ST. LAWRENCE UNIVERSITY
CHEMICAL HYGIENE PLAN

7/15/2015/2015 (REV 6)
SUNA STONE-MCMASTERS
CHEMICAL HYGIENE OFFICER

APPROVED BY THE INTERIM DIRECTOR OF
ENVIRONMENTAL HEALTH AND SAFETY

WILLIAM RITCHIE: _____ DATE: _____

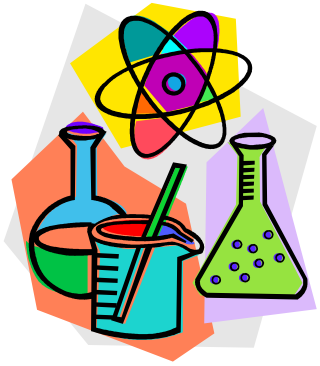

Table of Contents

Environmental, Health and Safety Resources at St. Lawrence University

Emergency: Call Campus Safety and Security Office (315) 229-5555.

Concern	Resource
Information on environmental, health and safety programs and training	Environmental Health and Safety (EH&S): William Ritchie, (315) 229-5913
Material Safety Data Sheets (MSDSs)	Most of the products used on campus have an MSDS listed in our account with MSDSOnline.com. To view our collection visit http://hq.msdsonline.com/stlaw2436
OSHA Laboratory Standard, Chemical Hygiene Plan, Laboratory Safety	Chemical Hygiene Officer Suna Stone-McMasters, 229-5105 smcmasters@stlawu.edu Chemical Hygiene Plan EHS Web Page – Chemical and Lab Safety - CHP
Radiation and laser safety	Radiation and Laser Safety Officer Jill Pflugheber, (315) 229-5645 jpflugheber@stlawu.edu EHS Web Page - Radiation Safety and Laser Safety
Chemical Waste Disposal	Chemical Hygiene Officer Suna Stone-McMasters, (315) 229-5105 smcmasters@stlawu.edu
Security	Campus Safety & Security (315) 229-5555 https://www.stlawu.edu/safety-and-security
Health center	Dana B. Torrey '82 Health and Counseling Center, (315) 229-5392
Fire or Medical Emergency	(315) 229--5555
Employee Injury Form	EHS Web Page
Facility Operations	(315) 229-5601
Workers' Compensation	(315) 229-5913
Oil Spill (SPCC)	EHS Web Page – Environmental Compliance

1. OSHA LAB STANDARD

Purpose

The Federal Occupational Safety and Health Association (OSHA) requires employers who operate laboratories, where personnel may be exposed to various health and physical hazards, to develop and implement a Chemical Hygiene Plan (CHP) to minimize the risks of such exposures. This

plan is intended to provide the St. Lawrence University community with the guidance necessary to comply with these requirements.

Objectives

- To protect the health and welfare of St. Lawrence University employees and the community;
- To provide employees with the necessary information and guidance concerning laboratory activities, by addressing the unique exposure conditions under which laboratory work is performed;
- To protect laboratory workers from adverse health effects that may result from their work in laboratories, regardless of what substances are used; and
- To comply with Title 29, Part 1910.1450 of the Code of Federal Regulations (CFR), otherwise known as the Laboratory Safety Standard (LSS).
    - See Appendix A for Laboratory Standard
    - http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10106
- To assure continuing laboratory safety, this document will be reviewed and updated a minimum of once per year.

Applicability

This plan applies to all St. Lawrence University employees, including faculty, staff and administrators, work-study students and research personnel, where the following laboratory conditions exist:

- Chemical manipulations are carried out on a "laboratory-scale".
- Multiple chemical procedures or chemicals are used.
- The procedures involved are not part of a production process, nor in any way simulate a production process.
- "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Exemptions

Students in an academic laboratory, other than those specified above, are not considered laboratory workers. However, student health and safety training in these procedures should be an integral part of any curriculum involving laboratory operations.

2. RESPONSIBILITIES

The most important rule is that everyone involved in laboratory operations must be safety minded. Safety awareness can become part of everyone's habits only if the issue of safety is discussed repeatedly and only if senior and responsible staff demonstrates a sincere and continuing interest in safety. Over-familiarity with a particular laboratory operation may result in overlooking or underrating its hazards. This attitude can lead to a false sense of security, which frequently results in carelessness. Be alert to unsafe conditions, actions and call attention to them so that corrections can be made as soon as possible. Every laboratory worker has a basic responsibility to themselves and colleagues to plan and execute laboratory operations in a safe manner

2.1. University President

2.1.1. Has ultimate responsibility for chemical hygiene and along with other administrators must provide continuing support to the university's chemical hygiene program.

2.2. Department Chairs will have the following responsibilities:

2.2.1. To be knowledgeable about all departmental operations and set a good example for safety, environmental protection and housekeeping.

2.2.2. Establish and maintain good operating and safety procedures in their department. Questions or suggestions with regard to safety or laboratory operations should be brought to the attention of the chair of the department.

2.2.3. Provide timely notification to the Environmental Health and Safety Office of termination of faculty using hazardous materials to expedite clearance of the laboratory for the next users.

2.2.4. Provide for departmental health and safety equipment as needed.

2.2.5. Require that a MSDS binder of all chemicals used in the department be readily available (each department responsible for their own MSDS files).

2.3. of Chemical Stockroom and Chemical Hygiene Officer:

2.3.1. Participate on the safety committee.

2.3.2. Participate on the safety compliance task force.

2.3.3. Obtain MSDS on all chemicals used in the chemistry department.

2.3.4. Procure and maintain an inventory of all chemicals.

2.3.5. Ensure that all reagents prepared for laboratory use are appropriately labeled.

2.3.6. Will collectively coordinate the hazardous waste program in the science center and advise laboratory personnel on proper disposal of waste chemicals and other hazardous materials.

2.3.7. Monitor laboratories for exposure to hazardous chemicals.

2.3.8. Revise the Chemical Hygiene Plan on an annual basis;

2.3.9. Provide annual safety training to all laboratory personnel.

2.3.10. Maintain safety forms from all chemistry lab students for 1 year.

2.3.11. Perform formal inspections of all laboratories each semester with the assistance of laboratory supervisors and the EHS department.

2.4. Director of Environmental Health and Safety Department

2.4.1. Chair the Safety committee

2.4.2. Provide technical assistance concerning protective equipment and laboratory safety equipment

2.4.3. Inspect laboratories for safety and health hazards and for compliance with local, state and federal regulations.

2.4.4. Investigate potential health hazards identified by laboratory employees.

2.4.5. Setup and maintain the hazardous chemical exposure medial consultation/exam program
2.4.6. Responsible for the respirator protection program.
2.4.7. Ensure that adequate records are kept of all training, accidents, inspections, and corrective actions taken.

2.5. Human Resources: Maintain employee safety training records

2.6. Laboratory Supervisors: A laboratory supervisor is anyone authorizing and overseeing any type of laboratory work, including faculty, administrators, staff and student research. Lab supervisors must serve as good role models for their technical staff and students by observing all safety rules, wearing protective equipment, and being enthusiastic about safety. Laboratory supervisors are primarily responsible for the implementation of the CHP, and shall**:**

2.6.1. Recognize the safety and health hazards to which these employees may be exposed and write safe working procedures for work in their laboratory.
2.6.2. Ensure that untrained workers (or students) are not permitted to work unsupervised with hazardous chemicals or certain pieces of equipment;
2.6.3. Inform and train all lab workers concerning chemical safety as required by this Chemical Hygiene Plan. The CHO will provide general laboratory safety training but the supervisor is required to provide training on specific hazards associated with working in their laboratory.
2.6.4. Ensure the availability, and enforce the use, of the appropriate personal protective equipment;
2.6.5. Remain cognizant of chemicals stored and used in labs, and their associated hazards;
2.6.6. Require that all hazardous chemical waste is in a properly sealed container, labeled, and stored in the satellite accumulation area.
2.6.7. Ensure that appropriate warning signs are posted within the laboratory.
2.6.8. Conduct internal inspections of their laboratories with the departmental Chemical Hygiene Officer to identify and address health and safety concerns
2.6.9. Request the allocation of funds for health and safety improvements as needed or identified.
2.6.10. Investigate and report accidents in timely manner.
2.6.11. Ensure that staff and visitors observe safety rules.
2.6.12. Conduct an "exit interview" with lab workers prior to their departure to ensure that all chemicals and equipment are properly cleaned and stored and that hazardous waste is properly disposed.

