

# University of Arizona **Lohse Biogeochemistry Laboratory**

## ***CHEMICAL HYGIENE PLAN & GENERAL LABORATORY SAFETY***

### **Purpose**

The Chemical Hygiene Plan (CHP) is a lab specific document that has been prepared to describe the conduct, policies, and procedures for managing the use, storage, and disposal of hazardous materials within the Lohse Biogeochemistry Laboratory (LBL). Also discussed is general information concerning other safety issues. Please review the [University of Arizona Laboratory Chemical Safety Manual](http://risk.arizona.edu/healthandsafety/labchemicalsafety/manual/index.shtml) (<http://risk.arizona.edu/healthandsafety/labchemicalsafety/manual/index.shtml>) as it has been designed to meet the requirements set by the federal Occupational Health and Safety Administration (OSHA) Standard, Occupational Exposure to Hazardous Chemicals in Laboratories (29 CFR 1910.1450). In addition, the [University of Arizona's Exposure Control Plan for Bloodborne Pathogens](http://risk.arizona.edu/healthandsafety/bloodbornepathogens.shtml) (<http://risk.arizona.edu/healthandsafety/bloodbornepathogens.shtml>) is designed to protect the health of employees determined to have potential exposure to human blood and other potentially infectious materials as mandated by OSHA. Recommended safety standards have been established to ensure a safe work environment. This CHP discusses strategies designed to protect employees from the health hazards presented by hazardous materials used in the LBL. Hazard identification, record keeping, and user training and information are among the items addressed.

### **Scope and Application**

OSHA has established permissible exposure limits for hazardous chemicals that must not be exceeded within the laboratory. Since UA has academic/research and clinical laboratories that use hazardous materials, resources and personnel are available to provide an effective program to prevent, reduce, and control hazards where necessary.

### **Lab Contacts**

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### **Lab Director's Responsibilities (K. Lohse)**

- ❑ Ensure that all lab personnel are aware of the dangers involved in the handling and use of hazardous materials.
- ❑ Communicate hazards of bloodborne pathogens in laboratory to personnel through the use of labels, signs, and information and training intended to provide adequate warning to eliminate or minimize exposure.
- ❑ Ensure that users receive appropriate Lab Chemical Safety and Fire Safety Training through Risk Management (RM)).
- ❑ Maintain users' training records.
- ❑ Notify RM if there is reason to believe that a user's exposure level to a hazardous chemical routinely exceeds the action level (or in the absence of an action level, the permissible exposure limit).
- ❑ Ensure that all material safety data sheets (MSDS) are available for users in the work area.
- ❑ Provide training in the use and comprehension of MSDS sheets.
- ❑ Forward copies of any non-standard MSDS sheets to RM.
- ❑ Inform any visitor, contractor, or vendor of the hazards of the materials used in the area they are working in or visiting.
- ❑ Provide proper Personal Protective Equipment (PPE) for lab users and visitors as necessary.
- ❑ Ensure that all lab equipment is operating properly.

### **Users' Responsibilities**

- ❑ Receive appropriate Lab Chemical Safety and Fire Safety Training through RM.
- ❑ Understand the hazards involved with any hazardous material they use.
- ❑ Follow all laboratory safety policies.
- ❑ Be familiar with the location and use of Personal Protective Equipment.
- ❑ Be familiar with the location and the contents of the work area's MSDS sheets.
- ❑ Be familiar with emergency systems and equipment and emergency evacuation procedures.
- ❑ Cooperate in maintaining a complete chemical inventory and MSDS collection.
- ❑ Consult the Lab Director if unsure of the safe handling, use, storage, or disposal of hazardous materials.

## **MSDS Sheets**

All MSDS sheets are stored in red binders within each lab. All new chemicals coming into the lab must have an accompanying MSDS sheet. They can be obtained directly from the chemical manufacturer/supplier.

Alternatively, websites such as that of the Vermont Safety Information Resources (<http://hazard.com/msds/>) are a good source.

## **Chemical Inventory**

Located within the red MSDS binder stored in each lab. Included with each chemical name is the quantity stored, the manufacturer, and the storage location in the work area. A chemical that is not currently stocked in the lab (not listed in inventory) must receive prior approval by Lab Manager before it is brought into the lab. Once approved, it must be entered on the Chemical Inventory and an MSDS must be filed.

