UMBC

UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

CHEMICAL HYGIENE PLAN

INTRODUCTION

The purpose of the UMBC Chemical Hygiene Plan is to comply with the requirements of the OSHA Standard for Occupational Exposure to Hazardous Chemicals in Laboratories (29 CFR 1910.1450). This plan has been written and developed by the UMBC Office of Environmental Safety and Health (ESH) in conjunction with university auditors as well as representatives from UMBC academic departments with the highest utilization of hazardous chemicals. This plan establishes general procedures and work practices that are designed to reduce exposure to the hazardous chemicals used in laboratories. Compliance with these guidelines will help to reduce the health and safety hazards associated with working with such chemicals. This plan will be evaluated periodically to determine its effectiveness, and additional measures will be developed as required. Campus employees as well as State and Federal regulatory agencies may review this plan upon request.

This plan applies to all UMBC personnel involved in the laboratory use of hazardous chemicals and support personnel. Laboratory use under this Plan includes all of the following conditions:

1. Chemical manipulations are carried out on a laboratory scale. Laboratory scale is defined as 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;

2. Multiple chemical procedures or chemicals are used;

3. Procedures are not part of a production process; and

4. Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

The plan is divided into the following areas:

1. Research Safety Committee: will assist with the development of safety procedures and recommendations for the use of hazardous chemicals on campus, particularly in laboratories and research facilities.

2. Medical and Post-Exposure Monitoring: the medical status of employees who work with various substances that pose potential health risks will be monitored.

3. Hazard Communication: all hazardous chemicals will be properly labeled with the chemical name and appropriate warnings. Safety Data Sheets

(SDS) will be maintained for all chemicals used on campus at the user department and the Office of Environmental Safety and Health.

4. Engineering Controls: lists of the equipment available on campus, the conditions for use of this equipment, and the testing and repair procedures for each type of control will be maintained by the user department.

5. Emergency Safety Equipment: safety equipment used in laboratories and the inspection and maintenance procedures will be periodically monitored by the Environmental Safety and Health Department and routinely monitored by persons designated by the department chairperson.

6. Employee Information and Training: campus personnel will be trained in the safe use of hazardous chemicals by user departments with assistance from the Environmental Safety and Health Department.

7. Record Keeping: specific employee and laboratory records will be maintained by department or their designee or responsible individual, in accordance with 29 CFR 1910.20 and additional records
will be kept as necessary to comply with other applicable requirements.

8. Laboratory Safety Plans: specific lab user responsibilities, standard operating procedures (SOP) and laboratory emergency procedures will be developed by Principal Investigators with assistance from teaching assistants and researchers.

9. Waste Disposal: all waste generated in the laboratory will be disposed of in accordance with local, state, and federal regulations.

I. RESEARCH SAFETY COMMITTEE

The Research Safety Committee will help to establish specific safety procedures and recommendations for the use of hazardous chemicals on campus. The Committee is chaired by the Environmental Safety and Health Director with representatives from each major department involved with the use of hazardous chemicals as defined by this plan. The Committee will meet as needed. Committee members are appointed for one academic year and may be renewed if both the Environmental Safety and Health Director and the committee members so desire.

A. KNOWLEDGE OF HAZARDOUS EXPERIMENTS

Principal investigators and laboratory instructors must be aware of all hazardous experiments in laboratories under their supervision. Hazardous experiments include those that utilize chemicals, biological agents, radioactive materials, or other substances that can cause harm through contact, inhalation, ingestion, or absorption. This information should include the nature of the experiment, the hazardous materials that will be used, recommended safety precautions, etc. They may require additional clarification, additional safety-related procedures, reformation of the methodology, or related measures.

Principal investigators/lab instructors shall be notified promptly when one or more of the following situations exist:

1. There is a new procedure established.

2. There is a change to the present procedure, such as the substitution of a new component, a substantial change in the amount of chemicals used or new equipment being utilized.

3. There is a failure of the required equipment.

4. There are unexpected test results.

5. Laboratory personnel are showing signs and symptoms of exposure to chemicals used or stored in the area.

B. EMPLOYEE EXPOSURE MONITORING

In the course of conducting laboratory experiments, Employee Exposure Monitoring will be performed when one or more of the following conditions exist:

1. When use of an OSHA regulated substance is believed to be in excess of an action level or Permissible Exposure Limit (PEL).

2. When the Exposure Risk indicates the need for sampling.

3. When laboratory personnel show signs and symptoms of exposure to chemicals used or stored in the area.

4. For investigation of reported safety concerns or unsafe conditions.

5. When additional health hazard information concerning use of a chemical is established.

The results of monitoring should be supplied to the affected personnel within a reasonable time after the receipt of the monitoring results. If initial monitoring exceeds an established action level or PEL, periodic and termination monitoring will be performed as required by the provisions of the specific OSHA Standard for the chemical.

