

# Earlham

COLLEGE

Chemical Hygiene Plan  
Revised August 2020

## **Table of Contents**

Introduction.....	4
A. Purpose and Application.....	4
B. Administration of Laboratory Standard (29 CFR 1910.1450 (e)(3)(vii)....	4
C. Chemical Hygiene Plan.....	6
Part I: Standard Operating Procedures for Working with Chemicals.....	7
A. Chemical Inventory and Information.....	7
B. Basic Rules and Procedures.....	7
I. Chemical Procurement, Distribution, and Storage.....	8
II. Environmental Monitoring.....	8
III. Housekeeping, Maintenance, and Inspections.....	8
IV. Personal Protective Apparel, Equipment, and Use.....	9
V. Medical Program.....	10
VI. Records.....	10
VII. Signs and Labels.....	10
VIII. Globally Harmonized System of Classification and Labeling of Chemicals (GHS).....	11
IX. Information and Training Program.....	11
X. Spills and Accidents.....	11
XI. Waste Disposal.....	12
Part II: Personal Rules and Procedures for Working with Chemicals.....	13
A. Chemical Accidents and Spills.....	13
B. Avoidance of Routine Exposure.....	13
C. Choice of Chemicals.....	13
D. Eating, Smoking, etc.....	13
E. Equipment and Glassware.....	14
F. Laboratory Behavior.....	14
G. Personal Apparel.....	14
H. Personal Housekeeping.....	14
I. Personal Protection.....	14
J. Planning Chemical Procedures.....	15
K. Unattended Operations.....	15

L. Prior Approval.....	15
M. Use of Fume Hood.....	16
N. Use of Respirators.....	16
O. Waste Disposal.....	16
Appendix A: Emergency Response Plan.....	18
Evacuation Procedures for the Science Complex.....	18
Health Emergency.....	19
Fire/Explosion Emergency.....	20
Chemical Spill/Air Quality Threat.....	21
Tornado.....	21
Bomb Threat.....	22
Flooding.....	22
Other Safety Measures.....	22
Appendix B: Exposure Assessments, Medical Consultation, and Examinations...	23
Exposure Assessment.....	23
Medical Consultation and Examination.....	25
Appendix C: Records and Recordkeeping.....	27

## **Introduction**

### *Legal Basis*

The Earlham College Chemical Hygiene Plan (CHP) meets the requirements of the Occupational Health and Safety Administration's Laboratory standard, 29 CFR 1910.1450, Subpart Z. The Laboratory Standard is known as 29 CFR 1910.1450 or Occupational Exposure to Hazardous Chemicals in Laboratories. It requires employers who maintain small laboratories with many hazardous chemicals in small quantities to appoint a Chemical Hygiene Officer and to prepare a Chemical Hygiene Plan. It also requires employees to comply with their employer's CHP. Where the Laboratory Standard applies, it supersedes the Hazard Communication Standard (HCS), 29 CFR 1910.1200, also known as the Right to Understand or the Haz-Com Act. The effective implementation date of the Laboratory Standard was January 31, 1991.

The Hazard Communication Standard applies to areas of the college that use small amounts of only a few selected chemicals.

OSHA defines a hazardous chemical as "any chemical which is classified as health hazard or simple asphyxiant in accordance with the Hazard Communication Standard."

### **A) Purpose and Application**

The purpose of the Laboratory Standard is to protect laboratory employees from harm due to chemical use while they are working in a laboratory. In addition to academic and administrative employees who spend a significant amount of their time working or teaching in a laboratory, the Laboratory Standard also includes as "laboratory employees" those office, custodial, and maintenance persons who, as part of their duties, regularly spend a significant amount of their working time within a laboratory environment. The Laboratory Standard also covers students paid to work as laboratory assistants by Earlham College. The College also has a moral obligation to protect all other laboratory students and to train them to protect themselves from harm due to hazardous chemicals.

### **B) Administration of Laboratory Standard (29 CFR 1910.1450(e)(3)(vii))**

The responsibility for Chemical Hygiene and Safety rests at all levels. The Director of Hazardous Materials Management at Earlham College is designated as the Chemical Hygiene Officer (CHO). The CHO acts as the representative of the President of the College who has the ultimate responsibility for chemical safety. The CHO also reports to the Academic Dean in regard to academic matters and the Chemical Hygiene Plan. The laboratory supervisors, supervising faculty and laboratory workers are also responsible for chemical safety.

The chair of each designated department or a department appointee, along with the Chemical Hygiene Officer will form the chemical safety committee.

As of July 1, 2019, the following persons are administrators of the Earlham College Chemical Hygiene Plan:

Anne Houtman, President  
Rebecca Thomas, Academic Dean  
Kayla Campbell, Chemical Hygiene Officer  
Lori Watson, Department supervisors

The following departments have been designated as laboratories at Earlham College and are therefore regulated by the Laboratory Standard 29 CFR 1910.1450:

Art and Art History  
Biology  
Chemistry  
Geology  
Physics

The Hazard Communication Standard, 29 CFR 1910.1200, regulates the following departments:

Athletics, Wellness, Physical Education, and Weber Pool  
Drama  
Health Services  
Joseph Moore Museum  
Maintenance  
Wilderness Programs

### ***Providing a Safe Chemical Environment***

Earlham College laboratories will make every effort to prevent hazardous air quality concentrations that might exceed the Permissible Exposure Limits (PEL), Threshold Limit Values (TLV), or action levels for a particular chemical. Chemical monitoring will be implemented if exposure values above limits for a given chemical are suspected. Results will be reported to any affected employees.

