

**LABORATORY SAFETY
PROGRAM**

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1.0 INTRODUCTION AND SCOPE

The laboratory is a workplace that may contain numerous potential hazards which include but are not limited to corrosive, flammable, reactive and toxic substances; biological hazards; radiological hazards; cryogenics; pressure and vacuum systems; glassware; electrical hazards; mechanical hazards; and other physical hazards.

The University of Toronto is committed to protecting the health and safety of its employees, students and visitors, in accordance with its Health and Safety Policy and its responsibilities under the Occupational Health and Safety Act of Ontario.

The **Laboratory Safety Program** has been developed by the [Office of Environmental Health and Safety](#) (EHS), and is intended to assist the University community in minimizing the risks associated with activities in the laboratory.

The basic elements of the program are:

- 1) the adherence to appropriate design criteria when designing and constructing a laboratory facility (Laboratory Construction Design Standards) and the procedural requirement for decommissioning a laboratory facility ([University of Toronto Laboratory Decommissioning Procedures](#)).
- 2) the identification and communication of [responsibilities](#) to laboratory supervisors and workers;
- 3) the provision of [information and labelling](#);
- 4) the [training](#) and education of laboratory workers;
- 5) the use of [personal protective equipment](#) where there is the potential for exposure to or contact with chemical, biological or physical agents;
- 6) the use of appropriate [laboratory safety equipment](#);
- 7) the provision of written safety procedures for activities involving hazardous work in the laboratory;
- 8) the requirement for proper [disposal of hazardous wastes](#);
- 9) the requirement for [reporting accidents/incidents](#) involving laboratory work;
- 10) the documentation and provision of [emergency procedures](#) in the laboratory; and
- 11) the provision for auditing the implementation and effectiveness of the program.

Objective of the Laboratory Safety Program

It is the objective of this laboratory safety program to minimize the risks associated with operations in the laboratory in accordance with the [University Health and Safety Policy](#) and the provisions of the Occupational Health and Safety Act of Ontario.

Scope

This program applies to all activities in the laboratory where there exists the potential for personal injury or property damage and to all those identified as laboratory supervisors/principal investigators and laboratory workers. Other University of Toronto health and safety programs provide more detailed operating procedures than is included in this general Laboratory Safety Program. As appropriate, laboratory supervisors and workers must refer to programs/manuals such as the [Hydrogen Fluoride Protocol](#), [Liquid Inert Cryogenic Usage Standard](#), [Biosafety Manual](#), [Radiation Protection Manual](#), [Laser Safety Manual](#), etc. Links to these documents can be found in this program, and can also be found on the EHS website.

2.0 DEFINITIONS

Laboratory

A laboratory is a workplace where relatively small quantities of hazardous chemical, biological or radioactive substances are used for the purposes of scientific research, experimentation or analysis.

Laboratory Worker

Any individual (e.g. faculty, staff, student) who conducts activities in a laboratory or who work sufficiently close to activities conducted in a laboratory.

Laboratory Supervisor/Principal Investigator

Any individual who has charge of a laboratory, laboratory worker or visitor.

Workplace Hazardous Materials Information System (WHMIS)

WHMIS is a regulation made under the Occupational Health and Safety Act of Ontario; it includes provisions for labelling, material safety data sheets (MSDSs) and worker training in workplaces where individuals are exposed or likely to be exposed to hazardous chemicals ([Instructions on Accessing Online WHMIS Training](#)).

3.0 RESPONSIBILITIES

The effectiveness of the Laboratory Safety Program is directly related to the realization of responsibilities by all pertinent parties. This section outlines the responsibilities within the University for the implementation of this program.

3.1 Department Heads

Department Heads have the following responsibilities under this program:

- 1) To identify all laboratory supervisors and ensure that they clearly understand their duties and responsibilities as defined in this program;
- 2) To ensure that all components of the laboratory safety program are implemented in the department.

