

**Department of Chemical Engineering and Applied Chemistry**

**Safety Manual for Researchers and Research Supervisors**

**2018**

## **Introduction and Purpose**

The purpose of this manual is to provide all Department employees, all registered students with the Department, visiting researchers, or anyone else doing work in the Department with a single source which outlines their responsibilities and duties under the Occupational Health and Safety Act, and lists Department and University Policies with respect to the application of the Act. A detailed overview of Supervisor's responsibilities may be found in the "Occupational Health and Safety Guide for Supervisors" (<http://www.utoronto.ca/safety/manindex.htm>), developed by the Office of Environmental Health and Safety and the University of Toronto. This manual is intended as a supplement to the University document; this manual also contains information relevant to all researchers in the Department of Chemical Engineering and Applied Chemistry.

For the purposes of the Occupational Health and Safety Act, all University employees are considered workers. This includes Faculty members, research, administrative and other support staff, and students, where they have been paid to perform work or supply services. The Act also defines a supervisor as anyone in charge of a workplace or with authority over a worker. Thus, Faculty members or principal investigators who oversee a research project are also considered to be supervisors.

All workers have legal obligations under the Ontario Occupational Health and Safety Act to ensure that all work is conducted in a safe manner. The purpose of the Act is to protect workers from health and safety hazards in the workplace, and to establish procedures for dealing with hazards in the workplace. This manual lists the Departmental and University policies developed in response to the Act. The basis of the Act is that the employer must take every reasonable precaution to protect workers, and workers are forbidden from disobeying safety regulations, and from knowingly working in an unsafe manner. Fines and/or by jail sentences may be (and have been) issued for violations of the Occupational Health and Safety Act.

The University and its employees must also abide by a number of other federal, provincial, and municipal regulations related to the Occupational Health and Safety Act. These regulations include, but are not limited to, regulations governing the disposal of wastes, the handling of designated substances, the handling and disposal of radioactive or biohazardous materials, and the transport and handling of dangerous goods.

Questions regarding specific details of the Occupational Health and Safety Act and related regulations should be directed to the Office of Environmental Health and Safety, 215 Huron Street, 7th Floor, University of Toronto.

## Table of Contents

<b>1. SUPERVISOR RESPONSIBILITIES</b>	<b>4</b>
<b>2. WORKER RESPONSIBILITIES</b>	<b>4</b>
<b>3. TRAINING REQUIREMENTS</b>	<b>4</b>
3.1 Primary Training	4
3.2 Supplementary Training	5
<b>4. REGISTRATION OF RESEARCH AND EXPERIMENTAL WORK</b>	<b>6</b>
4.1 Experimental Registration Forms	6
4.2 Special Forms and Permits	7
<b>5. MATERIAL SAFETY DATA SHEETS</b>	<b>8</b>
<b>6. DEPARTMENT POLICIES</b>	<b>8</b>
6.1 Incident Reports	8
6.2 Chemical Spills and Spill Kits	8
6.3 Biohazards	9
6.4 Radioisotopes	9
6.5 Designated Substances	10
6.6 Chemical Waste Disposal	10
6.7 Inventory Requirements	11
6.8 Chemical Storage and Transport	Error! Bookmark not defined.
6.9 Protective Apparel	11
6.10 Emissions	12
6.11 Safety Materials Required in All Laboratories	12
6.12 Smoking	12
6.13 Consumption of Food and Beverages	13
6.14 The Buddy System	13
6.15 Personal Safety and Security	13
<b>7. HEALTH AND SAFETY COMMITTEE</b>	<b>14</b>
<b>8. FIRST AID</b>	<b>15</b>
<b>9. UNIVERSITY OF TORONTO SAFETY SERVICES</b>	<b>16</b>
<b>10. EMERGENCY PROCEDURES</b>	<b>18</b>

## 1. Supervisor Responsibilities

Under the Occupational Health and Safety Act, supervisors have a legal duty to take every reasonable precaution to ensure that their workplace is safe. The following specific duties also apply:

- Supervisors must be familiar with the provisions of the Occupational Health and Safety Act, and with the University and Departmental policies as they apply to the workplace under their supervision.
- Supervisors must be knowledgeable about health and safety hazards (actual or potential) in their workplace, and must advise workers about these hazards.
- Supervisors must provide appropriate safety and protective equipment to workers, and ensure that this equipment is properly maintained.
- Supervisors must ensure that workers under their supervision properly use safety equipment, and that workers follow safe working procedures, as governed by the Act or by University or Departmental policies.
- Supervisors must maintain an up-to-date inventory of all hazardous materials in their workplace.
- Supervisors must ensure that all hazardous materials are properly identified and labelled, and that material safety data sheets are readily available for all hazardous materials.
- Supervisors must ensure that workers under their supervision receive and participate in safety training sessions.
- Supervisors must ensure that hazardous materials are disposed of in accordance with federal, provincial, municipal, University, and Departmental regulations.