### ***College Responsibilities (29 CFR 1910.1450(e)(3)(vii))***

The college is responsible for ensuring a safe chemical environment by:

- Providing adequate ventilation and fume hoods
- Providing employee training
- Providing safe storage, disposal, and handling of chemicals
- Ensuring prudent laboratory practices are in place

- Providing an inventory of all chemicals
- Ensuring proper labels on all chemicals
- Providing Safety Data Sheets (SDS) for each chemical purchased since May 1990 and making these readily available
- Providing safety showers and eyewashes
- Providing personal protective equipment (PPE)
- Providing and making available a Chemical Hygiene Plan that fulfills the requirements of 29 CFR 1910.1450
- Providing medical consultation with a licensed physician in the case of a suspected chemical exposure. The college will provide necessary information to the physician, request a written report from the physician and prepare a written report on the incident. The employee must receive a report within 15 days of the incident

### ***Employee Responsibilities***

Each employee who works with chemicals is responsible for:

- Knowing the general content of the Chemical Hygiene Plan
- Knowing the location of the printed CHP and SDS
- Following the chemical safety procedures outlined in the CHP
- Developing good personal chemical hygiene habits

### ***Chemical Hygiene Plan Availability (29 CFR 1910.1450(e)(2))***

The Chemical Hygiene Plan (CHP) will be distributed to all designated departments and copies will be available to any laboratory employee or interested party.

The effective date of this plan is January 31, 1991.

Revised August 2020

### **C) Chemical Hygiene Plan**

“The Chemical Hygiene Plan shall include each of the following elements and shall indicate specific measure that the employer will take to ensure laboratory employee protection.” (29 CFR 1910.1450 (e)(3))

- i. Basic Rules and Standard Operating Procedures
- ii. Employer’s criteria for determining and implementing control measures
- iii. Maintenance of proper functioning fume hoods and other protective equipment
- iv. Employee information and training
- v. Criteria for prior approval and specified activities or procedures
- vi. Provisions for medical consultation and exam
- vii. Designation of persons responsible for implementation of the CHP
- viii. Provide employee protection from particularly hazardous substances, highly toxic substances, select carcinogens, and reproductive toxins

## **Part I: Standard Operating Procedure for Working with Chemicals**

Much of the following Chemical Hygiene Program is derived from Appendix A of 29 CFR 1910.1450, which is based on recommendations found in Prudent Practices for Handling Hazardous Chemicals in the Laboratory, National Research Council, 1981.

- A. Chemical Inventory and Information
- B. Basic Rules and Procedures
  - XII. Chemical Procurement, Distribution, and Storage
  - XIII. Environmental Monitoring
  - XIV. Housekeeping, Maintenance, and Inspections
  - XV. Personal Protective Apparel, Equipment, and Use
  - XVI. Medical Program
  - XVII. Records
  - XVIII. Signs and Labels
  - XIX. Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
  - XX. Information and Training Program
  - XXI. Spills and Accidents
  - XXII. Waste Disposal

### A. Chemical Inventory and Information

Each Department will prepare and maintain an inventory of all chemicals found in the department. The inventory will be on file in the department and in the files of the CHO. The inventory will be updated continually.

Safety Data Sheets (SDS) will be available for all chemicals received since May 1990. Other information describing the hazards of department chemicals will be available to users.

MSDSOnline is used as the main campus inventory system and SDS database. The inventory link is readily available on all Chemistry laboratory computers. QR codes are posted, that can be scanned with a cellphone, and that will pull up the campus SDS searchable database. A current inventory can also be found at: <https://msdsmanagement.msdsonline.com/?ID=F13D59C6-ECAB-4D6E-8F95-53E3754846C3>



Earlham College

Scan to access an SDS

## B. Basic Rules and Procedures

Each department will establish its own rules for working in its laboratories. In general, the following guidelines should be followed

- a. Avoid working alone in a building.
- b. If laboratory procedures are hazardous, ensure that two or more persons are present in the laboratory.
- c. If it is necessary to work in the laboratory while the building is locked, Earlham College Security should be notified of the presence and departure of the individual.
- d. A telephone and posted emergency numbers should be available and accessible for emergency use.
- e. Be alert to unsafe conditions and see that they are corrected when detected.

