# Chemical Hygiene Plan

## Introduction

This Chemical Hygiene Plan (CHP) is intended to outline policies, protocols, and procedures regarding the use of chemicals in the various Montgomery College departments which have laboratories. It is intended to insure compliance with the OSHA Occupational Exposure to Hazardous Chemicals in Laboratories (29 CFR 1910.1450) regulations. All College employees involved in laboratory work, including faculty, staff and student assistants, should be familiar with this document and the aspects that pertain to their work. Every employee is responsible for ensuring that these procedures are followed. This written program is available to any employee during work hours from the College Environmental Safety Manager. In addition, department heads must insure that copies are available to their affected employees.

## General Principles

1. **Minimize exposures.**

Precautions for handling all laboratory chemicals should be adopted. OSHA's Permissible Exposure Limits (PEL) and the Threshold Limit Values (TLV) of the American Conference of Governmental Industrial Hygienists should not be exceeded. (This data is available on Material Safety Data Sheets for each product.)

2. **Do not underestimate risk.**

Even for substances with no known significant hazard, exposure should be minimized. Unless known otherwise, assume any mixture will be more toxic than its most toxic component and all substances of unknown toxicity are hazardous.

### 3. Control Exposures.

If possible substitute less toxic materials. Secondly, prevent chemical vapors and mists escaping into the atmosphere by the use of hoods and other ventilation devices. Where other controls do not adequately control the hazard, wear appropriate personal protective equipment to prevent exposures, e.g., gloves, eye protection, lab coats, or respirators. Never eat in the laboratory, store food in refrigerators designated for chemical storage, or place chemicals in a container where they might be ingested.

### 4. Designate Responsible Person

The OSHA Laboratory Safety Standard requires that the employer designate a Chemical Hygiene Officer (CHO). This person may be assigned at the departmental, campus or College level. The general responsibility of this person(s) is to insure compliance with this regulation and thereby improve the safety of all laboratory employees.

### 5. Practice Good Housekeeping.

Laboratories must be maintained in clean and orderly condition. This includes aisles and doorways clear of obstructions, clean bench tops, properly shelved and segregated chemicals, and sinks empty of dirty glassware.

Hazardous Waste containers are to be properly labeled with the collection dates. Containers must be promptly removed when filled or when disposal time periods are reached.

## Procedures

### 1. Hazard Evaluation and Planning

Plan ahead by identifying the potential hazards. Consider all weak links and things that could go wrong. Try to prevent their failure or occurrence. If the hazard still exists, build in safe guards and backups. Develop Standard Operating Procedures (SOP) for particularly hazardous procedures. Define small spills capable of being cleaned by area personnel and large spills that require the assistance of the

Montgomery County Hazardous Material Team. Spill kits, including absorbent material and personal protective equipment, must be on site. Be prepared with the proper equipment and supplies on hand to respond appropriately to an incident. Personnel should be trained and drilled on how to respond to possible events.

### 2. Spill Response

Without injuring you or others, assist any injured personnel. For eye or skin contact immediately remove any contaminated clothing and flush with water for 15 minutes. Seek medical attention.

Promptly contain chemical spills and alert people in all parts of the facility, including isolation areas such as stock rooms. Clean up small spills using appropriate protective apparel and equipment. Remember to dispose of contaminated articles as hazardous waste (contact the Environmental Safety Manager). For large spills clear the area, call campus security (which will notify the HazMat Response Team) and wait for the responders to arrive at the scene.

### 3. Prohibitions

- Eating, smoking, etc.

Do not intentionally smell or taste chemicals. Eating, drinking, smoking, gum chewing, or application of cosmetics is prohibited in areas where laboratory chemicals are present; wash hands before conducting these activities. Avoid storage or handling of food or beverages in storage areas, refrigerators, glassware or utensils that are also used for laboratory operations.

- Clothing & Dress

Appropriately protective clothing will be worn for laboratory work. Shorts and sandals are not permitted. Hair which is worn longer than shoulder-length should be tied back to prevent contamination or entanglement.

