



UA LITTLE ROCK



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ROCK**

Chemical Hygiene Plan

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PURPOSE

OSHA standard [29 CFR 1910.1450](#), the Occupational Exposure to Hazardous Chemicals in Laboratories standard, requires a written Chemical Hygiene Plan. The implementation of this Chemical Hygiene Plan provides employees with the information and training necessary to improve workplace safety and health and to prevent chemical-related injuries and illnesses in our laboratories. This plan will act as a supplement to the UA Little Rock Hazard Communication Program and provide more detailed information regarding the methods and practices necessary from the hazards associated with using chemicals at UA Little Rock.

RESPONSIBILITIES

UA Little Rock's Chemical Hygiene Officer (CHO) has been assigned the responsibility for implementing the University's Chemical Hygiene Plan (CHP). The CHO and Environmental Health and Safety Committee will review the CHP annually and update it as necessary. It is the responsibility of Primary Investigators (PIs), lab managers, instructors, and supervisors to:

1. Perform hazard analyses.
2. Develop Safe Operating Procedures (SOPs).
3. Complete, provide, and document training as identified by the hazard analyses.
4. Comply with routine inspections, and make corrections of violations.

SAFE OPERATING PROCEDURES

Uniformity of Practice

Uniformity of practice in the laboratory ensures safety and efficiency. SOPs create a standard of practice that is to be followed by ALL Faculty, Staff, and Students working in the laboratory, to ensure. The intent of SOPs is to assure that work practices and procedures are in place to protect employees and students from chemical hazards.

The following guidelines represent the MINIMUM safe practices for the handling of hazardous chemicals at UA Little Rock. Each laboratory MUST develop procedures specific to their situations. In ALL situations, individual faculty and staff supervisors are responsible for enforcing safety measures in the laboratory. A template for the development of lab-specific SOPs and examples of SOPs for common laboratory practices are found in the [Template for Laboratory Specific SOP](#).

Safe Operating Procedures for All Labs

1. *Accidents & Spills:*
 - a. *Eye Contact:* Promptly flush eyes with water for at least 15 minutes, and seek medical attention.
 - b. *Ingestion:* Follow Safety Data Sheet (SDS) recommendations, and seek medical attention.
 - c. *Skin Contact:* Promptly flush the affected area with water for at least 15 minutes, and remove any contaminated clothing. Follow MSDS recommendations, and seek medical attention.
 - d. *Clean Up:* Promptly clean up spills using appropriate protective apparel and equipment, and proper disposal procedures.
2. *Avoidance of "Routine" Exposure:* Develop and encourage safe habits. Avoid unnecessary exposure to chemicals. Do not smell or taste chemicals. Vent any apparatus