### I. Chemical Procurement, Distribution, and Storage

- a. *Procurement.* Before a substance is received, the department should know information on proper handling, storage, and disposal. No container will be accepted without an adequate identifying label. Upon arrival, packages containing chemicals will be inspected for integrity before accepting them from delivery company. Any package with obvious chemical leakage will be refused.
- b. *Stockrooms/storerooms.* Toxic substances should be segregated in a well-identified area with local exhaust ventilation. Chemicals that are highly toxic or other chemicals in containers greater than 1 liter that have been opened should be in an unbreakable secondary container. Stored chemicals should be examined annually for replacement, deterioration, and container integrity.
- c. *Distribution.* When chemicals are moved from one place to another, they should be placed in an outside container, bucket, or on a cart.
- d. *Laboratory Storage.* Storage on bench tops and in hoods is not advised. Exposure of chemicals to heat or direct sunlight should be avoided. Periodic inventories of chemicals in laboratories should be conducted with unneeded items returned to the stockroom or discarded.
- e. *Reactivity/Chemical Compatibility.* Stored chemicals should be separated according to reactivity and chemical compatibility. Flammable chemicals should be stored in a flammable safety cabinet.
- f. *Chemical Quantities.* Chemical amounts used should be as small as practical.
- g. *Chemical Preparation.* The chemical preparation area should be as far as possible from the chemical storage area.

### II. Environmental Monitoring



Regular instrumental monitoring of airborne concentrations is not usually justified or practical in laboratories but may be appropriate when testing or redesigning hoods or other ventilation devices.

Instrumental monitoring of airborne concentrations in laboratories should be conducted if highly toxic substances are in use or if high concentrations of airborne substances are suspected.

### III. Housekeeping, Maintenance, and Inspections

- a. Floors should be wet mopped weekly or more often if needed.
- b. Formal housekeeping and chemical hygiene inspections should be held at the beginning of each term using the department checklist. Informal inspections should be continual.
- c. Eyewash fountains should be tested at least monthly and recorded appropriately. The water should run for one minute.
- d. Safety showers should be tested at least once each term and recorded appropriately. The water should run for one minute.
- e. Other safety equipment should be tested at least once each term.
- f. Fire extinguishers will be tested and recharged when necessary once each year.
- g. Access to exits, emergency equipment, and utility controls should always be open. Stairways and hallways must be open for quick emergency exit.

### IV. Personal Protective Apparel, Equipment, and Use

Each laboratory should have access to proper equipment, appropriate personal protective apparatus, and clothing appropriate for substances being handled. These should include:

- a. Fire extinguisher(s)
- b. Fire alarm and telephone available for emergency use at all times
- c. Drench type hose or safety shower
- d. Eyewash fountain
- e. Fume hood(s)
- f. Flammables cabinet
- g. Protective apparel compatible with the required degree of protection needed:
  - *Chemistry*: Safety goggles or glasses, nitrile or latex gloves, movable shields, aprons, lab coats, heat and cold resistant gloves
  - *Biology*: Safety goggles or glasses, UV protection, latex gloves, heat and cold resistant gloves, lab coats, face shields
  - *Geology*: Safety goggles or glasses, hearing protection

- *Physics*: Safety goggles or glasses, nitrile or latex gloves
- *Museum*: Safety goggles or glasses, latex gloves, hearing protection in wood shop
- *Art*: Fabric, nitrile and latex gloves, regular and UV goggles, dust/mist mask
- *Drama*: goggles, hearing protection, nitrile or latex gloves, dust/mist mask, respirator, face shield
- *Maintenance/Housekeeping*: Safety glasses, rubber and leather gloves, back supports, ear plugs, face shields, leather aprons
- *Health Services*: safety glasses, gloves, gowns, foot covers, surgical caps, masks
- *Wellness (swimming pool)*: latex gloves, dust/mist masks, tyvek disposable suit
- *Wilderness (fuel)*: Latex and rubber gloves, flammables cabinet

## **V. Medical Program (see Appendix B)**

Earlham College shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention under the following circumstances:

- a. When an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory.
- b. Where exposure monitoring reveals an exposure level routinely above the action level.
- c. When an event takes place in the work area such as a spill, leak, explosion, or other occurrence.
- d. When employee has direct skin or eye contact with a hazardous chemical.

## **VI. Records (see Appendix C)**

Records will be kept in accordance with 29 CFR 1910.20 (j2)

- a. A written account of accidents and near accidents will be prepared and given to the Chemical Hygiene officer for the permanent records. These accounts should be considered as a means of preventing hazards and future accidents.
- b. The CHP records should document the fact that the facilities and precautions taken before the incident were consistent with current safety knowledge and regulations.
- c. Detailed inventory, personnel, and usage records should be kept for any highly toxic substance used.
- d. Medical records concerning any chemical incident shall be kept for thirty years in accordance with state and federal regulations.

- e. An accurate record of any measurements taken to monitor any employee exposures will be maintained for each employee involved.

## **VII. Signs and Labels**

Signage will be used to enable users to locate the information needed for safe behavior. Prominent signs and labels should be posted in the department as follows:

- a. Emergency telephone numbers appropriate to the department must be posted by the emergency phone
- b. All containers of chemicals or hazardous materials or wastes shall be labeled to specify contents.
- c. Safety showers, eyewash stations, safety and first aid equipment, exits, and other safety equipment shall be labeled. Laboratory refrigerators shall be labeled to prohibit food storage with chemicals.
- d. Warnings should be posted where areas or equipment present unusual hazards.

