

Title:	<i>SAFE WORK PRACTICE #6:</i> SAFE WORK PRACTICES FOR MECHANICAL EQUIPMENT TO PROTECT AGAINST CHEMICAL EXPOSURE
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This Safe Work Practice is approved and maintained by the Faculty of Science Safety Committee. Please contact Leanne Lucas, Safety Advisor–Science Activities, with any questions or concerns (leanne.lucas@smu.ca)

1. PURPOSE

To outline how the mechanical equipment in the Faculty of Science is maintained and controlled to prevent exposures to chemical hazards. To outline how to mitigate hazards by conducting a Hazard and Control Assessment.

2. SCOPE

- 2.1** This document is controlled by the Dean of Science with specific responsibilities assumed by the Senior Director of Facilities Management and the Departmental Chairs/Program Coordinators.
- 2.2** Facilities Management is responsible for fixed in place mechanical equipment that controls exposure to chemicals. Specifically, but not limited to, ventilation equipment (e.g. fume hoods, fume extractors, etc.) and fixed chemical storage locations.
- 2.3** With support from the Safety Advisor, Science Activities, the Chairs/Program Coordinators and Laboratory Supervisors (Laboratory Instructors and Principal Investigators) are responsible for:
- (i) elimination or reduction of hazardous chemical use;
 - (ii) proper placement of warning signs;
 - (iii) requisite WHMIS or other training of persons;
 - (iv) handling of chemicals in accordance with corresponding standard operating procedures (SOP); and
 - (v) the proper use of personal protective equipment (PPE).

2.4 Work involving unknown chemicals, new chemicals or processes, or physical changes to labs requires a **Hazard and Control Assessment** to assess the level of risk and risk mitigation strategies.

3. DEFINITIONS

3.1 “Fixed in place mechanical equipment” is any non-portable mechanical equipment that is intended to reduce exposure levels to hazardous chemicals.

3.2 “Hazardous chemical” is a chemical that has properties with the potential to do harm to human or animal health, the environment, or capable of damaging property. This includes but is not limited to chemicals with a safety data sheet (SDS). Examples: solvents, volatiles, toxic substances, petroleum products, or paints that produce volatiles, particulates, dust, vapour, fumes, or smoke, etc.

3.3 “Hazardous process” is any process or activity where raw starting materials, the intermediate or finished products, or by-products or wastes may:

- (i) cause physical impairment or harm to persons engaged in or exposed to said process, or
- (ii) result in pollution of the environment or property damages. Examples: liquid nitrogen handling, radioactive material handling, unmonitored chemical reaction experiments, etc.

4. EQUIPMENT AND SUPPLIES

4.1 General HVAC (Heating, Ventilation, and Air Conditioning) system, fume hoods, fume extractors, scrubber systems and other fixed systems designed to reduce hazardous chemical exposure are the responsibility of the Senior Director of Facilities Management. Warning signs should be reviewed by Facilities Management to ensure consistency.

4.2 All other portable control equipment, supplies, warning signs and protective equipment are the responsibility of the Departmental Chairs/Program Coordinators and Laboratory Supervisors (Laboratory Instructors and Principal Investigators) of the Faculty of Science.

5. PROCEDURE

5.1 Hazard and Control Assessment and Evaluation

5.1.1 The Hazard and Control Assessment form (see References for link) is filled out by an individual familiar with the proposed work, which may include graduate students, staff, or faculty members. Please refer to Chapter 3 of the Saint Mary’s University OHS Program for additional information on how to conduct an assessment.

5.1.2 The assessment will be evaluated by the person responsible for the task or space (Laboratory Supervisor: Laboratory Instructor or Principal Investigator), Department Chair, and the Safety Advisor, Science Activities. Review by the Dean of Science and Senior Director of Facilities Management is required for assessments involving changes to power or ventilation systems. Evaluation tests may be necessary to define the risk better, and this may require outside professional assistance.