3.2 Laboratory Supervisors/Principal Investigators

Laboratory Supervisors have charge of a laboratory, laboratory worker or visitor, and must be knowledgeable about the hazards, control measures, waste procedures and safety procedures associated with activities in the laboratory, the education and training requirements, as well as the other requirements of this program. They have the following responsibilities:

- 1) To implement this program in their workplace;
- 2) To ensure that all laboratory workers clearly understand their responsibilities as defined in this program;
- 3) To ensure that laboratory workers have received appropriate training in hazard information, safety rules, proper work practices, etc., and also that they have access to a copy of this program;
- 4) To provide health and safety information, including "Material Safety Data Sheets" for hazardous agents used in their laboratory;
- 5) To ensure that all containers in their laboratory are appropriately labelled as per the Ontario WHMIS regulation;
- 6) To provide written safety procedures for activities involving hazardous work in the laboratory;
- 7) To ensure that the appropriate safety equipment, such as fume hood facilities, eyewash units, safety showers, fire extinguishers, etc. are accessible, operable, and known to all laboratory workers;
- 8) To provide and enforce the use of appropriate personal protective equipment where there is the potential for exposure to or contact with chemical, biological or physical agents;

- 9) To ensure that appropriate warning signs are placed in the laboratory;
- 10) To implement and enforce laboratory safety rules for all laboratory workers and visitors;
- 11) To provide for and enforce the proper disposal of hazardous wastes;
- 12) To report all accidents/incidents to the Health and Well-being Programs and Services within 24 hrs of occurrence.

3.3 **Laboratory Workers**

Laboratory Workers are individuals who conduct activities in the laboratory or sufficiently close to activities conducted in the laboratory. They have the following responsibilities:

- 1) To participate in appropriate training sessions;
- 2) To be familiar with the hazards and safety procedures for activities involving hazardous work in the laboratory, as well as, information systems, such as Material Safety Data Sheets for hazardous chemicals used in the laboratory;
- 3) To be familiar with the labelling requirements of the WHMIS regulation;
- 4) To work in accordance with written safety procedures for activities involving hazardous work in the laboratory;
- 5) To use the appropriate laboratory safety equipment and personal protective equipment provided;
- 6) To follow all laboratory health and safety rules;
- 7) To follow procedures related to the proper disposal of hazardous wastes;
- 8) To promptly report all accidents/incidents and unsafe conditions to the laboratory supervisor/principal investigator.

3.4 **Office of Environmental Health and Safety**

The Office of Environmental Health and Safety has the following responsibilities within the Laboratory Safety Program:

- 1) To provide technical advice and recommendations to the University community on matters related to health and safety in the laboratory;
- 2) To provide collection and disposal services for hazardous waste;
- 3) To audit the effectiveness of this program on an on-going basis.

4.0 LABORATORY DESIGN, CONSTRUCTION, DECOMMISSIONING

Before the construction of a new laboratory or the renovation of an old one, all health and safety considerations must be evaluated carefully and, as appropriate, protective measures incorporated into the laboratory design. When a laboratory is being vacated, it must be properly decommissioned; advance planning enables the University to effectively decommission research space and eliminates the need for costly emergency decommissioning of facilities.

4.1 New Construction/Renovation

The construction of new laboratories or renovation of old ones must be done in accordance with Capital Projects (Design and Engineering) laboratory design standards (Laboratory Construction Design Standards) Close communication is essential between laboratory supervisors, laboratory workers, Project Managers (Capital Projects), Property Managers (Facilities and Services) and/or the Office of Environmental Health and Safety.

4.2 Laboratory Decommissioning

Before a laboratory is vacated, the department should contact (as early as possible) the Office of Environmental Health and Safety to assist in planning the decommissioning of the laboratory and ensuring the proper disposal of hazardous biological, chemical and radiological agents in accordance with the [*University of Toronto Laboratory Decommissioning Procedures*](#).