## **VIII. Globally Harmonized System of Classification and Labeling of Chemicals (GHS)**

On May 25, 2012, OSHA's Hazard Communication Standard (HCS) was revised to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

With this adoption, the MSDS was updated to a Safety Data Sheet (SDS) which was formatted to contain 16 standardized sections. Earlham provides the newly formatted, manufacturer supplies, Safety Data Sheets when available. If the new SDS is not available the MSDS will remain on file in the main binders and MSDSOnline until the updated SDS is available.

The adoption of GHS also brought new label requirements as well as hazard pictograms (see Figures 1 and 2).



- c. Custodial and maintenance personnel should be informed of chemical hazards in their working areas.
- d. Employees should be informed of the content, requirements, and availability of the Laboratory Standard and Chemical Hygiene Plan.
- e. Employees should be informed of hazardous chemicals used in Earlham College's Laboratories and directed to SDS sheets and other reference material describing the chemical and its hazards.
- f. Ongoing employee training shall include:
  - The methods and observations that may be used to detect the presence of release of a hazardous chemical.
  - The hazards associated with the chemicals used in Earlham College laboratories.
  - Specific procedures to follow when hazards are present such as appropriate work practices and personal protective equipment to be used in case of emergency procedures.

## **X. Spills and Accidents**

An emergency response plan is detailed in Appendix A. The plan includes response to spills and accidents and should be communicated to all personnel. In case of such an emergency:

- a. Earlham College will provide an alarm system in each building that can be manually activated to alert all persons to any emergency in the area. Faculty and staff will be trained in proper emergency exit procedures as stated in Appendix A.
- b. Each department will develop a spill control policy to include prevention, containment, cleanup, and reporting. See Appendix A.
- c. All accidents or near accidents should be analyzed with results extended to anyone who might be able to prevent such an accident in the future.

## **XI. Waste Disposal**

The purpose of this program is to assure that minimal harm to people, other organisms, and the environment will result from the disposal of waste laboratory chemicals and products.

- a. Waste Management Policy
  - i. Chemical waste, biological waste, "sharps," and all other laboratory wastes will be managed in an environmentally safe manner.
  - ii. The chemical user is responsible for planning and carrying out the proper method of disposal.
  - iii. Wastes will be segregated according to the method of disposal.

- iv. Chemicals destined for off-campus shipment by hazardous waste hauler or by recycling will be moved to the chemical storage room in Stanley Hall.
- v. Bio-contaminated materials will be autoclaved then disposed of in the regular trash.
- vi. The laboratory supervisors will manage chemicals requiring chemical conversion with direction from the CHO.
- vii. "Sharps" will be decontaminated, if necessary, collected in a separate, safe, container, then carefully packaged before disposed of in the regular trash.
- viii. Potentially infectious products to humans or contaminated materials will be autoclaved before disposal in regular trash.

b. Chemical Disposal Policy

- i. Any unlabeled containers of chemicals or chemical solutions should be removed from the lab or storage area promptly. The material should be analyzed and labeled or discarded as an unknown hazardous chemical.
- ii. The laboratory research worker is responsible for disposing of all his/her chemicals before leaving the project of institution.
- iii. Earlham College toxic and hazardous wastes will be removed by a professional chemical waste handler before the quantity reaches the threshold limit of 1000 Kg or 2200 pounds.
- iv. Disposal by recycling or chemical conversion should be practiced whenever possible.
- v. Most water-soluble compounds may be disposed of through the sanitary sewer as long as they do not contain heavy metals. The CHO will provide departments with appropriate guidelines for sanitary sewer or "down the drain" disposal.
- vi. The CHO will plan with the Richmond Sanitary District chemist the best available means of off-campus disposal for non-toxic chemicals and laboratory materials.

**Part II: Personal Rules and Procedures for Working with Chemicals**

All workers with chemicals should follow the procedures outlined in the above and following sections of the Chemical Hygiene Plan.

**A. Chemical Accidents and Spills**

- I. *Eye contact:* Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention. Report to supervisor.
- II. *Ingestion:* Consult the SDS. Encourage the victim to drink large amounts of water unless instructions advise otherwise. Report to supervisor. Seek medical attention immediately.

- III. *Skin contact:* Promptly flush affected areas with water for fifteen minutes or until symptoms disappear. Remove any contaminated clothing. Consult SDS. If symptoms persist after washing, seek medical attention. Report to supervisor.
- IV. *Cleanup:* Promptly clean up spills, using appropriate protective apparel and equipment and proper disposal. If volatile aerosols are produced in a spill, close off the area and wait for volatiles to subside. Evacuate the area/building if necessary based on the toxicity of the vapors generated.

#### **B. Avoidance of Routine Exposures**

- I. Develop safe-working habits. Prevent unnecessary exposure by any route.
- II. Do not smell or taste chemicals. Vent toxic fumes using exhaust hood or other exhaust device.
- III. Test gloves for leaks before use.
- IV. Do not release toxic chemicals into any closed space such as a cold room or environmental chambers.
- V. Keep exposed skin to a minimum. Use personal protective equipment.

#### **C. Choice of Chemicals**

- I. Use only those chemicals for which the quality of ventilation system is appropriate.

