

Introduction

The Occupational Safety and Health Administration (OSHA) promulgated its final standard on "Occupational Exposures to Hazardous Chemicals in Laboratories" in 1990 (published in the *Code of Federal Regulations* as 29 CFR 1910.1450).

If your laboratory had been in existence in 1990, the standard required completion and implementation of paragraph (e), a Chemical Hygiene Plan (CHP) by January 31, 1991. This article may serve as an opportunity to revisit, review and, perhaps, revise your laboratory's current standard.

Why A Laboratory Standard ?

The basis for the standard lies in the fact the "laboratories typically differ from industrial operations in their use and handling of hazardous chemicals and that a different approach than that found in OSHA's substance specific health standards is warranted to protect workers."

OSHA's intent for the standard is to reduce risk by at least as much as current standards, while formulating a more practical approach for laboratories. OSHA feels that the provisions of the laboratory standard are necessary to reduce or eliminate significant risk.

This federal standard, for the most part, *supersedes* requirements of all other OSHA health standards (e.g. lead, benzene) found in 29 CFR 1910, Subpart Z.

The laboratory standard *does not* eliminate the requirement to maintain exposures below the applicable Permissible Exposure Limits (PELs).

The standard *does* acknowledge the diverse characteristics of a laboratory, provides greater flexibility in methods of meeting worker protection, and thus allows a more practical approach to regulating hazardous chemicals.



Important components of the laboratory standard include:

- Determination of who must comply
- Employee exposure determination protocols
- Establishment and performance of the written chemical hygiene plan, including:
 - Standard operating procedures
 - Control measures
 - Protective equipment
 - Information and training requirements
 - Hazardous operations
 - Medical surveillance requirements
 - Responsibilities
 - Additional protection for employees
- Maintenance and recordkeeping of the program
- Hazard Identification

Who Must Comply?

The determination of applicability of the standard depends on whether the *laboratory use* of hazardous chemicals occurs on a *laboratory scale*. The terms *laboratory use* and *laboratory scale*, along with many others, are defined in the standard. Some of the more important terms include:

Term	Definition
Laboratory	A facility where the laboratory use of hazardous chemicals occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.
Laboratory Use	Handling of chemicals in which <i>all</i> four of the following criteria are met: <ol style="list-style-type: none">1. Chemical analyses are carried out on a <i>laboratory scale</i> (see Definition below)2. Multiple procedures or chemicals are used.3. The procedures employed <i>use</i> chemicals; the procedures do not <i>produce</i> or <i>manufacture</i> chemicals4. Written laboratory procedures, practices and, safety equipment are available and in use to reduce the potential for employee exposure.
Laboratory Scale	Work with hazardous chemicals in which containers used for reactions, transfers, and handling are designed to be easily and safely manipulated by one person.
Hazardous Chemical	A chemical for which there is evidence that acute or chronic health effects may occur in exposed individuals.

Permissible Exposure Limits (PELs)

As stated previously, the laboratory standard does not eliminate the requirement to maintain exposures below the applicable PEL for general industry. In general, a PEL may be defined as a level that is not to be exceeded by the average exposure over an 8-hour workday. For purposes of the standard, PEL refers to any OSHA limit (e.g., time weighted average, ceiling, short-term exposure limit, or excursion). This portion of the standard assures that there is no reduction in the health protection of laboratory employees.

Employee Exposure Determinations

The laboratory standard requires that “the employer shall measure the employee’s exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level (or in the absence of an action level, the PEL).” This is defined in the standard as *initial monitoring*. Initial monitoring is not required if, upon review, the hazardous chemicals and/or control processes in use demonstrate that exposures to the substances are improbable to exceed action levels or PELs. Factors indicating the possibility of overexposure may include:

- the mode in which the procedure is carried out (e.g., outside of a hood)
- information from historical monitoring which has exhibited elevated exposures for that chemical in similar operations
- use of procedures that use abundant quantities of hazardous chemicals, or procedures that are carried out over an extended time frame
- symptoms of exposure, such as eye or skin irritation, nausea, shortness of breath and/or headache

If the action level or PEL is routinely exceeded, the employer must also conduct periodic monitoring and medical provisions as prescribed in the relevant standard. Periodic monitoring must continue until the exposure level is below that dictated by the standard or until the chemical is no longer used in the procedure. Termination of monitoring does not preclude future monitoring. Within 15 days of receipt of monitoring results, notification, in writing, must be made either to the employee or must be posted in a location readily accessible to employees.