- Horseplay

Avoid practical jokes or other behavior that might confuse, startle or distract another worker.

- Mouth suction

Do not use mouth suction for pipetting or starting a siphon.

- Improper Containers

Use of food containers for chemical storage is prohibited. Food may for human consumption will not be stored in laboratory refrigerators or storage places.

- Working Alone

If the procedures being conducted are hazardous, do not work alone in a laboratory.

- Modifications to the Lab

Do not attempt to create your own local exhaust system, or tie into any existing ventilation systems without contacting Environmental Safety/Facilities. Do not allow release of toxic substances in areas other than laboratories since most College spaces have recirculated atmospheres.

**4. Equipment and Glassware**

Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware. Use extra care with Dewar flasks and other evacuated glass apparatus. Shield or wrap them to contain chemicals and fragments should implosion occur. Use equipment only for its designed purpose.

**5. Emergency Eyewash and Showers**

Safety showers and eyewashes must be within 10 seconds walking distance and less than 100 feet from where they may be needed. They must be well identified, remain on without the use of the operator's hands, and be capable for running continuously for 15 minutes. Showers should be tested quarterly and eyewash stations inspected weekly by the area safety coordinator or laboratory supervisor.

Documentation of all testing will be kept on file by individual departments.

## Personal Protective Equipment

Each laboratory must have protective apparel available that is compatible with the required degree of protection for substances being handled. This can be determined from information on the Material Safety Data Sheet (MSDS) or with assistance from the Environmental Safety Manager.

### 1. Eye Protection

ANSI approved eye wear must be worn anytime there is the possibility for an injury to the eye. This might be a splash, mist, explosive, ultraviolet radiation or particulate hazard to the eye. Protective eye wear is required in laboratories, chemical storage rooms and designated contaminated areas where work with chemicals is being performed by any of the laboratory personnel. Appropriate eye protection should be made available to visitors who enter the area. Students are required to wear chemical splash goggles when working in chemical laboratories.

### 2. Gloves

Gloves should be worn whenever protection is needed against chemical or physical agents. They should be worn to handle corrosive materials, to prevent accidental exposure to toxic chemicals or with very hot or cold materials. Inspect the gloves before each use. Wash reusable gloves before removal and replace them frequently to avoid contaminating you and other objects, such as door handles.

Numerous glove materials are available, including rubber, neoprene, butyl rubber, vinyl or leather. The appropriate glove can be determined by consulting MSDSs for the material compatibility. Lists are available from glove manufacturers, or by contacting the Environmental Safety Manager.

### 3. Footwear

Shoes must be worn at all times in buildings where chemicals are used or stored. Perforated shoes, sandals, or cloth sneakers should not be worn in laboratories where chemicals are used. Only leather shoes are appropriate in that instance. Steel toed shoes should be worn when heavy objects are being handled.

### 4. Clothing

Where the potential for chemical contamination exists, personal clothing that will be worn at home should be covered by protective apparel. Protective apparel include laboratory coats, aprons, shoe covers, and sleeve covers. Remove permeable protective clothing, such as laboratory coats, immediately upon significant contamination. Dirty lab coats should not be worn outside of the work area, i.e., in offices, clean corridors, rest rooms, lunchrooms, libraries, or conference rooms.

### 5. Respirators

Laboratory ventilation is normally adequate for employee protection against the kind and concentration of chemicals used in College labs. On rare occasions, such as spill clean-ups, respirators to protect employees shall be available and used when air contaminant concentrations are expected above the PEL. In accordance with the Occupational Safety and Health Administration (OSHA) standard, the College Respiratory Protection Program requires Standard Operating Procedures for respirator use, training, medical evaluation, and fit testing. Approval for respirator type and fit should be arranged with the Environmental Safety Manager.

### 6. Hearing Protection

Ear protection should be worn when working around dangerous noise levels. Most often, elevated noise levels in laboratories are rare at the College. As a rule of thumb, background noise levels are dangerous when conversation requires raised voices at 3 feet.