- (vacuum pumps, distillation columns, etc.) into local exhaust devices that might discharge toxic chemicals. Inspect gloves and test glove boxes before use. Do not allow release of toxic substances in cold rooms and warm rooms, since these have re-circulated atmospheres.
3. *Choice of Chemicals:* Use only those chemicals for which the quality of the available ventilation system is appropriate. Whenever possible, use the least toxic chemical options.
 4. *Eating, Smoking, Etc.:* Eating, drinking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present is prohibited. Wash hands before conducting these activities elsewhere. Do not store food or beverages in storage areas or refrigerators used for laboratory operations. Do not consume food or drink using glassware or utensils that have been used for laboratory operations.
 5. *Equipment & Glassware:* Use equipment only for its designed purpose. Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware. Shield or wrap glassware to contain chemicals and fragments in procedures that have the potential for implosion or explosion.
 6. *Exiting:* Thoroughly wash areas of exposed skin before leaving the laboratory. do not wear lab coats out of the lab. Maintain them inside the affected work area.
 7. *Horseplay:* The lab is a fun and interesting place for most. It is important to realize that joking around can lead to accidents. Do not engage in horseplay when in the lab.
 8. *Mouth Suction:* Do not use mouth suction for pipetting or starting a siphon.
 9. *Personal Apparel:* Confine long hair and loose clothing to prevent contact with chemicals. Wear fully enclosed shoes at all times in the laboratory. Wear long pants or a long skirt to cover legs. Wear long sleeves or a lab coat to cover arms. When possible, choose fabrics such as cotton and wool that are not easily ignited.
 10. *Personal Housekeeping:* Keep the work area clean and uncluttered with chemicals and equipment properly labeled and stored; clean up the work area on completion of an operation or at the end of each day.
 11. *Personal Protection:* Assure that all persons, including visitors where chemicals are stored or handled, wear appropriate eye protection. Wear appropriate gloves when the potential for contact with toxic materials exists; inspect the gloves before each use, wash them before removal, and replace them periodically. Use appropriate respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls. Inspect respirators before use. Use additional protective and emergency apparel and equipment as appropriate. Remove laboratory coats immediately on significant contamination. Remove gloves before exiting lab or when changing tasks (i.e., computer use).
 12. *Planning:* Seek information and advice about hazards, plan appropriate protective procedures and waste disposal, and plan positioning of equipment before beginning any new operation.
 13. *Unattended Operations:* Leave lights on, place an appropriate sign on the door, and provide for containment of toxic substances in the event of failure of a utility service (such as cooling water) to an unattended operation.
 14. *Use of Fume Hood:* Use the fume hood for operations which might result in release of toxic chemical vapors or dust. As a rule of thumb, use a fume hood or other local ventilation device when working with any appreciably volatile substance with a Threshold Limit Value (TLV) of less than 50 parts per million (ppm). Confirm adequate hood performance before use; keep hood closed at all times except when adjustments within the hood are being made; minimize storage of materials in hoods and do not allow anything to block vents or air flow. Leave the hood "on" when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is "off".
 15. *Use of Vacuum (House System):* Most labs are equipped with a house-vacuum system. This is a shared system in which all connections lead to a central collection tank that is

exhausted to the outside. Some building vacuum systems are designed for chemical/biological usage and others are not. Any chemical or biological materials requiring vacuum processes must be filtered or trapped using an appropriate means of collecting hazardous vapors or particulate matter prior to entering the vacuum system. Appropriate methods can include cold-traps, kill-traps, aspirators or individual vacuum pumps exhausted through a chemical fume hood. Principal Investigators are required to develop appropriate SOPs to ensure safe vacuum use. The Environmental Health and Safety Committee reviews and approves all SOPs.

16. *Vigilance*: Be alert to unsafe conditions and see that they are corrected when detected.
17. *Waste Disposal*: Assure that each laboratory includes plans and training for waste disposal.
18. *Working Alone*: Avoid working alone in a building; **DO NOT** work alone in a laboratory if the procedures being conducted are hazardous.

EMPLOYER CRITERIA FOR CONTROL MEASURES

Criteria have been developed for determining and implementing control measures to reduce employee exposure to hazardous chemicals in the laboratory. These include the following:

1. The degree of toxicity of the substances to be used
2. The exposure potential of the chemical procedures to be performed and the capacity of the engineering controls
3. Administrative/work practices or protective equipment to control exposure
4. Engineering controls: general ventilation, fume hoods, glove boxes, and other exhausts systems
5. Work practice: controls such as restricting eating and drinking areas, prohibiting mouth pipetting, and performing work in such a manner as to minimize exposure to hazardous chemicals and to maximize the effectiveness of engineering controls
6. Personal protective equipment (PPE): the type of PPE available and how it should be used

OSHA policy dictates that engineering and work practice controls be used to reduce employee exposure below the PEL (permissible exposure limit).