Chemical Hygiene Plan

The form in which compliance to the laboratory standard is obtained is determined by each employer through the development and implementation of the Chemical Hygiene Plan (CHP). A CHP is a written program documenting procedures, equipment, personal protective equipment, and work practices capable of protecting employees from health hazards used in that particular workplace. The objective of the CHP is twofold: First, to protect employees from health hazards associated with hazardous chemicals; and second, to keep exposures to those chemicals below the existing PELs. The written CHP must be readily accessible to all employees. A CHP must be prepared for your facility whenever any chemical meets the definition of hazardous chemical. The CHP must cover any hazardous chemical present. Ideally, the CHP should be distinct enough that it does not require employees to become adept with incidental material that is not applicable to their workplace.

Components of the Chemical Hygiene Plan

The CHP *must* contain the following eight components, and it must indicate specific actions that will be taken to assure employee protection

1. Standard operating procedures, applicable to safety and health considerations, that are to be followed when chemicals are used. This element assures that work practices and policies essential to protect employees from chemical hazards are in place (e.g., the wearing of safety glasses, eating and drinking area restrictions, spill clean-up procedures, etc.).

2. Criteria used by the employer to determine and implement control measures for reducing employee exposures to hazardous chemicals. This requirement documents engineering controls, personal protective equipment, and hygiene practices (e.g., wearing of lab coats, gloves, etc.). This criteria may be based upon the degree of toxicity of the substances, exposure capacity of the chemical procedure, and ability of any engineering controls to curb the exposures.
3. Procedures to insure the proper functioning and performance of protective equipment and fume hoods. OSHA does not specify face velocities for fume hoods, in deference to differences in hood design, use patterns, and methods of operation.
4. Provisions for employee information and training on the hazards of chemicals in use. The frequency of refresher information and training is to be determined by the employer. The CHP must document the formal information and training provided to employees, including:
 - (A) Information:
 - (1) Hazardous chemical physical and health hazard information shall be provided at employees initial assignment to a work area and prior to beginning any assignment that requires new exposure situations. The approach may be directed to classes or groups of chemicals.
 - (2) Employees must be informed of the contents, location, and availability of the OSHA regulation (29 CFR 1910.1450 and its appendices)
 - (3) The PEL for OSHA regulated chemicals or the recommended limits (where there in no OSHA PEL) must be communicated to employees. OSHA regulated chemicals are listed in 29 CFR 1910.1000.
 - (4) Signs and symptoms associated with exposure to hazardous chemicals used in the lab facility must be communicated to employees.
 - (5) Location and availability of reference material on hazards, safe handling, storage and disposal of chemicals. This criteria includes, but is not limited to, Material Safety Data Sheets (MSDSs) received from the chemical suppliers. Employees also need to be informed as to the location and availability of the MSDS (even if they are in the form of computer information).
 - (B) Training: Formal employee training shall include:
 - (1) Methods and observations made to detect presence or release of a hazardous chemical (e.g. monitoring, visual appearances, odors, etc.). Employees may also be alerted to presence of hazardous chemicals by the signs and symptoms of exposure.
 - (2) Identification of physical and health hazards of laboratory chemicals in use. For example, physical hazards are often responsible for subsequent health effects; such as when explosions or fires lead to the release of toxic fumes or vapors.
 - (3) Measures employees can take to protect themselves from hazards (e.g. work practices, emergency procedures, use of personal protective equipment, etc.)
 - (4) Employees shall also receive formal training on the written details of the CHP.

Note that much of the information and training materials required for the CHP may be commercially available. Such topics available for viewing on video include hazard communication, interpretation of the OSHA laboratory standard, information on fume hoods, etc. However, commercially available materials are often not sufficient to address the specific nature of an individual facility.

5. The employer's CHP must identify operations or activities which are believed to be sufficiently hazardous as to warrant prior management approval before implementation. An employer might decide that operations involving highly toxic carcinogenic or highly toxic volatile materials need prior approval and additional precautions before implementing.
6. Provisions for medical exams and consultations. Under the OSHA Laboratory Standard, the employer should provide an opportunity for medical attention, including follow up exams, under the following conditions:
 - (A) When an employee develops signs or symptoms associated with a hazardous chemical to which exposure has occurred.
 - (B) When monitoring reveals an exposure level above the action level or PEL for a regulated substance for which medical surveillance requirements exist (e.g. lead, benzene).
 - (C) When a spill, leak, explosion or other event occurs resulting in the potential of exposure.

The examinations or consultations shall be provided at no cost to the employee, without loss of pay and at a reasonable place and time.