# Engineering Controls

Elimination of hazardous conditions is the ideal. Where a hazard cannot be eliminated completely, mechanical means of controlling the hazard at the source is the next best situation. If elimination of the hazard or mechanical control is not sufficient to achieve acceptable limits of exposure, the use of personal protective equipment may be considered.

## 1. Lab Hoods

- ✓ Use the hoods for operations that might result in release of toxic chemical vapors or dust. As a rule of thumb, use a hood or other local ventilation device when working with any appreciably volatile substance.
- ✓ Confirm adequate hood performance before use with a gauge or tissue paper test. The ideal face velocity is 100 fpm for air entering the opening with the hood sash at operating height. If the hood is not performing properly, do not use it. Contact Facilities to request repairs.
- ✓ Keep hood sash closed when it is not in use.
- ✓ Keep materials stored in hoods to a minimum and do not allow them to block the back baffles or airflow through the hood.
- ✓ Leave the hood "on" when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is "off." Most laboratories are designed to have the proper balance of supply and exhaust air when the hood is left on.
- ✓ Move work toward center of hood, avoiding use of the first 6 inches behind the opening where air turbulence is greatest.

## 2. Explosion-proof Refrigerators

Explosion-proof refrigerators are typically designed to keep very volatile and temperature-sensitive materials cold. They may or may not be vented out of the laboratory. They should be hard-wired to prevent sparking in proximity to flammable vapors. Proper use may require defrosting at manufacturer's recommended intervals.

# Chemical Use Procedures

### 1. Procurement

Before a substance is received, those who use or store the material must know the information on proper handling, storage and disposal. Material Safety Data Sheets (MSDS) are required for all chemicals used at the College in accordance with state and federal laws. The department head and the Environmental Safety Manager will review requests for new chemicals before they are brought into the workplace or laboratory. Employees may only purchase chemicals on the approved workplace chemical list.

To avoid the accumulation of excess chemicals, purchase the minimum quantities of commercial chemicals necessary for your work.

It is the policy of the College not to accept donated chemicals or permit employees to bring on campus chemicals or other hazardous acquired elsewhere. Exceptions to this policy must be approved by the area Dean and the Environmental Safety Manager prior to receipt of the donated materials. If materials are acceptable, a typed inventory of all chemicals must be provided to the ES Office.

# Labels and Signs

- ✓ Laboratory doors must be identified with an indication of the potential hazards and emergency telephone numbers of laboratory supervisors.
- ✓ No container should be accepted without an adequate identifying label. Do not remove or deface labels. Identity labels must show contents of containers (including waste receptacles) and associated hazards. National Fire Protection Association (NFPA) hazard warning labels are preferred.
- ✓ Location signs should mark sites of safety showers, eyewash stations, exits, and other safety and first aid equipment.

## Material Data Safety Sheets (MSDS)

Copies of MSDSs for all hazardous chemicals to which department employees may be exposed shall be maintained and accessible within the department. The chemical user should review the MSDS for each chemical prior to the use of that chemical. The MSDSs are kept available for reference anytime the chemicals are used.

MSDSs can be found on CloudSDS use the link on the Environmental Safety Website. If MSDSs are missing or new chemicals for use do not have MSDSs, immediately contact the Environmental Safety Manager (telephone: 240-567-4308). Chemicals may not be used until the MSDS are provided. (See Services, MSDS on the ES web site for more information.)

The department safety coordinator will review incoming data sheets for new and significant health/safety information. He/she will contact the College Environmental Safety Manager for assistance, as needed, and see that any new information is passed on to the affected employees.

Additional toxicological information and procedural assistance is available from the Environmental Safety Office. Contact the Environmental Safety Manager at (240) 567-4308.