2.7. Lab Workers

2.7.1. Attend safety training programs <u>prior</u> to starting work with hazardous materials. (i.e. laboratory safety by CHO and supervisor's specific safety training).
2.7.2. Refrain from the operation of any equipment or instrumentation without proper instruction and/or authorization.
2.7.3. Request information and training when unsure how to handle a hazardous chemical, or safely utilize laboratory instrumentation.
2.7.4. Adhere to safety guidelines when handling hazardous materials, including the use of personal protective equipment.
2.7.5. Notify the supervisor of accidents, spills, or conditions that may warrant further investigation and/or monitoring.
2.7.6. Prior to leaving or changing work location within St. Lawrence University, ensure that all chemicals and equipment are properly cleaned and stored and that hazardous waste is properly disposed.

3. GENERAL LAB SAFETY PROCEDURES

3.1. General

3.1.1. Know the safety rules and procedures that apply to work being done. Determine the potential health and physical hazards and necessary precautions before undertaking any operation in the lab (MSDS, CHP, SOPs)

3.1.2. Become thoroughly acquainted with the location and use of safety equipment such as safety showers, fire blankets, eyewash fountains, fire extinguisher, and with emergency exits.

3.1.3. Be alert to any unsafe conditions and work practices, and if present, call attention to them immediately, such that appropriate action can be taken to ameliorate the condition or practice.

3.1.4. Horseplay, practical jokes, or other behavior which might confuse, startle, or distract other workers in the laboratory is forbidden.

3.2. Food and Beverage Handling:

3.2.1. Do not consume food, chew gum or drink in the laboratory.

3.2.2. Do not use glassware or utensils designed for laboratory use to prepare or consume food or beverages. Food and drinks are not to be stored in laboratory refrigerators or freezers.

3.2.3. Do not prepare drinks or food with water from the laboratory spigots. Drinking water fountains are located in the hallways.

3.2.4. Always wash your hands when you are finished working in the laboratory.

3.3. Housekeeping: Clean and orderly laboratory areas will promote safety.

3.3.1. General: The University janitorial service does maintain a degree of housekeeping standards. At times, however, it is necessary for department personnel to keep laboratory areas and equipment clear of dust and debris.

3.3.2. Laboratory Clean-up: All are responsible for keeping their work areas clean and unobstructed. Appropriate clean-up will be done at the end of any operation in the laboratory. Equipment and chemicals will be returned to and stored in their appropriate locations. All waste will be disposed of properly after operations in the laboratory are completed.

3.3.3. Instrument Areas: Samples and hard-copy data will not be allowed to accumulate in instrumentation or work areas.

3.3.4. Analytical Balances and Other Precise Equipment: All balances and precision equipment will be appropriately cleaned after use.

3.3.5. Storage Areas: Each individual will ensure all items are stored in their proper places. Hallways are not to be used as storage areas. Care must be taken to prevent contiguous storage of chemicals which, if mixed, would cause a safety hazard.

3.3.6. Exits and emergency equipment and controls will not be blocked.

3.3.7. All spills and breakage will be cleaned up and the lab supervisor will be notified immediately.

3.3.8. Hazardous chemicals found as waste or in unlabeled containers will be treated as hazardous waste and properly disposed of.

3.3.9. Syringes and syringe needles should be stored in a locked cabinet and accessed only by instructors. Sharps such as disposable syringes and needles should be disposed of in red biohazard “sharps” containers. Broken glass should be disposed of in a cardboard broken glass container (both available from the stockroom).

3.3.10. Keep flammable materials, towels, cardboard, and paper products properly stored.

3.3.11. Radioactive waste, hazardous chemical waste, and regulated medical waste must be segregated and disposed of as separate waste streams.

3.4. Warning Signs and Labels:

The following prominent warning signs and labels will be posted**:**

3.4.1. Emergency telephone numbers - Safety & Security –(315) 229- 5555.

3.4.2. Location signs are required for safety showers, eyewash stations, first aid kits, fire extinguishers and blankets, spill kits, exits, PPE required, and areas where food and beverage consumption is prohibited.

3.4.3. Be certain all chemicals are correctly and clearly labeled, and post warning signs when unusual hazards, such as radiation, laser, use of carcinogens, or highly toxic chemicals exist.

3.4.4. Identity labels showing the contents of chemical containers and waste receptacles, including their associated hazards. Fire extinguishers should have labels indicating the type of fire for which they are intended.

3.4.5. Hazard information should be posted on every laboratory door and other locations where appropriate. St. Lawrence University has adopted Cornell University's Hazard Assessment Sign ProgramThis information will be reviewed and updated annually.

3.5. Fire Prevention: Good laboratory technique and housekeeping will help prevent most fires. Personnel must observe the following precautions**:**

3.5.1. Smoking is prohibited in all buildings on campus.

3.5.2. Use other, safer methods of heating before using an open flame. Use a flame after the removal of flammable substances and notifying occupants in the laboratory. Never leave a flame unattended.

3.5.3. Use electrical equipment designed for laboratory use when volatile, flammable materials may be present.

3.5.4. Do not leave chemical reactions unattended if possible (see unattended operations).

3.5.5. Bulk solvents are to be stored in ventilated storage areas. Maintain small quantities of material at the workbench. Only store chemicals in explosion proof refrigerators.

3.5.6. Sealed containers used as reaction vessels are to have appropriate shielding and must be used in a hood.

3.5.7. Do not block access to or hang items on fire extinguishers.

3.5.8. The University is responsible for monthly inspections of fire extinguishes.

3.6. Electrical Equipment: Sparking equipment in the presence of flammable material is a serious hazard.

3.6.1. Only use dry hands when using electrical equipment. Keep water away from electrical equipment.

3.6.2. All electrical equipment must use approved wiring and should be checked prior to use for frayed or damaged cords. Such cords must be repaired or replaced immediately.

3.6.3. All electrical equipment must be equipped with a three-wire grounded plug and cord, or be double-insulated.

3.6.4. Connect only one piece of apparatus to one electrical outlet. Do not use 3-in-1 adapters which permit 3 power cords from one electrical outlet.

3.6.5. All laboratory bench electrical lines are to be equipped with ground fault interrupters. In the event of a ground current leak, the entire electrical line cuts off. Any electrical equipment that trips the ground current leak detector is defective and should be shut off immediately. The defective equipment will be reported to the supervisor.

3.6.6. All computer equipment will be connected to surge protectors.

3.6.7. Power strips should be turned off when not in use.

3.6.8. Power cords and extensions will be properly covered and kept out of walkways.

3.6.9. Electrical circuit breaker panels in hallways will be kept locked so as to prevent unauthorized tampering. Nothing will be stored in front of electrical panels.

3.7. **Glassware:**

3.7.1. Glassware should be handled and stored with care to avoid damage. Carry glassware with two hands. Never pickup volumetric flasks by the neck or pickup bottles by the cap.

3.7.2. Broken glassware free of hazardous chemicals will be discarded in marked broken glass containers. Broken glass containing hazardous waste will be placed in a spill bucket and discarded as hazardous waste.

3.7.3. Gloves should be used when picking up broken glass. Glass will be swept up using a brush and dustpan.

3.7.4. Adequate hand protection will be used when placing rubber hoses onto glass tubing or inserting glass tubing into corks or stoppers.

3.7.5. Vacuum-jacketed glass apparatus will be handled carefully. Dewar flasks will be taped or shielded.

3.8. Compressed Glass Cylinders: Lecture-size compressed gases are strongly discouraged because they are very expensive to dispose. Only flat bottom, reusable cylinders should be used at St. Lawrence University.

3.8.1. Freestanding compressed gas cylinders must be strapped or chained securely to a wall or bench top, and will be capped when in transportation, storage or not in use. Double strap/chain mounted fixtures are preferred.