## 2. Worker Responsibilities

As previously outlined, workers must comply with the Occupational Health and Safety Act and related regulations and policies. Specific duties include:

- Workers must use protective equipment as directed by the employer.
- Workers must immediately report unsafe working conditions and violations of safety regulations to their supervisor, or to the Chair of the Department or the Co-Chairs of the Departmental Safety Committee.
- Workers must not remove or tamper with protective devices required by the Act or by the employer.
- Workers must not work in a manner that may endanger themselves or any other worker.
- Workers must not engage in horseplay, pranks, or other potentially dangerous conduct.

## 3. Training Requirements

### 3.1 Primary Training

Under the Occupational Health and Safety Act, **all members** (faculty, staff and students) of the department **must** participate in comprehensive safety training before they begin work. The specific requirements vary, depending upon your status within the Department (i.e., undergraduate student, graduate student, postgraduate researcher, academic staff, or administrative or research support staff). Table 1 indicates the training sessions required.

**Table 1: Training Requirements**

<b>Status</b>	<b>Training Requirement</b>	<b>Timing</b>
<b>2nd yr Undergraduate student</b>	Half-day session	September
<b>4th yr Undergraduate student</b>	One-day session (1 <sup>st</sup> . day of CHE2222). Combination - in person and online training.	September
<b>Summer student</b>	Full-day session	May
<b>Graduate student</b>	Two-day session (CHE2222). Combination - in person and online training.	September, January
<b>Post-graduate researcher</b>	Two-day session (CHE2222). Combination - in person and online training.	September, January
<b>Academic or Research Support Staff (R. Assists, R. Assocs, PDF's, Lab Techs, V. Researchers, etc.)</b>	Two-day session (CHE2222). Combination - in person and online training.	
<b>New Administrative Staff</b>	On-line Training	

In all cases, participants will be required to complete and pass an examination related to their training session. The examination and/or training must generally be repeated if a grade less than 70% is obtained.

Note that individuals arriving in the Department after the required training session has occurred will be required to view the training sessions online. Access to the training material can be obtained from Rodney Gensell in WB 217. They will then be required to write and pass the examination pertaining to the training session. The online training is also available to those who do not pass the examination and further training is required.

Note that there are modules in the above training that are on-line EH&S training courses that require specific testing. A copy of EH&S training record/course grade must be retained as proof of completion of course(s). This must be attached to any Research (formerly Experimental) Registration Form when submitted.

### **3.1 Supplementary Training**

All persons required to attend CHE2222 must also, in subsequent years, participate in an annual safety training session. The purpose of these one hour sessions is to review WHMIS procedures, and to provide information about new safety policies and procedures implemented within the Department. These sessions are generally scheduled in September/October of each year. In accordance with University policy and Ministry of Labor regulations, attendance must be taken. Supervisors are ultimately responsible for ensuring that members of their group attend one of these sessions.

Individuals failing to attend WHMIS training sessions are subject to Departmental sanctions. Graduate students who miss these sessions will not be eligible for TA appointments, and will lose their research privileges and stipends until they have completed the training session. Late

participants must also take an examination related to the training session, and must achieve a minimum grade of 75%. The WHMIS session and quiz must be completed by December 15th, or stipends and TA appointments will be revoked effective January 1. Other postgraduate researchers who fail to attend the WHMIS training sessions may face the loss of research privileges and stipends until the training is completed.

Note that other types of training, beyond that listed in Table 1, may be required to safely conduct experimental work. Examples include specific training in the handling of radioisotopes, biohazards, safe handling of cryogenics, and training in the use and selection of respirators. For more information, please consult the Environmental Health and Safety website (<http://www.ehs.utoronto.ca/Training/training.htm>). A copy of EH&S training record/course grade must be retained as proof of completion of course(s). This must be attached to any Experimental Registration Form when submitted.

## 4. Registration of Research Work

### 4.1 Research Registration Forms

It is Department policy that **all research be registered** prior to commencing work on the project. **This policy applies to both experimental and computer research**, by undergraduate and graduate students, summer students, postgraduate researchers and research staff and visiting researchers. **If the research involves computer work exclusively, only the first few pages need to be completed.** Blank and sample forms are available from Rodney Gensell in WB217, and on the Department's website under Services & Safety – Health & Safety (<http://www.chem-eng.utoronto.ca/services/safety/ERFs.htm>).

