



ENVIRONMENTAL, SAFETY, AND RECYCLING OFFICE

CHEMICAL HYGIENE PLAN

OSHA 29CFR 1910.1450

TO INCREASE SAFE ACTIVITIES IN LABORATORIES

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OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES

OSHA - 29CFR 1910.1450

OVERVIEW

The “Lab Standard” of the Occupational Safety and Health Administration (OSHA) is designed to keep employees aware of (and to reduce the exposures to) hazards associated with chemicals used in laboratories. It is an exception from the more universal OSHA Hazard Communication Standard for operations where chemicals are used in a non-routine, non-production manner by workers with at least some education and training in science. The “laboratory use” of chemicals is defined by the Standard as chemical procedures using small quantities of hazardous chemicals on a laboratory scale and not as part of a production process in an environment where protective laboratory practices and equipment are in common use. The Lab Standard also goes beyond the Hazard Communication Standard in requiring a designated responsible employee (the Chemical Hygiene Officer), requiring specific precautions for “particularly hazardous substances”; employer provided medical consultation, and a specific program for ensuring the effectiveness of engineering control measures.

CHEMICAL HYGIENE PLAN FOR WESTERN NEW ENGLAND UNIVERSITY

A) INTRODUCTION

1. OBJECTIVES

To have in place a working Chemical Hygiene Plan applicable to the needs of all persons involved in laboratory procedures including faculty, adjunct faculty, department technicians, other staff, and students.

To enhance the learning experience by promoting safe laboratory operations.

To reduce exposure to hazardous chemicals through a hierarchy of source reduction, engineering controls, administrative controls, and personal protective equipment.

To be prepared for emergency situations.

To reduce waste generated in laboratories by improving experiment design and including opportunities for reuse and recycling.

To comply with the OSHA Lab Standard and other OSHA regulations pertaining to potential hazards found in the covered laboratories.

2. ACTIVITIES COVERED BY THIS CHEMICAL HYGIENE PLAN

This Plan covers all laboratory activities from the following disciplines. This specifically includes any course, research, or other work associated with: 1) The Chemistry and Biology Departments within the College of Arts and Sciences 2) The Biomedical and Civil/Environmental Departments within the College of Engineering 3) The Neuroscience Department within the College of Arts and Sciences 4) The College of Pharmacy and 5) Acoustical science activities within the Mechanical Engineering Department.

3. ORGANIZATION AND RESPONSIBILITIES

Ensuring compliance with federal, state, and local safety regulations is the responsibility of the University Environmental, Safety and Recycling Manager (ESRM). Plans written for this purpose will be negotiated with all of the affected faculty and staff. Input is welcome from all staff and this plan will be maintained to reflect a consensus of opinion of those parties covered by the Plan. This plan will be shared with the appropriate Department Chairs (upon completion of necessary updates) and will become valid after consideration/addition of pertinent comments or other edits.

Specific responsibilities are as follows:

A) Chemical Hygiene Officer.

The University ESRM will serve as Chemical Hygiene Officer (CHO) for the purposes of this plan. The CHO will be responsible for the following:

- Maintain the master of the University's Chemical Hygiene Plan and draft corrections, revisions, and additions for review by faculty and staff. The CHO will make this Plan and related documents available on the Environmental, Safety and Recycling Manager's web page available through the University's main web site.
- Maintain the University's Material Safety Data Sheet (SDS) Master File and on-line E-Binder.
- Provide safety training for all laboratory employees and support staff and maintain records of this training.
- Conduct exposure evaluations and monitoring as necessary.
- Assist faculty and staff in establishing safety procedures relevant to this plan.
- Represent the University in regulatory inspections of the laboratory areas.
- Review reported laboratory accidents and develop recommendations as necessary.
- Conduct a periodic inspection program as to ensure the working condition of laboratory engineering controls and safety equipment.
- Ensure compliance with the regulations regarding hazardous wastes generated in the laboratories.

B) Faculty

- Follow the policies and procedures of this Chemical Hygiene Plan in their laboratories.
- Assess the potential hazards of laboratory work (including research and or coursework) by considering all factors including the hazards of the stock chemicals, potential release of energy from a reaction, equipment hazards, and the hazards of chemicals created by the experiment.
- Select laboratory practices that reduce the risk of injury or chemical exposure. Chemical substitution, the use of smaller containers, the use of available engineering controls, and other techniques should be considered when selecting experiment procedures.
- Forward a copy of all Material Safety Data Sheets (SDS) received to the ESRM office at CUB 204. At least one copy should be added to an accessible collection within the department.
- Maintain original labels on chemicals and create new labels for non-original containers or other stock preparations of hazardous chemicals using the University's automated chemical label maker system or by completing the preprinted chemical label templates. Certain University Departments have access to the label maker system, while others use preprinted labels.
- Add additional precautionary labels to containers of chemicals listed on the "Particularly Hazardous Substance List".
- Instruct students at the beginning of each semester on the location and use of safety equipment in the laboratory.
- Inform staff, students, and visitors under their supervision of the specific hazards and required safety procedures associated with the work being performed.