3.8.2. Identification labels must never be removed from compressed gas cylinders.

3.8.3. Compressed gas cylinders will be transported using carts specifically designed for this purpose. Do not lift cylinders by the cap. The cap is for valve protection only.
3.8.4. DO NOT accept vendor supplied gas cylinders which are rusty, dented, have bent valve stems, broken valve handles, or valve covers missing.
3.8.5. Cylinders should be stored in a well ventilated area away from flames, sparks or any source of heat or ignition. Keep cylinders away from electrical circuits. Do not expose cylinders to an open flame or to any temperature above 130 degrees F.
3.8.6. Oxygen and nitrous oxide cylinders (empty or full) in storage should be separated from flammable or fuel-gas cylinders and combustible materials by a minimum distance of 20 feet or by a barrier at least 5 feet high having a fire-resistance rating of at least one-half hour.
3.8.7. Full and empty cylinders of all gases should be stored separately and identified by signs to prevent confusion.
3.8.8. The appropriate regulator will be used, and cylinders will not be bled completely empty.
3.8.9. Do not permit oil or grease to come in contact with cylinders or their valves.
3.8.10. The threads and mating surfaces of the regulator and hose connections should be cleaned before the regulator is attached.
3.8.11. Always use a cylinder wrench or another tightly fitting wrench to tighten the regulator nut and hose connections.
3.8.12. Open cylinder valves SLOWLY. Do not use a wrench to open or close a hand wheel type cylinder valve. If it cannot be operated by hand, the valve should be repaired.
3.8.13. Do not "crack" (open and close quickly before attaching regulator) hydrogen, fuel-gas, pyrophoric or toxic gas cylinder valves - just wipe out the outlet connections with a clean, dry, lint-free cloth.
3.8.14. Stand to the side of the regulator when opening the cylinder valve.
3.8.15. Store cylinders of toxic gas in an approved ventilated gas cylinder cabinet.

3.9. Systems Under Pressure:

3.9.1. Reactions must never be carried out in, nor heat applied to, an apparatus that is a closed system that is not designed to withstand pressure. Pressurized apparatus will have an appropriate relief device.
3.9.2. When a reaction cannot be directly opened to the atmosphere, an inert gas purge and bubbler system should be used to avoid pressure build-up.
3.9.3. Pressurized glass apparatus will be wrapped with tape to contain glass fragments in the event of an explosion or implosion.

3.10. Pipetting:

Mouth suction will not be used as a method for pipetting chemicals or starting a siphon. Instead, a pipette bulb or an aspirator will be used to provide a vacuum**.**

3.11. Escort Requirements:

Visitors (i.e., persons not affiliated with the university) are not allowed in laboratories without escort or proper authorization. University personnel who have authorized access to laboratories are allowed in the laboratories, and are responsible for understanding safe laboratory conduct. Children and pets are not permitted in the laboratories.

3.12. Prior Approval for Operations:

When a new procedure or experiment is performed, each individual must first consult adequate safety reference material to determine the associated hazards of each substance or apparatus involved in the experiment. Lab workers must write standard operating procedures for the new process (See Section 4). It must include information on environmental, health and safety aspects of the experiment and emergency shutdown procedures. Those procedures must be approved by the lab supervisor before the experiment begins.

3.13. Unattended Operations:

3.13.1. Reactions that are left to run unattended are inherently dangerous, and can be problematic in the event of electric/gas/water service interruptions. Unattended operations should be:

3.13.1.1. Checked at some predetermined regular interval.

3.13.1.2. Established such that vital equipment (power stirrers, hot plates, heating mantles, and water condensers) will not run unattended without fail-safe provisions.

3.13.1.3. Set up with the appropriate signs posted, indicating that a laboratory operation is in progress. Post a sign with contact name, phone number and emergency shutdown procedures.

3.13.2. Tubing will be attached securely to apparatus to prevent flooding.

3.14. Working Alone:

3.14.1. Working with hazardous chemicals or dangerous equipment alone in a lab setting is inadvisable for college employees and students, and is strongly discouraged.

3.14.2. Student employees are forbidden from working with hazardous chemicals or dangerous equipment unsupervised in a lab setting.

3.14.3. Lab supervisors must at a minimum employ the "buddy-system" when allowing student employees to work with hazardous chemicals or dangerous equipment, while the supervisor is on-site but not directly supervising the lab activity.

3.14.4. Lab supervisors may permit others within their department (other faculty, trained technical support staff) to supervise his/her student employees, as long as:

3.14.4.1. They are knowledgeable with the activity/task they are being asked to supervise;

3.14.4.2. They will be on-site and are willing to assist;

3.14.4.3. They acknowledge the additional responsibility; and

3.14.4.4. The supervisory change is communicated to the student worker.

3.15. Hazard Communication

3.15.1. All labs that contain hazardous chemicals and/or dangerous equipment will have the appropriate facility signage external to the room so as to communicate inherent risks to all building employees, students, visitors and emergency personnel.

3.15.2. All Science departments must maintain chemical product inventories that are specific to the lab/room where the chemicals are in use or stored.

3.15.3. Labeling

3.15.3.1. Container labels on incoming hazardous chemicals will not be defaced, and bulk chemicals dispensed into containers 100 mL or greater for distribution will be appropriately marked with a Hazcom label (full chemical name, NFPA rating and specific health/physical hazards), PPE, date prepared, expiration date (if applicable), and preparer's names.)

3.15.3.2. Containers smaller than 100 mL, or any vials, beakers, test tubes, beakers, etc. that holds chemicals for ongoing experimentation will be otherwise marked so as to clearly identify the container's contents.

3.15.3.3. Chemicals produced in the laboratory also require appropriate hazard communication labeling.

3.15.4. Material Safety Data Sheets (MSDS)

3.15.4.1. Chemical safety information will be made available to every employee and student using hazardous chemicals via access to MSDS sheets. See Appendix B for a guide for reading a MSDS.

3.15.4.2. MSDS must accompany incoming shipments of hazardous chemicals. Material Safety Data Sheets (MSDS) binders are located in the Chemistry stockroom (Bewkes 330) and in the Biology Preparation room (Bewkes 104).

3.15.4.3. **MSDSOnline**.com: Most of the products used on campus have an MSDS listed in our account with MSDSOnline.com. To view our collection, enter this site.

3.15.4.4. See EHS Web site for other internet MSDS links

3.15.4.5. MSDS should be kept by each department for 30 years after the chemical has stopped being used.

3.15.5. Lab supervisors requiring/authorizing lab personnel to use Particularly Hazardous Substances (or other acutely toxic/dangerous/carcinogenic chemicals) shall provide additional chemical-specific training to ensure their personnel are instructed appropriately before they begin work with those chemicals.

3.16. Working with Hazardous Chemicals:

3.16.1. All work with hazardous chemicals will be done in a fume hood whenever possible and appropriate PPE will be worn at all times.

3.16.2. All individuals will understand the hazards involved with reproductive toxins, confirmed or suspected carcinogens, chemicals with moderate to high chronic or high acute toxicity, and identified allergens. Known and suspected carcinogens are listed in Appendix C. This data was collaborated from many different sources as referenced in the appendix.

3.17. Peroxide-Forming Chemicals

3.17.1. Certain chemicals are known to produce dangerous peroxides upon exposure to air or light. These may detonate with extreme violence when concentrated by evaporation or distillation, when combined with other compounds, or when disturbed by unusual heat, shock or friction.

3.17.2. Examples of peroxide-forming chemicals and detailed procedures on how to work with them are in Appendix C.

3.17.3. Containers of peroxide-forming chemicals shall be dated upon *receipt and opening*, and disposed of in accordance with Appendix C and/or before its expiration date.

3.17.4. Any chemical that has the potential to form explosive peroxides must be tested before distillation. Peroxide test strips are available in the Chemical stockroom.

3.18. Other Hazardous Chemical Storage and Usage

3.18.1. Chemicals must be stored by compatibility groups to prevent fires or explosions.

3.18.2. See Appendix D for the recommended storage and usage guidelines for flammable, corrosive, oxidizer, reactive and toxic materials.

3.18.3. See Appendix E for physical/health hazards associated with different chemical hazard classes and protective measures for each.

3.19. Inspections:

Various inspections are performed on a regular basis to ensure all safety procedures are implemented, to identify possible hazards in the work areas, and to highlight any weaknesses or inconsistencies in the safety program.