## Storage and Transport

Laboratory personnel should follow the procedures found in the National Research Council's Prudent Practices in the Laboratory: Handling and Disposal of Chemicals (National Academy Press, 1995) for storing chemicals in laboratory spaces. When storing, transporting, using, or disposing of any substance, particular attention should be given to ensuring that the substance cannot accidentally come in contact with another with which it is incompatible. Such contact could result in an explosion or the formation of substances that are highly toxic or flammable or both. All procedures for handling hazardous materials must comply with OSHA regulations.

## Stockrooms

Substances should be segregated in a well-identified area with local exhaust ventilation providing at least six air changes per hour. Stored chemicals should be examined periodically (at least quarterly) for replacement, deterioration, and container integrity. Replace loose or deteriorated labels.

Flammable liquids shall be stored in steel storage cabinets with only quantities in use kept at workbenches. Quantities greater than 1 liter should be stored in metal or break resistant containers.

Refrigerators used for storage of flammable chemicals must be explosion-proof or laboratory-safe type units. Storage trays or secondary containers should be used to minimize the distribution of material in the event a container should leak or break.

## Laboratory storage

Working quantities of chemicals in the laboratory shall be kept to the smallest amount practical. Maintain quantities to no more than the amounts required for use in one week, except for amounts stored in a specific chemical storage area or cabinet that is located within the laboratory work area.

Storage on bench tops and in hoods is inadvisable. Flammable and corrosive materials that are not in use must be placed in approved designated storage.

Avoid exposing chemicals to heat or direct sunlight.

Conduct semi-annual inventory surveys. Dispose of unneeded items or return them to the stockroom.

## Transport

When chemicals are hand carried, containers should be packed in a secondary container or bucket. Lab carts should not be overloaded when transporting chemicals and never lifted over obstacles when the contents might spill.

### Compressed Gas Cylinders

Compressed gas cylinders are to be securely fastened during transit, storage, and while in use. Stationary cylinders should be chained at 2/3 their height, or set in stable racks, with valve covers installed. Use a wheel cart to transport large cylinders. Valves should be closed on empty cylinders and marked as empty. The regulator should be removed and the valve cover replaced.

## Environmental Monitoring

Regular instrumental monitoring of airborne concentrations is not usually justified or practical in laboratories but may be appropriate when testing ventilation devices or when a highly toxic substance is stored or used regularly. The Environmental Safety Office has the ability to perform such monitoring and can be consulted regarding the need to monitor a particular area or operation.

## Restricted Use Chemicals

The federal Alcohol, Tobacco and Firearms (ATF) branch of the US Treasury Department regulates ethanol. As part of the College's license to use tax-free alcohol, the ethanol must be restricted from access via lock and detailed records kept of its use. The necessary forms are managed by Procurement when the alcohol is purchased.

Known carcinogens, reproductive toxins and agents that are acutely toxic must be used in designated areas that are labeled as such. Use of these materials must be minimized as much as possible and work with these chemicals performed in fume hoods.

## Waste Disposal

Waste containers must be labeled "Hazardous Waste" and lids must be attached except when adding waste.

Follow disposal instructions as described in the College's Hazardous Waste Program. Do not dispose of any chemical down the sewer

system, allow it to evaporate, or place it in the garbage without confirming proper procedures with the Environmental Safety Manager.

"Unknown" chemicals must be identifiable through adequate records. Persons responsible for chemical inventory may not permit any chemical to become "unknown" by lack of labeling, loss of number code records, etc.

Mixing of wastes is not permitted. The College's Hazardous Waste Program should be consulted for proper procedures and every effort made to minimize the volume and hazards of laboratory waste.

Chemically treating hazardous wastes to reduce the hazard or volume may be a violation of federal and state laws and is therefore prohibited.

## Inspections and Investigations

The lab supervisor or department chairperson should conduct formal housekeeping and chemical hygiene compliance inspections at least quarterly. Informal inspections will be conducted by the Environmental Safety Manager upon request. Whenever an incident occurs in the laboratory, an internal incident investigation must be carried out. An Incident Report Form must be completed with Safety & Security and a copy forwarded to the Environmental Safety Office. The information will be used to mitigate similar situations before they happen.