- Arrange for immediate response to injuries or other emergencies in areas under their supervision or within their notice.
- File a Work Request or report to Facilities Management (or the ESRM) for any unsafe conditions that cannot be immediately remedied.
- Ensure that students are verbally informed of the safety precautions detailed in the experiment instructions for each lab session.
- Keep all hazardous chemicals stored in centralized chemical storage rooms, storage cabinets, or chemical storage refrigerators. Hazardous chemicals should not be stored in offices, lecture halls, or fume hoods.
- Prepare all necessary additional paperwork required as laid out in this plan when laboratory work involves “Particularly Hazardous Substances”.
- Attending safety training given by the CHO.
- Reporting of all accidents, spills or injuries to an immediate Supervisor and the Public Safety Department. This is to include arrangements for immediate response to injuries or other emergencies in areas under their supervision or within their notice.

C. Department Technicians and Stock Room Manager.

- Follow the policies and procedures within this Chemical Hygiene Plan within their laboratories.
- Forward a copy of any SDS received to the Environmental, Safety and Recycling Manager.
- Reporting of all accidents, spills or unsafe conditions to the Faculty in Charge.
- Maintain original labels on chemicals and create new labels for non-original containers or other stock preparations of hazardous chemicals using the University’s automated chemical label maker system or by completing the preprinted chemical label templates. Certain University Departments have access to the label maker system, while others use preprinted labels.
- Add additional precautionary labels to containers of chemicals listed on the “Particularly Hazardous Substance List”.
- File a Work Request or report to Facilities Management (or the ESRM) for any unsafe conditions that cannot be immediately remedied.
- Label hazardous waste and move it to the secured accumulation areas when the container is full or no longer needed.
- Attend Safety Training given by the CHO.

D. Students

- Work in a safe and responsible manner.
- Follow directions for experiments as outlined by Faculty members.
- Wear proper protective equipment (i.e. safety glasses) as instructed by Faculty.
- Follow emergency procedures, report all spills or accidents to Faculty immediately.
- Follow other individual Departmental laboratory requirements as communicated via use agreements and or written contracts.

B) GENERAL SAFETY PRECAUTIONS WHEN WORKING IN A LABORATORY

1. Develop Good Habits

Assume that all chemicals in the laboratory, regardless of state (liquid, powder, gas), may pose a potential hazard and learn to temper curiosity with knowledge.

Examine every container before moving it or opening it. Is the container in good condition? Is there chemical residue on the outside warranting the use of gloves or other personal protective equipment? Are there warnings on the container label? Is the cap securely attached? Do the contents appear like they should appear? Are there signs of sedimentation, oxidation, or possible contamination? If the answer to any of these questions is yes, do not touch the container. Contact the ESRM (X1634) to have the container researched.

Keep all laboratory work areas as uncluttered as possible.

2. Learn

Know where to find, and how to use, the safety equipment in the laboratory. Note the location of the emergency exits, fire blankets, fire extinguishers, first aid kits, drench hoses, eye wash stations, and emergency showers.

Learn the meaning of terms used on safety labels identifying the types of hazards or proper precautions for using a chemical. Become familiar with other resources for chemical information including reference books and catalogs, D'Amour Library resources, and the University's Material Safety Data Sheet "eBinder" available on the Facilities web page.

3. Do Not

Do not pipette ANYTHING by mouth. Rubber bulbs and pipetteing devices are available.

Eating, drinking, or smoking in any laboratory is not allowed. This includes chewing candy or gum. No food or beverages are allowed to be brought into any laboratory. Note that the mouth is a very susceptible route of entry for chemical and microbiological agents. Personal habits that involve contact with the mouth are strongly discouraged such as chewing on pencils or pens, or the application of cosmetics.

Do not ingest any reagents and do not attempt to breathe them in directly. If an odor sample is necessary, use a cupped hand to move a diluted vapor toward the face.

Do not use glassware that is cracked or chipped. Examine all laboratory equipment for defects before beginning work and seek replacement items from the instructor or the stock room manager when a negative condition is discovered. When inserting glass tubing or thermometers into stoppers, lubricate the tubing and the hole in the stopper with glycerol or water. Hold the tubing in a towel near the stopper and insert while twisting.

Carrying out of unauthorized experiments is strictly prohibited.

4. Do

Long hair, loose jewelry, and loose clothing should be secured. These items can cause accidents by disturbing chemical containers, contribute to increased exposure by soaking up chemicals, or increase hazards by catching fire or reacting to chemicals.

Keep your lab area as clean and uncluttered as possible

Leave all personal items (coats, non-essential books, etc.) outside of the laboratory or in an unused portion of the laboratory. Coat racks are available for that purpose. Be certain that these items do not block exit routes or safety equipment. Keep any personal items that may be necessary for an experiment (such as notebooks, pen, etc.) well away from the chemical use area.

Use all of the personal protective equipment required for each chemical manipulation based on written experiment instructions or knowledge of potential hazards.

Inform your instructor or supervisor about any accidents, spills, or potential hazards.

Before leaving the laboratory, wash all glassware, equipment, and lab table tops. Note that if your work involved microbial or potential infectious materials then the word wash should also include disinfection techniques.

If you wear gloves during an experiment, rinse the gloves off before removing them and then wash your hands with soap and water.

5. Unattended operations

Class experiments and other chemical procedures should not be left unattended without proper precautions being taken. Hazardous chemicals and other hazards associated with the procedures (heat, high voltage, etc.) should be clearly labeled. Other instructors or lab users should be given reasonable notice about the experiment's existence. This will provide the opportunity for others to mention if they will be in need of that equipment or area, and also allow for a determination on Housekeeping access during Third Shift. The following must be implemented for unattended laboratory experiments:

1. The immediate work area (i.e. chemical fume hood, lab bench) must be marked with:
 - a. The names of ALL chemicals involved in the reaction
 - b. A physical or health hazard warning statement concerning the chemicals. (i.e. flammable, keep away from flame)
 - c. A signal word (i.e. Notice, Caution, Warning, Danger)
 - d. Other hazard identification (i.e. electricity, heat)
 - e. Faculty Name and their emergency phone contact information
2. Material Safety Data sheets for all chemicals involved in the reaction must be in the laboratory.

