Preventing Exposure to Hazardous Chemicals in Laboratories
Preface

This booklet provides an overview of the Oregon OSHA standard on exposure to hazardous chemicals in laboratories, but it is not a substitute for the safety and health rules OAR 437-002-1910.1450 and www.orosha.org/subjects/laboratory.html

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Background

Traditionally, Oregon OSHA’s approach to controlling occupational exposures to hazardous chemicals has been through the development of substance-specific standards (e.g., benzene). Where substance-specific standards do not exist, Oregon OSHA requires compliance with the permissible exposure limits (PELs), in Oregon Rules for Air Contaminants, 437-002-0382, Subdivision Z. Although Oregon OSHA has found that this approach works well in industrial settings, where workers may be exposed over prolonged periods to large quantities of hazardous chemicals, the use of such materials in labs 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. Laboratory workers may be routinely exposed to hazardous chemicals such as acetone, carbon monoxide, formaldehyde, hydrogen sulfide, mercury, nitric acid, and xylene. Many preventable accidents occur annually in labs, resulting in chemical-related injuries and illnesses ranging from skin and eye irritation to fatal pulmonary edema. Accordingly, Oregon 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 prudent work practices and effective personal 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, Oregon OSHA aims to reduce risks to Oregon workers in industrial, clinical, and academic 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. “Laboratory use” of hazardous chemicals occurs in facilities where relatively small quantities of hazardous chemicals are used on a non-production basis. “Laboratory scale” means work with substances in containers used for transfer, reactions, and other handling procedures that are designed to be easily manipulated by one person. This would not include workplaces that produce commercial quantities of materials. The standard covers all chemicals meeting the health-hazard definition in Oregon 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. However, it requires that employers address such physical hazards in training programs. OAR 437-002-1910.1450.

Work practices pertaining to compressed gasses, flammable/combustible liquids, and reactive/explosive materials, specified in Subpart H, and regulations for noise exposure and radiation, specified in Subpart G, apply to laboratories and other general industry employees.

The lab rule requires compliance with Oregon OSHA’s PELs and with the employer’s written chemical hygiene plan, assuring that exposures do not exceed permissible levels. This may involve personal monitoring initially and periodically if required by the relevant standard. 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 requirement for a written plan is the core of the standard; affording the employer 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.
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 alert workers to the hazards present in their work area at the time of a worker’s initial assignment and continue prior to assignments involving new exposure situations. The program incorporates the training and information requirements of the hazard communication standard, emphasizing physical and health hazards. OAR 437-002-1910.1200(h).

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

• The content, location, and availability of the laboratory standard.
• The location, content, and availability of the employer’s chemical hygiene plan.
• PELs for regulated substances and current recommended exposure limits for other hazardous chemicals for which no Oregon OSHA standard applies.
• Signs and symptoms associated with exposure to hazardous chemicals used in the laboratory.
• The location and availability of reference materials, including material safety data sheets (MSDSs) that address the hazards, safe handling, storage, and disposal of hazardous chemicals in the workplace.

Training — The employee training plan must include these elements:

• Details of the chemical-hygiene plan and how it is implemented in the workplace.
• Physical and health hazards of chemicals in the work area.
• Requirements for employer-implemented control measures that provide worker protection, including engineering controls, work practices, emergency procedures, and a selection of personal protective equipment.
• Methods and observations such as continuous monitoring devices, visual appearance, or smells by which workers detect the presence of hazardous chemicals, and the limits of these methods.
• Information about the proper use and methods to evaluate adequate performance of fume hoods and other protective equipment.
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 Oregon 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 a written opinion from the doctor 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 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.

Oregon OSHA policy requires 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. Other PPE that may be used in labs includes such items as safety glasses, whole body coverings, and appropriate 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 work 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 handling and 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 hazardous ingredients, physical and chemical properties, associated health hazards, reactivity data, control measures, emergency and first-aid procedures, and precautions for safe handling and use.

When employers develop chemical substances in their lab, they must:

• Provide appropriate training on the hazards (if known).
• Assume the substance is hazardous (if known).
• Provide an MSDS in compliance with OAR 437-002-1910.1200(g).
Recordkeeping

For each worker, employers must establish and maintain an accurate record of exposure-monitoring results. The record must include all medical consultations, examinations, tests, physician opinions, and MSDSs for chemicals used. The records must be kept, transferred, and made available in accordance with Oregon 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 suggested 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, including 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.
Related publications

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

- OAR 437-002-1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories
- OAR 437-002-0391 Oregon Rules for Carcinogens in Labs
- OAR 437-002-1910.1200 Hazard Communication
- OAR 437-002-0382 Oregon Rules for Air Contaminants
- OAR 437-002-1910.1020 Access to Employee Exposure and Medical Records
- Oregon OSHA Hazard Communication Publications
Oregon OSHA Services

Oregon 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 help Oregon employers recognize and correct workplace safety and health problems.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, assistance to new businesses, the Safety and Health Achievement Recognition Program (SHARP), and the Voluntary Protection Program (VPP).

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

Appeals, Informal Conferences
- Provides the opportunity for employers to hold informal meetings with Oregon OSHA on concerns about workplace safety and health.
- Discusses Oregon OSHA’s requirements and clarifies workplace safety or health violations.
- Discusses abatement dates and negotiates settlement agreements to resolve disputed citations.

Standards and Technical Resources
- Develops, interprets, and provides technical advice on safety and health standards.
- Provides copies of all Oregon 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 with a video lending library, books, technical periodicals, and consensus standards.
Public Education and Conferences

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

For more information, call the Oregon OSHA office nearest you.

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