#### **D. Eating, Smoking, Etc.**

- I. Do not eat, drink, smoke, chew gum, or apply cosmetics in any laboratory or stockroom area or areas where laboratory chemicals are present.
- II. Do not store food or beverages in any laboratory area, stockroom area, or laboratory refrigerator, or any other areas where chemicals are present.
- III. Wash hands before leaving the laboratory. After working with chemicals, wash hands before eating, smoking, etc.
- IV. Do not use glassware, utensils, or appliances for food or beverages that have been used with chemicals.

#### **E. Equipment and Glassware**

- I. Handle and store laboratory glassware with care to avoid damage.
- II. Do not use damaged glassware.
- III. Use extra care with Dewar flasks and other evacuated glass apparatus. Wrap or shield to contain chemicals and broken glass should an implosion occur.

#### **F. Laboratory Behavior**

- I. There should be absolutely no practical joking, horseplay, or other behavior that might confuse, startle, or distract another worker.
- II. Do not use mouth suction for pipetting or starting a siphon.
- III. Wash areas of exposed skin before leaving the laboratory.

#### **G. Personal Apparel**

- I. Confine long hair, loose clothing, beards, or any other items that might interfere with or be caught in laboratory equipment or procedures.
- II. Shoes must be worn at all times in the laboratory. Open-top shoes can be penetrated by chemicals and should not be worn in the lab.

#### **H. Personal Housekeeping**

- I. Keep work area clean and uncluttered.
- II. Properly label and store chemicals and equipment.
- III. Clean up the work area on completion of an operation or at the end of each day.

#### **I. Personal Protection**

- I. All persons must wear appropriate eye protection when hazardous chemicals are handled.
- II. Wear chemical resistant gloves when the potential for contact with hazardous materials exist. Inspect gloves before each use. Wash gloves before removal. Replace glove periodically.
- III. It is strongly recommended that contact lenses not be worn in the laboratory because of the additional hazard of trapping solvents or caustics between the lens and the eye. If contacts are worn, safety glasses with side shields must be worn.
- IV. Laboratory coats or aprons should be worn when procedure includes hazardous chemicals or materials. Remove laboratory coat immediately upon significant contamination.
- V. Use heat or cold protective gloves when handling hot or cold materials.

#### **J. Planning Chemical Procedures**

- I. Seek information and advice about hazards of chemical use planned.
- II. Plan appropriate protective procedures before beginning.
- III. Plan positioning of equipment for maximum safety.
- IV. Plan to use the minimum amount of chemical possible.

#### **K. Unattended Operations**



Unattended operations that present no substantial risk are permitted. If failure of a component in an unattended operation would lead to a substantial risk, then automatic safety features must be in a place or operation supervised.

- I. Leave lights on and place an appropriate sign on the door (Department may restrict this option).

#### **L. Prior Approval**

Employee must obtain prior approval from their immediate supervisor to continue with a laboratory procedure whenever:

- I. A new laboratory procedure or test is to be carried out.
- II. It is likely that toxic limit concentrations could be exceeded or that other harm is likely.
- III. There is a change in a procedure or test, even if it is very similar to prior practices. "Change in procedure or test" means:
  - a. A 10% or greater increase or decrease in the amount of one or more chemicals used.
  - b. A substitution or deletion of any of the chemicals in the procedure.
  - c. Any change in other conditions under which the procedure is to be conducted.
- IV. There is a failure of any of the equipment used in the process, especially of safeguards such as fume hoods or clamped apparatus.
- V. There are unexpected results that lead to potentially hazardous conditions.
- VI. Members of the laboratory staff become ill, suspect that they or others have been exposed, or otherwise suspect a failure of any safeguards.

#### **M. Use of Fume Hoods**

- I. Use hood for operations that might result in the release of toxic chemical vapors or dust.
- II. As a rule of thumb, use hood or other local ventilation device when working with any appreciable volatile substance with a TLV (threshold limit value) of less than 50 ppm.
- III. Keep hood door at level of maximum airflow at all times.
- IV. Keep materials stored in hoods to minimum. Do not allow materials to block vents or airflow.
- V. Leave airflow "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."
- VI. Confirm hood performance meets OSHA standard of 100 linear feet per minute (fpm) rate of airflow.
- VII. Hood air velocity should be checked during monthly safety check.

- VIII. Work with toxic chemicals that have low air concentration limits, or that have high vapor pressures, should always be done in a hood.
- IX. Apparatus inside the hood should be placed on the floor of the hood at least six inches away from the front edge.
- X. Personnel should be aware of the steps to be taken in the event of a power failure or other hood failure.
- XI. Hood vent ducts and fans should be inspected at frequent intervals to be certain they are both clean and clear of obstructions.

## **N. Use of Respirators**

No college department will allow chemical processes to cause exposures above the Permissible Exposure Limits (PEL). Therefore, respirators will not be available for routine use. In case of an accident or spill causing exposure above the TLV (threshold limit value), the laboratory will be evacuated and closed until exposure values decrease or specially trained personnel with respirator training will be called to respond to the emergency.

