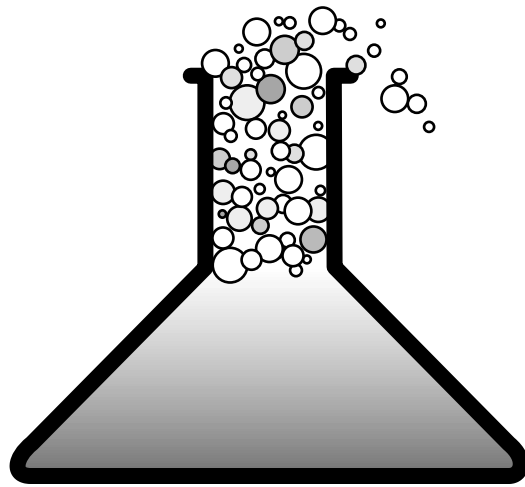


Exposure to Hazardous Chemicals in Laboratories



Oregon Occupational Safety &
Health Division (OR-OSHA)

Preface

This booklet provides an overview of the OR-OSHA standard on exposure to hazardous chemicals in laboratories, but it is not a substitute for the safety and health rules, which are available from:

Dept. of Consumer & Business Services
OR-OSHA Standards & Technical Resources Section
350 Winter St. NE, Rm. 430
Salem, OR 97301-3882

Comments, corrections, or suggestions (printed or typed), may also be sent to that address.



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Background

Laboratory workers are routinely exposed to hazardous chemicals such as acetone, carbon monoxide, formaldehyde, hydrogen sulfide, mercury, nitric acid, and xylene. Many accidents and injuries occur annually in labs, resulting in chemical-related illnesses ranging from skin and eye irritation to fatal pulmonary edema.

Traditionally, OR-OSHA's approach to controlling occupational exposures to hazardous chemicals has been through development of substance-specific standards (e.g., benzene).

Where substance-specific standards do not exist, OR-OSHA requires compliance with permissible exposure limits (PELs), in Oregon Rules for Air Contaminants, 437-002-0382, Subdivision Z.

OR-OSHA has found this approach works well in industrial settings, where workers may be exposed over prolonged periods to large quantities of hazardous chemicals. In labs, the use of such chemicals is generally limited to small quantities on a short-term basis in operations where chemicals and procedures change frequently. Consequently, lab workers are exposed to many chemicals, but generally to smaller quantities for shorter periods of time than workers in general industry. Accordingly, OR-OSHA recognizes the need for a regulation that focuses on the unique nature of lab work and believes its laboratory standard meets this need.

The standard emphasizes the use of work practices and effective worker protection appropriate to the unique nature of the lab. This performance-oriented rule is intended to provide employers with the flexibility to implement safe work practices and procedures specific to their workplace while reducing worker injuries and illnesses. With this standard, OR-OSHA aims to reduce risks to Oregon workers in industrial, clinical, and school labs in a cost-effective manner.

Scope of the standard

Workplaces covered by the standard are determined by their conformance with “laboratory use” and “laboratory scale” criteria, as defined in the standard. The standard covers all chemicals meeting the health-hazard definition in OR-OSHA’s Hazard Communication Standard, OAR 437-002-1910.1200.

The lab standard doesn’t specify work practices that protect employees from physical hazards associated with chemicals used in the workplace.* It requires that employers address such physical hazards in training programs. (See OAR 437-002-1910.1450).

*For example, labs and other general-industry employers must comply with Subpart H, pertaining to hazardous materials, compressed gasses, and flammable/combustible liquids and with Subpart G, containing regulations for noise exposure and radiation.

The lab rule requires compliance with OR-OSHA's PELs and with the employer's written chemical hygiene plan. To provide more safeguards for lab employees, the standard provides guidelines for substances thought to be particularly hazardous. This includes select carcinogens, reproductive toxins, and some substances with acute toxicity.

Chemical-hygiene plan

The written plan is the core of the standard, affording flexibility in providing the type of worker protection appropriate for a specific workplace. This employer-developed plan specifies training and information required by the standard. The written plan also specifies work practices, standard operating procedures, control methods, use of protective equipment, medical examinations, and special precautions for work with particularly hazardous substances. Some employers may be able to meet certain requirements for the written plan with their existing safety and health plans. Employers must evaluate the effectiveness of their plans at least annually and update them as necessary. The program must be available to workers and their designated representatives.

