



Laboratory Chemical and General Safety Program

Scope

This program applies to all laboratories at the University of Toronto where chemicals are used, and all laboratories where general hazards exist.

Introduction

Chemicals are used in most University of Toronto labs. The types of chemicals in use can range from extremely toxic gasses to largely non-toxic solids. Risk is an inherent part of most chemical usage and most research. The University of Toronto Chemical and General Safety Program seeks to reduce the hazard presented by the work required for University research to a level that is as low as is reasonably achievable. This document has been developed by the University of Toronto Office of Environmental Health and Safety (EHS). The Office of EHS assists researchers in reducing risks through provision of tools, standards and guidelines as well as through the verification of critical infrastructure items such as fume hoods and safety showers. The provision of inspections and advice on implementing inspection recommendations also form a core part of the activities of the Office of EHS.

This Program lays out the basic requirements of laboratories using chemicals and other general (non-biological, non-radiological) hazards. The Program needs to be read in conjunction with the Laboratory safety manual, as well as any referenced Policies, Procedures, Protocols, guidelines and tools.

Please note that this Program and the Manual are not an exhaustive, prescriptive set of rules that will eliminate risk – the dictates of the ever-changing University research environment do not allow for such rules. Instead, this Program and associated documents should be viewed as a non-exhaustive description of some known risks and techniques (best practices) that can be used to reduce the hazard of these known risks. There is a need for constant conscious thought on the part of lab leadership and users in order to anticipate potential “unknown” risks.

Pertinent Legislation

The primary governing health and safety legislation in Ontario is the Ontario Occupational Health and Safety Act (OHSA). OHSA covers all aspects of general and chemical safety in Ontario. For the most part the pertinent clauses are not prescriptive – they lay out the general requirements for training, instruction, and supervision, but without specifics. The broadest clause that catches all aspects of safety is sec. 25(2)(h) “take every precaution reasonable in the circumstances for the protection of a worker” (employee). This section’s wording includes all possible general hazards such as electrical, slips/falls and all other potential sources of injury in addition to any chemical hazards. The WHMIS Regulation (O.R.860) lays out details of required training on labelling and Material/Safety Data Sheets (M/SDS) but does not detail the exact content of the required workplace specific training. It merely says that employees must be trained on specific workplace hazards. The OHS Act specifies that workers must use and be supplied with protective equipment (PPE), specifies the hazards that must be



controlled and details the hierarchy for control of hazards, but does not say exactly what PPE is required or exactly how hazards must be controlled.

Hazard Levels

All Principal Investigators (PIs) responsible for laboratories where chemicals are used will indicate that they use chemicals during the grant approval process. A hazard level will be assigned to the lab after an initial visit from an EHS staff member.

Risk Assessment/Chemical Containment Levels

Due to the non-prescriptive nature of the legislation in Ontario, risk assessment becomes important for ensuring that all appropriate precautions have been taken and all due diligence requirements have been met. The Office of EHS provides various risk assessment tools to assist professors and lab managers in meeting their legislated duties.

The first step in the risk assessment process is that any PI using chemicals in a lab will indicate that they use chemicals during the Grant approval process. EHS will then visit the lab and classify it into one of three hazard levels – Limited, Standard, or High Hazard.

Graduate Students

Graduate students are considered by the University to be students rather than employees under the OHS Act, however the University of Toronto Health and Safety Policy ([insert link](#)) outlines how health and safety is to be handled for students. The Policy contains the following statements that are pertinent to student safety: “The University of Toronto is committed...to the provision of a safe and healthy...study environment.”; “Where reasonable, the University will strive to exceed the legislated requirements...” and; “the University is also committed to ensuring that health and safety is considered in all aspects of student life.”

Definitions

Lab User: Any individual that assigned to a lab in order to conduct laboratory activities, or to supervise other lab users.

Principal Investigator (PI): the professor responsible for a research group.