## **O. Waste Disposal**

- I. The plan for each laboratory operation including student experiments should include plans and training for possible hazards, waste minimization, and waste disposal.
- II. Waste receptacles should be properly labeled according to the type of waste generated. A label indicating each type of waste contained must be on the receptacle.
- III. Sewer disposal of chemicals will be limited to dilute acids and bases, water-soluble alcohol, small quantities of water-soluble organic and any soluble substance which will not interfere with the biological activity of the waste water treatment plant. No heavy metal solutions may be disposed of through the sewer. Contact the CHO for recommendations on sewer disposal.
- IV. Sewer disposal will not be allowed for highly toxic, malodorous, or lachrymatory substances, flammable substances, concentrated acids or bases, heavy metal solutions, or any substance which would interfere with the biological activity of the wastewater treatment plant.

## **Appendix A: Emergency Response Plan**

### Science Division Emergency Response Plan

This plan is to provide direction to Earlham College faculty, staff, and students in case of a fire, explosion, chemical spill, tornado, flood or any other emergency situation.

### Warning Alarm

A warning alarm is provided in each building for the purpose of notifying occupants of an emergency situation and need for evacuation.

### Evacuation Procedures for the Science Complex

The following evacuation procedure should be followed when warning alarm rings.

- **MOVE OUT** of the building immediately through the nearest exit at the sound of the alarm
- **SHUT ALL DOORS**
- **MEET** at designated location:

<b>Building</b>	<b>Preferred Assembly Location</b>
Center for Science & Technology (CST)	West sidewalk (adjacent Landrum Bolling Center)
Dennis Hall	South Sidewalk (adjacent Joseph Moore Museum)
Noyes Hall	West sidewalk (adjacent Tyler Hall)
Stanley Hall	West sidewalk (adjacent Landrum Bolling Center)

- **ACCOUNT FOR** all persons known to be in the buildings
- **REPORT** missing persons, if any, to Campus Public Safety Department
- **REMAIN** at designated location until released by Campus Public Safety Department
- **RE-ENTER** building when permission is given by Campus Public Safety Department

## Health Emergency

Faculty, staff, or authorized person should:

1. Assess the situation
  2. Make appropriate decisions
  3. Supervise response until released by Campus Public Safety Department
- Minor Injuries
    - Render first aid
    - Report to Safety Officer and maintain record in Chemical Hygiene Officer's files
  - Major Injuries
    - Remain calm
    - Call Campus Public Safety Department (x1400) for immediate assistance
    - Notify of nature and location of emergency, give name, telephone number, building, floor number, and place to meet emergency vehicle.
    - Report condition of victim
    - Do what is necessary to protect life until help arrives
    - Meet or send someone to meet emergency crew
    - Document emergency and response
    - Evaluate response
    - Report to Chemical Hygiene Officer and maintain record in Safety Officer's file.

## Fire/Explosion Emergency

Faculty, staff, or authorized person should:

1. Assess situation
2. Make appropriate decisions
3. Supervise response until released by Campus Public Safety Department

### ▪ **Small Fires**

- Extinguish by using a portable extinguisher on base of fire from position accessible to an exit. Never attempt to fight fire alone.
- Turn off any nearby apparatus and remove combustible materials from the area
- Immediately after the fire is extinguished, report to the Campus Public Safety Department and the Chemical Hygiene Officer.
- Request recharging of extinguishers.
- Maintain record in the Chemical Hygiene Officer's files.

### ▪ **Large Fires**

- Call Campus Public Safety Department (x1400) immediately
- Notify of exact location and where someone will meet emergency personnel.
- Pull building fire alarm.
- **EVACUATE BUILDING** including all secretarial and maintenance staff.
- Use nearest stairwell exits for evacuation—never the elevator.
- Turn off nearby apparatus, if safely possible.
- Isolate area closing doors and hoods, if safely possible
- Check remote areas, if safely possible
- Render first aid to any persons possible
- Meet at predetermined location to assess completeness of evacuation.
- Meet emergency personnel and notify them of special hazards.
- Document emergency and response
- Evaluate response
- Maintain record in Chemical Hygiene Officer's files.

## Chemical Spill/Air Quality Threat

Faculty, staff, or authorized person should:

1. Assess situation
2. Make appropriate decisions
3. Supervise response until released by Campus Public Safety Department

The following general procedures should be followed by laboratory personnel to clean up **Minor spills**:

1. Notify people in the immediate area.
2. Evacuate all nonessential personnel from the spill area.
3. Attend to exposed or contaminated personnel by following the first aid Procedures
4. If spilled material is flammable, turn off ignition and heat sources, if possible.
5. Avoid breathing vapors of the spilled material and, if necessary, use a respirator (see [Respirators](#)).
6. Maintain or establish exhaust ventilation, if safe to do so, by opening the sash on the fume hood. Do not open doors or windows.
7. Wear appropriate personal protective equipment (PPE) such as gloves, lab coats, goggles and aprons to prevent exposure and minimize contamination.
8. Obtain a laboratory spill kit.
9. Using the absorbent material confine the spill, if this can be done without risk of injury or contamination.
10. Remove sharp objects using mechanical means such as tongs; never with hands.
11. Clean up spill by working from the outside of the spill toward the center to minimize spread of contamination.
12. Neutralize or clean the spill area. Be sure to allow adequate contact time to ensure complete neutralization.
13. Properly dispose of spill cleanup debris according to procedures outlined in the [Waste and Recycling Guidelines](#).
14. Wash hands and other exposed skin after completing clean-up.
15. Notify the Chemical Hygiene Officer if you require assistance or additional information.