It is important that supervisors ensure **all researchers** under their supervision register for proper safety training through the Health & Safety Committee (Leticia in WB217 - committee secretary) and that they indeed have a fully authorized Research Registration Form.

The form must be reviewed thoroughly by the researcher's supervisor, signed by the supervisor, and then submitted to the Health & Safety Committee (Rodney in WB217 - committee secretary) for review and proper authorization. The form will be returned to researcher and if it has any missing information or requires revisions, the form should be corrected and resubmitted for authorization immediately. **ONLY WHEN THE FORM HAS BEEN AUTHORIZED CAN LAB WORK BEGIN.**

Prior to a supervisor signing off on an Research Registration Form, the form must be properly reviewed by the supervisor. The supervisor should know full details of the experiment and should ensure all proper safety procedures are in place in case of off-gasing, potential flooding in the event of water recirculation line failure, etc. They must review these forms with the students in detail, including a site visit to the lab by the supervisor and student to check the equipment hazards involved in the experiment and ensure all possible hazardous issues are dealt with ahead of time. The supervisor should ensure that all sections of the form are completed in detail and that all supplementary training is completed (ie. biosafety, radiation, etc) and all permits required are attached (See section 4.2 below). **A copy of EH&S training record/course grade must be attached as proof of completion of course(s).** This must be attached to any Research Registration Form when submitted. Only once this is done should a supervisor sign the form.

Inspection of experimental apparatus prior to form being approved should be done by a H&S committee member when equipment involves toxic/noxious gases or chemicals, custom fabricated equipment, alterations to existing equipment, and/or water recirculation to ensure proper procedures are in place to avoid potential incidents/accident.

**Individuals failing to submit and have fully registered a Research Registration Form are subject to Departmental sanctions. Those who do not submit a form in a timely fashion will lose their research privileges and stipend/pay until they have submitted and had fully authorized the required form. Graduate students will not be eligible for TA appointments unless they have a valid Research Registration Form.**

Research Registration Forms are issued for a maximum of one year (until July 31st), but may simply be re-submitted for extension if the work is ongoing and has not changed. **If there is a substantive change in the chemicals and/or procedures used, a new form should be submitted.** Once a registration number has been assigned, and the form has been returned to you, it should be placed in the plastic holder attached to the door of your laboratory or, if your lab group is large, in a group binder. A note should be clearly visible on the door indicating the location of the Research Registration Forms for the group. If the permit applies to research conducted in more than one laboratory, place a note in the plastic holder attached to the door of each of the other labs clearly indicating the location of the Research Registration Form. Research Registration Forms are issued to individuals, and therefore, separate forms are required from each person doing research, even if the work is substantially the same.

Research Registration Forms **for 4th year thesis students must be submitted** to the Undergraduate Office **before work commences, or by the date designated by the Undergraduate Chair**, whichever comes first. The form will then be forwarded to the Health & Safety committee for authorization. The form will be returned to researcher and if it has any missing information or requires revisions, the student must address all changes and questions about their form, resubmit the form and have it authorized by Health & Safety committee **before work commences, or by the date designated by the Undergraduate Chair**, whichever comes first. **ONLY WHEN THE FORM HAS BEEN AUTHORIZED CAN LAB WORK BEGIN.**

Students that do not comply with this deadline will not receive credit for thesis work submitted (e.g., interim report, poster, oral presentation, final thesis) until such time that a form is submitted and approved. If an Research Registration Forms is submitted **after** a body of thesis work is submitted, **students will not receive credit for that work.** For example, if the Research Registration Forms was submitted November 1st, but the revisions were not submitted until January 30th, the student would not receive credit for either the interim report or the poster presentation. **If a student does not submit a form, or if the requested revisions are not submitted and authorized, the Department will not issue a grade for CHE489/499.**

#### **4.2 Special Forms and Permits**

Special permits are required whenever the following circumstances apply in your research:

- The work involves lasers, radioactive or biohazardous materials.
- The work involves a designated substance under the Occupational Health and Safety Act.
- The work involves experiments which must be left running overnight.

Work with **lasers and radioactive materials** require a special permit and special training from the University of Toronto Radiation Protection Authority (x84876).

Anyone working with **biohazards** or working in a lab containing biohazards should consult with their supervisor regarding proper training and to ensure their name is officially added to the

supervisor's Laboratory Biosafety Certificate through the University of Toronto Biosafety Committee (x83981).

Specific control measures must be in place before a permit to authorize the use of a designated substance will be issued. **Designated substances** permits may be obtained from Rodney Gensell in WB217, should be filled in and signed by the researcher and the supervisor, and then submitted along with the researcher's Research Registration Forms. See section 6.5 for a list of University and Department designated substances.

