

## Chemical Hygiene Plan Guidance

This guidance document summarizes the requirements of the Occupational Safety & Health Administration (OSHA) Lab Standard: 29 CFR 1910.1450 - Occupational Exposure to Hazardous Chemicals in Laboratories including interpretations of the Maine Department of Labor (DOL) as they apply to the University of Maine.

By agreement with the Maine Department of Labor, shops using small quantities of chemicals are allowed to use the Lab Standard as an alternative to the Hazard Communication Standard (at their discretion). All other work areas where hazardous chemicals are used must follow with the UMaine Hazard Communication (HAZCOM) Program.

The Lab Standard is written to allow the flexibility needed in a research setting where hazardous chemicals are used in small quantities. Each work area under the Lab Standard is required to develop a written Chemical Hygiene Plan (CHP) that addresses the unique hazards of that particular work area. Each individual working in the area must be trained on the area-specific CHP.

In order to use this approach the work area must meet all of the following conditions:

- Chemical manipulations are carried out on a laboratory scale (defined as relatively small quantities of hazardous chemicals are used on a non-production basis);
- Multiple chemical procedures or chemicals are used; and
- Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

As a “performance” standard, the goal of the Lab Standard is to protect employees using generally acceptable methods, which meet the following performance criteria:

- **Minimize chemical exposures** using written general guidelines and precautions for working with chemicals, which limit the potential for skin contact, inhalation or other potential exposure routes;
- **Avoid underestimation of risk** by recognizing the following:
  - For substances of no known hazard, exposure should be minimized;
  - Assume that a mixture will be more toxic than the most toxic component (*unless test results show otherwise*);
  - For substances that present special hazards, list the precautions that must be taken;
  - Treat substances of unknown toxicity as toxic (*this includes substances where little or no toxicity information is available*);
- **Provide adequate ventilation** by utilizing proper local exhaust (fume hood) and general (laboratory) ventilation;
- **Observe published Occupational Exposure Limits such as PELs and TLVs; and**
- **Develop and implement a written Chemical Hygiene Plan (CHP).**

### **The written Chemical Hygiene Plan (CHP) must:**

- Protect employees from health hazards associated with chemicals in the laboratory;
- Maintain exposures to hazardous chemicals below published Permissible Exposure Limits (PELs) and the limits specified in 29 CFR 1910.1450(c); and
- Be readily available to employees working in the area and available upon request to employee representatives and the Maine Department of Labor.

**Annual Review:** The CHP must be reviewed annually for effectiveness at meeting the performance objectives. Update the CHP as necessary and record the review date on the cover sheet or some other location within the document.

### **The CHP must incorporate the following eight (8) elements:**

*(Note: these elements may be arranged in any order to meet the laboratory's needs)*

#### **1. Chemical hygiene responsibilities**

Personnel must be designated as the work area Chemical Hygiene Officer (CHO) or officers, who are responsible for the implementation and maintenance of the laboratory's CHP (*e.g.*, the laboratory manager and/or principal investigator). This responsible person must be listed in the laboratory's CHP.

The CHO is a person who is qualified by training or experience to provide technical guidance in the development and implementation of the provisions of the CHP. Additionally, a Chemical Hygiene Committee may be used to support the CHO. It is the responsibility of the designated CHO to keep track of the chemicals (inventory), assess the potential hazard(s) posed to their workers, and to train the workers about these hazards.

In addition to the responsibilities of personnel within the laboratory, the following UMaine Departments provide support to laboratories in meeting the requirements of the Lab Standard:

- Safety and Environmental Management (SEM) maintains a staff member who serves as the University Chemical Hygiene Officer (CHO) who serves as the campus resource for Chemical Hygiene Plan development, periodically inspects laboratories (and other areas) that fall under the Lab Standard, annually certifies chemical fume hoods, and manages collection of required annual chemical inventories.
- Human Resources (HR) maintains records of medical testing and surveillance as required under the Lab Standard, coordinates baseline medical surveillance and manages workers' compensation claims.
- Facilities Management (FM) maintains systems and equipment to support the provisions of a CHP (*e.g.*, mechanical ventilation systems, repair of chemical fume hoods, eyewashes, safety showers, fire extinguishers, sprinklers, fire alarms, and emergency lighting). FM Custodial Staff provide housekeeping and non-hazardous trash removal.

## 2. *Employee information and training*

Initial and annual training of laboratory workers must be documented. Training must cover the elements of the CHP and any associated Standard Operating Procedures (SOPs). Training shall meet the HazCom training requirements of 1910. 1200 paragraph h.

This section of the laboratory's CHP must describe how employee training requirements are met and how required information such as the CHP, Safety Data Sheets (SDS), and other technical documents are made available to employees. The Principle Investigator (PI) and/or CHO are responsible for ensuring that employees are familiar with relevant documents, and receive training on all relevant work practices. The PI and the CHO are responsible for coordinating and documenting Chemical Hygiene Plan training.