A **large spill** is classified as a volume that exceeds the capacity of a standard spill kit, uncontrolled leak of a toxic or highly reactive chemical, or a situation where personal protective equipment (PPE) is not adequate to ensure worker safety.

The following general procedures should be followed by laboratory personnel to clean up large spills:

1. Evacuate the area immediately; shutting doors and windows on the way out, if possible.
  2. For situations that threaten life or property, activate fire alarms (or chemical safety alarms if applicable) and immediately dial 911.
  3. Notify the laboratory supervisor, principal investigator and EH&S (515-294-5359; after hours contact ISU Police at 515-294-4428).
  4. Attend to any persons who may have been exposed or contaminated by following the [first aid procedures](#).
  5. Assemble persons who were present in the laboratory at the time of the spill and wait for assistance at a safe location.
  6. Provide EH&S and/or fire & police officials with details of the problem upon their arrival.
- 
- Call Campus Public Safety Department (x1400) immediately.
  - Notify of exact location, injuries, and place to meet emergency personnel.
  - Isolate spill, if safely possible
  - If nature of health threat is unknown, proceed as if threat is **severe**.
  - Pull emergency alarm.
  - Evacuate building.
  - Meet at predetermined location to assess completeness of evacuation
  - Security shall decide whether access to the building should be restricted after consulting with responsible faculty, the Chemical Hygiene Officer, Maintenance, and emergency response personnel.
  - If access is restricted, all outside entrances must be restricted.
  - Public Safety, Chemical Hygiene Officer, and their chosen consultant will decide when the building is safe to re-enter.
  - Document emergency and response.
  - Evaluate response.
  - Maintain record in Chemical Hygiene Officer's files.

### Tornado

- Campus Public Safety will notify building offices of tornado warning or watch.
- Follow Campus Public Safety's instructions.
- If safe shelter is required, move to:
  - Dennis Hall and Museum
  - Wildman Science Library and Computer Lab
  - Stanley Hall
  - Greenhouse and Greenhouse Lab
- Remain in designated area until notified that emergency has passed.
  - Notification may come from Campus Public Safety or local radio
- Document emergency and response.
- Evaluate response.
- Maintain record in Chemical Hygiene Officer's file.

### Bomb Threat

- Call Campus Public Safety (x1400).
- Follow instructions from Campus Public Safety
- If evacuation is necessary, follow standard evacuation procedure.
- Document emergency and response.
- Evaluate response.
- Maintain record in the Chemical Hygiene Officer's files.

### Flooding

- Assess situation
- Call Campus Public Safety (x1400) and Chemical Hygiene Officer (x1623) if chemicals are involved.
- Call Maintenance (x1315)
- Act to move equipment and supplies out of flood path if possible
- Clean up
- Document incident and maintain record if health or safety was threatened.

### Other Safety Measures

- SDS information should always be accessible
- A plot of the chemical storage areas should be prepared for Campus Public Safety and local fire department.
- All flammable storage areas should be labeled.
- Emergency lights are installed in Dennis basement, Stanley basement, and Wildman library computer area.
- Evacuation drills should be held once each semester.
- Evacuation route should be posted in each room.



- Faculty should discuss emergency response procedures on first day of class.
  - Emphasize that response to alarm is required.
- Emergency phone number should be posted on all phones
- Campus Public Safety phone number and other pertinent emergency numbers should be posted for students using building in the evening.

## **Appendix B: Exposure Assessments, Medical Consultations, and Examinations**

It is the policy of Earlham College to provide medical support to an employee or student who has reason to suspect exposure to toxic substances.

### **Exposure Assessment**

1. Suspected Exposures to Toxic Substances
  - a. There may be times when employees or supervisors suspect that an employee has been exposed to a hazardous chemical to a degree and in a manner that might have caused harm to the victim. If the circumstances suggest a reasonable suspicion of exposure, the victim is entitled to a medical consultation and, if so determined in the consultation, also to a medical examination at no cost with no loss of workday time attributed to the victim.
  
2. Criteria for Reasonable Suspicion of Exposure
  - a. It is the policy of Earlham College's to investigate promptly all employee-reported incidents in which there is a possibility of employee overexposure to a toxic substance.
  - b. Events or circumstances that might reasonably constitute overexposure include:
    - i. A hazardous chemical leaked or was spilled or was otherwise rapidly released in an uncontrolled manner.
    - ii. A laboratory employee had direct skin or eye contact with a hazardous chemical.
    - iii. A laboratory employee manifests symptoms, such as a headache, rash, nausea, coughing, tearing, irritation or redness of eyes, irritation of nose or throat, dizziness, loss of motor dexterity, or judgment, etc.  

AND some or all of the symptoms disappear when the person is taken away from the exposure area and breathes fresh air.