## Medical Program

### Medical Surveillance

A medical survey, under the direction of an Occupational Physician, must be provided at no cost to the employee by the College when:

- The employee exhibits signs or symptoms associated with exposure to a hazardous chemical used in the laboratory.
- A spill, leak or explosion occurs resulting in the likelihood of a hazardous exposure.
- Any employee is exposed routinely above the action level (1/2 the PEL), or in the absence of an action level, above the permissible

exposure limit for which there are exposure monitoring or medical surveillance requirements.

### Supervisory Responsibilities

The laboratory supervisor or his/her representative should provide the physician with the identity of the chemicals, description of exposure conditions and symptoms, if any. The physician's opinion must be written and include any need for follow-up, results, any increased risk and a statement that the employee has been notified of the previous items. The physician will make any reports available to the Environmental Safety Manager.

### First Aid

Safety & Security Officers at the College are available 24 hours a day and are trained in basic first aid procedures. Lab staff should also be trained in emergency first aid. If expected to administer procedures to coworkers, College personnel must follow OSHA Bloodborne Pathogen Standard requirements. See the Bloodborne Pathogen Safety Program for details.

## Training

### Responsibility

The department chairperson is responsible for the employee-training program in the work area. The Environmental Safety unit of Facilities periodically arranges training. Various training materials are available to those departments that care to use them. Training must be documented with copies provided to the Environmental Safety Manager.

### Content

All of the elements specified below must be provided to the employees in this work area.

- ✓ An overview of the requirements contained in the OSHA Laboratory Safety Standard.

- ✓ A listing of hazardous chemicals present in their work place operations.
- ✓ Location and availability of the College Chemical Hygiene Plan.
- ✓ Physical and health hazards of the hazardous chemicals in their work area, including the Occupational Safety and Health Administration (OSHA) permissible exposure limits (PEL) and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV).
- ✓ Methods and observation techniques used to determine the presence or release of hazardous chemicals in their work area.
- ✓ How to lessen or prevent exposure using personal protective equipment.
- ✓ Steps the department and/or the College has taken to lessen or prevent exposure to these hazardous chemicals.
- ✓ Symptoms associated with exposure to chemicals found in the area.
- ✓ Emergency procedures to follow if they are exposed to hazardous chemicals.
- ✓ Location of MSDS file and hazardous chemical list for the lab work area.
- ✓ Various other resources that are available at the College.

## Records

### Accident Records

Must be written and retained by department supervisors. A copy should be sent to the Environmental Safety Manager and Campus Safety & Security Office.

### Inventory and Usage Records

Records must be developed and maintained by departmental staff for all high-risk substances.

### Medical Reports

Correspondence and physician's employee health evaluations must be retained for 30 years in accordance with the requirements of state and

federal regulations. Environmental Safety and/or Human Resources will coordinate the management of these records and employee privacy shall be ensured.

**Training records**

Will be maintained both at the department and the Environmental Safety Office for at least three years. These records must include the contents of the training, date, presenter, signatures and list of attendees.

**Program Review**

The Montgomery College - Chemical Hygiene Plan will be reviewed annually by the Environmental Safety Manager, CHOs and any College employees designated for this purpose. The intent of this review is to fine tune the plan and to incorporate any regulatory changes that may have occurred.

***References***

Prudent Practices in Laboratories for Handling and Disposal of Chemicals, National Research Council, 1995

CRC Handbook of Laboratory Safety , 4th Edition, A. Keith Furr, editor, 1995

# Emergency Contacts

Dial the number or extension shown from any campus phone to reach:

**Fire/Ambulance/Police: 9-911**

**Campus Safety & Security:**

- Germantown – x. 77777
- Rockville – x. 75111
- Takoma Park/Silver Spring – x. 71600

**Environmental Safety Office:** x. 74308, location – CT building, 9221 Corporate Blvd, Rockville, MD 20850)