As part of the written plan, employers must designate a chemical-hygiene officer and, if appropriate, set up a chemical-hygiene committee to give technical guidance in developing and implementing provisions of the plan. The chemical-hygiene officer may have a variety of duties such as monitoring processes, procuring chemicals, helping project directors upgrade facilities, and advising administrators on improved chemical hygiene policies and practices.

A discussion of components of chemical-hygiene plans follows.

Employee information and training

As part of the written plan, employers must create a training and information program for employees exposed to hazardous chemicals in the workplace. The program should be started at the time of a worker's initial assignment and prior to assignments involving new exposure situations. The program incorporates training and information requirements of the hazard communication standard, including training on physical and health hazards.

Information — *At a minimum, discussion topics must include the following:*

- The existence of the chemical hygiene plan and lab standard requirements
- The location and availability of the employer's chemical hygiene plan

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- PELs for regulated substances and recommended exposure limits for other hazardous chemicals for which no OR-OSHA standard applies
 - Signs and symptoms associated with exposure to hazardous chemicals used in the laboratory
 - The location and availability of known reference materials, including material safety data sheets (MSDSs) on the hazards, safe handling, storage, and disposal of hazardous chemicals in the workplace

Training — *The employee training plan must include these elements:*

- Components of the chemical-hygiene plan and how it is implemented in the workplace
- Hazards of chemicals in the work area and protective measures employees can take
- Specific procedures that provide worker protection, including engineering controls, work practices, and personal protective equipment
- Methods and observations such as continuous monitoring procedures, visual appearance, or smells by which workers detect the presence of hazardous chemicals

Medical examinations and consultation

The standard doesn't mandate medical surveillance for all lab workers; however, there are certain circumstances in which employers must provide any worker who works with hazardous chemicals an opportunity for medical attention.

Specifically, medical attention, including any follow-up examination and treatment recommended by the examining doctor, must be offered to employees who exhibit signs or experience symptoms associated with exposure to a hazardous chemical used in the lab, employees who are routinely exposed above the action level or, if there's no action level, above the PEL for an OR-OSHA-regulated substance for which there are exposure monitoring or medical surveillance requirements.

A medical consultation to determine the need for a medical examination must be offered to any worker present when a spill, leak, explosion, or other accident occurs that results in a potentially significant exposure to a hazardous chemical.

Employers must give the doctor specific information about the hazardous chemical, the conditions under which the exposure occurred, and the signs and symptoms of exposure experienced by the worker. Employers must get from the doctor a written opinion about follow-up examinations, related test results, medical conditions of the worker that might increase risk, and a statement that the employee was informed of the medical examination or consultation results.

Methods of control and personal protective equipment

As part of the chemical-hygiene plan, employers must develop criteria for determining and implementing control measures to reduce worker exposure to hazardous chemicals in labs. Traditionally, these measures have included engineering and work practice controls and personal protective equipment (PPE). Engineering controls include ventilation, fume hoods, glove boxes, and other exhaust systems. Work practice controls may include restricting eating and drinking areas and prohibiting mouth pipetting. Controls may also include working in a manner that minimizes exposure to hazardous chemicals and maximizes the effectiveness of engineering controls.

OR-OSHA policy dictates that engineering and work practice controls reduce employee exposure below PELs. Respiratory protection may be used only as an interim measure or when engineering or work practice controls aren't feasible. Respiratory equipment used must meet the requirements of OAR 437-002-1910.134, Subdivision I, which specifies factors such as selection, fit, use, and maintenance. If appropriate, other PPE that must be used in labs includes such items as safety glasses, whole body coverings, and gloves.

Safeguards for particularly hazardous substances

Employers must consider including additional protective measures in the chemical-hygiene plan for work involving select carcinogens, reproductive toxins, and substances with a high degree of acute toxicity. (See the standard itself for definitions of these.) Chemical-hygiene plans must incorporate the following:

- Establishing a designated area with appropriate signs warning of hazards associated with the substance
- Using a fume hood or equivalent containment device
- Procedures for decontaminating the designated area
- Procedures for the safe removal of contaminated waste

Hazard identification

Employers must ensure that labels on hazardous chemical containers aren't removed or defaced. Employers must also maintain MSDSs received with chemical shipments and ensure they're available to workers. MSDSs are documents providing specific information about chemicals, including chemical identities, physical properties, associated health hazards, reactivity data, control measures, and safe handling and use precautions.

Employers aren't required to prepare MSDSs, except when they prepare a chemical in their lab for use in another lab.