AND the symptoms reappear soon after the employee returns to work with the same hazardous chemicals.
  - iv. Two or more persons in the same laboratory work area have similar complaints

### 3. Exposures

All exposure complaints and their disposition, no matter what the ultimate disposition, are to be documented by the immediate supervisor using

procedures stated in 4c of this Appendix. If no further assessment of the even is deemed necessary, the reason for that decision should be included in the documentation. If the decision is to investigate, a formal exposure assessment will be initiated.

#### 4. Formal Exposure Assessment

- a. In case of emergency, exposure assessments are conducted after the victim has been treated.
- b. The purpose of an exposure assessment is to determine that there was, or was not, an exposure that might have caused harm to one or more employees and, if so, to identify the hazardous chemical or chemicals involved. It is not the purpose of an exposure assessment to determine a failure on the part of the victim or others to follow proper procedures. Other investigations might well evaluate results and conclusions from an exposure assessment, along with other information, to derive recommendations that will prevent or mitigate any further overexposures. However, exposure assessments determine facts; they do not make recommendations.
- c. Procedures
  - i. Unless circumstances suggest other or additional steps, these actions constitute an exposure assessment:
    1. Interview the complainant and also the victim, if not the same person
    2. List the essential information about the circumstances of the complaint, including:
      - a. The chemical under suspicion
      - b. Other chemicals used by the victim
      - c. All chemicals being used by others in the immediate area
      - d. Other chemicals stored in that area
      - e. Symptoms exhibited or claimed by the victim
      - f. How these symptoms compare to symptoms stated in the safety data sheet (SDS) for each of the identified chemicals
      - g. Were control measures, such as personal protective equipment and hoods, used properly?
    3. Sample the air in the area for suspected chemicals.
    4. Determine whether the victim's symptoms compare to the symptoms described in the SDS or other pertinent scientific literature.
    5. Determine whether the present control measures and safety procedures are adequate
    - 6.

#### 5. Notification of Results of Sampling

Within 15 working days of receipt of the results of any sampling, notify employees of those results wither in writing or by posting in an accessible spot.

## **Medical Consultation and Examination**

The physician determines the details of medical consultations and examination.

### **1. Purpose**

The purpose of a medical consultation is to determine whether a medical examination is warranted. When, from the results of an exposure assessment, it is suspected or known that an employee was overexposed to a hazardous chemical or chemicals, the employee should obtain medical consultation from or under the first supervision of a licensed physician.

When warranted, employees also should receive a medical examination from or under the direct supervision of a licensed physician who is experienced in treating victims of chemical overexposure. The medical professional should also be knowledgeable about which test or procedures are appropriate to determine if there has been an overexposure; these diagnostic techniques are called “differential diagnoses.”

### **2. Procedures**

These provisions apply to medical consultations and examinations.

- a. All employees who work with hazardous chemicals will have an opportunity to receive medical consultation and examination when:
  - i. The employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory.
  - ii. Monitoring, routine or otherwise, suggests that there could have been an exposure above the action level, or PEL if there is no action level, for a chemical for which a substance-specific standard has been established.
  - iii. There is a spill, leak, or other uncontrolled release of a hazardous chemical.
- b. The physician will be provided with
  - i. The identity of the hazardous chemical or chemicals to which the employee may have been exposed.
  - ii. The exposure conditions.
  - iii. The signs and symptoms of exposure the victim is experiencing, if any.
- c. Physicians will ordinarily furnish to the employee in written form:

- i. Recommendations for follow-up, if determined to be pertinent.
- ii. A record of the results of the consultation and, if applicable, of the examination and any tests that were conducted.
- iii. Conclusions concerning any other medical condition noted that could put the employee at increased risk.
- iv. A statement that the employee has been informed both of the results of the consultation or examination and of any medical condition that may require further examination or treatment.
- v. These written statements and records should not reveal specific findings that are not related to an occupational exposure.

### 3. Documentation

All memos, notes, and reports related to a complaint of actual or possible exposure to hazardous chemicals are to be maintained as part of the record.

### 4. Notification

Employees shall be notified of the results of any medical consultation or examination with regard to any medical condition that exists or might exist as a result of overexposure to a hazardous chemical.

### **Appendix C: Records and Recordkeeping**

“The employer shall assure that records of employee exposure, medical consultations, examinations, tests, and written evaluations shall be kept, transferred, and made available in accordance with 29 CFR 1910.20”

1. Earlham College will maintain any records of air concentration monitoring results, exposure assessments, medical consultations, and examinations for at least 30 years. These records will be accessible to employees or their representatives.
2. Documents recording the participation of employees in safety training sessions or activities will be maintained for 30 years. Any significant employee safety suggestions will also be maintained.
3. A record will be kept of all employee complaints, suspected exposures, investigations, and outcomes related to chemical exposure or chemical safety. The records will be maintained regardless of the outcome of the exposure assessment.
4. Near-miss reports—Employees who participate in or witness an event that could have caused harm, but fortunately did not, should prepare a report of the incident. These reports will be used to develop changes in procedure.

The EPA and other Federal and state agencies have special record keeping requirements. For example: Record keeping of allegations and the reporting of suspect hazards from the adverse effects of chemical exposure are required under Section 8(c) and 8(e) of the Toxic Substances Control Act; see 40 CFR 716 and 717.