5.0 TRAINING AND EDUCATION

Training is an integral part of this program. Academic institutions have a moral, professional and legal responsibility to train laboratory workers in safe laboratory practices. Laboratory supervisors must ensure that training occurs before an individual begins working in the laboratory.

- 5.1 All laboratory workers must have access to health and safety information, including [MSDSs](#) for hazardous materials used in their laboratory.
- 5.2 All laboratory workers must receive appropriate training in the safe handling, use and proper disposal of the hazardous materials with which they work.
- 5.3 All laboratory workers must be familiar with the labelling requirements of the [WHMIS](#) regulation.
- 5.4 All laboratory workers must be familiar with all safety procedures for activities/ techniques involving hazardous work in the laboratory.
- 5.5 All laboratory workers must be trained in emergency procedures, the proper use of appropriate safety equipment (e.g. fume hoods, eyewash units, deluge showers, fire extinguishers), and, where appropriate, in the proper use of personal protective equipment (such as eye and face protection, protective clothing, hand protection, foot protection, hearing protection and respiratory protection).
- 5.6 All laboratory workers must be familiar with appropriate procedures for dealing with fires that might break out in their laboratory, spillages of the substances handled in their laboratory and other accidents that have the potential for property damage and/or personal injury.
- 5.7 Please consult the Office of Environmental Health and Safety website for a list of currently available [health and safety training courses](#).

6.0 PERSONAL PROTECTIVE EQUIPMENT

Wearing proper personal protective equipment in the laboratory is **mandatory** when it is stipulated by policy, procedure or the material safety data sheet.

6.1 Protective Clothing (Laboratory Coats)

Appropriate protective clothing must be worn where there exists the potential for splashes or spills of hazardous substances. This clothing must be removed when leaving the laboratory area. The [\(University of Toronto Protective Clothing Standard\)](#) provides further details regarding the selection and use of appropriate protective clothing.

6.2 Hand Protection

Gloves must be worn whenever handling hazardous substances that can cause harm to the skin or can be absorbed through the skin. Gloves must be selected on the basis of the material being handled, the particular hazard involved, and their suitability for the operation being conducted. For further details, consult the [\(University of Toronto Protective Glove Standard\)](#).

6.3 Foot Protection

Appropriate shoes must be worn at all times in laboratories where there is a hazard of foot injury. Perforated shoes, sandals and the like must not be worn in the laboratories. For further details, consult the [\(University of Toronto Foot Protection Standard\)](#).

6.4 Eye and Face Protection

The [\(University's Protective Eye and Facewear Standard\)](#) requires that appropriate protective eyewear be worn by faculty, staff, students and visitors in all situations where there is a potential hazard of injury to the eye/face.

6.5 Hearing Protection

The [\(University's Hearing Protection Devices Standard\)](#) requires that appropriate hearing protection be worn by all those who work in noise hazard areas or who have the potential to develop noise-induced hearing loss as a result of their occupation, and where it is not practical or feasible to reduce or eliminate excessive noise exposure in the laboratory by means of engineering controls or work practices.

6.6 **Respiratory Protection**

Respirators provide personal protection either by removing contaminants from the air before they are breathed in (air-purifying respirators), or by supplying breathable air (atmosphere-supplying respirators).

The ([*University of Toronto Respiratory Protection Program*](#)) requires the use of respiratory protection for work which involves exposure to potentially hazardous environments (oxygen deficiency or airborne contaminants). The use of respirators may be required when engineering control measures are inadequate, during shutdown for maintenance or repair, or during emergencies.

7.0 SPECIAL PRECAUTIONS – PREGNANCY

Ideally workplace procedures should be set up with the assumption that any female worker could be pregnant at any time. However in some cases when laboratory workers become pregnant, it may be preferable to change procedures and restrict activities. The Office of Environmental Health and Safety (EHS) has a checklist available for supervisors and workers to conduct a self-assessment that helps to determine if further involvement by EHS is needed. If the checklist indicates that a full assessment by EHS is needed, then the supervisor or worker needs only contact EHS to arrange an appropriate time to conduct the assessment. For more information see the [Workplace Screening Tool for Pregnant Workers](#).