Designate: A member of the research group designated to act in the PI's stead in the event that the PI is unavailable, for instance abroad.

Responsibilities

Directors, Department Chairs

Directors and Chairs shall ensure PI's follow this program as required.



Principal Investigators and Lab Managers

PIs and Lab Managers will ensure that all Lab Users are appropriately trained and will take steps to enforce compliance with this Program and any other applicable UofT programs, standards, protocols etc.

Lab Users

Lab Users will follow all pertinent part of this Program and other applicable programs, standards, protocols etc.

Office of Environmental Health and Safety

The Office of EHS will conduct inspections as required by this program and will make recommendations to improve safety in the inspected labs. EHS will also maintain this program and revise it when necessary.

Inspections/Oversight

PI's or their designate should be inspecting the work/study space on a regular, informal basis. The "P.I. Inspection Checklist" (link) should be formally completed at least once a term or every 4 months.

The Office of Environmental Health and Safety will endeavour to conduct a chemical/general safety inspection on average at least twice annually for all labs that have a High Hazard Chemical Safety permit (C3). Inspections would be annual for a Standard Chemical usage classification (C2). Labs with a Limited Chemical Usage classification will be inspected once every two years on average. Note that resource issues may occasionally prevent achievement of the inspection goals.

Training

Laboratory WHMIS

The WHMIS and Lab Safety online training course or departmental equivalent shall be completed by all lab users prior to commencing work. A refresher should be completed once every 3 years.

Chemical Classification and Permit Definitions

The chemical hazard classes and High Hazard permit will follow the below general models. EHS will as needed refine the definitions with the approval of the Institutional Laboratory Safety Committee.

Limited Chemical Usage (C1)

The Limited chemical Usage classification is assigned to a lab that uses a small number of lower risk chemicals, often as an incidental activity. C1 labs use at most low toxicity solvents, low toxicity powders, and dilute acids. Examples of low toxicity solvents include ethanol, isopropanol and acetone. Dilute acids and bases are 1 Molar or less.

Standard Chemical Usage (C2)

Standard chemical usage (C2) labs use a larger number of higher hazard solvents and powders and strong/concentrated acids, but do not fit the definition of a High Hazard Chemical Lab.



High Hazard Chemical Permit (C3)

High Hazard Chemical labs are labs that use a large number of materials that are highly toxic, highly reactive, highly corrosive, carcinogenic, teratogenic, or nano scale. Labs making novel compounds are also included in this definition. The complete definition is available on the EHS website and the grant approval forms.

Inventory

An inventory of the chemicals present in the laboratory shall be conducted at least once per annum. This meets the requirements of the Fire Code and internal U of T best practice. Inventory may be conducted more frequently for financial tracking or operational purposes, but is only required annually for safety purposes.

Animal Work

Work with chemicals in animal models will follow the protocols established jointly by EHS and the UofT animal facility being used. Work at non-UofT animal facilities is not covered by this Program.

Protocols, Procedures, and Forms or Equivalent

As appropriate, the Office of EHS will produce documents to assist Faculty/Staff in following appropriate procedures for the safe use of chemicals in the Laboratory. These documents are for guidance and may not be strictly applicable in all cases.

Accident/Incident investigations

Accidents, incidents and near misses involving lab users will be investigated by EHS to a degree appropriate to the potential severity of injury or damage that could have or did result from the incident. Some incidents may require extensive follow up, while others may require none.

Gap analyses

On request from a Department or at the discretion of EHS the Gap Analysis Tool can be used to assess overall due diligence on the part of a department or faculty. The Gap Analysis Tool is based on the American Chemical Society (ACS) document; "Identifying and Evaluating Hazards the Research Laboratories".

Laboratory Safety Manual

This Program forms part of the Lab Safety Manual and should be read in conjunction with other documents and Programs contained in the Manual.

Every lab should have a copy of the lab safety Manual available for reference. The copy may be electronic or paper, but it should be up-to-date and lab users should know how to access it.