II. MEDICAL MONITORING AND POST-EXPOSURE MONITORING

Medical Monitoring Procedures have been established to monitor the medical status of personnel who work with asbestos, lead, bloodborne pathogens, pesticides and hazardous chemicals in addition to those who wear respirators or who are exposed to noise levels above threshold limit values. This program will be administered and coordinated by the UMBC Environmental Safety and Health Department. The Principal Investigator/Lab Manager is responsible for supplying the attending physician with the appropriate information (identity of the chemicals to which the employee was exposed, conditions under which the exposure occurred, symptoms experienced). Environmental Safety and Health may assist with these duties, as needed. The types of testing required will depend on the employee's responsibilities and the specific material used.

When an unexpected situation (such as a spill) results in the likelihood of chemical exposure, post-exposure monitoring will be available as a Worker's Compensation Claim. The process will involve filing the Employee's First Report of Injury, Supervisor's First Report of Injury/Occupational Illness and other material as required. The Environmental Safety and Health Department will assist with monitoring the exposure and the consultation and/or examination.

The conditions for which use of hazardous chemicals require medical consultations and/or examinations are:

1. When area or personnel exposure sampling indicates the action level or permissible exposure limit of an OSHA regulated substance (29 CFR 1910 subpart Z) which requires exposure monitoring and medical surveillance is routinely exceeded.

2. When laboratory personnel develop signs and symptoms of exposure specific to the chemical being used or stored in the area. A Safety Data Sheet (SDS) or other specific information will help to provide information concerning this evaluation.

3. When a spill, leak, explosion or other circumstance occurs that may result in an exposure to the chemical. This includes direct eye or skin contact.

When one of the above conditions is met, the Environmental Safety and Health Department in collaboration with the Principal Investigator/Lab Manager will assist with supplying the following information to the physician performing the evaluation:

1. Suspected chemical(s) to which personnel have been exposed.

2. Other chemicals being used or stored in the area.

3. Signs and symptoms experienced by the employee.

4. Conditions of exposure.

5. Engineering control measures that are in use.

6. Monitoring devices in use in the area.

7. Previous monitoring results.

8. Information the physician is required to include in the medical evaluation.

This information will be obtained from investigation by the Environmental Safety and Health Department, the SDS, the chemical information list for the area/laboratory and any specific records available concerning the incident.

When medical consultations and/or examinations are performed, the licensed physician is required to supply, in writing to the Environmental Safety and Health Department, an opinion concerning the following information.

Only information pertaining to the specific exposure is required:

1. Results from the examination and any associated tests.

2. Any recommendations for further follow-up examinations.

3. Medical conditions found during the examination that may increase the employee's health risk.

4. Statement that the employee has been informed of all conditions found during the examination.

All medical surveillance results/records will be kept in accordance with OSHA's Access to Employee Exposure and Medical Records Standard (29 CFR 1910.20) by the Environmental Safety and Health Department.

III. HAZARDOUS CHEMICAL IDENTIFICATION

UMBC maintains a Hazard Communication procedure to ensure chemicals are appropriately identified to ensure compliance with 29 CFR 1910.1200 (f) and 1910.1450 (h). UMBC faculty and staff shall ensure that all hazardous chemicals on campus are properly labeled with the chemical identity and appropriate hazard warnings. Safety Data Sheets (SDS) will be maintained for hazardous chemicals. This information will be made available to any UMBC employee on request. In addition to providing information concerning the hazardous chemical, training in the safe use of hazardous chemicals will be provided by the using department.

Upon receipt of hazardous chemicals, and prior to their transfer to storage locations or the requesting laboratory, the receiving department will check all containers for accuracy in labeling: chemical identity, pictograms, danger and warning statements, and the name and address of the chemical manufacturer, distributor or importer. All labels and other forms of warning must be legible, in English, and prominently displayed on the container. If the labeling is found to be inadequate, the proper identity and/or hazard label will be permanently affixed to the container by the receiving department. All old labeling must be removed or permanently defaced if new labeling is affixed.

Departments will be responsible for ensuring all lab users will have Safety Data Sheets readily accessible.

When performing routine laboratory inspections, containers will be randomly checked by the Environmental Safety and Health Department or designee to ensure proper labeling. If the labeling is improper, corrective action must be taken immediately. In addition to these inspections, employees are instructed to immediately report any container(s) found to have inadequate labeling to the laboratory supervisor and/or to label the container accordingly.