6. Working alone

Students should never work alone, without supervision in a laboratory. A single student may conduct an experiment only if an instructor is present. Faculty who wish for students to work without supervision must make arrangements through the Department Chair and the ESRM. Additional training must be given to the student concerning the hazards of the individual experiment. There are no restrictions on the use of laboratories by faculty and technicians other than the general requirement to observe the safety practices noted in this plan.

Note: The College of Pharmacy allows students to work without supervision provided each student has attended Chemical Hygiene Plan Training.

C) EMERGENCY PLANNING

Emergency response requires planning. It is the responsibility of each Faculty member to evaluate the hazards of the experiments being performed, and to determine appropriate emergency procedures. Faculty must make students aware of any emergency procedure prior to the start of any laboratory experiment. The following is a listing of emergency numbers

Public Safety	X1411 (413) 782-1411	Using a University Phone Using a Cell Phone
Environmental Safety and Recycling Manager	X1634 (413) 782-1634	Using a University Phone Using a Cell Phone
Director of Facilities Management	X1240 (413) 782-1240	Using a University Phone Using a Cell Phone

1. Emergency Equipment and Exits

Emergency Equipment is essential to any response. The equipment (i.e. fire extinguishers, fire Blankets, eyewash and safety showers) must never be blocked. A quick check (by a faculty Member) prior to the start of a laboratory experiment to ensure emergency equipment is readily available is a good practice.

Egress in and out of laboratories must be maintained at all times. Aisle space must be adequately maintained in order to ensure proper evacuation.

2. Emergency Communication and Evacuation Plans

Emergency response procedures have been established in the Western New England University Emergency Handbook. These handbooks give detailed response instructions to a variety of likely emergency scenarios on campus. Included with the procedures is an "Emergency Reference Map" which shows the Emergency Assembly Point (EAP) for individual University buildings. The emergency assembly point for each building is the reporting location for faculty and students in the event of a building evacuation. For convenience purposes, these procedures and map are available on the ESRM's webpage. The CHO will include these topics in the annual refresher training provided to faculty. In addition the University Emergency Response Plan references the map and is available on the Department of Public Safety webpage.

D) EMERGENCY PROCEDURES

1. Chemical Spills

Faculty must understand the chemicals (and their quantities) used in particular laboratories in order to plan for emergencies. This will help them understand the level of response potentially required in the event a substance spills; and also help them understand what types of emergency information will need to be communicated to students. **All spills should be reported to Public Safety at X1411.** Be cognizant of the location, material involved and instructions given by Public Safety. If comfortable in doing so, use the following as guidance in assessing spills to public safety.

a) Incidental Spills

Spills that involve chemicals in types and quantities which can be absorbed or otherwise controlled by those in the immediate area. This spill control must take into account the safety of those responding and ultimately impose no safety or other hazard.

If you discover, or are involved in an incidental spill, ensure notification is made to a supervisor. Clean up the spill upon assurance that no safety hazards are imminent. Spill clean-up materials are available in the laboratory areas.

b) Emergency Spills

Spills that involve chemicals in types and quantities which are uncontrolled, to the environment, or pose significant health or physical hazards. These spills will likely require the services of emergency responders (i.e. fire, police, etc...) due to their location and or hazard potential.

If you discover, or are involved in an emergency spill, ensure the notification is made to a supervisor and the Public Safety Department. Evacuation of the lab should be coordinated.

2. Chemical Contamination

There are several paths for Chemical contamination. Injection, Inhalation, Absorption and Ingestion are the primary sources of chemical contamination. In the event that a Student or Faculty member becomes contaminated with a chemical or biological substance the following steps should be followed...

- a) Report to an eyewash, drench hose and or safety shower and flush affected areas with copious amounts of water.
- b) Contact (or have someone contact) Public Safety X1411.
 - o Communicate contamination source
 - o Communicate contaminant
- c) Remove any contaminated clothing while continuing to shower.
- d) Follow Public Safety instructions.

3. Fire

a) Discovery of a Fire

If any faculty member or student detects smoke or other signs of fire, they should investigate only if it is safe to do so. The appropriate response steps are: 1) Pull the fire alarm, 2) evacuate and

3) call Public Safety at X1411. Finally, go directly to the designated Emergency Access Point as indicated in the Emergency Handbook.

Certain **trained** faculty members can attempt to fight fires only if the following conditions exist.

1. alarm has been pulled
2. escape route present
3. fire is small and contained
4. no flammable chemicals in immediate area

b) Hearing a Fire Alarm

If while working in the laboratory a faculty member or student hears a fire alarm, they should

1. return any operating equipment to it's off position
2. ensure everyone is out of lab and close door
3. exit building (using stairs if on upper levels)
4. report to a designated EAP.

4. Injury

Upon an injury or discovery of an injured person, students and faculty should stay with the injured person until emergency personnel can arrive on scene. Someone else should be sent to make the call to Public Safety. Keep the injured person calm while avoiding contact with blood or other bodily fluids. Do not move the injured person unless they are in immediate danger (i.e. fire or spill).