3.19.1. The Chemical Hygiene Officer and EHS Director together with every lab supervisor will conduct a minimum of 2 formal inspections per year of their laboratories.

3.19.2. Informal safety inspections should be conducted by all lab supervisors during the course of laboratory work. They should continuously assess the safety of their own work area and make continuous improvements. (i.e. chemicals stored in cabinets and by chemical compatibility, all bottles have HazComm labels, emergency

equipment labeled and available, hazardous waste management, housekeeping, etc).

3.20. EHS Communication:

3.20.1. The Department Chairs should use the department meetings as a time to communicate and promote safety and occupational health awareness. The meetings should cover topics of interest pertaining to the health and safety of personnel. They should also serve as a way to inform personnel of new safety regulations, updates to the safety program and required training.

3.20.2. The safety committee meets monthly to address university wide safety concerns. Any questions or concerns should be addressed to the EHS Director (x-5913).

3.20.3. The safety compliance task force is a new group formed to address all EHS regulatory issues on campus. The outcome of that committee will be communicated to the University Safety Committee and the committee members will pass the information on to their staff.

3.21. Laboratory check-out for departing employees (i.e. end of contract, work-student, retiring, new position, etc)**.**

3.21.1. Everyone that works in a lab is responsible for properly closing out their lab space when they complete working in that area.

3.21.2. See Appendix S for laboratory close-out procedure. Supervisors are responsible for verifying their employees have followed this protocol.

3.21.3. This procedure is also required of all students conducting independent research or taking advanced labs. The course instructor is responsible for making sure their students have properly cleaned up the laboratory at the end of the semester.

4. LABORATORY SPECIFIC STANDARD OPERATING PROCEDURES:

The implementation of the Universal Standard Operating Procedures (SOP's) noted above, along with the development of SOP's for department-specific chemical and physical hazards shall be facilitated through the use of Departmental EHS Handbooks. Each of the Sciences shall use the Universal SOP's in this Chemical Hygiene Plan as the minimum lab requirements, and will use their handbooks for more specificity or rigidity as they see fit. Further, a completed Departmental EHS handbook will provide the baseline for lab-specific training that supervisors must provide to new employees when starting a new assignment.

See Appendix F for the General SOP format used for department-specific hazards.

Examples of department-specific chemical or physical hazards that require SOP's include, but are not limited to, the following:

- The use of Particular Hazardous Substances —SOP requirements may be satisfied by the generation of a Use Approval Form—see Appendix G, H and I
- Lasers (See laser safety program on EHS web)
- Autoclaves
- Analytical equipment, like gas chromatographs/mass spectrometers, high pressure liquid chromatographs, and trans/scanning electron microscopy
- Mechanical grinders/crushers
- Formaldehyde
- Hydrogen fluoride
- Mercury
- Cold Traps and Cryogenic Hazards
- Any other process identified by the lab supervisor or the Chemical Hygiene Officer as requiring a SOP.

5. CHEMICAL PROCUREMENT, DISTRIBUTION AND STORAGE

5.1. Chemical Procurement: Prior to ordering and receiving a chemical, consult the MSDS or other sources of information to determine the hazards associated with the chemical, and to ensure safety procedures and equipment are adequate for work that is planned**.**

5.1.1. All chemicals ordered should be received by a chemical hygiene officer or their department designee who will record the chemical into the inventory database, ensure that labels on incoming containers of chemicals are not removed or defaced, and that MSDSs accompany the shipment. The same individual will write the dates the chemicals where received on the label. ***The person that first opens the chemicals must date them when opened.***

5.1.2. Labels will be checked to verify that appropriate identities and hazard warnings are present. When deficiencies in labeling are found, the person who notices the problem will request the information from the manufacturer or distributor, and ensure each container is updated.

5.1.3. All personnel are responsible for maintaining the MSDS notebook. The person ordering chemicals will request information not received at the time of the first shipment of a chemical. If problems are encountered with the information received and it cannot be resolved with the product supplier, the matter will be referred to OSHA for investigation. When updated information is obtained on a chemical, the individual ordering chemicals will update the MSDS notebook (keep all old MSDSs for 30 years from the date the chemicals is no longer in use).

5.2. Chemical Distribution:

When chemicals are moved, they will be adequately protected to avoid accidental spillage from broken containers. When hand-carrying hazardous chemicals, place the chemical container in an outside container or bucket. Use a hand cart if large quantities of chemicals are being transported. If need be, use only the elevator to transport chemicals between floors.

5.3. Dispensing Chemicals and Supplies to Students:

Do not give any chemicals or equipment to students unless the request is authenticated by an instructor, the student is taking a course in our laboratories and the material is necessary for the work. All chemicals (as well as equipment, glassware and tools) will be signed out of the chemical stockroom using the log books and checked off when the supplies are returned.

5.4. Chemical Storage

5.4.1. Chemicals must be segregated when stored to avoid accidental mixing which could result in fire, explosion or release of toxic or flammable gases. Bulk quantities of laboratory chemicals should be stored primarily in the centralized stockroom. Secondary storage is in appropriate areas of laboratories such as cabinets and cupboards. Long term storage should never be on counter tops or in fume hoods.

5.4.2. Chemical Storage in the Preprooms:

5.4.2.1. Chemicals will be stored by chemical compatibility and hazard class. The chemistry department uses the Flinn Scientific Safe Storage Pattern.

5.4.2.2. See Appendix J for Flinn safe storage pattern and Appendix K for chemical compatibilities chart.

5.4.3. Chemical Return: Chemicals in the laboratory areas that have not been used within a two-week time period will be returned to the stockroom for proper storage. The

individual last using the chemical will be responsible for this. Hazardous chemicals should never be left out on a workbench unattended.

5.4.4. Stockroom and Laboratory Doors: The stockroom door is open during laboratory hours and locked during non-laboratory hours or when not in use. Laboratory doors are locked at night and checked during the weekend by security.

5.4.5. Special Storage Facilities Required: If special storage facilities are required or you are not sure of the proper storage area of a material, consult the Chemical Hygiene Officer.

5.4.6. Storage Problems: When a storage problem arises, e.g., a change in the appearance of a reagent on the shelf, consult the Chemical Hygiene Officer.

6. WASTE STREAM MANAGEMENT

Laboratory supervisors are responsible for knowing whether or not the waste streams they generate are regulated, or for making that determination with the assistance of the Chemical Hygiene Officer **before** the wastes are generated. The quick procedures below should be used as a reference --for further guidance, see the Waste Management and Minimization Plan and the regulated medical waste and biohazard procedures on the EHS web site.

6.1. Hazardous Waste

- Hazardous wastes are the result of discarded or inherently waste-like by-products of certain characteristic or listed chemical wastes.
- Hazardous waste must be collected in a suitable container that is no greater than 4 Liters in volume, and shall be kept closed except when being filled.
- Hazardous waste containers must be labeled with the appropriate "Hazardous Waste" label, which identifies the chemical contents and concentration (if known) by name, not chemical symbol, in addition to the hazard class, i.e. ignitable, corrosive, oxidizer, etc. Labels are available in the chemical stockroom.
- Labs that routinely generate hazardous waste must have a designated satellite accumulation area (SAA) where containers of hazardous waste are temporarily stored, so as to both isolate and segregate the wastes from other usable hazardous lab chemicals.
- Laboratories may not store more than 55 gallons of hazardous waste, or 1 quart of acute hazardous waste, in a SAA at any time. As a good management practice, labs should notify the Chemical Hygiene Officer on a regular basis to see that full containers of hazardous waste are routinely moved to the 180 Day Hazardous Waste Storage Facility on the ground floor of the Bewkes Science Building.
- Hazardous waste containers moved to the 180 Day Facility will either be consolidated with other like wastes, or full dated for storage, and will be shipped out within 180 days.
- Under no circumstances shall hazardous wastes be drain disposed, allowed to evaporate in a lab hood, or be treated or otherwise utilized in a methodology constituting disposal.