When working with chemicals in the laboratory, hazard identification will not be required for portable containers if the chemicals are transferred from labeled containers for immediate use by

the person performing the transfer. Any chemicals that are transferred to smaller containers that will be kept and used at a later time or mixtures that are created must be labeled with an appropriate secondary container label for storage and identification.

If the product of a chemical reaction is known, appropriate information/training will be provided for working with this chemical. When a byproduct is formed from a reaction for which the identity is unknown, the product will be assumed to be hazardous and safe work practices will be implemented.

Laboratory personnel desiring information concerning a hazardous chemical present in the laboratory shall contact the laboratory supervisor and/or the Environmental Safety and Health Department. The Environmental Safety and Health Department will assist with providing this information in accordance with the UMBC Hazard Communication procedure.

IV. ENGINEERING CONTROLS

Engineering controls will be utilized by laboratory personnel working with hazardous chemicals as a primary means of protection. Requirements for use will be determined by the toxicity of the chemicals or other materials/agents being used. The types of engineering controls that are present in the laboratories include chemical fume hoods and biological safety cabinets.

Chemical Fume Hoods

Generally, chemical fume hoods will be required for use of hazardous chemicals with a low Permissible Exposure Limit (PEL) and/or a high vapor pressure. More specific chemical use will require a fume hood to perform work as deemed necessary by the user department. This will include chemicals that require use in a designated area and use of chemicals where exposure sampling results are in excess of an action level or PEL when performing experiments outside of the fume hood. Chemical fume hoods should be separated into three classes depending on the toxicity of the chemicals being used and as recommended by manufacturer's specifications. Depending on chemicals being used, specialized or specially designed fume hoods may be necessary.

Biosafety Cabinets (BSC)

Biosafety Cabinets (BSC) utilize high efficiency particulate air (HEPA) filters to capture biological agents and other particles. This filtered air is then recirculated within the BSC or exhausted. HEPA filters are efficient at capturing particles but are unable to capture volatile or toxic chemicals. The use of volatile or toxic chemicals inside a BSC can result in the recirculation or buildup of that chemical inside the BSC unit or in the surrounding area. This could potentially create a flammable risk, impact research results, or lead to personnel exposure. The major issues for using a chemical in a BSC relates to the chemical’s flammability and toxicity. A buildup of flammable vapors within the BSC may cause a fire or explosion and the buildup of toxic vapors may result in personnel exposure or an impact to research results. The use of some nonvolatile chemicals such as aerosolized acids can damage the HEPA filter as well.

If a hazardous chemical is to be used in a BSC, a thorough risk assessment must be conducted and the chemical quantity must be limited. It is best to utilize a chemical fume hood whenever

possible when handling or preparing hazardous chemicals for application. If gaseous, vaporized, or aerosolized chemicals are generated in a BSC it is imperative to ensure that the quantity being generated will not cause a flammable or toxic risk. Class III Biosafety Cabinets (also known as Glove Boxes) are required when working with high hazard materials. These cabinets are totally enclosed to provide the highest possible protection to personnel and the microorganisms. It is also important to note that glove boxes are also required for experiments using radioactive solids that may become airborne or with other highly toxic chemicals. Regardless of the type of research being conducted, it is important to follow safe practices, guidelines, and manufacturer recommendations in order to minimize possible exposure.

Ventilation Requirements

Minimum requirements have been established for the operation of local ventilation systems. Performance testing of this equipment will be performed by appropriate personnel under established testing conditions. If equipment is no longer functioning as designed, all work must end until equipment is returned to functioning status.

Personal Protective Equipment

When engineering controls are not feasible, are in the process of being instituted or do not provide sufficient protection when working with hazardous chemicals, appropriate personal protective equipment (PPE), such as respiratory protection, will be used. The UMBC Environmental Safety and Health Department will assist with selection of the appropriate PPE and assist with facilitating personnel enrollment into the UMBC Respiratory Protection Program.

V. EMERGENCY SAFETY EQUIPMENT

Laboratories that utilize hazardous chemicals will be equipped with appropriate emergency equipment. The type of equipment required to be present in the laboratory will depend on the chemicals used in the area. During regular safety inspections, the presence and condition of this equipment will be checked to ensure that it is properly maintained. Examples of emergency safety equipment are fire extinguishers and emergency showers and eyewashes.

Fire extinguishers are present in areas as determined necessary by campus Fire Marshals. The type of extinguisher present must be specific for extinguishing the type of fire that may occur without further damaging equipment located in the area. The use will be limited to small fires where the possibility of harm to personnel is minimal. Awareness training may be provided as needed for use of fire extinguishers. Fire extinguishers present in laboratories will be inspected, serviced or replaced as needed.