## **Personal Protective Equipment (PPE)**

Personal protective equipment (PPE) required to be used at all times while working in the laboratory includes, but may not necessarily be limited to:

- Safety glasses, goggles, or face shield (which to use depends on circumstances)
- Laboratory coats, aprons, or other suitable clothing (shirt and long pants)
- Shoes (**no open-toed shoes** e.g., sandals, flip-flops)

PPE required to be used at all times when handling particularly hazardous chemicals, reproductive toxins, carcinogens, and sensitizers in the laboratory includes, but is not limited to:

- Appropriate gloves
- Approved respirators in the absence of fume hoods

If you are unsure which PPE is necessary for the work you are performing, consult the MSDS and/or Lab Manager.

## **Designated Areas**

### *Safe Area*

BSE Rm 307 has been set up to provide a safe area away from laboratory hazards. Since this is separated from the laboratory work area, there is no need to enforce the same rules that are expected within the laboratory.

Food and beverages are allowed in this designated area and the equipment described above (Personal Protective Equipment) is not needed. *Outside of these designated areas, everyone is expected to follow the appropriate safety guidelines and wear all necessary PPE.*

## **Hazardous Waste**

Laboratory operations that produce waste chemicals are considered to produce hazardous waste regulated by The Arizona Department of Environmental Quality (ADEQ). The waste must be classified and tagged for proper disposal. All laboratory personnel who produce hazardous waste are required to manage their waste according to the [guidelines](http://risk.arizona.edu/environmentalcompliance/chemicalwastedisposal.shtml) (<http://risk.arizona.edu/environmentalcompliance/chemicalwastedisposal.shtml>) established by EH&S. State and federal law require the management of hazardous waste and failure to manage waste properly may result in criminal prosecution. See Lab Director for proper collection, storage, identification, and disposal procedures as these will vary depending on the waste type.

Glass waste, sharps, and biohazard waste are stored and handled separately from chemical waste.

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## **Highly Dangerous Materials**

The following is a list of highly dangerous materials that will need **prior approval** (see below) by the lab manager before they can be used:

Biohazards (Bloodborne Pathogen training required)

acetylene (extremely flammable)

methyl-ethyl ketone (extremely flammable)

mercuric chloride (extremely poisonous)

mercuric thiocyanate (highly toxic)

phenol (extremely corrosive and poisonous)

sodium arsenate (extremely poisonous)

sodium nitroprusside, a.k.a. sodium nitroferricyanide <sup>4</sup> (extremely poisonous)

## **Prior Approval**

This is a systematic process that involves the identification of hazards, management of risk, and evaluation of pollution prevention / waste minimization. A [Laboratory Activity Prior Approval form](#) is required in certain cases.

## **Ventilation and Fume Hoods**

Daily fume hood monitoring must be conducted by laboratory personnel. Daily monitoring is accomplished by noting, before working in a hood, that air flow is evident. Users must also check hoods to ensure that exhaust slots, pressure alarms, and other features are set properly and are in good working order. Operators must report all problems with fume hoods to the Laboratory Director immediately.

- Face velocity must be greater than 80 feet per minute (FPM) and less than 120 FPM.
- The fume hood should be kept neat and not overloaded. Long-term storage of bottles requiring ventilation should be in cabinet under hood, **NOT IN HOOD**. Only store bottles in hood while in use.
- The fume hood sash must be opened to 18 inches when in use and closed to 1 inch when not in use.

## **Employee Information and Training**

Arizona Department of Occupational Safety and Health (ADOSH) has mandated that all laboratory workers attend a laboratory training session. It is therefore mandatory that all laboratory staff and students working in any laboratory at UA attend the **Laboratory Chemical Safety** training session and the **Fire Safety and Prevention** training class presented by RM. Lab personnel are strongly encouraged to attend refresher courses annually. The **Laboratory Chemical Safety** training session presents the university's chemical hygiene plan for academic and research laboratories using hazardous chemicals. Material Safety Data Sheets (MSDS), labelling, chemical inventory, general lab safety, personal protective equipment (PPE), and reporting accidents are some of the topics presented. The Laboratory Director must give further training relative to the specific hazardous materials that are being used in each specific laboratory

## **Labeling**

All chemicals and sample storage vessels in the laboratory **must** be clearly labelled. This includes non-hazardous as well as hazardous materials. The label must include the name of the container's contents in English using IUPAC chemical names (i.e.: sodium chloride). Also included on the label must be the date, name of contact person, concentration, and any applicable hazard warning. If a chemical arrives from the manufacturer, an appropriate label must be attached that has the name and address of the chemical manufacturer or distributor. If it is not practical to label a container, appropriate information may be placed on a sheet near the container(s). Chemicals that are time sensitive or produce peroxides must be dated indicating when storage began.