E) SAFETY EQUIPMENT

1. Equipment List

Laboratory safety equipment consists of equipment and supplies intended to reduce exposure to chemicals and to respond to spills and accidents. In general, this equipment will be maintained by academic faculty and technicians with advice from the Chemical Hygiene Officer. The following outlines the different types of safety equipment available in the laboratories.

- a) **Fire Extinguishers**
- b) **Fire Blankets**
- c) **First Aid Kits**
- d) **Safety Showers and or Drench Hoses**
- e) **Eye Wash Stations**
- f) **Hoods**
- g) **PPE**
- h) **Spill Control Supplies**
- i) **Chemical Hygiene Plan**

2. Equipment Inspection

Each of these pieces of equipment serves an individual function in worker protection. Outside of fire extinguishers and PPE, all of the above equipment is inspected, tested, flushed and or restocked by the CHO. The following outlines the inspection schedule.

- a) **Monthly (during the academic year)**
 - Fire Blankets and Spill Clean-up Supplies. Inspect and restock as necessary
 - First Aid Kits. Inspect and restock as necessary
 - Fire Extinguisher. Ensure charged and at location.
- b) **Pre-Semester**
 - Safety Showers, Plumbed Eye/Face Washes, and Drench Hoses; Activate handle and flush for several minutes. Clean all surfaces.

- Fire Blankets and Spill Clean-Up Supplies; inspect condition and restock as necessary,
 - Fume Hoods; Inspection for proper operation (i.e. visual only)
- c) **Annual**
- Chemical Hygiene Plan; review and revise as necessary.
 - Coordination of fume hood and Bio-Safety Cabinet certification. These are completed by a third party vendor and funds are secured through each Department.

3. Personal Protective Equipment (PPE)

Please note that a variety of PPE apparel and safety equipment are commercially available.

The faculty member must investigate the properties of each chemical he or she is working with in order to ensure they have the appropriate PPE. Note that PPE will always serve as the last line of experimental hazard defense and follow established administrative and engineering controls. The CHO is available to discuss or advise on appropriate PPE upon request.

A variety of PPE is readily available for student and faculty use. Below are some of the more common items likely to be needed in the University laboratories:

- Safety Goggles:** various types of safety goggles are available in the Department stock rooms. Others can be ordered directly from distributors. Goggles are intended for use when splashing or flying particles are a potential hazard.
- Safety Glasses:** glasses are for use during routine laboratory operations. While glasses offer some protection against flying objects and splashes, goggles should be worn in conjunction with glasses when a splash is a likely occurrence.
- Face Shields:** full face shields are required when there is a danger of violent chemical reaction, or splash work involving extremely cold or highly corrosive or caustic agents.
- Gloves:** skin contact is a major source of exposure to chemicals. Proper gloves must be worn when such a hazard exists. Since gloves are made from a wide variety of materials, one must be careful to select the appropriate type for the material they are working with. The CHO has a copy of the glove selection guide. This guide is available to Faculty as to select appropriate gloves based on chemical use.
- Lab Coats:** Faculty should assess the experiment as to determine the necessity of a lab coat. Highly toxic, flammable and microbial agents are a few instances when lab coats may be warranted.

4. Fume Hoods.

Fume Hoods are an important engineering control in working with chemicals. The hoods serve to exhaust contaminated air away from the worker. The following represents the hood types, inspections and problem reporting information that is applicable to the University.

- Laminar Flow Biological Safety Cabinets:** One in the Biology department, one in the Biomedical Engineering department, one in the Neuroscience department and two in the School of Pharmacy. These cabinets are to be certified upon installation and then annually (or as moved) from there. The inspection will be by a certified cabinet inspector.
- Chemical Exhaust Fume Hoods:** This includes five hoods in Sleith and the thirty-eight in the Center for Sciences and Pharmacy (CSP).

The following outlines who completes the inspection and at what timeframe:

- Sleith Units
 - Annually by a Third Party Vendor
 - At the request of a faculty member
 - Following any major repair or renovation.
- CSP Units
 - Annually by a Third Party Vendor
 - At the request of a faculty member
 - Following any major repair or renovation.

All of the hoods in the CSP are low flow/high efficiency. These hoods have been certified to ASHRAE 110 to confirm the following minimum performance is maintained.

- Average face velocity of 70 fpm at the full open sash position.
- Minimum of six readings equally spaced to determine the average with no reading more than 20% different than the average.
- Visual observation that determines an effective capture of indicator smoke at the countertop, upper level and from 6" in front of the hood opening.
- Tracer Gas testing to ensure leakage <.05 ppm.

5. Safety Data Sheets

Safety Data Sheets (SDS) are prepared by the Manufacturer or Importer of hazardous chemicals or chemical products. These SDS are made available to purchasers of hazardous chemicals or chemical products by the Manufacturer or Importer. These purchasers must then make SDS sheets available to employees using these chemical or chemical products as part of their employment. Supervisors or Department Managers should review or distribute SDS sheets to employees prior to them using a chemical or chemical product as to ensure they understand the specific safety information. These SDS sheets can contain upwards of 16 sections of information concerning the ingredients, physical and chemical properties, physical and chemical hazards, emergency handling, transportation and disposal of chemical and chemical products. Reviewing these SDS sheets prior to use will ensure that employees understand not only how to use the product safely, but also how to respond in an emergency situation.