8.0 LABORATORY SAFETY EQUIPMENT

As appropriate, laboratories must be equipped with or have ready access to safety equipment that may include fume hoods, eyewash units, deluge showers, flammable storage cabinets and fire extinguishers.

8.1 Fume Hoods

In most laboratories, the fume hood is the primary device for the control of exposures to hazardous substances as it provides containment of operations which may release harmful gases, vapours or aerosols. The [\(University of Toronto Laboratory Fume Hood Standard\)](#) requires that these devices be appropriately selected, installed, used and maintained such that the health of laboratory workers is safeguarded.

8.2 Eyewash Units

Eyewash units are required by law in all laboratories where a person is exposed to a potential hazard of injury to the eye due to contact with a biological or chemical substance. These units should be located close to the hazard site and must always be fully accessible to laboratory workers and must be maintained properly and tested regularly. For further details, consult the [\(University of Toronto Emergency Eyewash and Shower Standard\)](#).

8.3 Deluge showers

Deluge showers are required by law where a person is exposed to a potential hazard of injury to the skin due to contact with a biological or chemical substance. These units may be located outside the laboratory but must always be accessible to laboratory workers and must be maintained properly and tested regularly. For further details, consult [\(University of Toronto Emergency Eyewash and Shower Standard\)](#).

8.4 Flammable Storage Cabinets

Flammable storage cabinets are required by law in all laboratories for the storage of flammable liquids that are not required for immediate use. The [\(University of Toronto Flammable Liquids Storage: Standard for Storage Cabinets\)](#) provides further details regarding labelling, maximum permissible quantities and good storage practices.

8.5 Refrigerators

The use of domestic refrigerators for the storage of highly volatile flammable liquids presents a significant hazard to the laboratory work area. If flammable liquids are to be stored, specially designed "explosion-proof" or "explosion-safe" refrigerators must be used. For further details, consult the [\(University of Toronto Flammable Liquids Storage: Standard for Refrigerators\)](#).

8.6 **Fire Extinguishers**

Portable fire extinguishers are designed to extinguish or control a small fire. They are not intended to fight a large or spreading fire.

Laboratories that use flammable liquids are equipped with multipurpose fire extinguishers, typically marked on the wall adjacent to each doorway. Fire extinguishers are required to be unobstructed, are to be visually checked and their tags initialled by laboratory supervisor/administrators on a monthly basis.

9.0 WRITTEN SAFETY PROCEDURES

When laboratory work involves the use of hazardous agents, **procedures** relevant to health and safety considerations must always be available to all laboratory workers. These procedures may be provided in the form of instructional manuals (prepared by the manufacturer of equipment or the laboratory supervisor/worker) or other appropriate written information to ensure compliance with safe work practices.

Written safety procedures should include the following information:-

1) Responsibilities

- supervisors/principal investigators
- laboratory workers/users

2) Information and Training

- provision of chemical safety information
- general and task-specific training
- training in the use of engineering controls, work practices and the use of personal protective equipment
- proper disposal of hazardous wastes

3) Hazards

- identification of hazards in the laboratory
- analysis of these hazards
- the University of Toronto has developed various programs in order to protect workers and the public from various hazards associated with potential exposure these programs include

[Hydrogen Fluoride Protocol](#)

[Chemical Storage Standard](#)

[Standard for Inert Cryogenic Liquid Usage](#)

[Control Program for Liquid Cryogenic Transfer Facilities](#)

[Biosafety Program](#)

[Radiation Safety](#)

4) Controls

- use of engineering controls
- use of safe work practices
- use of personal protective equipment

5) Emergency Procedures

- procedures in the event of a fire, chemical spill or exposure incident

6) Work Alone

- assess all hazards of your work
- assess all other circumstances of your workplace
- use of appropriate training and education
- use appropriate procedures when working with hazardous substances,

materials, and equipment

- The [**Lone Worker Program at University of Toronto St. George Campus, Mississauga Campus and Scarborough Campus**](#) is designed to create a safer environment for users
- [**Policy with Respect to Workplace Violence**](#)
- [**Policy with Respect to Workplace Harassment**](#)