6.2. Biohazardous Waste

- All sharps (syringes, hypodermic needles, scalpel/razor blades) regardless of contamination, and certain types of contaminated glassware (cover slips, Pasteur pipettes) must be collected in rigid containers with the proper labeling/coloring. Once full, call facility operations to have the sealed, labeled container properly disposed. Syringe needle should be disposed of after each use. The disposable syringe body can be reused but must also be disposed of in the sharps container when it is ready to be disposed. ***No Syringe needles or syringes may be thrown away in the regular trash.*** Syringes containing blood or other potentially infectious material must be disposed of as regulated medical waste. Syringes contaminated with radioactive material must be disposed of as radioactive waste, per the Radiation Safety Program.
- Animal carcasses are only considered to be biohazard waste if they have been contaminated with infectious substances. If carcasses have not been exposed to infectious substances, lab supervisors must contact facility operations for pickup of the carcasses.

6.3. Other Wastes

7. *Glassware*—All intact and broken glassware, i.e. pipettes, vials, test tubes, beakers, etc., capable of causing puncture injuries to custodial personnel must be discarded in the appropriate closable cardboard broken glass boxes.
8. *Vacuum Pump Oil*—Vacuum pump oil should be maintained free from chemical contamination, and so when spent, will be shipped out as non-regulated chemical waste. If vacuum pump oil becomes chemically contaminated, lab supervisors must communicate this fact to the Chemical Hygiene Officer, who will make a hazardous waste determination on the oil.
9. *Batteries*—While standard alkaline batteries may be recycyled when expired, other battery types (lithium, nickel-cadmium, sealed lead, lead-acid) must be collected by facility operations as universal waste.
10. *Empty Chemical Containers*— Contact the Stockroom Director when a chemical bottle is empty before disposing of it. The stockroom director will remove it from the chemical inventory database. Most chemical containers emptied by normal means (pipetting, pouring, aspirating, etc.) are considered legally empty and may be disposed of as glassware trash as long as there is less than 3% of the original volume of chemical in the container. The only exception is chemical containers that once held a P-listed chemical must be disposed of as hazardous waste.

7 CONTROLLING CHEMICAL EXPOSURES

The basic routes for a chemical to enter the body in a laboratory setting are through inhalation, absorption (skin and eye contact), ingestion, and injection. The prevention of entry by one of these routes can be accomplished by adherence to the general or specific SOP's noted above, and by control mechanisms such as engineering controls, personal protective equipment, and administrative controls.

7.1. Inhalation Hazards

Inhalation of chemicals is the most common route of entry a chemical can take to enter the body. To avoid significant inhalation exposure, substituting a less volatile or toxic chemical, or substituting a liquid or solid chemical for a gaseous one, is the best means of control. If substitution is not practical, ventilation should be used to lessen the chance of overexposure. The use of well-functioning local exhaust ventilation equipment, such as ventilation hoods, biological safety cabinets, and vented glove boxes, are primary examples of suitable engineering controls that will minimize inhalation exposure to hazardous chemicals. Dilution ventilation may be used to reduce exposure to non-hazardous nuisance odors. For extremely toxic chemicals, such as those classified as poison gases by the State or Federal Department of Transportation (i.e. arsine, phosgene), the use of closed systems, vented gas cabinets, failsafe scrubbing, detection or other stricter controls may be required.

If both substitution and engineering controls are unavailable, the use of personal protective equipment may be required to reduce inhalation exposures to below the PEL (Permissible Exposure Limit, 8 hr time weighted average). Respiratory protection, from dust masks to a self-contained breathing apparatus, may be utilized to this end. If laboratory employees wear respirators, requirements of the OSHA Respirator Standard (1910.134) must be met. This Standard requires training in the proper use of respirators, medical prequalification to ensure the user is capable of wearing a respirator, and fit testing to ensure that the respirator fits properly. A lab worker or his/her supervisor must contact the Office of Environmental Health and Safety in the event that respiratory protection is necessary to control exposures to hazardous chemicals. No one is permitted to conduct work in a setting that requires a respirator without first meeting all OSHA respiratory requirements.

Finally, administrative controls can be utilized to reduce the risk of overexposure to hazardous chemicals. Some examples of administrative controls include:

- Minimizing the exposure time for individual employees;
- Reducing the quantities/volumes of chemicals used in experiments to as little as practical, or using micro-scale experiments; and
- Restricting access to areas where particularly hazardous experiments are on-going, and placing appropriate signage as a warning to others.

7.2. Absorption (Skin and Eye Hazards)

To reduce the risk of a chemical entering the body via skin and eye contact use engineering controls such as substitution and appropriate ventilation as described above in Inhalation hazards. The more obvious means of preventing skin and eye contact is the wearing of personal protective equipment such as eye protection, face shields, gloves, appropriate shoes, lab aprons, lab coats, and other protective equipment as appropriate to the hazard. Since the chemical resistivity of the different types of protective equipment varies significantly, the lab supervisor should consult the MSDS or other appropriate references to determine the type of personal protective equipment required. The glove material compatibility chart is found in Appendix L.

Administrative controls to reduce skin/eye contact include:

- Posting signs to notify people of hazards and PPE requirements in certain lab areas;
- Enforcement of policies pertaining to skin and eye protection; and
- Training on selection of the proper type of PPE

7.3. Ingestion Hazards

Ingestion of chemicals is another route of entry for chemicals to gain access into the body. A laboratory worker can easily ingest chemicals into the body via contaminated hands if they are not washed prior to eating or smoking, or by sticking part of the hand or a writing tool that has been in contaminated hands into the mouth. Some controls for preventing this route of exposure include engineering controls (i.e. use glove box), personal protective equipment such as the wearing of gloves, and administrative controls such as restricting mouth pipetting, encouraging good personal hygiene and designating a well-marked non-chemical area where eating and drinking is permitted.

7.4. Injection Hazards

Exposure to chemicals by injection is a final route of entry for chemicals to gain access into the body. It can inadvertently occur through injury from metal or glass contaminated with chemicals, or when chemicals are handled in syringes. Attention to detail and adherence to general standard operating procedures will provide control against accidental injection exposure. Red boxes shall be used to collect all used needles and syringes, and separate collection containers shall be used to collect broken glass.

8. VENTILATION HOOD ENGINEERING CONTROL

8.1. Laboratory Ventilation Hoods

The ventilation hood is the primary engineering control for protecting lab personnel from exposure to hazardous chemicals. The hood itself is one component of the system that consists of a working chamber, an exhaust system, proper hood location, make-up air to the hood, a hood monitoring system, hood operating parameters, routine performance surveys, and system maintenance.

8.2. Ventilation Hood Air Flow

Air flow patterns are affected by many factors, including traffic patterns, room make-up air, doorways, room size, hood location, work practices, objects inside the hood, baffle adjustment, and sash opening. These are considerations for design, installation and use of ventilation hoods. Ideally, the air should flow into the lab from doors, hallways and the room air supply and exit the room through the ventilation hood. There should not be any turbulence at the hood face which could spill contaminated air into the room. All areas of the open hood face should have a velocity sufficient to draw room air and not spill contaminated air from the hood.