Employees or their designated representative(s) can access the list of hazardous chemicals on campus and print a copy of any SDS in the Western New England University E-Binder. This is accessible from the Facilities Management web page which is available through the University's Home Page.

If an SDS is not found in the E-Binder for a chemical found on campus, notify the Environmental, Safety and Recycling Manager at peter.varley@wne.edu. An equivalent SDS may be on file or an internet search can be conducted to obtain the missing SDS.

Alternatively, hard copies of SDS sheets are maintained (by Building and or department) in the Environmental, Safety and Recycling files. Access to these records is during normal business hours. Note: It is recommended that Faculty or Staff in charge of areas where chemicals are stored also maintain hard copies of SDS within the particular area.

NOTE: The paper and electronic University SDS files with the ESRM may contain both Global Harmonized System (GHS) compliant (16 sections) and non GHS compliant SDS versions. Some chemicals were on campus before the GHS format took effect. While these SDS have been maintained, they have not been updated since the product is no longer used or stored on Campus. When possible, separate folders are maintained for GHS versions, versus non GHS versions, of SDS sheets for the active inventory chemical products.

6. Signs and Labels

a) Signs are in place within the laboratory to denote the location of:

1. Safety Showers
2. Eyewashes
3. Fire Extinguishers
4. Exits

b) Labels must be in place on every chemical container. This labeling must be done according to the following:

1. **Original Containers:** All of the hazardous chemicals arriving at the University should be labeled by their manufacturer (or distributor) with the identity of the chemical(s) and the health or physical hazard associated with the product. Regardless of the format used, at a minimum, original manufacturer labels will identify the following: 1) Source of the chemical – Manufacturer Name; 2) Product or chemical name; 3) A health and or physical hazard (i.e. Flammable or corrosive or toxic, etc...) - prominently (usually in all bold or all caps or both) displayed in conjunction with a warning (hazard) statement (i.e. keep away from flame, may burn the skin, etc...) - to help further clarify handling and storage concerns. Beginning in June of 2015 the hazard statement identified in #3 will become more descriptive and be chosen based on specific chemical properties

4) A signal word (i.e. Danger or Warning, Caution, Notice – corresponding to the hazard statement); 5) A precautionary statement (also corresponding to the hazard statement); 6) One (or a series) of GHS pictograms. There are nine pictograms to choose from, all of which are displayed on the next page. All six of these label elements work together to communicate the chemical hazard clearly.

NOTE: Since the University maintains an inventory of chemical products it is very likely that employees will find some manufacturer containers labeled with only 4 of the above elements. This can be attributed to the fact that the chemical product was in storage before the pictogram and other enhanced GHS label requirements (i.e. precautionary statement) took effect in 2015. Therefore, employees should always pay the closest attention to the signal word and hazard statement elements of the label.

2. Non-original Containers: If the label on an original container becomes unreadable, if the contents are transferred to another container, or if the chemical is used in a stock solution, a new label should be made.

This plan establishes as a standard, a text label based on the original supplier's label or, if unavailable, on the Risk Phrase noted in the *Packaging and Labeling* section of the International Chemical Safety Cards (U.S. National Version) from the International Programme on Chemical safety. These labels contain, at a minimum the:

- identity of the chemical (chemical name, not an abbreviation or formula)
- a signal word (Notice, Caution, Warning, Danger)
- hazard(s) associated with that chemical (such as poison, corrosive, etc.)
- and, if appropriate, route of entry (such as inhalation, skin absorption)

A chemical on the OSHA Particularly Hazardous Substance list will also be required to have an additional label noting the type of hazard. An additional pictographic warning should also be used where space allows.

A number of chemical template labels have been created within the Departments. These templates are formatted to print on any compatible printer but is intended to be used with the Brother 9200 Label Makers. Labels for OSHA hazardous chemicals should be printed with black font on yellow stock labels.

In addition, the College of Pharmacy has implemented preprinted template stickers where users only have to fill in the pertinent information pertaining to the specific chemical.

Reaction vessels: The containers used for a chemical reaction do not need to be labeled if they are in the use and under control of the person who transferred the chemical into the container and if that person remains responsible for the container until its waste has been collected and the container cleaned. Titration setups or other stock preparations left unattended or for use by more than lab section should be labeled.

Small test tubes of the same material stored in a rack: A sheet of paper must be obviously displayed with information concerning: 1. The contents of the tubes; 2. Pertinent physical or health hazard information; 3. Researcher contact information

Pictograms:

Oxidizer



Flammable



Explosive



Toxic - Fatal



Corrosive



Compressed
Gas



Systemic
Health Hazard



Environmental





Irritant



Example Of The New GHS Label Format with all elements:

ACETONE

Danger



Extremely flammable liquid and vapour. Causes serious eye irritation. Repeated exposure may cause skin dryness or cracking. May cause drowsiness or dizziness. Keep out of reach of children. IF IN EYES: Rinse cautiously with water for several minutes. IF SWALLOWED: Rinse mouth. Immediately call a POISON CENTER or doctor/physician.

CHEMO Ltd
Industrial 245
Contact tel.: 123 456 789

REFER TO MATERIAL SAFETY DATA SHEET FOR FURTHER INFORMATION

7. Emergency Gas Panels

These panels provide natural gas service to individual laboratories. By activating the switch to “on”, then inserting your key and turning clockwise, gas service is activated. At the end of the lab the switch should be turned to “off.” In an emergency, push the red button to immediately turn off the gas. Pressing this button will also summon the University Public Safety Department. If the emergency button is depressed, the panel will need to be reset using the key discussed above.