10.0 HAZARDOUS WASTE MANAGEMENT

The University of Toronto manages the disposal of hazardous wastes through [Environmental Protection Services \(EPS\)](#) (Office of Environmental Health and Safety) and through Facilities and Services. The hazardous waste disposal procedures, as outlined in the University's [Laboratory Hazardous Waste Management Manual](#), are mandatory. **It is a serious offence to pour hazardous substances into the drainage system.**

10.1 Laboratory Supervisors/Principal Investigators must provide for and enforce the proper disposal of hazardous wastes.

10.2 Laboratory workers must follow procedures related to the proper disposal of hazardous wastes.

10.3 Chemical waste generators are responsible for:

- segregating incompatible combinations of chemical wastes;
- proper packaging and labelling of chemical waste;
- proper storage of chemical waste prior to collection;
- proper disposal of hazardous chemical waste --- not flushing this waste down drains or mixing with the general garbage.

10.4 Biological waste generators are responsible for:

- collection of biological waste (sharps, liquids, solids) in appropriate containers (see [Manual](#));
- proper labelling (CL 2 & 3) and storage until collected by EPS;
- For CL 1 using Not Marked autoclave bags, if applicable

10.5 Radioactive waste generators are responsible for:

- collection of radioactive waste (sharps, liquids, solids) in appropriate containers (see [Manual](#));
- proper labelling of containers, including permit number;
- storage and shielding prior to collection/removal by EPS.

11.0 ACCIDENT/INCIDENT REPORTING

- 11.1 University policy requires the reporting of all accidents/incidents which result in or have the potential to result in personal injury.

Reporting of accidents involving death, critical injury, lost time or health care is required for **employees** under the Occupational Health and Safety Act and the Workplace Safety and Insurance Act, while University policy requires the [Reporting of Accidents, Incidents and Occupational Illnesses](#) involving **students and visitors and other persons on University premises.**

12.0 EMERGENCY PROCEDURES

All laboratory workers must be trained to deal promptly with emergency situations involving fires in their laboratory, spillages of the substances handled in their laboratory and other occurrences that have the potential for property damage and/or personal injury. Procedures for these emergency situations must be provided in writing.

12.1 **Fires**

Each laboratory worker must be familiar with the following:-

- the procedure to follow when a "fire alarm" is activated;
- the "choice of" and when to "use/not use" fire extinguishers;
- how to deal with clothing fires;
- For more information see the [Fire Prevention](#) website.

12.2 **Spills**

Each laboratory worker must be familiar with the appropriate procedures for dealing with spills involving the hazardous substances handled in the laboratory. These include procedures for handling both major and minor spills, the use of appropriate personal protective equipment (e.g. hand protection, eye and face protection) and the use of appropriate safety equipment (e.g. eyewash units, deluge showers). Labs should be equipped with spill control materials appropriate to the materials present. For more information see the [Environmental Protection](#) portion of the EHS website.

12.3 **Medical Emergency/First Aid**

Each laboratory worker must be familiar with the availability of the designated first-aid personnel, equipment and facilities in his/her department, and the procedures to follow for major and minor injuries. For more information see the EHS [first aid page](#).

13.0 PROGRAM AUDIT

13.1 The Office of Environmental Health and Safety shall audit various components of this program on a periodic basis.

The audit may consist of but is not limited to the following:

- 1) inspections of laboratories to assess compliance with the Laboratory Safety Program;
- 2) review of training records to confirm that laboratory workers have had appropriate training in laboratory safety.

13.2 The pertinent joint health and safety committee, as part of its routine inspection of the workplace, may inspect laboratory facilities to determine compliance with the University Health and Safety Policy and the major provisions of the Occupational Health and Safety Act of Ontario.