RESPIRATORY PROTECTION

Respiratory protection is to be used only as an interim measure or when engineering or work practice controls are not feasible. Use of respiratory equipment must comply with the requirements of [Title 29 CFR 1910.134](#), which specifies factors such as selection, medical clearance, fit, use, and maintenance. Respirator criteria will be based on the degree of toxicity of the substances to be used, the exposure potential of the chemical procedures to be performed and the capacity of the engineering controls, administrative practices, or protective equipment to control employee exposure. Additional requirements must be included in the CHP where appropriate to protect employees working with particularly hazardous chemicals, such as select carcinogens, teratogens, and chemicals exhibiting a high degree of acute toxicity. Each employee **MUST** be cleared by a physician to wear a respirator. The clearance consists of a Pulmonary Function Test (PFT) and chest X-Ray. It is recommended that students also be medically cleared to wear a respirator.

Control Measures:

1. To be determined by specific use and chemical involved. These must be cleared by the CHO.
2. OSHA policy dictates that engineering and work practice controls be used to reduce employee exposure below the PEL (permissible exposure limit).

3. Respiratory protection is to be used only as an interim measure or when engineering or work practice controls are not feasible

FUME HOODS AND OTHER PROTECTIVE EQUIPMENT

Fume hoods and other protective equipment must function properly. Each laboratory is responsible for developing an appropriate SOP. The following specific measures should be taken to ensure proper and adequate performance of such equipment:

1. *Hoods:* A laboratory hood with 2.5 linear feet of hood space per person is required when handling hazardous chemicals.
2. If a fume hood does not have a continuous monitoring device to verify proper performance, then substances of unknown toxicity must be avoided or other types of local ventilation provided.
3. *Other Local Ventilation Devices:* Ventilated storage cabinets, canopy hoods, snorkels, etc. are provided as needed by each department. Each canopy hood or snorkel should have a separate exhaust duct. Exceptions to this requirement must be cleared by the EHS Committee.
4. *Modifications:* Alteration of the ventilation system requires thorough testing to verify that worker protection from airborne toxic substances is adequate.
5. *Performance:* A rate of 4-12 room air changes/hour is adequate ventilation if local exhaust systems, such as hoods, are used as the primary method of control.
6. *Quality:* General airflow should not be turbulent and should be relatively uniform throughout the laboratory, with no high velocity or static areas; airflow into and within the hood should not be excessively turbulent; hood face velocity should be 80-120 linear feet per minute (lfm) at any point with an average face velocity of 100 lfm.
7. *Evaluation:* Quality and quantity of ventilation must be evaluated upon installation, monitored, and reevaluated whenever a change in local ventilation devices is made. EHS will certify that fume hoods meet flow requirements at least annually or as needed.

EMPLOYEE INFORMATION AND TRAINING

UA Little Rock provides all persons affected by [29 CFR 1910.1450](#) with information regarding how to protect themselves when working with hazardous chemicals. This section outlines the training and information in effect at this workplace. Training will be provided to new employees upon hire, if working with a new hazard, and at least annually. The CHO will provide training. Each department will contact the CHO for training dates. The training shall include the following:

1. The components of the Chemical Hygiene Plan and how it is implemented in the workplace
2. The hazards of the chemicals in the work area and protective measures required
3. Specific procedures put into effect by the employer to provide protection, including engineering controls, work practices and PPE
4. Methods and observations (e.g., continuous monitoring procedures, visual appearance, or odors) that workers can use to detect the presence of hazardous chemicals.

APPROVAL OF HAZARDOUS OPERATIONS

Laboratory activities involving particularly hazardous materials and/or equipment or any chemical or activity that will require specific engineering controls (glove boxes, specialized ventilation systems, storage systems, etc.) will require prior approval from the CHO and department head. Examples of particularly hazardous materials are listed in the [Employee Protection Provisions](#) section of this document and in [Examples of Hazardous Chemicals](#).

MEDICAL CONSULTATIONS AND EXAMINATIONS

Availability

All employees who work with hazardous chemicals will have an opportunity to receive medical attention, including any follow-up examinations that an examining physician determines necessary, under the following circumstances:

1. Whenever an employee develops symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory
2. Where exposure monitoring reveals an exposure level above the action level or PEL for a regulated substance for which there are exposure monitoring and medical surveillance requirements
3. Whenever a spill, leak or other incident result in the likelihood of a hazardous exposure.