Departments that use hazardous chemicals will be responsible for ensuring that first aid kits are in appropriate areas and are properly provisioned. The contents of the kits will be appropriate for handling minor first aid problems, such as small cuts. Major problems will be reported and handled by appropriate emergency services personnel. It is the responsibility of each department to determine the location of the kit and selection of additional supplies to be present.

Operation of emergency eyewashes will be routinely checked by the department responsible individual. Showers will be tested by Environmental Safety and Health. Minimum requirements have been established for the operation of this equipment. For combined units, the shower and eyewash must operate independently of each other and meet established requirements for each component. Other safety equipment that can be used in conjunction with this equipment include Personal Eyewashes and Hand-held Drench Hoses. Operation and maintenance of additional equipment will be according to applicable manufacturer's specifications.

VI. EMPLOYEE INFORMATION AND TRAINING

Employees utilizing hazardous chemicals will be trained in their proper use and handling. The Environmental Safety and Health Department will assist with obtaining adequate information to ensure that all laboratory personnel can work confidently with hazardous chemicals.

As part of the new hire orientation process, the Environmental Safety and Health Department provides oncoming research personnel with information concerning the employee safety programs on campus. Those who will be involved with the use of hazardous chemicals as defined by this plan will be required to complete training upon their initial assignment in the laboratory. The chairperson of the academic department and the principal investigator or supervising faculty/staff will be responsible for notifying these persons of the requirements for training by the department.

If new procedures are implemented for use of chemicals, additional training must be provided to the employee. Refresher training sessions will be conducted as needed. Records of training will be forwarded to the Environmental Safety and Health Department. Initial training should be completed within the first 90 days of employment or prior to work beginning in the laboratory, whichever occurs first.

VII. RECORDKEEPING

For all surveillance that is performed under the Chemical Hygiene Plan, record keeping will be required.

1. Area and Personnel Monitoring. If an employee reports a condition concerning possible exposure, or is reason to believe that concentration of a hazardous chemical in a laboratory is in excess of an
action level or permissible exposure limit, or when an employee exhibits signs and symptoms of exposure to a particular chemical used or stored in the laboratory, personal and area monitoring will be performed. The results will be sent to the personnel involved and a copy will be kept by the Environmental Safety and Health Department in accordance with 29 CFR 1910.20.

2. Medical Consultations and Examinations. When medical surveillance is required, the licensed healthcare provider will supply the employee with the
appropriate results and send notification to the Environmental Safety and Health Department indicating that the tests/exams were performed and
detailing the recommendations made. The Environmental Safety and Health Department will keep this record on file and the physician will keep the actual

results, both in accordance with 29 CFR 1910.20.

3. Laboratory Safety Inspections. Records of periodic laboratory safety inspections will be kept by the Environmental Safety and Health Department. This includes general laboratory safety, emergency safety equipment and engineering controls inspections.

4. Chemical Inventory and SDS Information: When hazardous chemicals are received by UMBC Departments, chemical inventories should be updated and provided to the Environmental Safety and Health Department. All questions concerning the labeling of chemicals and access to SDS files may be referred to the Environmental Safety and Health Department or their designee.

5. Employee Training: Training records must indicate the training received, the name(s) of employees who received the training, and the date the training was completed. Current records of all employee training shall be maintained by the employee's department.

6. Laboratory Incident Reports: All submitted laboratory incident reports and associated investigation documentation will be maintained by the Environmental Safety and Health Department.

7. HAZMAT Response Information: All documentation regarding hazardous materials (HAZMAT) response will be maintained by the Environmental Safety and Health Department.

8. Hazardous Chemical Inventory: Copies of each department's hazardous chemical inventory must be forwarded to the Office of Environmental Safety and Health on a recurring basis. This information will be furnished upon request to the Maryland Department of the Environment and must be readily available to police, fire, and emergency services personnel. Inventories must include: chemical name, room number, department, building and quantity.

VIII. LAB SAFETY PLANS

Hazardous chemical use shall be based on risk assessment and all chemicals shall be utilized in accordance with that risk assessment. Lab Safety Plans that detail both general and specific health and safety policies and procedures will be prepared by the lab's Principal Investigator and associated instructors, faculty, and staff.

Each department is responsible for familiarizing students and employees with the existence, contents and location of the Lab Safety Plans and for keeping them up to date. Plans must be reviewed annually.

IX. WASTE DISPOSAL

Laboratory waste shall be disposed of in accordance with applicable local, state, and federal regulations. UMBC Environmental Safety and Health can provide guidance and waste determinations for all waste generated in laboratories on UMBC campus. All waste pickup/disposal requests should be emailed to Environmental Safety and Health at

esh@umbc.edu.

Previous Revision Date: 8/23/2021

Current Revision Date: 6/11/2025

Date Approved: 6/26/2025