8.3. Hood Classification Guidelines

Standards of performance for ventilation hoods are set forth by ANSI/AIHA Z9.5 and OSHA 29 CFR 1910.145(e)(3)(iii). The average face velocity of optimally performing hoods should be between 80 and 120 feet per minute (FPM) when measured with the sash raised to the 18" mark. These average face velocities and the date of survey will appear on the inspection sticker located on the front or side of each ventilation hood. Ratings are also stated according to the hood performance as follows:

Score	Criterion	Usage
Pass	Average face velocity 80-120 fpm	Normal chemical hood use
Restrict	Average face velocity 70-79 or 120-159 fpm	Not recommended for use with highly toxic materials
Fail	Not meeting the above standards	Suitable for storage only

8.4. Ventilation Hood Work Practices

- Any direct handling and/or experimentation with chemical materials in a laboratory environment should attempt to make use of ventilation hood control measures to the greatest extent possible.
- Before work begins, check to be sure the hood fan is operating by observing the airflow monitor and visually checking for draft.
- Check the inspection sticker to determine if the hood has been currently inspected and what performance rating it was given. If observable questions arise about inspection or current hood performance, notify the lab supervisor for assistance.
- If a hood's performance is questionable or malfunctioning, it should be marked in a fashion that takes it temporarily out of service, and Facilities Operations should be notified to arrange for timely repairs (Call x-5601 for an emergency work order request)
- Ventilation hoods should be used with the sash positioned at 15", or as otherwise specified on the inspection sticker.
- The sash position should be lowered as needed for additional physical barrier protection against splash hazards, and shall always be closed when the hood is not actively in use.
- All equipment and materials should be located at least 6" from the sash face.
- Large items should be elevated at least 2" from the hood base to ensure airflow to the baffle opening at the rear interior base of the hood.
- Do not use the ventilation as a storage cabinet—excessive storage can obstruct airflow and cause areas of low air velocity at the face opening.
- Do not extend face or head inside the hood.
- Minimize traffic and other sources of cross drafts (i.e. open windows, doors, fans, etc.) that may pull contaminated air from the hood.
- When using electrical equipment in a hood, take extra precautions to prevent spark sources from causing a fire or explosion—all electrical connections should be made outside the hood.
- Do not use perchloric acid heated above ambient temperature in a ventilation hood unless it is a specifically designed perchloric acid hood with a wash-down system. St. Lawrence University does not any hoods that meet these requirements and therefore experiments with perchloric acid above room temperature are not allowed.
- Emergency plans should be understood by all hood users in the event of an unexpected occurrence such as fire or explosion in the hood.

9. PROTECTIVE CLOTHING AND EQUIPMENT

9.1. Eye Protection:

9.1.1. Eye protection must be worn by everyone in a laboratory while any experiment or laboratory procedure (regardless of whether an eye hazard is anticipated) is being performed

9.1.2. Laser users should refer to the laser safety regulations on the EHS web page.

9.1.3. General types of eye protection:

9.1.3.1. **Safety Glasses.** Ordinary prescription glasses do not provide adequate protection from injury to the eyes. Safety glasses used in the laboratory are to comply with the Standard for Occupational and Educational Eye and Face Protection (Z87.1) established by the American National Standards Institute. This standard specifies a minimum lens thickness of 3 mm, impact resistance requirements, passage of a flammability test and lens-retaining frames. Side shields that attach to regular safety spectacles offer some protection from objects that approach from the side but do not provide adequate protection from splashes. Chemical splash goggles or full-face shields are to be worn when significant liquid splash hazards exist.

9.1.3.2. **Goggles.** Goggles are not intended for general use. They are intended for wear when there is danger of splashing chemicals or flying particles. For example, goggles are to be worn when working with glassware under reduced or elevated pressure and when glass apparatus is used in combustion or other high temperature operations. Impact-protection goggles have screened areas on the sides to provide ventilation and reduce fogging of the lens and do not offer full protection against chemical splashes. Splash goggles that have splash-proof sides are to be used when protection from harmful chemical splash is needed. There are specific goggles and masks for glassblowing, welding and intense light sources, such as lasers and ultraviolet light.

9.1.3.3. **Face Shields.** Goggles offer little protection to the face and neck. Full-face shields that protect the face and throat are to be worn when maximum protection from flying particles and harmful liquids is needed. For full protection, safety glasses are to be worn with face shields. A face shield or mask may be needed when a vacuum system (which may implode) is used or when a reaction that has a potential for mild explosions is conducted.

9.1.3.4. **Contact Lenses.** The National Society to Prevent Blindness points out that contact lenses do not provide adequate eye protection for hazardous operations and must be worn in conjunction with approved safety eye wear. Furthermore, when the work environment entails exposure to chemical fumes, vapor or splashes, intense heat, molten metals or highly particulate atmosphere, contact lens use should be restricted. In addition, identification of contact lens wearers should be ensured for appropriate emergency care and for protection in work areas hazardous to the eyes.

9.2. Gloves:
Gloves must be worn when performing any hazardous operation in a laboratory. Gloves provide skin protection against chemicals. However, gloves of the proper material must be selected to ensure they are impervious to the chemicals being used. Various types of gloves are available and are located in the stockrooms and in many laboratories. Review the glove description from the vendor if there is any question of protective ability for a given operation. (See material compatibility chart in Appendix L)

9.3. Footwear:
Appropriate shoes must be worn when working in a laboratory. Sandals and other open-toed shoes are not permitted since they offer no protection against falling objects or chemical spills. High-heeled shoes pose a hazard and are not to be worn when working in the lab. Cloth sneakers can allow the chemical to penetrate the mesh and contact the skin. Full leather shoes offer the best protection. Shoe covers are also available from the chemical stockroom.

9.4. Laboratory Clothing, Coats and Apron:
Appropriate clothing must be worn in the labs. Shorts and skirts are not permitted while working with hazardous chemicals or equipment in the laboratory. While laboratory coats are not required at all times, it is recommended that they be worn while conducting experiments in the laboratory. Some chemicals require the use of appropriate apron or lab coat. Read the chemical label and MSDS to determine required PPE before working with any chemical.

9.5. Shielding Equipment:
Blast shields should be used for conducting operations on sensitive or energetic compounds. Safety shielding should be used for any operation having the potential for explosion such as (1) a reaction attempted for the first time (small quantities of reactants should be used to minimize hazards), and (2) operations carried out under non-ambient conditions. Shields must be placed so that all personnel in the area are protected from hazard. In the majority of cases, the hook sash is adequate shielding.

9.6. Fire Extinguishers:
Fire extinguishers are located strategically throughout the laboratories. They should be used with small fires only after reporting the emergency to Safety & Security (315) 229- 5555. All department personnel will be trained on the use and handling fire extinguishers. The two most common types of extinguishers in the chemistry laboratory are pressurized dry chemical (Type BC or ABC,) and carbon dioxide extinguishers. These are for normal combustibles like paper, wood or furniture, flammable liquids and electrical fires. In addition, you may also have a specialized Class D dry powder extinguisher for use on flammable metal fires. For additional information on fire safety and fire extinguishers see Appendix M.

9.7. Chemical Spills Bucket:
Every lab should have a chemical spill bucket near a posted sign. They can be obtained from the chemistry stockroom. They contain the following:

- 2.5 gallon HDPE bucket and screw top
- PPE: gloves, goggles, apron, dust mask
- Scraper and scoop

- Acid spill: Sodium sesquicarbonate
- Base spill: Citric acid
- Solvent spill: Magic sorb
- Hazardous Waste label

Use the bucket to contain the spilled material and dispose of properly. See the Chemical stockroom for refilling spill kit supplies when needed.

9.8.Safety Showers and Eyewash

Safety showers are located in the loading dock entrance and all labs in Bewkes. They are inspected annually by facilities (information recorded on inspection tag). If there are any problems call in a work order to facility operations at x-5601.

Safety eyewash stations should be located in each laboratory. Fountain type eyewash stations are recommended. Hand held saline solution bottles can be used in addition to an eyewash fountain but can not replace them. Safety showers are inspected annually by facilities. In addition, each lab supervisor should flush their eyewash station weekly and record it on the inspection tag. See Appendix N for additional information on safety shower and eyewash stations. Some of the specifications of ANSI Z358.1-1990 are listed as follows: Plumbed emergency eyewash units must be able to deliver not less than 1.5 liters (.4 gallons) of clean water per minute. The water must be readily available to wash both eyes simultaneously and the flushing streams must rise to approximately equal heights. The emergency eyewash units must be designed to provide flushing water velocities which are not injurious to the eyes. The eyewash area must be spacious enough to allow the eyelids to be held open, with both hands at once, while the eyes are in the water streams. The nozzles must be protected to prevent freezing of the flushing water in cold weather and contact with airborne contaminants. Nozzle covers must not require a separate motion by the operator to be removed when activating the emergency eyewash unit. The flow control valve must be designed so the water flow remains on without requiring the use of the operator's hands. The flow valve must be simple to operate and must go "on" in 1 second or less and must be resistant to corrosion from potable water. The flow valve actuator must be large enough to be easily located and easy to operate.

Safety showers and eyewash stations should only be used for emergency situations. Under no circumstances should the eyewash station be used to clean glassware or wash hands.

