

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 has been written and developed by the Office of Environmental Safety and Health in conjunction with University auditors and representatives from the UMBC academic departments with the highest utilization of hazardous chemicals. The plan establishes general procedures and work practices that are designed to reduce exposure to hazardous chemicals used in laboratories. Compliance with these guidelines will reduce the health hazards associated with working with such chemicals. This plan will be evaluated periodically to determine its effectiveness and additional procedures will be developed as indicated. Campus employees and State and Federal regulatory agencies may review the plan upon request.

The plan applies to all UMBC personnel involved in the laboratory use of hazardous chemicals. As defined by OSHA, Laboratory use@ 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.

If these particular conditions are not met, then other OSHA regulations still apply.

The plan is divided into various areas to meet OSHA requirements:

1. **Environmental Health and 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 Identification:** all hazardous chemicals will be properly labeled with the chemical name and appropriate warnings. Material Safety Data Sheets (MSDS) 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 Safety Officer 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 Safety Officer.
7. **Record Keeping:** specific employee and laboratory records will be maintained in accordance to 29 CFR 1910.20 and additional records will be kept as necessary to comply with other applicable requirements.
8. **Laboratory Safety Guidelines:** specific employer/employee responsibilities, standard operating procedures and laboratory emergency procedures will be developed by the Environmental Health and Safety Committee and disseminated by department chairpersons.

I. ENVIRONMENTAL HEALTH AND SAFETY COMMITTEE

An Environmental Health and Safety Committee will help to establish specific safety procedures and recommendations for 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. 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 should be notified 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 substitution of a new component, a substantial change in the amount of chemical 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 exists:

1. When regular 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 employee complaints.
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, blood borne 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 Safety Officer. The Safety Officer is also 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). 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 a 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 Safety Officer 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 that 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 Material Safety Data Sheet (MSDS) 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 are met, the Safety Officer 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 Safety Officer, the MSDS, 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 Safety Officer, 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 Safety Officer.

III. HAZARDOUS CHEMICAL IDENTIFICATION

UMBC's policy for identification of hazardous chemicals is in 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. Material Safety Data Sheets (MSDS) 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. The Safety Officer will assist with training materials as requested.

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, hazard warnings, 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.

As part of the receiving procedure for hazardous chemicals, a receipt log shall be maintained by each department. This log will include the date of receipt, chemical identity, quantity and initials of receiver. These logs are subject to review by University auditors, State and Federal officials. The ordering department is responsible for maintaining a MSDS for each hazardous chemical in its inventory.

When performing routine laboratory inspections, containers will be randomly checked by the Safety Officer 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 when chemicals are transferred from labeled containers for immediate use by the person performing the transfer.

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 must contact the laboratory supervisor and/or the Safety Officer. The Safety Officer will assist with providing this information in accordance with the UMBC Hazard Communication Program.

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.

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. Class A hoods will be those used for extremely toxic materials, such as chemicals requiring use in a designated area or having a low PEL. Class B hoods, the most common, are those used with chemicals of average toxicity. Class C hoods are those used with low toxicity chemicals. Each hood must be classified according to the toxicity of chemical used.

Biological safety cabinets will be used primarily when working with biological hazards. The type of hood to be used will depend on the Biosafety Level of the microorganism as specified by CDC-NIH guidelines. For Biosafety Level 1 microorganisms, standard microbiological practices will provide adequate protection. However, if additional protection is desired, any class of cabinet may be used by personnel working with these microorganisms. Class I and II Biosafety Cabinets will be used for low to moderate hazard microorganisms of Biosafety Levels 2 and 3. The main difference between the two hoods is that Class II cabinets provide protection to personnel and the microorganism and Class I cabinets only provide protection to personnel. Class III Biosafety Cabinets with Glove Boxes are required when working with high hazard microorganisms at Biosafety Level 4. These cabinets are totally enclosed to provide the highest possible protection to personnel and the microorganisms. Glove boxes are required for experiments using radioactive solids that may become airborne and with other highly toxic chemicals. Decontamination of the equipment must be performed prior to use of different materials/agents.

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.

When engineering controls are not feasible, are in the process of being instituted or do not provide sufficient protection when working with hazardous chemicals, respiratory protection equipment will be used. The UMBC Safety Officer will assist with obtaining/providing the necessary equipment and support to comply with OSHA's Respiratory Protection Standard (29 CFR 1910.134).

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 operability of this equipment will be checked to ensure that it is properly maintained. Examples of emergency safety equipment are fire extinguishers, first aid kits, and emergency showers and eyewashes.

Fire extinguishers are present in areas where the possibility of a fire exists. 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. Proper training of personnel must be provided. 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 located 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 and for notifying the Safety Officer when additional supplies or replacements are needed.

Operation of emergency showers and eyewashes, plumbed or self-contained, will be routinely checked by the department and periodically by the Safety Officer in all laboratories using hazardous chemicals. 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, but not in lieu of, 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 Safety Officer will assist with obtaining adequate information to ensure that all laboratory personnel can work confidently with hazardous chemicals.

As part of the Human Resources/Relations Orientation, the Safety Officer provides 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 notified that they must attend additional training upon their initial assignment in the laboratory. The chairperson of the academic department 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 Safety Officer.

VII. RECORD KEEPING

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

1. **Area and Personnel Monitoring.** When there 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 Safety Officer in accordance with 29 CFR 1910.20.
2. **Medical Consultations and Examinations.** When medical surveillance is required, the licensed physician will supply the employee with the appropriate results and send notification to the Safety Officer indicating that the tests/exams were performed and detailing the recommendations made. The Safety Officer 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 Safety Officer. This includes general laboratory safety, emergency safety equipment and engineering controls inspections.
4. **Hazardous Chemical Receiving Logs and MSDS Information:** Copies of information obtained when hazardous chemicals are received by UMBC departments should be sent to the Safety Officer who is also the UMBC Right-to-Know Program coordinator. All questions concerning the labeling of chemicals and maintenance of the MSDS files may be referred to the Safety Officer or his designee.
5. **Employee Training:** Copies of acknowledgment forms that describe the content and date of department training and which are signed by each attending employee shall be maintained by the employee=s department.
6. **Employee Complaint/Incident Reports:** All employee complaints and the investigation results will be maintained by the Safety Officer. Appropriate information will be collected using the Incident Report completed by the Safety Officer and other appropriate records.

7. **HAZMAT Information:** All recommendations regarding HAZMAT will be maintained by the Safety Officer. This includes information provided by the investigators, committee recommendations for safe use of chemicals and other appropriate information supplied by the committee.
8. **Hazardous Chemical Inventory:** The Internal Audit Office requires that user departments prepare annual inventories of hazardous chemicals. This is mandated by OSHA Standard 29 CFR 1910.1200 and the Environmental Protection Agency Right-to-Know Law. Copies of each department=s hazardous chemical inventory must be forwarded to the Office of Environmental Safety and Health prior to the end of the calendar year. This information will be furnished 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 GUIDELINES

Lab Safety Guidelines that detail both general and specific health and safety policies and procedures will be prepared by the Environmental Health and Safety Committee. Each department is responsible for familiarizing students and employees with the existence, contents and location of the Guidelines and for keeping them up-to-date. Suggestions for additions or improvements to the guidelines are encouraged and may be made to the Environmental Health and Safety Committee for review.