Arranging for Exams

All medical examinations and consultations shall be coordinated through UA Little Rock Health Services. In the event of a life-threatening illness or injury, dial 911, and request an ambulance.

DESIGNATION OF RESPONSIBLE PERSONNEL

The *Chemical Hygiene Officer* is responsible for:

The CHO is qualified by training or experience to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan required by [OSHA 1910.1450](#) Laboratory Standard. The CHO may assign areas of responsibility to departments, department safety and health committees, supervisors, and other individuals, as necessary, to implement and carry out the provisions of the CHP.

The *Departments* are responsible for:

1. Implementing and maintaining the CHP in their respective work areas
2. Providing means and motivations to allow all supervisors and employees to comply with occupational safety regulations

For more efficient implementation of the CHP, department heads should select one or more individuals to serve as coordinators. Department safety and health committees can also assume these responsibilities.

Laboratory Supervisors & Principal Investigators are responsible for:

1. Workers know and follow the chemical hygiene rules.
2. Any necessary Hazard Assessments have been conducted and a written hazard assessment certification has been posted in each work area (see Appendix A).
3. PPE and other protective equipment is available and in working order.
4. Appropriate information and training have been provided, including all PPE training.
5. Facilities and training are at all times appropriate and adequate.
6. Requests for information or action, from internal safety committees or EHS, are satisfied promptly.
7. Providing access regular, formal chemical hygiene inspections of their facilities and equipment
8. Knowing the current legal and University requirements concerning regulated substances
9. Customizing their work area's Chemical Hygiene Plan in any way necessary to provide for Safe Operating Procedures, Emergency Procedures, and circumstances and/or procedures and/or operations requiring prior approval of the supervisor, if the hazards of their employees' laboratory work are not sufficiently addressed by the non-customized CHP

In customizing the work area Chemical Hygiene Plan, it is only permissible for the supervisor to add and clarify the requirements, Safe operating procedures, restrictions, and necessary protocols but not to omit or relax any which are given in the manual.

Laboratory Workers are responsible for:

1. Planning and conducting each operation in accordance with University chemical hygiene procedures and for developing good personal chemical hygiene habits
2. While students are not covered under the provisions of the OSHA Laboratory Standard, students should be made aware of chemical health and safety hazards in classroom situations, and should be provided with information and equipment to protect themselves from those hazards. Departments should provide student training at the beginning of each course in which hazardous chemicals are used. Specific safety instructions should be provided at the beginning of each class period.

EMPLOYEE PROTECTION PROVISIONS

Special provisions must be in place to protect employees working with select carcinogens, teratogens, or substances having a high degree of acute toxicity. These provisions include designated work areas, special containment devices in those work areas, decontamination procedures, waste removal procedures, and safe operating procedures. Work with particularly hazardous materials requires approval from the CHO and department head before work may begin.

1. *Allergens & Sensitizers*
 - a. Examples: diazomethane, isocyanates, bichromates
 - b. Wear suitable gloves to prevent hand contact with allergens or substances of unknown allergenic activity.
2. *Embryotoxins*
 - a. Examples: organomercurials, lead compounds, formamide
 - b. Women of childbearing age must only handle these substances in a hood where satisfactory performance has been confirmed and use appropriate protective apparel (especially gloves) to prevent skin contact. Review uses annually or whenever a procedural change is made.
3. *Chemicals of Moderate, Chronic, or Highly Acute Toxicity*: Acutely toxic substances produce adverse effects when exposed individuals receive only small doses of that substance for a short period of time (hydrogen fluoride, for example). OSHA defines substances that have a high degree of acute toxicity as those "which may be fatal or cause damage to target organs as the results of a single exposure or exposures of short duration." For many chemicals, the health effects in humans may not have been tested. Frequently, only basic animal testing has been done, such as the LD50 or the LC50. The LD50 is the Lethal Dose that kills 50 percent of the animals when the chemical is given orally or applied to the skin. The LC50 is the Lethal Concentration in air that kills 50 percent of the animals.
 - a. *Access*: Use and store these substances only in areas of restricted access. Assure that the controlled area is conspicuously marked with warning and restricted access signs and that all containers of these substances are appropriately labeled.
 - b. *Location*: Always use a hood or other containment device for procedures that can result in generation of aerosols or vapors; trap released vapors to prevent their discharge with the hood exhaust. Use a wet mop or a vacuum cleaner equipped with a HEPA filter instead of dry sweeping if the toxic substance is a dry powder.
 - c. *PPE*: Avoid skin contact by use of gloves, long sleeves, and other protective apparel as appropriate. Wash hands and arms immediately after working with these materials.
 - d. *Records*: Maintain records of the amounts of these materials on hand, amounts used, and the names of the workers involved.