F) CHEMICAL SAFETY

1. Procurement

Chemicals required by Faculty for use in laboratories are purchased by the Department laboratory Technician/Laboratory Manager. In some cases there is Departmental overlap and chemicals are ordered by the same Technician/Manager. This Technician/Manager understands the current inventory of Departmental Chemicals. The Technician/Manager is also the main contact for purchase orders and account numbers applicable to chemical ordering. Allowing a single person per Department to order chemicals ensures the University will minimize overstock and order errors. This single point control also helps the University maintain compliance with:

- a) **Hazard Communication Standard:** Proper labeling, Material Safety Data Sheets (MSDS) obtainment, receiving and inventory of incoming chemicals.
- b) **Chemical Storage:** The Proper storage of flammable/combustible materials, incompatible materials and or corrosive materials is necessary to ensure worker and student safety.
- c) **Acutely Toxic Chemicals:** These chemicals have limited use on Campus. Contact the CHO with questions or to find out what chemicals are considered Acutely Toxic.

2. Hazardous Chemicals

Not all chemicals are hazardous. In fact, most chemicals used at the University are non-hazardous in nature. Hazardous chemicals are defined as those that exhibit either physical or health hazards to those utilizing them. Chemicals capable of producing physical hazards include explosives, flammables, oxidizers, peroxides and other unstable materials. Chemicals capable of producing health hazards include toxins, irritants, corrosives and carcinogens. Note that the manufacturers of chemicals are required to inform users of the physical and health hazards of their products. This is done through primarily through product labels and product SDS Sheets. SDS sheets are available in the Campus Utilities Building Room 204 during normal work hours and on-line at the University Facilities Management webpage anytime.

3. Hazardous Chemical Storage

Properly storing chemicals is more than just ensuring they are located within a secured room and protected from extreme temperatures. Care to ensure that there is no comingling of incompatible materials and that containers are properly labeled is vital to safe storage of chemicals. The following offers some simple guidance towards safe storage of chemicals:

- a) Store Chemicals in rooms isolated from work areas
- b) Storage areas should not have direct sun exposure on bottles
- c) Ensure all bottles are properly capped (with caps tightened) at the time of storage
- d) Store chemicals on shelves that are firm and sturdy
- e) Keep Inorganic materials separate from Organic Materials
- f) Separate Acids from Bases and provide secondary containment when necessary
- g) Store all flammable and combustible liquids in Flammable Cabinets
- h) Perform an evaluation to determine if chemicals are still needed on a regular basis

4. Flammable and Combustible Liquids

When talking about laboratory safety, of significant importance is the management of flammable and combustible liquids. Solvents, Alcohols, Dyes and fuels are an important part of many experiments and therefore can be found in any laboratory stockroom. The safe storage, handling and usage of these materials will minimize the potential for accidents. It is important to understand that there are several different classes of flammable and combustible materials depending on applicable flashpoints and boiling points. A materials flashpoint (FP) is the temperature at which vapors are given off in sufficient concentration to support combustion in air. A materials boiling point (BP) is the temperature at which the vapor of the material is equal to atmospheric pressure.

These chemical properties can be located within a particular substances SDS sheet. The classes of flammable liquids are as follows:

a)	Class IA	FP <73(F)	BP <100(F)
b)	Class IB	FP <73(F)	BP >100(F)
c)	Class IC	73(F) < FP < 100(F)	
d)	Class II	100(F) < FP < 140(F)	
e)	Class IIIA	140(F) < FP < 200(F)	
f)	Class IIIB	FP > 200(F)	

The storage of flammable and combustible liquids is highly regulated by the Springfield Fire Department. A very specific quantity of each flammable liquid class is permitted within educational buildings. Furthermore, all flammable liquids must be stored within a specifically constructed “control area” on a particular building floor and within flammable liquid cabinets. The CHO routinely inspects storage areas to ensure that flammable liquid storage is within regulations. If there are any questions concerning the storage of flammable liquids, please contact the CHO.

The dispensing of flammable liquids is to be done under the fume hoods. Currently the University purchases containers of flammable liquids in quantities ≤ 1 gallon in size. Dispensing into smaller containers to facilitate laboratory classes is primarily done by the Lab Technician/Manager, in the hood, prior to the start of the lab.

5. Compressed Gas Cylinders.

Any cylinder under pressure is considered hazardous. Even room air, compressed into a cylinder, has the potential to explode or propel the cylinder and cause considerable damage and injuries. Other gases will compound this fundamental danger by releasing gases that might be flammable, toxic, or an asphyxiant. When a gas is released from pressure the cooling effect may cause frostbite. And the weight of the cylinder, empty as well as full, can make them difficult to maneuver creating additional potential for injury or damage. For these many reasons, the following basic precautions should be observed:

- As with any hazardous chemical, every gas cylinder must have a label identifying its contents and the associated hazard. This label should be visible at all times.
- Use a hand truck to move cylinders that cannot be easily carried.
- All cylinders must be chained or strapped.
- The valve protection cap will remain on the cylinder until it is in its final position and ready to use.
- Use a regulator that is designed for that gas and cylinder valve. Inspect the regulator and associated hoses prior to use.