- ***Documentation of Training Completed:*** Training and education provided to employees and others in the program must be documented with detailed records of training maintained by the laboratory and/or department. The training records must be kept for the length of employment.

## 3. *Requirements for prior approval of laboratory activities*

The CHP must describe the circumstances where a particular laboratory operation, procedure or activity requires prior approval from the PI, CHO, and/or laboratory manager before implementation. Some examples might include highly toxic materials, biological agents, or radioactive materials, etc.

## 4. *A requirement that fume hoods and other protective equipment are functioning properly and specific measures that will be taken to ensure proper and adequate performance of such equipment*

The CHP must include a description of specific measures in place, which a lab worker may utilize to ensure the proper and adequate performance of equipment. The CHP must list the procedure that laboratory workers will use to verify the proper function of a chemical fume hood before use and prudent operating practices for fume/vapor hood use (including, proper location of the sash, housekeeping within the hood, and body positioning and any limitations of the hood).

## 5. *Measures to reduce employee exposure to hazardous chemicals*

The CHP must outline the measures that will be implemented reduce exposures, which may include engineering controls, personal protective equipment (PPE), and good laboratory practices that will reduce employee exposure to hazardous chemicals. Many labs meet this requirement by including a section on "Safe Work Practices" which may include wearing proper eyewear, footwear, use of fume/vapor hoods while carrying out certain chemical manipulations, not eating or drinking in the laboratory, etc. These "Safe Work Practices" may be supplemented with additional "Standard Operating Procedures" (SOPs) for specific types of experiments. In most laboratories both general and specific practices/procedures are needed, with SOPs being specific to a particular procedure(s) or class of chemical

manipulation(s), and the “Safe Work Practices” section covering general lab practices while working within in the laboratory in general.

The UMaine Chemical Hygiene Officer (CHO) may be contacted to assist with the evaluation of exposure situations and review proper approaches for mitigating chemical hazards.

## **6. *Standard Operating Procedures (SOP) and/or Guidelines for safety and health.***

Standard Operating Procedures/Guidelines (SOP/SOG) should be developed addressing safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals. These SOPs/SOGs must include hazard information for the chemical and/or chemical class (flammable, corrosive, reactive, pyrophoric, etc.), recognition of signs and symptoms of overexposure to hazardous chemicals and/or chemical classes, recognition of routes of entry of hazardous chemicals and/or chemical classes into the body, and protective measures to be utilized to prevent exposures. How a particular laboratory meets this requirement may vary. Grouping of chemical classes and chemical hazards is permitted and may be presented in various ways. Alternatively, commonly utilized lab procedures may have separate SOPs written for them. SOPs should include information on proper chemical storage (including storage of compatible materials) general housekeeping guidelines, waste disposal requirements, chemical spill cleanup limits, and actions to take in an emergency (eg., if an exposure occurs or a spill exceeds safe cleanup limits). Often, safety requirements can be integrated into existing laboratory protocols/research methodologies. *Note: If a procedure involves the use of an OSHA defined “Particularly Hazardous Substance (PHS)” additional employee protection and handling will be required and in most cases a separate protocol will be needed (see below).*

## **7. *Special precautions for work with Particularly Hazardous Substances (PHS)***

The CHP must include provisions for additional employee protection for work with Particularly Hazardous Substances (PHS). These include “select carcinogens,” reproductive toxins and substances that have a high degree of acute toxicity. A specific SOP should be in place identifying the following:

- Designation, description, and location of the designated area where the work with the PHS is carried out;
- The containment devices and or controls for work with the PHS (e.g., fume hood, glove box, etc.);
- Procedures and steps for the safe removal and handling of waste contaminated with the PHS; and,
- Decontamination procedures for spaces, tools, glassware, reusable protective clothing, etc. that comes in contact with the PHS.

## **8. *Medical consultation and medical examinations***

The CHP must include a notice for an employee’s ability to seek medical attention if they develop signs or symptoms of overexposure, monitoring indicates exposure above action levels, or exposure during a spill or leak. If any of these events occurs the affected employee will be provided the opportunity for a medical consultation with a physician without cost to

the employee. The statement should also include documents/information that will need to be forwarded to a physician in cases where one of the listed events occurred. Examples include, the identity of the hazardous chemical(s) to which the employee may have been exposed, description of the conditions under which the exposure occurred, and a description of the signs and symptoms of exposure that the employee is experiencing, if any.

All employees working under a CHP should be informed, and it must be described in the CHP that:

- Monitoring results and/or written physician's statements will be provided to the employee by UMaine HR;
- Results of medical examinations or consultation must be considered confidential information; and,
- The written physician's opinion will not reveal specific findings of diagnoses unrelated to occupational exposure.