5.1.3 Any change in chemical exposure control processes shall only be addressed after a written Risk Assessment is received and reviewed by the departmental chair(s) involved in the change, the Safety Advisor – Science Activities, the Dean of Science, and the Senior Director of Facilities Management.

5.2 Control Options and Actions

5.2.1 Strategies for mitigation of potential hazards can follow the hierarchy of controls.

5.2.1.1 Elimination of hazardous chemical or process. Is this chemical or process necessary for the teaching or research objective?

5.2.1.2 Substitution of a less hazardous chemical or process. Can we use another chemical or process, or less hazardous form of the chemical (e.g. more dilute) to carry out the process effectively and meet the teaching/research requirement?

5.2.1.3 Specific training from qualified personnel shall be provided to the operators with regards to potentially hazardous chemicals or processes, to ensure safety and prevent unsafe exposures. An SOP shall be developed and ready for use.

5.2.1.4 Engineering controls must be used to reduce the chemical hazard to an acceptable level. Define the types and levels of hazardous chemicals and select the best engineering control. Choice of engineering controls may require professional assistance and specific testing of airborne contaminant levels.

5.2.1.5 Personal protective equipment used when dealing with chemical hazards may include, but is not limited to: lab coats, safety glasses (with side shields), goggles, face shield, minimal exposed skin, and gloves. PPE is to be selected as necessary for the task, and shall always be worn as required.

5.2.1.6 If the necessary equipment to adequately reduce the risk associated with a hazard is not available, the work will not proceed. This applies to both teaching and research activities.

5.3 Post Control Action Installation

5.3.1 For fixed in place mechanical systems, the Senior Director, Facilities Management, shall ensure the unit or system is operated and maintained as per manufacturer's or designer's specifications and keep a record to that effect.

5.3.2 All warning signage should be standardized and reviewed by Facilities Management.

5.3.2.1 If an experiment is to continue unattended OR outside of regular working hours (i.e. evening, overnight, weekends and holidays) the Laboratory Instructor shall complete the **Experiment in Progress Form**. The form must be prominently displayed on the lab door outside of the teaching area. A duplicate copy of the form may also be posted on or near the equipment in use (e.g. growth chamber door, fume hood, glove box). The form includes contact information for the Laboratory Supervisor (Laboratory Instructor or Principal Investigator), as they will be contacted if there is an issue with the experiment. If there is a concern about posting personal contact information publicly, a Teams phone number may be used and set to forward to a personal number. Students, staff, or faculty working alone during evenings or weekends should advise Security when they arrive and leave campus. Security will check on those working alone during

their rounds, as part of the Lone Worker/Student program. Ensure the warning sign contains the following information, based on WHMIS categories:

- 5.3.2.1.1 Class of chemical (e.g. flammable and subclass).
- 5.3.2.1.2 Signal Words and Hazard Statements.
- 5.3.2.1.3 Hazard Pictogram(s).

5.3.3 All Hazard and Control Assessments must be reviewed and approved by those assigned responsibility. ~~Risk~~ Completed Assessments must be kept on file.

6. REFERENCES

6.1 Science Safety Documents:

Experiment in Progress Form

Hazard and Control Assessment

<https://www.smu.ca/faculty-of-science/science-safety-documents.html>

6.2 Fundamentals of Industrial Hygiene, B Plog et al, National Safety Council, 1011 pages, 1996.

6.3 Part 5 Handling and Storage of Materials, Occupational Health and Safety General Regulations, Nova Scotia.

https://novascotia.ca/just/regulations/regs/ohsgensf.htm#TOC1_5

6.4 OHS Program Manual Chapter 3 – Hazard Identification, Risk Assessment, Risk Control. Saint Mary's University. <https://www.smu.ca/about/ohs-programs.html>

7. REVISION HISTORY

Date	Version	Summary of changes
2024-11-08	v1.0	New SWP. Replaces Work Instruction SOP-FSSC-WI-006 Revision 17 (Jan. 18, 2021). Clarified purpose. Added new form and updated procedure to reflect use of the new form. Updated references.