In the event of a science building water outage, facility operations will send out a campus wide E-mail AND notify the Chemical Hygiene Officer (229-5105). If the CHO is unavailable, contact the Biology Senior Secretary (229-5294). This will enable a timely communication to everyone that will be impacted by the water outage. It is recommended to cancel lab if hazardous chemicals and/or biological agents are being used. However, it is up to the faculty's discretion to continue or cancel lab based on the hazards associated with their specific lab. All laboratories must have backup saline solution eyewash bottles for emergency use in the event of a water outage. In addition, all labs should have several gallons of water set aside to rinse glassware and wash hands in the event of an unscheduled water outage.

10. MEDICAL CONSULTATIONS

All college employees working with hazardous chemicals in a laboratory setting shall have an opportunity to receive medical consultation, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

10.1. If an employee develops signs or symptoms associated with a hazardous chemical to which they may have been exposed.
10.2. There has been a spill, leak, explosion, or other occurrence in the work area resulting in the likelihood of a hazardous exposure.
10.3. If exposure monitoring reveals that a PEL or action level is routinely violated for any OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements.

In the event a medical consultation is deemed necessary, the Director of Environmental Health and Safety will complete the injury report (See Human Resources Forms Page for accident form). This report will be forwarded to the Director of Human Resources, who will make the necessary arrangements with Health Services, or other local health care providers. In addition, employees who need to wear respirators to control chemical exposures must have a medical examination prior to wearing the respirator to ensure they are physically able to wear one.

11. EMERGENCY PROCEDURES/CONTINGENCY PLAN

All college employees using hazardous chemicals and/or generating hazardous wastes should be thoroughly familiar with the proper chemical/waste handling and emergency procedures relevant to their responsibilities during normal institutional activities and foreseeable emergencies. For a more detailed description of the college's emergency procedures/contingency plans, refer to the Emergency Preparedness Plan located in Security and Safety. The following outlines those basic procedures.

11.1. Emergency Preparedness

All chemical users and/or waste generators should be prepared for emergencies before they engage in work with such materials. Emergency preparedness begins at a minimum with the following:

- Be prepared for chemical spills, or spills of hazardous/universal/other wastes;
- Before you begin using hazardous materials, be familiar with the MSDS for the appropriate containment materials and safety precautions;
- Ensure the appropriate emergency equipment, such as fire extinguishers, first aid equipment, emergency eye washes and/or showers, and spill equipment, is accessible as required; and
- Know the procedures for handling those emergencies that may arise in your work area.

11.2 Level 1 Emergencies

Level 1 emergencies, otherwise referred to as incidental or incipient emergencies are those that do not pose a significant threat to life, the environment or property. Level 1 emergencies are routine occurrences that can be handled safely by operational employees in the immediate work area or by maintenance personnel. Common examples of Level 1 emergencies include:

- Minor/incidental spills that pose minimal risk to safety, health or the environment;
- First-aid injuries that can be safely treated by Safety and Security (315) 229-5555 and
- Minor fires that can be safely extinguished with a hand-held fire extinguisher.

Minor/Incidental Spills

Minor/incidental spills that do not pose a significant safety, health or environmental hazard may include any of the following:

- A spill of a hazardous chemical, such as a solvent like acetone, in a laboratory in quantities not to exceed 1 liter (as a general rule of thumb), that can be safely isolated and contained by lab personnel with staged spill kits;
- A broken universal waste lamp in a maintenance area that again can be safely isolated and contained by trained maintenance personnel with the appropriate equipment; and
- A spill of used oil on a concrete floor within a maintenance area that can be immediately controlled and cleaned up before the oil reaches any release pathways.

Minor Spill Response Steps

- Immediately alert area/nearby personnel, secure the scene, and notify your supervisor.

- The supervisor shall make the determination as to whether or not the spill can be safely controlled and cleaned up by trained individuals with the appropriate equipment, or whether an evacuation and Campus Safety notification is necessary.
- Put on the appropriate personal protective equipment located within your workstation or in a nearby spill kit.
- Deploy spill absorbent/neutralization materials upon the spill as necessary.
    - Spill kits in laboratories have three absorbent/neutralization materials for this purpose; sodium sesquicarbonate for acidic spills, citric acid for basic spills and Magic-Sorb for solvent/other spills;
    - Spill kits in garage/maintenance areas have spill pads/pillows, oil booms, and speedi-dry for absorbent purposes.
- Once the chemical or waste has been controlled, absorbed and/or neutralized, consolidate the spill cleanup materials be sweeping inward, and collect in a suitable container.
- Notify your departmental chemical hygiene officer or department administrator that you have a full container of spill cleanup materials, label it and have it picked up by the Chemical Hygiene Officer.

Minor First-Aid Injuries

First-aid injuries in general include those that will not require medical treatment, and can be safely and thoroughly addressed by first-aid kits deployed by security and safety. These types of incidents include, but are not limited to, minor cuts, scrapes and abrasions, as well as topical burns and foreign bodies not embedded in the eye. Injuries beyond those that are minor in nature, such as chemical splashes in the eye thus requiring the engagement of an emergency eye wash followed by medical treatment, must be immediately conveyed to Campus Safety, who will notify the appropriate response agency/personnel. The procedures for responding to a minor first-aid incident are as follows:

- The injured individual will immediately notify his/her supervisor, who will assist in determining the nature and severity of the injury.
- Call Campus Security and Safety (315) 229-5105 to come to the site to administer first aid.
- In the event blood is dripped upon the floor or other surfaces, the supervisor will notify the area custodian or Facilities Operations, who will take the necessary precautions to clean up the bloodstained areas.
- The supervisor must then complete the required accident report http://www.stlawu.edu/sites/default/files/resource/incident_report.pdf. Upon completion the form must be forwarded to the Human Resources Department.

Minor Fires

In the event of a fire:
Call Safety & Security (315) 229-5555
Safety and Security will report the fire to 911.

Although a properly trained individual with the appropriate ABC rated fire extinguisher may easily extinguish minor fires involving isolated pieces of equipment, fires in general are inherently extremely dangerous. Since university personnel will not engage in fighting uncontrolled fires, the key to knowing the difference between a “minor” and “major” fire is **discretion**. Should there be

any question as to the nature and dangers involved with a fire, fires should be considered an emergency incident, requiring the immediate evacuation of all area personnel and building occupants, followed by the notification of Campus Safety. In general, using fire extinguishers to extinguish a fire would not be appropriate if any of the following conditions exist:

- The fire could block your only exit;
- The fire is large, and/or is spreading quickly or uncontrollably;
- The type or size of the fire extinguisher is wrong or insufficient; or
- You have not been properly trained on using a fire extinguisher.

If the fire blocks your egress, personnel trained in the use of fire extinguishers may proceed to extinguish the fire as follows:

- **Retrieve** the appropriate ABC rated fire extinguisher staged from a safely accessible location, and alert someone near to you to notify Campus Safety;
- **Pull** the trigger pin;
- **Aim** the extinguisher nozzle toward the base of the fire;
- **Squeeze** the handle or trigger to activate the device; and
- **Sweep** the nozzle of the fire extinguisher in a side-to-side motion, applying the dry chemical to the fire from the base of the fire up, until the fire is adequately suppressed or the extinguisher is empty.

If the fire cannot be extinguished immediately it is now a Level 2 Emergency.

11.3 Level 2 Emergencies

Level 2 emergencies are those that pose some threat to health, safety or the environment, and typically require:

1. localized evacuations from buildings/groups of buildings on campus,
2. employee/student congregating at designated assembly points, and
3. the notification of trained outside emergency responders (i.e., the local fire department, ambulance services, police, private Hazmat teams).

Common examples of Level 2 emergencies include:

- A 5-gallon spill of a highly flammable solvent in a scientific laboratory;
- An actual or potential fracture injury at the Physical Plant; and
- An equipment fire that is large in size and blocking an exit.