Permits for overnight operation of experiments may be obtained from Rodney in WB217, should be filled in and signed by the researcher and the supervisor, and then submitted along with the researcher's Research Registration Forms.

## 5. Material Safety Data Sheets

Material safety data sheets (MSDSs) may be obtained directly from suppliers, or via several sites on the internet. A good site to start with is that from Environmental Health and safety, <http://www.utoronto.ca/safety/info.htm>. It may be necessary to check several sites to find an MSDS with all of the necessary information, or to find the most up-to-date information. MSDSs can be stored as hard copies in a binder or as electronic copies on a designated computer. The location of the binder or computer must be noted on the lab door where other safety documents are kept (i.e. Research Registration Forms for lab occupants).

## 6. Department Policies

A number of Departmental policies have been developed dealing with health and safety. In this section, the details of these policies are described.

### 6.1 Accident/Incident/Near Misses Reports

Should an injury occur due to the incident/accident, an incident/accident report must be filed within 24 hours. More details on what report should be filled out as well as links to the online forms are given in the link below.

<http://www.ehs.utoronto.ca/resources/wcbproc.htm>

### Procedures to be followed in the case of an accident/incident (potential for accident or injury):

1. Should anyone become aware of what appears to be a chemical odour, please try to get in touch with a member of the Department's Health & Safety Committee so they can investigate immediately the source of the odour. The committee members are listed on page one of this document as well as on the Department website and the 2nd floor Safety bulletin board. Call 83000 if you cannot get in touch with a committee member. We cannot fix the problem if we are not told about it and investigate it at the time of the incident/accident. An accident/incident report should be submitted only once the source of the odour has been determined by either a Safety Committee member or the building engineer, and it is deemed to be a health hazard issue. The report should be submitted by the person causing the odour issue as per instructions below.
2. Should First Aid be required, most of the Safety Committee members are certified First Aiders.
3. Should an incident/accident occur to a **UofT employee(s)**, please be aware that the employee should not be submitting the employee accident/incident form themselves, but must sit with their supervisor to discuss the incident and the supervisor then fills out the form with the employee present to provide additional information as needed. This



ensures that the supervisor has been made fully aware of the incident/accident and can take appropriate action as needed. Should an injury have occurred due to the incident/accident, this report must be filed within 24 hours.

4. Should an incident or injury involve **students, contractors or other visitors (including visiting students conducting research)** occur, the accident/incident form for non-employees must be completed. In most cases, the student or visiting student/researcher must sit with their supervisor to discuss the incident and the supervisor then fills out the form with the employee present to provide additional information as needed. This ensures that the supervisor has been made fully aware of the incident/accident and can take appropriate action as needed.
5. The non-employee form may also be used to report incidents like near misses, where there was no injury, but the potential for injury existed.
6. Should an incident/accident occur to a **student in a classroom/teaching lab**, the incident/accident should be reported to the UofT professor or lecturer in charge of the class/lab and again, the student must sit with the professor/lecturer to discuss the incident and the professor/lecturer then fills out the form with the student present to provide additional information as needed. This ensures that the supervisor has been made fully aware of the incident/accident and can take appropriate action as needed.

All accidents/incident must also be reported within 24 hours after the accident/incident on the appropriate form to the Secretary of the Joint Occupational Health and Safety Committee, Leticia Gutierrez, room WB217.

## **6.2 Chemical Spills and Spill Kits**

Chemical spills usually represent the greatest exposure hazard a researcher may encounter. Spilled quantities may be large, and may occur outside normal laboratory controls (e.g. fumehoods). A swift and appropriate response is required to minimize the effects of a spill. All research personnel are expected to be fully cognizant of spill clean-up procedures, and must also be aware of reporting requirements for chemical spills and other incidents. We would like to emphasize that **individuals should not put themselves at risk** when performing a spill clean-up. Professionals should handle large spills or spills of highly toxic materials, since they have the appropriate respirators and other safety equipment for safe clean-up of the spill. Call Hazardous Chemical Control (x87000) to deal with major or dangerous spills.

Spills of lesser quantity or hazard should be handled by lab personnel, using solusorb for solvent spills, or baking soda for acid or base spills.

### **All laboratories are required to have spill kits, consisting of at least:**

- 500 g of Solusorb or other sorbent for clean-up of solvent spills
- 500g boxes of baking soda for acid or base spills
- Dustpan and brush

The Department maintains a supply of spill kits which are available at a cost recovery charge to the lab supervisor.

The specific procedures to follow in the event of a chemical spill are listed on the next page. A copy of this notice is posted within each laboratory.