### **Further information on preparing a CHP**

A sample CHP is available on the SEM website that covers the requirements of the lab standard. The regulation is available on the web at [www.osha.gov](http://www.osha.gov) or by contacting SEM.

In addition to the requirements of the lab standard there are several requirements that a laboratory must follow in conjunction with their chemical hygiene program. Those are:

### **Maintain an Inventory of Hazardous Chemicals – The Chemical Inventory**

Complete, accurate, and up-to-date chemical inventories are essential to identify and track the use of chemicals in a workplace. Before the process of evaluating a chemical's hazards can begin it must be known which ones are present and what documentation must be acquired.

- Requirement: Perform an annual inventory of chemicals on-hand. In addition, maintain an up-to-date listing of chemicals on-hand and ensure that the inventory is readily available and accessible for all employees working around hazardous chemicals.
- Requirement: Establish a procedure or process for ensuring that new chemicals are promptly and accurately added to the workplace inventory.

### **Maintain Safety Data Sheets**

Safety Data Sheets (SDS) are the most convenient, accurate, and widely accepted method for communicating the hazards of a chemical to an employee. SDS are a printed description of the chemical's properties and are produced by the manufacturer of the chemical. These documents provide the supervisor and employees with the necessary information to use chemicals safely and how to deal with chemical spills and releases.

- Requirement: Each work area supervisor must maintain a file of SDS for chemicals used within their area. Also, a supervisor must ensure that the file is accessible to all employees in the work area during their work hours. Supervisors of personnel involved in field work or at a work site away from the main campus must ensure that SDS are readily available to employees.

- For products currently in use, SDS must be obtained immediately.
- For new products the SDS must be obtained, and appropriate training provided prior to the use of the product by any employee, and it is the supervisor's responsibility to ensure this training is conducted.
- SDSs that are received from shipments shall be maintained and accessible to employees.

### **Other Requirements:**

- Labels on incoming chemicals are not removed or defaced.
- Hazardous chemicals must be separated from eating and drinking areas in order to prevent possible ingestion of toxic materials.
  - No employee or student will be allowed to consume or store food or beverages in any area exposed to hazardous chemicals;
  - Food and beverages must never be stored in a refrigerator or freezer where hazardous chemicals, biohazards, or other toxic materials are stored;
  - No food or beverage should ever be placed in a microwave oven or other heating device that is used to conduct experimental processes; and
  - Label areas exposed to hazardous chemicals with signage indicating that eating and drinking is prohibited in the work area.
- Refrigerators, freezers, and microwaves used for the storage or processing of hazardous chemicals must be labeled with wording that positively identifies that the equipment's use is restricted. Words such as "CHEMICAL STORAGE ONLY", or "CHEMICAL PROCESSING ONLY", are appropriate.
- For clarity, foods that are used in experiments should be labeled "Not For Human Consumption" or other appropriate wording.

### **Definitions**

**Action Level** means a concentration designated for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

**Chemical** means any element, chemical compound or mixture of elements and/or compounds.

**Chemical Hygiene Plan (CHP)** is written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that meets the requirements of OSHA 29 CFR 1910.1450.

**Hazardous Chemical** is defined as a chemical that meets the definition of a health hazard class (see Appendix A of 29 CFR 1910.1200); a physical hazard class (see Appendix B of 29 CFR 1910.1200); or it is a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified (see the definitions for these terms at 29 CFR 1910.1200(c)). It also includes, any chemical substance with a National Fire Protection Agency (NFPA)/Hazardous Materials Information System (HMIS) health, flammability, or reactivity rating of 2 or higher.



**Health Hazard** means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term “health hazard” includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, or agents which act on the hematopoietic system and agents which damage the lungs, skin, eyes, or mucous membranes.

**Laboratory** under The Lab Standard is defined as an area where small quantities of hazardous chemicals (see Laboratory Scale) are used on a non-production basis.

**Laboratory Scale:** Work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person.

**Particularly Hazardous Substances (PHS):** Select carcinogens, reproductive toxins (mutagens, teratogens, etc.), and chemicals with acute toxicity.

**Reproductive toxins:** Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

**Shop** under the Lab Standard (by agreement between Maine DOL and UMaine) is area where small quantities of chemicals are used on a non-production basis.

**Select carcinogen:** Any substance, which meets one of the following criteria:

- It is regulated by OSHA as a carcinogen; or,
- It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or,
- It is listed under Group 1 ("carcinogenic to humans") by the International Agency for research on Cancer Monographs (IARC) (latest editions); or,
- It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
  - After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m (3);
  - After repeated skin application of less than 300 (mg/kg of body weight) per week; or,
  - After oral dosages of less than 50 mg/kg of body weight per day.

**Physical Hazard** means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

**Additional Information:** Questions can be addressed to:

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