Follow these actions in a Level 2 Emergency:

- Immediately notify and evacuate all personnel in the area of the emergency incident.
- Contact Campus Safety at 315-229-5555 from a secure location, and be prepared to provide the dispatcher with as much information relative to the emergency, including the following:
    - Your name and phone number;
    - The nature of the emergency incident;
    - Location of the incident (be as specific as possible);
    - The name and/or type of substance(s) involved (if known);
    - The approximate quantity of substance(s) released;

  - The hazards involved (i.e. flammables, explosives, corrosives, toxics, etc.);
  - Advise if there are any injuries thus requiring an ambulance.
- The individual(s) making the initial notification to Campus Safety should secure the area to the safest extent possible, until he/she is relieved by a more experienced or senior university official. Under no circumstances should anyone attempt a rescue operation, fire-fighting, or a spill response during an emergency incident. Toxic substances commonly have no odor or other warning properties, and untrained personnel can only worsen the initial emergency incident.
- Campus Safety will immediately dispatch security personnel to the scene, and will notify the primary facility emergency coordinator(s), or any alternates as required.
- The Incident Commander will then authorize which outside emergency response organization(s) will be contacted to safely respond to the emergency incident, and will take any further action in accordance with the Emergency Response Manual.

Overexposure to Hazardous Material: Get medical help immediately by calling Safety and Security at (315) 229-5555. Check the MSDS for first aid instructions. The following general guidelines are appropriate initial procedures for overexposure to most chemicals.

- Eyes: Flush with water for fifteen minutes.
- Ingestion: Follow label and MSDS instruction.
- Skin contact on a substantial area of the body: Stand under emergency shower, activate the water flow, and remove contaminated clothing immediately.
- Inhalation: Get to fresh air and get prompt medical attention.

11.4 Level 3 Emergencies

Level 3 emergencies, otherwise referred to as catastrophes, are those occurrences that pose a significant threat to life, the environment or property, and will typically involve a great number of emergency responders/response agencies, and resources. Common examples of Level 3 emergencies include:

- A natural disaster resulting in the widespread disruption of essential functions/services on campus; and
- A terrorist attack or downed airplane on campus.

In the event of a Level 3 emergency, emergency responders and local/state/federal authorities will likely assume on-site decision-making. See the University Emergency Preparedness plan for more information.

11.5 Other Emergencies

Power Failure:

- Loss of electric power could result in fume hood failure and loss of lighting, ventilation, refrigeration, computers, GCs, and other essentials. When loss of power occurs, hood sashes will be closed and heating elements, equipment, and other electrical devices will be turned off. If the power failure is prolonged (more than 3 hours) the department chair should be notified and generators will be arranged to preserve the contents of appropriate freezers.
- After being secured, evacuate the laboratory. When chemical reactions releasing hazardous chemicals are present, a sign will be posted and the hood(s) will be left on in that area. Re-entry to the area will be allowed only after power has been restored and a suitable amount of time for ventilation of the area has occurred. Notify your professor of the situation.

Loss of Water:

- All hazardous laboratory work should cease in the event of water loss. Loss of water supply can render safety showers, eyewash fountains and reaction column cooling inoperative.

12. EMPLOYEE INFORMATION AND TRAINING

The Chemical Hygiene Officer shall develop a general employee training program to meet the information requirements of the Lab Safety Standard. It is the responsibility of the department to assure their employees attend the required training. In addition, it is the responsibility of each department to provide its employees training for activities which are unique and/or specific to that department. The Chemical Hygiene Officer is available for assistance in the development of these programs.

12.1. Mandatory Employee Informational Training and Orientation

All college employees working in a laboratory setting shall be trained upon, and informed of the location and availability of, the following:

- 29 CFR Part 1910.1450 "Occupational Exposures to Hazardous Chemicals in Laboratories" (OSHA Lab Standard).
- The St. Lawrence University Chemical Hygiene Plan (CHP).
- Reference materials on chemical safety, including Material Safety Data Sheets (MSDS's).
- Permissible exposure limits (PEL's) for OSHA regulated substances, or if there is no applicable OSHA Standard, the recommended exposure limits (REL's) as per NIOSH, or threshold limit value (TLV's) as per the ACGIH.
- Signs and symptoms associated with exposure to hazardous chemicals found in the lab.

This type of informational training shall be required at the time of an employee's initial assignment, and shall be repeated annually thereafter. It will be the responsibility of the employee's department to coordinate this training with the Chemical Hygiene Officer. This training will be documented and the training records will be maintained by Human Resources. Appendix P provides an example of how this informational training and orientation will be documented accordingly.

12.2. Mandatory Laboratory Training

All college employees working in specified laboratories shall be trained upon the following:

- The specific details of the Chemical Hygiene Plan applicable to the individual lab.
- Any other department or lab-specific SOP's developed for such activities.
- Methods and observations that may be used to detect the presence or release of hazardous chemicals, such as air monitoring, continuous monitoring devices, or the visual appearance or odor of hazardous chemicals.
- The physical and chemical hazards of chemicals in the work/lab area.
- The measures employees can take to protect themselves from these hazards, including specific procedures that have been implemented to protect employees from exposure to hazardous chemicals, such as safe work practices, engineering controls, emergency procedures, and personal protective equipment.

This type of laboratory training shall be required before employees work with hazardous chemicals in the lab setting. It will be the responsibility of the lab supervisors and Departmental Chemical Hygiene Officers to devise and implement this type of training. Appendix Q provides a recommended worker agreement form by which lab supervisors/Departmental Chemical Hygiene Officers may document this training.

12.3. Non-Mandatory Lab Training

Although students registered in laboratory courses where hazardous chemicals are used are not required to be trained by the mandatory elements described above, student safety and training should be an integral part of every laboratory course curriculum. Student safety and training programs should be sufficient enough to address the type, variety and nature of the chemical and physical hazards posed by the laboratory course. Department chairs and lab supervisors are charged with devising and implementing such student safety and training programs in accordance with these non-mandatory recommendations, with assistance from the Chemical Hygiene Officer. Appendix R provides an example of a recommended lab safety agreement form that can be utilized to document this process. The training records will be kept by the department chemical hygiene officer.

13. CHEMICAL FACILITY ANTI-TERRORISM STANDARDS

On April 9, 2007 the U.S. Department of Homeland Security issued an Interim Final Rule regulating the security of high risk chemical facilities. This was done under authority of the Department of Homeland Security Appropriations Act of 2007, which was signed by President Bush on October 4, 2006.

A list of Chemicals of Interest (COI's), Appendix A of the regulation, includes this list of regulated chemicals and their Screening Threshold Quantities (STQ's. If a facility stores, uses or ships any of the COI's in amounts exceeding an STQ, the facility must then comply with the requirements of 6 CFR Part 29, the Chemical Facility Anti-Terrorism Standards.

No chemical listed in this Standard may be purchased in amounts exceeding the Screening Threshold Quantity without first notifying Environmental Health and Safety Office. The EHS Director will then contact the Department of Homeland Security to conduct a Top Screen, as required by law.

Appendix T lists the Chemicals of Interest. If you need assistance interpreting the information please contact the Chemical Hygiene Officer.

Document History:

Date	Change(s)	Contact Name
8/28/01	Old Chemical Hygiene Plan	Elli Rupp
5/12/05	Updated responsibility section. Added required sections on medical consultation, materials requiring prior approval and procedure for writing lab specific SOPs. Updated training requirements. Added information on waste management. Added information and procedures on lab hoods. Added section on hazardous chemical storage guidelines, safety and protective measures. Added Appendices with detailed reference material.	Sue Kenney
12/18/2006	Updated contact person information	Suna Stone-McMasters
12/20/2010	Updated names of RSO and Health Center. Section 3.15.4.4 added information about MSDSOnline.com. Section 3.4.5 HASP information is not posted on the website or provided directly to the Fire Department, it is shared via SARA Title III reporting. Added section 13 to address CFATS, the Dept. of Homeland Security Chemical Facility Anti-terrorism Program, and Appendix T listing the chemicals of interest.	Suna Stone-McMasters
12/19/2011	Reviewed, no changes	Suna Stone-McMasters
12/17/2012	Reviewed, no changes	Suna Stone-McMasters
12/23/2013	Reviewed, no changes	Suna Stone-McMasters
2/19/2015	Remove Kathy Boak from contact list. Update web links. Change Ted Coviello to Theresa Simoni	Suna Stone-McMasters
7/15/2015	Added full security number, updated emergency response procedures, updated contact information, Removed 3E contact information for access to MSDS and changed MSDS resource to MSDSOnline	Suna Stone-McMasters