### **Guidelines for Handling Chemical Spills:**

Large spills involving highly hazardous or flammable materials, which you cannot handle safely on your own, should be handled by the University's Hazardous Chemical Control Section. Call x87000 (or x82222 after hours) for assistance.

For all other spills, the following procedure should be followed:

1. Isolate and Ventilate the Area. Keep other persons away from the spill site.
2. Put on appropriate safety apparel. Use safety goggles, gloves, boots, and a lab coat, as required.
3. Liberally cover the spill with sorbant. Use Solusorb for solvent spills, and sodium bicarbonate (baking soda) for acids and bases.
4. Remove the solid residue. Sweep the residue into a heavy (6 mil) polyethylene bag, double bagging if necessary. Close the bag(s) with either a twist tie or a knot.
5. Affix an appropriate waste label. The labelled bag should be transferred to WB16F for final disposal.
6. File an incident report. An incident report **MUST** be filed with Leticia Gutierrez (WB217) for all spills requiring the use of a spill kit, particularly if the material is hazardous or flammable.
7. Perform final clean-up. You may wish to have one of the cleaning staff come in to mop up the floor.

**ALL SPILLS OCCURRING OUTSIDE A LABORATORY MUST BE REPORTED, REGARDLESS OF THE SIZE OF THE SPILL.**

Additional report forms are available from Rodney Gensell in WB217.

### **6.3 Biohazards**

The use of biohazardous materials requires special biohazard training and a lab biosafety certificate from the University of Toronto Biosafety Committee. The lab biosafety certificate is issued to the principal investigator responsible for the laboratory. Researchers disposing of potentially biohazardous substances must follow the University's waste control guidelines. Sharp biohazardous waste such as needles/syringes must be kept separately, within specially labelled yellow containers. The University policy on sharps and biohazards can be accessed via <http://www.ehs.utoronto.ca/resources/wmindex/wm5-1.htm>.

### **6.4 Radioisotopes**

The use of radiolabelled compounds falls under the jurisdiction of the Atomic Energy Control Board of Canada, and within the University, under the jurisdiction of the University of Toronto Radiation Protection Authority (UTRPA). UTRPA is responsible for issuing licenses to research supervisors for the use of radiolabelled materials. These licenses must be posted on the door of all laboratories where radioactive materials are used and stored. Specific requirements for the storage and inventory of radiolabelled compounds have also been developed. These are spelled out as conditions of the license, and are also communicated via training programs offered by UTRPA. Before individuals are permitted to handle radioactive substances, they must attend special training sessions offered by UTRPA. Researchers may be required to wear dosimeters or film badges to monitor their exposure to radioactive substances. The disposal of radioactive wastes is also handled via UTRPA and are outlined on the University's Environmental Health & Safety website at <http://www.ehs.utoronto.ca/resources/wmindex.htm>.

## 6.5 *Designated Substances*

The Ministry of Labor has designated certain substances as being particularly hazardous. To use these substances, listed below, a special written assessment must be completed, and a permit obtained.

- Acrylonitrile
- Benzene
- Lead
- Vinyl Chloride
- Arsenic
- Ethylene oxide
- Mercury
- Asbestos
- Isocyanates
- Silica

In addition, the Department has designated the following substances as hazardous, and requires that a permit be obtained before their use:

- Carbon disulfide
- Styrene
- Cadmium
- Carbon tetrachloride
- Hydrogen sulfide
- Formaldehyde
- Cyanide

## 6.6 *Chemical Waste Disposal*

Researchers are expected to abide by all federal, provincial, municipal, and University guidelines regarding the disposal of all wastes. The Department has adopted the following procedure for the handling and disposal of chemical wastes, in accordance with these guidelines. The basis of the procedure is improved labeling, with the objective of preventing the build-up of wastes or avoiding accidents due to combination of incompatible wastes.

1. A bottle label is required containing the name of the researcher, building, room #, phone #, and a list of chemicals and their % composition in the overall waste.
2. The waste label should also contain a serial number at the top of the label. The serial number on the bottle would be of a standard format, including the lab supervisor's initials, the room number, a single letter code which designates the class of wastes, and the number of the waste bottle. For example, BAS128-C4 would designate the 4th bottle of organic solids in B. A. Saville's laboratory, WB128.
3. When the waste container is 2/3 full or is more than 6 months old, it should be brought to WB16 using the freight elevator and the waste bottle should be in an approved bottle carrier.

Labels are available from Rodney Gensell in WB217, and from Phil Milczarek in WB16. More details on waste label requirements including classes of wastes are shown on the next page.