6. Cryogen Gases.

Liquid nitrogen and liquid helium are located on campus. These liquefied gases are extremely cold and cause frostbite instantly. In addition the gases can displace oxygen in a room, creating a breathing environment that is immediately dangerous to life and health (IDLH). Faculty and technicians should approach storage areas where cryogen gases are present attentively.

7. Particularly Hazardous Substances.

In addition to a general definition of “hazardous chemical”, the OSHA Lab Standard identifies a more select group of chemicals that warrant more specific management practices. It is important to note that this list is subject to revision due to regulatory changes by OSHA or by a change in chemical status by other organizations. The following categories are:

- a) Categories of Particularly Hazardous Substances
 - “Select Carcinogens” is an attempt by OSHA to classify for special treatment (as cancer causing agents only) those chemicals for which there is formal corroborative evidence of this risk. It includes chemicals identified by OSHA and also chemicals identified by two outside agencies both of which are continually testing and updating their findings. These agencies are the National Toxicology Program (part of the U.S. Centers for Disease Control), which publishes an annual report, and the International Agency for Research on Cancer, which publishes Monographs at the conclusion of a testing program for a particular chemical.

- “Reproductive Toxins” are chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).
- “Acute Toxins” are chemicals which may be fatal as a result of a single exposure or exposure of a short duration. This determination is based on published LD50 toxicological data for each chemical.
- “Skin Hazards” are chemicals that are not only toxic but are also readily absorbed through the skin. This characteristic represents a serious hazard in a laboratory situation for the following reasons. Skin absorption may not have the same warning properties as inhalation hazards. Exposure reduction relies on Personal Protective Equipment (gloves, lab coats, etc.), rather than more permanent engineering controls. And in an academic laboratory, where participation and observation of chemical reactions is the fundamental purpose of the use of chemicals, the necessary proximity increases the potential for skin contact.

b) Procedures for use of Particularly Hazardous Substances.

Chemicals that meet the above criteria, and are in common usage at Western New England, will have an “Experiment Design Addendum” prepared by the Faculty member in charge.

c) Experiment Design Addendum:

A page describing the hazardous properties of a Particularly Hazardous Chemical and the necessary safety precautions will be appended or integrated into to every experiment containing these chemicals. The CHO, with the guidance of the faculty member, will draft these addenda to include the following provisions:

- The identity of the chemical.
- An explanation of the hazard associated with this chemical including information on target organ and route of entry.
- Designated work area including use of engineering controls.
- Requirements for personal protective equipment.
- Waste handling procedures.
- Decontamination procedures.

d) Labeling:

All containers containing any portion of a Particularly Hazardous Substance must be labeled with an additional label provided by the University. These labels are needed to note whether this chemical represents an acute or chronic exposure hazard. These labels are available at the Label Maker stations. These University supplied labels are required for:

- Original containers when received
- Non-original containers for the chemical or stock solutions containing the chemical
- Waste collection containers

This additional label does not have to be added to reaction vessels as long as these vessels are not left unattended and are in the control of the individual that transferred the chemical.

8. Peroxide Forming Chemicals

Chemicals capable of forming explosive labels of peroxides must be labeled with the date of receipt at the University. The most common peroxide forming chemicals at the University are ether compounds. While only a few bottles are present at the University, they still must be handled conservatively. These compounds are to be stored in a chemical storage refrigerator when not in use. A time-table for testing and reagent test strips for peroxides are also kept in these refrigerators.

9. Other Reactive Chemicals

Reactive chemicals are those capable of releasing heat, energy or exploding upon interaction with water or air. A few air reactive and water reactive chemicals were part of the most recent University inventory.

Particular attention must be paid to the labels for these chemicals as to ensure storage and or use does not render the material unstable.

10. Controlled Substances

Controlled substances are those compounds regulated by the Drug Enforcement Agency and or the Massachusetts Department of Public Health. These organizations have established a schedule for which compounds are further regulated. The more severe the side effects (i.e. dependency), the higher the compound is regulated on the schedule. The schedule or regulated substances includes...

Schedule I.	Heroin, Mescaline
Schedule II.	Cocaine, Morphine
Schedule III.	Pentobarbital, Testosterone
Schedule IV.	Valium, Ambien
Schedule V.	Codeine, Opium
Schedule VI.	Exempt Chemical Preparations for educational purposes

In order to purchase or maintain Controlled Substances Faculty must be registered and have a license with both the DEA and DPH. Local DEA and DPH officials will coordinate an inspection of controlled substance use locations prior to authorization. The Faculty must ensure that while at the University the substance is secure (i.e. locked) in a room when not in use. These substances may not be used without the licensed Faculty person present at the time of use.

Controlled substance disposal must be coordinated through the Drug Enforcement Agency. Any excess material that requires disposal must be approved by the DEA in advance of disposal. Contact the ESRM with questions.

G) CHEMICAL WASTE DISPOSAL

In order to ensure proper disposal of chemical waste, a couple of decisions must be made as to whether or not the material is still hazardous. These decisions must include comparing properties of the particular chemical waste in hand to both Federal and State definitions and regulations. These definitions and regulations are included below...