- e. *Medical Surveillance*: If using toxicologically significant quantities on a regular basis (three times per week or more), consult a qualified physician concerning regular medical surveillance.
- f. *Spills*: Assure that contingency plans, equipment, and materials to minimize exposures of people and property in case of accident are available. Assure that at least two people are present at all times if a compound in use is highly toxic or of unknown toxicity. Store containers of these substances below eye level, in chemically resistant trays or other secondary containment, and in a limited access area. Perform work with these substances on spill trays. If a spill occurs outside the fume hood, evacuate the area; assure that cleanup personnel wear suitable protective apparel and equipment.
- g. *Housekeeping*: Thoroughly decontaminate or incinerate contaminated clothing or shoes. Store contaminated materials and waste in closed, suitably labeled, impervious containers. Protect vacuum pumps against contamination by scrubbers or HEPA filters and vent them into the hood. Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the hood before removing them from the controlled area. Decontaminate the controlled area before normal work is resumed.
- h. *Glove Boxes*: For a negative pressure glove box, ventilation rate must be at least two volume changes/hour and pressure at least 0.5 inches of water. For a positive pressure glove box, thoroughly check for leaks before each use. In either case, trap the exit gases or filter them through a HEPA filter and then release them into an operating fume hood.

RECORD KEEPING

Exposure Assessment

The Chemical Hygiene Officer will establish and maintain an accurate record of any measurements taken to monitor exposures. Records, including those from monitoring provided by other qualified services, will be managed in accordance with OSHA standard [29 CFR 1910.1020](#), Access to Employee Exposure and Medical Records.

Medical Consultation and Examination

Results of medical consultations and examinations will be kept by the UA Little Rock Health Services Department for a length of time specified by the appropriate medical records standard. This time will be at least the term of employment plus 30 years as required by OSHA.

Training

The PI/Supervisor or designee must keep a copy of the outline of the topics covered in Lab-Specific Chemical Hygiene Training. The names of lab workers who have completed the lab-specific training and read the Chemical Hygiene Plan must be submitted to the EHS Office. These training records are then entered into the EHS Assistant database of central training records database. Web-based training records are automatically entered into the database when a course is completed. Training records are kept for at least three years after an employee or student leaves the University.

Fume Hood Monitoring

Data on annual fume hood monitoring will be kept by the EHS Office. Fume hood monitoring data are considered maintenance records, and as such, the full data will be kept for one year and summary data for five years.

Inspection Reports

Laboratory inspection records will be maintained by the EHS Office.

Laboratory-Specific Policies & Procedures

Safe operating procedures (SOPs) developed in addition to the SOPs contained in this Chemical Hygiene Plan, copies must be maintained in the laboratory accessible to laboratory personnel.

ANNUAL HYGIENE PLAN REVIEW

The CHO and EHS Committee will review UA Little Rock's Chemical Hygiene Plan annually or as needed.

RESOURCES

OSHA 29 CFR 1910.1450: [Occupational exposure to hazardous chemicals in laboratories](#)
Office of Research Services–National Institutes of Health: [Lab Worker's Resources](#)
American Chemical Society: [Chemical Health and Safety Resources](#)
Division on Earth and Life Studies: [Board on Chemical Sciences and Technology](#)