## Chemical Waste Disposal Bottle Label Information

Bottle Serial Number \_\_\_\_\_

Example of required serial number: BAS-128-E-2

**BAS:** supervisor's initials                      **128:** lab room number

**E:** category of waste (see below)              **2:** bottle number

### Classes of Waste:

<b>Aa:</b> Inorganic Acids	<b>Da:</b> Flammable Organic Liquids
<b>Ab:</b> Compounds which do not form gases when acidified	<b>Db:</b> Halogenated Solvents
<b>Ac:</b> Inert Inorganic Solids	<b>Dc:</b> Organic Acids
<b>Ba:</b> Organic and Inorganic Bases	<b>E:</b> Oxidizing Agents
<b>Bb:</b> Acid Reactive Compounds that form gases when acidified	<b>F:</b> Pesticides
<b>C:</b> Neutral Organic Solids	<b>X:</b> Specials (see list)

## 6.7 Inventory Requirements

The Occupational Health and Safety Act, under its WHMIS legislation, requires that an up-to-date inventory of all chemical and physical hazards be kept. Each year, research supervisors are required to submit an inventory of all chemicals and physical hazards (e.g. X-Rays).

Research supervisors have the option of completing this inventory themselves, or paying a Departmental representative to conduct the inventory for them. Completed inventory listings are to be returned to Leticia Gutierrez in WB217 on an annual basis by July 31<sup>st</sup>.

## 6.8 Chemical Storage and Transport

Researchers are required to safely transport and store all chemicals, including gas cylinders. Approved bottle carriers must be used when transporting chemicals, and carts must be used when transporting compressed gas cylinders. Gas cylinders must be transported with their caps securely fastened (i.e., no regulators!). Only the freight elevators may be used to transport chemicals and gas cylinders between floors of the building (the passenger elevator is not ventilated, and would provide an extreme danger in the event of a spill or leak).

In laboratories, chemicals must be properly segregated according to their chemical class. Avoid storing incompatible chemicals (e.g. flammables and oxidizing agents) in close proximity. Furthermore, it may be necessary to store flammable solvents in a special fire-resistant cabinet. This is particularly important if the materials are extremely volatile, have a low flash point or auto-ignition temperature, or if the required inventory is large (>23L).

It is good practice to avoid storing chemicals in fumehoods, since this tends to restrict air flow within the hood.

## 6.9 Protective Apparel

Researchers are required to use appropriate protective equipment and apparel when working in a laboratory. The following basic guidelines must be adhered to:

- **Contact lenses** are not recommended in any laboratory. If contact lenses must be worn, safety goggles must also be worn.
- **Safety eyewear** is required when working in labs. This may consist of safety glasses with sideshields, safety goggles, or a full face shield, depending upon the degree of hazard.

- **Lab coats** are highly recommended, but not required. Lab coats provide an excellent barrier (both in terms of safety and cleanliness) between you and your experiment.
- **Shorts/skirts/dresses** may not be worn in any chemical laboratory, as they provide no protection to your legs in the event of a chemical spill.
- **Open toed shoes or sandals** may not be worn in laboratories.
- **Roller blades** may not be worn in any University building.
- **Hard hats** are required in WB25/125, and in any other lab where there is the potential for objects falling from overhead.
- **Oven mitts/gloves** are required when handling extremely hot or extremely cold substances.
- **Special gloves** may be required when handling dangerous chemicals. Note that **the use of the incorrect type of gloves may increase the danger**; please check with a member of the safety committee for up-to-date guidelines regarding the types of gloves to be used. The Fisher and Revere-Seton catalogs provide a comprehensive list of glove types and their compatibility with a range of chemicals.
- **Hearing protection** may be necessary if working for extended times near noisy equipment (>80dBa).
- **Dust masks** may be required if working with small particulates, etc.
- **Respirators** may be necessary if working with asphyxiants or other substances which are hazardous if inhaled.

### 6.10 Emissions

We are required to adhere to Federal, Provincial, and Municipal bylaws regarding the emission of toxic substances. Furthermore, we wish to avoid adversely affecting our neighbors in the communities which surround us. While fumehoods are designed to carry away noxious substances, it is also appropriate to limit these emissions through the use of charcoal traps, scrubbers, and other containment devices. Exhaust emissions via the fumehoods should therefore have a negligible environmental impact. Please be cognizant of any toxic or odorous materials which may be emitted via the stacks, and take steps to limit their effect upon the surrounding residences and the environment.

### 6.11 Safety Materials Required in All Laboratories

Safety inspectors will be looking for the following information and safety equipment, which is required in all laboratories:

- Plastic holder (attached to the lab door) with up to date safety registration forms
- Up-to-Date Contact sheet affixed to the door listing room occupants, lab phone number, faculty supervisor and their contact information.
- Spill kits (contents listed in section 6.2)
- Binder of material safety data sheets (MSDSs), or computer containing electronic copies of MSDS for chemicals in laboratory inventory. Note should be placed in holder on door indicating location of binder or computer containing MSDS's.