1. How to Identify a Hazardous Waste

Waste is material which has served its original purpose or is no longer needed and is being discarded. Hazardous Waste is defined by State and Federal regulations and must be collected for special disposal. There are two primary types of hazardous waste at the University; LISTED WASTE and CHARACTERISTIC WASTE:

a) Listed Wastes at the University:

- Most solvents including: acetone, benzene, toluene, xylene, and others
- Solvent mixtures containing the above such as "paint thinner" or "mineral spirits" or aqueous solutions thereof.
- Chlorinated solvents: methylene chloride, trichloroethylene, "laminate adhesive" and aqueous solutions thereof.
- Alcohols and ketones and aqueous solutions thereof.
- Restricted pesticides: chlordane, cresol, and others.

b) Characteristic Wastes at the University:

- Ignitable: Solutions with a Flash point less than 140°F. (Note: Flammables have flash points less than 100°F and Combustibles have flash points between 100°F and 200°F.). Ignitable also pertains to flammable solids (i.e. carbon), oxidizers (i.e. Nitrates) and some reactive materials.
- Corrosives: pH less than or equal to 2 or more than or equal to 12.5
- Reactivity: Unstable and readily undergoes violent changes, or reacts violently with water, capable of detonating with an initiating source.
- Toxic: Known to cause a health hazard including the toxic metals and pesticides mentioned above. This includes solutions or media contaminated with metals: lead, mercury, cadmium, chromium and others as well as chloroform, benzene and other liquids with toxic characteristics.

Information used to determine whether or not a chemical is a hazardous waste can be found on bottle labels and or material SDS sheets. A hazard warning on the label will provide some initial information as to hazardous properties (i.e. Warning, Danger, and Toxic) for the material. Please contact the ESRM for waste characterization guidance.

2. What about Non-Hazardous Waste

If the chemical waste does not fall under any of the categories outlined above, it is Non-Hazardous Waste. Non-Hazardous Waste must be compared with local Sewer (if liquid) and local Landfill (if solid) regulations in order to ensure it is acceptable for disposal. Please contact the ESRM for sewer or trash disposal questions.

a) Materials that CANNOT be disposed down the DRAIN:

- Any Liquid or Solid Hazardous Waste (See Above)
- Solid Material
- Oils and or greases
- Unknown materials
- Solution with high organic load (i.e. glycol solution)
- Solution with $5.5 > \text{pH} > 9$
- Solution with oil or grease sheen
- Solution with high solids
- Solution with trace amounts of lead, arsenic or other heavy metal
- Solution with Copper, Nickel, Zinc
- Solution with infectious material
- Solution of Chlorinated Solvents

b) Materials that CANNOT be disposed in the trash:

- Any liquid or solid Hazardous Waste (See Above)
- Solids laden with solvents and or oils (i.e. fail one drop test)
- Aerosol cans that are not truly empty
- Spill clean up materials
- Reactive Chemicals
- Blood or Biologically laden material

3. What the Rules are for Handling Hazardous and Non-Hazardous Waste.

a) All materials must be placed into a container which is...

- Appropriate for the waste
- In Good Condition
- Remains tightly closed when not in use
- Has labels visible and legible

b) All containers must be labeled with

- The words "Hazardous Waste"
- The Hazard of the material (i.e. Toxic, Ignitable, Reactive, Corrosive)
- The ingredients of the Waste
- The Date the waste was generated

c) All labeled containers must be properly stored in...

- Hazardous Waste Central Storage Areas
- Satellite storage - Only if the container is still in use (i.e. other sections will add to it)
- Contact the Environmental Manager for proper storage of hazardous waste.

The Environmental, Safety and Recycling Manager will arrange (through a third party) for the proper disposal of materials stored in these areas.

4. Security Awareness.

The hazardous components of the University's hazardous waste could be used in a deliberate attempt of assault, environmental pollution or other illegal act. Waste collection areas should remain locked except when adding material. Keys should be kept in the control of the person to whom they were distributed by the Environmental, Safety and Recycling Manager (ESRM). Threats to these security precautions should be reported to the ESRM at extension 1634. If these threats create an immediate danger to individuals or University property, or the illegal use of a hazardous material is witnessed, contact Public Safety at their Emergency Extension, 1411.

H) INFORMATION AND TRAINING

All new employees in the departments covered by this plan will receive a written summary of University safety topics as part of their new employee package from Career and Human Resources. Additional training materials for all employees can be obtained through the ESRM. Access to the University's online MSDS file is accessible from the Western New England University Facilities web page.

I) EXPOSURE MONITORING AND MEDICAL SURVEILLANCE

The Lab Standard requires that employee exposure monitoring be done if “the employee's exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level (or in the absence of an action level, the PEL).” There have been several scenarios where exposure monitoring has been performed. These scenarios involved specific chemicals of concern including: Benzene, Methylene Chloride, Formaldehyde and Lead.

At the time of this CHP revision there are no apparent situations requiring exposure monitoring. However, this due in part to the availability and efficiency of engineering controls, and the observance of administrative controls. Both of these factors comprise the bulk of this CHP.

The University's ESRM will perform exposure monitoring in accordance with the OSHA Lab Standard:

- if he or she suspects potential exposure
- at the request of a member of the faculty or
- at the request of the University Health Services.

Medical examinations and consultations performed under this CHP will be done by the University Health Service Department unless the service is closed during an emergency situation.

J) OTHER SAFETY PROGRAMS

Work in the University wet laboratories may involve other hazards besides chemicals. It is important that Faculty recognize all experimental hazards and determine if additional training may be required. Some examples of other safety programs include but may not be limited to:

- Biological Safety - For work with BSL1 or BSL2 level materials
- Bloodborne Pathogens- For work with blood or other potentially infectious materials
- Personal Protective Equipment
- Needle stick prevention

Questions concerning additional training applicable to specific work can be addressed with the ESRM.

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