## **Cold Room and General Sample Storage**

- All samples must be stored in an organized manner (within a box, etc.) and must be clearly labeled with the date, owner's name, and telephone number.
- Storage facilities are provided for users only while samples are being processed. Long term storage is not available in the Environmental Facility. Users must remove samples when all analyses have been completed. Unclaimed samples will be disposed of by Lab Director 30 days after notification.
- Refrigerated samples are to be stored on metal shelving units. Room temp samples are to be stored in cabinets or on shelves, NOT on bench top.

## **Emergency Procedures**

All lab personnel must understand the following emergency procedures:

- Evacuations due to fires or chemical spills.
- Location of exits and exit routes
- Location and use of emergency equipment (showers, eyewashes, fire extinguisher, fire alarm).
- Location of First Aid Station.

Details [on locations and evacuation procedures are being developed.](#)

All personnel must check-in /out with Lab Manager or other lab staff before entering lab and when leaving for the day. This will ensure you are accounted for in case of an Emergency Evacuation.

## **Accident Reporting**

Supervisors must submit accident reports to the Dean, Safety Committee, and to RM for any accident or near-miss situations. All employees will be free from any reprisals for reporting accidents.

## **Audits**

Safety committees and supervisors must conduct regular periodic audits of the work areas to evaluate work practices and identify potential hazards. Audits are required whenever new substances, processes, procedures, or equipment presenting additional considerations for health and safety are introduced into the work area. Audit reports must include dates, who conducted the inspections, unsafe conditions found, and corrective actions taken.

## **General Lab Safety**

Within the lab, there are a number of hazardous chemicals and gases that are stored. Lab Certification placards are located outside the entrance to each lab. These provide information about the hazards found in each lab, emergency contacts, and location of MSDS collection and electrical circuit box. Please review the MSDS for the chemicals to be used and follow all recommended safety precautions. Solvents, acids, and caustic chemicals are stored in specially designated locations. Always return the supply container to the storage area after using.

## **Common Sense**

The following are a few examples of common sense and courtesy that must be followed in order to maintain a good work environment:

- When dispensing or weighing chemicals, please be careful and clean up any mess that you make.
- If you must work after normal lab hours, please try to have someone with you. You should never work alone in any laboratory.
- Take off gloves when using a computer or answering the phone.
- Food or drink is allowed only in the designated safe area.
- If you see anyone doing something that is unsafe or not following safety rules, please make him/her aware of it. Contact Tom Colella if the problem persists.
- Smoking is not allowed in any building at UA

## **General Safety Information About Specific Classes of Compounds:**

### Organic Compounds

- Most are flammable because they have relatively low specific heats and ignition temperatures.
- Water should not be used to extinguish a fire since most organic compounds are insoluble in water. Use a type ABC fire extinguisher.
- They tend to react easily with oxidizing agents (ex: potassium dichromate, ammonium nitrate).

### Phenol

In concentrated form, phenol causes severe burns. It can be absorbed through the skin even in dilute form. If phenol is allowed to remain on the skin for any length of time, gangrene is likely to be induced. Phenol is also a poison.

### Cyanide Compounds

Certain cyanide salts poison both through inhalation of the gas or by its absorption through the skin. When mixed with acids, hydrogen cyanide gas is formed. This gas is extremely toxic.

### Sulfide Compounds

When mixed with acids, hydrogen sulfide gas is formed. This gas is extremely toxic.

### Mercury Compounds

Extremely poisonous! Symptoms of mercury poisoning range from mild gastritis to severe pain and vomiting

### Ammonium Nitrate

This is a strong oxidizing agent and can be explosive when mixed with organic material

### Arsenic Compounds

These compounds are extremely poisonous. A lethal dose of arsenic trioxide is 0.1 grams.

**LBL**  
**CHP & General Lab Safety Agreement**

I have read and understand all aspects of the Goldwater Environmental Lab Chemical Hygiene Plan & General laboratory Safety document and I hereby agree to abide by those safety policies and guidelines set forth while working in the LBL facility.

Name (print) \_\_\_\_\_

Date \_\_\_\_\_

Signature \_\_\_\_\_