The research supervisor is responsible for acquiring these materials, and ensuring they are readily available to staff and students under their supervision.

### 6.12 Smoking

In accordance with the City of Toronto's smoking by-laws, the University of Toronto has adopted a smoking policy that prohibits smoking in all University buildings and consequently, smoking is not permitted in the Wallberg building. When smoking outdoors, be aware of hazards outside of buildings, such as chemical storage areas, gas cylinders, and other areas where flammable materials may be stored.

### **6.13 Consumption of Food and Beverages**

To prevent accidental ingestion of hazardous chemicals, the **storage and/or consumption of food and beverages in laboratories is strictly prohibited**. Please use offices, or the undergraduate or graduate lounges for this purpose.

**Note that labs cannot be arbitrarily divided into a “lab area” and an “office area”. Only if there is a solid wall with a door is it deemed to be a proper partition. If there are chemicals present within the room, then entire room must be treated as a lab, even if it is primarily used as an office.**

### **6.14 The ‘Buddy’ System**

For personal safety and protection, researchers working outside normal University operating hours of Monday to Friday, from 8:00 am to 5:00 pm, whether in a lab or office area are expected to follow the buddy system.

The researcher and the “buddy”, who is also in the building, must agree to check in on each other at prescribed intervals. For relatively non-hazardous situations (e.g., computer simulations), telephone contact every 30 minutes is sufficient. If the work involves significant hazards (handling highly toxic or radioactive materials), the researcher and his/her buddy must be in the same laboratory.

When leaving the building, researchers are encouraged to make use of the Walksafer Program operated by the University of Toronto. Call 978-SAFE, and an escort will walk with you across campus to subway or bus stops.

**If experimental work involves hazardous materials, the buddy system should be used at all times when working in the lab.**

### **6.15 Personal Safety and Security**

The Wallberg building is situated in the downtown of a major city, and is not immune to theft, assaults, and other criminal acts. It is in everyone’s best interests to protect themselves and their (or their supervisor’s) possessions, since thefts are relatively common. Consequently, laboratory, office doors, common room doors and computer lab doors should be locked when unoccupied, especially after normal building hours (8:45am to 5:00pm).

**Furthermore, it is an offense and against the UofT Code of Conduct to intentionally tamper with any security device (e.g., by propping open a building entrance door or any interior door) and thereby endangering other occupants of the building and the building contents.**

When working in an office or lab, it is your decision whether or not you lock the door. A locked door may protect you from an intruder, but it may also prevent someone from entering the room to help you. You must exercise your judgement and weigh the risks accordingly.

Many laboratory doors have windows within them. **Under Department policy, these windows may not be obstructed in any way.** Doing so may prevent rescuers from determining who is inside the room and who needs help in the event of chemical spills, fires, accidents, etc.

### 6.15.1 Safety Phones

In addition to the phones in most offices and laboratories, there are several safety phones in the Wallberg building, for use in the event of an emergency. These safety phones are located at:

- Basement: Personnel elevator (WB22)
- 1st Floor: Personnel elevator (WB122)
- 2nd Floor: Personnel elevator (WB224)  
WB216 (computer room)  
WB259  
Graduate and Undergraduate common rooms (WB247 and WB238)  
Pay phone opposite WB227.
- 3rd Floor: Personnel elevator (WB325)  
WB316
- 4th Floor: Personnel elevator (WB419)

In the event of an emergency, campus security may be contacted at x82222. For non-emergency situations, phone x82323.

## 7. Health and Safety Committee

The safety committee in the Department of Chemical Engineering and Applied Chemistry is a sub-committee of the Occupational Health and Safety Committee within the Faculty of Applied Science and Engineering. The Faculty committee, which has membership from all engineering departments, ultimately reports to the Office of Environmental Health and Safety. Currently, Brad Saville is a member of the Faculty Committee. The members of the Chemical Engineering sub-committee are:

	<u>Room</u>	<u>Telephone</u>
Prof. B.A. Saville (Co-Chair-Certified Faculty)	340	87745
A. Dean (Co-Chair-Certified Worker)	125A	85623
R. Gensell (Secretary)	217	83063
D. Tomchyshyn	260	81144
G. Norval	216C	67507
P. Milczarek	16	85504
E. Susilawati	314	87988
R. DiLeo	333	84046
J. Farmer	201A	86561
2 Graduate Student Representatives		
Geoff Shirliff-Hinds, EH&S (215 Huron St, 7 <sup>th</sup> Floor)		84335

Feel free to contact any member of the safety committee if you have questions about safety issues, or if you require assistance.