Record-keeping

For each worker, employers must establish and maintain an accurate record of exposure-monitoring results. The record must include all medical consultations, examinations, tests, and physician opinions. The records must be kept, transferred, and made available in accordance with OR-OSHA's rule governing access to employee exposure and medical records, OAR 437-002-1910.1020.

Under this regulation, exposure records and data analyses based on them must be kept for 30 years. Medical records must be kept for at least the duration of employment plus 30 years. Medical records of employees who have worked less than one year needn't be kept after employment, but employers must provide these records to the workers upon termination of employment.

Appendices

Appendices to the laboratory standard provide non-mandatory guidelines and recommendations for compliance. Appendix A is extracted from the 1981 National Research Council publication, *Prudent Practices for Handling Hazardous Chemicals*. Appendix B contains a variety of references intended to assist employers in developing a chemical hygiene plan. To review appendices A and B, see the standard.

Summary

Laboratory standard requirements provide employers and employees in labs with a flexible, viable alternative to traditional substance-specific regulation. Compliance with this regulation and implementing a chemical hygiene plan provides workers with the information and training necessary to improve workplace safety and health and to reduce the number of chemical-related injuries and illnesses in labs. Besides providing greater worker protection, the standard may significantly reduce the laboratory employer's compliance costs associated with individual substance-specific standards.

Related publications

Single free copies of the following items are available from OR-OSHA field offices or the OR-OSHA Resource Center, at the address shown on the preface page.

- OAR 437, Division 2/Z — Hazardous Chemicals in Laboratories
- OAR 437, Division 2/Z — Air Contaminants
- Developing Your Hazard Communication Program (440-2034)
- OR-OSHA Directory of Services (440-1941)
- Workplace Safety Committees (440-2341)

OR-OSHA Services

OR-OSHA offers a wide variety of safety and health services to employers and employees:

Consultative Services

- Offers no-cost on-site safety and health assistance to Oregon employers for help in recognizing and correcting safety and health problems in their workplaces.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, new business assistance, and the Safety and Health Achievement Recognition Program (SHARP).

Enforcement

- Offers pre-job conferences for mobile employers in industries such as logging and construction.
- Provides abatement assistance to employers who have received citations and provides compliance and technical assistance by phone.
- Inspects places of employment for occupational safety and health rule violations and investigates workplace safety and health complaints and accidents.

Standards & Technical Resources

- Develops, interprets, and provides technical advice on safety and health standards.
- Provides copies of all OR-OSHA occupational safety and health standards.
- Publishes booklets, pamphlets, and other materials to assist in the implementation of safety and health standards and programs.
- Operates a Resource Center containing books, topical files, technical periodicals, a video and film lending library, and more than 200 databases.

Public Education & Conferences

- Conducts conferences, seminars, workshops, and rule forums.
- Coordinates and provides technical training on topics like confined space, ergonomics, lockout/tagout, and excavations.
- Provides workshops covering basic safety and health program management, safety committees, accident investigation, and job safety analysis.
- Manages the Voluntary Protection Program and the Safety and Health Education and Training Grant Program, which awards grants to industrial and labor groups to develop occupational safety and health training materials for Oregon workers.

Questions?

For more information, call the OR-OSHA office nearest you. *(All phone numbers are voice and TTY.)*

Salem Central

350 Winter St. NE, Rm. 430
Salem, OR 97301-3882
(503) 378-3272
Toll free: (800) 922-2689
Fax: (503) 947-7461

Spanish-language phone:

1 (800) 843-8086

Web site: www.orosha.org

Portland

1750 NW Naito Parkway, Ste. 112
Portland, OR 97209-2533
(503) 229-5910
Consultation:
(503) 229-6193

Salem

DAS Bldg. 1st Floor
1225 Ferry St. SE, U110
Salem, OR 97301-4282
(503) 378-3274
Consultation:
(503) 373-7819

Eugene

1140 Willagillespie, Ste. 42
Eugene, OR 97401-2101
(541) 686-7562
Consultation:
(541) 686-7913

Bend

Red Oaks Square
1230 NE Third St., Ste. A-115
Bend, OR 97701-4374
(541) 388-6066
Consultation:
(541) 388-6068

Medford

1840 Barnett Rd., Ste. D
Medford, OR 97504-8250
(541) 776-6030
Consultation:
(541) 776-6016

Pendleton

721 SE Third St., Ste. 306
Pendleton, OR 97801-3056
(541) 276-9175
Consultation:
(541) 276-2353

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