Information to be provided to the physician by the employer includes:

- (A) the identity of the hazardous chemical
- (B) a description of the conditions where exposures occurred (including exposure data, if any)
- (C) description of signs and symptoms experienced, if any

The examining physician shall then provide a written opinion to the employer which shall include:

- (A) any recommendations for follow up
- (B) results of the exam and associated tests, if any
- (C) any medical condition which may have been revealed which places the employee at elevated risk as a result of exposure to the hazardous chemical as found in the workplace
- (D) a statement that the physician has informed the employee of the results of the exam or consultation.

The written opinion shall not reveal findings unrelated to occupational exposures. Employers must establish and maintain accurate records of any of the preceding aspects undertaken.

7. The employer must designate an employee who is responsible for implementation of the CHP. A *chemical hygiene officer* and/or chemical hygiene committee must be established. A chemical hygiene officer is an employee, designated by the employer, who is qualified by training and/or experience to provide guidance in the development, implementation, and supervision of the CHP. OSHA has not defined the skills that are necessary to maintain this position, as qualifications will vary according to the scope of the operation.
8. Provisions that establish additional protection for employees working with particularly hazardous substances. A particularly hazardous substance is defined as a select carcinogen, reproductive toxin, or chemical with high acute toxicity. OSHA recommends that the following special considerations be considered when working with these hazardous chemicals:
 - Establishing of a designated work area for use of these chemicals
 - Using containment devices such as hoods and glove boxes
 - Carrying out the safe removal of contaminated waste
 - Paying attention to decontamination procedures

OSHA allows each laboratory to determine whether a substance meets the criteria of moderate to high potency before requiring any of the above considerations.

Plan Maintenance

The CHP shall be reviewed and evaluated at least annually, and updated and revised as necessary.

Hazard Identification

OSHA's Laboratory Standard was designed as a broad approach, requiring that employers develop a plan to implement practices that are effective in minimizing laboratory employee exposures to hazardous chemicals. Under the Laboratory Standard, employees have the same "right to know" as in any other industry. The Laboratory Standard supersedes OSHA's Hazard Communication Standard (29 CFR 1910.1200), which applies to all non-laboratory workplaces where hazardous chemical are used.

Like OSHA's Hazard Communication Standard, the Laboratory Standard includes labeling and MSDS requirements. MSDSs arriving with incoming shipments are to be kept and maintained and made accessible to employees. Labels on incoming containers of hazardous chemicals are not to be removed or destroyed, and must be legible and displayed. Secondary containers, as a minimum, must be labeled as to their identity. Labels are not required on portable containers if the transporter will use the contents for immediate use.

When a laboratory produces a chemical for its own use, the employer must provide hazard information to employees who are exposed to that chemical. MSDS and label preparations do not apply. Laboratories that produce byproducts whose content is not known shall assume that the chemical is hazardous, and they must comply with the chemical hygiene plan regarding its handling and use. The production of a chemical with subsequent shipment to an outside facility falls under the domain of the Hazard Communication Standard; the employer must develop MSDS and labeling information. (Waste disposal by a laboratory is not defined as a case of a chemical substance produced and then sent to another facility.)

Respirators

If respirators are necessary to maintain exposures to a hazardous chemical below the PEL, they must be provided at no cost to the employees by the employer. Respirators must be selected and used fulfilling the requirements of 29 CFR 1910.134 - the respirator protection standard.

Recordkeeping

Employers must establish and maintain records of any exposure monitoring that is done. Recordkeeping must also include information about medical examinations and consultations, including testing and/or opinions rendered. Records must be kept, transferred and made available per the requirements of 29 CFR 1910.20 (OSHA's general standard for access to employee medical and exposure records).

Conclusion

The OSHA Laboratory Standard includes two appendices which provide guidance in the establishment of the CHP. One appendix is a draft of a sample CHP, while the other appendix lists references available on hazardous substances and availability of references for the development of the CHP. In addition, consult the references cited at the end of this article. Your state or federal OSHA representatives can also assist you with any questions you have regarding compliance to “Occupational Exposures to Hazardous Chemicals in Laboratories”.

References

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4. U.S. Department of Labor. Occupational Safety and Health Administration. “Occupational Exposures to Hazardous Chemicals in Laboratories.” *Federal Register*, Rules and Regulations, 29 CFR 1910.1450, Vol. 55, No. 21, Jan 31, 1990.
5. Waxman, Michael F., “New Lab Standard and Chemical Hygiene Plan Enhance Workplace Safety.” *Occupational Health & Safety*, March 1992.

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