## 8. First Aid

There are first aid boxes on each floor of the Wallberg building (within WB2, WB16, WB125A, WB207, WB214, WB307). In case of emergency, phone 82222 from any campus phone, or 911 from a Bell pay-phone.

Student Health Centre, 2<sup>nd</sup> Floor, 214 College Street (UofT Bookstore)

Department Certified First Aiders are:

### PERSONS HOLDING FIRST AID CERTIFICATES

Name	Room	Date Issued	Expiry Date	Assigned Location
Phil Milczarek	16	Aug. 2016	Aug. 2019	Basement
Ezzat Jaroudi	121/123	Feb. 2016	Feb. 2019	1st Floor
Alexander Dean	125	Feb 2018	Feb 2021	1st Floor
Amir Shafie	254	May 2016	May 2019	2nd Floor
Jennifer Farmer	201A	Dec 2016	Dec 2019	2nd Floor
Rodney Gensell	217	Jan 2017	Jan 2020	2st Floor
Endang (Susie) Susilawati	314	May 2015	May 2018	3rd Floor
Rosa DiLeo	333	Nov. 2015	Nov. 2018	3rd Floor
Fakhria Muhammad Razeq	301	Aug. 2015	Aug. 2018	3rd Floor
Andrei Starostine	413	Aug. 2015	Aug. 2018	4th Floor
Alexander Imbault	419	Feb. 2016	Feb. 2019	4th Floor



## **University of Toronto Safety Services**

The following is a list of committees and groups which provide safety services on campus. Please feel free to contact them should the need arise.

### **Office of Environmental Health and Safety**

215 Huron Street, 7<sup>th</sup> Floor  
978 4467

### **Biosafety Officer**

Office of Environmental Health and Safety  
215 Huron Street, 7<sup>th</sup> Floor  
978 3981

### **Chemical Waste Disposal**

Hazardous Chemical Control Section  
Office of Environmental Health and Safety  
978 7000

### **Fire Prevention**

215 Huron Street, 7<sup>th</sup> Floor  
978 5298

### **Indoor Air Quality**

Occupational Hygiene and Safety Section  
Office of Environmental Health and Safety  
978 8787

### **Laser Safety**

Occupational Hygiene and Safety Section  
Office of Environmental Health and Safety  
978 6846

### **Personal Safety**

Community Safety Officer  
978 1485

### **Radiation (Ionizing and Non-Ionizing)**

University of Toronto Radiation Protection Authority  
978 3265

### **Laboratory Safety**

Office of Environmental Health and Safety  
978 5943

### **Workers' Compensation**

Workers Compensation Coordinator  
Office of Environmental Health and Safety  
978 8804

## 9. Emergency Procedures

### A. Fire, Explosion

1. . Pull the nearest wall mounted fire alarm
2. . Phone 82222
3. . Evacuate the building immediately
  - Close the door behind you
  - Do not use elevators
  - Do not re-enter the building until authorized by Campus Police/Fire Officer

**NOTE:** You should NOT attempt to extinguish the fire, unless you can do so safely, using only ONE extinguisher

### B. Major Chemical Spill/Hazard

1. Evacuate the immediate area
2. Call Hazardous Chemical Control (local 87000) or 82222 after hours
  - identify, if possible, the chemical(s) involved, approximate quantity, location, and source
3. Wait in a safe area for the response team to arrive

### C. Medical Emergencies

1. Phone Campus Security at x82222
2. Keep the casualty still and comfortable
3. Control serious bleeding by applying direct pressure on the wound
4. While waiting for the emergency response team, obtain as much information as possible regarding the patient and/or circumstances

### D. Release of Radioactive or Biohazardous Material

1. Alert everyone in the area to prevent further spread of the contaminant
2. Confine the spill, if possible, with the appropriate adsorbent
3. Clear the area; remove all persons from the affected area
4. Contact 82222 (emergencies), 82374 (Radiation Protection), or 87000 (Hazardous Material Spills) and wait for assistance

### E. Personal Safety and Security

1. If a phone is accessible, phone Campus Security at 82222
2. If a phone is not accessible, pull the nearest fire alarm
3. If it is not possible to leave the scene, do your best to remain calm.

**NOTE:** A key element in personal safety and security is **prevention**:

- When working after hours or on weekends, the buddy system must be used. This implies VOICE CONTACT every 30 minutes; more often if circumstances warrant.
- Do not compromise building security by propping doors or windows open
- Be aware of your surroundings
- There is safety in groups; if venturing outside the building, escorts are available via the University Walksafer program
- Do not leave laboratories or offices unlocked while unattended